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June 1999

**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION  
AND ASSESSMENT SCHEME**

**FULL PUBLIC REPORT**

**Polymer in Lumitol M 100**

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Director  
Chemicals Notification and Assessment

**FULL PUBLIC REPORT****Polymer in Lumitol M 100****1. APPLICANT**

PPG Industries Australia Pty Ltd of McNaughton Road, Clayton, Victoria, 3168 and BASF Australia Ltd of 500 Princes Highway, Noble Park, Victoria, 3174 have submitted a joint limited notification statement in support of their application for an assessment certificate for the new synthetic polymer, Polymer in Lumitol M 100.

**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 and the Summary Report.

**Trade Name:** Lumitol M 100 (contains 60% polymer)

Lumitol M 100 was formerly known as Lumitol LR 8747. The name of the automotive refinish primer that contains the new polymer is 467-F0398 2K Sealer.

**Additives/Adjuvants:**

*Chemical name:* tert-butyl peroctoate

*CAS No.:* 13467-82-8

*Weight percentage:* 2.44

*Chemical name:* xylene

*CAS No.:* 1330-20-7

*Weight percentage:* 18.78

*Toxic properties:* harmful by inhalation and in contact with skin (R20/21); irritating to skin (R38) (List of Designated Hazardous Substances, NOHSC 1994a)

*Chemical name:* n-butyl acetate

*CAS No.:* 123-86-4

<i>Weight percentage:</i>	18.78
<i>Toxic properties:</i>	NOHSC exposure standard = 713 mg/m <sup>3</sup> (TWA) (Exposure Standards for Atmospheric Contaminants in the Occupational Environment, NOHSC, 1995); skin and severe eye irritant; mildly toxic by inhalation and ingestion (Lewis, 1996)

### 3. PHYSICAL AND CHEMICAL PROPERTIES

The following data relate to the imported product Lumitol M 100 which contains the notified polymer at a concentration of approximately 60% w/w in solvents, xylene and n-butyl acetate. The polymer itself is never isolated from the *in situ* manufactured acrylic resin solution.

<b>Appearance at 20°C and 101.3 kPa:</b>	colourless to faint yellow liquid
<b>Boiling Point:</b>	127°C
<b>Specific Gravity:</b>	1.0 g/cm <sup>3</sup>
<b>Vapour Pressure:</b>	1.0 kPa at 20°C
<b>Water Solubility:</b>	no data presented; see comments below
<b>Partition Co-efficient (n-octanol/water):</b>	no data presented; see comments below
<b>Hydrolysis as a Function of pH:</b>	no data presented; see comments below
<b>Adsorption/Desorption:</b>	no data presented; see comments below
<b>Dissociation Constant:</b>	no data presented; see comments below
<b>Particle Size:</b>	not applicable as the polymer is never isolated from solution
<b>Flash Point:</b>	25°C (as for xylene)
<b>Flammability Limits (20°C, 101.3 kPa):</b>	Upper Explosive Limit = 7.6% (xylene/n-butyl acetate) Lower Explosive Limit = 1.0% (xylene/n-butyl acetate)
<b>Autoignition Temperature:</b>	370°C (as for n-butyl acetate)
<b>Explosive Properties:</b>	polymer expected to be stable under normal use conditions

**Reactivity/Stability:** stable at ambient temperatures; however, Lumitol M 100 contains flammable solvents making it incompatible with oxidising agents

### **Comments on Physico-Chemical Properties**

The polymer is never isolated as a defined entity and the data provided are for a 60% polymer solution in the solvent system.

The notifier claims that by analogy with similar polymers, the polymer is not expected to be volatile under the conditions of use. The boiling point of the polymer has been determined to be 127°C, while the vapour pressure of the polymer is predicted to be very low with the value given above that of the solvent xylene.

