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NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME

FULL PUBLIC REPORT

Modified PET-1

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For enquiries please contact the Administration Coordinator at:

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Director
Chemicals Notification and Assessment

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1. APPLICANT

BP Fabrics and Chemicals Australia of 28-34 Orange Grove Road, Liverpool, NSW (ABN 42 008 451 483) has submitted a notification statement in support of their application for an assessment certificate for the synthetic polymer of low concern (PLC) **Modified PET-1**.

2. IDENTITY OF THE CHEMICAL

The chemical name, 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: Amosorb 3XXX (where X is any number 0-9 or any letter)
Amosorb DFC

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	Clear or opaque pellets	
Melting point	230-250 °C	
Density	1300 kg/m^3	
Water solubility	Not determined	Expected to be <1 mg/L
Particle size	Not applicable	Polymer is in large pellet form.

Flammability	Combustible
Autoignition temperature	Not determined
Explosive properties	None identified
Stability/reactivity	Stable

5.1 Comments on physical and chemical properties

No details of analytical methodologies were provided.

Water solubility was not determined for the notified polymer but the solubilities of similar polyester resins indicate that the water solubility of the notified polymer would be less than 1 mg/L.

The notified polymer contains ester groups, which would not hydrolyse within the environmental range pH of 4-9 due to low water solubility. The polymer also contains terminal hydroxyl groups that could be reactive under extreme conditions. The polymer contains reactive functional groups of low concern only. It is expected to remain stable under ambient conditions.

6. USE, VOLUME AND FORMULATION

Use: The notified polymer will be used as a component of plastic food and beverage packaging.

Manufacture/Import volume: The notified polymer will not be manufactured in Australia. It will be imported as pellets containing 40-99% notified polymer in 680 kg foil-lined bags housed in reinforced cardboard boxes.

Approximately 23 tonnes will be imported in the first year rising to 46 tonnes in the second year and then 68 tonnes/year up to the fifth year.

7. OCCUPATIONAL EXPOSURE

Exposure route	Exposure details	Controls indicated by notifier
Transport and storage		
Import and Transport of Imported Pellets		
Dermal	Accidental breach of bags and spillage of pellets containing 40-99% polymer.	No exposure controls specified.
Manufacture of Container Preforms		
Pouring of Pellets into Additive Loader Hopper (1 worker)		

Dermal	Accidental spillage of pellets containing 40-99% polymer.	No exposure controls specified.
Pouring of Regrind Pellets into Injection Machine Hopper (1 worker)		
Dermal	Accidental spillage of regrind pellets containing < 10 % polymer.	No exposure controls specified.
Injection Moulding of Container Preforms		
Inhalation	Inhalation of vapours from heated material containing < 10% polymer.	Local exhaust ventilation fitted to injection moulder
Regrinding Spillage and Scrap Container Preforms (2 workers)		
Dermal, ocular, inhalation	Accidental spillage of regrind pellets; inhalation of regrind dust containing < 10% polymer.	Local exhaust ventilation fitted to grinder; no further exposure controls specified.
Blow Moulding of Containers		
Injection Moulding		
Inhalation	Inhalation of vapours from heated material containing < 10% polymer.	Local exhaust ventilation fitted to injection moulder.
Disposal		
Collection of Scrap Container Preforms		
Dermal	Accidental spillage of scrap.	No exposure controls specified.

8. PUBLIC EXPOSURE

The notified polymer is not available for sale to the public and will be used in plastic packaging products. The potential for public exposure to the notified polymer during transport, reformulation or disposal is likely to be negligible. Although members of the public may consume food or beverage from packages manufactured using the notified polymer, the polymer is unlikely to be released from the polymeric resin of the packaging material. Therefore, exposure is unlikely.

9. ENVIRONMENTAL EXPOSURE

9.1. Release

The notifier indicates that up to 2% of the notified polymer will be generated as waste from the manufacturing process and all of this will be sold to recyclers. This translates to 1,365 kg/year, assuming the maximum import volume of 68.25 tonnes/year. However, it is likely that a much greater proportion will ultimately go to landfill as used polymer products, with a much smaller fraction finishing up in the aquatic compartment.

