File No: LTD/1690

December 2013

NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME (NICNAS)

PUBLIC REPORT

Modified Polyvinyl Alcohol Resin

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 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:

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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/1690	DuPont (Australia) Ltd	Modified Polyvinyl Alcohol Resin	ND*	< 5 tonnes per annum	Component of pouches for detergents

*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 the PEC/PNEC ratio and 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

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

- 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

- The notified polymer should be disposed of to landfill.

Emergency procedures

- Spills or accidental release of the notified polymer should be handled by 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;

or

(2) Under Section 64(2) of the Act; if
- the function or use of the polymer has changed from a component of pouches for detergents, 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;
- 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 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)
DuPont (Australia) Ltd (ABN: 59 000 716 469)
7 Eden Park Drive
Macquarie Park NSW 2113

NOTIFICATION CATEGORY
Limited: Synthetic polymer with Mn ≥ 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, additives/adjuvants, use details, import volume and identity of manufacturer.

VARIATION OF DATA REQUIREMENTS (SECTION 24 OF THE ACT)
Variation to the schedule of data requirements is claimed as follows: *all physico-chemical endpoints.*

PREVIOUS NOTIFICATION IN AUSTRALIA BY APPLICANT(S)
None

NOTIFICATION IN OTHER COUNTRIES
Canada (2012) and US (2003)

2. IDENTITY OF CHEMICAL

MARKETING NAME(S)
Modified Polyvinyl Alcohol Resin

MOLECULAR WEIGHT
> 10,000 Da

ANALYTICAL DATA
Reference FTIR, GPC spectra were provided.

3. COMPOSITION

DEGREE OF PURITY
> 95%

4. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE AT 20 °C AND 101.3 kPa: The produced product containing the notified polymer at < 65% concentration is a clear film resin.

Property	Value	Data Source/Justification
Melting Point	Not determined	Introduced only in formulated products
Boiling Point	Not determined	Introduced only in formulated products
Density	Not determined	Introduced only in formulated products
Vapour Pressure	Not determined	Expected to have low vapour pressure based on the polymers high MW
Water Solubility	Not determined	Expected to be highly water soluble based on the presence of hydrophilic functional groups in the chemical structure and use in aqueous systems.
Hydrolysis as a Function of pH	Not determined	Contains functionalities that may slowly hydrolyse under normal environmental conditions of pH 4 – 9.

Partition Coefficient (n-octanol/water)	Not determined	Not expected to significantly partition to n-octanol based on its expected high water solubility.
Adsorption/Desorption	Not determined	Expected to have low mobility in soil based on its high molecular weight.
Dissociation Constant	Not determined	The notified polymer is a salt and is expected to be ionised under normal environmental conditions of pH 4-9.
Flash Point	Not determined	Introduced only in formulated products. Not expected to be flammable under conditions of use
Flammability	Not determined	Does not contain any functional groups that imply flammability
Autoignition Temperature	Not determined	Imported only in formulated products. Not expected to autoignite under normal conditions of use
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

DISCUSSION OF PROPERTIES

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

Physical hazard classification
Based on the expected physico-chemical properties 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 (≤ 3%) of an outer film pouch that will be filled with a detergent.

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

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

PORT OF ENTRY
Air and sea ports Australia wide

TRANSPORTATION AND PACKAGING
The finished pouches containing the notified polymer will be individually wrapped in plastic and packed into either a plastic container or a stand-up bag. During transportation the bags/plastic containers will be packed into large cartons which will be packed into pallets. The pallets will be shipped to Australia by sea or air and then transported by road or rail within Australia.

USE
The notified polymer will be imported as part of finished pouches containing detergent and cleaning products for a range of applications such as laundry and dishwasher detergents. The notified polymer will be present in the final products at ≤ 3% and will be available for commercial and consumer use.

OPERATION DESCRIPTION
The notified polymer will be imported as a component (≤ 3%) of finished products (pouches) that will be filled with detergent or other cleaning products for various applications for commercial and consumer use. There will be no reformulation in Australia.

