

File No PLC/705

10 July 2007

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

**FULL PUBLIC REPORT**

**Polymer in Versaflex®ONE**

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 the Environment and Water Resources.

For the purposes of subsection 78(1) of the Act, this Full Public Report may be inspected at our NICNAS office by appointment only at 334-336 Illawarra Road, Marrickville NSW 2204.

This Full 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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**FULL PUBLIC REPORT****Polymer in Versaflex®ONE****1. APPLICANT AND NOTIFICATION DETAILS**

## APPLICANT(S)

National Starch & Chemical Pty Ltd (ABN: 37 000 351 806)  
7 Stanton Road  
Seven Hills NSW 2147

## NOTIFICATION CATEGORY

Polymer of Low Concern

## EXEMPT INFORMATION (SECTION 75 OF THE ACT)

No details are claimed exempt from publication.

## Data items and details claimed exempt from publication:

- Chemical name
- Other names
- Molecular formula
- Structural formula
- Means of identification
- Number average molecular weight
- Weight-average molecular weight
- Weight percentage of polymer species with MW < 1000 and MW < 500
- Charge Density
- Polymer Constituents
- Residual Monomers and impurities
- Reactive Functional Groups

## 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)

None

## NOTIFICATION IN OTHER COUNTRIES

None

**2. IDENTITY OF CHEMICAL**

## MARKETING NAME(S)

Versaflex®ONE (the aqueous dispersion of the notified polymer to be imported)

## MOLECULAR WEIGHT

|                                      |        |
|--------------------------------------|--------|
| Number Average Molecular Weight (Mn) | > 1000 |
| % of Low MW Species < 1000           | < 10   |
| % of Low MW Species < 500            | < 5    |

The notified polymer contains only low concern functional groups.

### 3. PLC CRITERIA JUSTIFICATION

| <i>Criterion</i>                                       | <i>Criterion met</i> |
|--|----------------------|
| Molecular Weight Requirements                          | Yes                  |
| Functional Group Equivalent Weight (FGEW) Requirements | Yes                  |
| Low Charge Density                                     | Yes                  |
| Approved Elements Only                                 | Yes                  |
| Stable Under Normal Conditions of Use                  | Yes                  |
| Not Water Absorbing                                    | Yes                  |
| Not a Hazard Substance or Dangerous Good               | Yes                  |

The notified polymer meets the PLC criteria.

### 4. PHYSICAL AND CHEMICAL PROPERTIES

|  |  |
|--|--|
| <b>Appearance at 20°C and 101.3 kPa</b>    | Yellow, clear coloured aqueous solution (aqueous solution of polymer, Versaflex®ONE)   |
| <b>Melting Point/Glass Transition Temp</b> | 0°C (Versaflex®ONE)  |
| <b>Density</b>                             | 1215 kg/m <sup>3</sup> (Versaflex®ONE)   |
| <b>Water Solubility</b>                    | The notified polymer is freely soluble in water but forms a gel at high concentrations (OECD TG 105).  |
| <b>Dissociation Constant</b>               | The dissociation constant of the notified polymer was not determined. However, based on its chemical structure, the polymer is expected to be at least partially dissociated in water over the entire environmentally relevant pH range (4-9). |
| <b>Particle Size</b>                       | Imported as aqueous solution.  |
| <b>Reactivity</b>                          | Stable under normal environmental conditions.  |
| <b>Degradation Products</b>                | Stable at normal temperature and pressure. The notified polymer contains hydrolysable functional groups but hydrolysis is unlikely to occur under ambient abiotic conditions in the environmental pH range (4-9).                              |

### 5. INTRODUCTION AND USE INFORMATION

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 - 100 | 30 - 100 | 30 - 100 | 30 - 100 | 30 - 100 |

USE AND MODE OF INTRODUCTION AND DISPOSAL

#### **Mode of Introduction**

The notified polymer will not be manufactured in Australia, but will be imported by sea in 225 L open head steel drums as a component (< 50%) of Versaflex®One.

#### **Reformulation/manufacture processes**

The notified polymer will be imported in an aqueous solution in 225 L drums and reformulated into a water treatment solution in 1 000 L Intermediate Bulk Containers (IBCs) which are in turn shipped to customers who will connect them to a closed system containing the water to be treated.

Following transport of the 225 L drums to a single customer, they are opened and hoses connected to

them. The contents of the drums are pumped to a 500 – 10 000 L mixing vessel which is vented to the outside atmosphere to remove any vapours. Five to ten tonnes of water treatment solution are made per batch, the dilution factor is 1:10. Each batch is quality checked and adjustments made as required. After mixing is complete, the water treatment product is pumped through a hard piped system to the 1 000 L IBCs. Local and general ventilation is located in all areas of the plant.

The water treatment solution in the IBCs will be delivered to industrial plants. The solution may be decanted to smaller vessels or used straight from the IBC. In both cases a pump is used to automatically meter the product to a closed system containing the water which is continuously reused.

#### Use

Versaflex®One is used as an additive for scale and deposit control in industrial water treatment. It is used in stressed cooling water conditions where high pH and/or high calcite saturation exists.

## 6. HUMAN HEALTH IMPLICATIONS

### 6.1. Exposure Assessment

#### OCCUPATIONAL EXPOSURE

| <i>Category of Worker</i>   | <i>Number</i> | <i>Exposure Duration</i> | <i>Exposure Frequency</i> |
|---|---------------|--------------------------|---------------------------|
| <i>Transport and Storage</i>  |               |                          |                           |
| Transporting from dock to customer's warehouse for reformulation (loading/unloading trucks) | 2             | 1 – 2 hours/day          | 10 -20 days/year          |
| <i>Reformulation</i>  |               |                          |                           |
| Plant operators   | 2             | 3 – 4 hours/day          | 10 -30 days/year          |
| QC testing  | 1             | 2 hours/day              | 4 days/ year              |
| Maintenance workers   | 2             | 2 hours/day              | 4 day/year                |
| <i>End-use – Industrial Water Plants</i>  |               |                          |                           |
| Plant operators   | 10            | 0.5 hours/day            | 500- 100 days/year        |

*QC testing:* Dermal and ocular exposure is possible from drips, spills and splashes during batch adjustment and when taking and testing samples. Workers wear coveralls, goggles and impervious gloves to minimise exposure.

