File No: PLC/128

June 2000

**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME**

# FULL PUBLIC REPORT

## Glasurit High Solid Texture Additive

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 Family Services.

For the purposes of subsection 78(1) of the Act, copies of this full public report may be inspected by the public at the Library, National Occupational Health and Safety Commission, 92-94 Parramatta Road, Camperdown NSW 2050, between the following hours:

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*Facsimile:* (61) (02) 9577 9465


Director
Chemicals Notification and Assessment

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## Glasurit High Solid Texture Additive

## 1. APPLICANT

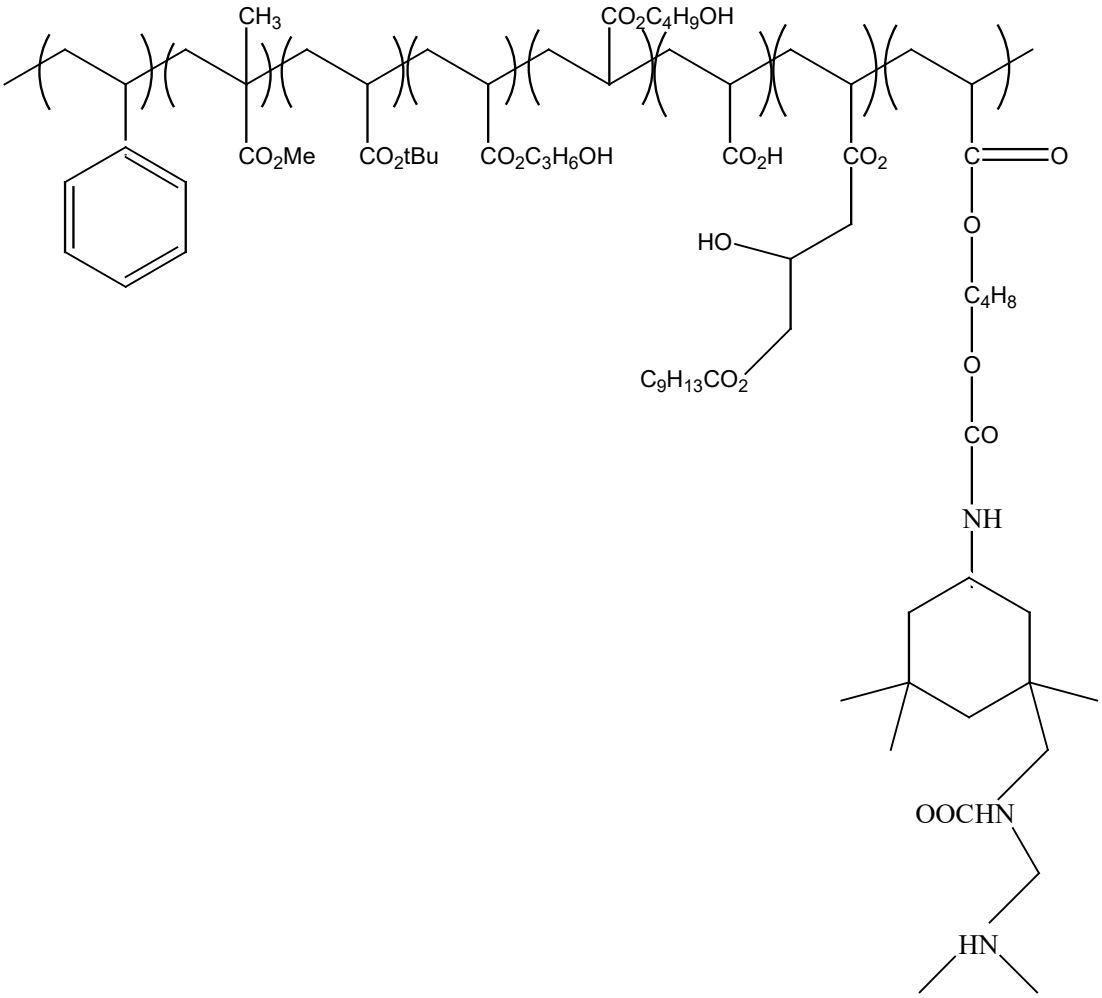
Glasurit Pty Ltd of 231-233 Newton Rd WETHERILL PARK NSW 2164 has submitted a Polymer of Low Concern notification statement in support of their application for an assessment certificate for Glasurit High Solid Texture Additive.

