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NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME

FULL PUBLIC REPORT

AHP-253P

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Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT

AH-253P

1. APPLICANT

BHP Steel, Building and Industrial Products Division of Industrial Drive MAYFIELD NSW 2304 has submitted a notification statement accompanying their application for assessment of a synthetic polymer of low concern, AH-253P.

2. IDENTITY OF THE CHEMICAL

AH-253P 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, molecular weight and spectral data have been exempted from publication in the Full Public Report.

Trade Name: Zinc Rich Binder (AH-253P)

Method of Detection: data from Infra-Red and gel permeation chromatography have been provided for the notified polymer

3. PHYSICAL AND CHEMICAL PROPERTIES

Appearance at 20°C and 101.3 kPa:	pale yellow, semi-viscous liquid
Boiling Point:	56ºC
Specific Gravity:	10.9 $g.cm^{-3}$
Water Solubility:	not determined, see comments below
Polymer stability	see comments below
Hydrolysis as a Function of pH:	not determined, see comments below

Comments on Physico-Chemical Properties

The notifier states that it in general it is accepted that polyesters are not significantly water soluble. The polymer contains no polar functionalities that would confer solubility in water, and this together with the high hydrocarbon content, resulting from the fatty acids of soy bean oil, indicates very low water solubility.

The ester linkages of the polymer have the potential to hydrolyse. However, it is anticipated that the low solubility of the polymer will prevent hydrolysis under environmental conditions. The polymer contains no charged groups and will not be cationic or anionic in the typical environmental pH range (4-9).

The data provided are acceptable for a polymer of low concern.

5. USE, VOLUME AND FORMULATION

The notified polymer will not be manufactured in Australia but will be imported into Australia in 205 L steel drums. Import volumes for the notified polymer are estimated to be approximately 10 tonnes per annum during the next 5 years.

The notified polymer will be used as a binder system for a zinc rich, anti-corrosive coating for the internal surface of tubes and pipes. The notified polymer will be present in the product Zinc Rich Binder at a concentration of less than 30% in solvent where the solvent composition is:

acetone	CAS No. 67-64-1	30-60%
2-butoxyethanol	CAS No.111-76-2	<10%
Propylene glycol monomethyl ether	CAS No. 107-98-2	<10%
solvent naphtha	CAS No. 64742-95-6	<2%

This product will be used at a single site in New South Wales. At the site, the product is pumped into a mixing tank where it will be mixed with zinc dust and diluted with acetone to give a coating product. After mixing, the coating product will be transferred to 205 L drums and stored for use as required. The notified polymer will be present at less than 10% in the coating product.

At the site coating plant, the coating product will be added to a closed holding tank using an air pump. The coating is then applied to the inside of pipes and tubes using a spray head in a continuous automated process. The coating is then cured by air drying. Coated pipes and tubes will be used for structural purposes in applications such as fencing, hand-rails, gates and barbecues.

6. OCCUPATIONAL EXPOSURE

Waterside and transportation workers (4 to 6 personnel, 2-3 hours/day, 5-10 days/year) will handle the imported drums containing the notified polymer. During this phase of operations, worker exposure is unlikely except in the event of an accident.

At the notifier's site, the categories of workers with a potential to be exposed to the product containing the notified polymer during blending and application includes as follows: mixing plant operators (2 personnel, 4 hours/day, 25 days/year); paint room attendants (6 personnel, 8 hours/day, 35 days/year); coating plant operators and supervisors (5 personnel, 8 hours/day, 240 days/year); and quality control technicians (2 hours/day, 60 days/year).

Mixing plant operators will open the drums, for direct transfer of the notified polymer to a closed mixing tank by use of an air pump. Operators are likely to be exposed to the notified polymer and solvents from splashes and spills as they open the drums, and connect/disconnect pump lines to the drums. The possibility of skin, eye and respiratory exposure to both the notified polymer and solvents exists. Acetone and zinc dust are added to the notified polymer in the mixing tank, via automatic dosing, and blended. Blending is carried within a closed system and is subject to local exhaust ventilation, thereby reducing the potential for exposure to notified polymer, solvents and dust.

