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

FULL PUBLIC REPORT

DP 2005

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**Director
NICNAS**

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FULL PUBLIC REPORT**DP 2005****1. APPLICANT AND NOTIFICATION DETAILS**

APPLICANT(S)

Dupont (Australia) Ltd (ABN 590 000 716 469) of 49-59 Newton Road, Wetherill Park, NSW, 2164

NOTIFICATION CATEGORY

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
 Polymer constituents
 Import volume
 Details of use

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

USA 2000

2. IDENTITY OF CHEMICAL

MARKETING NAME(S)

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MOLECULAR WEIGHT (MW)

Number Average Molecular Weight (Mn) >1000

3. COMPOSITION

PLC CRITERIA JUSTIFICATION

The notified polymer contains only low concern functional groups

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

<i>Year</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>
<i>Tonnes</i>	1-3	1-3	3-10	3-10	3-10

USE

Component of aqueous ink for imaging of woven and non-woven substrates.

5. PROCESS AND RELEASE INFORMATION

5.1. Operation Description

The ink containing the notified polymer will be imported, distributed and supplied to industrial users in sealed ink-jet toner cartridges (1-2 L) packaged in cardboard cartons.

To change the cartridge, the seal tape is removed and the cartridge placed into the printing machine or printer. The toner cartridges are designed not to release the toner until the shutter is opened or seal tape is removed.

The printing applications are typical to substrates with approximately 20-30 inches wide and 1-2 m in length. During the printing operation, the ink will be transferred onto the fabrics and firmly fixed by heat.

6. EXPOSURE INFORMATION

6.1. Summary of Environmental Exposure

The notified polymer will not be manufactured or reformulated in Australia.

Due to the packaging, environmental release of the notified polymer from cartridges during importation, transportation, storage, handling and use is unlikely. In the event of an accidental leakage, clean-up procedures are expected to efficiently remove the majority of the released notified polymer.

The ink-jet toner will be directly applied to fabric using dedicated printers. Once applied the toner will be fixed by heating. It is anticipated that 3-6% of the ink-jet toner (corresponding to up to 27 kg per annum of the notified polymer) may remain in the used cartridges that will either be sent to landfill or exported for recycling.

The majority of the polymer will share the fate of the printed textiles and either be disposed of to landfill, or incinerated at the end of its useful life. The notifier indicates that some of the printed textile may be used in the manufacture of paper or cardboard as recycled rag textile. It is anticipated that during this process the notified polymer fixed to the textile will be deposited from the paper mill wastewater treatment process and either consigned to landfill or incinerated.

Due to its expected moderate water solubility, the notified polymer is likely to be mobile in soils. However, it is unlikely to move from the landfilled printed waste material into leachate or groundwater since the majority will be bound on the textile in an inert matrix. If the polymer does enter the leachate it will be present at very low concentrations and will be released in a diffuse manner across Australia. The notified polymer will degrade through abiotic and biotic processes to water vapour and oxides of carbon and nitrogen.

Incineration of waste textile will destroy the notified polymer and will generate water vapour and oxides of carbon and nitrogen.

The polymer contains ester groups, which are unlikely to hydrolyse under ambient environmental conditions (pH 4-9). A stability test has indicated that a closely related polymer is stable at pH 2, 7 and 9. Initially, the molecular weight of the test material was determined and then samples were crushed and dissolved or dispersed in pure water to give a concentration of 1000 mg/L at pH 1.2, 2, 7 and 9. After 4 hours of agitation at 40°C in natural light the Dissolved Organic Carbon (DOC) was measured in all samples. The pH 2, 7 and 9 samples were then agitated for a further 14 days while the pH 1.2

sample was agitated for 15 days. The DOC was again measured and the samples were filtered and dried. The molecular weight of the dried material was then determined by GPC. Comparison of the DOC levels and the molecular weights did not show any significant changes, thus indicating the polymer was stable at the pH levels tested.

The notified polymer is not expected to bioaccumulate due to its high molecular weight.

6.2. Summary of Occupational Exposure

As the ink containing the notified polymer is imported in sealed cartridges packed in cardboard boxes typically plastic wrapped onto pallets, exposure to the notified polymer during transport and storage is expected to be very low. Accidental exposure through breach of packaging is possible but expected to be infrequent.

