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**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION
AND ASSESSMENT SCHEME**

FULL PUBLIC REPORT

Lotader AX 8840

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Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT**Lotader AX 8840****1. APPLICANT**

FUJI XEROX AUSTRALIA PTY LTD of 546 Gardeners Road, Mascot NSW 2020 has submitted a limited notification statement in support of their application for an assessment certificate for Lotader AX 8840.

2. IDENTITY OF THE CHEMICAL

The chemical name, CAS number, molecular and structural formulae, molecular weight, spectral data, details of the polymer composition and details of customers have been exempted from publication in the Full Public Report and the Summary Report. Data from Infra-Red and GPC analysis have been provided for the polymer.

Marketing Name: 'Lotader AX 8840'

3. PHYSICAL AND CHEMICAL PROPERTIES

The following physical and chemical properties are for the final product, Lotader AX 8840, unless otherwise stated. The product contains *ca.* 3 % notified polymer.

Appearance at 20°C black powder
and 101.3 kPa:

Boiling Point: Not specified

Specific Gravity: ~ 1.0

Vapour Pressure: Not measured (see comments below).

Water Solubility: Not measured (see comments below).

Partition Co-efficient (n-octanol/water): Not measured (see comments below).

Hydrolysis as a Function of pH: Not measured (see comments below).

Adsorption/Desorption: Not measured (see comments below).

Dissociation Constant:	Not measured (see comments below).
Flash Point:	Not applicable.
Flammability Limits:	Not flammable, however there is a risk of dust explosion in the presence of an ignition source.
Autoignition Temperature:	Ignition temperatures to ignite toner dust clouds and layers are <i>ca.</i> 496 and 388 °C respectively.
Explosive Properties:	The final product is not flammable under normal conditions of use but will support combustion at the ignition temperatures to produce smoke and oxides of carbon and nitrogen.
Reactivity/Stability:	The final product is stable.
Particle Size:	The notified polymer is produced as pellets of <i>ca.</i> 1.9 mm diameter. During the manufacture of the final toner product, the pellets are compounded in an extruder with other ingredients to yield a final particle size of <i>ca.</i> 9µm, <i>i.e.</i> respirable.

Comments on Physico-Chemical Properties

Vapour pressure was not measured. However, the stated high molecular weight would indicate that it would be negligible.

Water solubility was not measured. However, the high molecular weight and apolar grouping would make solubility low. The epoxide group present in the polymer, whilst potentially able to increase water solubility when reacted with water, is not expected to significantly increase water solubility.

It is given that the ester groups within the notified polymer may undergo hydrolysis under certain temperatures and pH conditions (*i.e.* outside the environmental temperature and pH range). The epoxide group present in the notified polymer will also react with water. It is anticipated that both reactions would be slow at ambient environmental conditions.

The high hydrocarbon content of the notified polymer suggests that it would have a high partition co-efficient and a strong affinity for oil, soil and sediments. There are no dissociable groups present within the notified polymer.

4. PURITY OF THE CHEMICAL

Degree of Purity:	Very high.
Hazardous Impurities:	within the notified polymer are:

<i>Chemical name:</i>	Carbon black
<i>CAS No.:</i>	1333-86-4
<i>Weight percentage:</i>	< 6 %
<i>Toxic properties:</i>	NOHSC exposure standard 3 mg/m ³ TWA

Non-hazardous Impurities: within the notified polymer are:

<i>Chemical name:</i>	Isododecane
<i>CAS No.:</i>	31807-55-3
<i>Weight percentage:</i>	0.15%

Maximum Content of Residual Monomers: One hazardous substance is present, however this residual monomer is present below the cut-off concentration of 1 %.

Additives/Adjuvants: Within the final product:

<i>Chemical name:</i>	Polypropylene wax
<i>CAS No.:</i>	9003-07-0
<i>Weight percentage:</i>	< 6 %

<i>Chemical name:</i>	Surface treated silica
<i>CAS No.:</i>	68909-20-6
<i>Weight percentage:</i>	< 5%

<i>Chemical name:</i>	Titanium dioxide (surface-treated)
<i>CAS No.:</i>	13463-67-7
<i>Weight percentage:</i>	< 3%

<i>Chemical name:</i>	Zinc stearate
<i>CAS No.:</i>	557-05-1
<i>Weight percentage:</i>	< 1%

5. USE, VOLUME AND FORMULATION

The notified polymer will be used as a component of a toner cartridge for photocopiers. It will be imported as part of the final product containing *ca.* 3% notified polymer in 1050 g sealed, ready-to-use bottles.

No manufacturing or reformulation will occur within Australia. Approximately 1000 kg/annum of the final product will be transported to and stored at the notifier's site. The

cartons will then be distributed by road to service outlets throughout Australia.

