

File No: LTD/1518

January 2012

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

PUBLIC REPORT

AMPS/Acrylamide Copolymer, Ammonium Salt

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 Sustainability, Environment, Water, Population and Communities.

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	4
1. APPLICANT AND NOTIFICATION DETAILS	4
2. IDENTITY OF CHEMICAL	4
3. COMPOSITION.....	5
4. PHYSICAL AND CHEMICAL PROPERTIES.....	5
5. INTRODUCTION AND USE INFORMATION.....	6
6. HUMAN HEALTH IMPLICATIONS	6
7. ENVIRONMENTAL IMPLICATIONS	7
<u>APPENDIX A: PHYSICAL AND CHEMICAL PROPERTIES.....</u>	<u>10</u>
<u>APPENDIX C: ENVIRONMENTAL FATE AND ECOTOXICOLOGICAL INVESTIGATIONS.....</u>	<u>12</u>
<u>BIBLIOGRAPHY.....</u>	<u>16</u>

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
LTD/1518	Schlumberger Australia Pty Ltd	AMPS/Acrylamide Copolymer, Ammonium Salt	ND*	≤30 tonnes per annum	Mining and Metal Extraction

*ND = not determined

CONCLUSIONS AND REGULATORY OBLIGATIONS

Hazard classification

Based on the limited data available the notified polymer cannot be classified as hazardous according to 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 the assessed use pattern, the notified polymer is not considered to pose an unreasonable risk to the environment.

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 as introduced in powder form:
 - Dust masks

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 *Approved Criteria for Classifying Hazardous Substances* [NOHSC:1008(2004)] 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 to landfill.

Emergency procedures

- Spills 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 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(2) of the Act; if
 - the function or use of the polymer has changed from a component of cement used in offshore oil and gas operations, or is likely to change significantly;
 - the amount of polymer being introduced has increased from 30 tonnes per annum, 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 MSDS of products containing the notified polymer provided by the notifier were reviewed by NICNAS. The accuracy of the information on the MSDS remains the responsibility of the applicant.

ASSESSMENT DETAILS

1. APPLICANT AND NOTIFICATION DETAILS

APPLICANT(S)

Schlumberger Australia Pty Ltd (ABN 74 002 459 225)
Level 5, 256 St George's Terrace
PERTH WA 6000

NOTIFICATION CATEGORY

Limited: Synthetic polymer with $M_n \geq 1000$ 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, and import volume.

VARIATION OF DATA REQUIREMENTS (SECTION 24 OF THE ACT)

Variation to the schedule of data requirements is claimed as follows: adsorption/desorption.

NOTIFICATION IN OTHER COUNTRIES

Canada

2. IDENTITY OF CHEMICAL

MARKETING NAME(S)

UNIFLAC-L D168 (containing the notified polymer at $\leq 30\%$)

UNIFLAC-S D167 (notified polymer)

AMPS/acrylamide copolymer, ammonium salt (notified polymer)

MOLECULAR WEIGHT

Mn >10,000 Da.

ANALYTICAL DATA

Reference ^1H NMR, IR and UV-Vis spectra were provided.**3. COMPOSITION**

DEGREE OF PURITY >90%

LOSS OF MONOMERS, OTHER REACTANTS, ADDITIVES, IMPURITIES
None

DEGRADATION PRODUCTS

None

4. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE AT 20°C AND 101.3 kPa: white powder

Property	Value	Data Source/Justification
Melting Point	Decomposes at >200°C	Measured
Boiling Point	Decomposes at >200°C	Measured
Density	1,330 kg/m ³ at 20°C	Measured
Vapour Pressure	<1.47 x 10 ⁻⁶ kPa at 20°C	Measured
Water Solubility	> 1000 g/L at 20°C	Measured
Hydrolysis as a Function of pH	t _{1/2} > 1 year at 25°C	Measured
Partition Coefficient (n-octanol/water)	log Kow < 0 at 20°C	Measured
Adsorption/Desorption	Not determined	The notified polymer is expected to be mobile in soils based on its low log Kow and high water solubility
Dissociation Constant	Not determined	
Particle Size	Inhalable fraction (<100 µm): <76.5% Respirable fraction (<10 µm): <19.56% MMAD* = 50.43 µm	Measured
Flammability	Not highly flammable	Measured
Flammability in contact with water	Not highly flammable in contact with water	Estimated based on molecular weight and chemical structure
Autoignition Temperature	>400°C	Measured
Oxidizing Properties	Not predicted to have oxidizing properties	Estimated based on chemical structure
Pyrophoric Properties	Not predicted to have pyrophoric properties	Did not ignite in contact with air
Explosive Properties	Not predicted to be explosive	Estimated based on molecular weight and chemical structure

