This Assessment has been compiled in accordance with the provisions of the *Industrial Chemicals (Notification and Assessment) Act 1989* (Cwlth) (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 Department of Health and Ageing, and conducts the risk assessment for public health and occupational health and safety. The assessment of environmental risk is conducted by the Department of the Environment and Heritage.

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Director
Chemicals Notification and Assessment
# TABLE OF CONTENTS

**FULL PUBLIC REPORT** ............................................................................................................. 4

1. **APPLICANT AND NOTIFICATION DETAILS** ........................................................................... 4

2. **IDENTITY OF CHEMICAL** ....................................................................................................... 4

3. **COMPOSITION** ...................................................................................................................... 4

4. **INTRODUCTION AND USE INFORMATION** .......................................................................... 4

5. **PROCESS AND RELEASE INFORMATION** ............................................................................ 5
   5.1. Distribution, Transport and Storage ....................................................................................... 5
   5.2. Operation Description .............................................................................................................. 5
   5.3. Occupational exposure .......................................................................................................... 5
   5.4. Release .................................................................................................................................. 6
   5.5. Disposal .................................................................................................................................. 6
   5.6. Public exposure ...................................................................................................................... 6

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

7. **TOXICOLOGICAL INVESTIGATIONS** .................................................................................... 8

8. **ENVIRONMENT** .................................................................................................................... 8

9. **RISK ASSESSMENT** .............................................................................................................. 8
   9.1. Environment .......................................................................................................................... 8
   9.1.1. Environment – exposure assessment .................................................................................. 8
   9.1.2. Environment – effects assessment .................................................................................... 8
   9.1.3. Environment – risk characterisation .................................................................................. 8
   9.2. Human health ........................................................................................................................ 8
   9.2.1. Occupational health and safety – exposure assessment ...................................................... 8
   9.2.2. Public health – exposure assessment ................................................................................. 9
   9.2.3. Human health - effects assessment ................................................................................... 9
   9.2.4. Occupational health and safety – risk characterisation ..................................................... 9
   9.2.5. Public health – risk characterisation .................................................................................. 9

10. **CONCLUSIONS** .................................................................................................................. 9
    10.1. Hazard classification .......................................................................................................... 9
    10.2. Environmental risk assessment ........................................................................................ 9
    10.3. Human health risk assessment .......................................................................................... 9
    10.3.1. Occupational health and safety ..................................................................................... 9
    10.3.2. Public health ................................................................................................................... 9

11. **MATERIAL SAFETY DATA SHEET** ................................................................................... 9
    11.1. Material Safety Data Sheet ................................................................................................ 9
    11.2. Label ................................................................................................................................. 10

12. **RECOMMENDATIONS** ...................................................................................................... 10
    12.1. Secondary notification ...................................................................................................... 10

13. **BIBLIOGRAPHY** ............................................................................................................... 11
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**

<table>
<thead>
<tr>
<th>Year</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tonnes</td>
<td>21</td>
<td>21</td>
<td>21</td>
<td>21</td>
<td>21</td>
</tr>
</tbody>
</table>

**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**

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

**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
**Appearance at 20°C and 101.3 kPa**  
Clear, moderately yellow granules

**Melting Point**  
> 90°C

**Density**  
1360 kg/m³

**Solution/Extraction Behaviour**  
7.9 g/L at 20°C

Remarks  
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.

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.

**Particle Size**  
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.

**Flammability**  
Not flammable

**Explosive Properties**  
Not explosive

**Hydrolysis as a Function of pH**  
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.

**Partition Coefficient (n-octanol/water)**  
Not determined

Remarks  
The notified polymer is relatively soluble, thus indicating it will partition into the water phase (however see comments above).

**Adsorption/Desorption**  
Not determined

Remarks  
The notified polymer is likely to have some mobility in soil due to its relative solubility.

**Dissociation Constant**  
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.

### BIBLIOGRAPHY


