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

FULL PUBLIC REPORT

Yellow Pigment in HP T300 Digital Printing Press Ink

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 Full Public Report may be inspected at our NICNAS office by appointment only at Level 7, 260 Elizabeth Street, Surry Hills NSW 2010.

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:

Street Address:	Level 7, 260 Elizabeth Street, SURRY HILLS NSW 2010, 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
NICNAS**

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FULL PUBLIC REPORT**Yellow Pigment in HP T300 Digital Printing Press Ink****1. APPLICANT AND NOTIFICATION DETAILS**

APPLICANT(S)

Hewlett-Packard Australia Pty Ltd (ABN 74 004 394 763)
353 Burwood Highway
FOREST HILL VIC 3131

NOTIFICATION CATEGORY

Limited-small volume: Chemical other than polymer (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, residual monomers/impurities, use details, import volume, site of manufacture.

VARIATION OF DATA REQUIREMENTS (SECTION 24 OF THE ACT)

Variation to the schedule of data requirements is claimed as follows: Hydrolysis as a function of pH, Adsorption/Desorption.

PREVIOUS NOTIFICATION IN AUSTRALIA BY APPLICANT(S)

None

NOTIFICATION IN OTHER COUNTRIES

EU

2. IDENTITY OF CHEMICAL

MARKETING NAME(S)

Yellow Pigment in HP T300 Digital Printing Press Ink (Ink product containing the notified chemical at $\leq 0.1\%$)

MOLECULAR WEIGHT

Mn >500 Da.

ANALYTICAL DATA

No reference spectra were provided.

3. COMPOSITION

DEGREE OF PURITY >95%

4. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE AT 20°C AND 101.3 kPa: yellow solid powder

Property	Value	Data Source/Justification
Melting Point	No melting point observed	Measured
Boiling Point	No boiling point observed	Measured
Density	1274 kg/m ³ at 20°C	Measured
Vapour Pressure	Not determined	Not expected to be volatile based on relatively high molecular weight
Water Solubility	1.8 x 10 ⁻³ g/L at 20°C	Measured at pH 5.06 – 5.32
Hydrolysis as a Function of pH	Not determined	Not expected to hydrolyse under environmental conditions
Partition Coefficient (n-octanol/water)	log Pow = 2.7 at 20°C	Measured
Adsorption/Desorption	Not determined	Expected to be immobile in soil based

Dissociation Constant	pKa = 0.87, 4.41	on its low water solubility Calculated
Particle Size	Inhalable fraction (<100 µm): 100% Respirable fraction (<10 µm): 100% MMD* = 1.6 µm	Measured
Flammability	Not highly flammable	Measured
Autoignition Temperature	269°C	Measured
Explosive Properties	Not predicted to be explosive	Estimated
Oxidizing Properties	Not predicted to be oxidizing	Estimated

* MMD = Mass Median Diameter

DISCUSSION OF PROPERTIES

For full details of tests on physical and chemical properties, refer to Appendix A.

Reactivity

The notified chemical is expected to be stable under normal ambient conditions.

Dangerous Goods classification

Based on the submitted physical-chemical data in the above table the notified chemical is not classified according to the Australian Dangerous Goods Code (NTC, 2007). However the data above do not address all Dangerous Goods endpoints. Therefore consideration of all endpoints should be undertaken before a final decision on the Dangerous Goods classification is made by the introducer of the chemical.

5. INTRODUCTION AND USE INFORMATION

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

The notified chemical will be imported by sea in 205 L drums as a component of liquid commercial printing inks at ≤0.1%.

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	≤1	≤1	≤1	≤1

PORT OF ENTRY

Melbourne, Sydney

IDENTITY OF RECIPIENTS

Hewlett-Packard Pty Ltd
353 Burwood Highway
FOREST HILL VIC 3131

TRANSPORTATION AND PACKAGING

The notified chemical will be imported at ≤0.1% in 205 L lined, steel drums by sea or air and transported from the wharf to the notifier's warehouse and then to print operators by truck.

USE

The notified chemical will be used as a component of liquid commercial printing inks at ≤0.1% for the printing of books and newsprint.

OPERATION DESCRIPTION

The notified chemical will not be manufactured, reformulated or repackaged in Australia.

At the commercial printing operations, a flexible hose will be manually inserted into the inlet of a 205 L lined, steel drum containing the ink (at a concentration of ≤0.1%) and connected to the printing machine. The ink will be automatically pumped from the drum to the printing machine and fed through the print head onto the substrate via an electrostatic field. Separate ink bottles will be provided for each of the required colours for printing.

While printers are running, printer operators will monitor their operation and keep the print substrate feeders stocked and attend to substrate jams. Throughout the print run, quality control will be carried out by printer operators. Maintenance of machines and changing of filters will be carried out by service technicians. Any residual ink within printing equipment will be wiped clean using rags and solvents.

After printing, the ink will be coated with a fixer ink and air-dried onto the surface of the substrate prior to exiting the printer. The notified chemical will be fixed (cured) with other ink ingredients into the printed article.