* MMAD = Mass Median Aerodynamic Diameter

DISCUSSION OF PROPERTIES

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

Dangerous Goods classification

Based on the submitted physical-chemical data in the above table the notified polymer is not classified according to the Australian Dangerous Goods Code (NTC, 2007). However the data above do not address all Dangerous Goods endpoints. Therefore consideration of all endpoints should be undertaken before a final decision on the Dangerous Goods classification is made by the introducer of polymer.

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 either be imported in powder form (at >90% concentration) or in a liquid dispersion (at ≤30% concentration).

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>	30	30	30	30	30

PORT OF ENTRY

Perth, Brisbane, Karratha, Darwin

IDENTITY OF MANUFACTURER/RECIPIENTS

Schlumberger Australia Pty Ltd

TRANSPORTATION AND PACKAGING

The notified polymer will be imported by sea in powder form (at >90% concentration) in 11.3 or 24.9 kg sacks. Alternatively, the notified polymer will be imported at ≤30% concentration as a component of a liquid dispersion in high density polyethylene containers of various sizes (1003, 208, 193, 30.2 or 18.9 L).

USE

The notified polymer will be used in cement applications in the oil and gas industry.

OPERATION DESCRIPTION

In powder form, workers will open sacks of the notified polymer and pour into an additive bottle. Once added to the additive bottle, the notified polymer will be transferred via a closed, automated system to a weigh batch blender and a specified quantity will be transferred to a pressurised tank where it will be mixed with other cement components. The cement mix will then be transferred to a silo for storage before being added to a bulk cement truck for transportation to the end use site.

End use

The bulk cement truck will transport the cement mix containing the notified polymer to the drill hole where water and other additives will be blended with the cement mix in an open mixing bowl. (If the notified polymer is imported in a liquid dispersion (UNIFLAC-L D168), then drums will be opened and poured into the mixing bowl). The resultant cement slurry will be circulated to achieve the desired density. The cement slurry will be pumped to the well head and downhole where the cement will set.

6. HUMAN HEALTH IMPLICATIONS

6.1. Exposure Assessment

6.1.1. Occupational Exposure

EXPOSURE DETAILS

The notified polymer will be introduced in powder form (at >90%) or in a liquid dispersion (at ≤30%).

Transport and storage of the notified polymer is not expected to lead to exposure except in the case of an accident involving spillage.

Opening of sacks containing the notified polymer and pouring into an additive bottle or mixing bowl by workers is expected to lead to inhalation, dermal and ocular exposure. It is expected that workers will wear

masks to minimise inhalation exposure during the opening and pouring of sacks of the notified polymer in powder form.

Once the notified polymer (either at >90% in powder form or ≤30% in a liquid dispersion) has been added into the additive or mixing bowl, workers may be exposed to occasional drips, spills and splashes during mixing and pumping to the drill hole as well as during cleaning of equipment. However, the use of personal protective equipment (PPE) such as gloves, safety goggles and long-sleeved clothing is expected during each of these activities to minimise dermal and ocular exposure.

6.1.2. Public Exposure

The notified polymer is intended for industrial use on specific sites and therefore public exposure is not anticipated.

6.2. Human Health Effects Assessment

No toxicity data were submitted.

Toxicokinetics, metabolism and distribution

The notified polymer is not expected to be absorbed across biological membranes, based on the high molecular weight (>10,000 Da) and low percentage of low molecular weight species (<1,000 Da).