The notifier has not requested that any information relating to the notified polymer be exempt from publication in the Full Public Report.

## 2. IDENTITY OF THE CHEMICAL

| | |
|---|---|
| **Chemical Name:** | neodecanoic acid, oxiranylmethyl ester, polymer with 2-(dimethylamino)ethanol adduct with 5-isocyananato-1-(isocyanatomethyl)-1,3,3-trimethylcyclohexane, 1,1-dimethylethyl 2-propenoate, ethenylbenzene, 4-hydroxybutyl 2-propenoate, methyl 2-methyl-2-propenoate, 1,2-propanediol mono-2-propenoate and 2-propenoic acid |
| **Chemical Abstracts Service (CAS) Registry No.:** | 182937-79-7 |
| **Other Names:** | glycidyl neodecanoate, polymer with 2-(dimethylamino)-ethanol adduct with isophorone diisocyanate, t-butyl acrylate, styrene, 4-hydroxybutyl acrylate, methyl methacrylate, hydroxypropyl acrylate and acrylic acid |
| **Marketing Name:** | Glasurit High Solid Texture Additive |
| **Molecular Formula:** | ($C_{16}H_{29}N_3O_3.C_{13}H_{24}O_3.C_7H_{12}O_3.C_7H_{12}O_2.C_8H_8.C_5H_8O_2.C_3H_4O_2.C_6H_{10}O_3$) |

**Structural Formula:**




The polymer consists of an acrylic backbone, consisting of a random copolymer of the acrylic monomers and styrene, with the additional monomers, neodecanoic acid, oxiranylmethyl ester and 2-(dimethylamino)ethanol adduct with 5-isocyananato-1-(isocyanatomethyl)-1,3,3-trimethylcyclohexane, being attached to the hydroxylated side groups of the acrylic polymer.

| | |
|---|---|
| **Number-Average Molecular Weight (NAMW):** | 3645 |
| **Weight-Average Molecular Weight:** | 16040 |
| **Polydispersity:** | 4.40 |
| **Maximum Percentage of Low Molecular Weight Species** | |
| **Molecular Weight < 500:** | 2.7 % |
| **Molecular Weight < 1 000:** | 5.3 % |

**Weight Percentage of Ingredients:**

| *Chemical Name* | *CAS No.* | *Weight %* |
|---|---|---|
| neodecanoic acid, oxiranylmethyl ester | 26761-45-5 | 18.6 |
| ethenylbenzene | 100-42-5 | 14.7 |
| methyl 2-methyl-2-propenoate | 80-62-6 | 13.7 |
| 1,1-dimethylethyl 2-propenoate | 1663-39-4 | 19.6 |
| 1,2-propanediol mono-2-propenoate | 25584-83-2 | 12.7 |
| 4-hydroxybutyl 2-propenoate | 2478-10-6 | 11.8 |
| 2-propenoic acid | 79-10-7 | 6.9 |
| 5-isocyananato-1-(isocyanatomethyl)-1,3,3-trimethylcyclohexane | 4098-71-9 | 1.4 |
| 2-(dimethylamino)ethanol | 108-01-0 | 0.6 |

**Method of Detection and Determination:** infrared spectroscopy

**Spectral Data:** 3510 (br), 2960, 2870, 1730, 1450, 1380, 1360, 1250, 1160, 1060, 990, 840, 760, 700 $cm^{-1}$

**Characterisation as a Synthetic Polymer of Low Concern**

**Polymer Stability** the polymer is expected to be stable

**Reactivity** the polymer contains no reactive functional groups

**Particle Size** the polymer is not isolated from solution

**Charge Density** no groups will be charged in the environmental pH range

**Water Solubility** not soluble

The polymer meets the criteria for assessment as a synthetic polymer of low concern under Regulation 4A of the *Industrial Chemicals (Notification and Assessment) Act 1989*.