6. OCCUPATIONAL EXPOSURE

The notified polymer Lotader AX 8840 will be imported as part of the finished product, Toner in Document Centre 240/265 Cartridge. Up to 5-10 Transport and Storage workers, 50 Customer Service Engineers and ~700 Office Customers (Key Operators) may be potentially exposed to the notified polymer, which is in the form of a fine black powder.

Repackaging, Transport and Storage

The notified polymer will be imported as part of the finished product which will be packed in cartons (6 bottles per carton). The cartons will be transported from the dockside to the Fuji Xerox warehouse site. The cartons will be stored before being distributed by road to service outlets around Australia (2-3 hours a day, 10-15 days/year). It is anticipated that waterside workers, transport drivers and warehouse workers would only be exposed to the material in the event of an accident.

Customer Service Engineers

The Customer Service Engineers replace the developer collector bottle containing a mixture of excess developer and toner (5-20 minutes/day, 4-160 days/year). The developer collector bottle is replaced every 100 000 prints and then returned to Fuji Xerox for cleaning. Skin contamination may occur when cleaning the photocopier. Inhalational exposure may occur if dust clouds are generated during maintenance. Once the toner is bound to paper, the notified polymer will not be separately available for exposure or uptake by paper handlers.

Office Customers

Customer operators load toner into a photocopier by hand in accordance with instructions specific to the photocopier (5-10 minutes/day, 25-50 days/year). Typically, the depleted toner bottle is removed from the photocopier and the new sealed toner bottle is simply inserted into the photocopier. Provided the instructions are followed, there should be minimal contact with the toner. Skin contamination and inhalational exposure may occur if spillage results during the loading operation.

No special safety procedures are recommended by the notifier when handling the notified polymer by these workers.

7. PUBLIC EXPOSURE

It is expected that during transport, storage, and use by Customer Service engineers, exposure of the general public to the notified polymer will be minimal, except in the event of an accidental spill.

Public exposure to the notified polymer during use is expected to be occasional but widespread and would include changing toner bottles or cartridges and attending to minor faults such as paper feed jams. Inhalation, ocular or dermal exposure to toner could occur in the event of a spill.

End Use

The toner containing the notified polymer forms a polymer matrix in its dry bound form on paper making the notified polymer biologically unavailable. A relatively low amount, *ca.* 50 mg, of toner is used per legal sheet of paper. Collectively, this indicates that there would be little to no human exposure to the notified polymer during the handling of printed materials.

8. ENVIRONMENTAL EXPOSURE

Release

Toner bottles are fully sealed prior to insertion into copier machines and therefore minimal environmental release is expected prior to and during use. When the toner is exhausted, the used bottles are discarded to landfill. The notifier has indicated that *ca.* 1% of the toner (*i.e.* 0.32 g of notified polymer) will remain as residue in these used bottles. Assuming an import volume of 1000 kg, this equates to *ca.* 10 kg being released per annum. Spent bottles are either directly disposed of to landfill or returned to the manufacturer prior to disposal to landfill.

Photocopiers designed to use the above toner bottles also possess a developer collector bottle which, when full, is discarded to landfill. These bottles store *ca.* 0.5% (3.25 g) of waste toner. Assuming an import volume of 1000 kg, this equates to *ca.* 5 kg per annum of waste notified polymer.

Release of the notified polymer is also expected to occur at landfill sites where spills and waste paper are discarded. In addition, polymer removed from the paper during recycling is likely to be incorporated with the waste sludge which will then be discarded to landfill or incinerated.

Although there is a risk of polymer release during transport, it is considered to be low as the polymer is contained in individual, sealed bottles. Collection of spilt material will be disposed of to either landfill or incineration.

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, flotation and dispersion stages. During these processes 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.

Once in landfill, leaching of the toner/polymer mix is unlikely to occur due to the low predicted solubility of the substance. Hydrolysis, although theoretically possible, is unlikely. According to the Material Safety Data Sheet (MSDS), the notified polymer is not readily biodegradable but may be expected to degrade slowly via biotic and abiotic processes.

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 the notified substance is not expected to bioaccumulate.

9. EVALUATION OF TOXICOLOGICAL DATA

No toxicological data were submitted by the notifier to support this limited notification. The MSDS supplied by the notifier contains toxicological information on other toners containing the toner constituents, on similar toners, or on the constituents. This information suggested that there exists low acute oral ($LD_{50} > 34.6$ g/kg) and inhalation ($LC_{50} > 5000$ mg/m³ /4h) toxicity in rats, low acute dermal toxicity in rabbits ($LD_{50} > 5000$ mg/kg), no eye irritancy and that there is no evidence of mutagenicity in a battery of Ames tests. The Lotader AX 8840 toner product was subjected to a human patch test and was found to be a mild irritant without skin sensitisation.

10. ASSESSMENT OF ENVIRONMENTAL EFFECTS

No ecotoxicological data were provided.

