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

PUBLIC REPORT

Polymer in Arkomon V1002

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 and Energy.

This Public Report is 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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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/2068	Clariant (Australia) Pty Ltd	Polymer in Arkomon V1002	No	≤ 300 tonnes per annum	Component of explosives

CONCLUSIONS AND REGULATORY OBLIGATIONS

Hazard Classification

Based on the available information, the notified polymer is not recommended for classification according to the *Globally Harmonised System of Classification and Labelling of Chemicals (GHS)*, as adopted for industrial chemicals in Australia.

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 PEC/PNEC ratio, the notified polymer is not considered to pose an unreasonable risk to the environment.

Recommendations

REGULATORY CONTROLS

Occupational Health and Safety

- A person conducting a business or undertaking at a workplace should implement the following safe work practices to minimise occupational exposure during manufacture of the notified polymer and explosive emulsions containing it:
 - Avoid skin and eye contact
- A copy of the SDS should be easily accessible to employees.

Disposal

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

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 1,000 g/mol;or
- (2) Under Section 64(2) of the Act; if
 - the function or use of the polymer has changed from a component of explosives, or is likely to change significantly;
 - the amount of polymer being introduced has increased, or is likely to increase, significantly;
 - the method of manufacture of the polymer in Australia has changed, or is likely to change, in a way that may result in an increased risk of an adverse effect of the polymer on occupational health and safety, public health, or the environment;
 - 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.

Safety Data Sheet

The SDS of the notified polymer provided by the notifier was reviewed by NICNAS. The accuracy of the information on the SDS remains the responsibility of the applicant.

ASSESSMENT DETAILS

1. APPLICANT AND NOTIFICATION DETAILS

APPLICANT

Clariant (Australia) Pty Ltd (ABN: 30 069 435 552)
Level 3, Olympus Building, 3 Acacia Place
296-324 Ferntree Gully Road
NOTTING HILL VIC 3168

NOTIFICATION CATEGORY

Limited: Synthetic polymer with $M_n \geq 1,000$ g/mol

EXEMPT INFORMATION (SECTION 75 OF THE ACT)

Data items and details exempt from publication include: 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, manufacture volume, site of manufacture and identity of manufacturer.

VARIATION OF DATA REQUIREMENTS (SECTION 24 OF THE ACT)

Schedule data requirements are varied for all physico-chemical endpoints except for water solubility.

PREVIOUS NOTIFICATION IN AUSTRALIA BY APPLICANT

None

NOTIFICATION IN OTHER COUNTRIES

None

2. IDENTITY OF CHEMICAL

MARKETING NAME

Arkomon V1002 (product containing the notified polymer at < 65% concentration)

MOLECULAR WEIGHT

Number average molecular weight (M_n) is > 1,000 g/mol.

ANALYTICAL DATA

Reference FTIR spectra was provided.

3. COMPOSITION

DEGREE OF PURITY

> 80%

4. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE AT 20 °C AND 101.3 kPa: Dark brown viscous liquid*

<i>Property</i>	<i>Value</i>	<i>Data Source/Justification</i>
Melting Point	< 0 °C	SDS*
Boiling Point	Not determined	Expected to decompose prior to boiling
Density	900 - 930 kg/m ³	SDS*
Vapour Pressure	Not determined	Expected to be very low based on its high molecular weight
Water Solubility	1.2%	Measured
Hydrolysis as a Function of pH	Not determined	Contains groups which have the potential to undergo hydrolysis
Partition Coefficient (n-octanol/water)	Not determined	The notified polymer is an emulsifier and contains both hydrophobic and hydrophilic functionalities
Adsorption/Desorption	Not determined	Contains both hydrophobic and hydrophilic

<i>Property</i>	<i>Value</i>	<i>Data Source/Justification</i>
Flash Point	~ 200 °C	functionalities SDS*
Flammability	Not determined	Not expected to be flammable
Autoignition Temperature	Not determined	Not expected to auto-ignite under normal use conditions
Explosive Properties	Not determined	Contains no functional groups that would imply explosive properties
Oxidising Properties	Not determined	Contains no functional groups that would imply oxidising properties

*For the product containing the notified polymer at < 65% concentration in mineral oil

DISCUSSION OF PROPERTIES

For full details of water solubility test, 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 cannot be classified according to the *Globally Harmonised System of 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 be manufactured in Australia at < 65% concentration in mineral oil.