Consumers will take the pouch, which contains the cleaning product or detergent, from an outer packaging and place it into the equipment (e.g. dishwasher). Once in the equipment the water soluble pouch is designed to dissolve when wet.

6. HUMAN HEALTH IMPLICATIONS

6.1. Exposure Assessment

6.1.1. Occupational Exposure

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 accident. In this case, dermal and ocular exposure may occur; however, standard clean-up procedures would be in place to minimise worker exposure to the notified polymer.

Retail workers
Retail workers are not expected to have potential for exposure to the notified polymer except in the event of an accidental package breach. In this case, dermal and ocular exposure may occur; however, exposure is expected to be minimised by the use of appropriate PPE including gloves and protective clothing during clean-up of any spills.

End use
Workers in professions using commercial cleaning equipment may come into contact with the notified polymer when using pouches (containing ≤ 3% notified polymer), for cleaning. Dermal exposure is expected when removing the pouch, which is filled with a cleaning product or detergent, from an outer packaging and placing it into the equipment (e.g. dishwasher). The pouches are designed to be added to cleaning equipment and are not designed to be dissolved in water for hand washing of items such as dishes or clothes; however, if used in this manner, potential dermal exposure is expected on the hands and wrists (which are expected to be rinsed after washing). Dermal exposure may be minimised if workers are using PPE such as gloves. The notified polymer is expected to dissolve in contact with water. Therefore, exposure from residual polymer left on items after a cleaning cycle is expected to be low.

6.1.2. Public Exposure
Consumers will have similar but less frequent potential than workers for exposure to the notified polymer at ≤ 3% in pouches filled with detergent (exposure discussed above).

6.2. Human Health Effects Assessment

No toxicity data were submitted on the notified polymer. Analogous poly vinyl alcohol (PVA) polymers have been shown to have low oral toxicity after both acute and repeated exposure (DeMerlis et al, 2003) as well as low dermal toxicity, slight to no eye or skin irritation, to be non-sensitising to guinea pigs, and not mutagenic or genotoxic both *in vitro* and *in vivo* (Nair, 1998).

The notified polymer has a high molecular weight (> 10,000 Da), is partially ionised and is expected to have limited water solubility. Hence, it is not expected to be absorbed following oral, dermal or inhalation exposure. Furthermore, it contains no detectable low molecular weight species.

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 to the notified polymer at ≤ 3% is expected during normal use such as removing the pouch and placing it into equipment (e.g. dishwashers), as well as during any potential spills and may be reduced by

the use of PPE. There was no toxicity data available on the notified polymer; however, the high molecular weight suggests that absorption across biological membranes is unlikely and hence systemic toxicity from exposure to the notified polymer is not expected. The predicted low toxicity of the notified polymer was supported by the studies on analogous polymers where no systemic or local effects were observed. Based on the predicted low toxicity and the relatively low concentrations it will be used at, the risk of the notified polymer to workers is not considered to be unreasonable.

6.3.2. Public Health

Consumers are expected to have similar but less frequent potential than workers for exposure to the notified polymer at ≤ 3% in pouches filled with detergent (risk characterisation discussed above). Therefore, the risk to the public from the use of the notified polymer is not expected 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 manufactured, reformulated or repackaged in Australia; therefore there will be no release from these activities. Environmental release during importation, transport, storage and distribution may occur as a result of accidental spills. Spills are expected to be contained, collected and disposed of to landfill.

RELEASE OF CHEMICAL FROM USE

The notified polymer dissolves on use as a component in a pouch containing detergent and cleaning products for different applications. Therefore, the majority of the notified polymer is expected to be released to the sewer nationwide in wastewaters following use.

RELEASE OF CHEMICAL FROM DISPOSAL

Some of the notified polymer may be disposed of to landfill as domestic waste when unused pouches are discarded.

7.1.2. Environmental Fate

The notified polymer is not expected to be significantly hydrolysed in the aquatic environment under normal environmental conditions based on structural considerations. The notified polymer is a modified polyvinyl alcohol (PVA) resin, and PVA polymers are known to be biodegradable. Therefore, the notified polymer is expected to have the potential to biodegrade in the environment. However, due to its modified structure and high molecular weight, the polymer is not expected to be readily biodegradable.

