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

FULL PUBLIC REPORT

DP2011

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 Heritage.

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Street Address:	334 - 336 Illawarra Road MARRICKVILLE NSW 2204, AUSTRALIA.
Postal Address:	GPO Box 58, SYDNEY NSW 2001, AUSTRALIA.
TEL:	+ 61 2 8577 8800
FAX	+ 61 2 8577 8888.
Website:	www.nicnas.gov.au

**Director
Chemicals Notification and Assessment**

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FULL PUBLIC REPORT**DP2011****1. APPLICANT AND NOTIFICATION DETAILS**

APPLICANT(S)

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

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 and Structural Formulae, Molecular Weight, Polymer Constituents, Use Details, and Import Volume.

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)

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Artistri P794 Black Pigment Ink (<10% notified polymer)

MOLECULAR WEIGHT (MW)

Number Average Molecular Weight (Mn) >1000

3. COMPOSITION

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
No Substantial Degradability	Yes
Not Water Absorbing	Yes
Low Concentrations of Residual Monomers	Yes
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	1-3	1-3	1-3

USE

As an ink resin at <10% in aqueous formulations supplied in non-refillable cartridges ready for use in industrial printing of flexible and textile substrates.

5. PROCESS AND RELEASE INFORMATION

5.1. Operation Description

No manufacturing, reformulation, filling or refilling of cartridges will occur in Australia. When replacing ink cartridges, workers of design/fashion houses will follow replacement procedures recommended by the manufacturer. This involves using a disposable polyethylene glove to remove the seal tape and insert the cartridge (usually 1-2 L) into a printer cradle. Spent cartridges will be disposed of with industrial waste to landfill or incineration.

After printing the fabric is air-dried and heated to approximately 130-150°C enabling the ink to enter the fabrics' polymer structure, and the polymer is expected to be permanently anchored on cooling. The printed fabric is then washed and dried to remove any sizing and sent to garment or homewares manufacturing.

6. EXPOSURE INFORMATION

6.1. Summary of Environmental Exposure

Release of the notified polymer to the environment during shipping, transportation, and warehousing of inkjet cartridges would only occur through accidental spills or leaks of the packed product, yet this should be limited to single 1-2 L units. When spills occur, the ink will be contained and collected with absorbent material such as paper waste or vermiculite, dried and sent to landfill or incineration.

Under normal use, the notified polymer could potentially be released during disposal of spent cartridges and ink waste from the printing process. It is estimated that 2-6% of the total volume will remain in the used cartridges and expected to be disposed in landfill or incinerated together with consumer or business waste. This residual dye is absorbed onto foam contained within the cartridge and can only be removed if the integrity of the cartridge is compromised. Release during printing process would be <2%, essentially from coverage of non-image areas and start-up and selvage edges. After heat fixing, the cloth will be trimmed and trimmings will sent to recycling as fibres used in paper manufacture, upholstery padding or fibre stuffing that may eventually be destined to landfill after these secondary uses. Trimmings from clothing or homeware manufacture will be treated similarly. Hence, the total waste ink from all sources including clean up and repair is estimated between 4-8% of the total ink imported.

During heat treatment of the printed fabric associated amines from the ink will volatilise leaving trace amounts in the fabric to be removed by washing. The printed material at the end of its useful life will be either recycled or sent to landfill while those used in fine paper may be incinerated as mill sludge.

Overall, the notified polymer is expected to be used in a diffuse pattern and has a limited release to the environment through landfill of fabric remnants or secondary use of printed fabric fibres. It is hydrolytically stable and not expected to be readily biodegradable. Therefore, when released the notified polymer would associate with aquatic sediments and organic phase of soils where it will slowly degrade to simple carbon compounds. In addition, its high molecular weight inhibits the passage through biological membranes required to effect bioaccumulation. The amines are primarily lost to air and thus there should not be a significant source of amine release to water to cause a concern for fish and invertebrates.

6.2. Summary of Occupational Exposure

During transport and storage, workers are unlikely to be exposed to the notified polymer except when packaging is accidentally breached.

