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NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME

FULL PUBLIC REPORT

Polymer in Tafigel PUR 50

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Director
Chemicals Notification and Assessment

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1. APPLICANT

Swift and Company Ltd of 64 Trenerry Crescent Abbotsford VIC 3067 (ACN 000 005 578) has submitted a Polymer of Low Concern notification statement in support of their application for an assessment certificate for Polymer in Tafigel PUR 50.

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.

Marketing Name:	Tafigel PUR 50

Characterisation as a Synthetic Polymer of Low Concern

Number-Average Molecular Weight (NAMW):	> 1000
Maximum Percentage of Low Molecular Weight Species	
Molecular Weight < 500:	< 10 %
Molecular Weight < 1 000:	< 25 %
Polymer Stability	the notified polymer is stable under normal environmental conditions; thermally stable to 160°C
Reactivity	no reactive functional groups are present
Charge Density	the notified polymer has no charged functional groups

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*.

Method of Detection and Determination:	infrared spectroscopy

3. PHYSICAL AND CHEMICAL PROPERTIES

The notified polymer will be imported in solution in water. The physical and chemical properties given below are for the pure notified polymer and the solution, as indicated.

Appearance at 20°C and 101.3 kPa:	yellow waxy solid (notified polymer) white dispersion (solution)
Melting Point:	70°C (notified polymer)
Specific Gravity:	1.2 (notified polymer) 1.02 (solution)
Water Solubility:	readily soluble
Particle Size:	not applicable as the notified polymer is only used in solution
Partition Co-efficient (n-octanol/water):	not determined (see comments below)
Hydrolysis as a Function of pH:	not determined (see comments below)
Dissociation Constant:	no dissociable groups are present; pH of solution is ~8
Flammability Limits:	not relevant as only used in aqueous solution
Autoignition Temperature:	cannot be autoignited
Explosive Properties:	not explosive
Reactivity/Stability:	the notified polymer is stable under normal environmental conditions; thermally stable to 160°C; no reactive functional groups are present

3.1. Comments on Physico-Chemical Properties

The water solubility was determined by a modified OECD 105 method. The modification consisted of using hot water (65°C) to gain faster solubility before allowing the solution to equilibrate to 20°C. The notified polymer was tested over the range of 0.1 to 50 parts per 100 mL water. These values equate to 1-5 % water solubility at 20°C, 1 % being a blue micro-emulsion and 5 % being a white micro-emulsion. From a photograph provided the 0.5 % solution seems relatively clear but the 5% is milky, indicating a dispersion rather than a true solution.

The polymer is expected to remain stable under ambient conditions. It will however, start to decompose when temperatures exceed 160°C.

The notified polymer contains only functional groups of low concern; these are not expected to hydrolyse under normal environmental conditions.

4. PURITY OF THE CHEMICAL

Degree of Purity: ~ 96 %

Maximum Content of Residual Monomers: residual monomer identities and concentrations have been exempted from publication; concentrations of residual monomers are all below the relevant cutoffs for the notified polymer to be classified as hazardous

5. USE, VOLUME AND FORMULATION

The notified polymer will be used as a thickener in water based architectural and industrial paints.

The notified polymer will be imported in the form of Tafigel PUR 50, containing 20 % notified polymer in water, in 25 kg and 155 kg plastic pails and drums. The product will be reformulated at a number of paint manufacturing sites to produce finished paints. The finished paints would generally contain between 0.2 % and 1 % notified polymer. Industrial paints will be stored and transported in 200 L plastic lined steel drums or 20 L pails. The finished architectural paints will be packaged into 500 mL, 1 L, 4 L and 10 L epoxy lined tin plate cans and marketed to tradesmen and to members of the general public. Approximately 80 % of the notified polymer is to be used in products for brush or roller application, while the majority of the remainder will be applied by spray. Minimal use by dipping is expected.

The anticipated import volume is 20 tonnes notified polymer in the first year and 50 tonnes per annum over the next four years of importation.

6. OCCUPATIONAL EXPOSURE

Transport and Storage
The notified polymer will be imported as part of the product Tafigel PUR 50 (40 % notified polymer). The product is liquid, and packed in 25 kg and 155 kg plastic pails and drums. Between 6 and 10 dock and transport workers will handle sealed containers of the notified polymer solution for 10 days per year, and from 26 to 38 storage workers will handle the sealed containers of solution for 50 days per year. No exposure is expected during transport and storage, except in the case of an accident involving damage to the packaging. Similarly, no exposure to the formulated paints (< 1 % notified polymer) is expected during transport and storage.