The majority of the notified polymer is expected to be released to sewage treatment plants (STPs) via domestic wastewater. As the notified polymer is a water soluble anionic polymer of moderately high molecular weight, up to 75% removal of the notified polymer from STP effluent is anticipated via partitioning to sludge (Boethling & Nabholz, 1997). Notified polymer in treated sewage effluent may be released to surface waters or applied to land when used for irrigation. Notified polymer in sewage sludge may be disposed of to landfill or applied to land when sludge is used for soil remediation. The notified polymer is not expected to be bioaccumulative due to its high molecular weight. Despite its expected high water solubility, notified polymer applied to soils or in landfill is expected to have low mobility due to its high molecular weight.

The notified polymer is likely to degrade and form low molecular weight (< 1,000 Da) metabolites in STPs, surface waters, soils and landfill due to its potential for biodegradability. Based on the modelled data for two representative oligomers with a molecular weight of approximately 300 Da, low molecular weight metabolites of the notified polymer are: predicted to be highly water soluble (> 50 g/L, WSKOW, v1.42; US EPA, 2011); unlikely to bioaccumulate based on the predicted partition coefficient (log Kow < 0.2, KOWWIN, v1.68; US EPA, 2011); and, expected to have low sorption to soils based on the predicted high water solubility. The low molecular weight metabolites are expected to further degrade in both the aquatic and terrestrial compartments through biotic and abiotic processes to form water, oxides of carbon and inorganic salts.

7.1.3. Predicted Environmental Concentration (PEC)

The calculation for the Predicted Environmental Concentration (PEC) is summarised in the table below. Based on the reported use of dissolvable pouches containing cleaning materials, it is assumed that 100% of the total import volume of the notified polymer is released to the sewer. The release is assumed to be nationwide over 365 days per year. It is conservatively assumed that 0% of the notified polymer will be removed during sewage treatment processes.

Predicted Environmental Concentration (PEC) for the Aquatic Compartment		
Total Annual Import/Manufactured Volume	5,000	kg/year
Proportion expected to be released to sewer	100%	
Annual quantity of chemical released to sewer	5,000	kg/year
Days per year where release occurs	365	days/year
Daily chemical release:	13.7	kg/day
Water use	200	L/person/day
Population of Australia (Millions)	22.613	million
Removal within STP	0%	
Daily effluent production:	4,523	ML
Dilution Factor - River	1.0	
Dilution Factor - Ocean	10.0	
PEC - River:	3.03	µg/L
PEC - Ocean:	0.30	µg/L

STP effluent re-use for irrigation occurs throughout Australia. The agricultural irrigation application rate is assumed to be 1,000 L/m^2/year (10 ML/ha/year). The notified polymer in this volume is assumed to infiltrate and accumulate in the top 10 cm of soil (density 1,500 kg/m^3). Using these assumptions, irrigation with a concentration of 3.03 µg/L may potentially result in a soil concentration of approximately 20.2 µg/kg. Assuming accumulation of the notified polymer in soil for 5 and 10 years under repeated irrigation, the concentration of notified polymer in the applied soil in 5 and 10 years may be approximately 101.0 µg/kg and 201.9 µg/kg, respectively.

7.2. Environmental Effects Assessment

The results from ecotoxicological investigations conducted on analogue 1 and 2 are summarised in the table below. Details of these studies can be found in Appendix A. The ecotoxicity data for fish and daphnia from the analogue substances were used as read across to the notified polymer as these analogues are structurally similar to the notified polymer.

