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NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME (NICNAS)

PUBLIC REPORT

Dispersant in HP Designjet Commercial and Industrial Printer Inks

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 Sustainability, Environment, Water, Population and Communities.

For the purposes of subsection 78(1) of the Act, this Public Report may be inspected at our NICNAS office by appointment only at Level 7, 260 Elizabeth Street, Surry Hills NSW 2010.

This 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

TABLE OF CONTENTS

SUMMARY

The following details will be published in the NICNAS *Chemical Gazette:*

ASSESSMENT REFERENCE	APPLICANT(S)	CHEMICAL OR TRADE NAME	HAZARDOUS CHEMICAL	INTRODUCTION VOLUME	USE
LTD/1619	Hewlett-Packard Australia Pty Limited	Dispersant in HP Designjet Commercial and Industrial Printer Inks	ND*	≤ 0.3 tonnes per annum	Component of commercial and industrial printer inks contained in sealed cartridges

*ND = not determined

CONCLUSIONS AND REGULATORY OBLIGATIONS

Hazard classification
As no toxicity data were provided, the notified polymer cannot be classified according to the *Globally Harmonised System for the Classification and Labelling of Chemicals (GHS),* as adopted for industrial chemicals in Australia, or the *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 2004).

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

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

Environmental risk assessment
On the basis of the PEC/PNEC ratio and the assessed use pattern, the notified polymer is not considered to pose an unreasonable risk to the environment.

Recommendations

CONTROL MEASURES
Occupational Health and Safety

Guidance in selection of personal protective equipment can be obtained from Australian, Australian/New Zealand or other approved standards.

- Printer operators and service personnel should wear 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 (M)SDS should be easily accessible to employees.

- If products and mixtures containing the notified polymer are classified as hazardous to health in accordance with the *Globally Harmonised System for the Classification and Labelling of Chemicals (GHS)* as adopted for industrial chemicals in Australia, workplace practices and control procedures consistent with provisions of State and Territory hazardous substances legislation should be in operation.

Disposal

- The notified polymer should be disposed of to landfill.

Emergency procedures

- Spills 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 polymer 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 importation volume exceeds one tonne per annum notified polymer;

or

(2) Under Section 64(2) of the Act; if
- the function or use of the polymer has changed from a component of commercial and industrial printer inks contained in sealed cartridges, or is likely to change significantly;
- the amount of polymer being introduced has increased from 300 kg per annum, or is likely to increase, significantly;
- the polymer has begun to be manufactured in Australia;
- additional information has become available to the person as to an adverse effect of the polymer 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 (M)SDS of a product containing the notified polymer provided by the notifier was reviewed by NICNAS. The accuracy of the information on the (M)SDS remains the responsibility of the applicant.

ASSESSMENT DETAILS

1. APPLICANT AND NOTIFICATION DETAILS

APPLICANT(S)
Hewlett-Packard Australia Pty Limited (ABN 74 004 394 763)
353 Burwood Highway
FOREST HILLS VIC 3131

NOTIFICATION CATEGORY
Limited-small volume: Synthetic polymer with Mn <1000 Da (1 tonne or less per year).

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, analytical data, degree of purity, import volume and analogue details.

VARIATION OF DATA REQUIREMENTS (SECTION 24 OF THE ACT)
Variation to the schedule of data requirements is claimed for all physico-chemical properties.

PREVIOUS NOTIFICATION IN AUSTRALIA BY APPLICANT(S)
None

NOTIFICATION IN OTHER COUNTRIES
None

2. IDENTITY OF CHEMICAL

MARKETING NAME(S)
HP Designjet Commercial and Industrial Printer Ink (contains < 2% notified polymer)

3. COMPOSITION

DEGREE OF PURITY 70-80%

4. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE AT 20 °C AND 101.3 kPa: Slightly hazy yellow liquid