6. HUMAN HEALTH IMPLICATIONS

6.1 Exposure assessment

6.1.1 Occupational exposure

NUMBER AND CATEGORY OF WORKERS

<i>Category of Worker</i>	<i>Number</i>	<i>Exposure Duration (hours/day)</i>	<i>Exposure Frequency (days/year)</i>
Transport and warehouse	10-20	4-8	50
Service technicians	5-10	0.5-6	≤ 25
Printer operators	20-50	8-10	≤ 210

EXPOSURE DETAILS

Transport and Storage

Transport and storage workers are not expected to be exposed to the notified chemical except in the case of an accident involving the rupture of the steel drums containing the inks.

Printer operators

Printer operators are not expected to be exposed significantly to ink containing the notified chemical at ≤0.1%, as the process is mainly automated. However, dermal and ocular exposure to the notified chemical (at ≤0.1%) is possible for workers during connection of the steel drums holding the ink to the flexible hose and replacement of ink drums but is expected to be limited due to the use of gloves and goggles by these workers. Inhalation exposure may also occur to aerosols of the notified chemical during the operation of the printers. However, this is expected to be minimised by local exhaust ventilation employed in areas surrounding the printing machines.

Service technicians

Service technicians are expected to experience dermal contact with ink containing the notified chemical at ≤0.1% during printer maintenance, removal and replacement of filters and cleaning. However, this is expected to be minimized by the use of gloves, goggles and coveralls. Inhalation exposure may also occur but will be minimized through the use of local exhaust ventilation and a respirator.

Handling of printed substrates

After application to the substrate, the ink containing the notified chemical (at ≤0.1%) will be fixed and hence no longer bioavailable. In addition, it will be coated with a fixer ink. As such, exposure is not anticipated for workers handling the printed substrates.

6.1.2. Public exposure

The printer inks containing the notified chemical at ≤0.1% will not be sold to the public. Members of the public may experience dermal exposure to printed articles containing the notified chemical. The notified chemical is not expected to be released as it will be bound to the substrate matrix and thus, public exposure resulting from the use of the notified polymer is expected to be negligible.

6.2. Human health effects assessment

No toxicity data were submitted.

The notified chemical contains functional groups that are structural alerts for sensitisation and irritation. It also contains some minor components with azo linkages. Such components may be sensitising, and may break down to potentially mutagenic / carcinogenic amines, although the breakdown products are not known carcinogens.

Health hazard classification

As no toxicity data were provided for the notified chemical, it cannot be classified according to the *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 2004).

6.3. Human health risk characterisation

6.3.1. Occupational health and safety

The notified chemical contains a structural alert for skin sensitisation and irritation and it is possible that some of the impurities may form mutagens. However, at the low concentrations at which the notified chemical is present in the ink products handled by workers ($\leq 0.1\%$), such effects are not expected to be significant.

Printer operators and service technicians may encounter dermal, ocular and possibly inhalation exposure to ink formulations containing the notified chemical at up to 0.1% during replacement of ink drums, printer maintenance and cleaning. These workers are expected to wear gloves and coveralls to minimise dermal exposure, goggles to minimise ocular exposure and exhaust ventilation is expected to be in use to minimise inhalation exposure. Furthermore, exposure is not anticipated for workers handling printed substrates as the notified chemical will be bound with a print matrix and is not expected to be bioavailable.

The particle size of the notified chemical is in the respirable range ($< 10 \mu\text{m}$) and may be inhaled into the lower respiratory system if exposed. Approximately 7% by weight has a particle size of $< 0.5 \mu\text{m}$. While the particle distribution graph suggests that none of the particles are likely to be $< 0.1 \mu\text{m}$ or 100 nm, measurement of the fraction $< 0.5 \mu\text{m}$ was not carried out. Considering the very low concentration of the notified chemical in the liquid ink, inhalation hazards are not expected when used under exhaust ventilation.

Given the low concentration ($\leq 0.1\%$) of the notified chemical in ink formulations, the use of PPE and engineering controls to further minimise exposure and the lack of bioavailability of the notified polymer in the printed material, the risk posed to occupational health and safety of workers is not considered to be unacceptable.

6.3.2. Public health

The inks containing the notified chemical at $\leq 0.1\%$ will not be sold to the public. Printed substrates containing the notified chemical will be available to the public. However, the notified chemical will be bound within an inert matrix and will not be bioavailable. Therefore, the risk to public health is not considered to be unacceptable, based on the low potential for exposure.

7. ENVIRONMENTAL IMPLICATIONS

7.1. Environmental Exposure & Fate Assessment

7.1.1 Environmental Exposure

RELEASE OF CHEMICAL AT SITE

The notified chemical is a component of printing ink which will be imported into Australia in 205 L drums. No manufacturing and reformulation of the notified chemical will take place in Australia. Environmental release of the notified chemical is unlikely to occur during importation, storage and transportation.

