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

FULL PUBLIC REPORT

Polymer #2010L

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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**Director
NICNAS**

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FULL PUBLIC REPORT**Polymer #2010L****1. APPLICANT AND NOTIFICATION DETAILS**

APPLICANT(S)

Hewlett Packard Australia Pty Ltd (ABN: 74 004 394 763) of 3 Richardson Place North Ryde NSW 2113.

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 and Structural Formulae, Molecular Weight, Polymer Constituents, Purity, Identity Hazardous and Non-Hazardous Impurities, Identity and Percentage Weight of Additives/Adjuvants, Spectral Data, Import Volume, Concentration in Ink, and Identity of sites.

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)

No

NOTIFICATION IN OTHER COUNTRIES

No

2. IDENTITY OF CHEMICAL

MARKETING NAME(S)

Polymer #2010L

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**Appearance at 20°C and 101.3 kPa**

White solid or flake

Melting Point/Freezing Temp

> 360 ± 0.5°C, by differential scanning calorimetry, using ASTM E537-86, Method A1 of Commission Directive 92/69/EEC.

Density

1.23 at 19.4 ± 0.5°C using a gas comparison pycnometer, Method A3 of Commission Directive

| | |
|------------------------------|---|
| Water Solubility | 92/96/EEC In the range of 28.9-30.0% w/w of solution at $20.0 \pm 0.5^\circ\text{C}$, based on the flask method A6 of Commission Directive 92/69/EEC. The water solubility was estimated based on visual inspection due to high solubility producing unfilterable mixtures. |
| Dissociation Constant | Not determined. Dissociation constants of 4.93 ± 0.23 and 4.54 ± 0.50 have been estimated using ACD software. |
| Particle Size | The proportion of test material having an inhalable particle size less than $100\ \mu\text{m}$ was 0.4%. The test material has been determined to be essentially non-inhalable. |
| Reactivity | Stable under normal conditions. |
| Degradation Products | According to the monomer composition, the notified polymer is considered to be stable for depolymerization, photodegradation and thermal degradation. For hydrolysis properties, when the notified polymer is treated with aqueous acid, such as hydrochloric acid, potassium carboxylate group undergoes hydrolysis to carboxylic acid. But main chain structures are considered to be approximately stable. |

Partition and adsorption coefficient determination could not be carried out as the test material exhibited the properties of a surfactant. The notified chemical contains no functional groups that are prone to hydrolysis. Therefore, the notified chemical can be expected to be hydrolytically stable under environmentally relevant conditions at pH 4. The determination at pH 7 and pH 9 also showed no hydrolysis throughout testing.

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>Kilograms</i> | 100 | 100 | 200 | 200 | 250 |

USE AND MODE OF INTRODUCTION AND DISPOSAL

Mode of Introduction

The notified polymer will be imported as a component of inkjet printing inks in pre-packed cartridges. The inks will contain < 2% of the notified polymer. The volume of the inkjet cartridge ranges from 30 – 790 mL.

Reformulation/manufacture processes

No reformulation or repackaging of the imported product containing the notified polymer occurs in Australia. Sealed ink cartridges containing the notified polymer will be handled by service technicians or office workers or the public, who will replace spent cartridges in the printers as necessary. The ink cartridges containing the notified polymer are designed for a single use, and will not be refilled.

Use

Component of printing inks.

6. HUMAN HEALTH IMPLICATIONS

6.1. Exposure Assessment

OCCUPATIONAL EXPOSURE

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

Dermal and inhalation exposure at a maximum concentration of 2% to worker to the notified polymer will potentially occur when replacing spent cartridges and clearing paper jams from the printers. However, the concentration of the notified polymer in the toner is low, and the design of the cartridges is such that exposure to the notified polymer would be limited to a very small amount of dermal and inhalation exposure.

Users of the printers may also be exposed to the notified polymer during handling of printed paper, however, the notified polymer is bound to the paper matrix and not expected to be readily bioavailable except if the paper or other substrate is handled before the ink has dried.

PUBLIC EXPOSURE

The sealed ink cartridge containing the notified polymer will be used in printing kiosks at the shopping malls. The public could be exposed from use of the kiosks if they handle the prints before they are adequately dry. However, the risk to public health will be negligible because the notified polymer is present at low concentrations and unlikely to be bioavailable, once incorporated into a printed image.

