File No PLC/560

10 October 2005

NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME (NICNAS)

FULL PUBLIC REPORT

Polymer in FD-02

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Director
NICNAS

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1. APPLICANT AND NOTIFICATION DETAILS

APPLICANT(S)
Delacamp Australia Pty Ltd. (ABN: 91 784 950 865)
77-87 Mark Street
NORTH MELBOURNE VICTORIA 3051

NOTIFICATION CATEGORY
Polymer of Low Concern

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
Polymer Constituents
Residual Monomers/Impurities
Use Details
Manufacture/Import Volume
Site of Manufacture/Reformulation

VARIATION OF DATA REQUIREMENTS (SECTION 24 OF THE ACT)
No variation to the schedule of data requirements is claimed.

PREVIOUS NOTIFICATION IN AUSTRALIA BY APPLICANT(S)
Yes

NOTIFICATION IN OTHER COUNTRIES
USA (1999)

2. IDENTITY OF CHEMICAL

OTHER NAME(S)
Polyester Resin

MARKETING NAME(S)
FD-02

Number Average Molecular Weight (Mn) >1000

3. COMPOSITION

POLYMER CONSTITUENTS

PLC CRITERIA JUSTIFICATION
There are no moderate or high concern reactive functional groups.

Criterion	*Criterion met*

	(yes/no/not applicable)
Molecular Weight Requirements	Yes
Functional Group Equivalent Weight (FGEW) Requirements	Yes
Low Charge Density	Yes
Approved Elements Only	Yes
Stable Under Normal Conditions of Use	Yes
Not Water Absorbing	Yes
Not a Hazard Substance or Dangerous Good	Yes

The notified polymer meets the PLC criteria.

4. INTRODUCTION AND USE INFORMATION

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

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

Year	*1*	*2*	*3*	*4*	*5*
Tonnes	3-10	10-30	10-30	10-30	10-30

USE

The notified polymer will be used as the main component in a toner product at a concentration of >83%.

5. PROCESS AND RELEASE INFORMATION

5.1. Operation Description

The notified polymer will be imported into Australia as the toner product. After importation the toner product will be transferred into cartridges and bottles in Australia.

6. EXPOSURE INFORMATION

6.1. Summary of Occupational Exposure

Transport and storage

Waterside, warehouse and transport workers are unlikely to be exposed to the notified polymer under normal circumstances. Exposure is only possible in the event of a spill.

Repackaging

Several workers will be involved in repackaging the toner product into cartridges and bottles at one or more sites in Australia. Workers will unpack the polyethylene bags and load the toner into a hopper. Filling the toner into cartridges and bottles is an automatic process. The equipment is cleaned daily with vacuum extraction unit connected to a waste bin and dry cloth.

Inhalation, dermal and ocular contamination to the toner may occur during repackaging, as it is an open process. The distribution of particle sizes of the toner product was not provided, however it is described as a black powder. Industrial controls such as local exhaust system should be in place to keep airborne concentrations below the exposure limit. Workers involved in the repackaging process will wear approved respirators, protective gloves, and safety glasses or chemical goggles.

Service personnel

Service personnel may come into dermal and respiratory contact with toner powder when cleaning and servicing printers or photocopiers. As the toner is contained within a cartridge or bottle, potential worker exposure via inhalation is not expected to be significant except in the event of a spill. In addition, it is recommended that all photocopiers and printers be placed in well-ventilated areas. Under most conditions, no personal protection is needed for service personnel.

Office workers
Office workers will add new toner cartridges or bottles to printers or photocopiers or remove spent cartridges or bottles and replace them as instructed on product labels. Spent cartridge or bottles are expected to contain approximately 2g of toner. Office workers may be exposed to toner dust by the dermal and inhalation routes if spillage occurs. Considering the design packaging of the cartridge and bottle, worker exposure is not anticipated when the product is used in accordance with label instructions and in well ventilated areas. Empty toner bottles and used cartridges will be placed in office waste bins and may be recycled.

6.2. Summary of Public Exposure

Dermal and inhalation exposure of office workers to the notified chemical will potentially occur when replacing spent cartridges or bottles and clearing paper jams from the printer or photocopier.

There is a potential for public exposure to the notified polymer during exchange of cartridges and bottles in printers and photocopiers. In the printers, notified polymer will become irreversibly bound to the copy paper and the potential for public exposure and the potential for public exposure thereafter are negligible.

