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NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME (NICNAS)

FULL PUBLIC REPORT

Polymer in Alcoguard 2300

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Director
Chemicals Notification and Assessment

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1. APPLICANT AND NOTIFICATION DETAILS

APPLICANT(S)
National Starch and Chemical Pty Ltd (ABN 37 000 351 806)
Stanton Rd, Seven Hills. NSW 2147

Clorox Australia Pty Ltd (ABN 19 077 194 935)
36 Gow Street, Padstow NSW 2211

NOTIFICATION CATEGORY
Synthetic Polymer of Low Concern

EXEMPT INFORMATION (SECTION 75 OF THE ACT)
Data items and details claimed exempt from publication:

Chemical name
Other names
CAS number
Molecular formula
Structural formula
Number Average Molecular Weight
Number Average Molecular Weight
Polymer constituents
Charge density
Residual monomers and impurities
Concentration of notified polymer in end use product

VARIATION OF DATA REQUIREMENTS (SECTION 24 OF THE ACT)
No variation to the schedule of data requirements is claimed.

PREVIOUS NOTIFICATION IN AUSTRALIA BY APPLICANT(S)
Nil

NOTIFICATION IN OTHER COUNTRIES
None

2. IDENTITY OF CHEMICAL

MARKETING NAME(S)
Polymer in Alcoguard 2300

3. COMPOSITION

PLC CRITERIA JUSTIFICATION

Criterion	*Criterion met*
Meets Molecular Weight Requirements	Yes
Meets Functional Group Equivalent Weight (FGEW) Requirements	Yes
Low Charge Density	Yes
Approved Elements Only	Yes
No Substantial Degradability	Yes
Water Absorbing	Yes

Low Concentrations of Residual Monomers	Yes
Hazard Substance or Dangerous Good	Yes

The notified polymer meets the PLC criteria.

4. INTRODUCTION AND USE INFORMATION

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

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

USE

The notified polymer is used as a film forming agent in domestic cleaning formulations at a concentration of less than 1% of notified polymer.

5. PROCESS AND RELEASE INFORMATION

5.1. Operation Description

National Starch & Chemical will import the product containing the notified polymer into Australia in 200 L drums as a 32% aqueous solution. The product containing the notified polymer will be transported direct from the dockyard to the notifier's warehouse prior to distribution. The product will be sold to Clorox Australia, who will manufacture the finished products through the contract manufacturer, Aeropak Australia at Wethrill Park, NSW.

Formulation involves pumping the polymer solution from drums by metered dosing into the blending vessel together with other ingredients. The finished products will be formulated in batch sizes of 10 tonnes, transferred to a filling machine via closed transfer lines and will be filled into consumer packages (750 mL pump spray). Prior to packaging, sampling and quality testing is carried out. The general public will use these finished products as a domestic cleaning solution.

6. EXPOSURE INFORMATION

6.1. Summary of Environmental Exposure

There is potential for environmental release of the notified polymer during the formulation of the products. However, any spills will be contained within the plant through bunding. The raw material dispensing, blending and filling areas are bunded. There will be some release to sewer of the notified polymer. All spills are collected using adsorbent material and sent to landfill for disposal. Empty containers are rinsed with water and sent to drum recyclers. Any rinsates from blending vessels, transfer lines and filling machine and empty containers are collected and sent to a liquid waste treatment facility for processing and disposal by a licensed waste disposal contractor. It is estimated that 1% of the import volume will be disposed to a liquid water treatment facility.

The use of the cleaning product containing the notified polymer will be widespread and diffuse. Most of the imported volume (98%) will be released to the domestic sewer. Residual material in empty consumer containers is likely to account for 1% of the imported volume per year and will be disposed of to landfill.