The notified polymer will be imported in pre-packed ink cartridges. Dermal and inhalation exposure to the notified polymer may occur when replacing spent cartridges and servicing the 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.

6.3. Summary of Public Exposure

The notified polymer will not be available to the public. Members of the public may come into contact with printed products containing the notified polymer. The ink coverage deposited on the fabric will vary depending upon the image being printed, typically 50-100%. Once dried, the notified polymer will be bound within the matrix of substrates and become inert.

7. PHYSICAL AND CHEMICAL PROPERTIES

Appearance at 20°C and 101.3 kPa	Clear to light yellow polymer solution
Melting Point/Glass Transition Temp	Not determined. The notified polymer is supplied only in an aqueous dispersion.
Density	1100-1200 kg/m ³ (estimated)
Water Solubility	>10 g/L
Dissociation Constant	The aqueous dispersion of the notified polymer contains groups which may dissociate at pH >5.8.
Reactivity	Stable under normal environmental conditions
Degradation Products	CO, CO ₂ , acrylate monomers, and hydrocarbons

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

No toxicological data were submitted.

Based on IUCLID Dataset (2000), the associated amine has a low acute toxicity to fish (96 h LC50 = 100-200 mg/L for *Leuciscus idus* and 81 mg/L for *Pimephales promelas*) and invertebrates (48 h EC50 = 98.77 mg/L for *Daphnia magna*), and a moderate acute toxicity to algae (72 h EC50 = 35 mg/L for *Scenedesmus subspicatus*).

9.2. Environmental Hazard Assessment

Anionic polymers are known to be moderately toxic to algae. The mode of toxic action is overchelation of nutrient elements needed by algae for growth. The highest toxicity is when the acid is on alternating carbons of the polymer backbone. Whether this applies to the notified polymer is unclear. 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 (Nabholz et al 1993).

10. RISK ASSESSMENT

10.1. Environment

No significant aquatic exposure is anticipated during end use of the notified polymer as a component of heat set fabric dyes. Due to the accuracy and efficiency of the ink application

technology used, there will be negligible residual ink resulted from cleaning of the printing equipment. The total waste ink is estimated to be 4-8% of the imported volume with 2-6% as cartridge residues and <2% resulted from printing application. It is also expected that practically all of the waste generated from secondary usage will be disposed of in approved landfills as inert solid waste.

The notified polymer is considered to have a low environmental hazard based on its ability to bind to metal ions of clay, soil and sediments and its large molecular size which limits the crossing of cell boundaries.

Given the dispersed use pattern of the products containing the notified polymer, the significant levels of control preventing escape in application process, and the expected low probability of the polymer entering the aquatic phase, the risk to the environment is considered low.

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

Finished inks will be imported for use in industrial textile printing by professional printers. Members of the public will not come in contact with the textile coloured with the ink until after the ink has been permanently heat set into the textile and unlikely to be bioavailable. Hence, the risk to public health is considered low.

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.

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

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.

- In the interest of occupational health and safety, the following guidelines and precautions should be observed for use of the notified polymer as introduced as an ink resin at <10% in aqueous formulations:
 - Wearing cotton or disposable gloves and ensuring adequate ventilation during replacement of inkjet cartridges, machine maintenance and repair services;
 - Adequate induction and training programs for service personnel.
- 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 waste containing the notified polymer should be incinerated or disposed of to landfill according to Local and State government regulations. Use only approved waste management contractors.
- Spill containment containers or contaminated containers can be re-used after cleaning or sent to local recycling or waste disposal facilities.

Emergency procedures

- Spills/release of the notified polymer should be contained and collected with adsorbent materials such as sand, vermiculite or paper, and placed into a suitable container for disposal. Do not allow spills to enter watercourses or drain.

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.

14. BIBLIOGRAPHY

Nabholz JV, Miller P & Zeeman M (1993) Environmental risk assessment of new chemicals under the Toxic Substances Control Act (TSCA) Section Five. In: Landis WG, Hughes JS & Lewis MA ed. Environmental toxicology and risk assessment. Philadelphia, PA, American Society for Testing and Materials, ASTM STP 1179.

IUCLID (2000) Dataset. European Chemicals Bureau, European Commission.