Irritation and Sensitisation

The notified polymer contains a sulfonate functional group which is a structural alert for corrosion (Hulzebos et al., 2005). However, given the high molecular weight and the lack of low molecular weight (<1,000 Da) species, the potential for corrosion is not expected to be of concern.

Health hazard classification

Based on the limited data available the notified polymer cannot be classified as hazardous according to the *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 2004).

6.3. Human Health Risk Characterisation

6.3.1. Occupational Health and Safety

The main risk to workers is expected to be inhalation of the notified polymer in powder form during addition to an additive bottle or mixing bowl. The notified polymer contains <1% particles in the inhalable (<100 µm) and <1% particles in the respirable (<10 µm) range. Inhalation exposure to high molecular weight water-insoluble polymers with respirable and inhalable particles has been linked to overloading of the lung clearance mechanism (US EPA, 2010). The notified polymer is water-absorbing but water soluble and is therefore expected to clear from the respiratory tract and not cause lung overloading. The potential for lung overloading would be minimised further by the use of PPE such as dust masks.

Given the expected low potential hazard, the proposed use pattern and the proposed use of PPE, the risk to workers of the notified polymer is not considered to be unreasonable.

6.3.2. Public Health

The notified polymer is intended for use in industrial settings (cementing applications in offshore oil and gas wells) by trained workers. Therefore, public exposure to the notified polymer is not expected and the risk to public health from the notified polymer 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 either be imported as a solid powder or in a liquid formulation and will not be manufactured in Australia. Therefore, release of the notified polymer to the environment is only possible in the unlikely event of an accident.

RELEASE OF CHEMICAL FROM USE

The notified polymer will be used in cementing applications in offshore oil and gas wells. It will be added to mix water which will be mixed with cement, to give a notified polymer concentration of 2.5% in cement. After drilling each hole section, cement containing the notified polymer is pumped down the casing (steel pipe that is slightly smaller than the bore hole) and up the annulus formed between the casing and the well bore. During this process some excess cement may be displaced into the water column and onto the seabed.

This cement may remain liquid for several hours, during which time the release of chemicals into the ambient waters is considered negligible. After the cement has hardened the chemical components of the cement are locked in the inert cement matrix (CHARM 2004).

During drilling of the subsequent sections, a small amount of solid cement will be drilled out from the top of each interval and this material will be commingled with the drill cuttings. Small amounts of cement mixture may be discharged with the drilling cuttings and during cleaning of the cementing equipment. Release to seawater may occur due to discharges from left-overs of mix-water and from cleaning of the equipment (estimated to be < 0.38% of notified polymer).

RELEASE OF CHEMICAL FROM DISPOSAL

The cement containing the notified polymer will remain in deep zones of the ocean and is not expected to be returned to the surface.

7.1.2. Environmental Fate

The notified polymer is potentially biodegradable in seawater according to the provided study report.

Based on the reported use pattern, most of the notified polymer will be bound into the matrix of hardened cement and not expected to be bioavailable nor mobile. The notified polymer is expected to remain at the bottom of the ocean in concrete or be disposed of to landfill. In both cases it is expected to eventually degrade via abiotic and biotic pathways, forming water and oxides of carbon, nitrogen and sulfur and inorganic salts.

For the details of the environmental fate study refer to Appendix C.

7.1.3. Predicted Environmental Concentration (PEC)

The PEC was not calculated as very limited aquatic exposure is expected based on the reported use pattern.

7.2. Environmental Effects Assessment

The results from ecotoxicological investigations conducted on the notified polymer 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>
Marine Fish Toxicity	LL50 > 552 mg/L (WAF)	Not Harmful up to the limit of its solubility in seawater
Marine Invertebrate Toxicity	EL50 = 625 mg/L (WAF)	Not Harmful up to the limit of its solubility in seawater
Marine Algal Toxicity	E _r L50 = 590 mg/L(WAF) NOEL = 316.2 mg/L (WAF)	Not Harmful up to the limit of its solubility in seawater
Sediment Reworker Toxicity	LC50 = 6500 mg/kg dry sediment	Not Harmful

The notified polymer is not harmful to aquatic organisms up to its limit of solubility in seawater. Under the Globally Harmonised System of Classification and Labelling of Chemicals (GHS; United Nations, 2009) the notified polymer is classified as not harmful to marine fish, aquatic invertebrates or algae. Based on the acute toxicity to aquatic biota the notified polymer is not classified for acute toxicity or long term hazard under the GHS.