Property	Value	Data Source/Justification
Melting Point/Freezing Point	Not determined	Imported as an aqueous solution.
Boiling Point	680 °C at 101.3 kPa	Calculated* using MPBPVP v 1.43 adapted Stein and Brown method (US EPA, 2011))
Density	1,125 kg/m^3 at 25 °C	(M)SDS
Vapour Pressure	5.22×10^{-20} kPa at 25 °C	Calculated* using MPBPVP v 1.43 modified Grain method (US EPA, 2011)
Water Solubility	0.837 g/L at 25 °C	Calculated* using WSKOW v1.42 (US EPA, 2011). Expected to be dispersible in water due to its surfactant properties.
Hydrolysis as a Function of pH	Not determined	Contain hydrolysable functionality. However, significant hydrolysis is not expected under environmental conditions (pH 4-9).
Partition Coefficient (n-octanol/water)	logPow = -0.74 at 25 °C	Calculated* using KOWWIN v1.68 (US EPA, 2011). Expected to partition to the interface between octanol and water due to its surfactant properties.
Adsorption/Desorption	$\log K_{oc}$ = 0.19, 3.5	Calculated* using KOCWIN v2.00 with the Kow and MCI methods, respectively (US EPA, 2011). Expected to partition to phase boundaries based on its surfactant properties.
Dissociation Constant	Not determined	The notified polymer is a salt and is expected to be ionised under environmental conditions (pH 4-9).
Particle Size	Not determined	Imported as an aqueous solution.
Flash Point	Not determined	Imported as an aqueous solution.
Flammability	Not determined	Imported as an aqueous solution.
Autoignition Temperature	Not determined	Not expected to undergo autoignition.
Explosive Properties	Not determined	The structural formula contains no explosophers.
Oxidising Properties	Not determined	Contains no functional groups that would imply oxidative properties.

* Calculated on a low molecular weight representative structure of the notified polymer.

DISCUSSION OF PROPERTIES

Reactivity
The notified polymer is expected to be stable under normal conditions of use.

Physical hazard classification
Based on the submitted physico-chemical data depicted in the above table, the notified polymer is not recommended for hazard classification according to the *Globally Harmonised System for the Classification and Labelling of Chemicals (GHS),* as adopted for industrial chemicals in Australia.

5. INTRODUCTION AND USE INFORMATION

MODE OF INTRODUCTION OF NOTIFIED CHEMICAL (100%) OVER NEXT 5 YEARS
The notified polymer will be imported as a component (< 2%) of printer inks.

MAXIMUM INTRODUCTION VOLUME OF NOTIFIED CHEMICAL (100%) OVER NEXT 5 YEARS

Year	*1*	*2*	*3*	*4*	*5*
Tonnes	≤ 0.3	≤ 0.3	≤ 0.3	≤ 0.3	≤ 0.3

PORT OF ENTRY
Melbourne and Sydney

IDENTITY OF MANUFACTURER/RECIPIENTS
Recipients are located throughout Australia and include commercial and industrial printeries.

TRANSPORTATION AND PACKAGING
The notified polymer will be imported as a component of ink in either printhead (25 mL or 100 mL capacity) or ink cartridges (775 mL or 5000 mL capacity). They will be transported by road to the notifier's warehouse and then redistributed by road to printing houses.

USE
Component (< 2%) of commercial and industrial printer inks.

OPERATION DESCRIPTION
No reformulation or repackaging of the notified polymer will occur in Australia. The cartridges containing the notified polymer at < 2% concentration will be delivered to the end-user in the same form in which they are imported. The cartridges will be installed into printers by printer operators and service technicians. Printing will be largely enclosed and automated.

6. HUMAN HEALTH IMPLICATIONS

6.1. Exposure Assessment

6.1.1. Occupational Exposure

CATEGORY OF WORKERS

Category of Worker	*Exposure Duration (hours/day)*	*Exposure Frequency (days/year)*
Transport and storage	4-8	200
Service technicians	8	200
Printer operators	0.5	5

EXPOSURE DETAILS
Exposure to the notified polymer during the importation, transport and storage of the printer is not expected, except in the unlikely event of an accident where the packaging may be breached.

Both printer operators and service technicians may be exposed (dermal or ocular) to the notified polymer in inks at < 2% concentration while changing printer cartridges, and service technicians may additionally be

exposed during printer maintenance. Dermal exposure is expected to be minimised through the use of chemical resistant gloves.

