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**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION
AND ASSESSMENT SCHEME**

FULL PUBLIC REPORT

Polymer in HA-45-6149 Alkyd Resin

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 the National Occupational Health and Safety Commission which also conducts the occupational health & safety assessment. The assessment of environmental hazard is conducted by the Department of the Environment and the assessment of public health is conducted by the Department of Health and Aged Care.

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Director
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FULL PUBLIC REPORT**Polymer in HA-45-6149 Alkyd Resin****1. APPLICANT**

PPG Industries Australia Pty Ltd of McNaughton Road CLAYTON VICTORIA 3168 (ACN 055 500 939) has submitted a notification statement in support of their application for an assessment certificate for the synthetic polymer of low concern Polymer in HA-45-6149 Alkyd Resin.

2. IDENTITY OF THE CHEMICAL

The chemical name, CAS number, molecular and structural formulae, molecular weight, and spectral data have been exempted from publication in the Full Public Report.

Marketing Name:

Polymer in HA-45-6149 Alkyd Resin.

Comments on Chemical Identity

Infrared spectral data was submitted for the identification of the notified polymer. A trace from Gel Permeation Chromatography was supplied to substantiate the number average molecular weight and percentage of low molecular weight species.

Number Average Molecular Weight

> 1 000

3. POLYMER COMPOSITION AND PURITY

3.1 Composition

Details of the polymer composition have been exempted from publication in the Full Public Report.

3.2 Purity (%):

Not stated. Polymer not isolated from solvent solution.

Hazardous Impurities (other than residual monomers and reactants):

None.

Non-Hazardous Impurities at 1% by weight or more:

None.

Additives/Adjuvants:

Xylene, n-butyl acetate and aromatic hydrocarbon solvent.

4. PLC JUSTIFICATION

The notified polymer meets the Synthetic Polymer of Low Concern (PLC) Criteria.

5. PHYSICAL AND CHEMICAL PROPERTIES

Unless otherwise stated, the physico-chemical properties tabled below are for the polymer solution as the polymer is never isolated.

Property	Result	Comments
Appearance	Clear viscous liquid	
Boiling Point:	126-181°C	
Density:	1 170 kg/m ³ for polymer (calculated)	1 080 kg/m ³ for polymer solution.
Water Solubility	Very low	See comments below
Particle Size	Not applicable	Aerosol formation unlikely based on viscous nature
Flash Point:	24°C	
Flammability Limits	0.8 – 7%	
Autoignition Temperature	425°C	
Explosive Properties	None	
Stability/Reactivity	Stable	

5.1 Comments on Physical and Chemical Properties

The polymer is manufactured as a 60% solution in hydrocarbon solvents. The water solubility of the polymer is unable to be determined, as it is never isolated from the polymer solution. On the basis of its non-ionic nature, high molecular weight and very high content of hydrophobic aromatic and aliphatic groups, the polymer is expected to be of very low water solubility. The representative structure contains some hydroxyl and polar oxygen atoms that would help increase water solubility.

Despite containing ester linkages, the polymer is not expected to undergo hydrolysis in the environmental pH range 4 to 9 because of the expected low water solubility.

The notified polymer itself does not present dangerous physico-chemical properties. However, the hydrocarbon solvents present in HA-45-6149 Alkyd Resin are flammable.

6. USE, VOLUME AND FORMULATION

Use:

The notified polymer is an ingredient in industrial paints for application to commercial vehicles (trucks etc), farm equipment (tractors, trailers) and industrial machinery.

Import Volume:

<i>Year</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>
Import Volume (tonnes)	1-10	10-100	10-100	10-100	10-100

Transportation of the paint throughout Australia will be via road to distributors where it will be available to customers.

Formulation Details:

The notified polymer will initially be introduced at 40% as an ingredient in paint in steel containers of 5 and 20 L capacity.

At a later date it will be imported as the resin solution, HA-45-6149 Alkyd Resin (60% resin in hydrocarbon solvent) for local paint manufacture, at the notifier's site. The polymer solution may also be manufactured at the notifier's site. The polymer solution will be stored in 200 L steel containers.

Manufacture of the polymer solution will involve charging reactants and solvents to a closed reactor. The resultant polymer solution will be filtered before being packaged. The polymer solution will be stored on-site until required.