## 3. PHYSICAL AND CHEMICAL PROPERTIES

The notified polymer will be imported as a component of an additive for spray paint mixtures at a concentration of 30 – 60 % in mixed solvents, predominantly butyl acetate. The physical and chemical properties listed below are for the polymer solution, except where stated.

**Appearance at 20°C and 101.3 kPa:** clear liquid

**Melting Point:** not determined for the polymer

| | |
|---|---|
| **Specific Gravity:** | 1.038 |
| **Vapour Pressure:** | not volatile (polymer) |
| **Water Solubility:** | the notified polymer is not soluble (see comments below) |
| **Partition Co-efficient (n-octanol/water):** | not determined |
| **Hydrolysis as a Function of pH:** | not determined (see comments below) |
| **Flash Point:** | > 23°C |
| **Flammability Limits:** | Lower Explosive Limit > 35 g/m$^3$ |
| **Autoignition Temperature:** | > 200°C |
| **Explosive Properties:** | not expected to be explosive |
| **Reactivity/Stability:** | not expected to be reactive under normal environmental conditions |

### 3.1. Comments on Physico-Chemical Properties

The notifier indicated that the polymer is present in a clear solvent solution. The structure of the polymer does not indicate any reactive properties. Under the conditions of use the polymer will not undergo photo or thermal degradation.

A water solubility study indicated that the water solubility of the polymer was effectively nil. In the study, the polymer was agitated in water for 1 hour, then the resin was filtered off and the water phase was investigated for residual solids.

While the new polymer contains pendant ester and urethane linkages which are inherently susceptible to hydrolytic cleavage, the water solubility of the polymer is very low. This will preclude contact between the potentially reactive functionalities and water (as well as other reactants in the environment), and hence the possibility for hydrolysis in the environmental pH region ($4 < pH < 9$).

The polymer contains a low percentage of free carboxylic acid groups likely to have typical acidity, as well as a small amount of basic tertiary amine. It is likely that the notified polymer will be zwitterionic under normal environmental conditions.

## 4. PURITY OF THE CHEMICAL

**Degree of Purity:** > 99 %

**Hazardous Impurities:** see residual monomers below

**Non-hazardous Impurities (> 1% by weight):** none

**Maximum Content of Residual Monomers:**

| *Chemical Name* | *CAS No.* | *Weight %* |
|---|---|---|
| methyl 2-methyl-2-propenoate | 80-62-6 | < 0.05 |
| 1,1-dimethylethyl 2-propenoate | 1663-39-4 | 0.1 |

**Additives/Adjuvants:**

| | |
|---|---|
| *Chemical name:* | xylene (mixed isomers) |
| *CAS No.:* | 1330-20-7 |
| *Weight percentage:* | 1 – 2.5 % in polymer resin solution |
| *Regulatory Controls:* | National exposure standard 80 ppm TWA, 150 ppm STEL (NOHSC, 1995) |
| *Toxic properties:* | R20/21 Harmful by inhalation and in contact with skin<br>R38 Irritating to skin<br>(NOHSC, 1999a) |
| *Chemical name:* | 2-methoxy-1-methyl ethyl acetate |
| *Synonym:* | methoxypropyl acetate |
| *CAS No.:* | 108-65-6 |
| *Weight percentage:* | 1 – 2.5 % in polymer resin solution |
| *Regulatory Controls:* | the national exposure standard for the closely related 2-methoxy ethyl acetate is 5 ppm (TWA) with skin notation (NOHSC, 1995); those countries which have adopted exposure standards for 2-methoxy-1-methyl ethyl acetate have selected higher values than for 2-methoxy ethyl acetate (50 to 100 ppm) (American Conference of Government Industrial Hygienists, 1998) |
| *Toxic properties:* | R36 Irritating to eyes<br>(NOHSC, 1999a) |
| *Chemical name:* | n-butyl acetate |
| *Weight percentage:* | 25 - 50 % in polymer resin solution |
| *CAS No.:* | 123-86-4 |
| *Regulatory Controls:* | NOHSC exposure standard 150 ppm TWA, 200 ppm |

| | |
|---|---|
| | STEL (NOHSC, 1995) |
| *Toxic properties:* | eye and mucous membrane irritant (American Conference of Government Industrial Hygienists, 1998) |