Assuming a worst case scenario where all the notified polymer (500 kg) will be disposed of to sewer throughout Australia and none is attenuated within these systems. Assuming a national population of 19.5 million and that each person contributes an average 200 L/day to overall sewage flows and all partitioned into water, the predicted concentration in sewage effluent on a nationwide basis is estimated as (500 kg/(200 L X 365 days X 19500000 persons) = 0.35 μg/L.

Based on the respective dilution factors of 1 and 10 for inland and ocean discharges of effluents, the PECs of the notified polymer in freshwater and marine water may approximate 0.35 or 0.035 μg/L.

6.2. Summary of Occupational Exposure

Workers may be exposed to the notified polymer through accidental breaches of the containers at the dockside and during transport.

Dermal and ocular exposure can occur to the notified polymer during reformulation, and quality control testing. Retail workers may be exposed through accidental breaching of the containers and also spills from the damaged containers.

Engineering controls to minimise exposure to workers to the notified polymer include enclosed mixing vessels, automated filling machines fitted with local exhaust ventilation to capture any volatile or aerosol materials at the source, and PPE. The workers involved at reformulation sites will wear overalls, safety glasses and/or safety shoes, and impervious gloves. General and local ventilation will also be used. The workers involved in quality control will wear laboratory coat, safety glasses and rubber gloves.

All personnel involved in the handling and use of products containing the notified polymer will have access to Material Safety Data Sheet.

6.3. Summary of Public Exposure

Public exposure through importation, transport or storage is negligible. The public will come into contact with notified polymer on a daily basis through the use of the cleaning products containing the notified polymer. However, exposure will be minimal as the notified polymer is present at a low concentration in the finished products.

7. PHYSICAL AND CHEMICAL PROPERTIES

Appearance at 20°C and 101.3 kPa	Colourless solution
Boiling Point	100°C (solution)
Density	1000 kg/m^3 at 20°C (solution)
Water Solubility	No data available but expected to be <10 g/L at 20°C.
Dissociation Constant	The notified polymer contains free carboxylate groups, which may be ionised under environmental pH conditions.
Explosive Properties	None expected.
Reactivity	Stable under normal environmental conditions
Degradation Products	No biodegradability data available.

8. HUMAN HEALTH IMPLICATIONS

8.1. Toxicology

No toxicological data were submitted.

8.2. Human Health Hazard Assessment

The notified polymer meets the PLC criteria and can therefore be considered to be of low hazard.

9. ENVIRONMENTAL HAZARDS

9.1. Ecotoxicology

9.1.1. Acute toxicity to aquatic invertebrates

TEST SUBSTANCE	SS0953.01
METHOD	NATA endorsed ESA Standard Operating Procedure 101. This procedure is based on methods described by the US EPA (1993) and adapted for use with the locally collected *C. dubia* by Bailey et al (2000).

Species	Fresh water *Ceriodaphnia dubia*
Exposure Period	48 h
Auxiliary Solvent	None
Water Hardness	Dilute mineral water prepared by diluting Perrier mineral water to a concentration of 20% (vol/vol) with deionised water plus vitamin B_{12} and selenium supplements (hardness and Ca content unclear).
Analytical Monitoring	None
Remarks - Method	Based on the range finding results, nominal concentrations of 100, 50, 25, 12.5, 6.25, 31.2, 1.56, 0.75 and 0.37 g/L) were prepared in 250 mL beakers and used for the definitive static non-renewal test. The solutions were dispensed into 20 mL glass scintillation vials, with four replicates being prepared for each test concentration and control. Five *C. dubia* were introduced in each test vial and exposed for 48 h duration. The test vials were then incubated in a constant temperature chamber at 25ºC. A 16:8 h light/dark cycle was provided. The condition of the test animals were assessed at 24 h and again at 48 h, and the number of immobilised animals was recorded. Water quality parameters of temperature, dissolved oxygen, conductivity and pH were measured throughout the test and were within acceptable limits. The EC50 estimates (with 95% confidence limits) were determined using the trimmed Spearman-Karber method. The NOEC and LOEC were determined by performing an Analysis of Variance followed by Dunnetts test for parametric data or Steels Many-One Rank Test for non-parametric data