9.2. Fate

The notified polymer, along with virtually all commodity plastics, is characterised by high molecular weight, insolubility in water, low chemical reactivity, considerable mechanical

strength, and resistance to biodegradation, photolysis and hydrolysis. These characteristics are associated with little inherent ecotoxicity (Bartha et al, 1997). Conventional means of waste disposal of plastic products are landfill and incineration. In landfill, the polymer is expected to slowly break down and become part of the soil matrix. It is unlikely to leach from the soil due to its expected low water solubility. The incineration of polymer waste would yield water and oxides of carbon. The polymer is not expected to cross biological membranes due to its high molecular weight and expected low water solubility, and should not bioaccumulate (Connell, 1990).

The notified polymer is anticipated to become a part of the PET waste stream. Existing waste management alternatives designed to reduce the waste inherent in landfill and incineration facilities include source reduction through packaging efficiency, waste-to-energy incineration, recycling, and reuse (Bartha et al, 1997). Planetark (http://www.planetark.org/recycling) report that the rate current of recycling PET is estimated to be 30% Australia-wide and up to 50% in capital cities.

10. EVALUATION OF HEALTH EFFECTS DATA

No toxicological data were submitted.

The health hazards of the constituents and hazardous impurities, additives and adjuvants are tabulated below.

Chemical	Health hazards	Regulatory controls
Additives/adjuvants		
Phenol, 2,6-bis(1,1-dimethylethyl)-4-methyl-	Dust is irritating if in contact with the eyes, nose or throat (Hazardous Substances Data Bank)	Atmospheric Exposure Standard 10 mg/m^3 TWA (NOHSC, 1995)

11. EVALUATION OF ENVIRONMENTAL EFFECTS DATA

No ecotoxicological data were submitted.

12. ENVIRONMENTAL RISK ASSSESSMENT

Release of waste products containing the notified polymer to the aquatic environment is likely in cases of random dumping. The majority of the notified polymer will follow the fate of the products in which it is incorporated and eventually be disposed of in landfill. In landfill, the polymer will exist as a stable polyester. It is unlikely to be mobile in soil and is expected to very slowly degrade to carbon dioxide through abiotic and biotic processes. The environmental hazard of the notified polymer in landfill is expected to be low.

The polymer's large molecular weight and expected low water solubility should prevent bioaccumulation.

Given the above considerations, the overall environmental hazard is expected to be minimal.

13. HEALTH AND SAFETY RISK ASSESSMENT

13.1. Hazard assessment

No toxicological data were provided for the notified polymer and so the polymer cannot be classified according to the NOHSC *Approved Criteria for Classifying Hazardous Substances* (National Occupational Health and Safety Commission 1999b). However, the high molecular weight and low content of low molecular weight species indicate that the polymer would be poorly absorbed across biological membranes. Moreover, the low residual monomer content and presence of only low concern reactive functional groups suggest that the notified polymer would be of low toxicity.

13.2. Occupational health and safety

Workers will handle the notified polymer in the form of imported pellets containing 40-99% notified polymer and reground rejected packaging preforms containing < 10% notified polymer. For workers involved in import and initial transport, dermal contact will be the main route for exposure when handling the notified polymer. Exposure will only occur as a result of accidental puncture of the foil-lined bags.

For workers involved in extrusion processing of plastic containers incorporating the notified polymer, there is the possibility of dermal exposure to the notified polymer from the handling of imported pellets or ground material from rejected container preforms. Inhalation exposure to polymer dust during the grinding of rejected container preforms and vapours evolved from extrusion processes may occur. However, the anticipated low toxicity of the notified polymer combined with local forced ventilation controlling inhalation exposure and personal protective equipment consisting of gloves and coveralls which should be worn renders the health risk during these activities low.

Pouring imported pellets and reground recycled pellets may produce electrostatic buildup. Electrical grounding of equipment is recommended. Also, spilt pellets may represent a slipping hazard and so polymer pellets should be cleaned up immediately.

After the extrusion processes are completed, the polymer will be bound within a fused matrix and not available for exposure or uptake. Therefore, the health risk for workers handling formed plastic containers is low.

13.3. Public health

The notified polymer is not available for sale to the public. Although members of the public may consume food or beverage from packages manufactured using the notified polymer, the risk to public health from the notified polymer is likely to be low because the notified polymer is unlikely to be released from plastic resins and is unlikely to be bioavailable.

