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**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION
AND ASSESSMENT SCHEME**

FULL PUBLIC REPORT

HS-1260P

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 National Occupational Health and Safety Commission which also conducts the occupational health & safety assessment. The assessment of environmental hazard is conducted by the Department of the Environment and the assessment of public health is conducted by the Department of Health and Aged Care.

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For enquiries please contact the Administration Section at:

Street Address: 92 -94 Parramatta Rd CAMPERDOWN NSW 2050, AUSTRALIA
Postal Address: GPO Box 58, SYDNEY NSW 2001, AUSTRALIA
Telephone: (61) (02) 9577 9514 FAX (61) (02) 9577 9465

Director
Chemicals Notification and Assessment

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FULL PUBLIC REPORT**HS-1260P****1. APPLICANT**

Lexmark International Inc of 12A Rodborough Road, Frenchs Forest, NSW 2086 (ABN No. 86 050 148 466) has submitted a notification statement in support of their application for an assessment certificate for the synthetic polymer of low concern (PLC) **HS-1260P**.

2. IDENTITY OF THE CHEMICAL

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

Marketing name:

HP-1260P

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

Property	Result	Comments
Appearance	White or light yellow solid	
Melting point	75-80°C	
Density	1200 kg/m ³	
Water solubility	0.067 mg/L	Very slightly soluble (Mensink, 1995)
Particle size	mean diameter 1.54 mm toner particle size 10 micron	

Flammability	Not determined.	
Autoignition temperature	300°C or more	
Explosive properties	Not explosive	
Stability/reactivity	Stable	
Hydrolysis as function of pH	Not determined	Contains hydrolysable ester groups that are not expected to hydrolyse under environmental pH (4-9).
Partition coefficient	Not determined	Low water solubility indicates preferential partition to organic phase.
Adsorption/desorption	Not determined	Low water solubility indicates polymer will strongly adsorb to soils.
Dissociation constant	Not determined	Does not contain any protons that would readily dissociate under environmental pH (4-9).

6. USE, VOLUME AND FORMULATION

Use:

The notified polymer will be imported as a component of a toner contained in cartridges for use in printers. It will not be manufactured or reformulated in Australia. The cartridge is designed so that it will not release the contents until the shutter or seal is removed. The toner will then be transferred to paper and fixed during the printing operation.

Manufacture/Import volume:

Up to 2 tonnes per annum of the notified polymer will be imported for each of the first 5 years.

Formulation details:

The notified polymer will not be further formulated in Australia.

7. OCCUPATIONAL EXPOSURE

The toner containing the notified polymer will be contained in sealed cartridges. No reformulation or repackaging will take place, therefore no exposure to the toner and hence to the notified polymer, is expected during transportation and storage.

Occupational exposure to the notified polymer in Australia will primarily concern two main

worker categories. These are printer service personnel and office staff using printers. The notifier did not provide details on the number of workers in each category, the number of printers imported per year or estimated duration of exposure per change.

Duties of the service personnel will include cleaning the inside of the machine, servicing the machine and replacement of toner cartridges. Both inhalation and dermal exposure to the toner powder may occur during these activities. No protective equipment has been specified for service personnel.

To change the toner cartridge, a seal is removed and the cartridge placed into the machine. The replacement of the cartridge is anticipated to take around 1 minute per change. Assuming that toner cartridges are replaced approximately 5 times per year, the estimated total exposure time per individual worker is 5 minutes per machine per year.

Inhalation and dermal exposure to the toner powder may occur during toner replacement, particularly in the event of a container leak or spill. Office workers would not normally wear protective equipment.

Exposure may occur upon handling printed material. However, the toner would not be separately available for exposure or dermal uptake as it is fused and fixed to the printed surface.

8. PUBLIC EXPOSURE

Laser printers utilising the toner containing the notified polymer is likely to normally be used in the occupational environment. Public exposure during transport of sealed toner cartridges or cartridges is unlikely. In the event of a transport accident, public exposure may occur only if the integrity of the cartridge is impaired. Public contact will therefore occur predominantly from touching the fixed toner on paper. The toner is fused to the paper and under normal conditions release from the surface is unlikely to occur. Consequently, the potential for public exposure to the notified polymer during all phases of its life cycle is considered to be negligible.

