

File No PLC/707

2 July 2007

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

**FULL PUBLIC REPORT**

**Polymer in Micronal PCM Product**

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 Micronal PCM Product****1. APPLICANT AND NOTIFICATION DETAILS**

## APPLICANT(S)

BASF Australia Ltd (ABN 62 008 437 867)  
Kororoit Creek Road  
Altona VIC 3018

## NOTIFICATION CATEGORY

Polymer of Low Concern

## EXEMPT INFORMATION (SECTION 75 OF THE ACT)

Data items and details claimed exempt from publication:

Chemical Name, CAS Number, Molecular and Structural Formulae, Molecular Weight, Polymer Constituents, Residual Monomers/Impurities, Use Details, Import Volume

## VARIATION OF DATA REQUIREMENTS (SECTION 24 OF THE ACT)

Variation to the schedule of data requirements is claimed as follows:

Melting Point/Glass Transition Temp, Density, Water Solubility, Dissociation Constant, Particle Size Distribution

## PREVIOUS NOTIFICATION IN AUSTRALIA BY APPLICANT(S)

No

## NOTIFICATION IN OTHER COUNTRIES

USA

**2. IDENTITY OF CHEMICAL**

## MARKETING NAME(S)

Micronal DS5000 x, Micronal DS5001 x, Micronal DS5007 x, Micronal DS5008 x,

% of Low MW Species < 1000 < 2

% of Low MW Species < 500 < 2

## MOLECULAR WEIGHT (MW)

Number Average Molecular Weight (Mn) >10000

## REACTIVE FUNCTIONAL GROUPS

The notified polymer contains only low concern functional groups.

**3. PLC CRITERIA JUSTIFICATION**

<i>Criterion</i>	<i>Criterion met (yes/no/not applicable)</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>	White powder (Micronal DS 5001 X, Micronal DS 5008 X) or aqueous dispersion (Micronal DS 5000 X, Micronal DS 5007 X)
<b>Melting Point/Glass Transition Temp</b>	Not available due to its highly cross-linked nature.
<b>Density</b>	Micronal powder products (Micronal DS 5001 X, Micronal DS 5008 X) have a bulk density of 250-350 kg/m <sup>3</sup> Micronal aqueous dispersion products (Micronal DS 5000 X, Micronal DS 5007 X) have a bulk density of 980-990 kg/m <sup>3</sup> .
<b>Water Solubility</b>	Not available as notified polymer exists as a high molecular weight cross-linked polymer, which at best, is miscible in water.
<b>Particle Size</b>	The polymer is used to coat tiny globules of wax 2 to 20 microns in diameter. Most of the notified polymer in powder form will be in respirable range (<10 µm).
<b>Reactivity</b>	While the notified polymer contains hydrolysable functionality, it is expected to be stable under normal environmental conditions.
<b>Degradation Products</b>	None under normal conditions of use

#### 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>	0-5	5-10	10-15	15-20	20-25

USE AND MODE OF INTRODUCTION AND DISPOSAL

##### Mode of Introduction

The notified polymer will be imported at concentration < 30% in the products packaged in the following containers and quantities:

- Micronal DS 5000x – Aqueous Dispersion – 110 kg drums or 900 IBC's
- Micronal DS 5001x – Powder Form – 12.5 kg bags
- Micronal DS 5007x – Aqueous Dispersion – 110 kg drums or 900 IBC's
- Micronal DS 5008x – 12.5 kg bags

These products will be initially stored and distributed from the notifier's third party warehouse at Melbourne Warf. From the third party warehouse, the Micronal products will be distributed to the client's premises.

##### Reformulation/manufacture processes

The Micronal products (containing the notified polymer) will be decanted (in the case of aqueous dispersions) or shovelled/trowelled (in the case of solid powders) and blended into mortars/concrete paints or other construction materials, using standard construction and material handling techniques. The Micronal products can be used in products such as plaster, plasterboard, flooring compounds and architectural paints, etc.

##### Use

The notifiable polymer functions as an external shell making up a microscopic polymer encapsulating a wax core. The products which use the notified polymer can be employed in conventional building materials such as plaster, plasterboard, flooring compounds and agricultural paints to boost their thermal capacity and smooth out temperature fluctuations.

## **6. HUMAN HEALTH IMPLICATIONS**

### **6.1. Exposure Assessment**

#### **OCCUPATIONAL EXPOSURE**

Dermal and ocular exposure may potentially occur during certain processes involving the notified polymer, such as decanting (in the case of aqueous dispersions) or shovelling/trowelling (in the case of solid powders) and blending. However, exposure to significant amounts of the notified polymer is limited because of the semi-automated processes, and the engineering controls and personal protective equipment worn by workers. Workers will make dermal contact with pellets/powder containing the notified polymer (up to 30%). However, the notified polymer is cured into an inert matrix and is hence unavailable for exposure.