Paint Manufacture
The notifier indicates that the notified polymer is expected to be handled by 300 factory workers (in high speed dispersion, paint makeup and container filling) and 10 paint chemists. High speed dispersion will involve exposure to the 20 % solution of notified polymer, and

will involve approximately 100 workers for 4 hours per day, 30 days per year. The other operations will generally involve exposure to formulated paints. The notifier estimates exposure times to be 2 hours per day, 30 days per year for paint makeup workers, and 8 hours per day, 30 days per year for quality control and filling personnel.

The products may be used at a large number of sites for reformulation into architectural and industrial paints. Reformulation will involve transfer of the solution, containing 20 % notified polymer, into mixing pots, where it will be blended with water, polymer emulsions and other additives to produce paints. Transfer may be by decanting or drum pumps. Samples will be taken for quality control testing. Dermal exposure to drips and spills of the product Tafigel PUR 50 is possible during transfer.

The formulated product (≤ 1 % notified polymer) is filled into 500 mL, 1 L, 4 L or 10 L steel cans, or 20 L pails and 200 L drums, in the case of industrial coatings. Dermal exposure to the ≤ 1 % solution of notified polymer is possible during filling.

Warehouse workers will handle the drums of polymer solution and also the filled cans of finished paint, but no exposure is expected unless the packaging is ruptured.

Paint chemists would be expected to sample the raw materials and paints for quality control purposes, and may be dermally exposed to the paint during sampling and testing. Quality control testing involving paint spraying will be carried out in an approved booth.

The notifier states that exhaust ventilation is fitted to the mixers and the filling system. Workers in the paint reformulation sites generally wear coveralls, safety goggles and impervious gloves.

Industrial Paint Application
Industrial paints containing the notified polymer will be applied by spray painting, roller coating or dipping. Paint will be stirred, thinned and loaded into circulation tanks or spray guns. Coating by roller coating or dipping is likely to be an automated process, and exposure of workers will be limited to dermal contact during these operations. Spray painting involves a high level of potential exposure by the dermal, ocular and inhalation routes, and should be carried out in accordance with the NOHSC *National Guidance Material for Spray Painting* (NOHSC, 1999b).

The notifier has estimated that 10 workers will be involved in each of spray painting and roller coating or dipping, for 8 hours per day on a daily basis. An additional 10 workers may be exposed to paints containing the notified polymer during equipment cleaning, for 1 hour per day on a daily basis. The notifier states that industrial paint use will occur in an environment with an effective filtered exhaust system. Coveralls, safety goggles and impervious gloves will be worn by industrial paint users, and cartridge type respirators may be used during spray application of the paints.

Architectural Paint Sales and Application
Architectural paints containing the notified polymer will be available to both professional painting contractors and do-it-yourself home painters. Paint application will generally be done by brush or roller, although spray painting may also occur. Occupational contact with the notified polymer can occur during the tinting of paints at point of sale by the store staff,

and during the application of the paints by professional painting contractors. The exposure for these workers will be to the finished paint containing ≤ 1 % notified polymer, and would normally be dermal. The notifier estimates that the number of professional painters and home users will both be in the thousands, with professional painters being exposed for up to 8 hours per day, 100 days per year. The notifier indicated that coveralls, impervious gloves and safety glasses are recommended to the end users, but that the use of protective equipment is difficult for the paint manufacturer to control.

After application of the paint, it will cure and crosslink, encapsulating the notified polymer, which will no longer be separately available for exposure.

Material Safety Data Sheets (MSDS) will be available to customers using the architectural paints.

7. PUBLIC EXPOSURE

It is expected that during transport, storage, reformulation and most industrial use, exposure of the general public to the notified polymer will be minimal, except in case of a spill.

Public exposure to paints or lacquers containing the notified polymer is expected to be widespread but intermittent, being limited to periods of home decoration. The likely route of exposure would be dermal, with the possibility of accidental oral and ocular exposure. Due to the wide range of applications, including automobiles, industrial, and domestic buildings and objects, public exposure via dermal contact with dried paint films containing the notified polymer is expected to be high.