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>	≤ 300	≤ 300	≤ 300	≤ 300	≤ 300

TRANSPORTATION AND PACKAGING

The notified polymer at < 65% concentration in mineral oil will be transported to customers by road and rail in 1,000 L intermediate bulk containers (IBCs).

USE

The notified polymer will be used as an emulsifier at < 2% concentration in the manufacture of ammonium nitrate explosive emulsions for construction and mining operations.

OPERATION DESCRIPTION

The notified polymer will be manufactured and used in the manufacture of ammonium nitrate explosive emulsions in Australia.

Manufacture of the notified polymer

The notified polymer will be manufactured in mineral oil using an enclosed and automated eight-tonne reactor. Raw materials will be weighed and pumped directly from original packaging into the reaction vessel. Once the reaction is complete and passed quality assurance, the resulting product (containing the notified polymer at < 65% concentration) will be pumped from the reaction vessel through fixed piping to the holding and packaging area.

Following manufacture, the notified polymer at < 65% concentration in mineral oil will be transported by road and rail to customer sites in 1,000 L intermediate bulk containers (IBC) for the manufacture of ammonium nitrate explosive emulsions.

Manufacture of ammonium nitrate explosive emulsions

The notified polymer at < 65% concentration will be pumped directly from the IBC to a mixing tank where it will be blended with other raw materials (diesel fuel and mineral oil) to produce the “fuel phase” mixture. The

concentration of the notified polymer in the fuel phase mixture will be 20-30%. The reformulation process is expected to be fully automated and performed under controlled conditions.

The fuel phase will be dispensed from the mixing vessel via hard-piping into the emulsion plant where it will be mixed with an ammonium nitrate melt to produce a bulk emulsion. The bulk emulsion containing the notified polymer at < 2% concentration will be transferred to specialised trucks for delivery to the quarry or mine site.

End-use

At the end-use site, the bulk ammonium nitrate emulsion product containing the notified polymer at < 2% concentration will be added directly from tanker trucks to drilled blast holes using a hose. The bulk emulsion will then be detonated as required by the quarry or mine site.

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>
<i>Polymer manufacture</i>		
Transport and storage	1	30-40
Plant operators	8-10	30-40
Quality assurance/laboratory workers	8-10	30-40
Maintenance workers	6-12	10-20
<i>Explosive manufacture</i>		
Transport and storage	10-20	200
Plant operators	8-12	200
Onsite explosive technicians	4-8	200

EXPOSURE DETAILS

Transport and storage

Transport and storage workers are not expected to be exposed to the notified polymer except in the unlikely event of an accident.

Manufacture of the notified polymer

The notified polymer will be manufactured and dispensed into IBCs using largely enclosed and automated processes; therefore exposure to the notified polymer is expected to be negligible. Dermal and ocular exposure to the notified polymer at < 65% concentration may occur during connection and disconnection of transfer lines, quality control testing, and equipment cleaning/maintenance. Inhalation exposure is not expected given the expected low vapour pressure of the notified polymer. According to the notifier, exposure to the notified polymer is expected to be minimised by the use of personal protective equipment (PPE) including goggles, impermeable gloves and coveralls.

Manufacture of ammonium nitrate explosive emulsions

The ammonium nitrate explosive emulsions will be manufactured using largely enclosed and automated processes; therefore exposure to the notified polymer is expected to be negligible. Dermal and ocular exposure to the notified polymer at < 65% concentration may occur during connection and disconnection of transfer lines and equipment cleaning/maintenance. Inhalation exposure is not expected given the expected low vapour pressure of the notified polymer. Exposure to the notified polymer is expected to be minimised by the use of PPE including goggles, impermeable gloves and coveralls, as stated by the notifier.

End-use

Dermal and ocular exposure to the notified polymer at < 2% concentration may occur during transfer of the ammonium nitrate explosive emulsions to the blast holes when connecting and disconnecting transfer hoses. Inhalation exposure is not expected given the expected low vapour pressure of the notified polymer. Exposure to the notified polymer is expected to be minimised by the use of PPE including goggles, impermeable gloves and coveralls, as stated by the notifier.

6.1.2. Public Exposure

The notified polymer and products containing it will not be made available to the public; therefore no public exposure is expected to occur.