6.3. Summary of Environmental Exposure

6.3.1. Environmental Release

The toner containing the notified polymer will be repackaged into the cartridges/bottles using an automated filling machine. This machinery will be vacuumed out daily and the notifier estimates that <300 g/day of the toner will be lost in this way. It can be estimated that the packaging may occur up to 300 days/annum that will result in a loss of approximately 90 kg/annum from machinery cleaning. We can estimate that <5 g of toner will remain as waste in the import bags after "emptying" and that < 100g may be lost per bag as spills during transfer, which will be vacuumed up. At an exported volume of 12 tonnes of the toner and the import bags being 20 kg or 80 kg each, the number of bags to be imported will be between 150 to 600/annum. The release from spills and bag residues will be approximately 63 kg/annum. This waste (63 kg toner or 52 kg notified polymer) and the waste from equipment cleaning (90 kg toner or 75 kg notified polymer) will likely be disposed of to landfill.

The toner cartridges are sealed prior to insertion into copier machines and therefore minimal environmental release is expected prior to use. When the toner is exhausted, the used cartridges are discarded to landfill. We may estimate that approximately 2g of toner will remain in the used cartridge, which equates to up to 264kg of toner (219kg of the notified polymer) annually, which is then disposed of to landfill.

Small amounts of toner may be spilt during maintenance. This material along with waste non-recycled paper will be discarded to landfill. In addition, polymer removed from recycled paper is likely being incorporated with the waste sludge, which will then be discarded to landfill, or incinerated.

Although there is a possibility of release of this polymer during transport, the risk of adverse effects to the environment is considered to be low as the polymer is contained in individual, sealed cartridges or sealed polyethylene bags. Collection of spilt material will be disposed of to either landfill or incineration.

The waste toner generated with each copy is reused within the machine, so there is no waste toner collection container.

6.3.2. Environmental Fate

During recycling, waste paper is pulped and de-inked using a variety of dispersing and wetting agents, organic solvents and bleaches. After pulping, the contaminants and ink are separated from the fibres by pumping the stock through various heat washing, screening, cleaning, and flotation and dispersion stages. During this procedure there is the potential for hydrolysis of the polymer to occur. Polymer removed from the paper will most likely be incorporated with the sludge remaining from recycling. Sludge is likely to be discarded to landfill or incinerated. Combustion products are likely to be water and oxides of carbon and hydrogen.

It is unlikely that used cartridges will be refilled or recycled, and they will most likely be disposed to landfill.

Once in landfill, leaching of the toner/polymer mix is unlikely to occur due to the expected insolubility of the substance. Hydrolysis is unlikely. Any polymer accidentally entering waterways would be expected to settle out onto sediments.

The polymer is not expected to cross biological membranes, due to the low solubility and high molecular weight. Therefore this polymer may be expected not to bioaccumulate.

7. PHYSICAL AND CHEMICAL PROPERTIES

Appearance at 20ºC and 101.3 kPa	Black fine powder as toner, slightly yellowish pellet as polyester
Melting Point/Glass Transition Temp	Softening point 130ºC
Density	Polyester: 1250 kg/m^3 at 25ºC Toner: 1200 kg/m^3 at 25ºC
Water Solubility	Negligible
Dissociation Constant	Not Applicable
Particle Size	*1. Polyester* >2000 µm 17.8% 2000–1400 µm 53.3% 1400-1000 µm 17.1% 1000-710 µm 7.22% 710-500 µm 2.80% 500-250 µm 1.41% 250-180 µm 0.22% 180-150 µm 0.07% 150-125 µm 0.04% 125-100 µm 0.02% <100 µm 0.02% *2. Toner* 25.0-20.0 µm 0.2 Vol.% 20.0-16.0 µm 0.6 Vol.% 16.0-12.0 µm 6.9 Vol% 12.0-10.0 µm 25.0 Vol% 10.0-8.0 µm 36.0 Vol% 8.0-6.0 µm 28.0 Vol% <5.0 µm 3.0 Vol%
Reactivity	Not active and the substance does not contain any reactive functional groups of moderate or high concern.
Degradation Products	Toxic gases (carbon monoxide, carbon dioxide, nitrogen oxides) will form upon combustion. However, the compound is considered stable under normal use conditions.

8. HUMAN HEALTH IMPLICATIONS

8.1. Toxicology

The following toxicological end-points were submitted:

Endpoint	*Result*	*Classified?*	*Effects Observed?*
Rat, acute oral	LD50 >2000 mg/kg bw	no	no
Rabbit, skin irritation	non-irritating	no	no
Skin sensitisation – maximisation test	non-sensitising	no	no

Genotoxicity – bacterial reverse mutation	non-mutagenic	no	no

All results were indicative of low hazard.

8.2. Human Health Hazard Assessment

The notified polymer meets the PLC criteria and can therefore be considered to be of low hazard.

9. ENVIRONMENTAL HAZARDS

9.1. Ecotoxicology

No toxicological data were submitted.

9.2. Environmental Hazard Assessment

The notified polymer meets the PLC criteria and can therefore be considered of low hazard.

