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

FULL PUBLIC REPORT

Lexmark Polymer HB-580

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**Director
Chemicals Notification and Assessment**

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FULL PUBLIC REPORT

Lexmark Polymer HB-580

1. APPLICANT

Lexmark International (Australia) Pty Limited (ABN 86 050 148 466) of 12A Rodborough Road, Frenchs Forest NSW 2086 has submitted a notification statement in support of their application for an assessment certificate for the synthetic polymer of low concern (PLC) Lexmark Polymer HB-580.

2. IDENTITY OF THE CHEMICAL

The chemical name, other names, CAS number, molecular and structural formulae, molecular weight, spectral data and details of the polymer composition have been exempted from publication in the Full Public Report.

Marketing names: Lexmark Polymer HB-580.
Tuftone HB-580.
Tuftone HB A100.

3. POLYMER COMPOSITION AND PURITY

Details of the polymer composition have been exempted from publication in the Full Public Report.

4. PLC JUSTIFICATION

The notified polymer meets the PLC criteria.

5. PHYSICAL AND CHEMICAL PROPERTIES

The following physico-chemical properties relate to the notified polymer unless otherwise specified.

Property	Result	Comments
Appearance	Pale yellow powder with no specific odour	
Melting range	88-155°C	<i>No test report provided.</i>
Density	1.12 kg/m ³	No test report provided.
Water solubility	< 1 mg/L at 20°C	A water solubility test was performed using duplicate pyrex bottles containing 10 g of the notified polymer and 1L of water which were purged with nitrogen, sealed and shaken at 20°C for 24 hours. The samples were then filtered through 0.2 µm nitrocellulose filters and the concentration of the notified polymer determined by

		measurement of dissolved organic carbon concentration. These measurements gave a water solubility of < 1 mg/L.
Particle size	9.2% by mass < 75 µm	No test report provided.
Flammability	Non-flammable	
Self-ignition temperature for solids	No self-ignition below melting temperature	
Explosive properties	Not explosive	
Stability/reactivity	Stable, not oxidising, not hydrolysing	No photo or thermal degradation or depolymerisation under normal use.
Hydrolysis as function of pH	Not determined	The polymer contains some ester groups, which may hydrolyse under extreme temperature and pH conditions.
Vapour pressure	1.7 x 10 ⁻⁴ kPa at 25°C	The notified polymer is not volatile, no test report was provided.
Partition coefficient	Not determined	Due to insolubility in n-octanol and water.
Adsorption/desorption	Not determined	Due to low aqueous solubility.
Dissociation constant	Not determined	Due to low aqueous solubility.

6. USE, VOLUME AND FORMULATION

Use:

A component of a toner formulation.

Manufacture/Import volume:

The notified polymer will be introduced into Australia with the volume expected to be:

Year 1:	< 100 kg
Year 2-5:	up to 800 kg

7. OCCUPATIONAL EXPOSURE

A toner formulation containing the notified polymer will be imported in pre-packed toner cartridges.

Waterside, warehouse and transport workers are unlikely to be exposed to the notified polymer unless the packaging is breached.

Office workers and printer maintenance workers may be intermittently exposed to the notified polymer contained in the toner cartridge via skin contact when replacing the spent cartridge, and during maintenance and cleaning of printers. Exposure by inhalation may also occur, although the amount of dust around printers is expected to be minimal. Maintenance workers for printers may potentially come in contact with the notified polymer more often than office workers. Exposure is expected to be controlled through the design of the ink cartridges and the printing machines. Printer maintenance personnel often wear cotton disposable gloves and are trained in proper servicing techniques. Pre-packed toner cartridges are sealed and worker exposure to the toner is minimised by the use of the replacement procedures recommended by the manufacturer.

Contact with paper printed with toners containing the notified polymer is unlikely to result in dermal exposure, as it will be bound to the paper.

8. PUBLIC EXPOSURE

Members of the public may be exposed to the toner containing the notified polymer following transport accidents involving breakage of the cartridges or following environmental contamination or during the recycling of cartridges. Such exposure is unlikely.

Exposure may also occur following accidental spillage of toner powder when replacing spent cartridges. This type of exposure, although more likely to occur, is not expected to be common or involve anything more than very small amounts of toner powder. During printing the toner powder will be fixed to paper by heat. The notified polymer on printed paper is likely to be inaccessible to human contact. The potential for public exposure is therefore minimal.

9. ENVIRONMENTAL EXPOSURE

9.1. Release

Release of the notified polymer during transport is not expected because the polymer is housed in sealed toner cartridges. These cartridges are designed to prevent release of the toner until the cartridges are inserted into the printer.

