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NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME

FULL PUBLIC REPORT

POLYMER IN EPOTUF 38-692

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Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT

POLYMER IN EPOTUF 38-692

1. APPLICANT

Quaker Chemical (Australasia) Pty Ltd of 8 Abbott Road SEVEN HILLS NSW 2147 has submitted a notification statement accompanying their application for assessment of a synthetic polymer of low concern, Polymer in EPOTUF 38-692.

2. IDENTITY OF THE CHEMICAL

Polymer in EPOTUF 38-692 has been accepted as a Polymer of Low Concern according to the definition under the Act, and is not considered to be hazardous according to NOHSC's Criteria, based on the nature of the polymer and the data provided. Therefore the chemical name, molecular formula, structural formula, molecular weight and spectral data have been exempted from publication in the full public report.

Trade Name(s):	EPOTUF 38-692 (containing greater than 60% of the notified polymer)

3. PHYSICAL AND CHEMICAL PROPERTIES

Appearance at 20°C and 101.3 kPa:	amber solid (flexible)
Boiling Point:	169 - 173°C (EPOTUF 38-692)
Specific Gravity:	1.045 (EPOTUF 38-692)
Water Solubility:	not determined but estimated to be less than 1 $mg.L^{-1}$
Partition Co-efficient (n-octanol/water):	not determined
Hydrolysis as a Function of pH:	not determined (see comments below)
Flammability Limits:	Lower Explosive Limit = 1.1% (EPOTUF 38-692)

Flash Point:	68^{0}C (EPOTUF 38-692)
Autoignition Temperature:	not determined
Explosive Properties:	solvent vapours may form an explosive mixture in air (EPOTUF 38-692)
Polymer Stability:	the notified polymer is an epoxy resin and generally stable, however, the polymer may undergo hydrolysis under extreme temperature and pH conditions
Particle Size Distribution: range - μm	not applicable

Comments on Physico-Chemical Properties

The notification states that there may be some free carboxylate groups. The notifier has indicated an acid value of 40 to 50 but the methodology used to obtain this value would include both free acid and anhydride and the exact extent of the former is unclear. Given that the pKa of these groups should be similar to benzoic acid (pKa equal to 5.41) and the small number of such groups, the notifier concludes that the level of ionisation will be low in the environmental pH range. However, it is noted that all these groups will be ionised at pH greater than 6.5. The notifier has indicated that water solubility will be less than 1 mg.L^{-1}. It is agreed that the polymer should exhibit very low water solubility at a pH less than 6 but at pH greater than 6 the degree of solubility will be greater depending on the amount of free acid. The polymer is fully reacted and does not contain any reactive groups which are intended to undergo further reaction. The data provided are acceptable for a polymer of low concern.

5. USE, VOLUME AND FORMULATION

The imported product EPOTUF 38-692 containing the notified polymer will be used as a major formulation component of various water based, emulsion, surface coating products. For use as a metallic post coating, the final product will contain 30 to 60% of the imported product. For use on metal strapping the final product will contain 10 to 30% of the imported product.

The notified polymer will not be manufactured in Australia. It will be imported into Australia as a greater than 60% component of the imported product in 210 kg steel drums. The import volume is expected to be approximately 315 tonnes of the notified polymer per annum.

6. OCCUPATIONAL EXPOSURE

The notified polymer will be imported in 210 kg steel drums. Waterside workers, transport drivers and warehouse operators will only be exposed to the notified polymer in the event of an accident.

At the formulation site, the imported product containing the notified polymer will be transferred from the drums to a closed mixing vessel using pumps. The product will be blended with other chemicals in the mixing vessel which is equipped with mechanical agitation and local exhaust ventilation. The final products will contain 10 to 30% of the notified polymer for the metallic post coating and 10 to 20% of the notified polymer for the metallic strapping coating. They will be packed in 200 kg plastic-lined steel drums or 1 000 L bulk bins. Exposure of the workers at the formulation site is expected to be minimal considering the using of closed systems and ventilation.

At coating sites, the formulated products will be pumped into large dip tanks and then applied to the external surfaces of metallic fence posts or metallic strapping material for industrial packaging. The coating process will be fully automated and local exhaust ventilation is positioned over the dip tanks to vent any fumes. Unused coating material will be recycled. Workers at the coating sites would exposed to the notified polymer during unloading to the storage tanks and cleaning/maintenance of the process equipment. Dermal contact is considered to be the main route of exposure.

7. PUBLIC EXPOSURE

EPOTUF 38-692 will be imported into Australia and transported to the formulation site. Procedures set out in the Material Safety Data Sheet (MSDS) should minimise the potential for public exposure in the event of a spill during transportation.

Public exposure to the notified polymer resulting from the manufacture and application of these coatings is expected to be negligible.

There will be minimal waste generated from these processes. All effluent is to be treated in an on-site waste treatment plant. Any liquid material remaining will be disposed of to an Aqueous Waste Treatment Plant. Material obtained from dried spills and leaks will be disposed of to landfill in accordance with Local and State regulations. Public exposure is expected to be negligible.