6.2. Human Health Effects Assessment

The results from toxicological investigations conducted on an analogue polymer at 70% concentration in mineral oil are summarised in the following table. For full details of the studies, refer to Appendix B.

<i>Endpoint</i>	<i>Result and Assessment Conclusion</i>
Acute oral toxicity – rat	LD50 > 2,000 mg/kg bw; low toxicity
Skin irritation – rabbit	slightly irritating
Eye irritation – rabbit	slightly irritating

Toxicokinetics

Given the high molecular weight (> 1,000 g/mol), low percentage (~5%) of low molecular weight species < 500 g/mol and low water solubility (1.2% at 30 °C), absorption across biological membranes is expected to be limited.

Acute toxicity

No acute toxicity studies were submitted of the notified polymer. An analogue polymer at 70% concentration in mineral oil was found to be of low acute oral toxicity in rats.

Irritation and sensitisation

No irritation or skin sensitisation studies were submitted of the notified polymer.

An analogue polymer at 70% concentration in mineral oil is slightly irritating to the skin and eyes based on studies conducted in rabbits. This is consistent with the structure of the notified polymer that contains a structural alert for corrosion/irritation.

The notified polymer does not contain a structural alert for skin sensitisation

Repeat dose toxicity

No repeat dose toxicity studies were submitted of the notified polymer. Based on the high molecular weight, low percentage of low molecular weight species (< 500 g/mol) and low water solubility of the notified polymer, significant absorption across biological membranes is not expected. Therefore, the potential for systemic toxicity is expected to be low.

Genotoxicity

No genotoxicity studies were submitted of the notified polymer. The notified polymer does not contain a structural alert for genotoxicity.

Health Hazard Classification

Based on the available information, the notified polymer is not recommended for classification according to the *Globally Harmonised System of Classification and Labelling of Chemicals (GHS)*, as adopted for industrial chemicals in Australia.

6.3. Human Health Risk Characterisation

6.3.1. Occupational Health and Safety

Based on the information available, the notified polymer is expected to be of low hazard presenting only as a slight skin and eye irritant.

Manufacture of the notified polymer and explosive emulsions

During the manufacture of the notified polymer and explosive emulsions containing it, workers may be exposed to the notified polymer at up to 65% concentration and hence may be at risk of slight skin and eye irritation effects. The expected use of PPE by workers and largely enclosed and automated manufacturing processes should minimise exposure to the notified polymer. Overall, based on the expected low hazard of the notified polymer and occupational settings described, the risk to workers during manufacture of the notified polymer and explosive emulsions containing it is not considered to be unreasonable.

End-use

Given the low concentration (< 2%) of the notified polymer in the finished explosive emulsions, irritation effects are not expected. Therefore, based on the expected low hazard of the notified polymer, the risk to workers during end-use is not considered to be unreasonable.

6.3.2. Public Health

No public exposure to the notified polymer is expected under the proposed use. Therefore, when used in the proposed manner, the notified polymer is not considered to pose an unreasonable risk to public health.

7. ENVIRONMENTAL IMPLICATIONS**7.1. Environmental Exposure & Fate Assessment****7.1.1. Environmental Exposure****RELEASE OF CHEMICAL AT SITE**

The notified polymer will be manufactured in Australia, in reaction vessels, through a mostly automated process. The notifier estimates that 5 kg of the notified polymer from each 8,000 kg batch (0.0625%) will remain in the reaction vessels, but an estimated 90% of this will be recovered and used in subsequent batches. The remainder of the notified polymer (~0.006%) will be discharged into effluent pits and treated using dissolved air flotation (DAF) cells where it is skimmed off and sent for disposal by a licensed waste contractor. The treated water is further treated through a triple interceptor pit before eventually being discharged to sewers. It is estimated by the notifier that less than 10 mg of notified polymer/L of water will be discharged into sewers this way.

RELEASE OF CHEMICAL FROM USE

The notified polymer is expected to be fully combusted as part of its end-use in explosives.

RELEASE OF CHEMICAL FROM DISPOSAL

The empty containers of the notified polymer will be disposed of via landfill which is estimated to contain 1% of the manufacture volume. Any potential spills will be collected using absorbent material and also disposed of in landfill, where the notified polymer will eventually be degraded by biotic and abiotic mechanisms.