The water solubility was not determined, but the notifier states that the polymer is expected to be of low solubility (< 1 mg/L) by comparison with similar polymers and since it is non-ionic, of high molecular weight and contains a high level of aliphatic and hydrophobic groups.

The polymer contains ester linkages that could be expected to undergo hydrolysis under extreme pH conditions. However, due to the low water solubility, this is unlikely in the environmental pH range of between 4 and 9.

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The determination of partition coefficient and adsorption/desorption could not be undertaken as the notified polymer is expected to be insoluble in water and will largely partition into *n*-octanol rather than water. Due to its low water solubility, the polymer is expected to become associated with the organic component of soils and sediments.

No dissociation constant data was provided as the notifier claims that once cross-linked in the final coating product the polymer has no units likely to dissociate.

## **4. PURITY OF THE CHEMICAL**

**Degree of Purity:** 99.328%

## **5. USE, VOLUME AND FORMULATION**

The notified chemical is a new low-viscosity acrylic resin for an automotive refinish primer. It will initially be imported into Australia by PPG Industries Pty Ltd as part of a formulated primer, 467-F0398 2K Sealer contain 1-9% of the notified chemical. It will be imported in tinplate paint cans of 1, 3.5 and 20L and transported by road to customers throughout Australia.

Luminol M 100 may be imported as a 60% w/w solution in solvents (i.e. Lumitol M 100) at a later date for local paint manufacture and used at up to 10% by weight in the paint. Future imported Lumitol M 100 will be packed in 200 kg polyethylene drums. These drums will be transported by road from the wharf to the BASF warehouse at Noble Park, then delivered to PPG Industries at Clayton.

Two hundred kilogram of the notified polymer are to be imported in the first year and 1000 kg for each of the next four. years.

## **6. OCCUPATIONAL EXPOSURE**

The notifier has provided the following information, to cover local paint manufacture and use of either locally manufactured or imported paint containin the polymer. According to the notifier, three main groups of workers will be exposed to the polymer :

- Group 1        those involved in laboratory development;
- Group 2        those involved in paint manufacture;
- Group 3        those involved in paint application.

For each group, the most likely means of exposure to the polymer and its solutions will be skin contact. Inhalation of the polymer (in aerosol form) is unlikely due to the viscous nature of the polymer solution and the expected low vapour pressure of the resin.

### *Laboratory development*

Group 1 workers (1 site, PPG Australia; 3 personnel) will be involved in small scale manufacturing of paint, as well as product testing. The maximum extent of exposure for an individual is expected to be 8 hours per day for 20 days each year.

### *Paint manufacture*

Group 2 workers (1 site, PPG Australia; 9 personnel) will be involved in paint preparation, QC testing and the filling of paint drums. The maximum extent of exposure for an individual is expected to be 8 hours per day for 30 days each year.

At the PPG facility there are procedures for minimising the exposure of workers (Groups 1 and 2) to the polymer and its solutions. Firstly, reactants and solvents are mixed and blended in a high speed mixer fitted with exhaust ventilation to capture volatiles at the source. A regular maintenance program is carried out and includes measurement of air flows at determined intervals. Any spills that occur during the blending and batching stages are contained within the plant through existing bunding. Both polymer solution and paint are filled into containers under local exhaust ventilation that captures vapours. Any spills that occur during the filling stage are contained to the plant through existing bunding. The spillage is absorbed with sand, soil or a suitable inert absorbent by workers, wearing personal protective equipment for eye, skin and respiratory protection. The absorbed material is collected and sealed in labelled containers and disposed of according to local waste management regulations.

The minimum protective clothing issued to workers involved in the handling of polymer solution and paint, includes impervious gloves, coveralls and goggles.

### *Paint application*

Group 3 workers (3000 sites; 6000 personnel) will be involved in the activation, thinning and application of the paint products and cleaning of spray equipment. The maximum extent of exposure for an individual is expected to be 4 hours per day for 220 days each year.