There may be public contact with the notified polymer in the form of plastic coatings made from the polymer. However, the polymer is a stable high molecular weight substance, and as such it is expected that it would be poorly absorbed across biological membranes. It will be strongly bound within the matrix of the coating material on the external surfaces of treated posts, pipes, tubes and strapping and so exposure is expected to be minimal.

8. ENVIRONMENTAL EXPOSURE

. Release

The notifier estimates that during reformulation at the formulation site approximately 1% of the notified polymer, some 3 150 kg per year, will be lost due to factors such as spills, leaks and cleaning. All waste will be treated in an on-site waste treatment plant. This plant uses two dissolved air flotation (DAF) tanks plus a range of other waste water and sludge tanks where various chemicals, such as alum and caustic soda, are added to coagulate waste and adjust pH. Once the waste has been sufficiently treated it is discharged to sewer. Sludge scraped from the two DAF tanks is either further treated on-site or disposed of at an Aqueous Waste Treatment plant.

During the waste treatment process the effluent is initially adjusted to pH 2 to 4. At this pH level the polymer is insoluble and should be removed with sludge. Based on an assumption of 95% adsorption in sludge and hence 5% discharge from the waste water treatment plant, the daily effluent discharge of 300 000 L will contain 18 ppm of the notified polymer on the thirty days per year when reformulation is undertaken. The notified polymer adsorbed onto sludge, some 3 000 kg, will be disposed of to the Aqueous Waste Treatment Plant. Once empty, containers used to import the notified substance will be high pressure rinsed with either water or caustic solution and the rinsate will be sent to the on-site waste water treatment plant. The drums will then be sent to a drum recycling facility.

The formulated product will be sent to treatment plants in 1 000 L bulk tanks and 200 kg drums. The 1 000 L containers will be dedicated vessels and will only be cleaned periodically with water or caustic solution. Any rinsate from the washing process will be sent to the formulator's waste water treatment plant. Any residual material remaining in the 200 kg drums will be allowed to cure. The plastic drum liner will then be disposed of to landfill and the drums will be sent to a drum recycler. At the sites where the formulated product is used to coat metal items, a dip tank is used. Plastic sheeting is laid under the tank to catch any spills and leaks which occur during this process. Any spilt material dries rapidly and on exposure to air is said to auto-oxidize and cross-link to a high molecular weight insoluble polymer. The plastic sheeting is replaced daily and is disposed of to landfill. The notifier estimates that losses during application will be less than 0.5% and that some
1 560 kg of the notified polymer will be deposited to landfill in the form of cured material.

. Fate

In the case of accidental spillage, the polymer is expected to be adsorbed onto soil or, if a spill occurs to water, onto sediment. Waste from the formulation process will mostly be disposed of in sludge sent to the Aqueous Waste Treatment Plant with a small proportion entering the sewage system in effluent from the formulation plant. Cured waste from the coating process will be disposed of to landfill. Due to the anticipated negligible solubility of the polymer, leaching from landfill is highly unlikely with no movement from the landfill site expected.

The majority of the polymer is not expected to be released to the environment until it has been used a corrosion preventative on various products and will then share the fate of these products. Biodegradation is unlikely. The high molecular weight of the substance also means that bioaccumulation is not likely to occur (1, 2).

9. ASSESSMENT OF ENVIRONMENTAL EFFECTS

No ecotoxicological data were provided which is acceptable for polymers of low concern with a NAMW greater than 1 000 according to the *Industrial Chemicals (Notification and Assessment) Act* (1989).

10. ASSESSMENT OF ENVIRONMENTAL HAZARD

The polymer is unlikely to present a hazard to the environment when it is used in coatings for steel fence posts and strapping. Coated items will be consigned to landfill or recycled at the end of their useful life. The environmental hazard from such exposure of cured coating is expected to be low.

Some 3 000 kg of the notified polymer will be disposed in sludge from the water treatment plant at the manufacturing plant. This material is expected to be adsorbed to the sludge and both bioconcentration and leaching are considered to be unlikely to occur, due to the high molecular weight of the product and its insoluble nature.

Some 1 560 kg of the notified polymer will be deposited to landfill in the form of cured material as waste from the coating process. The majority of the notified polymer is not expected to be released to the environment until it has been fully cured into a solid polymer matrix. When the cured polymer is disposed of, either as a residue or as a coating, no hydrolysis, movement, leaching, biodegradation or bioaccumulation of the polymer is expected.

If any uncured polymer is disposed of to landfill it should remain immobile in the landfill due to the polymer's expected low solubility in water. The main environmental hazard would arise through spillage in transport accidents that may release quantities of the polymer to drains and waterways. However, the polymer is expected to sink to the sediments and remain immobile on the soil/sediment layer.

The low environmental exposure of the polymer as a result of the proposed use, together with its expected negligible environmental toxicity, indicate that the overall environmental hazard should be negligible.

11. ASSESSMENT OF OCCUPATIONAL AND PUBLIC HEALTH AND SAFETY EFFECTS

Polymer in EPOTUF 38-692

Polymer in EPOTUF 38-692 has been accepted as a polymer of low concern under section 23 for the purposes of section 24A of the Act. The polymer is considered of low hazard to human health.