7.1.2. Environmental Fate

No environmental fate data were submitted for the notified polymer. The submitted study, conducted on the analogue polymer, indicates it is not readily biodegradable (biodegradability value of 37% after 28 days). It is expected that the notified polymer will have similar biodegradability. The notified polymer is not expected to cross biological membranes due to its high molecular weight (> 1,000 g/mol), therefore it is not expected to bioaccumulate.

7.1.3. Predicted Environmental Concentration (PEC)

The Predicted Environmental Concentration (PEC) was calculated based on a worst-case scenario of ~0.006% release rate from manufacture into the sewers near the manufacturing site (Barwon water sewerage system) over 260 working days of the year and assuming that none of the notified polymer is removed during sewage treatment processes. The resulting PEC in sewage effluent is displayed below.

Predicted Environmental Concentration (PEC) for the Aquatic Compartment		
Total Annual Import/Manufactured Volume	300,000	kg/year
Proportion expected to be released to sewer	~0.006%	
Annual quantity of chemical released to sewer	18	kg/year
Days per year where release occurs	260	days/year
Daily chemical release:	0.069	kg/day
Individual Sewage Treatment Plant Average Daily Flow:	43	ML/day
Removal within STP	0%	
Dilution Factor - River	1.0	
Dilution Factor - Ocean	10.0	
PEC - River:	1.61	µg/L
PEC - Ocean:	0.16	µg/L

7.2. Environmental Effects Assessment

The results from ecotoxicological investigations conducted on an analogue 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>
Fish Toxicity	LL50 > 100 mg/L	Analogue polymer is non-toxic to fish
Daphnia Toxicity	EL50 > 100 mg/L	Analogue polymer is non-toxic to invertebrates
Inhibition of Bacterial Respiration	EC50 > 10,000 mg/L	Analogue polymer is non-inhibitory to bacterial growth

7.2.1. Predicted No-Effect Concentration

The Predicted No-Effect Concentration (NOEC) was calculated using the EC50 for invertebrates (> 100 mg/L). A safety factor of 500 is applied given that two toxicological endpoints based off of an analogue were provided.

Predicted No-Effect Concentration (PNEC) for the Aquatic Compartment		
EC50 (Invertebrates).	> 100.00	mg/L
Assessment Factor	500.00	
Mitigation Factor	1.00	
PNEC:	> 200.00	µg/L

7.3. Environmental Risk Assessment

Risk Assessment	PEC µg/L	PNEC µg/L	Q
Q - River:	1.61	200	< 0.01
Q - Ocean:	0.16	200	< 0.01

The risk quotient ($Q = PEC/PNEC$) has been calculated based on limited release during manufacturing from the current site with the current controls of release into sewers. The calculated Q values indicated that it is unlikely that the notified polymer will reach ecotoxicologically significant concentrations based on the proposed annual manufacturing volume and use patterns. Therefore, the notified polymer is not considered to pose an unreasonable risk to the environment.

APPENDIX A: PHYSICAL AND CHEMICAL PROPERTIES**Water Solubility** 1.2% at pH 6-7 (30 °C)

Method	OECD TG 105 Water Solubility
Remarks	Flask Method. Based on percentage of polymer extracted into the water phase.
Test Facility	C(A)PL (2018)

APPENDIX B: TOXICOLOGICAL INVESTIGATIONS

B.1. Acute Oral Toxicity – Rat

TEST SUBSTANCE	Analogue polymer (75% concentration) in mineral oil
METHOD	OECD TG 401 Acute Oral Toxicity
Species/Strain	Rat/HSD: Sprague Dawley SD
Vehicle	Sesame oil
Remarks – Method	In a dose range finding study 1M/1F rats were exposed to 500, 1,000 and 2,000 mg/kg bw of the analogue polymer. No mortalities or clinical symptoms were observed during the study period. Based on the results 2,000 mg/kg bw was chosen for the main study.
	No protocol deviations.

RESULTS

<i>Group</i>	<i>Number and Sex of Animals</i>	<i>Dose (mg/kg bw)</i>	<i>Mortality</i>
1	5M/5F	2,000	0/10

LD50	> 2,000 mg/kg bw
Signs of Toxicity	No clinical signs of toxicity were observed.
Effects in Organs	No abnormalities were observed at necroscopy.
Remarks – Results	Normal body weight gain was observed.