Dermal and inhalation exposure to the notified polymer may occur when replacing spent cartridges or during maintenance and cleaning of printers. However, the concentration of the notified polymer in the ink is low, and the design of the cartridges is such that exposure to the notified polymer should be low.

Worker exposure from the handling of printed substrates is expected to be negligible as the notified polymer is bound to the substrate matrix and not expected to be readily bioavailable, however, exposure could occur if the substrate is handled before the ink has dried.

6.3. Summary of Public Exposure

The notified polymer is intended only for use in industry.

There is potential for extensive public exposure to articles printed with ink containing the notified polymer, however, exposure is expected to be negligible as the notified polymer is bound to the substrate matrix and not expected to be readily bioavailable.

7. PHYSICAL AND CHEMICAL PROPERTIES

Appearance at 20°C and 101.3 kPa	Clear to slightly yellow solution
Melting Point/Glass Transition Temp	Not determined. Polymer is introduced in solution.
Density	1140 kg/m ³ (50% w/w solution of analogous polymer in tetrahydrofuran) Estimated density of solid 1100-1200 kg/m ³
Water Solubility	An analogous polymer is soluble to 0.0071% and dispersible in water up to 15% by weight.
Dissociation Constant	The notified polymer contains an anionic functionality expected to have typical acidity.
Particle Size	Not determined. Polymer is introduced in solution.
Reactivity	Stable under normal environmental conditions
Degradation Products	Combustible. Information on degradation products not supplied.

8. HUMAN HEALTH IMPLICATIONS

8.1. Toxicology

The following toxicological studies were submitted on ink containing 7.5% of an analogous polymer:

<i>Endpoint</i>	<i>Result</i>	<i>Classified?</i>	<i>Effects Observed?</i>
Skin sensitisation - LLNA.	No evidence of sensitisation	no	no
Genotoxicity - bacterial reverse mutation	Non-mutagenic	no	no

All results were indicative of low hazard.

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

No toxicological data was submitted.

9.2. Environmental Hazard Assessment

Anionic polymers 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. This may occur in the notified polymer. However, the toxicity to algae is likely to be further reduced due to the presence of calcium ions, which will bind to the functional groups. The aquatic toxicity may be expected to be relatively low.

10. RISK ASSESSMENT

10.1. Environment

The notified polymer will be imported into Australia as a component in an ink formulation in finished cartridges. Release of the polymer to the environment is not anticipated because the ink is housed in sealed cartridges, designed to prevent release until the cartridges are inserted into a printer. Ultimately most of the notified polymer in the ink will be bound to printed textiles (in stable polymer matrix formed by reaction with other ink components), which at the end of its useful life will be either buried in land fill, or incinerated.

The notified polymer in ruptured landfill cartridges will be mobile in soil thus entering the leachate or groundwater, but this will be at very low concentrations. The polymer is expected to undergo slow degradation by biotic and abiotic processes. Incineration is expected to destroy the notified polymer resulting in the release of combustion products such as water and oxides of carbon and nitrogen.

Given these considerations, the potential risk to the environment posed by the use of the polymer is low.

10.2. Occupational health and safety

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

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

Inkjet printer inks containing the notified polymer will not be available to the public. Members of the public may make dermal contact with products containing the notified polymer. However, the risk to public health will be negligible because the notified polymer is present at low concentrations, will be bound within a matrix when dried and is unlikely to be bioavailable. Additionally, similar polymers to the notified polymer have a long history of safety, and are used routinely in food packaging.

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 in inkjet printer inks.

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 inkjet printer inks.

12. MATERIAL SAFETY DATA SHEET

Material Safety Data Sheet

The notifier has provided a 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.
- Service personnel should wear cotton or disposable gloves and ensure adequate ventilation is present when removing spent printer cartridges containing the notified polymer and during routine maintenance and repairs.
- 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

- The following control measures should be implemented by the distributor to minimise environmental exposure during use of the notified polymer:
 - Clear instructions on the installation of cartridge and disposal of any spilt material or empty cartridges.

Disposal

- Spent inkjet printer cartridges, which hold the ink that contains the notified polymer, will be disposed of to domestic landfill. The textiles to which the notified polymer has been applied will be landfilled, incinerated or recycled.

Emergency procedures

- Any spills/release of the notified polymer should be soaked up with inert absorbent material and disposed of appropriately.

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.