Formulation of the notified polymer into paint products will involve mixing polymer solution and other ingredients in a high-speed mixer. Each batch is to be quality checked and adjustments made as required. The resultant paint is filtered prior to being dispensed into 5 L and 20 L steel paint cans and pails. Paint products containing the notified polymer will be warehoused at the notifier's site in and distributed to 6 000 customer sites. At customer sites the paint will be mixed, stirred and diluted then placed in a spray gun. The object to be primed with the paint will be sprayed then heat cured, resulting in the painted article.

7. OCCUPATIONAL EXPOSURE

<i>Nature of Work Done & (Number of Workers Exposed)</i>	<i>Details of Occupational Exposure</i>	<i>Personal Protective Equipment/ Engineering Controls & Maximum Duration of Exposure</i>
Laboratory Manufacture & testing of polymer solution and paint (3).	Skin contact during the handling of small quantities of polymer solution or paint for laboratory analysis.	Impervious gloves, overalls and eye protection. Polymer & paint manufacture enclosed system. Exhaust ventilation capture volatiles at source. 8 hours/day, 30 days (total)/year.
Polymer Manufacture: Sampling, testing and filling of polymer into drums. Cleaning & Maintenance (9).	As above for Laboratory Development. Skin contact is possible if drum overfilling or spillages occur. Clean-up and maintenance workers may be exposed to residual polymer solution in plant equipment.	As above. Filtration & filling operations enclosed & automated. 8 hours/day, 10 days/year.
Paint Manufacture: Makeup (3); Filtering and Packaging (3).	Skin contact from spillages of the paint containing the polymer is possible during: blending in the high speed mixer; removal and testing of laboratory samples; and from drips and spills during paint filtration and filling.	Impervious gloves, goggles and coveralls. Paint manufacture enclosed. Filtration & filling operations enclosed & automated. Exhaust ventilation captures volatiles/aerosols at source. 8 hours/day, 30 days/year.
Paint Application: Spray painting (6 000) Includes activation and thinning of paint, paint application and cleaning of spray equipment.	Skin contact to the polymer in paint is possible during preparatory stages of the paint for spraying and cleaning of equipment. Formation of aerosols and therefore inhalation exposure is likely during spray application.	Impervious gloves, eye protection, anti-static footwear, anti-static flame retardant overalls while mixing the paint. A full face shield and respirator are used while inside the ventilated spray booth. 4 hours/day, 220 days/year.
Transport & Storage: Handling & Transport of containers.	Containers will be sealed and exposure is unlikely except in the event of a spill.	Not indicated, but expected to be as a minimum gloves, and coveralls.

8. PUBLIC EXPOSURE

It is expected that during transport, storage, manufacture and application, public exposure to the notified polymer will be minimal, except in the case of an accidental spill.

Neither the resin solution nor the final paint product containing the notified polymer will be sold to the general public. Once applied, the notified polymer is incorporated in a coating formulation on the surface of commercial vehicles, farm equipment and industrial machinery. Therefore, public exposure to the notified polymer in the fully cured paint film is considered to be very low.

9. ENVIRONMENTAL EXPOSURE

9.1. Release

During the reformulation of the polymer into paint products any spillage would be contained by plant bunding. The notifier estimates that up to two tonne per year of waste polymer will be generated during the manufacturing process as follows: rinsing of manufacturing equipment, 0.8 tonne; accidental spills, 0.2 tonne; and residual polymer in drums, one tonne per year. This waste will be disposed of via the notifier's "Dusol" process or by incineration. Drums are to be recycled by either refilling with the same polymer solution or sent to a drum recycler for cleaning by incineration. Release to the atmosphere is expected to be minimal as the polymer is non volatile.

Total waste from customer sites is estimated at 62 tonnes. Spray painting occurs with a transfer efficiency of approximately 40%. Overspray will be captured and collected within spray booths throughout the filtering system or on masking materials. Assuming a maximum import volume of 100 tonnes per year, the amount of waste polymer generated will be 60 tonnes per year. Licensed waste disposal contractors will clean the waste from spray booths, treat it and send it to trade-waste landfill. Waste from the cleaning of spray guns and mixing equipment will be collected and disposed of as above. The notifier estimates that there will be up to two tonnes of residual polymer in used paint cans, that will dry to non-leachable solid and be disposed of as solid landfill.

9.2. Fate

Solid waste generated from the manufacture and application of paint products will be sent to landfill. Once polymerised, the polymer is expected to be immobilised within the polymer matrix. Any free unreacted polymer is likely to be immobile due to its predicted low water solubility and expected high binding affinity to soils. Polymer waste in landfill is expected to degrade slowly via biotic and abiotic processes.

