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June 2002

**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION  
AND ASSESSMENT SCHEME**

**FULL PUBLIC REPORT**

**BYK-333**

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 Ageing.

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, Plaza level, Alan Woods Building, 25 Constitution Avenue, Canberra ACT 2600 between 9am to 5pm Monday to Friday.

Copies of this full public report may also be requested, free of charge, by contacting the Administration Coordinator on the fax number below.

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**FULL PUBLIC REPORT****BYK-333****1. APPLICANT**

Nuplex Industries (Aust) Pty Limited of 49-61 Stephen Road Botany NSW 2019 (ACN 000 045 572) and Du Pont (Australia) Pty Ltd of 49-59 Newton Road Wetherill Park NSW 2164 (ACN 000 716 469) have submitted a notification statement in support of their application for an assessment certificate for the synthetic polymer of low concern (PLC), BYK-333.

**2. IDENTITY OF THE CHEMICAL**

The chemical name, CAS number, molecular and structural formulae, molecular weight, spectral data, details of the polymer composition and exact import volume have been exempted from publication in the Full Public Report.

**Marketing names:** BYK-333

**3. POLYMER COMPOSITION AND PURITY**

Details of the polymer composition have been exempted from publication in the Full Public Report.

**4. PLC JUSTIFICATION**

The notified polymer meets the PLC criteria.

**5. PHYSICAL AND CHEMICAL PROPERTIES**

| Property      | Result                       | Comments |
|---------------|------------------------------|----------|
| Appearance    | Yellow to light brown liquid |          |
| Boiling point | Not provided                 |          |
| Density       | 1040 kg/m <sup>3</sup>       |          |

|                                     |                |  |
|-------------------------------------|----------------|--|
| <b>Water solubility</b>             | Not determined | The notifier indicates that the notified polymer is water-soluble. This is consistent with the high proportion of polyethylene oxide groups present, in spite of the insoluble silicone portion. |
| <b>Particle size</b>                | Not applicable | The notified polymer is a liquid.  |
| <b>Flammability</b>                 | Not provided   | Flash Point (Pensky Martins Closed Cup Method): >100°C   |
| <b>Autoignition temperature</b>     | Not provided   |  |
| <b>Explosive properties</b>         | Not determined | The notified polymer is not explosive.   |
| <b>Stability/reactivity</b>         | Not determined | The notified polymer is not reactive.  |
| <b>Hydrolysis as function of pH</b> | Not determined | The notified polymer does not contain any linkages that could be expected to undergo hydrolysis.   |
| <b>Partition coefficient</b>        | Not determined | Due to the notified polymer's expected water solubility it is likely to partition into the aqueous phase.  |
| <b>Adsorption/desorption</b>        | Not determined | As a consequence of its expected hydrophilicity the notified polymer is likely to be mobile in soil, though this may be offset by its surfactant properties.                                     |
| <b>Dissociation constant</b>        | Not determined | The notified polymer does not contain any groups that could be expected to undergo dissociation.   |

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## 6. USE, VOLUME AND FORMULATION

### Use:

The notified polymer will be used in automotive and OEM (original equipment manufacture) refinish coatings. It will be used predominantly as a component of solvent and water based automotive refinish products, and UV systems. In the coating systems, the polymer functions to increase surface slip and improves substrate wetting. In aqueous system, the polymer increases anti-blocking properties.

A small proportion of the paints containing the notified polymer may also be used Australia wide in general industrial and architectural coatings.

### Manufacture/Import volume:

The notified polymer will be imported in 1, 2 and 4 L paint cans as a component of ready to use paint or in 25 or 200 L steel drums for incorporation into paint products.

Import volumes for the notified polymer are expected to be less than 10 tonnes/annum in the first five years.

**Formulation details:**

The notified polymer will be blended into general industrial, refinish, architectural and automotive coating systems at two sites in Australia. The imported polymer and other ingredients are added to a high-speed mixer to form the paint which is then filtered and pumped into 1 to 200 L cans and drums for transportation to customer sites. No reformulation is required for imported finished paint containing the polymer. The paint formulation contains 0.05 to 1% notified polymer.

Majority of the paint containing the notified polymer will be applied to automotive panels by spray application and then heat cured. A small proportion of the paints containing the notified polymer may also be used Australia wide in general industrial and architectural coatings. In this application, the paints containing the notified polymer will be applied by spray gun, brush and roller.