During the blending phase, a technician will take samples of the mixture in sealed containers for laboratory testing. Details of the sampling procedure were not provided. Exposure for laboratory personnel and is assumed to be minimal due to the small sample size taken and because testing is carried out under local exhaust.

Operators transfer the blended coating product to the drums, which are then sealed. Details of the transfer procedure were not provided. The possibility of skin, eye and respiratory exposure to both the notified polymer and solvents exists. The drums are stored until required for production.

Paint room attendants manage the storage and inventory of coating products. During this phase of operations, worker exposure is only likely in the event of an accident.

During the application phase, coating plant operators will open the drums containing the coating product and pump the product to a closed holding tank using an air pump. Worker exposure to the notified polymer and solvents is expected to occur during opening of the drums and pump line connection/disconnection. The coating product is then transferred by metered dosing to an enclosed, continuous coating line where it is applied to the internal surface of pipes and tubes by a spray head and then cured by air-drying. The spray application is carried out *in situ* as the pipe/tube is formed from a flat strip. The application process is carried out within a closed system and is subject to local exhaust ventilation, thereby reducing the potential for exposure to notified polymer and solvents.

Acetone will be used to manually rinse all process equipment and drums. Negligible occupational exposure to the notified polymer is expected to occur during rinsing, as the notified polymer will be present in very low concentrations in the residual material. However, large volumes of acetone will be used as a rinsing agent and skin, eye and respiratory exposure to this solvent is expected.

The imported product is highly flammable, therefore, the work area will be ignition source free and equipment grounded to prevent static discharges.

7. PUBLIC EXPOSURE

The notified polymer will not be sold to the public but will be applied by industrial customers only. There is little potential for public exposure to the notified polymer during import, storage, transport, mixing or coating, or use of the end-product. Minor public exposure to the notified chemical may result from accidental spillage during transport. If spillage occurs as a result of a transport accident, the material will be disposed of in accordance with local and State regulations.

There is little potential for public exposure to the notified polymer during the formulation and application processes as described in Section 6.

Waste will be disposed of by waste contractor at a liquid waste treatment facility, in accordance with local and state regulations.

Release of the notified polymer to the general environment as a result of its use as an internal pipe coating material is likely to be minimal. The chemical will be immobilised in a cured form on the internal surface of tubes and pipes, the ability to cure or harden at room temperature under little or no pressure being a characteristic of this type of polyester resin. In its encapsulated form it is not expected that the notified polymer will leach from the product, and the pipes will not be used for potable water. Thus, it is unlikely that there would be any significant public contact with the notified polymer in this form.

8. ENVIRONMENTAL EXPOSURE

Release

Release of the polymer during transport is not anticipated except in the event of an accident. The Material Safety Data Sheet (MSDS) for the imported product contains adequate instructions for dealing with such an accident.

Minimal release of the notified polymer is expected during mixing of the coating products. Residues in import drums will be rinsed into the mixing tank with acetone. The blending tank will also be rinsed with acetone that will be used to dilute subsequent batches.

Application of the coating product to the internal surface of pipes and tubes is achieved using a spray head inserted into the end of the pipe or tube as it is being formed from a flat strip. Hence, there will be no overspray.

The notifier has estimated a total maximum of 2% wastage during mixing and application, resulting from spills and leaks. This would account for a maximum of 200 kg per annum of the notified polymer. This waste will be disposed of by liquid waste contractors.

Drums that are not recycled internally after cleaning will be disposed of to landfill. This practice will be minimised as far as possible.

Fate

The fate of the bulk of the notified polymer will share that of the pipes or tubes to which it has been applied, and be disposed of to landfill or recycled to reclaim the metal. When applied to the internal surfaces of the pipes or tubes the polymer will cure, through crosslinking, to form an inert coating of high molecular weight. This coating is not expected to be mobile or degrade in landfill due to its high molecular weight and low water solubility.