Most of the notified polymer will be deposited with the toner onto sheets of paper during the printing process. The waste paper generated will eventually be disposed of either through recycling, landfill or incineration.

Some release of the notified polymer may occur following disposal of the spent toner cartridges. The notifier estimates up to 20% of toner containing the notified polymer, may remain in spent cartridges. Most spent cartridges are disposed of through household and business waste, which are incinerated or sent to landfill. Due to the anticipated nationwide use, the disposal is expected to be widespread across Australia.

9.2. Fate

The fate of the notified polymer which is bound to printed paper will be dictated by paper disposal and recycling trends. Recent literature suggests that current paper recycling rates in Australia are 70-92% (Australian Environmental Review, 2001).

Paper recycling is carried out in paper mills, where it is likely that at least primary sedimentation occurs, with some facilities also having biological treatment provisions. During the recycling process, waste paper is repulped using a variety of chemical agents to enhance fibre separation, ink detachment from paper fibres, pulp brightness, and the whiteness of paper. Removal rate of ink particles from paper during the de-inking phase of recycling is estimated to be 30-60% efficient for inkjet copying. These inks are expected to reside in the sewerage system and may eventually be released into the local sewage treatment works with the effluent water after treatment. The insoluble substances retained in the paper fibre or in the sludge will eventually be used to make recycled paper, or will be disposed to landfill with waste sludge (EC, 1994).

Because the notified polymer contained in the toner is poorly water soluble, it is expected that most of the substance will reside in solid wastes generated from the recycling process. Solid materials not becoming an integral part of recycled paper are expected to be disposed of either by incineration or in landfill.

Incineration is expected to destroy the notified polymer resulting in the release of combustion products such as carbon monoxide, carbon dioxide, and low molecular weight organics. Any polymer sent to landfill, either fixed to paper, residing in sludge, or released from ruptured cartridges, is not expected to enter the aquatic compartment via surface runoff or percolating groundwater owing to its low water solubility. The substance does not hydrolyse, depolymerise or photodegrade easily, and hence, is not expected to readily degrade in the environment. However, the substance contains ester groups, which are amenable to hydrolysis under suitable conditions. As such, the polymer is expected to undergo slow degradation by biotic and abiotic processes.

The polymer's high molecular weight would preclude any appreciable absorption across biological membranes. Hence the substance is not expected to bioaccumulate (Connell, 1990).

10. EVALUATION OF HEALTH EFFECTS DATA

No toxicological data was supplied by the notifier. The MSDS states that no adverse effects are expected following contact with the notified polymer. With a high NAMW and a small percentage of low molecular weight species, the polymer is unlikely to penetrate biological membranes.

Several polymer constituents are classified as hazardous substances according to NOHSC *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 1999). However, the reported concentration of all hazardous residual monomers is below the concentration cut off.

11. EVALUATION OF ENVIRONMENTAL EFFECTS DATA

No ecotoxicological data were provided.

12. ENVIRONMENTAL RISK ASSESSMENT

The polymer is not expected to enter the water compartment and pose a threat to aquatic organisms during its use as a component in toner cartridges. Ultimately most of the notified polymer in the toner will be bound to printed paper, which will be either buried in landfill, incinerated, or recycled at the end of its useful life. A small amount of the polymer may enter the soil environment directly at landfill sites when spent cartridges are disposed of with normal office garbage. However in landfill, the polymer will be immobile due to its low water solubility and is not expected to present a threat to terrestrial organisms given the low import volumes and expected nationwide use of the product.

In the event of an accident, should the polymer enter the aquatic compartment, its high molecular weight would preclude any appreciable absorption across biological membranes. Hence it is not expected to bioaccumulate.

Given these considerations, the potential risk to the environment posed by the use of the polymer is low.

13. HEALTH AND SAFETY RISK ASSESSMENT

13.1. Hazard assessment

No toxicology data on the polymer have been submitted. The NAMW of the polymer is high which should minimise passage across biological membranes. The vapour pressure and water solubility of the notified polymer are very low.

13.2. Occupational health and safety

The occupational health risk to transport and storage workers is considered to be negligible, as they will be only be exposed to the notified polymer in the event of an accident or damage to packaging.

Office workers are not expected to come into contact with the notified polymer under normal circumstances. The design of the toner cartridges is such that exposure to Lexmark Polymer HB-580 should be minimal. Dermal exposure may occur during changing of toner cartridges if a small quantity of toner is present around the printer. There may be a low level of toner dust in the immediate vicinity of printers when they are operating, although inhalation exposure to the notified polymer is expected to be negligible. Exposure to the notified polymer is not expected to occur once the toner is bound to paper. Based on expected low toxicity of the polymer and the expected low exposure, the health risk posed to office workers is negligible. Employers are responsible for maintaining the NOHSC exposure standard for nuisance dust of 10 mg/m³ TWA (NOHSC, 1995).