Waterside workers, transport drivers and warehouse operators will only be exposed to the notified polymer in the event of an accident.

Exposure of the workers at the formulation site is expected to be minimal by the use of closed systems and local exhaust ventilation. The occupational health risk for formulation workers is expected to be low.

At coating sites, the coating process will be fully automated and local exhaust ventilation is positioned over the dip tanks to vent any fumes. Workers at the coating sites would be exposed to the notified polymer during unloading to the storage tanks and cleaning/maintenance of the process equipment. However, the health risk for these workers is also expected to be low due to the nature of the polymer and the low concentration of the notified polymer in the formulated products.

There is negligible potential for public exposure to the polymer arising from transportation, manufacture of the coating formulations and application to pipes, robes, posts and strapping, and disposal. While there may be public contact with the notified chemical in the form of coated products, the polymer is unlikely to be absorbed through biological membranes.

EPOTUF 38-692

The imported product EPOTUF 38-692 contains a hazardous component, 2-butoxyethanol (30 to 60%). 2-Butoxyethanol has a moderate acute toxicity by all exposure routes and is a severe eye irritant. It is on the NOHSC's List of Designated Hazardous Substances (3) and NOHSC has established an exposure standard (TWA, 25 ppm or 121 $mg.m^{-3}$) for 2-butoxyethanol (4). EPOTUF 38-392 is classified as hazardous according to the NOHSC's criteria and personal protective equipment is required for workers to handle it.

12. RECOMMENDATIONS

To minimise occupational exposure to Polymer in EPOTUF 38-692 the following guidelines and precautions should be observed:

- Spillage of the notified chemical should be avoided, spillages should be cleaned up promptly with absorbents which should then be put into containers for disposal;

- Good personal hygiene should be practised to minimise the potential for ingestion;

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

The imported product EPOTUF 38-692 contains a hazardous component, 2-butoxyethanol. To minimise occupational exposure to EPOTUF 38-692, the following additional guidelines and precautions should be observed:

- Safety goggles should be selected and fitted in accordance with Australian Standard (AS) 1336 (5) to comply with Australian/New Zealand Standard (AS/NZS) 1337 (6);

- Industrial clothing should conform to the specifications detailed in AS 2919 (7) and AS 3765.1 (8);

- Impermeable gloves or mittens should conform to AS 2161 (9);

- All occupational footwear should conform to AS/NZS 2210 (10);

- the NOHSC Exposure Standard for 2-butoxyethanol should not be exceeded at the workplaces.

13. MATERIAL SAFETY DATA SHEET

The MSDS for EPOTUF 38-692 was provided in accordance with the *National Code of Practice for the Preparation of Material Safety Data Sheets* (11).

This MSDS was provided by the notifier 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 notifier.

14. REQUIREMENTS FOR SECONDARY NOTIFICATION

Under the Act secondary notification of Polymer in EPOTUF 38-692 shall be required if any of the circumstances stipulated under subsection 64(2) of the Act arise. No other specific conditions are prescribed.

15. REFERENCES

1. Anliker, R., Moser, P. & Poppinger, D. 1988, *Bioaccumulation of dyestuffs and organic pigments in fish. Relationships to hydrophobicity and steric factors, Chemosphere* **17** 1631-1644.

2. Gobas, F.A.P.C., Opperhuizen, A. & Hutzinger, O. 1986, *Bioconcentration of hydrophobic chemicals in fish: relationship with membrane permeation, Environmental Toxicology and Chemistry* **5** 637-646.

3. National Occupational Health and Safety Commission 1994, *List of Designated Hazardous Substances* [NOHSC:10005(1994)], Australian Government Publishing Service Publ., Canberra.

4. 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 Publ., Canberra.

5. Standards Australia 1994, Australian Standard 1336-1994, Eye protection in the Industrial Environment, Standards Association of Australia Publ., Sydney.

6. Standards Australia/Standards New Zealand 1992, Australian/New Zealand Standard 1337-1992, Eye Protectors for Industrial Applications, Standards Association of Australia Publ., Sydney, Standards Association of New Zealand Publ, Wellington.

7. Standards Australia 1987, Australian Standard 2919-1987, Industrial Clothing, Standards Association of Australian Publ., Sydney.

8. Standards Australia 1990, Australian Standard 3765.1-1990, Clothing for Protection against Hazardous Chemicals Part 1 Protection against General or Specific Chemicals, Standards Association of Australia Publ., Sydney.

9. Standards Australia 1978, Australian Standard 2161-1978, Industrial Safety Gloves and Mittens (excluding electrical and medical gloves), Standards Association of Australia Publ., Sydney.

10. Standards Australia/Standards New Zealand 1994, Australian/New Zealand Standard 2210-1994, Occupational Protective Footwear, Standards Association of Australia Publ., Sydney, Standards Association of New Zealand Publ, Wellington.

11. National Occupational Health and Safety Commission 1994, *National Code of Practice for the Preparation of Material Safety Data Sheets* [NOHSC:2011 (1994)], Australian Government Publishing Service, Canberra.