Inhalation exposure to the fine powder when shovelling/trowelling is expected to be controlled by Local Exhaust Ventilation (LEV) and a dust mask or respirator. Dermal and occasional ocular exposure is expected to be controlled by the use of gloves, safety goggles and overalls. Because the application of shovelling/trowelling and blending is expected to be semi-automated, the concentration of dust in the workplace should be minimised by the spray booth design including the use of LEV. The most likely exposure scenarios involve cleaning up dust residues with an industrial vacuum cleaner and its emptying and cleaning. There is a possibility of dust generation requiring the use of a mask or respirator to control inhalation exposure while cleaning.

Construction workers may have inhalation and dermal exposure to the dry mortar containing the notified polymer, however exposure to the notified polymer would likely be limited due to the concentration and the use of face masks and gloves.

A large proportion of the polymer dust generated during application should be respirable (mean particle size < 10 µm) and there may be respiratory effects in some individuals if atmospheric levels of nuisance dust approach the Australian Safety and Compensation Council exposure standard for nuisance dust of 10 mg/m<sup>3</sup>. Inhalation toxicity is not known; however, there may be some potential for exposure while cleaning up dust residues but as this should be conducted using an industrial vacuum cleaner the majority of the dust should be collected into the vacuum cleaner itself and there should be little atmospheric dust generated.

#### **PUBLIC EXPOSURE**

The notified polymer will not be sold to the public. Powders of the notified polymer will only be used in industry, and as such, public exposure is not expected. The public may be exposed in the unlikely event of a transport accident where the transport containers are breached and product is spilled.

The notified polymer will not be sold to the public except in the form of finished articles. There is potential for extensive public exposure to articles such as building materials comprised wholly or partly of the notified polymer.

**6.2. Toxicological Hazard Characterisation**

No toxicology data have been provided for the notified polymer, but as it is notified under the PLC criteria, it can be considered to be of low hazard. The notified polymer is likely to be not bioavailable and non-toxic, due to its probable very high molecular weight, cross-linking and water insolubility. The main risk of adverse health effects presented by the notified polymer is from its small particle size.

Most of the notified polymer in powder form will be in the respirable range ( $<10\ \mu\text{m}$ ). The health effects of inhalation exposure to the notified polymer are unknown. The notified polymer is unlikely to be absorbed from the lung, so deposition in the deep lung is probable, combined with an inability of the lungs to dislodge the particles. Inhaled particulates are known to interfere with cell function in the airways, causing inflammatory-like reactions\*. Therefore, bronchial or pulmonary irritation is possible following inhalation exposure to particles containing the notified polymer, arising from deposition of water-insoluble particles in the lung. The US EPA have similarly expressed concern regarding high molecular weight (70,000 Da or greater) insoluble polymer particles of respirable size, as they can potentially result in irreversible lung damage.

\*\* R.C. Rylander (1997) Organic dusts. In: Roth RA, ed. *Comprehensive Toxicology, Volume 8: Toxicology of the Respiratory System*. Elsevier Science Ltd., pp 415-424.

### 6.3. Human Health Risk Assessment

#### OCCUPATIONAL HEALTH AND SAFETY

The notified polymer meets the PLC criteria. Thus, it is expected to be generally a low health hazard to workers, following oral, dermal or ocular exposure.

The workers who will be potentially exposed to powders of the notified polymer are mainly reformulation operators, and these workers face the greatest potential risk of adverse health effects arising from exposure to the notified polymer. Of main concern to the health of workers is the risk from inhalation exposure to the notified polymer, due to the potential adverse health effects of respirable insoluble particulates. Inhalation exposure to the notified polymer could occur during opening of the bags containing the notified polymer and manually transferring the contents for blending. When the amount of handling and the import volume is taken into account, a medium risk to worker safety is presented from the notified polymer.

The EASE model predicts maximal atmospheric particulate concentrations of 2-5 mg/m<sup>3</sup> during weighing and addition of powder to the mixer, but actual levels are likely to be lower where dust control measures are used (<1 mg/m<sup>3</sup>). The Australian recommended exposure standard for nuisance dust is 10 mg/m<sup>3</sup> [NOHSC 3008:(1995)], but a recommended exposure limit of 3 mg/m<sup>3</sup> has been suggested by the American Conference of Governmental Industrial Hygienists (ACGIH) for "respirable (insoluble) particulates (not otherwise regulated)".

Appropriate control measures to mitigate inhalation exposure to respirable particles of the notified polymer should be implemented. Such controls include an approved dust respirator and/or appropriate engineering controls (eg local exhaust ventilation) where airborne dusts of the notified polymer are concentrated. Dust masks have been proposed, which may be sufficient protection against dusts containing the notified polymer when weighing out and adding powder to a mixer, and would be especially important to mitigate the effects of large accidental spills involving dust generation (such as accidental spillage of the contents of a bag containing the notified polymer).

The use of dust masks, in combination with adequate general ventilation and local exhaust ventilation, will reduce the risk to reformulation workers' health. With these measures in place, high dust levels are unlikely to be reached in the workplace, and there is a low risk of adverse acute or chronic lung conditions either arising or being aggravated in exposed workers.

