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June 2016

NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME (NICNAS)

PUBLIC REPORT

Phosphanol RA-600

This Assessment has been compiled in accordance with the provisions of the *Industrial Chemicals (Notification and Assessment) Act 1989* (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 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.

This Public Report is 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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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/1903	Bantex Pty Ltd	Phosphanol RA-600	Yes	< 0.12 tonnes per annum	Component of ink contained within sealed writing instruments

CONCLUSIONS AND REGULATORY OBLIGATIONS

Hazard classification
Based on the available information, the notified polymer is recommended for hazard classification according to the *Globally Harmonised System of Classification and Labelling of Chemicals (GHS),* as adopted for industrial chemicals in Australia. The recommended hazard classification is presented in the following table.

Hazard classification	*Hazard statement*
Corrosive (Category 1B)	H314: causes severe skin burns and eye damage

Based on the available information, the notified polymer is recommended for hazard classification according to the *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 2004), with the following risk phrase:

R34: Causes burns

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 reported use pattern, the notified polymer is not considered to pose an unreasonable risk to the environment.

Recommendations

REGULATORY CONTROLS

Hazard Classification and Labelling

- The notified polymer should be classified as follows:

  Corrosive (Category 1B): H314- causes severe skin burns and eye damage

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 (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 of 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

- Where reuse or recycling are not appropriate, dispose of the notified polymer in an environmentally sound manner in accordance with relevant Commonwealth, state, territory and local government legislation.

Storage

- The handling and storage of the notified polymer should be in accordance with the Safe Work Australia Code of Practice for *Managing Risks of Hazardous Chemicals in the Workplace* (SWA, 2012) or relevant State or Territory Code of Practice.

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 polymer, 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 ink contained within sealed writing instruments, or is likely to change significantly;
  - the amount of polymer being introduced has increased, 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.

(Material) Safety Data Sheet
The (M)SDS of the notified polymer and products containing the notified polymer provided by the notifier were 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
Bantex Pty Ltd (ABN: 72 000 994 310)
17 Interchange Drive
EASTERN CREEK NSW 2766

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 name, CAS number, molecular and structural formulae, molecular weight, analytical data, degree of purity, polymer constituents, residual monomers, impurities, use details and import volume.

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

NOTIFICATION IN OTHER COUNTRIES
None

2. IDENTITY OF CHEMICAL

MARKETING NAME
Phosphanol RA-600

MOLECULAR WEIGHT
< 1,000 Da

ANALYTICAL DATA
Reference IR, GPC, ^{1}H and ^{13}C NMR spectra were provided.

3. COMPOSITION

DEGREE OF PURITY
> 93%

4. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE AT 20 °C AND 101.3 kPa: pale yellow viscous liquid

Property	Value	Data Source/Justification
Melting Point/Freezing Point	-17.5 °C	(M)SDS
Boiling Point	Not determined	Decomposition is expected prior to boiling point being reached
Density	1,080 kg/m^3 at 25 °C	(M)SDS
Vapour Pressure	Not determined	Not expected to be highly volatile based on molecular weight
Water Solubility	Soluble	(M)SDS. The notified polymer is expected to be surface active and water dispersible.
Hydrolysis as a Function of pH	Not determined	The notified polymer contains hydrolysable functionalities. However, no significant hydrolysis is expected to occur in the environmental pH range of 4 – 9
Partition Coefficient (n-octanol/water)	Not determined	Expected to partition to the interface between octanol and water, based on its amphiphilic structure

Property	Value	Data Source/Justification
Adsorption/Desorption	Not determined	The notified polymer is expected to adsorb to organic carbon, soil and sediment because it is a surfactant
Dissociation Constant	Not determined	Contains ionisable functionalities. Therefore, the notified polymer is expected to be ionised at the environmental pH range of 4 – 9
Flash Point	193 °C at 101 kPa	(M)SDS
Flammability	Not determined	Not expected to be flammable based on flash point
Autoignition Temperature	Not determined	Not expected to undergo autoignition
Explosive Properties	Not determined	Contains no functional groups that would imply explosive properties
Oxidising Properties	Not determined	Contains no functional groups that would imply oxidative 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 of Classification and Labelling of Chemicals (GHS),* as adopted for industrial chemicals in Australia.

However, based on its low pH (< 2) the notified polymer is classified as a Class 8 dangerous good, UN3265 corrosive liquid, acidic, organic, n.o.s. (NTC, 2007).

5. INTRODUCTION AND USE INFORMATION

MODE OF INTRODUCTION OF NOTIFIED POLYMER (100%) OVER NEXT 5 YEARS
The notified polymer will be imported as a component of ink contained within writing instruments at ≤ 5% concentration.