Dermal exposure of workers to the notified polymer from dried inks on printed substrates is expected to be minimal, as the notified polymer will be largely trapped within the matrix of the dried ink.

Inhalation exposure is not expected based on design of the printer and low volatility.

6.1.2. Public Exposure

The cartridges containing the notified polymer will not be sold to the public. Once released onto the substrate and dry, the notified polymer is expected to remain bound to the substrate print matrix. Hence public exposure to the notified polymer is not expected.

6.2. Human Health Effects Assessment

No toxicity data were submitted.

The notified polymer is of low molecular weight (< 1000 Da) with a high proportion of low molecular weight species < 500 Da and is a surfactant; hence absorption across biological membranes and systemic toxicity cannot be ruled out.

The notified polymer contains a structural alert for irritation/corrosion (Hulzebos, 2005).

6.3. Human Health Risk Characterisation

6.3.1. Occupational Health and Safety

The notified polymer has the potential to be irritating or corrosive. Systemic effects cannot be ruled out.

Printer operators and service technicians may be exposed to the inks containing < 2% notified polymer. Given the low concentration the risk of irritant or systemic effects from the notified polymer is expected to be low. Furthermore, exposure is expected to be limited by the inks being contained within sealed cartridges and the enclosed and automated printing process. The expected use of chemical resistant gloves should further reduce the risk from exposure.

Overall the risk to workers from use of the notified polymer in printing inks at < 2% concentration contained within sealed cartridges is not considered to be unreasonable.

6.3.2. Public Health

The inks containing the notified polymer at < 2% will not be sold to the public. The public may come into contact with the dried printed materials; however once the inks are cured and dried the notified polymer will be bound in the print matrix and will not be bioavailable. Therefore, when used in the proposed manner, the risk to public health from the notified polymer is not considered to be unreasonable.

7. ENVIRONMENTAL IMPLICATIONS

7.1. Environmental Exposure & Fate Assessment

7.1.1. Environmental Exposure

RELEASE OF CHEMICAL AT SITE

The notified polymer will be imported as a component of ink in sealed cartridges and transported to printing houses in the original import containers. No release of the notified polymer to the environment is expected from manufacture, reformulation and repacking as these activities will not occur in Australia.

RELEASE OF CHEMICAL FROM USE

Release of the notified polymer to the environment from use will be accidental spills (up to 0.3% of the annual import volume) and washings from printing equipment cleaning. Spills and washings are expected to be collected and disposed of to landfill. The notified polymer is likely to be stable within an inert ink matrix adhering to substrates and is not expected to be released to the environment once cured.

RELEASE OF CHEMICAL FROM DISPOSAL

Following its use as a component of ink for printing on paper, canvas, shade cloth and a variety of other substrates, the notified polymer is anticipated to share the fate of printed articles and is expected to be disposed of to landfill or be recycled when used on paper. Half amount of the total import volume of the notified polymer is expected to be released in sewage with the recycling of the used paper. Residues of the notified polymer in empty containers (up to 2% of the annual import volume) are expected to be disposed of to landfill along with the containers.

7.1.2. Environmental Fate

No data for the environmental fate of the notified polymer were submitted. The notified polymer is expected to be disposed of to landfill along with printed articles or may be subjected to paper recycling processes. During paper recycling processes, waste paper is repulped using a variety of chemical agents which, amongst other things, enhance detachment of ink from the fibres. The notified polymer may partition to the supernatant water, which is expected to be released to the sewer, based on its predicted water solubility (0.837 g/L). The notified polymer is likely to be removed from the sewage treatment plants (STPs) influent due to its estimated biodegradability, based on analogue data (Madsen et al. 2001). Due to its surface activity, a portion of the notified polymer may partition to sludge during paper recycling and STPs processes. Sludge containing the notified polymer is expected to be disposed of to landfill or applied to soil for remediation of agricultural land. In landfill or soil, the notified polymer may leach due to its predicted water solubility. Notified polymer released to surface waters is expected to disperse and degrade. The potential for the notified polymer to bioaccumulate is low due to its surface activity and expected biodegradability. In soil or water, the notified polymer is expected to degrade to form water and oxides of carbon, and inorganic salts.