**7. OCCUPATIONAL EXPOSURE**

| <b>Exposure route</b>  | <b>Exposure details</b>  | <b>Controls indicated by notifier</b>   |
|--|--|---|
| <b><i>Paint Manufacture</i></b>                                  |  |   |
| <i>Paint make-up (9 workers, 8 hours/day, 30 days/year)</i>      |  |   |
| dermal   | Workers may be exposed to drips and spills of polymer solution during weighing, connecting and disconnecting transfer hoses. | Weighing and paint mixing are under exhaust ventilation.<br><br>Paint mixing and transfer operations are automated and enclosed.<br><br>Spillage would be contained in bunded areas.<br><br>PPE includes: coveralls, impervious gloves and goggles. |
| <i>Laboratory testing (9 workers, 8 hours/day, 30 days/year)</i> |  |   |
| dermal   | Limited exposure to small quantities of paint during quality control testing   | Exhaust ventilation in place.<br>PPE: same as above.  |
| <i>Drum filling (9 workers, 8 hours/day, 30 days/year)</i>       |  |   |
| dermal   | Exposure to drips and spills of paint when filling containers  | Exhaust ventilation in place.<br>PPE: same as above.  |

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***End-use – automotive paint***

*Activation and thinning of paint, spray application and cleaning of equipment (6000 workers, 4 hours/day, 240 days/year)*

|                            |   |  |
|----------------------------|---|--|
| dermal, ocular, inhalation | Dermal and ocular exposure to paint during activation and thinning processes, spray application and cleaning of spray equipment.<br><br>Inhalation exposure to fine mist of paint particles during application. | Mixing is enclosed and spraying is carried out in a down draft spray booth.<br><br>PPE: antistatic flame retardant overalls, anti-static footwear, impervious gloves eye protection and air supplied respirator as required. |
|----------------------------|---|--|

---

***End use –general industrial and architectural coating***

*Paint application by spray gun, brush or roller and cleaning of application equipment (Numbers of workers not specified)*

|                               |   |   |
|-------------------------------|---|---|
| dermal, ocular and inhalation | Intermittent exposure to paints during paint application and cleaning of paint equipment. | PPE includes: coveralls, impervious gloves and goggles. |
|-------------------------------|---|---|

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***Transport and storage***

*Transport and storage of sealed drums (5 workers, <1 hour/day, 100 days/year)*

|      |   |      |
|------|---|------|
| None | No exposure is expected except in case of accident. | none |
|------|---|------|

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## **8. PUBLIC EXPOSURE**

It is expected that during transport, storage, and commercial and industrial use, exposure of the public to the notified polymer will be low, except in the event of an accidental spill. Small spills should be contained and absorbed with absorbent material (sand, sawdust, earth) and placed into suitable labelled containers and sealed. Large spills should be collected using a vacuum truck and the residue treated as per a small spill. Appropriate protective clothing (gloves, glasses or goggles, overalls and safety boots) should be worn. Releases should not be allowed to enter drains or waterways. Waste should be disposed of according to Federal, State, and local regulations.

Public exposure to coatings containing the notified polymer is expected to be infrequent, ie. limited to periods of application of architectural coatings. Dermal exposure would be likely, with the possibility of oral and ocular exposure. Widespread dermal contact with dried coatings on automobiles, architectural and industrial surfaces will also occur.

## **9. ENVIRONMENTAL EXPOSURE**

### **9.1. Release**

During coatings production, the notifier estimates that up to 30 kg per annum of waste containing the notified polymer will be generated from cleaning up minor spills and quality control testing. The notifier further estimates, based on a spray transfer efficiency of between 30 and 70%, that up to 3.5 tonnes per annum of the notified polymer will be disposed of during coating application and up to 50 kg will remain in empty paint containers.

### **9.2. Fate**

The majority of the notified polymer will be combined with other coating components where heat induces reaction to form a very high molecular weight and stable coating. Therefore, once incorporated into the coating formulation, the notified polymer is expected to be immobile in the environment. As the coating degrades over time, any fragments, chips and flakes of the coating will be of little concern as they are expected to be inert. The metal panels and car bodies coated with the polymer are likely to be either recycled for steel reclamation or be placed into landfill at the end of their useful life. When recycled the polymer would be destroyed in furnaces and converted to water vapour and oxides of carbon and nitrogen.