## 5. USE, VOLUME AND FORMULATION

The notified polymer will not be manufactured in Australia, but will be imported in an organic solvent mixture containing xylene, methoxypropyl acetate and n-butyl acetate. The notifier indicates that the new polymer would comprise 30 - 60 % (w/v) of the resin solution. The product is to be imported in 1 L cans. The notifier indicated that during the first 5 years the anticipated annual import quantities for the resin solution containing Glasurit High Solid Texture Additive is 40 - 60 tonnes annually – this equates to between 12 and 36 tonnes of the polymer itself.

The notified polymer is intended for use as a texture additive for topcoats in commercial vehicle repair shops. Preparation of the ready-to-spray mixture will be completed at the customer facility by the operator immediately prior to application. The quantity of the prepared paint mixture required for each application can vary up to 15 L for a full vehicle respray. Application of the lacquer to vehicles is performed in a spray booth with a fume extraction system.

## 6. OCCUPATIONAL EXPOSURE

*Transport and Storage*
The cans of product containing the notified chemical will be imported in shipping containers as part of a mixed load. The containers will be transported to a paint supply warehouse where the product will be stored. Two dock workers and one transport worker will be involved in handling the product containing the polymer, two times a month. These workers would not be expected to be exposed to the notified polymer except in the case of an accident involving rupture of the cans.

At the warehouse, the individual cans will be unpacked and dispatched as required. Individual customers will generally only purchase one or two cans at a time. The individual cans are dispatched by road transport. The warehouse and courier workers would only be exposed in the event of an accident.

*End Use*
The notifier estimates that the polymer will be used by up to 500 spray painters on a regular basis.

At each crash repair shop, one operator would be involved in using the product containing the notified polymer. The product will be mixed with base colour in proportions of approximately 1:1, depending on the desired effect. This mixture is then mixed with hardener and reducer in a ratio of 4:1:1 just prior to use, then loaded into a high pressure spray gun or high volume low pressure spray gun. These steps will be carried out manually. Therefore, there is a risk of dermal exposure to spills and drips. This procedure is estimated by the notifier to take between 10 and 15 minutes per application.

The spraying of the automobile will be carried out in a laminar flow downdraft spray booth which is designed to rapidly remove aerosol particles and solvent vapour from the atmosphere. Several possible booth 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* (Standards Australia/ Standards New Zealand, 1995a) and AS/NZS/4114.2:1995 *Spray Painting Booths – Selection, Installation and Maintenance* (Standards Australia/ Standards New Zealand, 1995b).

The notifier estimates that the application of the paint will take between 10 and 90 minutes per vehicle. The volume of prepared mixture required per vehicle is expected to be up to 10 - 15 L, with approximately 500 mL required for touch-up jobs.

Residual paint mixture will be washed from the equipment manually, using recycled paint solvent.

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.

The notifier states that generally a spray painter would be exposed to the notified polymer for a maximum of 5 hours per week.

Local exhaust ventilation will normally be provided where natural ventilation is inadequate to keep the solvent vapour concentrations below the recommended exposure standards. Spray painters will wear appropriate personal protective equipment at all times; neoprene, nitrile or PVC gloves and overalls while mixing the paint, and, in addition, a full face shield and vapour respirator while inside the spray booth.

## 7. PUBLIC EXPOSURE

The public exposure to the notified polymer arising from use, waste disposal, or transport is expected to be low. Public exposure through environmental dispersion of the polymer is also unlikely.

The uncured polymer is only used in an industrial environment. The notified polymer will only enter the public domain incorporated into automotive finish lacquers, where it will be cross-linked as a component of a continuous unreactive film. Although there will be public contact with the cured lacquer on commercial vehicles, the notified polymer will not be bioavailable.

## 8. ENVIRONMENTAL EXPOSURE

## 8.1. Release

The notified polymer will be exclusively used as a component of automotive repair paint. The polymer has the potential for environmental release during the thinning process for lacquer preparation and during application. Loss to the environment is expected to be minimal since the polymer is non-volatile and overspray would be trapped in the spray booth and soaked up with inert absorbent material.