The notifier has indicated that no ecotoxicity tests were done on the toner since it does not contain any toxic substances. However, based on similar toners and the major constituents, the MSDS indicates that the toner product containing the notified polymer is not toxic to rainbow trout ($LC_{50} > 1000$ mg/L).

11. ASSESSMENT OF ENVIRONMENTAL HAZARD

The notified polymer will not be manufactured or reformulated in Australia and will be imported as a component of a toner bottle for photocopiers.

Release of the notified chemical is not expected to occur until the notified chemical is disposed of to landfill or when paper containing the polymer is recycled or disposed of. The polymer would remain either bound to waste paper, or to sludge that results from recycling processes and may be sent to landfill or incinerated.

Accidental spills of the polymer, either during replacement of bottles or during transport, are expected to be minimal. Spilt material and polymer remaining in spent bottles and full developer collector bottles will be disposed of to landfill. Movement of the polymer by leaching from landfill sites is not expected.

The low environmental exposure of the polymer as a result of normal use indicates that the overall environmental hazard should be low.

12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

Hazard Assessment

No toxicological data were submitted to support his limited notification. The MSDS supplied by the notifier contains toxicological information on other toners containing the toner constituents, on similar toners, or on the constituents. This information suggested that the toner is of low toxicity and not likely to be a hazardous substance under NOHSC Approved Criteria for Hazardous Classifications (NOHSC 1999).

Occupational Health and Safety

The finished toner product has a mean particulate size of 9 μm falling within the respirable range ($< 8\text{-}10\ \mu\text{m}$). Due to the physical form and particle size of the finished toner product, there exists risk of inhalational and dermal exposure in the event of contact with the toner. Exposure to toner containing the notified polymer may occur during machine cleaning and maintenance and whilst clearing paper feed problems. Transport and storage of the toner bottles and cartridges is unlikely to result in worker exposure except in the event of accidental spillage.

Persons who will perform additions of toner and replacement of a used toner container (cartridge or bottle), are expected to be exposed infrequently to the notified polymer as the toner container is sealed and loaded directly into a printing machine. Upon application to the paper, the toner is irreversibly impregnated on to the paper and release is unlikely to occur. Therefore, the risk of adverse health effects to printing personnel is low and no personal protective equipment is required. However, given that most of the product is respirable and that inhalation data has not been provided, it is important that any generation of dust is avoided.

Service personnel may be exposed to the notified polymer when cleaning printer/copier equipment and replacing copier developer. However, as the toner product is unlikely to be hazardous, the risk of adverse health effects is low. Disposable gloves may be worn to prevent skin irritation and workers should avoid any generation of dust when handling the toner. Spilt residues should be swept up manually or using a dust explosion-proof vacuum cleaner and placed within a waste container.

The toner can be considered a nuisance dust and the notifier's recommended exposure limits of $2.5\ \text{mg}/\text{m}^3$ (8 hr TWA) total inhalable dust and $0.4\ \text{mg}/\text{m}^3$ (8 hr TWA) total respirable dust should be adhered to. It is unlikely that the airborne concentration of toner dust in the workplace would warrant exposure monitoring and specific ventilation.

Workers handling printed paper are not at risk of adverse health effects as the polymer is fixed to the paper and not available for exposure or dermal uptake. The notified polymer is combined within a polymer matrix and is not expected to degrade or decompose under normal use conditions. There is not expected to be any natural loss of monomers, reactants, additives, or impurities from the polymer matrix when applied in a dry bound form to paper.

Given these considerations, the chemical will not pose a significant health risk in the occupational environment.

Public Health

The potential hazard to the public throughout of the life cycle of the notified polymer is considered to be low based on the following; the only acute toxicological hazard is the possibility of mild skin irritation; spills of toner containing the notified polymer are

minimised by the use of cartridges; and the concentration of notified polymer in the product is low (3 %).

13. RECOMMENDATIONS

To minimise occupational exposure to Lotader AX 8840, the following guidelines and precautions should be observed:

- Spillage of the notified polymer should be avoided. Spills should be vacuumed or collected into suitable containers and disposed of at landfill in accordance with State regulations. If necessary, residues may be washed away with cold water;
- The generation of dust clouds should be avoided. All sources of ignition should be extinguished to prevent potential explosion from this fine dust.
- Good personal hygiene should be practised to minimise the potential for ingestion;
- A copy of the MSDS should be easily accessible to employees.

14. MATERIAL SAFETY DATA SHEET

The MSDS for the notified polymer was provided in a format consistent with the *National Code of Practice for the Preparation of Material Safety Data Sheets* (NOHSC 1994).

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 polymer may be required if any of the circumstances stipulated under section 64 of the Act arise. No other specific conditions are prescribed.

16. REFERENCES

National Code of Practice for the Preparation of Material Safety Data Sheets, (1994), Canberra, Australian Government Publishing Service.

National Occupational Health & Safety Commission Approved Criteria for Classifying Hazardous Substances (1999), Canberra, Australian Government Publishing Service.