

File No: NA/425

Date: October 1996

**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION
AND ASSESSMENT SCHEME**

FULL PUBLIC REPORT

MTR-1

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 Worksafe Australia which also conducts the occupational health & safety assessment. The assessment of environmental hazard is conducted by the Department of the Environment, Sport, and Territories and the assessment of public health is conducted by the Department of Health and Family Services.

For the purposes of subsection 78(1) of the Act, copies of this full public report may be inspected by the public at the Library, Worksafe Australia, 92-94 Parramatta Road, Camperdown NSW 2050, between the hours of 10.00 a.m. and 12.00 noon and 2.00 p.m. and 4.00 p.m. each week day except on public holidays.

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Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT**MTR-1****1. APPLICANT**

Mita Copiers Australia Pty Ltd of 25 Sirius Road LANE COVE NSW 2066 has submitted a limited notification statement in support of their application for an assessment certificate for MTR-1.

2. IDENTITY OF THE CHEMICAL

MTR-1 is not considered to be hazardous based on the nature of the chemical and the data provided. Therefore the chemical name, CAS number, molecular and structural formulae, exact molecular weight, spectral data, details of the polymer composition and details of exact import volume have been exempted from publication in the Full Public Report and the Summary Report.

Number-Average

Molecular Weight: > 1000

Weight-Average

Molecular Weight: not provided

**Maximum Percentage of Low
Molecular Weight Species**

Molecular Weight < 1000: 8.2%

Molecular Weight < 500: 1.8%

**Method of Detection
and Determination:**

ultraviolet/visible and infrared spectroscopy

3. PHYSICAL AND CHEMICAL PROPERTIES**Appearance at 20°C
and 101.3 kPa:**

white to pale yellow coarse powder

Softening Range:

100-140°C

**Glass Transition
Temperature:**

180°C (approximately)

Density:	1260 kg/m ³ at 20°C
Vapour Pressure:	< 5 X 10 ⁻¹⁴ kPa at 25°C
Water Solubility:	saturation concentration = 13.4 mg/L at 20°C; content of water extractable parts = 0.34 g/kg
Partition Co-efficient (n-octanol/water):	log P _{ow} > 6
Hydrolysis as a Function of pH:	not determined
Adsorption/Desorption:	estimated K _{oc} > 1 X 10 ⁶ (by estimation from log P _{ow})
Dissociation Constant:	not determined
Flash Point:	not determined
Flammability Limits:	not highly flammable
Decomposition Temperature:	> ~240°C
Autoignition Temperature:	> 400°C
Explosive Properties:	non-explosive
Particle Size:	medium mass diameter: 270 µm 0.5% < 14 µm 5.94 < 63 µm 93.56 > 63 µm
Reactivity/Stability:	predicted to be non-oxidising; sunlight and temperatures above 40°C will contribute to instability

Comments on Physico-Chemical Properties

The notified polymer exhibits slight solubility at room temperature. Water solubility was determined using the new draft solubility/extractability OECD test (1), which gives a measure of solubility for the test material by the amount extracted into double-distilled water. The solubility for this substance seems high given the lack of functionality that might confer such properties to this chemical and the calculated logP_{ow}, and may reflect more soluble low molecular weight species.

While it contains ester functionalities the notified substance is not expected to hydrolyse under the expected environmental pH range.

The estimated partition coefficient data and high molecular weight for this polymer suggests that it is not expected to cross biological membranes or to bioaccumulate. The estimation of the ability for adsorption/desorption indicates the notified substance is expected to sorb strongly to soils. There are no dissociable hydrogens in the notified polymer.

4. PURITY OF THE CHEMICAL

Degree of Purity: 99.9%

Toxic or Hazardous Impurities: two of the monomers making up the notified polymer are estimated to be present at less than 0.01% (each) from GPC; one of these is an eye irritant (2); the other is a renal toxicant, experimental teratogen, human mutagen and an eye irritant (2); a third monomer is present at a concentration of 0.05% and exhibits pulmonary edema, irritation to the lung and air passage, immunological sensitisation with asthma like symptoms by inhalation and has an exposure standard of 39 µg/m³ (2,3)

Non-Hazardous Impurities (> 1% by weight): none

Maximum Content of Residual Monomers: 0.13%

Additives/Adjuvants: none

5. USE, VOLUME AND FORMULATION

The notified polymer is a component of formulated photocopy toners. It is to be imported at a rate of > 1 tonne for the next five years. It is present in photocopy toner at 80 - 90%, the remainder comprising carbon black (5 - 12%), amorphous silica (< 2%), 1-propane homopolymer (< 10%) and wax (< 10%).

6. OCCUPATIONAL EXPOSURE

The notified chemical is to be imported as a component of photocopy toner in plastic cartridges. There is a low probability of exposure during transport and handling in the event of an accident.