Building material end-users will apply these products by brush, roller or spraying. Workers exposed to the reformulated product would mostly consist of professional building workers. Dermal and inhalation exposure is possible during the use of building materials containing the notified polymer. The highest-risk exposure to products containing the notified polymer will arise where spray application is used. However, the risk presented by this kind of application is lower, as the particles are suspended in droplets of building materials, such as paint. Generally, building workers are likely to be trained in the spray application of building materials that contain solvents of much greater hazard than the notified polymer, and wear appropriate PPE. In addition, much of this kind of work is likely to be conducted in ventilated spray booths, which would reduce any potential inhalation, dermal and ocular exposure to the notified polymer.

Other categories of workers will only be exposed to the notified polymer bound within a matrix (eg plaster, plasterboard), and therefore experience a negligible risk. Likewise, a negligible risk also applies to end-users of flooring compounds containing the notified polymer.

#### PUBLIC HEALTH

The notified polymer will not be sold directly to the public, but will likely be present in products that are marketed to the public. The public will be potentially exposed to the notified polymer within building materials. However, in these states, particles of the notified polymer will be bound within an inert matrix and unavailable to cause any risk to public health. If the particles of the notified polymer were liberated (eg from building materials), they would not be present at sufficient concentrations to cause significant harm by inhalation. Therefore, the introduction of the notified polymer is unlikely to present any risk to public health for the notified uses.

## 7. ENVIRONMENTAL IMPLICATIONS

## 7.1. Exposure Assessment

### ENVIRONMENTAL RELEASE

The formulated products containing the notified polymer will be imported in 12.5 kg bags, 110 kg drums and 900 kg IBCs. These products are expected to be blended at building construction sites with other construction materials such as cement, plaster and industrial coatings prior to normal use. Release may occur from routine cleaning of mixing and application equipment, however given the association of the notified polymer with the construction materials, it is expected that it will be bound in the hardened or cured matrices.

Some residue will remain in the “empty” import drums after use. It is estimated that <0.5% of the import volume of notified polymer will remain as residue in containers containing the liquid form which will be either recycled, disposed of to licensed landfill (in the case of bags), or recycled / reused after washing. On-site wash waters are expected to be returned into the blended construction material.

Ultimately, the majority of the notified polymer is expected to be disposed of to landfill in association with the construction materials in which it is incorporated.

### ENVIRONMENTAL FATE

The results of a biodegradability test indicate (>70% DOC reduction according to OECD TG302B) indicate that the notified polymer is easily eliminated from water. In the landfill environment, the notified polymer is expected to remain immobile, due to its very high molecular weight and association with hardened or cured construction materials. Over time, the notified polymer is expected to degrade via biotic and abiotic process to form simple organic compounds.

## 7.2. Environmental Hazard Characterisation

While the notified polymer meets the PLC criteria, one environmental endpoint (aquatic invertebrates) observed in testing conducted on the notified polymer, as reported in the Material Safety Data Sheets for the products Micronal DS 5000 X and 5007 X, indicates that the notified polymer may be harmful to aquatic invertebrates. As the individual tests reports have not been sighted, it is not possible to make further comment.

<i>Endpoint</i>	<i>Result</i>	<i>Effects Observed?</i>	<i>Test Guideline</i>
Fish Toxicity	LC50 >100 mg/L	Not reported	OECD TG 203
Daphnia Toxicity	LC50 >20 mg/L	Not reported	Directive 84/449/EEC, C.2
Inhibition of Bacterial Respiration	EC20 >100 mg/L	Not reported	OECD TG 209

## 7.3. Environmental Risk Assessment

While an environmental endpoint indicates that the notified polymer may be harmful to aquatic organisms, release to the aquatic environment is not expected under the proposed use patterns. Further, the notified polymer is easily eliminated from water, and given its very high molecular weight, the notified polymer is not expected to bioaccumulate. Therefore, the notified polymer is not expected to pose an unacceptable risk to the aquatic environment.

## 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 Negligible Concern to public health when used in the proposed manner.

### 8.3. Level of Concern for the Environment

While an environmental endpoint indicates that the notified polymer may be harmful to aquatic organisms, given the lack of release to the aquatic environment, the notified 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

- Employers should implement the following engineering controls to minimise occupational exposure to the notified polymer during the application process where dust may be generated:
  - Use of LEV when handling the notified polymer in powder form
  - Application processes should be carried out in spray booths designed to include the use of LEV
  - Avoid the formation of airborne dusts
- Employers should ensure that the following personal protective equipment is used by workers to minimise occupational exposure to the notified polymer during the application where dust may be generated:
  - Use of a dust mask or respirator (adequate for respirable particle sizes) when handling notified polymer in powder form
  - Use of a mask or respirator (adequate for respirable particle sizes) while cleaning up dust residues with an industrial vacuum cleaner and emptying and cleaning of the industrial vacuum cleaner
  - Use of gloves, safety goggles and overalls
- In the interest of occupational health and safety, the following guidelines and precautions should be observed for use of the notified polymer as introduced in powder form
  - The level of atmospheric nuisance dust should be maintained as low as possible. The ASCC exposure standard for atmospheric dust is 10 mg/m<sup>3</sup> (REF).

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.

#### Disposal

- The notified polymer should be disposed of 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 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.