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**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME  
(NICNAS)**

**FULL PUBLIC REPORT**

**4949892 Saturated Polyester Resin**

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Street Address:	334 - 336 Illawarra Road MARRICKVILLE NSW 2204, AUSTRALIA.
Postal Address:	GPO Box 58, SYDNEY NSW 2001, AUSTRALIA.
TEL:	+ 61 2 8577 8800
FAX	+ 61 2 8577 8888.
Website:	<a href="http://www.nicnas.gov.au">www.nicnas.gov.au</a>

**Director  
Chemicals Notification and Assessment**

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**FULL PUBLIC REPORT****4949892 Saturated Polyester Resin****1. APPLICANT AND NOTIFICATION DETAILS**

## APPLICANT(S)

The Valspar (Australia) Corporation Pty Limited of 203 Power Street, Glendenning, NSW 2761.

## NOTIFICATION CATEGORY

The notified polymer meets the PLC criteria.

## EXEMPT INFORMATION (SECTION 75 OF THE ACT)

Data items and details claimed exempt from publication:

Chemical name and synonyms, molecular formula, polymer constituents, weight percentage of polymer constituents and residual monomers.

## VARIATION OF DATA REQUIREMENTS (SECTION 24 OF THE ACT)

No variation to the schedule of data requirements is claimed.

## PREVIOUS NOTIFICATION IN AUSTRALIA BY APPLICANT(S)

None

## NOTIFICATION IN OTHER COUNTRIES

None

**2. IDENTITY OF CHEMICAL**

## MARKETING NAME(S)

4949892 Saturated Polyester Resin

## METHODS OF DETECTION AND DETERMINATION

ANALYTICAL METHOD      IR

Remarks              The notifier has provided an IR spectrum for the notified polymer.

**3. COMPOSITION**

## PURITY

High

## HAZARDOUS IMPURITIES

None

## RESIDUAL MONOMERS

All residual monomers are below the relevant cut-offs for classification of the notified polymer as a hazardous substance (NOHSC, 1999a).

**4. INTRODUCTION AND USE INFORMATION**

MODE OF INTRODUCTION OF NOTIFIED POLYMER (100%) OVER NEXT 5 YEARS

The polymer will be manufactured at the notifier's plant in Dandenong, Vic.

#### MAXIMUM INTRODUCTION VOLUME OF NOTIFIED POLYMER (100%) OVER NEXT 5 YEARS

<i>Year</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>
<i>Tonnes</i>	21	21	21	21	21

#### USE

The notified polymer is a component of industrial PVC products for flooring.

## 5. PROCESS AND RELEASE INFORMATION

### 5.1. Distribution, Transport and Storage

#### IDENTITY OF MANUFACTURER/RECIPIENTS

The notified chemical will be manufactured at the notifier's plant in Dandenong, VIC, and reformulated into PVC flooring at Armstrong World Industries, in Braeside, VIC.

#### TRANSPORTATION AND PACKAGING

The notified polymer will be packed initially in 200 kg steel containers. After crushing, it is repacked into 25 kg hessian bags and stored at the manufacturer's site until required by the customer.

### 5.2. Operation Description

#### Polymer Manufacture

The polymer is manufactured in a batch processing operation in an enclosed heated reaction vessel fitted with stirring and an overhead condenser system under negative pressure. When the reaction is complete, the reaction vessel is cooled to around 150-180°C and the liquid polyester is discharged into 205 litre open headed drums and allowed to cool. During cooling the polyester solidifies (200 kg). A batch of resin is approximately 7 tonnes.

#### Crushing Process

After manufacture, the notified polymer is transported as 200 kg solid lumps in open headed steel drums to a crushing contractor's site. The polymer resin is crushed into lumps of 25 to 100 mm diameter and packed into 25 kg hessian sacks.

#### Product Manufacture

The notified polymer is weighed into a container and added to the mixer with other ingredients. The ingredients are blended in a Banbury type closed mixer then formed via calender rolls. The notified polymer comprises about 10% of the finished product.