Once applied to metal panels, the notified polymer will be incorporated in a hard, durable, inert paint film. Fragments, chips and flakes of the paint, if released, are expected to be inert and to partition to the soil compartment. The metal panels coated with the polymer are likely to be either recycled for steel reclamation or be placed into landfill at the end of their useful life. During metal recycling, the polymer would be destroyed in furnaces and converted to water vapour and oxides of carbon, as would residual polymer in incinerated drums.

The polymer is not expected to cross biological membranes, due to its high molecular weight and predicted low water solubility, and should not bioaccumulate (Connell, 1990).

10. EVALUATION OF HEALTH EFFECTS DATA

Health Effects of the Notified Polymer

No toxicological data on the notified polymer were submitted. The notifier states that similar polymers are in use and to date no adverse health effects have been reported. Nevertheless, the notifier does not exclude that skin irritation may occur from the notified polymer following prolonged or repeated skin contact.

Health Effects of the Constituents and Hazardous Impurities of the Notified Polymer and its Additives/Adjuvants

Hazard Identification & Regulatory Controls

Constituents: Residual monomers are present in the polymer solution at concentrations of less than 0.1%, which is below their respective concentration cut off levels as listed in the NOHSC *List of Designated Hazardous Substances* (NOHSC 1999a)

Hazardous Impurities: None.

Additives/Adjuvants: The notified polymer does not contain additives or adjuvants *per se*. Its resin solution contains the following solvents:

n-butyl acetate at 10 - 29%

May cause toxic effects if inhaled or absorbed through skin. Inhalation or contact with material may irritate or burn skin and eyes. Vapors may cause dizziness or suffocation. The solvent is highly flammable.

National Exposure Standard: 150 ppm TWA, 200 ppm STEL (NOHSC 1995).

Xylene at 1 to 9%

The neat solvent is acutely toxic by inhalation, and skin contact; it is also a skin irritant. It may cause central nervous system depression. The solvent is flammable.

Classification: mixtures containing the solvent at and above 12.5% are classified as Harmful (Xn).

Labels and MSDS require as appropriate: Risk Phrase 'R20/21 – Harmful by Inhalation and in Contact with Skin; and R38 – Irritating to Skin'.

National Exposure Standard: 80 ppm TWA, 150 ppm STEL (NOHSC 1995).

Aromatic Hydrocarbon Solvent at 10 - 29%

The neat solvent presents as an aspiration hazard.

Classification: mixtures containing the solvent at and above 10% are classified as Harmful (Xn).

Labels and MSDS require as appropriate: Risk Phrase 'R65 – Harmful May Cause Lung Damage if Swallowed' (NOHSC 1999a). Scheduled Poison S5 (AHMAC, 1999).

National Exposure Standard: None applicable. However, exposure to solvents in the workplace should be controlled.

11. EVALUATION OF ENVIRONMENTAL EFFECTS DATA

No ecotoxicological data were submitted.

12. ENVIRONMENTAL HAZARD (RISK) ASSESSMENT

Minimal release to water is expected during reformulation of the polymer solution into paint products. Most waste polymer is generated during spray gun application and is expected to be released to landfill or incinerated. Polymer released to landfill is unlikely to be mobile in the soil environment and would be expected to slowly degrade to carbon dioxide through abiotic and biotic processes. The environmental hazard of the notified polymer in landfill is expected to be low. Incinerated polymer would be rapidly destroyed and converted to water vapour and oxides of carbon.

In the event of accidental release of the polymer into waterways, the polymer is expected to settle to the bottom and bind to sediments where it would slowly degrade. The long term environmental hazard of the notified polymer in the aquatic environment is expected to be low.

The polymer's large molecular weight and expected low water solubility should prevent bioaccumulation. Given the above, the overall environmental hazard is expected to be low.

13. HEALTH AND SAFETY RISK ASSESSMENT

13.1. Hazard assessment

No toxicological data has been provided on the notified polymer. Considering the high molecular weight, the notified polymer is unlikely to cross biological membranes. Local effects, eg skin irritation, cannot be excluded, however.

The notified polymer is not a dangerous good for road or rail transport. However, when imported as the resin solution (60%) in flammable hydrocarbon solvent it will be stored and transported according to the statutory requirements applying to Class 3, Flammable, Dangerous Goods (FORS, 1998). The imported paint containing the notified polymer at 40% will be similarly transported and stored. Based on the potential to cause adverse health effects, the hydrocarbon solvents are subject to the provisions of Commonwealth, State and Territory Hazardous Substances regulations. In addition because of its hydrocarbon solvent content the resin solution is a Scheduled Poison (S5) (AHMAC, 1999).