Waste polymer from blending and application of the coating product will be disposed of by a liquid waste contractor by incineration or consignment to landfill. Incineration of the polymer will lead to its destruction and the evolution of decomposition products including water and oxides of carbon.

Bioaccumulation of the polymer is not expected as its large molecular size is likely to inhibit membrane permeability and prevent uptake during exposure (Gobas FAPC Opperhuizen A Hutzinger O, 1986).

9. EVALUATION OF TOXICOLOGICAL DATA

No toxicology data were provided. This is acceptable for polymers of number-average molecular weight (NAMW) >1000 according to the Act.

10. ASSESSMENT OF ENVIRONMENTAL EFFECTS

No ecotoxicology data were provided. This is acceptable for polymers of number-average molecular weight (NAMW) > 1000 according to the Act.

11. ASSESSMENT OF ENVIRONMENTAL HAZARD

The polymer is unlikely to present a hazard to the environment when it is used in coatings for the internal surface of pipes and tubes. 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.

Wastes generated during the blending and application will be low (maximum of 200 kg per annum), resulting from spills and leaks. This waste will be disposed of by a liquid waste contractor either by incineration or consignment to landfill. Incineration of the polymer will lead to its destruction and the evolution of decomposition products including water and oxides of carbon. Any uncured polymer disposed of to landfill should remain immobile in the landfill due to the polymer's expected low solubility in water.

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 low.

12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

The notified polymer will be imported in 205 L steel drums as a component (less than 30%) of the product, Zinc Rich Binder.

The notified polymer is not water soluble and since it has a molecular weight greater than 1 000, it is unlikely to readily cross biological membranes. The levels of low molecular weight species below 1 000 are low. One constituent of the notified polymer is listed on the National Occupational Health and Safety Commission (NOHSC) *List of Designated Hazardous Substances* (National Occupational Health and Safety Commission, 1994a). However, at the concentration present in the notified polymer it would not be classified as hazardous in accordance with NOHSC criteria for hazardous substances. Since none of the monomers are classified as hazardous, and the notified polymer does not contain any reactive functional groups, little toxicity from this source is likely. On the information provided, the notified polymer in Zinc Rich Binder is not considered hazardous and is unlikely to pose a health risk to workers. The main health risk associated with the handling and use of Zinc Rich Binder is related to its solvent content of at least 60%.

Considering the solvents in Zinc Rich Binder, 2-butoxyethanol is a hazardous substance according to the NOHSC *List of Designated Hazardous Substances* (National Occupational Health and Safety Commission, 1994a). It is very rapidly absorbed through the skin, respiratory tract and other membranes in both the vapour and liquid form and is a skin irritant. Acetone may cause kidney and/or liver damage from overexposure and has been classified by the notifier as hazardous according to NOHSC *Approved Criteria for Classifying Hazardous Substances* (National Occupational Health and Safety Commission, 1994b). In addition, the imported product contains solvent naphtha (<2%) which according to the European Commission Dangerous Substances Directive (European Commission, 1996) is classifiable as carcinogen category 2 (May cause cancer) if the solvent naphtha contains

greater than 0.1% benzene. It is expected that NOHSC will adopt the European hazard classification in the near future.

In accordance with the *Australian Code for the Transport of Dangerous Goods by Road and Rail* (Federal Office of Road Safety, 1998), the product overall is classified as a Dangerous Good (Class 3) because of the acetone and propylene glycol monomethyl ether content. Therefore, appropriate precautions should be taken during transport, storage and handling. These are outlined in the notifier's MSDS.

The MSDS for the product containing the notified polymer, indicates vapours may be irritating to the skin, eyes and upper respiratory tract and cause loss of consciousness. The liquid form may cause permanent eye damage.

The occupational health risk for waterside, transport and storage workers is negligible, as exposure is not expected to occur under normal circumstances.