6.2. Toxicological Hazard Characterisation

The notifier provided a genotoxicity study which is conducted in accordance with the Standards for Mutagenicity Tests using Microorganisms and Guidelines for Toxicity Testings of New Chemical Substances in Japan. The test was performed with 5 strains of bacteria (TA 98, 100, 1535, 1537 and FC WP2uvrA) at doses up to 5000 µg per plate. Negative results were showed with and with metabolic activation with the highest dose.

The MSDS for the notified chemical indicates it is not irritant to the skin and eyes and no known sensitisation effects.

The notified polymer contains five hazardous residual monomers to which dermal and inhalation exposure could occur. However, the concentrations of the hazardous residual monomers in the inks are < 0.1%.

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 minimal exposure to workers and the low intrinsic hazard of the polymer which is supported by the available data. The presence of hazardous residual monomers is not considered to present a significant risk to workers due to the low concentration in the ink (< 0.1%).

PUBLIC HEALTH

The notified polymer will not be available to the public. Members of the public may make dermal contact with inks containing the notified polymer. However, the risk to public health will be negligible because the notified polymer is of low hazard, present at low concentrations and is unlikely to be bioavailable once the ink has dried.

7. ENVIRONMENTAL IMPLICATIONS

7.1. Exposure Assessment

ENVIRONMENTAL RELEASE

Environmental release of the notified polymer is summarised in the following table.

| <i>Source of release</i> | <i>% Volume</i> | <i>Released to / Fate</i> |
|---|-----------------|---|
| Residual notified polymer in cartridges | ≤10% | Incinerated at Cartridge Recycling Facilities |
| Notified polymer on printed paper | ≤60% | Sewer |
| Notified polymer on printed paper | ≥30% | Landfill |

ENVIRONMENTAL FATE

Given the presence of anionic functionality, the notified polymer disposed of to landfill is expected to associate with soil and organic material and should be immobile within the landfill environment. Over time, the notified polymer is expected to degrade by biotic and abiotic means to form simple organic compounds.

The notified polymer on printed paper sent for recycling, which is not removed during recycling is expected to be released via the trade sewer where the majority will be absorbed to sludge. Any remaining polymer that enters the aquatic environment is expected to eventually associate with soil and sediment, and overtime degrade via biotic and abiotic processes to form simple organic compounds.

7.2. Environmental Hazard Characterisation

No ecotoxicological data were submitted. 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. This could apply to 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.

7.3. Environmental Risk Assessment

The notified polymer is imported into Australia in recyclable print cartridges. During recycling, it is expected that up to 10% residual notified polymer will be destroyed by incineration. Following use, printed paper may be disposed of directly to landfill or recycled. Assuming that all printed paper is sent for recycling, up to 60% of the total volume of notified polymer may be released to the aquatic environment via the trade sewer. The remainder is expected to be disposed of to landfill.

Using a worst case scenario without removal in sewage treatment plants, the following PEC has been calculated.

| Predicted Environmental Concentration (PEC) for the Aquatic Compartment | | |
|---|--------|--------------|
| Annual quantity of chemical released to sewer | 150 | kg/year |
| Days per year where release occurs | 365 | days/year |
| Daily chemical release: | 0.41 | kg/day |
| Water use | 200.0 | L/person/day |
| Population of Australia (Millions) | 20.496 | million |
| Daily effluent production: | 4,099 | ML |
| Dilution Factor - River | 1.0 | |
| Dilution Factor - Ocean | 10.0 | |
| PEC - River: | 0.10 | µg/L |
| PEC - Ocean: | 0.01 | µg/L |

As no ecotoxicity data are available, a PNEC and resultant Risk Quotient (Q) are unable to be calculated. However, given the low volume and diffuse release pattern, the overall environmental risk is expected to be 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 Negligible 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.
- A revised product MSDS with the following amendments need to be provided to NICNAS:
 - i) Statement of Hazardous Nature i.e. "Hazardous/Non-hazardous According to NOHSC Approved Criteria".
 - ii) Emergency Telephone Number in Australia.
- 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

- 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 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.