There are two types of workers who are likely to be exposed to the notified polymer: photocopier service engineers who install and maintain dry photocopiers; and office workers replacing toner cartridges, once, every few weeks per machine. The toner

in the photocopier is recharged by removal of the cartridge and discarding to a plastic bag and loading the prepacked toner cartridge to the photocopier. Exposure is expected to be low given that each recharge takes about 5 minutes and that a service engineer would spend a total of about 15 hours per year performing these operations.

7. PUBLIC EXPOSURE

Given that the toner will be packaged in prepacked toner cartridges, no public exposure to the notified polymer is expected during its distribution. The toner cartridge will be inserted directly into the photocopier and therefore the potential for public exposure to the polymer is expected to be minimal. Disposal of waste toner by landfill or incineration is not expected to lead to public exposure to the notified polymer. Although waste containing the polymer may be produced when paper treated with the toner is recycled, waste produced from recycling procedure is expected to be sent to landfill or incineration, and therefore no public exposure to the notified polymer is expected to occur.

Public exposure to the polymer is expected to result from contact with paper treated with the toner, however, given that the notified polymer will be bound to the paper such exposure is expected to be minimal.

8. ENVIRONMENTAL EXPOSURE

Release

The notifier indicated that the yearly loss from recharging photocopier toner, using the notified cartridges will be negligible. Office staff will directly insert toner cartridges into photocopiers as per instructions given with the toner. The company estimates that less than 9 g of the spent toner (containing less than 8 g of the notified polymer) is expected to remain in the cartridge at replacement. Replacement of cartridges are unlikely to occur more than once a week. Major release would be expected to be the disposal of cartridges containing residues of the notified polymer. Other possible release to the environment will be through spillages upon use of this developer and disposal of the plastic bags used for transport of the notified chemical.

Company sales forecasts are for 2000 cartridges in the year 2001. This equates to 16 kg of polymer being released with spent cartridges. For this assessment, it will be assumed that there is no cartridge recycling, so all release of this nature will be to landfill. Treatment and disposal of any spillages and wastes is adequately dealt with in the Material Safety Data Sheet (MSDS).

Loss of notified substance will also occur via cleaning of the printers using the developer. Printers will be cleaned using water-based solvents and the wastes disposed of according to local regulations.

There will be exposure to the environment through the disposal/recycling of paper containing the notified polymer. This situation is discussed below.

Fate

The fate of most of the notified substance is identical to that of the paper to which it is bound. This paper may be recycled but eventually will be disposed of to landfill. Here they would very slowly break down. It is unlikely that the developed ink would leach, but stay within the landfill.

Recycling is a growing industry in Australia. Waste paper is repulped using a variety of alkalis, dispersing agents, wetting agents, water emulsifiable organic solvents and bleaching agents. These chemicals enhance the fibre separation, ink detachment from the fibres, pulp brightness and the whiteness of the paper. After pulping, the contaminants and the ink are separated from the fibres by pumping the stock through various heat washing, screening, cleaning, flotation and dispersion stages. Similarly, the recycling of plastics will use a variety of physical and chemical processes.

The notifier has provided no data on the likely behaviour of the polymer during recycling processes. The hydrolysis of ester linkages and acid groups under alkaline conditions will be minimal due to the low solubility of the polymer. The polymer therefore is likely to survive recycling conditions, either remaining bound to the pulp or becoming associated with the sludge. In the latter case, the polymer will arrive in landfill where it can be expected to remain intact, or be destroyed through incineration.

The company has submitted a MSDS for the notified substance and it includes a suitable recommendation on handling of spills and their disposal.

Bioaccumulation

The waste generated by use of the notified substance will, in the general case, be through spills or by refilling of printing cartridges. These wastes will be treated as landfill. Given the water solubility of MTR-1, its $\log P_{ow}$ value (> 6) and low aquatic exposure, the potential for bioaccumulation seems negligible.

9. EVALUATION OF TOXICOLOGICAL DATA

Toxicological data are not required for polymers of number-average molecular weight (NAMW) > 1000 according to the Act. Nevertheless, some tests have been conducted on MTR-1 and were submitted as part of the notification statement.

9.1 *Salmonella typhimurium* Reverse Mutation Assay (4)

<i>Strains:</i>	TA 1535, TA 1537, TA 100 and TA 98 and <i>E. coli</i> WP2 <i>uvrA</i>
<i>Concentration range:</i>	312.5 - 5000 $\mu\text{g}/\text{plate}$

Test method: OECD Guidelines for Testing of Chemicals (5)

Result: not mutagenic in the bacterial strains tested in the presence or absence of metabolic activation provided by rat liver S9 fraction

9.2 Overall Assessment of Toxicological Data

The notified polymer was not mutagenic (with or without metabolic activation) in *Salmonella typhimurium*.