Prevention of exposure during paint application is achieved through a combination of engineering controls, personnel protective equipment and training courses. Cans of paint are handled by operators protected by anti-static flame retardant overalls, anti-static footwear, impervious gloves and eye protection conforming to Australian Standard AS/NZS 1337 (Standards Australia/Standards New Zealand, 1992; Standards Australia, 1994). Paint mixing and spraying is performed in a well ventilated, down draft spray booth with a minimum volume of four air changes per minute.

In typical spraybooths, a number of designs may be used. In a dry floor booth, the overspray will be collected in filters contained in the floor of the booth; any unremoved particulates will reach the exhaust stack with the solvent vapours. In a wet floor booth, overspray will collect in a pool of water below the grill floor or in a wet scrubber in the exhaust and will be removed with a filter. The residual solids will be disposed of to secure landfill. The spray booths are subject to AS/NZS/4114.1:1995 *Spray Painting Booths – Design, Construction and Testing* and AS/NZS/4114.1:1995 *Spray Painting Booths – Selection, Installation and Maintenance*. (Standards Australia/Standards New Zealand, 1995). After application of the paint, the automobile will be heated to cure the coating.

Solvent in the ventilation system is vented via a stack to the atmosphere. Overspray is trapped in the spray booth or on masking materials such as kraft and newspaper. The spray painter wears an air-fed breathing mask conforming to AS/NZS 1715 and AS/NZS 1716 (Standards Australia/Standards New Zealand, 1994a,b), in addition to the clothing specified above.

Once residual final paint mixture has dried, the notified polymer will be irreversibly bound within the cured matrix and not separately available for either exposure to workers, or for dermal absorption.

Paint wastes, generated from cleaning of the spray gun and mixing equipment, will be collected and disposed of in the same manner as for waste water from the spray booth.

Given these measures, standard personal protective equipment will provide an adequate level of protection from the notified polymer, which is likely to be less intrinsically toxic than most of the solvents, pigments and other paint resins. Health risks from inhalation and skin contact are therefore expected to be minimal due to the low toxicity and vapour pressure of the notified polymer.

## **7. PUBLIC EXPOSURE**

During transportation and warehousing of the notified chemical exposure to the public is expected to be minimal, except in the event of an accident spill.

The notified chemical will be used by the automobile spray painting industry, and will not be available to the general public. Once applied to the automobile body, the paint containing the notified chemical is bound in an insoluble matrix and no loss of residual monomers is expected.

## **8. ENVIRONMENTAL EXPOSURE**

### **Release**

There is potential for release during the paint formulation and the paint application. The formulation process will take place at the PPG plant and any spills that occur will be contained by the plant bunding. The paint is applied to motor vehicles with approximately 30% efficiency in a spray booth with control measures, such as a filtering system and masking materials, in place. Cleaning of the spray gun and mixing equipment will generate waste that will be collected and disposed of in the same manner as wastewater from the spray booth.

During the formulation process, the notifier estimates that up to 20 kg per year of waste polymer would be generated at the PPG plant. During coating application it is expected that 140 kg of polymer waste during the first year and 700 kg of waste per year during subsequent years will be produced.

Some residue will also remain in the 'empty' containers after use. It is estimated that 4 kg in the first year and 40 kg annually in the subsequent years (2% of the container contents) will remain as residue in the containers.

### **Fate**

Once applied to the metal panels of vehicles the notified polymer will be incorporated in a hard, durable, inert film and would not present a significant hazard. Any fragments, chips and flakes of the lacquer will be of little concern as they are expected to be inert. The metal panels coated with the polymer are likely to be either recycled for steel reclamation or placed into landfill at the end of their useful life. When recycled, the polymer would be destroyed in the blast furnaces and converted to water vapour and oxides of carbon.

The solid waste generated in the formulation and application of the coating will be disposed to landfill (although incineration is an option). Presumably the polymer is recovered as an insoluble solid from the wastewater derived from cleaning and also disposed to landfill. The containers and residue will also be disposed in this manner. Leaching of the polymer from landfill sites is unlikely, given the low solubility of the substance.

