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

FULL PUBLIC REPORT

NEJI-4 Polymer in EPSON Ink Cartridges

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**NEJI-4 Polymer in EPSON Ink Cartridges****1. APPLICANT AND NOTIFICATION DETAILS**

APPLICANT(S)

EPSON Australia Pty Ltd (ABN 91 002 625 783)
3 Talavera Road
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 and Residual Monomers/Impurities.

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)

LVC/475 and LVC/699

NOTIFICATION IN OTHER COUNTRIES

U.S. EPA in 2003

2. IDENTITY OF CHEMICAL

MARKETING NAME(S)

NEJI-4

MOLECULAR WEIGHT (MW)

Number Average Molecular Weight (Mn) >10000 Da

Reactive Functional Groups

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

Appearance at 20°C and 101.3 kPa	Dispersion in aqueous solution, the notified polymer is not isolated within Australia
Melting Point/Glass Transition Temp	Not determined (Present as a dispersion in an aqueous solution)
Density	1400 kg/m ³
Water Solubility	Claimed to be <1 mg/L at 20°C as “dissolved organic carbon value” at pH 2, 7 and 9, which is consistent with the largely hydrophobic structure.
Dissociation Constant	The notified polymer contains anionic functionality with typical acidity of pKa ≈ 5.
Particle Size	100% less than 10 µm with an average particle size for the notified polymer of 102.8 nm.
Reactivity	Stable under normal environmental conditions
Degradation Products	None under normal conditions of use. While the notified polymer contains hydrolysable functionality, this is not expected to occur within the environmental pH range of 4-9.

5. INTRODUCTION AND USE INFORMATION

Maximum Introduction Volume of Notified Chemical (100%) Over Next 5 Years

Year	1	2	3	4	5
Tonnes	<1	<1	<1	<1	<1

Use

The notified polymer is a component of printer ink for use in inkjet printer cartridges.

Mode of Introduction and Disposal

The notified polymer will be imported in sealed inkjet printer cartridges at concentrations of <2%. No manufacture or reformulation of the notified polymer will take place within Australia.

6. HUMAN HEALTH IMPLICATIONS

Hazard Characterisation

No toxicological data were submitted. The notified polymer meets the PLC criteria and can therefore be considered to be of low hazard. The notified polymer is however, a high molecular weight, insoluble polymer and inhalation of respirable particles (<10µm) of this class of polymers has been linked with irreversible lung damage. This lung damage has been attributed to lung overloading and impaired clearance of the lungs.

Occupational Health and Safety Risk Assessment

There is no manufacture or reformulation of the notified polymer within Australia.

Dermal and inhalation exposure to the notified polymer may occur when replacing spent cartridges. 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. As such the risk of lung overloading from inhalation of the notified polymer is also considered to be low. Once the ink dries, the chemical would be trapped in the printed paper, and therefore dermal exposure to the notified chemical from contact with the dried ink is not expected.

Overall, 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.

Public Health Risk Assessment

The scenarios by which the public may be exposed to the notified chemical would involve home use of printers, and are similar to those for office workers. However, it is expected that the public will be using the printer less often than workers.

The risk to public health presented by the notified polymer is expected to be low due to its intrinsic low toxicity, low concentration in the printer ink and low potential for exposure.

7. ENVIRONMENTAL IMPLICATIONS

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 possibly applies to the notified polymer. Further, the toxicity to algae is likely to be reduced due to the presence of calcium ions, which will bind to the functional groups.

Environmental Risk Assessment

The notified polymer will be imported in sealed cartridges. There will be no release to the environment due to reformulation or repackaging. The ink cartridges are designed to prevent leakage and will not be opened during transport, use, installation or replacement. Therefore, release of ink containing the notified polymer to the environment is not expected under normal conditions. However, if leakage or spillage does occur, the ink will be contained with absorbent material, which will presumably be disposed of in landfill in the normal office garbage along with the empty cartridges and print heads.

The sealed cartridges are contained within the printer until they are removed for disposal or recycling. Residual ink (< 5%) left in empty cartridges will most likely be disposed of to landfill.

Most of the notified polymer will be bound to printer paper, which will be disposed of to landfill, recycled or incinerated. Recycling of treated paper may result in the release of a proportion of the notified polymer to the aquatic compartment. Waste paper is repulped using a variety of polymer treatments, which result in fibre separation and ink detachment from the fibres. The wastes are expected to go to trade waste sewers where a major proportion may be absorbed to sludge due to low solubility. Any remaining polymer that enters the aquatic environment is expected to eventually associate with soil and sediments, and overtime degrade via biotic and abiotic processes to form simple organic compounds. Due to the low percentage of notified polymer in the ink and the widespread use, release to the aquatic compartment will be highly diluted. The notified polymer adsorbed to sludge during the recycling process will be disposed of to landfill.

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

As no ecotoxicity data are available, a PNEC and resultant Risk Quotient (Q) are unable to be calculated. However, given the likely low ecotoxicity together with the low volume and diffuse release pattern, there should be an adequate safety margin and the overall environmental risk is expected to be acceptable.

8. CONCLUSIONS AND RECOMMENDATIONS

Human health risk assessment

Under the conditions of the occupational settings described, the notified polymer is not considered to pose an unacceptable risk to the health of workers.

When used in the proposed manner, the notified polymer is not considered to pose an unacceptable risk to public health.

Environmental risk assessment

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

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 *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.

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.

Regulatory Obligations

Secondary Notification

This risk assessment is based on the information available at the time of notification. The Director may call for the reassessment of the chemical under secondary notification provisions based on changes in certain circumstances. Under Section 64 of the *Industrial Chemicals (Notification and Assessment) Act (1989)* the notifier, as well as any other importer or manufacturer of the notified chemical, have post-assessment regulatory obligations to notify NICNAS when any of these circumstances change. These obligations apply even when the notified chemical is listed on the Australian Inventory of Chemical Substances (AICS).

Therefore, the Director of NICNAS must be notified in writing within 28 days by the notifier, other importer or manufacturer:

- (1) Under Section 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 Section 64(2) of the Act; if
 - the function or use of the chemical has changed from a component of printer ink for use in inkjet printer cartridges, or is likely to change significantly;
 - the amount of chemical being introduced has increased from 1 tonne, or is likely to increase, significantly;
 - if the chemical has begun to be manufactured in Australia;
 - additional information has become available to the person as to an adverse effect of the chemical on occupational health and safety, public health, or the environment.

The Director will then decide whether a reassessment (i.e. a secondary notification and assessment) is required.

No additional secondary notification conditions are stipulated.

Material Safety Data Sheet

The MSDS of products containing the notified polymer provided by the notifier were reviewed by NICNAS. The accuracy of the information on the MSDS remains the responsibility of the applicant.