14. MSDS AND LABEL ASSESSMENT

14.1. MSDS

The MSDS of the notified polymer provided by the notifier was in accordance with the NOHSC *National Code of Practice for the Preparation of Material Safety Data Sheets* (NOHSC, 1994a). It 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 notified 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

To minimise occupational exposure to Modified PET-1, the following guidelines and precautions should be observed:

- Protective eyewear, chemical resistant industrial clothing and footwear and impermeable gloves should be used during occupational use of the products containing the notified polymer. Where engineering controls and work practices do not prevent exposure to particulates and vapours containing the notified polymer or thermal decomposition products, a negative pressure organic vapour and particle respirator should be used.

- Spillage of the notified polymer should be avoided. Spillages should be swept up promptly and put into containers for disposal;

- Equipment used for pouring pellets should be electrically grounded to dissipate electrostatic buildup.

- A copy of the MSDS should be easily accessible to employees.

If products containing the notified chemical are hazardous to health in accordance with the NOHSC *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 1999b), workplace practices and control procedures consistent with State and Territory hazardous substances regulations must be in operation.

Guidance in selection of protective eyewear may be obtained from Australian Standard (AS) 1336 (Standards Australia, 1994) and Australian/New Zealand Standard (AS/NZS) 1337 (Standards Australia/Standards New Zealand, 1992); for industrial clothing, guidance may be found in AS 3765.2 (Standards Australia, 1990); for impermeable gloves or mittens, in AS 2161.2 (Standards Australia/ Standards New Zealand, 1998); for occupational footwear, in AS/NZS 2210 (Standards Australia/ Standards New Zealand, 1994a); for respirators, in AS/NZS 1715 (Standards Australia/ Standards New Zealand, 1994b) and AS/NZS 1716 (Standards Australia/ Standards New Zealand, 1994c) and other internationally acceptable standards.

16. REQUIREMENTS FOR SECONDARY NOTIFICATION

Secondary notification may be required if:

(i) any of the circumstances stipulated under subsection 64(2) of the Act arise. If any importer or manufacturer of the notified polymer becomes aware of any of these circumstances, they must notify the Director within 28 days; or

(ii) the notified polymer is introduced in a chemical form that does not meet the PLC criteria.

17. REFERENCES

Bartha R. et al (1997). Plastics. In: Ecological Assessment of Polymers, pp 167-184. Van Nostrand Reinhold, New York, USA.

Connell D. W. (1990) General characteristics of organic compounds which exhibit bioaccumulation. In Connell D. W., (Ed) Bioaccumulation of Xenobiotic Compounds. CRC Press, Boca Raton, USA.

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

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

National Occupational Health and Safety Commission (1999a) List of Designated Hazardous Substances [NOHSC:10005(1999)]. Australian Government Publishing Service, Canberra.

National Occupational Health and Safety Commission (1999b) Approved Criteria for Classifying Hazardous Substances [NOHSC:1008(1994)]. Australian Government Publishing Service, Canberra.

Standards Australia (1990) Australian Standard 3765.2-1990, Clothing for Protection against Hazardous Chemicals Part 2 Limited protection against specific chemicals. Standards Association of Australia.

Standards Australia (1994) Australian Standard 1336-1994, Eye protection in the Industrial Environment. Standards Association of Australia.

Standards Australia/Standards New Zealand (1992) Australian/New Zealand Standard 1337-1992, Eye Protectors for Industrial Applications. Standards Association of Australia/ Standards Association of New Zealand.

Standards Australia/Standards New Zealand (1994a) Australian/New Zealand Standard 2210-1994, Occupational Protective Footwear. Standards Association of Australia/Standards Association of New Zealand.

Standards Australia/Standards New Zealand (1994b) Australian/New Zealand Standard 1715-1994, Use and Maintenance of Respiratory Protective Devices. Standards Association of Australia/Standards Association of New Zealand.

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Standards Australia/Standards New Zealand (1998) Australian/New Zealand Standard 2161.2-1998, Occupational protective gloves, Part 2: General requirements. Standards Association of Australia/Standards Association of New Zealand.