The polymer is not expected to cross biological membranes, due to the low solubility and high molecular weight, and as such should not bioaccumulate (Connell, 1989).

## **9. EVALUATION OF TOXICOLOGICAL DATA**

No toxicological data were provided for the notified polymer. This is acceptable for polymers of number-average molecular weight (NAMW) greater than 1000 daltons.

A Material Safety Data Sheet (MSDS) for Lumitol M 100 was included in the notification dossier. Toxicological and health hazard information on the solvents in Lumitol M 100 (i.e. xylene and n-butyl acetate) were provided on each. It is likely that these solvents would be the principal toxic agents in Lumitol M 100.

## **10. ASSESSMENT OF ENVIRONMENTAL EFFECTS**

No ecotoxicology data were provided, which is acceptable for polymers of NAMW > 1000 according to the Act.

## **11. ASSESSMENT OF ENVIRONMENTAL HAZARD**

The polymer cross-links with other paint components to form a very high molecular weight and stable film that adheres firmly to the primer layer to which it is applied. The polymer, as part of this surface coating will share the fate of the vehicle panel. The paint will slowly deteriorate under the action of UV light, but this process would be negligible over the life of the motor vehicle. When the vehicle panel is recycled, the polymer would be destroyed through incineration.

The majority of notified polymer associated with waste from the application of the coating to the automotive surface should not enter the environment until it is disposed of to landfill. Movement of the polymer by leaching from landfill sites is not expected because of its low water solubility and high binding affinity to soil and because it is cross-linked in the cured coating.

In the event of accidental spillage of the polymer solution into waterways, it is not expected to disperse into the water, but settle out onto sediments. If the polymer is spilt on land, either during usage or transport, it is expected that the polymer would become immobilised in the soil layer. Contaminated soil can then be collected and disposed of to landfill.

Given the above, environmental exposure and the overall environmental hazard is expected to be low.

## **12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS**

Based on the limited data available, the notified polymer itself is unlikely to be a hazardous substance (according to the National Occupational Health and Safety Commission *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 1994b)), or a dangerous good. Due to its high molecular weight (NAMW = 2900; WAMW = 8855) and low residual monomer content (sum total 0.53% by weight; 8.1% <1000mw, 2.2% <500mw), it is unlikely to traverse biological membranes.

Lumitol M 100 and 467-F0398 2K Sealer are both Class 3 (R10, flammable) dangerous goods. They are classified as hazardous substances according to NOHSC *Approved Criteria*. The MSDS lists a number of health effects, namely that they are harmful by inhalation and in contact with skin (R20/21), as well as irritating to the skin (R38). Oral ingestion can result in nausea, vomiting and central nervous system depression. The vapours are irritants to the respiratory tract and inhalation could lead to central nervous system depression, including unconsciousness on prolonged exposure. These relate to the organic solvents (xylene and n-



butyl acetate; plus naptha in the case of 467-F0398 2K Sealer). Both xylene and n-butyl acetate have a NOHSC time weighted average exposure standard (350 mg/m<sup>3</sup> and 713 mg/m<sup>3</sup>, respectively) and a short term exposure limit (655 mg/m<sup>3</sup> and 950 mg/m<sup>3</sup>, respectively) (NOHSC, 1995). Therefore, appropriate precautions should be taken in the handling and storage of solutions containing the polymer.

The types and prevalence of injuries and diseases relating to workers exposed to the notified polymer and its solutions were not available. It is expected that potential health effects are similar to those of the solvents, which are well documented and presented on the MSDS. No adverse health effects (symptoms) are known for the polymer itself. When part of an inert fully cured paint film, the notified polymer will not be available for exposure or absorption and, therefore, is not considered to be a risk to human health.