7.2.1. Predicted No-Effect Concentration

The lowest endpoint from ecotoxicological studies on the notified polymer was used to calculate the PNEC. An assessment factor of 100 was used as acute toxicity endpoints are available for the effects of the notified polymer on aquatic species from three trophic levels.

EL50 (algae, 72 h)	590	mg/L
Assessment Factor	100	
PNEC:	5.90	mg/L

7.3. Environmental Risk Assessment

The Risk Quotient, Q ($= PEC/PNEC$), has not been calculated since no significant release to the aquatic compartment is expected. The notified polymer did not exhibit toxic effects to species from three marine trophic levels, nor to a marine benthic species. The majority of notified polymer is expected to be bound in a cement matrix and hence release of the notified polymer to aquatic ecosystems is not expected from the proposed use pattern. Based on the assessed use pattern, the notified polymer is not expected to pose an unreasonable risk to the environment.

APPENDIX A: PHYSICAL AND CHEMICAL PROPERTIES

Melting Point/Freezing Point Decomposes at >200°C

Method OECD TG 102 Melting Point/Melting Range.
EC Directive 92/69/EEC A.1 Melting/Freezing Temperature.
Remarks Determined by differential scanning calorimetry
Test Facility NOTOX B.V. (2010)

Boiling Point Decomposes at >200°C

Method OECD TG 103 Boiling Point.
EC Directive 92/69/EEC A.2 Boiling Temperature.
Remarks Determined by differential scanning calorimetry
Test Facility NOTOX B.V. (2010)

Density 1,330 kg/m³ at 20°C

Method OECD TG 109 Density of Liquids and Solids.
EC Directive 92/69/EEC A.3 Relative Density.
Remarks Determined by pycnometer
Test Facility NOTOX B.V. (2010)

Vapour Pressure <1.47 x 10⁻⁶ kPa at 20°C

Method OECD TG 104 Vapour Pressure.
EC Directive 92/69/EEC A.4 Vapour Pressure.
Remarks Determined by the isothermal thermogravimetric method
Test Facility NOTOX B.V. (2010)

Water Solubility > 1000 g/L at 20°C

Method OECD TG 105 Water Solubility.
EC Directive 92/69/EEC A.6 Water Solubility.
Remarks The notified polymer was mixed with double distilled water at a nominal concentration of 1028.8 g/L at 20.3°C for 21 hours. After mixing the test sample appeared to be a gel without any solid particles observed. The pH of the formed gel could not be measured.
Test Facility NOTOX B.V. (2010)

Hydrolysis as a Function of pH

Method OECD TG 111 Hydrolysis as a Function of pH.
EC Directive 92/69/EEC C.7 Degradation: Abiotic Degradation: Hydrolysis as a Function of pH.

<i>pH</i>	<i>T</i> (°C)	<i>t</i> _½
4	25	> 1 year
7	25	> 1 year
9	25	> 1 year

Remarks Less than 10% hydrolysis was observed after 5 days at 50°C at pH 4, 7, and 9. Therefore, the test material is considered stable with a half life > 1 year at 25°C.
Test Facility NOTOX B.V. (2010)

Partition Coefficient (n-octanol/water) log K_{ow} at 20°C < 0

Method Based on OECD TG 117 Partition Coefficient (n-octanol/water)
Remarks HPLC Method. Two peaks were detected and the retention time of the first peak was < t₀ and hence no log K_{ow} could be calculated (i.e. log K_{ow} < 0). For the second peak, log

Test Facility Kow values ranged from -2.45 to -1.39.
Chemex International plc (1998a)

Particle Size MMAD* = 50.43 μm

Method OECD TG 110 Particle Size Distribution/Fibre Length and Diameter Distributions.