RESULTS

Concentration g/L	*% survival*	
Nominal	*24 h*	*48 h*
0 (control)	100	100
0.37	100	100
0.75	100	100
1.56	100	100
3.12	100	100
6.25	100	90
12.5	80	0**
25	5*	5
50	0	0
100	0	0

*significantly reduced survival compared with the control treatment (Dunnetts test, p=0.05, df=7.24, 1-tailed)

** Survival in the 6.25 g/L and lower concentrations were not significantly different to the control treatment (Steels Many-one rank test, p=0.05, 1-tailed).

LC50	8.2 g/L at 48 hours (CI: 7.5-9.1 g/L)
NOEC/LOEC	6.25/12.5 g/L at 48 hours
Remarks - Results	All results are expressed as nominal concentrations. No significant mortality was observed in the control or treatments at or below 6.25 g/L. As *C. dubia* survival is usually affected at pH <6.5, the toxicity observed at treatments of 6.25 g/L and above may be caused at least in part by pH alone since this ranged from 4.9-5.6 throughout the test. Based on 32% of the notified polymer in aqueous solution for Alcoguard, the EC50 based on the polymer content is 2.6 g/L, indicating a very low toxicity to cladocerans.
CONCLUSION	The notified polymer is considered to be very slightly toxic to *C.dubia.*
TEST FACILITY	Ecotox Services Australasia. (2003)

9.2. Environmental Hazard Assessment

On the basis of the ecotoxicity test report provided for *C. dubia*, a predicted no effect concentration (PNEC) of 2600 μg/L has been derived by dividing the LC50 value for *C. dubia* by a safety factor of 1000 since toxicity data are available for only one trophic level.

In addition to the test report for daphnia provided, the notifier has also provide an evaluation made by US EPA on a similar acrylic acid/acrylamide copolymer with respect to aquatic toxicity on the basis of its SAR model by assuming 98% acrylic acid and 2% acrylamide as the worst case for polyanionic polymers (with carboxylate groups on adjacent monomer units). The results are shown below:

96 h LC50 for fish	>100 mg/L
48 h LC50 for daphnia	>100 mg/L
96 h LC50 for green algae	3.0 mg/L

Predictions based on SARs for polyanionic polymers indicate that as the acrylic acid % decreases and the acrylamide % increases, the toxicity towards green algae will decrease. The toxicity is also expected to be mitigated as the hardness of dilution water/growth medium/receiving waters increases. At a hardness of 150.0 mg/L as $CaCO_3$, it is expected about 15 times mitigation of toxicity towards green algae. Therefore, there is low concern for toxicity in moderately hard and hard water. As the release of the consumer product is low and disperse and all generally will go to sewer treatment where the polymer is likely to be chelated with Ca prior to release to natural aquatic environment, further mitigation can be applied. However, these estimated results will not be used in this assessment report.

Nevertheless, the above may clarify why Lamberton (1995) who tested two anionic polyacrylamides of high MW (~10-20 X 10^6) to fish and daphnia found very high toxicity to the latter (48 h EC50s in the range of 0.09-0.19 mg/L and NOECs 0.05-0.084 mg/L). Lamberton used purified water with 10.6 mg/L Ca ion, total hardness 45 mg/L $CaCO_3$, which would seem to maximize aquatic toxicity potential.

Given the high water solubility of the notified polymer and its high molecular weight, there is little potential for bioaccumulation to occur.

10. RISK ASSESSMENT

10.1. Environment

Rinsate wastes generated from the manufacturing site would be disposed of by licensed waste contractors. Any spills will be contained within the plant through bunding or be disposed of by landfill. Residues from consumer containers will also be disposed of by landfill. Slow abiotic or biotic decomposition of the notified polymer will occur in landfill. The notified polymer may be mobile based on the high water solubility but will interact with metal ions present in soils.