Endpoint	*Result*	*Assessment Conclusion*
Analogue 1		
Fish	LC50 (96 h) = 9,540 mg/L	Not expected to be harmful to fish
Daphnia	LC50 (48 h) = 6,551 mg/L	Not expected to be harmful to aquatic invertebrates
Analogue 2		
Fish	LC50 (96 h) > 20,000 mg/L	Not expected to be harmful to fish
Daphnia	LC50 (48 h) = 2,783 mg/L	Not expected to be harmful to aquatic invertebrates

The available measured results for analogues were indicative of low hazard to fish and aquatic invertebrates. However, the notified polymer contains a small percentage of anionic components which are not present in the analogue structure. Therefore, the toxicity of the notified polymer is considered below. Anionic polymers are generally of low toxicity to fish and aquatic invertebrates but are known to be moderately toxic to algae. The mode of toxic action is over-chelation of nutrient elements needed by algae for growth. The highest toxicity is when the acid is on alternating carbons of the polymer backbone, which is unlikely to apply to the notified polymer due to the addition of non-chelating functionality. Further, the indirect toxicity to algae is likely to be mitigated due to the presence of calcium ions in the aquatic compartment, which can bind to the functional groups of the notified polymer.

The analogues and, by inference, the notified polymer are not harmful to fish and aquatic invertebrates. Therefore, the notified polymer is not formally classified for acute aquatic hazard under the Globally Harmonised System of Classification and Labelling of Chemicals (GHS; United Nations, 2009). The notified

polymer is not readily degradable and is not considered to have potential for bioaccumulation. On the basis of its acute toxicity, the notified polymer is not classified for long-term aquatic hazard under the GHS.

Based on the modelled data for two representative oligomers with a molecular weight of approximately 300 Da, the low molecular weight metabolites of the notified polymer are predicted have acute toxicity endpoints that are much greater than 100 mg/L for all three trophic levels. Therefore, the low molecular weight metabolites are expected to be of low hazard to aquatic organisms.

7.2.1. Predicted No-Effect Concentration

The Predicted No-Effect Concentration (PNEC) has been calculated from the acute toxicity data (daphnia) and an assessment factor of 1000. A conservative assessment factor of 1000 was used as acute toxicity endpoints are available for aquatic species from only two trophic levels, and these data are for analogue polymers.

Predicted No-Effect Concentration (PNEC) for the Aquatic Compartment		
LC50 (Invertebrates)	2,783	mg/L
Assessment Factor	1,000	
PNEC:	2,783	µg/L

7.3. Environmental Risk Assessment

Based on the above PEC and PNEC values, the following Risk Quotients (RQ) have been calculated for the aquatic compartment:

Risk Assessment	***PEC µg/L***	***PNEC µg/L***	***Q***
Q - River:	3.03	2783	0.001
Q - Ocean:	0.30	2783	0.0001

The risk quotients for discharge of treated effluents containing the notified polymer to the aquatic environment indicate that the notified polymer is unlikely to reach ecotoxicologically significant concentrations based on its annual introduction volume. The notified polymer is considered to have potential for biodegradation in the environment. It is thus unlikely to persist in surface waters or soils and is expected to degrade to form low molecular weight metabolites. Both the notified polymer and its low molecular weight metabolites are considered to have low potential for bioaccumulation and are expected to be of low hazard to aquatic organisms. Therefore, on the basis of the PEC/PNEC ratio and the assessed use pattern the notified polymer is not expected to pose an unreasonable risk to the environment.

APPENDIX A: ENVIRONMENTAL FATE AND ECOTOXICOLOGICAL INVESTIGATIONS

A.1. Ecotoxicological Investigations

A.2.1. Acute toxicity to fish

TEST SUBSTANCE	Analogue 1
METHOD	Static Acute Toxicity Test with Feathead Minnows following US EPA (1989) and EA (1992) methods
Species	Fathead Minnows (*Pimephales promelas*)
Exposure Period	96 hours
Auxiliary Solvent	Not reported
Water Hardness	133 – 271 mg/L
Analytical Monitoring	Not reported
Remarks – Method	The test was conducted according to the guidelines above. No significant deviations from the test guidelines were reported. The above stated test guideline is very similar to OECD TG 203.