*Maintenance workers:* There is possible of skin contact during equipment maintenance. Workers wear coveralls, goggles and gloves.

Workers may be exposed spills and residues in lines and on couplings when decanting and pumping the product. To minimize any exposure workers will wear coveralls, rubber gloves and safety goggles.

#### PUBLIC EXPOSURE

Exposure of the public as a result of reformulation, transport and disposal of the imported product containing the notified polymer is negligible. Products containing the notified polymer will only be used in industrial situations. They will not be used by the public in domestic situations. Therefore public exposure is unlikely as a result of the industrial uses of products containing the notified polymer.

### 6.2. Toxicological Hazard Characterisation

No toxicological data were submitted. The notified polymer meets the PLC criteria and can therefore be considered to be of low hazard.

### 6.3. Human Health Risk Assessment

#### OCCUPATIONAL HEALTH AND SAFETY

The OHS risk presented by the notified polymer is expected to be low, based on the likely low exposure to workers and the low intrinsic hazard of the polymer.

#### PUBLIC HEALTH

As there will be no exposure of the public to the notified polymer (or products containing the notified polymer) the risk to the public from exposure to the notified polymer is considered to be negligible. Where exposure occurs, the low hazard of the polymer translates to low risk.

## 7. ENVIRONMENTAL IMPLICATIONS

### 7.1. Exposure Assessment

#### ENVIRONMENTAL RELEASE

The majority of the notified polymer introduced annually ( $\geq 98.5\%$ ) will eventually be released into water treatment facilities as a result of the discharge of industrial cooling waters treated with this polymer. A relatively minor proportion ( $\leq 1.5\%$ ) will be released as a result of the clean-up of formulation equipment and transport containers.

#### ENVIRONMENTAL FATE

The concentration of notified polymer in waste water streams ( $< 5$  mg/L) is expected to be reduced by precipitation as the calcium salt and by adsorption to suspended organic material as well as dilution with untreated water prior to reaching water treatment plants. The concentration of polymer in solution is expected to be further reduced in sewage treatment plants by physical loss mechanisms such as precipitation and adsorption in addition to some limited biodegradation. Much of the notified polymer entering the waste water stream will therefore be removed as solid waste with the sewage sludge and disposed of to landfill. Based on its chemical structure, the notified polymer is not expected to be mobile in soil and will degrade slowly to simple inorganic and organic compounds. The fraction of the polymer that is released to the aquatic environment through sewage outfalls is expected to be further removed from the water column by precipitation or adsorption to organic matter. The notified polymer is not expected to present a bioaccumulation hazard based on its molecular weight.

### 7.2. Environmental Hazard Characterisation

The notified polymer meets the PLC criteria and can therefore be considered to be of low hazard. This is supported by environmental end-points observed in testing conducted on the notified polymer.

| <i>Endpoint</i>  | <i>Result</i>             | <i>Effects Observed?</i> | <i>Test Guideline</i> |
|------------------|---------------------------|--------------------------|-----------------------|
| Fish Toxicity    | LC50 630 mg/L (96 h)      | yes                      | OPPTS 850.1075        |
| Daphnia Toxicity | EC50 $> 1000$ mg/L (48 h) | no                       | OPPTS 850.1010        |

The acute toxicities of the notified polymer to rainbow trout (*Oncorhynchus mykiss*) and water fleas (*Daphnia magna*) were both determined by US EPA methods under static test conditions. The notified polymer is lethal to fish at nominal concentrations  $\geq 500$  mg a.i./L, but there are no adverse effects on daphnids treated up to the maximum nominal test concentration of 1000 mg a.i./L. Based on these results, the notified polymer is not considered to be harmful to the aquatic environment. A Predicted No-Effect Concentration (PNEC) of 630  $\mu$ g/L was calculated from the fish acute toxicity results after applying an Assessment Factor of 1000.

### 7.3. Environmental Risk Assessment

The Predicted Environmental Concentration (PEC) for the notified polymer in river water and ocean water is 134  $\mu$ g/L and 13.4  $\mu$ g/L, respectively. This calculation is based on the worst-case scenario in which 100% of the introduced quantity of the notified polymer is released into a volume of water produced by 50% of the Australian population annually. The Risk Quotient (= PEC/PNEC) for this scenario is 0.21 and 0.02 for river water and ocean water, respectively. As the risk quotient for both river and ocean disposal is less than 1, the risk to the environment from the notified polymer based on

the proposed use pattern and import volume is acceptable.

## 8. CONCLUSIONS

### 8.1. Level of Concern for Occupational Health and Safety

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

### 8.2. Level of Concern for Public Health

There is No Significant Concern to public health when used in the proposed manner.

### 8.3. Level of Concern for the Environment

The polymer is not considered to pose a risk to the environment based on its reported use pattern.

## 9. MATERIAL SAFETY DATA SHEET

### 9.1. 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.

## 10. 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 *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.

#### Environment

#### Disposal

- The notified polymer should be disposed of by [incineration or to landfill](#).

#### Emergency procedures

- Spills and/or accidental release of the notified polymer should be handled by [physical containment, collection and subsequent safe disposal](#).

### 10.1. Secondary Notification

The Director of NICNAS 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.