CONCLUSION	The test substance is of low acute toxicity via the oral route.
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TEST FACILITY	HMRD (1999a)
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B.2. Skin Irritation – Rabbit

TEST SUBSTANCE	Analogue polymer (75% concentration) in mineral oil
METHOD	OECD TG 404 Acute Dermal Irritation/Corrosion
Species/Strain	Rabbit/New Zealand White
Number of Animals	3F
Vehicle	Nil
Observation Period	72 hours
Type of Dressing	Semi-occlusive
Remarks – Method	No protocol deviations.

RESULTS

<i>Lesion</i>	<i>Mean Score*</i> <i>Animal No.</i>			<i>Maximum Value</i>	<i>Maximum Duration of Any Effect</i>	<i>Maximum Value at End of Observation Period</i>
	1	2	3			
<i>Erythema/Eschar</i>	0.33	0.33	0.0	1	< 48 h	0
<i>Oedema</i>	0.0	0.0	0.0	0	n/a	0

* Calculated on the basis of the scores at 24, 48, and 72 hours for EACH animal

Remarks – Results	No mortalities occurred during the study period.
	Very slight (barely perceptible) erythema was observed in all animals at the 30 minute observation which persisted in 2 animals at the 24 hour observation. All signs of irritation were resolved at the 48 hour observation.

CONCLUSION	The test substance is slightly irritating to the skin.
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TEST FACILITY HMRD (1999b)

B.3. Eye Irritation – Rabbit

TEST SUBSTANCE Analogue polymer (75% concentration) in mineral oil

METHOD OECD TG 405 Acute Eye Irritation/Corrosion
 Species/Strain Rabbit/New Zealand White
 Number of Animals 3F
 Observation Period 72 hours
 Remarks – Method No protocol deviations.

RESULTS

<i>Lesion</i>	<i>Mean Score*</i> <i>Animal No.</i>			<i>Maximum Value</i>	<i>Maximum Duration of Any Effect</i>	<i>Maximum Value at End of Observation Period</i>
	1	2	3			
<i>Conjunctiva – Redness</i>	0.66	0.33	0.66	2	< 72 h	0
<i>Conjunctiva – Chemosis</i>	0	0	0	0	n/a	0
<i>Conjunctiva – Discharge</i>	0	0	0	2	< 24 h	0
<i>Corneal Opacity</i>	0	0	0	0	n/a	0
<i>Iridial Inflammation</i>	0	0	0	0	n/a	0

* Calculated on the basis of the scores at 24, 48, and 72 hours for EACH animal

Remarks – Results

At the 1 hour observation, one animal showed moderate (grade 2) and two animals showed slight (grade 1) reddening of the conjunctiva. Slight reddening of the conjunctiva persisted in all animals at the 24 hour observation and in two animals at the 48 hour observation. No signs of conjunctival redness were observed at the 72 hour observation.

Moderate (grade 2, in two animals) to slight (grade 1, in one animal) ocular discharge was observed at the 1 hour observation in all exposed animals. The symptom was resolved at the 24 hour observation.

No chemosis, corneal opacity and iridial effects were observed at any of the observation periods.

CONCLUSION The test substance is slightly irritating to the eye.

TEST FACILITY HMRD (1999c)

APPENDIX C: ENVIRONMENTAL FATE AND ECOTOXICOLOGICAL INVESTIGATIONS

C.1. Environmental Fate

C.1.1. Ready biodegradability

TEST SUBSTANCE	Analogue polymer (75% concentration) in mineral oil
METHOD	OECD TG 301 B Ready Biodegradability: CO ₂ Evolution Test.
Inoculum	Activated Sewage Sludge
Exposure Period	28 days
Auxiliary Solvent	None reported
Analytical Monitoring	None
Remarks - Method	No significant deviations from the test guidelines were reported. A toxicity control test was included.

RESULTS

<i>Test substance</i>		<i>Sodium Acetate</i>	
<i>Day</i>	<i>Mean % Degradation (2 replicates)</i>	<i>Day</i>	<i>% Degradation</i>
8	7.5	8	64
14	17	14	79
28	35	28	93

Remarks - Results All validity criteria were met. The difference in extremes of the test substance was < 20% at the 10-day window. Total CO₂ production in the blank was < 40 mg/L, degradation in the functional control was > 60% at day 14. Temperature was maintained at 22±2 °C.