RELEASE OF CHEMICAL FROM USE

The notified chemical in digital printing press ink will be applied to paper by electrostatic deflection plates and the print will be protected with a fixer ink which is air dried. Only a small fraction of the notified chemical will be used to print and the majority will be recycled. A maximum of 2% notified chemical from equipment cleaning waste will be disposed by contractors to landfill. A further 1% notified chemical is expected to be released from spills which should be collected for disposal to landfill but some may be released to the sewer. The notified chemical will be bound within an inert matrix on the printed end-use articles during the printing process.

RELEASE OF CHEMICAL FROM DISPOSAL

The majority of the notified chemical applied via printing processes will share the fate of the paper, which may be either sent to landfill or recycled. It is assumed that 50% of the paper will end up in landfill and the other 50% will undergo paper recycling processes. During this process, waste paper will be repulped using a variety of chemical agents which, amongst other things, enhance detachment of inks from the fibres.

7.1.2 Environmental fate

No environmental fate data for the notified chemical were provided. The notified chemical has very low solubility in water and also based on structural considerations and cationic potential, it is expected to partition to soils and sediment. Due to its expected very low aquatic exposure, bioaccumulation is not expected. Considering the very low water solubility, residues of the notified chemical that are removed during paper recycling are expected to partition to sludge. Formulation wastes (a minor amount) will be collected and disposed of to landfill and sewer. Waste paper and sludge from paper recycling is expected to be disposed of to landfill and the sludge may be used for soil remediation. In landfill, when used for soil remediation, the notified chemical is not expected to be mobile based on its low water solubility and the residue is expected to undergo slow degradation by biotic and abiotic processes to water and oxides of carbon, nitrogen and sulfur.

7.1.3 Predicted Environmental Concentration (PEC)

Of the notified chemical released to STPs, the majority is expected to sorb to sludge due to its limited water solubility and cationic potential. Hence, very little aquatic exposure is expected and a PEC was not determined.

7.2. Environmental effects assessment

No ecotoxicity data were submitted. Very little aquatic exposure to the notified chemical is expected.

7.2.1 Predicted No-Effect Concentration

Since no ecotoxicity data were submitted and very little aquatic exposure is expected, the predicted no effect concentration (PNEC) was not calculated.

7.3. Environmental risk assessment

Approximately half of the articles containing the notified chemical are expected to be disposed directly to landfill with the remainder disposed to STPs as a result of paper recycling. The risk for harm to aquatic organisms due to washings to the sewer, as a result of paper recycling, is mitigated by the low water solubility of the notified chemical and its expected high propensity to adsorb to particulate matter. Taking into account the low exposure to aquatic organisms, the notified chemical is therefore not expected to pose an unacceptable risk to the environment based on its proposed use pattern.

8. CONCLUSIONS AND REGULATORY OBLIGATIONS

Hazard classification

As no toxicity data were provided for the notified chemical, it cannot be classified according to the *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 2004).

Human health risk assessment

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

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

Environmental risk assessment

On the basis of the reported use pattern and its expected low aquatic exposure, the notified chemical is not expected to pose a risk to the environment.

Recommendations

CONTROL MEASURES

Occupational Health and Safety

- Employers should implement the following engineering controls to minimise occupational exposure to the notified chemical as imported in the product HP T300 Digital Printing Press Ink:
 - Local exhaust ventilation

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.
- If products and mixtures containing the notified chemical 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 chemical should be disposed of to landfill.

Emergency procedures

- Spills or accidental release of the notified chemical 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 importation volume exceeds one tonne per annum notified chemical;
 - the chemical is imported in powder formor
- (2) Under Section 64(2) of the Act; if
 - the function or use of the chemical has changed from a component of commercial printing inks at $\leq 0.1\%$, or is likely to change significantly;
 - 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.

Material Safety Data Sheet

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

APPENDIX A: PHYSICAL AND CHEMICAL PROPERTIES**Water Solubility** 1.8×10^{-3} g/L at 20°C

Method	OECD TG 105 Water Solubility. EC Directive 92/69/EEC A.6 Water Solubility.
Remarks	Flask Method. A mixture containing 51.8% of the notified chemical in water at pH 5.06-5.32 was shaken at about 30°C for up to 72 hours, and then equilibrated for another 24 hours at 20°C. The supernatant solutions were centrifuged (~2900 g for 10 minutes) and filtered (Nylon 0.2 µm) prior to analysis using HPLC.
Test Facility	RCC (2006)

Partition Coefficient (n-octanol/water) $\log P_{ow} = 2.7$ at 20°C

Method	OECD TG 117 Partition Coefficient (n-octanol/water). EC Directive 92/69/EEC A.8 Partition Coefficient.
Remarks	HPLC Method. The dead time was determined by using thiourea. The partition coefficient was determined for the ionised form of the notified chemical (51.8% of a mixture) using a buffered aqueous methanol mobile phase (50:50 v/v H ₂ O:methanol, at pH 6.6).
Test Facility	RCC (2006)

Dissociation Constant $pK_a = 0.87, 4.41$

Method	Calculated using the SPARC model
Remarks	
Test Facility	CSI (2009)

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