### *Occupational Health and Safety*

There is little potential for occupational exposure to the notified polymer in the transport and storage of the paint components containing this polymer unless accidental spillage occurs. There will be exposure during any local production of the paint components (when commenced), as well as in the use and disposal of paints containing the polymer.

During the manufacture and reformulation processes, the main exposure route for the notified polymer will be dermal. The paints and polymer solutions will be viscous, and ready formation of aerosols is not expected. The polymer is not expected to be hazardous by dermal exposure as the high molecular weight will preclude absorption through the skin. Protective measures used to prevent exposure to the hazardous solvents should provide sufficient protection against the notified polymer.

The greatest occupational exposure associated with the notified polymer will come from the use and disposal of the paints containing it. The presence of hazardous substances in such formulations requires the use of stringent engineering controls, such as a correctly constructed and maintained spray booth, and of a high level of personal protective equipment, such as impermeable overalls and gloves and a full face shield and respirator. The use of any paint containing the notified polymer should be in accordance with the National Occupational Health and Safety Commission *Draft National Code of Practice for Spray Painting* (NOHSC, 1991).

The notifier has indicated that all paint applications will involve spraying in a well ventilated, down draft spray booth, with a minimum four air changes per minute. Paint over-spray, accounting for 70% of paint used, will be trapped onto spraybooth masking materials and solvent will be ventilated via a stack into the atmosphere. Given these measures, standard personal protective equipment will provide an adequate level of protection from the notified polymer, which is likely to be less intrinsically toxic than most of the solvents, pigments and other paint resins. Health risks from inhalation and skin contact are therefore expected to be minimal due to the low toxicity and vapour pressure of the notified polymer, as well as the infrequency of exposure.

Once the applied final paint mix has hardened, the polymer will not be separately available for exposure or absorption.

In the event of an accidental spill of resin solution or paint formulation, the notified polymer will remain part of the resin or paint and become attached to a solid absorbent (e.g. soil, sand or other inert material). The material can be collected and sealed in a suitable vessel for disposal. The MSDS explains the recommended clean-up procedures. Care should be taken, however, as spills will be slippery and inhaled vapours may be harmful. All ignition sources should be extinguished.

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There are NOHSC exposure standards for xylene and n-butyl acetate. The employer is responsible for ensuring that these exposure standards, and exposure standards pertaining to other final paint mix additives, are not exceeded in the workplace.

### *Public Health*

Paint containing the notified polymer will not be available to the general public. Once applied to the automobile body, the paint containing the notified polymer is bound in an insoluble matrix and no loss of residual monomers is expected. Consequently exposure to the public is expected to be negligible.

## **13. RECOMMENDATIONS**

To minimise occupational exposure to Lumitol M 100 the following guidelines and precautions should be observed:

- 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 should conform to AS/NZS 2161.2 (Standards Australia/Standards New Zealand, 1998);
- All occupational footwear should conform to AS/NZS 2210 (Standards Australia/Standards New Zealand, 1994c);
- Respirators should conform to AS 1715 and AS 1716 (Standards Australia/Standards New Zealand, 1994a,b);
- Spray booths should conform to AS/NZS 4114 (Standards Australia/Standards New Zealand, 1995);

- Spillage of the notified chemical should be avoided. Spillages should be cleaned up promptly with absorbents which should be put into containers for disposal;
- Good personal hygiene should be practised to minimise the potential for ingestion;
- A copy of the appropriate MSDS should be easily accessible to employees;
- The NOHSC exposure standards for xylene and n-butyl acetate should not be exceeded in the workplace.

#### **14. MATERIAL SAFETY DATA SHEET**

The MSDS for Lumitol M100 was provided in accordance with the *National Code of Practice for the Preparation of Material Safety Data Sheets* (NOHSC, 1994c).

The MSDSs were provided by the applicant as part of the notification statement. They are reproduced here as a matter of public record. The accuracy of the 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**

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