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

Year	*1*	*2*	*3*	*4*	*5*
Tonnes	< 0.12	< 0.12	< 0.12	< 0.12	< 0.12

PORT OF ENTRY
Melbourne and Sydney

TRANSPORTATION AND PACKAGING
The notified polymer will be imported as a component of ink (≤ 5% concentration) contained within sealed writing instruments. Writing instruments containing the notified polymer will be imported in cardboard cartons and outer shipper boxes in shipping containers, and will be transported to the notifier's warehouse by road.

USE
The notified polymer will be used as a component of ink contained within sealed writing instruments for writing on absorbent surfaces such as paper.

OPERATION DESCRIPTION
The notified polymer will not be reformulated or manufactured in Australia. The sealed writing instruments containing the notified polymer (as a component of ink at ≤ 5% concentration) will be transported to the notifier's warehouse for distribution to wholesale/retail outlets by road.

End-use
The writing instruments containing the notified polymer will be sold to office staff and the public at retail outlets for writing on paper.

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 warehousing	4-8	200
Wholesale/retail staff	20-200	250
Office staff	> 1000	250

EXPOSURE DETAILS
Transport, storage and retail workers are not expected to be exposed to the notified polymer except in the unlikely event of an accident.

Occasional dermal exposure to the notified polymer (at ≤ 5% concentration) during use of writing instruments by office staff may occur if surfaces are handled before the ink containing the notified polymer has dried, or if there is incidental contact with the tips of writing instruments.

Once the ink has dried, the polymer will be bonded to the paper, and dermal exposure to the notified polymer from contact with dried ink is not expected.

6.1.2. Public Exposure
Dermal exposure of the public to ink containing the notified polymer at ≤ 5% concentration is expected to be similar to that for office staff.

6.2. Human Health Effects Assessment
No toxicity data were submitted for the notified polymer.

The notified polymer is a highly water soluble ionic surfactant, therefore dermal absorption is not expected. However, given the corrosive properties of the notified polymer (see below), dermal absorption cannot be ruled out.

The notified polymer contains a strong acidic functional group and based on the classification of a closely related analogue (analogue 1), is recommended for classification as a Category 1B corrosive.

The notified polymer does not contain any structural alerts for skin sensitisation and genotoxicity.

Health hazard classification
Based on the available information, the notified polymer is recommended for hazard classification according to the *Globally Harmonised System of Classification and Labelling of Chemicals (GHS),* as adopted for industrial chemicals in Australia. The recommended hazard classification is presented in the following table.

Hazard classification	***Hazard statement***
Corrosive (Category 1B)	H314: causes severe skin burns and eye damage

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R34: Causes burns

6.3. Human Health Risk Characterisation

6.3.1. Occupational Health and Safety

The notified polymer is a corrosive. However at the proposed use concentration (< 5%) significant irritation effects are not expected. Furthermore, given the notified polymer will be introduced as a component of ink contained within a sealed writing instrument which is purpose designed for controlled release onto paper, exposure to the notified polymer is expected to be negligible.

Therefore, based on the assessed use pattern and low concentration of the notified polymer, the risk to workers is not considered to be unreasonable.

6.3.2. Public Health

The risk to public health from use of the notified polymer is expected to be similar to workers, and 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 not be manufactured or reformulated in Australia. It will be imported as a component of ink contained within a sealed writing instrument. The writing instrument is purpose-designed for controlled release of the ink onto paper during writing. Therefore, no release of the notified polymer to the environment is expected from these activities.

RELEASE OF CHEMICAL FROM USE

The ink contained within sealed writing instrument is designed to prevent leakage and will not be opened during use, installation or replacement. Therefore, there no release is expected of the notified polymer to the environment from these activities under normal conditions. However, if leakage or spillage occurs, the ink containing the notified polymer is expected to be contained with absorbent materials and will be disposed of to landfill. The residual ink containing the notified polymer is expected to be disposed of to landfill.

RELEASE OF CHEMICAL FROM DISPOSAL

The notified polymer will be used in ink for printing on paper. The notified polymer is expected to share the fate of the printed articles which are expected to be disposed of to landfill. It is assumed that 50% of the printed paper will end up in landfill and the rest will undergo paper recycling processes.

Spent writing instruments will be disposed of to landfill through industrial or domestic waste collection.