8. ENVIRONMENTAL EXPOSURE

8.1. Release

The notifier estimates that approximately 200 kg per year of notified polymer will end up as waste from the paint formulation process. This waste results from the clean up of minor spills, the cleaning of formulation equipment and rinsing out of the transport drums. In the event of major spills, waste would be contained within the plant by bunding. The aqueous waste is collected by licensed waste contractors and disposed of to secure landfill after treatment allowing for the formation of a solid residue.

It is expected that 80 % of the final paint product (40 tonnes notified polymer) will be applied by brush or roller techniques. Waste generated from these applications is estimated to be 2 % (0.8 tonnes notified polymer), mainly from the cleaning of the brushes, rollers and trays. This is likely to be released directly to the sewer, though in a highly diluted form. The remaining 20 % (10 tonnes notified polymer) of the final paint product is likely to be applied by spraying. Losses by spray applications can be as high as 70 % (8 tonnes notified polymer). The empty paint cans used for architectural coatings and the home handyman are likely to be disposed of to landfill via normal household garbage.

Maximum total loss to the environment both sewer and landfill from normal usage is approximately 18 % (9 tonnes notified polymer) per year.

8.2. Fate

Waste polymer sent to landfill as a dry solid is expected to remain associated with the soils and sediments and would not be expected to leach into the aquatic environment.

When released to the sewer the ready water solubility of the polymer may cause it to stay in solution as it is expected to be present in concentrations far below saturation. The notified polymer released to the sewer is expected not to degrade (hydrolyse). It will be highly diluted as copious amounts of water are used when washing out brushes and rollers. Distribution of the final paint product is expected to be wide spread, causing further dispersion of the notified polymer in the sewer systems.

The dried coating is expected to form a solid inert film that after use will share the fate of the substrate and 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.

Bioaccumulation of the polymer is unlikely due to the high molecular weight of the polymer, even before curing (Connell, 1990). The notified polymer is not expected to be bioavailable once dry due to being encapsulated within the paint matrix.

9. EVALUATION OF TOXICOLOGICAL DATA

No toxicology data were submitted. Polymers of low reactivity and high molecular weight do not readily cross skin or other biological membranes, and the toxicity of the notified polymer is therefore expected to be low.

10. ASSESSMENT OF ENVIRONMENTAL EFFECTS

No ecotoxicological data were submitted.

11. ASSESSMENT OF ENVIRONMENTAL HAZARD

The notifier estimates that during paint formulation and application, up to approximately 8 tonne per year of notified polymer will be disposed of to landfill as solid waste and 0.8 tonne per year will be released to the sewers as aqueous waste. The solid residues will remain associated with the soil and sediment due to the high molecular weight and the stability of the cured paint matrix. The fate of the aqueous residues released to the sewer system is harder to predict as the ready water solubility of the polymer will allow it to stay in solution at low concentrations where it should not hydrolyse.

Since the notified polymer will only be released to the sewer by the cleaning of brushes, rollers and trays after use and taking into account the expected widespread distribution of the final paint product (especially to the public) the impact to an individual sewer system cannot be estimated. As the notified polymer is heavily diluted and widely distributed, it is not expected to impact on the environment.

Based on use throughout Australia the Predicted Environmental Concentration (PEC) in receiving waters would be:

Amount released to sewer (per annum):	0.8 tonnes
Population of Australia:	18 million
Volume of water/person (per day):	150 L
Dilution factor in receiving water:	1:10
PEC in receiving water:	8×10^{-5} mg/L

This is well below solubility and expected aquatic toxicity levels (Boethling, 1997).

The majority of the notified polymer will be applied to various substrates and cured into a solid paint coating. The polymer will share the fate of these substrates and the eventual disposal of the article to landfill or incineration. This process is unlikely to present a hazard to the environment, as the notified polymer will be in a solid matrix that is not expected to biodegrade or leach. The aqueous waste released to the sewer by end users will be more widespread but will be heavily diluted, and therefore is not expected to be an environmental hazard.

The main environmental hazard would arise through spillage in transport accidents that may release large quantities of the polymer to drains and waterways. It is difficult to predict what the behaviour of the polymer will be in the natural aquatic environment.

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 and therefore the substance cannot be assessed against the NOHSC *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 1999c). Due to the high molecular weight and low reactivity of the polymer, the toxicological hazard of the notified polymer is expected to be low. The polymer is not expected to be hazardous by dermal exposure as the high molecular weight will preclude absorption through the skin.