Plant operators may experience skin and eye exposure to the notified polymer (and solvents) when process equipment and lines are rinsed or when drums are handled during opening/sealing, pump connection/disconnection and rinsing. Inhalation exposure is also expected to occur. However, the product is semi-viscous and unlikely to form aerosols or mists during normal use. Local exhaust ventilation will be used during all phases of product use at the notifier site. Post coating/curing exhaust system includes an electrostatic precipitator to minimise fume/particulate emissions. This should reduce exposure to solvent vapours. The notifier also states that mixing plant operators will be required to wear half face respirators, chemical goggles, gloves, overalls and safety boots while handling the chemical. These measures will serve to minimise skin, eye and inhalation exposure to the notified polymer and solvents. Therefore, the risk of adverse health effects to plant workers is expected to be minimal.

The occupational health risk posed to supervisors is minimal, given that these workers will be present during phases of production that occur within closed systems, that is blending and application, and under local ventilation. The occupational health risk posed to laboratory technicians is also minimal, given that typical sampling procedures from closed systems should not result in substantial exposure, and sampling occurs under local ventilation.

NOHSC exposure standards (National Occupational Health and Safety Commission, 1995) should be observed during all phases where worker exposure to Zinc Rich Binder may occur. Regular air monitoring should be conducted to ensure that exposure standards are not exceeded. The exposure standards are: acetone, 500 ppm (TWA), 1 000 ppm (STEL); zinc oxide dust, 10 mg/m^3 (TWA); 2-butoxyethanol, 25 ppm (TWA), skin notation; and propylene glycol monomethyl ether, 100 ppm (TWA), 150 ppm (STEL).

2-Butoxyethanol in either the vapour or liquid form is readily absorbed via the dermal and inhalation routes. Consequently, biological monitoring for 2-butoxyethanol should be considered in instances where overexposure is suspected. Given that large volumes of acetone will be used in the described processes and there is potential for inhalation exposure, biological monitoring for acetone should also be considered. Although NOHSC has not established biological monitoring reference values, Regulation 14(1)(c) of the *National Model Regulations for the Control of Workplace Hazardous Substances* (National Occupational Health and Safety Commission, 1994c) provides for biological monitoring. In

the absence of national values, consideration can be given to the: BAT value (biological tolerance value for occupational exposures; 100 $mg.L^{-1}$ in urine, end of shift) for 2-butoxyethanol adopted by the German Commission for the Investigation of Health Hazards of Chemical Compounds in the Work Area (Commission for the Investigation of Health Hazards of Chemical Compounds in the Work Area, 1997); and Biological Exposure Index (BEI; 100 $mg.L^{-1}$ in urine, end of shift) for acetone adopted by the American Conference of Governmental Industrial Hygienists (American Conference of Governmental Industrial Hygienists, 1997), as guidance values in the interpretation of biological monitoring results.

In addition, biological monitoring should be considered on a regular basis to evaluate the effectiveness of adopted control measures.

There is negligible potential for public exposure to the polymer arising from importation, formulation and industrial application to pipes and tubes. Similarly, the potential for public exposure to the chemical during transport, or disposal of waste after a spill is very minor. The polymer will finally be immobilised as part of an inert, hardened film. There will be no significant public contact with the notified chemical in this form, and there seems no likely route of exposure and absorption.

13. RECOMMENDATIONS

To minimise occupational exposure to Zinc Rich Binder containing the notified polymer, while handling the chemical during mixing or transferring, the following guidelines and precautions should be observed where appropriate:

- Respirators should be selected and fitted in accordance with Australia/New Zealand Standard 1715 -1994: *Use and Maintenance and Respiratory Protective Devices* (Standards Australia/Standards New Zealand, 1994a) and Australian/New Zealand Standard 1716 -1991 *Respiratory Protective Devices* (Standards Australia/Standards New Zealand, 1994b);

- Safety goggles should be selected and fitted in accordance with Australian Standard (AS) 1336 (Standards Australia, 1994) to comply with Australian/New Zealand Standard (AS/NZS) 1337 (Standards Australia/Standards New Zealand, 1992);