7.1.2. Environmental Fate

No environmental fate studies were submitted. The notified polymer trapped in the ink matrices is expected to be disposed of to landfill with the unrecycled paper to which it is applied. The notified polymer is expected to be readily biodegradable based on an acceptable analogue data. Approximately half of the paper to which the ink containing the notified polymer is applied to is likely to be recycled. During recycling processes, waste paper will be repulped using a variety of chemical agents which, amongst other things, enhance detachment of ink from the fibres. Based on the surface activity and ionic functionality, the notified polymer might partition to sludge during waste water treatment processes in sewage treatment plants (STPs). A small proportion of the notified polymer may be applied to land when effluent is used for irrigation, or when sewage sludge is used for soil remediation, or disposed to landfill as collected spills and empty writing instruments. The notified polymer residues in landfill, soil and sludge are expected to have low mobility based on surface activity. The notified polymer is expected to degrade via biotic and abiotic processes in the atmosphere and surface waters to form water and oxides of carbon and phosphorus. The notified polymer is not expected to bioaccumulate based on its water dispersibility and surface activity.

7.1.3. Predicted Environmental Concentration (PEC)

Based on the reported use in printing, it is conservatively assumed that 100% of the total import volume of the notified polymer will be used in paper printing. Using a worst-case scenario, it is assumed that up to 50% of the paper products containing the notified polymer will be recycled and will be released to the sewer with no

removal during recycling or STP processes. As the notified polymer is to be processed at paper recycling facilities located throughout Australia, it is anticipated that such releases will occur on 260 days per year into the Australian effluent volume. The resultant estimate for the predicted environmental concentration (PEC) in sewage effluent nationwide is summarised in the table below.

Predicted Environmental Concentration (PEC) for the Aquatic Compartment		
Total Annual Import/Manufactured Volume	120	kg/year
Proportion expected to be released to sewer	50%	
Annual quantity of chemical released to sewer	60	kg/year
Days per year where release occurs	260	days/year
Daily chemical release:	0.23	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:	0.05	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 0.051µg/L may potentially result in a soil concentration of approximately 0.34 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 1.701 µg/kg and 3.402 µg/kg, respectively.

7.2. Environmental Effects Assessment

No ecotoxicity data were submitted for the notified polymer. However the notifier provided data on acute toxicity to fish extracted from the SDS of a similar polymer (analogue 2).

Endpoint	*Result*	*Assessment Conclusion*
Fish Toxicity	LC50 (96 h) = 5.5 mg/L	Toxic to fish

The ecotoxicity data provided is considered useful to provide a general indication of potential environmental effects for the notified polymer. However, the data is not considered sufficient to formally classify the acute hazard of the notified polymer under the Globally Harmonised System for the Classification and Labelling of Chemicals (United Nations, 2009).

7.2.1. Predicted No-Effect Concentration

The Predicted No-Effect Concentration (PNEC) was calculated using the only available toxicity endpoint of the acceptable analogue (LC50 = 5.5 mg/L for fish). A conservative assessment factor of 1000 was used since only one trophic level of ecotoxicological data has been provided for an acceptable analogue.

Predicted No-Effect Concentration (PNEC) for the Aquatic Compartment		
LC50 (Fish).	5.50	mg/L
Assessment Factor	1,000	
PNEC:	5.50	µg/L

7.3. Environmental Risk Assessment

The Risk Quotient (Q = PEC/PNEC) has been calculated for a worst case discharge scenario based on the predicted PEC and PNEC.

Risk Assessment	***PEC µg/L***	***PNEC µg/L***	***Q***
Q - River:	0.05	5.5	0.009
Q - Ocean:	0.01	5.5	0.001

The risk quotient for discharge of treated effluents containing the notified polymer to the aquatic environment (Q << 1) indicates that the notified polymer is unlikely to reach ecotoxicologically significant concentrations in surface waters based on its maximum annual importation quantity. The notified polymer is not expected to bioaccumulate and is readily biodegradable in the environment. Therefore, the notified polymer is unlikely to result in ecotoxicologically significant concentrations in the aquatic environment.

On the basis of the PEC/PNEC ratio and the assessed use pattern the notified polymer is not expected to pose an unreasonable risk to the environment

BIBLIOGRAPHY

NOHSC (2004) Approved Criteria for Classifying Hazardous Substances, 3rd edition [NOHSC:1008(2004)]. National Occupational Health and Safety Commission, Canberra, AusInfo.

NTC (National Transport Commission) 2007 Australian Code for the Transport of Dangerous Goods by Road and Rail (ADG code), 7th Edition, Commonwealth of Australia

SWA (2012) Code of Practice: Managing Risks of Hazardous Chemicals in the Workplace, Safe Work Australia, http://www.safeworkaustralia.gov.au/sites/swa/about/publications/pages/managing-risks-of-hazardous-chemicals-in-the-workplace.

United Nations (2009) Globally Harmonised System of Classification and Labelling of Chemicals (GHS), 3rd revised edition. United Nations Economic Commission for Europe (UN/ECE), <http://www.unece.org/trans/danger/publi/ghs/ghs_rev03/03files_e.html >.