7.1.3. Predicted Environmental Concentration (PEC)

The predicted environmental concentration (PEC) can be estimated as outlined below. For the worst case scenario, it is assumed that all of the annual import ink containing the notified polymer will be applied to paper and 50% of the notified polymer will be released to sewage during recycling of the used paper. For the worst case scenario, it is assumed that the notified polymer is not removed from influent during STPs processes. It was assumed that release of the notified polymer occurs over 260 days per annum corresponding to release only on working days.

Predicted Environmental Concentration (PEC) for the Aquatic Compartment		
Total Annual Import/Manufactured Volume	300	kg/year
Proportion expected to be released to sewer	50%	
Annual quantity of chemical released to sewer	150	kg/year
Days per year where release occurs	260	days/year
Daily chemical release:	0.58	kg/day
Water use	200.0	L/person/day
Population of Australia (Millions)	22.613	million
Removal within STP	0%	
Daily effluent production:	4,523	ML
Dilution Factor - River	1.0	
Dilution Factor - Ocean	10.0	
PEC – River:	0.13	µg/L
PEC – Ocean:	0.01	µg/L

STP effluent re-use for irrigation occurs throughout Australia. The agricultural irrigation application rate is assumed to be 1000 L/m^2/year (10 ML/ha/year). The notified polymer in this volume is assumed to infiltrate and accumulate in the top 10 cm of soil (density 1500 kg/m^3). Using these assumptions, irrigation with a concentration of 0.128 µg/L may potentially result in a soil concentration of approximately 0.850 µg/kg. Assuming accumulation of the notified polymer in soil for 5 and 10 years under repeated irrigation, the concentration of notified polymer in the applied soil in 5 and 10 years may be approximately 4.25 µg/kg and 8.50 µg/kg, respectively. However, given the expected degradation and mobility of the notified polymer, these values should be considered as theoretical maximum concentrations only.

7.2. Environmental Effects Assessment

No ecotoxicity data for the notified polymer were submitted. The estimated ecotoxicological results of fish, daphnia and algae, based on data for analogue surfactants (Madsen et al. 2001), are summarised in the table below.

Endpoint	*Result*	*Assessment Conclusion*
Fish Toxicity	LC50 (96 h) ≥ 1 mg/L	Toxic to fish
Daphnia Toxicity	EC50 (96 h) ≥ 1 mg/L	Toxic to aquatic invertebrates
Algal Toxicity	EC50 (72 h) ≥ 4 mg/L	Toxic to algae

The notified polymer and the analogue can be considered to belong to the similar anionic surfactant groups based on their structures and functional groups. Therefore, the ecotoxicological endpoints measured for the analogue are considered acceptable for the purpose of regulatory risk assessment. However, as the toxicity of these surfactants is expected to vary with surfactant tail length and structure, these endpoints are not expected to be entirely representative for the purposes of classification under the Globally Harmonised System of Classification and Labelling of Chemicals (GHS; United Nations, 2009).

7.2.1. Predicted No-Effect Concentration

The predicted no-effect concentration (PNEC) was calculated using the lower limit for the endpoint for fish toxicity (LC50 (96 h)) of the analogue and an assessment factor of 1000, as the endpoints for three trophic levels are estimated based on analogue data.

Predicted No-Effect Concentration (PNEC) for the Aquatic Compartment		
LC50 (aquatic biota)	1.00	mg/L
Assessment Factor	1,000	
PNEC:	1.00	µg/L

7.3. Environmental Risk Assessment

The risk quotients (Q = PEC/PNEC) are calculated below:

Risk Assessment	***PEC µg/L***	***PNEC µg/L***	***Q***
Q - River:	0.13	1	0.128
Q - Ocean:	0.01	1	0.013

The notified polymer is an anionic surfactant. These types of the surfactants tend to be toxic for aquatic species. However, based on its annual imported amount and use pattern, the Risk Quotients (Q = PEC/PNEC) for the worst case discharge scenario have been calculated to be < 1 for the river and ocean compartments. The notified polymer is not expected to be bioaccumulative or persistent in the environment. Therefore the notified polymer is not expected to pose an unreasonable risk to the aquatic environment based on its assessed use pattern.

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