RESULTS

Nominal Concentration (mg/L)	*Number of Fish*	*Mortality (96 h) (%)*
Control	*20*	5
560	20	0
1,150	20	5
2,400	20	0
4,900	20	0
10,000	20	55

LC50	9,540 mg/L at 96 hours.
Remarks – Results	All validity criteria for the test were satisfied. The 96-hour LC_{50} was calculated by nonlinear interpolation method and binominal method. The results are based on the nominal concentrations.
CONCLUSION	The analogue and, by inference, the notified polymer are not harmful to fish.
TEST FACILITY	EA (1992)

A.2.2. Acute toxicity to fish

TEST SUBSTANCE	Analogue 2
METHOD	Static Acute Toxicity Test with Feathead Minnows following US EPA (1989) and EA (1992) methods.
Species	Fathead Minnows (*Pimephales promelas*)
Exposure Period	96 hours
Auxiliary Solvent	Not reported
Water Hardness	156 – 292 mg/L
Analytical Monitoring	Not reported
Remarks – Method	The test was conducted according to the guidelines above. No significant deviations from the test guidelines were reported. The above stated test guideline is very similar to OECD TG 203.

RESULTS

Nominal Concentration (mg/L)	*Number of Fish*	*Mortality (96 h) (%)*
Control	*20*	0
250	20	0
1,000	20	0
5,000	20	0

10,000	20	0
20,000	20	5

LC50	> 20,000 mg/L at 96 hours.
Remarks – Results	All validity criteria for the test were satisfied. The results are based on the nominal concentrations.

CONCLUSION The analogue and, by inference, the notified polymer are not harmful to fish.

TEST FACILITY EA (1992)

A.2.3. Acute toxicity to aquatic invertebrates

TEST SUBSTANCE Analogue 1

METHOD	US EPA (1989) and EA (1992) methods, *Daphnia* sp. Acute Immobilisation Test – Static Test
Species	*Ceriodaphnia dubia*
Exposure Period	48 hours
Auxiliary Solvent	None reported
Water Hardness	137 – 406 mg/L
Analytical Monitoring	None reported
Remarks - Method	The test was conducted according to the guidelines above. No significant deviations from the test guidelines were reported. The above stated test guideline is very similar to OECD TG 202.

RESULTS

Nominal Concentration (mg/L)	*Number of C. dubia*	*Cumulative % Immobilised (48 h)*
Control	20	0
300	20	0
1,000	20	0
3,000	20	0
10,000	20	85
30,000	20	100

LC50	6,551 mg/L at 48 hours (95% confidence limit: 3,000 – 10,000 mg/L)
Remarks - Results	All validity criteria for the test were satisfied. The 48-hour LC_{50} was calculated by nonlinear interpolation method and the 95% confidence limits were statistically estimated by binomial test. The results are based on the nominal concentrations.

CONCLUSION The analogue and, by inference, the notified polymer are not harmful to aquatic invertebrates.

TEST FACILITY EA (1992)

A.2.4. Acute toxicity to aquatic invertebrates

TEST SUBSTANCE Analogue 2

METHOD	US EPA (1989) and EA (1992) methods, *Daphnia* sp. Acute Immobilisation Test – Static Test
Species	*Ceriodaphnia dubia*
Exposure Period	48 hours
Auxiliary Solvent	None reported
Water Hardness	141 – 237 mg/L
Analytical Monitoring	None reported
Remarks - Method	The test was conducted according to the guidelines above. No significant

deviations from the test guidelines were reported. The above stated test guideline is very similar to OECD TG 202.

RESULTS

Nominal Concentration (mg/L)	*Number of C. dubia*	*Cumulative % Immobilised (48 h)*
Control	20	0
750	20	0
1,350	20	0
2,400	20	45
4,200	20	850
7,500	20	100

LC50	2,783 mg/L at 48 hours (95% confidence limit: 2,362 – 3,278 mg/L)
Remarks - Results	All validity criteria for the test were satisfied. The 48-hour LC_{50} and the 95% confidence limits were calculated by the moving average method by Probit statistical analysis. The results are based on the nominal concentrations.

CONCLUSION The analogue and, by inference, the notified polymer are not harmful to aquatic invertebrates.

TEST FACILITY EA (1992)

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