### 5.3. Occupational exposure

#### *Number and Category of Workers*

<i>Category of Worker</i>	<i>Number</i>	<i>Exposure Duration</i>	<i>Exposure Frequency</i>
Operator – batch processing	4	1-2 hours	3 per year
QC Testing	1	1-2 hours	3 per year
Supervision	1	1-2 hours	3 per year
Drivers – Truck deliveries	1		
Crushing plant operators		4-6 hours	3 per year

#### *Exposure Details*

#### Polymer Manufacture

During loading of ingredients, the mixer vessel is under negative pressure to minimise exposure to the polymer ingredients. The notified polymer is solid at the conclusion of the manufacturing process. No cleaning of the reactor vessel or feed lines occurs as the residual is incorporated into the following batch. Dermal exposure to the notified polymer due to spills or splashes may occur during discharge of the polymer from the reactor vessel.

#### Crushing Process

As the polymer is solid, exposure will be limited. Some exposure may occur to dusts created during crushing.

#### Product Manufacture

The notified polymer is solid when added to the mixer, and is extruded bound in sheets of vinyl flooring. Some potential exists for exposure to dust.

### **5.4. Release**

#### RELEASE OF CHEMICAL AT SITE

##### Polymer Production Site

The production vessels have overhead condensers installed. It is estimated that approximately 348 kg of distillate will be collected per production batch (7 tonnes of resin), this distillate may contain trace amounts of the notified polymer and its monomers. The condensers will also collect any dust generated in the mixing process thus generating a small amount of solid waste.

Since the notified polymer will be compatible with the next batch of material produced, the equipment is not cleaned after the polymer is produced. Some waste notified polymer may be generated due to spills during the production process, particularly during drum filling.

##### Crushing Site

The empty drums, which contained the polymer resin, may contain trace amounts of polymer.

During the crushing process (off-site) there is the possibility of the generation of polymer dust or fine polymer shards. No indication has been given as to the waste management at the crushing site, but presumably there will be a dust suppression system in-place, which may only be fine water sprays. If this is so, then the dust/shards will be prevented from leaving the site and will then be collected and stored for disposal.

#### RELEASE OF CHEMICAL FROM USE

Generally any spilt polymer resin will be swept up and, if not contaminated, added to the process. During the production of the flooring, the notified polymer will only be present in solid wastes (ie flooring off-cuts).

The empty hessian bags may have trace amounts of polymer resin in the form of dust.

### **5.5. Disposal**

##### Polymer Production Site

The distillate and other aqueous wastes will be sent to a thermal oxidiser where they will be burnt producing oxides of carbon and water vapour.

Any solid wastes generated during production will be collected and sent to landfill. Annually this will equate to approximately 24 kg.

##### Crushing Site

The empty drums, and any trace polymer, will either be refilled with polymer resin or will go to landfill.

Any collected dust or shards are likely to be sent to landfill.

##### Flooring Manufacturer

Any contaminated split resin and flooring off-cuts will be sent to landfill. The empty hessian will be sent to landfill.

### **5.6. Public exposure**

Public exposure to the notified chemical is only likely to occur if there is a spill of the solid material during transport to and from the crushing plant, or during transport to the customer site. The public may have low-level contact with products made from the resin.