Maintenance workers may be exposed to the toner dust repeatedly when servicing photocopies and printers. Exposure is anticipated predominantly by the dermal route, hence the wearing of cotton or disposable gloves is recommended. They are also likely to encounter inhalation exposure to dust containing up to 10% inspirable particles. It is recommended that printers/photocopiers be placed in well-ventilated areas. Given the training they receive, the low anticipated toxicity of the notified polymer and PPE worn, the risk of adverse health effects in this worker category is likely to be low.

Pre-packed toner cartridges are sealed and worker exposure to the toner is minimised by the use of appropriate gloves and replacement procedures recommended by the manufacturer. The notified polymer is of low concern to human health and safety.

13.3. Public health

Public exposure to the toner powder containing the notified polymer following transport accidents, environmental contamination or the recycling of cartridges is unlikely. Public exposure to the toner powder during the replacement of spent cartridges is more likely but is not expected to be common. Contact with the notified polymer on printed paper is likely to be negligible. Exposure is most likely to be dermal but ocular or respiratory contact is also possible. Exposure is likely to be of an infrequent or transient nature. The very low likelihood of contact with the notified polymer and the expected low toxicity of the notified polymer suggest that the notified polymer will not pose a significant hazard to public health when used in the proposed manner.

14. MSDS AND LABEL ASSESSMENT

14.1. MSDS

The MSDS for the notified polymer and for the product containing the polymer provided by the notifier were in accordance with the NOHSC *National Code of Practice for the Preparation of Material Safety Data Sheets* (NOHSC, 1994a). The MSDS for toner cartridge is published here as part of the assessment report. The accuracy of the information on the MSDS remains the responsibility of the applicant.

14.2. Label

The label for the imported product containing the polymer provided by the notifier was in accordance with the NOHSC *National Code of Practice for the Labelling of Workplace Substances* (NOHSC, 1994b). The accuracy of the information on the label remains the responsibility of the applicant.

15. RECOMMENDATIONS

CONTROL MEASURES

Occupational Health and Safety

- Employers should implement the following safe work practices to minimise occupational exposure to the new toner product containing the notified polymer:
 - Adequate induction and training programs for service personnel.
- Employers should ensure that the following personal protective equipment is used by maintenance workers to minimise occupational exposure to the new toner product:
 - Wearing of cotton or disposable gloves when servicing printers or removing spent cartridges.

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

- Employers are responsible for maintaining dust levels around printers below the NOHSC exposure standard for nuisance dust of 10 mg/m³ TWA. Printers should be located in well-ventilated areas.
- 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 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.

Disposal

- The notified polymer should be disposed of either through recycling, landfill or incineration.

Emergency procedures

- Spills/release of the notified polymer should be contained as described in the MSDS (ie sweep onto paper and transfer to a sealable waste container) and the resulting waste is disposed of in landfill.

15.1 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 Section 64(1) of the Act; if
 - the notified polymer is introduced in a chemical form that does not meet the PLC criteria.
- (2) Under Section 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.

16. REFERENCES

Australian Environmental Review, January 2001, 16(1):16.

Connell DW (1990) General characteristics of organic compounds which exhibit bioaccumulation. In: Connell DW ed. Bioaccumulation of Xenobiotic Compounds. Boca Raton, USA, CRC Press, pp 47-57.

EC (1994) Official Journal of the European Communities. Technical Guidance Document in Support of Commission Directive 93/67/EEC on Risk Assessment for New Notified Substances and Commission Regulation (EC) No 1488/94 on Risk Assessment for Existing Substances. Part IV, pp 703-707.

NOHSC (1994a) National Code of Practice for the Preparation of Material Safety Data Sheets [NOHSC:2011(1994)]. National Occupational Health and Safety Commission, Canberra, Australian Government Publishing Service.

NOHSC (1994b) National Code of Practice for the Labelling of Workplace Substances [NOHSC:2012(1994)]. National Occupational Health and Safety Commission, Canberra, Australian Government Publishing Service.

NOHSC (1995) Exposure Standards for Atmospheric Contaminants in the Occupational Environment [NOHSC:3008(1995)] & [NOHSC:1003(1995)]. National Occupational Health and Safety Commission, Canberra, Australian Government Publishing Service.

NOHSC (1999) Approved Criteria for Classifying Hazardous Substances [NOHSC:1008(1999)]. National Occupational Health and Safety Commission, Canberra, AusInfo.