<i>Size (μm)</i>	<i>Mass (%)</i>
<10	<19.56
<100	<76.5

* mass median aerodynamic diameter

Remarks Laser diffraction particle size analyser
Test Facility Chilworth Technology Limited (2010)

Flammability Not highly flammable

Method EC Directive 92/69/EEC A.10 Flammability (Solids).
Test Facility NOTOX B.V. (2010)

Autoignition Temperature >400°C

Method EC Directive 92/69/EEC A.16 Relative Self-Ignition Temperature for Solids.
Remarks No exotherms were observed at up to 400°C
Test Facility NOTOX B.V. (2010)

APPENDIX C: ENVIRONMENTAL FATE AND ECOTOXICOLOGICAL INVESTIGATIONS

C.1.1. Biodegradability in seawater

TEST SUBSTANCE	Notified polymer (10% solution in water)
METHOD	OECD TG 306 Biodegradability in Seawater; Closed Bottle Method
Inoculum	No inoculum was added
Exposure Period	28 days
Auxiliary Solvent	None
Analytical Monitoring	Dissolved oxygen by polarographic electrode
Remarks – Method	The test substance was added to nutrient-fortified seawater at 4.0 mg/L. Oxygen consumption over a 28-day period was followed. Biodegradation was expressed as a percentage of its ThOD (% BOD). Test temperature was $20 \pm 1^\circ\text{C}$. An inhibition test was performed in parallel.

RESULTS

<i>Test substance</i>		<i>Sodium benzoate</i>	
<i>Day</i>	<i>% Degradation</i>	<i>Day</i>	<i>% Degradation</i>
7	18	7	75
13	8	13	89
21	37	21	92
28	67	28	100

Remarks – Results All validity criteria were satisfied. The reference substance (sodium benzoate) degraded >50% by day 7 indicating the suitability of the seawater. The inhibition test indicated the test substance is classed as inhibitory at the test concentration used. Based on the test results, the test substance has potential for biodegradation in the marine environment.

CONCLUSION The notified polymer is potentially biodegradable in the marine environment

TEST FACILITY Clariant Oil Services (2007)

C.2. Ecotoxicological Investigations

C.2.1. Acute toxicity to fish

TEST SUBSTANCE	Notified polymer
METHOD	OECD TG 203 Fish, Acute Toxicity Test - Semi-static; modified to marine conditions
Species	OSPAR / PARCOM Protocols on Methods for the Testing of Chemicals Used in the Offshore Industry 1995 <i>Scophthalmus maximus</i> (Turbot)
Exposure Period	96 hours
Auxiliary Solvent	None
Water Hardness	Not reported
Analytical Monitoring	None
Remarks – Method	A limit test was conducted at a test substance concentration of 552.1 mg/L. A Water Accommodated Fraction (WAF) containing the test substance was prepared in artificial seawater. The solution was spun overnight and following a 4 h settling period, 10 L was siphoned from the vessel to be used as the test volume. Replacement of test and control media after 48 h. Test conditions in the control and test group: dissolved

O₂ 92.1–100.0% of air saturation value, pH 8.18–8.49, temperature 14.0–15.5°C, salinity 35.0–36.0 ‰.

RESULTS

Nominal Concentration mg/L	Number of Fish	Mortality				
		0 h	24 h	48 h	72 h	96 h
0	7	0	0	0	0	0
552.1	7	0	0	0	0	0

EL50 >552.1 mg/L at 96 hours (based on loading rate, WAF)
 NOEL ≥552.1 mg/L at 96 hours (based on loading rate, WAF)
 Remarks – Results Following the spinning and settling period, at both 0 and 48 hours, it was noted that there was undissolved sample present at the bottom of the WAF. No mortalities were observed in the control or test group.

CONCLUSION The notified polymer is not harmful to marine fish up to the limit of its solubility in artificial seawater

TEST FACILITY STL Runcorn (2006)

C.2.2. Acute toxicity to aquatic invertebrates

TEST SUBSTANCE Notified polymer

METHOD Water Quality : Determination of acute lethal toxicity to marine copepods (*Copepoda*, *Crustacea*), representing UK proposal to ISO TC147/SC5/WG2.