9. ENVIRONMENTAL EXPOSURE

9.1. Release

Emissions into the hydrosphere can occur at different phases of the life cycle of a substance used in the printing and publishing industry. The life cycle begins with the production and formulation of the toner product followed by the processing cycle and ends with the recovery and discharge into wastewater or waste (Baumann et al., 1999).

Transport

Losses during this process will be minimal as the notified polymer is housed in sealed cartridges. These cartridges are designed to prevent release of the toner until the shutter or sealing tape is removed. Accidental spillage of the polymer, during transport should result in minor amounts of powder wastes being sent to either landfill or incineration facilities.

End User Site

Losses are, again, expected to be negligible because cartridges will remain sealed until they are placed inside printers. Under normal use, the toner is transferred onto a sheet of paper where it is firmly fixed to the surface by heat. Thus, the polymer will be fixed into the cured toner and there will be limited release to the environment. Accidental spillage of the polymer, during replacement of cartridges should result in small amounts of powder wastes being sent to either landfill or incineration facilities.

Recycling and Disposal

The majority of the notified polymer entering the environment will be fused to paper during the printing process. The waste paper generated will be disposed through landfill, recycling, or incineration. Current paper recycling rates in Australia are estimated to be in the order of 70-92% (Australian Environmental Review, 2001). In a landfill, the toner (and thus the notified polymer) should remain fixed to the paper substrate and remain immobile.

Spent cartridges that are not recycled are likely to be sent to landfill. As a worst case, a maximum of 300 kg/year of the notified polymer could be sent to landfill from this route and a maximum amount of 15% remaining in each cartridge is anticipated. The disposal of used cartridges would be widespread across Australia.

9.2. Fate

Some waste paper may be disposed of directly to landfill with the notified polymer strongly bound to the paper. It is anticipated that prolonged residence in an active landfill will eventually degrade the notified polymer. Incineration of the waste paper will destroy the compound with the generation of water vapours and oxides of carbon and nitrogen.

When the paper is recycled, waste sludge containing the notified polymer will be disposed to landfill. It is estimated that the removal rate of ink particles during the de-inking phase of paper recycling is 30-60% efficient for xerographic copying. It is likely that the same proportion of notified polymer, which is retained in the paper fibre, is retained in the sludge when the waste paper is re-pulped. Recycling is carried out in paper mills where it is likely that at least primary sedimentation is carried out. Thus, it can be assumed that nearly 100% of easily soluble substances will be released to waste water after primary treatment while around 50% of poorly soluble substances will be removed to sludge (EC, 1994). Sludges produced by flotation and clarification will be de-watered and disposed to landfill. It is likely that the bulk of the notified polymer will remain bound to the sludge and will not mobilise to groundwater under landfill conditions, given the anticipated high adsorption/desorption value and lack of solubility (Gustafson, 1989). Incinerated toner wastes will generate water and oxides of carbon.

No information on degradation of the notified polymer was submitted but it is expected that it will slowly degrade in landfill. There is potential for bioaccumulation, given the low water solubility and likely high $\log P_{ow}$ for the notified polymer, but this will be limited by its high molecular weight (Connell, 1990).

10. EVALUATION OF TOXICOLOGICAL DATA

No toxicology data were submitted.

Health Effects of the Constituents and Hazardous Impurities of the Notified Polymer and its Additives/Adjuvants & Regulatory Controls

Constituents:

Hazardous residual monomers are present in the polymer solution at concentrations below their respective concentration cut off levels as listed in the NOHSC List of Designated Hazardous Substances (NOHSC 1999a).

Hazardous Impurities:

Chemical, CAS number, percentage	Health hazards	Regulatory controls
stannane, dibutyl-oxo- 818-08-6, < 1%	Eye, skin and respiratory tract irritant; impairment of central nervous system function possibly resulting in death; liver impairment; suspected cause of birth defects; effects may be delayed (International Chemical Safety Cards, 1999).	National exposure standard for tin, organic compounds, 0.1 mg/m ³ TWA, 0.2 mg/m ³ STEL with skin notation (NOHSC, 1995).

Additives/Adjuvants

None

11. ASSESSMENT OF ENVIRONMENTAL EFFECTS

No ecotoxicological data were submitted.