The residual monomer concentrations in the finished polymer are below the cutoff levels for classification as a hazardous substance.

Occupational Health and Safety (OHS)

There is little potential for significant occupational exposure to the notified polymer in the transport and storage of the polymer solution or the paint component containing this polymer. There will be exposure during production of paints, and in the use and disposal of the paints.

During the paint manufacture processes, the main exposure route for the notified polymer will be dermal. The paints 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. The engineering controls and personal protective equipment specified in the notification (impervious gloves, safety goggles and coveralls) will provide a high level of protection against the notified polymer. No significant OHS risks are expected when control and protective measures are implemented.

Industrial application of paint by roller coating or dipping may lead to dermal exposure to a < 1 % solution of the notified polymer, and the use of the specified personal protective equipment will provide a high level of protection against the notified polymer.

The paint containing the notified polymer will also be applied by spraying. The spraying procedure produces a dense aerosol of paint particles which would potentially lead to a high level of exposure to the notified polymer by the dermal, ocular and inhalation routes. The industrial paint will also contain a wide variety of additional ingredients once fully mixed.

For these reasons, the notified polymer must be assessed for the contribution it makes to the hazards associated with use of the spray paints. 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* (NOHSC, 1999b). 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 many of the components of the paints.

Occupational exposure during the sale and professional use of architectural paints is likely to be widespread and often under poorly controlled conditions. Dermal contact during handling and application of the paints is likely. The occupational health and safety risk associated with dermal contact with the notified polymer in the form of uncured paints will be low, due to the low toxicological hazard of the polymer and the low concentration (< 1 %) in the finished paints.

Public Health
While dermal and possibly eye contact with the notified polymer may occur during application of the paints containing the polymer by the general public, based on its expected low toxicity, the notified polymer is not expected to pose a significant hazard to public health when used in the proposed manner.

In dried paint films, the notified polymer will be encapsulated in an inert, very high molecular weight matrix, which will render it biologically unavailable, and consequently public exposure to the notified polymer from dried paint films is considered to be low.

13. RECOMMENDATIONS

To minimise occupational exposure to Polymer in Tafigel PUR 50 the following guidelines and precautions should be observed:

- Use of the paint containing the notified polymer by spray application should be in accordance with the NOHSC *National Guidance Material for Spray Painting* (NOHSC, 1999c);

- Safety goggles, chemical resistant industrial clothing and footwear and impermeable gloves should be used during occupational use of the products containing the notified polymer; where engineering controls and work practices do not reduce vapour and particulate exposure to safe levels, an air fed respirator should also be used;

- 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.

If products containing the notified chemical are hazardous to health in accordance with the NOHSC *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 1999b), workplace practices and control procedures consistent with State and territory hazardous substances regulations must be in operation.

Guidance in selection of goggles may be obtained from Australian Standard (AS) 1336 (Standards Australia, 1994) and Australian/New Zealand Standard (AS/NZS) 1337 (Standards Australia/Standards New Zealand, 1992); for industrial clothing, guidance may be found in AS 2919 (Standards Australia, 1987) and AS 3765.2 (Standards Australia, 1990); for impermeable gloves or mittens, in AS 2161 (Standards Australia/ Standards New Zealand, 1998); for occupational footwear, in AS/NZS 2210 (Standards Australia/ Standards New Zealand, 1994a); for respirators, in AS/NZS 1715 (Standards Australia/ Standards New Zealand, 1994b) and AS/NZS 1716 (Standards Australia/ Standards New Zealand, 1994c).

14. MATERIAL SAFETY DATA SHEET

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

16. REFERENCES

Boethling R. S. and Nabholz J. V. (1997) Environmental Assessment of Polymers under the U.S. Toxic Substances Control Act Chapter 10 (pp 187-234) of Ecological Assessment of Polymers, J. D. Hamilton and R. Sutcliffe (Ed's), Van Nostrand Reinhold.

Connell D. W. (1990) General characteristics of organic compounds which exhibit bioaccumulation. In Connell D. W., (Ed) Bioaccumulation of Xenobiotic Compounds. CRC Press, Boca Raton, USA.

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National Occupational Health and Safety Commission (1999c) Approved Criteria for Classifying Hazardous Substances [NOHSC:1008(1994)]. Australian Government Publishing Service, Canberra.

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