The notified polymer in liquid waste from spills, equipment cleaning, spray booths and on masking material will be treated and the resulting solid containing the notified polymer will be dried and disposed of to landfill and the water will be tested prior to release into the sewer.

The wastes generated from the cleaning of equipment used in the application of the paint formulation in general industrial and architectural coatings will be disposed of according to local government regulations, either in landfill, by incineration or poured onto the ground. Water used to wash brushes and rollers may be released into the sewer. Polydimethylsiloxanes are unstable (Hamelink, 1992; Lehmann et al, 1994a and 1994b) because under dry conditions, clay minerals catalyse their hydrolytic decomposition to smaller molecules, some of which may be volatile and enter the atmosphere. However, when released to the atmosphere, low molecular weight organosilanes are rapidly degraded through photolysis (Hamelink, 1992). Therefore, in landfill and when disposed of onto the ground, the notified polymer is expected to eventually become part of the soil matrix and slowly degrade and as such poses little risk to the environment. Incineration of wastes containing the notified polymer will produce water vapour and oxides of carbon and silicon. Empty paint containers and solid wastes from spills and spray booths will also be disposed of in landfill.

The notified polymer is water-soluble and is therefore expected to be mobile in both the terrestrial and aquatic compartments. However, it is expected that it will eventually associate with the soil matrix and sediments and slowly degrade. The notified polymer is not expected to cross biological membranes due to its high molecular weight and is therefore not expected to bioaccumulate (Connell, 1990).

## 10. EVALUATION OF HEALTH EFFECTS DATA

### 10.1 Summary of Toxicological Investigations

| <i>Endpoint &amp; Result</i>        | <i>Assessment Conclusion</i> |
|-------------------------------------|------------------------------|
| Rat, acute oral LD50 >8000 mg/kg bw | low toxicity                 |
| Rabbit, skin irritation             | non-irritating               |
| Rabbit, eye irritation              | slightly irritating          |

### 10.2 Acute Toxicity

#### 10.2.1 Acute Oral Toxicity

|                  |  |
|------------------|--|
| TEST SUBSTANCE   | Notified polymer   |
| METHOD           | OECD 401 Acute Oral Toxicity and Appraisal of the Safety of Chemicals in Foods, Drugs and Cosmetics. |
| Species/Strain   | Rat/Wistar SPF   |
| Vehicle          | None   |
| Remarks - Method | No significant protocol deviations.  |

#### RESULTS

| <i>Group</i> | <i>Number &amp; Sex<br/>of Animals</i> | <i>Dose<br/>mg/kg bw</i> | <i>Mortality</i> |
|--------------|--|--------------------------|------------------|
| I - Control  | 5/sex                                  | 0                        | 0                |
| II - Low     | 5/sex                                  | 2000                     | 0                |
| III - Mid    | 5/sex                                  | 4000                     | 0                |
| IV - High    | 5/sex                                  | 8000                     | 0                |

|                   |   |
|-------------------|---|
| LD50              | >8000 mg/kg bw                                      |
| Signs of Toxicity | None  |
| Effects in Organs | No macroscopic abnormalities were seen at necropsy. |
| Remarks - Results | None  |

|            |  |
|------------|--|
| CONCLUSION | The notified chemical is of low toxicity via the oral route. |
|------------|--|

|               |                   |
|---------------|-------------------|
| TEST FACILITY | Pharmatox (1993a) |
|---------------|-------------------|

#### 10.2.2 Skin Irritation

|                    |  |
|--------------------|--|
| TEST SUBSTANCE     | Notified polymer   |
| METHOD             | OECD 404 Acute Dermal Irritation/Corrosion and Appraisal of the Safety of Chemicals in Foods, Drugs and Cosmetics. |
| Species/Strain     | Rabbit/New Zealand White   |
| Number of Animals  | 3/unspecified sex  |
| Observation Period | 7 days   |



|                  |                                     |
|------------------|-------------------------------------|
| Vehicle          | None                                |
| Type of Dressing | Semi-occlusive                      |
| Remarks - Method | No significant protocol deviations. |