10. RISK ASSESSMENT

10.1. Environment

While environmental exposure is limited during toner use, the total import volume of the notified polymer will ultimately be disposed of in either landfill or be incinerated. The widespread use pattern indicates that landfills throughout Australia would receive the notified polymer bound into the toner matrix within cartridges and on paper products. The used toner would be expected to remain within the container unless breached. On paper the notified polymer will interact with other components to form a stable polymer matrix and, once dry, is expected to be immobile and pose little risk to the environment.

During recycling processes, waste paper is repulped using a variety of alkaline, dispersing and wetting agents, water emulsifiable organic solvents and bleaches. These agents enhance fibre separation, toner detachment from the fibres, pulp brightness and the whiteness of paper. These aqueous wastes are expected to go to sewer. Very little of the notified polymer is expected to partition to the supernatant water which is released to the sewer. Sludge generated during the washing process is dried and incinerated or sent to landfill for disposal.

The notified polymer is not likely to present a risk to the environment when it is stored, transported, used, recycled and disposed of in the proposed manner.

10.2. Occupational Health and Safety

Waterside, warehouse and transport workers will be only exposed to the notified polymer in the toner in the even of an accident or damage to packaging. The occupational health risk to these workers is negligible, given the low toxicity hazard.

Packaging workers could be exposed to the notified polymer via dermal, ocular and inhalation routes when they open the package, load hopper and clean the filling machines. Particles of the toner product could be respiratory and eye irritants. Industrial controls such as local exhaust ventilation are used to keep airborne concentrations below the exposure limit. Workers wear respirators, protective gloves and safety glasses or chemical goggles to reduce the potential for exposure. These industrial controls and personal protective equipment are considered to be sufficient to minimise the health risk to repacking workers.

Trained service personnel will clean and service photocopiers or printers, and may be exposed to spilt toner. Toner particles are contained within the bottle or cartridge. Spent bottles or cartridges are expected to retain contained within the bottles or cartridge.

Office workers will add toners to bottles or change toner cartridges as required. The toner, hence the notified polymer, is contained within the bottle or cartridge unit. New cartridges will be removed from packaging, shaken and inserted into the machine. For bottle toners, workers will take bottles from packaging, remove the lids and add the toner containers of the

photocopiers. There may be some exposure to any spilt toner, however the risk of health effects resulting from dermal and respiratory exposure during addition of toner or replacement of cartridges is low. Contact with printed-paper will not result in skin contamination, as the notified chemical will be fixed to the paper as part of the toner product.

Overall, the potential risk to office workers is considered to be negligible.

10.3. Public Health

There is negligible concern to public health because the notified polymer is present at low concentrations and bound within a matrix and unlikely to be bioavailable. The toner is contained within sealed bottles, which are not expected to leak during normal use, while the ink deposited on the printed pages is bound to the paper and hence not biologically available once dried.

11. CONCLUSIONS – ASSESSMENT LEVEL OF CONCERN FOR THE ENVIRONMENT AND HUMANS

11.1. Environmental Risk Assessment

The polymer is not considered to pose a risk to the environment based on its reported use pattern.

11.2. Human Health Risk Assessment

11.2.1. Occupational health and safety

There is Low Concern to occupational health and safety under the conditions of the occupational settings described.

11.2.2. Public health

There is Negligible Concern to public health when used in the proposed manner.

12. MATERIAL SAFETY DATA SHEET

12.1. Material Safety Data Sheet

The notifier has provided an MSDS of the toner product containing the notified chemical as part of the notification statement. The accuracy of the information on the MSDS remains the responsibility of the applicant.

13. RECOMMENDATIONS

CONTROL MEASURES

Occupational Health and Safety

- Avoid generating dust when handling toner.

  Spillage of the notified polymer should be avoided. Spillage should be cleaned up by sweeping up/vacuuming and placing into containers for disposal.

- The repackaging process should be performed under exhaust ventilation to prevent the airborne concentration of dust exceeding exposure limits.

  - The NOHSC exposure standard for atmospheric nuisance dust is 10 mg/m^3.
  - Guidance in selection of personal protective equipment can be obtained from Australian, Australian/New Zealand or other approved standards.

- Atmospheric monitoring should be conducted to measure workplace concentrations of airborne particulates during the repackaging of the notified polymer.

- Service personnel should wear cotton or 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 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 to landfill or incinerated.

- Empty containers, toner bottles and toner cartridges should be sent to waste disposal facilities.

Storage

- The following precautions should be taken regarding storage of the notified polymer:
  - Under most conditions, no personal protection is needed.
  - In a dusty atmosphere, wear dust respirators and chemical goggles.

Emergency Procedures

- Spills/release of the notified polymer should be handled by sweeping up/vacuuming and placing into containers for disposal.

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

or

(2) Under subsection 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.