13.2. Occupational Health and Safety

Exposure to the notified polymer may occur during polymer manufacture, paint manufacture and paint application by spray painting. The polymer solution and paint will contain the notified polymer at 60% and 40%, respectively. Where worker intervention is required during polymer and paint manufacture exposure is most likely to be from skin contact with spillages, which may occur during sampling for laboratory analysis and during filtration and packaging.

Exposure and any potential for skin contact during polymer and paint manufacture will need to be mitigated by the presence of engineering controls, such as closed, automated systems and a requirement for workers to wear personal protective equipment, such as impervious gloves, overalls and eye protection. Skin contact and inhalation exposure from the notified polymer during spray painting is considered minimal given the presence of in situ engineering controls (spray booth) and the requirement that full personal protective equipment be worn. Once the final paint mix has hardened, the notified polymer is bound within the matrix and unavailable for exposure. Should exposure occur, the risk of health effects from the polymer is low.

The notified polymer is of low concern to worker health and safety and no specific additional risk reduction measures are necessary.

Exposure to the hydrocarbon solvent for the resin solution will need be controlled by the use of effective ventilation systems to reduce exposure to levels below the relevant national occupational exposure standard and personnel wearing the appropriate protective equipment.

13.2. Public health

Neither the resin solution nor the final paint product containing the notified polymer will be sold to the general public. The public will come into contact with the notified polymer only after it has been applied to and becomes an integral part of a hard durable paint film on commercial vehicles, farm equipment and industry machinery. Therefore, the potential risk to the public posed by the notified polymer when used as described is considered to be very low. Should exposure occur, the risk of health effects from the polymer is low.

14. MSDS AND LABEL ASSESSMENT

14.1. MSDS

The MSDS for the product containing the notified polymer, HA-45-6149 Alkyd Resin Solution, 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 product containing the notified polymer, HA-45-6149 Alkyd Resin Solution, 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 the notified polymer the following practices and guidelines should be observed:

- Use of the paint containing the notified polymer by spray application should be in accordance with the *National Guidance Material for Spray Painting* (NOHSC 1999).
- Workers should receive regular instruction on good occupational hygiene practices in order to minimise personal contact, and contamination of the work environment with the notified polymer solution and the products that contain it.
- Employers should ensure that NOHSC exposure standards for all of the components of the polymer solution are not exceeded in the workplace.
- Personal protective equipment should be used where exposure to the notified polymer solution and the products that contain it occurs. Respiratory protection is required for spray painting. Workers should be trained in the proper fit, correct use and maintenance of their protective gear. Guidance in the selection, personal fit and maintenance of personal protective equipment can be obtained from:

Respiratory Protection: AS /NZS 1715; AS /NZS 1716 (SA/SNZ, 1994 b, c)

Protective eyewear: AS 1336 (SA 1994);
AS/NZS 1337 (SA/SNZ 1992).

Chemical impermeable AS 3765.2 (SA 1990).
clothing:

Impermeable gloves: AS 2161.2 (SA/SANZ 1998).

Occupational footwear: AS/NZS 2210 (SA/SANZ 1994).

- Workplace practices and control procedures consistent with provisions of State, Territory and Commonwealth legislation based on the *National Model Regulations for the Control of Workplace Hazardous Substances* must be in operation if products containing the notified polymer are determined to be hazardous.
- A copy of the MSDS for the notified polymer and the products that contain it should be easily accessible to employees.

16. REQUIREMENTS FOR SECONDARY NOTIFICATION

Under the Act, the Director of Chemical Notification and Assessment must be informed if the polymer characteristics cease to satisfy the criteria under which it has been accepted as a Synthetic Polymer of Low Concern, and secondary notification may be required under subsection 64(1). The Director must be informed if any of the circumstances stipulated under subsection 64(2) of the Act arise, and secondary notification of the notified polymer may be required. No other specific conditions are prescribed.

17. REFERENCES

Australian Health Ministers Advisory Council (AHMAC) (1999) Standard for the Uniform Scheduling of Drugs and Poisons, Australian Government Publishing Service, Canberra 1999.

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.

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

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

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

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

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

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

Standards Australia/Standards New Zealand (SA/SNZ) (1994c) Australian/New Zealand Standard 1716-1994, Respiratory Protective Devices. Standards Association of Australia/Standards Association of New Zealand.

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