## **6. PHYSICAL AND CHEMICAL PROPERTIES**

<b>Appearance at 20°C and 101.3 kPa</b>	Clear, moderately yellow granules
<b>Melting Point</b>	> 90°C
<b>Density</b>	1360 kg/m <sup>3</sup>
<b>Solution/Extraction Behaviour</b>	7.9 g/L at 20°C
Remarks	<p>One (1) g of the ground polymer resin was added to 100 mL of deionised water and stirred with a magnetic stirrer for 24 hours. After this the mixture was filtered to remove any solid material and the resultant filtrate was dried and the resultant material (the dissolved polymer resin) was weighed.</p> <p>Only brief details are available and this would seem to be a very high solubility for a largely hydrophobic polymer despite the presence of some carboxylic acid groups.</p>
<b>Particle Size</b>	20-100 mm diameter
Remarks	Particle size has been determined for the polymer following crushing. The particles are large and not inspirable, however, a small quantity of fine particles may be produced.
<b>Flammability</b>	Not flammable
<b>Explosive Properties</b>	Not explosive
<b>Hydrolysis as a Function of pH</b>	Not determined
Remarks	The notified polymer contains ester functionalities that could be expected to undergo hydrolysis under extreme pH conditions. However, in the environmental pH range of 4–9, significant hydrolysis is unlikely to occur.
<b>Partition Coefficient (n-octanol/water)</b>	Not determined
Remarks	The notified polymer is relatively soluble, thus indicating it will partition into the water phase (however see comments above).
<b>Adsorption/Desorption</b>	Not determined
Remarks	The notified polymer is likely to have some mobility in soil due to its relative solubility.
<b>Dissociation Constant</b>	Not determined
Remarks	The notified polymer contains carboxylic functionalities, which are expected to have typical acidity.

## 7. TOXICOLOGICAL INVESTIGATIONS

No Toxicological data were submitted. According to the MSDS, the acute exposure to the polymer may cause mild to moderate irritation of the eyes and mild irritation of the skin. Dermatitic effects may result from prolonged exposure. Vapours from the heated resin may be irritating to the respiratory tract. Ingestion may cause gastro-intestinal disturbances and be slightly irritating to the mucous membranes.

## 8. ENVIRONMENT

No ecotoxicological data were submitted.

## 9. RISK ASSESSMENT

### 9.1. Environment

#### 9.1.1. Environment – exposure assessment

##### *Release*

It is anticipated that very little of the notified polymer will be released to the environment (see section 5.4). The majority of the notified polymer will be incorporated into flooring materials, which at the end of their useful lives will be disposed of to landfill. Once incorporated in the flooring material the notified polymer will be contained in an inert matrix.

##### *Fate*

In landfill, it is expected that the waste neat polymer from the two production stages may be mobile, due its relatively high water solubility, but at very low concentrations. The polymer will eventually degrade through biotic and abiotic processes to give water vapour and oxides of carbon.

The polymer will not be released from the flooring materials, but over time the flooring materials will slowly degrade due to biotic and abiotic processes.

#### 9.1.2. Environment – effects assessment

Some of the leachate from the landfill may reach the aquatic compartment but this will be at very low concentrations and in a very diffuse manner. There are no ecotoxicity data, however, it is unlikely that the polymer will be toxic to aquatic organisms at the levels at which it may enter the water bodies.

The polymer is not expected to cross biological membranes due to its high molecular weight, and as such should not bioaccumulate (Connell, 1990).

#### 9.1.3. Environment – risk characterisation

Taking into account the use and release patterns, as specified in the notification, the risk posed by the notified polymer is expected to be low.

### 9.2. Human health

#### 9.2.1. Occupational health and safety – exposure assessment

Dermal and ocular exposure can occur during certain formulation and manufacturing processes. However, exposure to significant amounts of the notified polymer is limited because of the engineering controls (closed reaction vessel, extraction ventilation) and personal protective equipment worn by workers. Safety boots, coveralls and safety glasses are required in all areas, and additional equipment such as dust mask, air supplied hood, chrome leather or PVC gloves, face shields or hard hats are required during reactor operations and batch processing procedures.

During transport and storage, workers are unlikely to be exposed to the notified polymer except when packaging is accidentally breached. Forklift drivers will wear safety glasses and chrome leather gloves.

Workers at the crushing plant may be exposed to dusts generated in the crushing process, and should wear protective clothing, including dust masks, goggles and coveralls.