The notifier estimates that 70 % of the final product will be consumed during end use pattern and a 30 % wastage from residue remaining in packs after use and as a result of application by HVLP spray guns. Taking into account an annual import volume of 40 - 60 tonnes of the new product, the maximum amount of notified polymer that may be released into the environment is estimated as 3.6 – 10.8 tonnes per year. However, if conventional spray guns are used 50 – 60 % wastage would be expected, which would give a potential release volume of the notified polymer of 6 - 21.6 tonnes. The notifier has not estimated the number of operators that would be using HVLP spray guns compared to the conventional guns (which the notifier states are still common) so the potential release volume of the polymer may be anywhere between 3.6 - 21.6 tonnes. Most of this would be contained within the control equipment at the automotive repair facility, and would be collected and disposed of appropriately, most likely to landfill.

## 8.2. Fate

Once applied to the metal panels of vehicles, the notified polymer will be incorporated in an inert film and would not present a significant hazard. Any fragments, chips or flakes of the paint 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 in blast furnaces or placed into landfill at the end of their useful life. In blast furnaces, the polymer would be destroyed and converted to water vapour and oxides of carbon and nitrogen. When deposited into landfill with waste paint, used paint cans or on discarded panels, the organic components of the paint including the notified polymer would be inert and immobile, but could be expected to be very slowly degraded through the biological and abiotic processes operative in these facilities.

# 9. EVALUATION OF TOXICOLOGICAL DATA

No toxicology data were submitted. The polymer is not volatile and is not reactive. Molecules, including polymers, of high molecular weight do not readily cross biological membranes. The residual monomer concentration is low (≤ 0.15 % in total). The notifier states that no occupational or public health issues have been reported for the notified polymer overseas or for polymers of similar composition in Australia.

# 10. ASSESSMENT OF ENVIRONMENTAL EFFECTS

No ecotoxicological data were submitted.

## 11. ASSESSMENT OF ENVIRONMENTAL HAZARD

The majority of the polymer would be encapsulated in an inert film after application. However, it is possible that up to 60 % (ie. a maximum of 21.6 tonnes per annum) of the polymer could be released as a consequence of paint preparation and application. This is expected to be primarily in automotive repair facilities. The procedures in place at the repair facility will need to ensure that any released material is properly contained and disposed of, most likely to landfill.

The polymer is unlikely to present a hazard to the environment after it has been incorporated into the paint and applied to solid substrates. The physical characteristics of low solubility in water and non-volatility suggest that the mobility and degradation of the polymer in the environment will be very limited.

The low environmental exposure of the polymer as a result of the proposed use indicates the overall environmental hazard should be low.

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

No toxicological information has been provided for the notified polymer. Therefore, the substance cannot be assessed against the NOHSC *Approved Criteria for Classifying Hazardous Substances* (National Occupational Health and Safety Commission, 1999b). The polymer solution Glasurit High Solid Texture Additive is a not a hazardous substance. It is classed as a Class 3 dangerous good (flammable liquid) because of the solvent content. The MSDS for the polymer solution Glasurit High Solid Texture Additive lists a number of potential health effects, namely mucous membrane and respiratory irritation, and kidney, liver and central nervous system effects. Symptoms including headache, dizziness, fatigue, muscular weakness, drowsiness or loss of consciousness may be seen. Skin defatting may also occur on repeated exposure. The symptoms relate mainly to the solvents, xylene, methoxypropyl acetate and butyl acetate, rather than the notified polymer.

The polymer itself is not reactive and non-volatile, and because of the high molecular weight is not expected to cross biological membranes. The notifier states that there have been no reported incidences of adverse effects on the occupational health of workers using the notified polymer overseas.

*Occupational Health and Safety*

There is little potential for occupational exposure to the notified polymer in the transport and storage of the imported polymer solution. The greatest exposure is in the mixing and use of the paints. Mixing of the paints must take place in a well ventilated area.