The toxicity control test showed 42% degradation at day 14 and 46% at day 28. The reference substance was not inhibited by the test substance.

CONCLUSION The test substance is not readily biodegradable.

TEST FACILITY DNL (1999a)

C.1. Ecotoxicological Investigations

C.2.1. Acute Toxicity to Fish

TEST SUBSTANCE	Analogue polymer (75% concentration) in mineral oil
METHOD	OECD TG 203 Fish, Acute Toxicity Test - static
Species	<i>Danio rerio</i>
Exposure Period	96 hours
Auxiliary Solvent	None
Water Hardness	210 - 250 mg CaCO ₃ /L
Analytical Monitoring	Total Organic Carbon (TOC)
Remarks – Method	The test was conducted in accordance with the test guideline above, with no significant deviation in protocol reported.

A water accommodated fraction (WAF) at the limit of solubility was used for the test concentration. The WAF was prepared by direct addition of the test substance to water and homogenising the mixture for 24 hours. Samples for use were taken from the middle of the test chamber for use in the study.

RESULTS

Concentration (mg/L)		Number of Fish	Mortality				
Nominal	Actual		1 h	24 h	48 h	72 h	96 h
0	0	7	0	0	0	0	0
100 (WAF)	10	7	0	0	0	0	0

LL50 > 100 mg/L at 96 hours

NOEL ≥ 100 mg/L at 96 hours

Remarks – Results All validity criteria were met. Dissolved oxygen was 6.2-9.7 mg/L, ≥ 70% (USGS, 2011). Additionally, pH was maintained at 7.3-8.1 and temperature was maintained at 21.4-21.6 °C. No adverse effects observed in the test group.

CONCLUSION The test substance is not toxic to fish

TEST FACILITY HMRD (1999d)

C.2.2. Acute Toxicity to Aquatic Invertebrates

TEST SUBSTANCE Analogue polymer (75% concentration) in mineral oil

METHOD OECD TG 202 *Daphnia* sp. Acute Immobilisation Test and Reproduction Test – Static

Species *Daphnia magna*

Exposure Period 48 hours

Auxiliary Solvent N/A

Water Hardness 257 mg CaCO₃/L

Analytical Monitoring DOC and TOC

Remarks – Method Water hardness exceeds the levels specified in the OECD test guidelines (140-250 mg CaCO₃/L).

WAF dispersions for each test concentration were treated with ultrasound for 15 minutes at 60 °C and subsequently cooled to 20 °C for 1 hour. A reference test was conducted using potassium dichromate.

RESULTS

Loading levels (mg/L)		Number of <i>D. magna</i>	Number Immobilised	
Nominal	Actual		24 h [acute]	48 h [acute]
Control		20	0	0
6.25		20	0	0
12.5		20	0	0
25		20	0	0
50		20	0	0
100		20	2	5

EL50 > 100 mg/L at 24 hours

> 100 mg/L at 48 hours

NOEL_{WAF} 50 mg/L at 48 hours

LOEL_{WAF} 100 mg/L at 48 hours

Remarks – Results All validity criteria were met. Dissolved oxygen was > 7.27 mg/L. Additionally the temperature was maintained at 19 ± 1 °C and pH was maintained at 7 ± 1.

The toxicity determined by the reference test, concluded a 24 h EC50 of 1.24 mg/L (within the expected range).

CONCLUSION The test substance is not toxic to invertebrates

TEST FACILITY DNL (2004)

C.2.3. Inhibition of Microbial Activity

TEST SUBSTANCE Analogue polymer

METHOD OECD TG 209 Activated Sludge, Respiration Inhibition Test
Inoculum Activated sludge
Exposure Period 3 hours
Concentration Range Nominal: 1,000 – 10,000 mg/L
Remarks – Method The test was conducted in accordance with the test guideline.
Copper (II) sulfate pentahydrate was used as the reference substance.

RESULTS
IC50 > 10,000 mg/L
NOEC > 10,000 mg/L
Remarks – Results All validity criteria were met. Control respiration rates did not differ more than 15% and the EC50 for the reference substance was 104 mg/L (within expected range).

CONCLUSION The test substance is not inhibitory to bacterial respiration

TEST FACILITY DNL (1999b)

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