10. ASSESSMENT OF ENVIRONMENTAL EFFECTS

No ecotoxicological data were provided, which is acceptable for polymers with an annual import rate of > 1 tonne and a NAMW > 1 000, according to the Act.

11. ASSESSMENT OF ENVIRONMENTAL HAZARD

The notified substance is unlikely to present a hazard to the environment at any stage of its use. It is expected that negligible amounts will be released during recharging of photocopier cartridges or cleaning of the photocopying machines. The ultimate fate of the waste developer is treatment by landfill at an approved industrial facility. Leaching of such treated wastes into the soil is not expected.

The notifier has estimated 2 000 cartridges containing the polymer will be used in Australia in the year 2 001. Each cartridge contains 1 820 g of toner (up to 1640 g of notified polymer), which is an importation of 3 280 kg of polymer in this year.

Replacement of cartridges are unlikely to occur more than once a week. Spent cartridges typically contain less than 8 g of the polymer. A maximum amount of 16 kg of MTR-1 is expected to end up as landfill through association with disposal of spent cartridges. This equates to a weekly release of 308 g, and is spread across many sites, Australia wide.

Between 20-25 tonnes of this chemical is expected to be imported over the next five years through a separate company. As such, because of the relatively small additional amount being imported and the small amount of release being spread across the country, the environmental hazard of the polymer is rated as negligible.

12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

The notified polymer has a NAMW greater than 1000 and should not be absorbed across biological membranes to cause systemic effects. The levels of low molecular weight species (8.2%) and residual monomers (maximum of 0.13%) would not render the polymer hazardous according to the criteria of Worksafe Australia (6).

Exposure of workers to the notified polymer during importation, warehousing and

handling of containers is likely to occur only in the event of an accident.

Exposure of office workers and service engineers to photocopier toner containing the notified polymer is expected to be low given the time taken to change the toner cartridge. Accidental spills during this operation are expected to be infrequent. There may be some exposure to toner during cleaning of the machine and machine maintenance but this can be easily avoided by the use of disposable plastic gloves.

Health risks to service engineers involved in developer replenishment and machine maintenance are considered to be negligible given the limited and infrequent exposure coupled with the predicted low hazard of the notified chemical.

Although, public contact with paper treated with the notified polymer may occur, its high NAMW suggests that if contact were to occur, absorption is unlikely, and therefore there is negligible risk to public safety.

13. RECOMMENDATIONS

To minimise occupational exposure to the notified chemical the following guidelines and precautions should be observed:

- Spillage of the notified chemical should be avoided, spillages should be cleaned up and put into containers for disposal;
- Good personal hygiene should be practised to minimise the potential for ingestion; and
- A copy of the relevant MSDS should be easily accessible to employees.

14. MATERIAL SAFETY DATA SHEET

The MSDS for the product containing the notified chemical was provided in accordance with the *National Code of Practice for Preparation of Material Safety Data Sheets* (7).

This MSDS was provided by the applicant as part of the notification statement. It is reproduced here as a matter of public record. The accuracy of this information remains the responsibility of the applicant.

15. REQUIREMENTS FOR SECONDARY NOTIFICATION

Under the Act, secondary notification of the notified chemical shall be required if any of the circumstances stipulated under subsection 64(2) of the Act arise. No other specific conditions are prescribed.

16. REFERENCES

1. OECD ENV/MC/CHEM(96)2. Proposal for the Endorsement of Three New Test Guidelines and One Updated Guideline, Submitted to the 24th Joint Meeting, 1996.
2. *Dangerous Properties of Industrial Materials*, 7th Ed., Sax N. I. and Lewis R. J. Sr Eds, Van Nostrand Reinhold, 1989.
3. National Occupational Health and Safety Commission 1995, *Exposure Standards for Atmospheric Contaminants in the Occupational Environment [NOHSC:1003 (1995)]*, Australia Government Publishing House, Canberra
4. *Ames/Salmonella-E. coli Plate Incorporation Assay on OS #89887*, Project No.: PH 301-LU-001-92, data on file, Pharmakon USA, Waverley, PA, USA, 1992.
5. Organisation for Economic Co-operation and Development, *OECD Guidelines for Testing of chemicals*, OECD, Paris, France
6. National Occupational Health and Safety Commission 1994, *Approved Criteria for Classifying Hazardous Substances [NOHSC:1008(1994)]*, Australia Government Publishing Service, Canberra.
7. National Occupational Health and Safety Commission 1994, *National Code of Practice for the Preparation of Material Safety Data Sheets [NOHSC:2011(1994)]*, AGPS, Canberra.