The final paint mix including the pre-prepared paint component containing the notified polymer could contain a wide variety of additional ingredients. This is likely to introduce human health hazards because, apart from a range of potentially toxic solvents, there may be components containing resins with pendant isocyanate groups. The spraying procedure also produces a dense aerosol which would adversely affect human health even in the absence of additional hazardous components. It is also probable that professionals involved in the spray painting industry will use a number of different paint formulations.

For these reasons, the notified polymer must be assessed for the contribution it makes to the hazards associated with spray application of the paint. The presence of many potential and actual hazardous substances in the 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 the paint containing the notified polymer should be in accordance with the NOHSC *National Guidance Material for Spray Painting* (National Occupational Health and Safety Commission, 1999c). The level of protection from exposure afforded by the standard protective measures will provide adequate protection from the notified polymer, which is likely to be less intrinsically toxic than most of the solvents, pigments and other paint resins.

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

There are NOHSC exposure standards for n-butyl acetate and xylene, identified as ingredients in the pre-prepared paint Glasurit High Solid Texture Additive. 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.

The solutions containing the notified polymer are flammable due to their solvent content. Precautions must be taken to avoid sources of ignition, e.g. use of earthing leads. Operators should wear antistatic overalls and footwear.

Similar considerations apply in the cleaning of spray equipment and disposal of the polymer. The wastes containing the notified polymer may be hazardous materials on the basis of the solvent and other resin content, and the precautions used for the additional materials should be adequate for protection from the notified polymer. In addition, much of the polymer will be crosslinked and hardened, and therefore immobile, by the time of disposal.

*Public Health*
There is negligible potential for public exposure to the notified polymer arising from use in the automotive crash repair industry. There may be public contact with the notified polymer on the painted surface of commercial vehicles, but absorption across the skin or other biological membranes will be precluded by the physico-chemical properties of the cured film and its adhesion to the substrate. Therefore, based on its use pattern and physico-chemical characteristics, the notified chemical will not pose a significant hazard to public health.

## 13. RECOMMENDATIONS

To minimise occupational exposure to Glasurit High Solid Texture Additive the following guidelines and precautions should be observed:

- The use of the paint containing the notified polymer should be in accordance with the NOHSC *National Guidance Material for Spray Painting* (National Occupational Health and Safety Commission, 1999c)

- Employers should ensure that NOHSC exposure standards for all of the components of the final paint mix are not exceeded in the workplace;

- Respiratory protection according to Australian Standard (AS) 1716 (Standards Australia/Standards New Zealand, 1994a) should be used during spray application of the paints containing the notified polymer;

- 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 3765.2 (Standards Australia, 1990); impermeable gloves or mittens should conform to AS 2161 (Standards Australia/ Standards New Zealand, 1998); all occupational footwear should conform to AS/NZS 2210 (Standards Australia/ Standards New Zealand, 1994b);

- 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.

## 14. MATERIAL SAFETY DATA SHEET

The MSDS for Glasurit High Solid Texture Additive was provided in accordance with the *National Code of Practice for the Preparation of Material Safety Data Sheets* (NOHSC, 1994).

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 subsection 64(1) of the Act, secondary notification will be required if the polymer characteristics cease to satisfy the criteria under which it has been accepted as a Synthetic Polymer of Low Concern. Secondary notification of the notified polymer 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 Government Industrial Hygienists (1998). TLVs and Other Occupational Exposure Values.

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.

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(1999)]. Australian Government Publishing Service, Canberra.

National Occupational Health and Safety Commission (1999c) National Guidance Material for Spray Painting. Australian Government Publishing Service, Canberra.

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

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 1716-1994, Respiratory Protective Devices. Standards Association of Australia/Standards Association of New Zealand.

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

Standards Australia/Standards New Zealand (1995a). Australian/New Zealand Standard 4114.1-1995, Spray painting booths - Design, construction and testing. Standards Association of Australia/Standards Association of New Zealand.

Standards Australia/Standards New Zealand (1995b). Australian/New Zealand Standard 4114.2-1995, Spray painting booths - Selection, installation and maintenance. Standards Association of Australia/Standards Association of New Zealand.

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