Given the low usage volume (500 kg/year) and the widespread and diffuse use of the cleaning product containing the notified polymer, the environmental risk is likely to be low. Furthermore, on the basis of the PNEC and the worst case PEC derived, the ratio of PEC/PNEC (0.35/2600) is <<1. Therefore, there is unlikely to be an environmental risk under the reported use pattern.

10.2. Occupational health and safety

The OHS risk presented by the notified polymer is expected to be low. The notified polymer may be present in formulations containing hazardous ingredients. If these formulations are classified as hazardous to health in accordance with the NOHSC *Approved Criteria for Classifying Hazardous Substances*, workplace practices and control procedures consistent with provisions of State and Territory hazardous substances legislation must be in operation.

10.3. Public health

The public will come into contact with notified polymer on a daily basis during the use of the cleaning products containing the notified polymer. However, the risk to public health will be negligible because the notified polymer is considered to be of low hazard at the concentrations

used in finished products.

11. CONCLUSIONS – ASSESSMENT LEVEL OF CONCERN FOR THE ENVIRONMENT AND HUMANS

11.1. Environmental risk assessment

The polymer is not considered to pose a risk to the environment based on its reported use pattern and PEC/PNEC ratio.

11.2. Human health risk assessment

11.2.1. Occupational health and safety

There is Low Concern to occupational health and safety under the conditions of the occupational settings described.

11.2.2. Public health

There is Low Concern to public health when used in domestic cleaning formulations.

12. MATERIAL SAFETY DATA SHEET

12.1. Material Safety Data Sheet

The notifier has provided MSDS as part of the notification statement. The accuracy of the information on the MSDS remains the responsibility of the applicant.

13. RECOMMENDATIONS

CONTROL MEASURES

Occupational Health and Safety

- No specific engineering controls, work practices or personal protective equipment are required for the safe use of the notified polymer itself, however, these should be selected on the basis of all ingredients in the formulation.
  - 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 NOHSC *Approved Criteria for Classifying Hazardous Substances*, workplace practices and control procedures consistent with provisions of State and Territory hazardous substances legislation must be in operation.

Environment

Disposal

- Container residues should be disposed of by landfill or waste disposal contractors.

Emergency procedures

- In the event of a major spill, prevent spillage from entering drains or water courses. Absorb onto sand, vermiculite or other suitable absorbent material. Sweep up or shovel or collect recoverable product into labelled containers for recycling or salvage and dispose of promptly. After spills, wash area preventing runoff from entering drains.

13.1. Secondary notification

The Director of Chemicals Notification and Assessment must be notified in writing within 28 days by the notifier, other importer or manufacturer:

(1) Under subsection 64(1) of the Act; if
- The notified polymer is introduced in a chemical form that does not meet the PLC criteria.

or

(2) Under subsection 64(2) of the Act:
- If any of the circumstances listed in the subsection arise.

The Director will then decide whether secondary notification is required.

No additional secondary notification conditions are stipulated.

14. BIBLIOGRAPHY

Bailey HC et al (2000) Application of Ceriodaphnia dubia for whole effluent toxicity tests in the Hawkesbury-Nepean watershed, NSW, Australia: Method development and application. Environmental Toxicology and Chemistry 19, 88-93.

Ecotox Services Australasia (2003) Toxicity assessment of Alcoguard 2300 using the 48 h acute toxicity test with the cladoceran Ceriodaphnia dubia., Report No.PR0114, Clorox Australia. Unpublished report provided by the notifier.

Lamberton C J (1995) "Acute Toxicity and Management of Polyelectrolyte Flocculants in Australian Aquatic Ecosystems," Master of Applied Science Thesis, University of Technology, Sydney, Australia.

USEPA (1993) Methods for measuring the acute toxicity of effluents and receiving waters to freshwater and marine organisms. 4th edition. USEPA Report No. EPA-600/4-90/027F.