12. ASSESSMENT OF ENVIRONMENTAL HAZARD

The majority of the notified polymer entering the environment will be fused to paper during the printing process. The waste paper generated will be disposed of through landfill, recycling, or incineration. In a landfill, the toner (and thus the notified polymer) should remain fixed to the paper substrate and remain immobile. When the paper is recycled, waste sludge containing the notified polymer will be disposed of to landfill. Due to the low solubility of the notified polymer, it is expected that the bulk of it will remain bound to soils and will not be available to the environment. Incinerated paper/toner wastes will generate carbon oxides and water and thus do not present a significant environmental risk.

Accidental spillage of the polymer, either during replacement of cartridges or during transport, should result in small amounts of powder wastes being sent to either landfill or incineration facilities. Spent cartridges that are not recycled are likely to be sent to landfill, along with used toner containers from photocopy machines. The notifier has stated that up to 50 g of residual toner could remain in 'empty' cartridges. Therefore, as a worst case, a maximum of 300 kg/year of the notified polymer could be sent to landfill from this route, assuming an import volume of up to 2 tonnes. The disposal of cartridges would be widespread across Australia.

Significant leaching of the notified polymer from landfill is not expected given the low water solubility of the polymer. The overall environmental risk presented by the importation of the notified polymer is low.

13. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

No toxicological information has been provided for the notified polymer and therefore the substance cannot be assessed against the NOHSC *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 1999b). The overall toxicity of the notified polymer is expected to be low as it is not highly reactive and, having a high molecular weight would not readily cross biological membranes.

The toner containing the notified polymer will have a uniformly small particle size, with the majority of the particles being marginally in the respirable size range.

Occupational Health and Safety

Waterside, warehouse and transport workers will be only exposed to the notified polymer in the event of an accident or damage to packaging. The occupational health risk to these workers is negligible, considering the small quantities of notified polymer in individual cartridges and the low hazard it presents.

The main exposure will be to service personnel while cleaning and servicing the printers or spent cartridge. The design of the toner cartridges is such that exposure to the notified polymer should be minimal, and therefore replacement of toner cartridges should not lead to significant exposure. Minor dermal or inhalation exposure may occur if a small quantity of toner is spilt while changing cartridges. The cartridge label and instruction sheet in the carton contain instructions on how to insert a new cartridge. Cotton or disposable gloves should be worn if contact with toner material is likely.

Office workers are not expected to come into contact with the notified polymer under normal circumstances. Infrequent dermal exposure of end users to the toner containing the notified polymer may occur when changing toner cartridges or clearing paper jams, but the high molecular weight of the notified polymer indicates that dermal absorption would be minimal. 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 not expected to pose a significant toxicological hazard. Work areas around the laser printers should be well ventilated to ensure that the concentration of airborne toner particles is as low as possible. Exposure to the notified polymer is not expected to occur once the toner is bound to paper.

Based on the low toxicological hazard presented by the polymer and the expected very low exposures, the health risk posed to office workers by the notified polymer is low.

Public Health

Public exposure to the notified polymer is possible in the event of an accident during transport and storage, but the likelihood of a substantial spill occurring is low in view of the packaging. The toner containing the notified polymer would normally only be used in

occupational settings, and therefore inhalation exposure to toner dust is not likely. Due to the high molecular weight of the notified polymer, percutaneous absorption is unlikely in the case of dermal contact with the toner.

Based on the information provided and the intended use, the notified polymer does not appear to pose a significant risk to public health.

14. MSDS AND LABEL ASSESSMENT

14.1 MSDS

The MSDS for the notified polymer and toner cartridge containing the notified polymer were provided in accordance with the *National Code of Practice for the Preparation of Material Safety Data Sheets* (NOHSC, 1994a).

These MSDS were provided by the applicant as part of the notification statement. The MSDS for the toner cartridge is reproduced here as a matter of public record. The accuracy of this information remains the responsibility of the applicant.

14.2. Label

The label for the products 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 engineering controls to minimise occupational exposure to the notified polymer in the toner cartridge:
 - Work areas around printers should be well ventilated.
- Employers should implement the following safe work practices to minimise occupational exposure during handling of the notified polymer in the toner cartridge:
 - Avoid spills and the formation of dust.
 - Spillages should be swept up promptly and put in containers for disposal.
- Employers should ensure that the following personal protective equipment is used by workers to minimise occupational exposure to the notified polymer in the toner cartridge:
 - Cotton or disposable gloves should be worn if direct contact with toner material is possible.

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 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.

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

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