OSPAR / PARCOM Protocols on Methods for the Testing of Chemicals Used in the Offshore Industry 1995.

Species *Acartia tonsa* (marine crustacean)

Exposure Period 48 hours

Auxiliary Solvent None reported

Water Hardness Not reported

Analytical Monitoring None

Remarks - Method Following range finding studies a definitive test was performed at nominal concentrations in the range 251–3981 mg/L. Water Accommodated Fractions (WAFs) of the test substance were shaken vigorously and allowed to stand for 1 hour. A reference control was run in parallel with 3,5 dichlorophenol. Test conditions in the control and the 1995 mg/L test group: dissolved O₂ 93–96% of air saturation value, pH 7.7–8.1, temperature 19.8–20.4°C, salinity 38 ‰.

RESULTS

Nominal Concentration mg/L	Number of <i>A. Tonsa</i>	Cumulative Number Immobilised	
		24 h	48 h
0	20	0	1
251	20	0	3
501	20	1	4
1000	20	5	13
1995	20	20	20
3981	20	20	20

LL50 625 mg/L at 48 h (based on loading rate, WAF)

NOEL Not determined

Remarks - Results In the reference control, 45% mortality was observed indicating an acceptable level of sensitivity of test organisms. A NOEL could not be determined at 48 h due to mortality in the lowest test concentration.

CONCLUSION The notified polymer is not harmful to marine invertebrates up to the limit of its solubility in seawater

TEST FACILITY Chemex International plc (1998b)

C.2.3. Algal growth inhibition test

TEST SUBSTANCE Notified polymer

METHOD OECD 201 Algal growth Inhibition test – Static test

ISO 10253 (1998): Water Quality-Marine growth inhibition test with *Skeletonema costatum* and *Phaeodactylum tricornutum*
Skeletonema costatum
 Species
 Exposure Period 72 hours
 Concentration Range 56.2, 100.0, 177.8, 316.2, 562.3 and 1000 mg/L (WAFs)
 Auxiliary Solvent None reported
 Water Hardness Not reported
 Analytical Monitoring Not conducted
 Remarks - Method Following a range finding study a definitive test was performed. Water Accommodated Fractions (WAFs) of the test substance were prepared over the range 56.2–1000 mg/L in an enriched seawater medium (Guillard's f/2 medium + Si). After a spinning and settling period the clear central portion of each was siphoned and used as the test concentration. It was noted that the WAF was clear. Test conditions were pH 8.2–8.8, temperature 20°C, continuous white light at 6000–10000 lux.

RESULTS

<i>E_r</i> L50 mg/L at 72 h	NOEL mg/L at 72 h
590.3 (based on loading rate, WAF) (95% C.I. 415.5–838.6)	316.2 (based on loading rate, WAF)

Remarks - Results No unusual cell growth or deformity was observed at any test concentration. Negative inhibition was observed at test concentrations of 56.2, 100.0 and 177.8 mg/L after 72 h.

CONCLUSION The notified polymer is not harmful to marine algae up to its limit of its solubility in seawater

TEST FACILITY STL Runcorn (2007)

C.2.3. Acute toxicity to the sediment reworker *Corophium volutator*

TEST SUBSTANCE Notified polymer

METHOD PARCOM 1994: A sediment bioassay using an amphipod *Corophium sp.*

PARCOM 1995 Protocols on Methods for the testing of Chemicals used in the offshore Oil Industry

SPECIES *Corophium volutator*

EXPOSURE PERIOD 10 days

Remarks – Method Following a range finding a study a definitive test was performed under static conditions with test substance concentrations of 631, 1259, 2512, 5012 and 10000 mg/kg wet sediment. Test sediments were prepared by addition of test substance to dry sediment which was mixed vigorously before the addition to wet sediment and seawater. Test conditions: pH

7.8–8.0, dissolved oxygen 94–98% ASV, temperature 12.8–15.0°C, salinity 37–42 ‰.