**9.2.2. Public health – exposure assessment**

The notified polymer will not be available to the public. Members of the public may come into contact with products containing the notified polymer.

**9.2.3. Human health - effects assessment**

The notified polymer meets the PLC criteria and therefore low hazard is expected due to the lack of reactive groups and the inability of the polymer to penetrate biological membranes. Dust may be generated during the crushing process.

**9.2.4. Occupational health and safety – risk characterisation**

The OHS risk presented by the notified polymer is expected to be low, however, there is a risk of exposure to mechanically-generated dusts during the crushing process. The notified polymer may be present in formulations containing hazardous ingredients. If these formulations are classified as hazardous to health in accordance with the NOHSC Approved Criteria for Classifying Hazardous Substances, workplace practices and control procedures consistent with provisions of State and Territory hazardous substances legislation must be in operation.

**9.2.5. Public health – risk characterisation**

The notified polymer will not be available to the public. Members of the public may make dermal contact with products containing the notified polymer at low concentrations. However, the risk to public health will be negligible because the notified polymer is bound within a matrix and unlikely to be bioavailable.

**10. CONCLUSIONS – ASSESSMENT LEVEL OF CONCERN FOR THE ENVIRONMENT AND HUMANS**

**10.1. Hazard classification**

Based on the available data the notified polymer is not classified as hazardous under the *Approved Criteria for Classifying Hazardous Substances* (NOHSC., 1999b)

**10.2. Environmental risk assessment**

The polymer is not considered to pose a risk to the environment based on its reported use pattern.

**10.3. Human health risk assessment**

**10.3.1. Occupational health and safety**

There is Low Concern to occupational health and safety under the conditions of the occupational settings described.

**10.3.2. Public health**

There is Negligible Concern to public health when used as described.

**11. MATERIAL SAFETY DATA SHEET**

**11.1. Material Safety Data Sheet**

The MSDS of the notified polymer 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 a matter of public record. The accuracy of the information on the MSDS remains the responsibility of the applicant.



### 11.2. Label

The label for the notified polymer 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.

## 12. RECOMMENDATIONS

### CONTROL MEASURES

#### Occupational Health and Safety

- No specific engineering controls, work practices or personal protective equipment are required for the safe use of the notified polymer itself, however, these should be selected on the basis of all ingredients in the formulation.
- Employers should ensure that the following personal protective equipment is used by workers to minimise occupational exposure to the dusts generated during the crushing process notified chemical
  - Dust masks, goggles, coveralls.

Guidance in selection of personal protective equipment can be obtained from Australian, Australian/New Zealand or other approved standards.

- A copy of the MSDS should be easily accessible to employees.
- If products and mixtures containing the notified polymer are classified as hazardous to health in accordance with the NOHSC *Approved Criteria for Classifying Hazardous Substances*, workplace practices and control procedures consistent with provisions of State and Territory hazardous substances legislation must be in operation.

#### Environment

- The following control measures should be implemented by the operator to minimise environmental exposure during (manufacture and use) of the notified polymer:
  - Minimise dust production during crushing via the use of fine water sprays,
  - Contain and sweep up any spilt material,
  - Do not allow it to enter any stormwater drains or natural water bodies.

#### Disposal

- The notified polymer should be disposed of by landfill or incineration.

#### Emergency procedures

- Spills/release of the notified polymer should be handled by containment and then swept up, placed in sealable container, and disposed of to landfill, or recycled if possible.

### 12.1. Secondary notification

The Director of Chemicals Notification and Assessment must be notified in writing within 28 days by the notifier, other importer or manufacturer:

- (1) Under Section 64(1) of the Act; if
  - the notified polymer is introduced in a chemical form that does not meet the PLC criteria.

or

- (2) Under Section 64(2) of the Act:  
- if any of the circumstances listed in the subsection arise.

The Director will then decide whether secondary notification is required.

No additional secondary notification conditions are stipulated.

### **13. BIBLIOGRAPHY**

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