- Industrial clothing should conform to the specifications detailed in AS 2919 (Standards Australia, 1987) and AS 3765.1 (Standards Australia, 1990);

- Impermeable gloves or mittens should conform to AS 2161 (Standards Australia, 1978);

- All occupational footwear should conform to AS/NZS 2210 (Standards Australia/Standards New Zealand, 1994c);

- 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 indirect ingestion;

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

Engineering controls are required to limit exposure to the hazardous components of the product. Regular workplace air monitoring should be conducted to ensure adopted control measures are effective. NOHSC *Exposure Standards for Atmospheric Contaminants in the Occupational Environment* (National Occupational Health and Safety Commission, 1995) apply to acetone, 500 ppm TWA 1 000 ppm (STEL); zinc oxide dust, 10mg/m^3 (TWA); 2-butoxyethanol, 25 ppm (TWA), skin notation; and propylene glycol monomethyl ether,100 ppm (TWA), 150 ppm (STEL). All employers are responsible for ensuring the exposure standards are not exceeded.

Biological monitoring for 2-butoxyethanol and acetone should be considered in instances where overexposure is suspected. Although NOHSC has not established biological monitoring reference values, Regulation 14(1)(c) of the *National Model Regulations for the Control of Workplace Hazardous Substances* (National Occupational Health and Safety Commission, 1994c) provides for biological monitoring. In the absence of national values, consideration can be given to the: BAT value (biological tolerance value for occupational exposures; 100 $mg.L^{-1}$ in urine, end of shift) for 2-butoxyethanol adopted by the German Commission for the Investigation of Health Hazards of Chemical Compounds in the Work Area (Commission for the Investigation of Health Hazards of Chemical Compounds in the Work Area, 1997); and Biological Exposure Index (BEI; 100 $mg.L^{-1}$ in urine, end of shift) for acetone adopted by the American Conference of Governmental Industrial Hygienists (American Conference of Governmental Industrial Hygienists, 1997), as guidance values in the interpretation of biological monitoring results.

Workers should also be made aware of the flammable nature of the product.

14. MATERIAL SAFETY DATA SHEET

The MSDS for the product, Zinc Rich Binder containing the notified polymer was provided in accordance with the *National Code of Practice for the Preparation of Material Safety Data Sheets* (National Occupational Health and Safety Commission, 1994d).

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

American Conference of Governmental Industrial Hygienists (1997) 1997 TLV's and BEI's: Threshold Limit Values and Physical Agents; Biological Exposure Indices. Cincinnati, American Conference of Governmental Industrial Hygienists (ACGIH).

Commission for the Investigation of Health Hazards of Chemical Compounds in the Work Area (1997) Deutsche Forschunsgemeinschaft: List of MAK and BAT values 1997; Report No 33. Weinheim, Wiley-VCH Verlag GmbH.

European Commission (1996) EC Council Directive 96/54/EC on the approximation of the laws, regulations and administrative provisions relating to the classification, packaging and labelling of dangerous substances. Official Journal of the European Communities, L248, 30 September 1996.

Federal Office of Road Safety (1998) Australian Code for the Transport of Dangerous Goods by Road and Rail. Canberra, Australian Government Publishing Service.

Gobas FAPC Opperhuizen A Hutzinger O (1986) Bioconcentration of hydrophobic chemicals in fish: relationship with membrane permeation. Environmental Toxicology and Chemistry, **5**: 637-646.

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

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

National Occupational Health and Safety Commission (1994c) Control of Workplace Hazardous Substances [NOHSC:1005(1994), 2007(1994)]. Canberra, Australian Government Publishing Service.

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

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, .

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

Standards Australia (1987) Australian Standard 2919-1987, Industrial Clothing. Sydney, Standards Association of Australia.

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

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

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

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

Standards Australia/Standards New Zealand (1994b) Australian/New Zealand Standard 1716-1994, Respiratory Protective Devices. Sydney/Wellington, Standards Association of Australia/Standards Association of New Zealand.

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