RESULTS

<i>Nominal concentration mg/kg</i>			
<i>Wet sediment</i>	<i>Dry sediment</i>	<i>Number of C. Volutator</i>	<i>Mortality at 10 days</i>
Control	Control	20	0
631	747	20	0
1259	1490	20	0
2512	2973	20	0
5012	5933	20	17
10000	11837	20	20

Remarks – Results

No mortalities were observed in the control. The LC50 at 10 days was determined to be 6500 mg/kg dry sediment (95% C.I. 5500–7700 mg/kg dry sediment). The NOEC was determined to be 2973 mg/kg dry sediment

CONCLUSION

The notified polymer is not harmful to *Corophium volutator*

TEST FACILITY

Chemex International plc (1998c)

BIBLIOGRAPHY

- CHARM (2004), Thatcher M, Robson, Henrriquez L.R., Karman C.C., (Version 1.4,) A User Guide for the Evaluation of Chemicals used and Discharged Offshore
- Chemex International Plc (1998a) The Bioaccumulation Potential of the Notified Polymer. Reference: ENV1474/109705. Schlumberger report no. 1092DS. Bedfordshire, UK. 23 February 1998 (Unpublished report provided by notifier)
- Chemex International Plc (1998b) The Toxicity to *Acartia tonsa* of the Notified Polymer. Reference: ENV1471/109705. Schlumberger report no. 1044DS. Bedfordshire, UK. 30 January 1998 (Unpublished report provided by notifier)
- Chemex International Plc (1998c) The Toxicity to *Corphium volutator* of the Notified Polymer. Reference: ENV1472/109705. Schlumberger report no. 1045DS. Bedfordshire, UK. 4 February 1998 (Unpublished report provided by notifier)
- Chilworth Technology Limited (2010) Particle Size Analysis on a Sample of AMPS/acrylamide copolymer, ammonium salt. Report Number GLP104522R1V1/10. Southampton, UK. 2 September 2010 (Unpublished report provided by notifier)
- Clariant Oil Services (2006) An Assessment of the Aerobic Biodegradability in Seawater (28 days) of the Notified Polymer. Study Ref. no. 60843.fra/2146/biodeg. Bergen, Norway. 2 January 2007 (Unpublished report provided by notifier)
- Hulzebos, E., Walker, J.D., Gerner, I. and Schlegel, K. (2005) Use of structural alerts to develop rules for identifying chemical substances with skin irritation or skin corrosion potential. QSAR Combinatorial Science. 24:332-342
- NOHSC (1994) National Code of Practice for the Labelling of Workplace Substances [NOHSC:2012(1994)]. National Occupational Health and Safety Commission, Canberra, Australian Government Publishing Service.
- NOHSC (2003) National Code of Practice for the Preparation of Material Safety Data Sheets, 2nd edition [NOHSC:2011(2003)]. National Occupational Health and Safety Commission, Canberra, Australian Government Publishing Service.
- NOHSC (2004) Approved Criteria for Classifying Hazardous Substances, 3rd edition [NOHSC:1008(2004)]. National Occupational Health and Safety Commission, Canberra, AusInfo.
- NOTOX B.V. (2010) Determination of Physico-Chemical Properties of AMPS/Acrylamide Copolymer, Ammonium Salt. NOTOX Project 493527. 's-Hertogenbosch, The Netherlands. 30 August 2010 (Unpublished report provided by notifier)
- NTC (National Transport Commission) 2007 Australian Code for the Transport of Dangerous Goods by Road and Rail (ADG code), 7th Edition, Commonwealth of Australia
- STL Runcorn (2006) The Acute Toxicity of Aliphatic Amide Polymer R1231 to the Juvenile Turbot *Scophthalmus maximus*. Study no. STL064090, Schlumberger report no. 2145 DS. Cheshire, UK. 30 November 2006 (Unpublished report provided by notifier)
- STL Runcorn (2007) The Acute Toxicity of the Notified Polymer to the Marine Alga *Skeletonema costatum*, Study no. STL064091, Schlumberger report no. 2194 DS. Cheshire, UK. 12 July 2007 (Unpublished report provided by notifier)
- 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 (2010) High Molecular Weight Polymers in the New Chemicals Program. Available online [12 January 2012]: <http://www.epa.gov/oppt/newchemicals/pubs/hmwtpoly.htm>