## RESULTS

|                   |   |
|-------------------|---|
| Remarks - Results | There were no test related clinical signs during the study period. There were no dermal reactions observed. All individual Draize scores were zero. |
|-------------------|---|

|            |  |
|------------|--|
| CONCLUSION | The notified chemical is non-irritating to skin. |
|------------|--|

|               |                   |
|---------------|-------------------|
| TEST FACILITY | Pharmatox (1993b) |
|---------------|-------------------|

### 10.2.3 Eye Irritation

|                |                  |
|----------------|------------------|
| TEST SUBSTANCE | Notified polymer |
|----------------|------------------|

|        |   |
|--------|---|
| METHOD | OECD 405 Acute Eye Irritation/Corrosion and Appraisal of the Safety of Chemicals in Foods, Drugs and Cosmetics. |
|--------|---|

|                    |                                     |
|--------------------|-------------------------------------|
| Species/Strain     | Rabbit/New Zealand White            |
| Number of Animals  | 3/unspecified sex                   |
| Observation Period | 7 days                              |
| Remarks - Method   | No significant protocol deviations. |

|         |   |
|---------|---|
| RESULTS | Slight redness of the conjunctiva was seen in all animals up to 2 hours after instillation and slight lacrimation was present in animals within 2 hours after instillation. All effects returned to normal after 2 hours. |
|---------|---|

| <i>Lesion</i>                     | <i>Mean Score<br/>Animal No.</i> |          |          | <i>Maximum<br/>Value</i> | <i>Maximum<br/>Duration of<br/>Any Effect</i> | <i>Maximum<br/>Value at End of<br/>Observation<br/>Period</i> |
|-----------------------------------|----------------------------------|----------|----------|--------------------------|---|---|
|                                   | <i>1</i>                         | <i>2</i> | <i>3</i> |                          |   |   |
| <i>Conjunctiva: redness</i>       | 0                                | 0        | 0        | 1                        | 2   | 0   |
| <i>Conjunctiva: chemosis</i>      | 0                                | 0        | 0        | 0                        | 0   | 0   |
| <i>Conjunctiva:<br/>discharge</i> | 0                                | 0        | 0        | 1                        | 2   | 0   |
| <i>Corneal opacity</i>            | 0                                | 0        | 0        | 0                        | 0   | 0   |
| <i>Iridial inflammation</i>       | 0                                | 0        | 0        | 0                        | 0   | 0   |

\*Calculated on the basis of the scores at 24, 48, & 72 hours for EACH animal.

|            |  |
|------------|--|
| CONCLUSION | The notified chemical is slightly irritating to the eye. |
|------------|--|

|               |                   |
|---------------|-------------------|
| TEST FACILITY | Pharmatox (1993c) |
|---------------|-------------------|

## 11. EVALUATION OF ENVIRONMENTAL EFFECTS DATA

No ecotoxicological data were provided.

## **12. ENVIRONMENTAL RISK ASSESSMENT**

The majority of the notified polymer will be combined with other coating components to form a very high molecular weight and stable coating. Therefore, once incorporated into the coating formulation, the notified polymer is expected to be immobile and pose minimal risk to the environment.

The notified polymer in liquid waste will be treated and the resulting solid containing the notified polymer will be dried and disposed of into landfill and the water will be tested prior to release into the sewer. A small proportion of the paints containing the notified polymer will also be used in general industrial and architectural coatings. The wastes generated will be disposed of either in landfill, by incineration or poured onto the ground. Water used to wash brushes and rollers may be released into the sewer. Polydimethylsiloxanes are unstable because clay minerals catalyse their hydrolytic decomposition to smaller molecules, some of which may be volatile and enter the atmosphere. However, when released to the atmosphere, low molecular weight organosilanes are rapidly degraded through photolysis. Therefore, in landfill and when disposed of onto the ground, the notified polymer is expected to eventually become part of the soil matrix and slowly degrade and as such poses little risk to the environment. Incineration of wastes containing the notified polymer will produce water vapour and oxides of carbon and silicon. Empty paint containers and solid wastes from spills and spray booths will also be disposed of in landfill.

The notified polymer is water-soluble and is therefore expected to be mobile in both the terrestrial and aquatic compartments. However, it is expected that it will eventually associate with the soil matrix and sediments and slowly degrade. The notified polymer is not expected to cross biological membranes due to its high molecular weight and is therefore not expected to bioaccumulate.

The notified polymer is not likely to present a hazard to the environment when it is stored, transported and used in the proposed manner.

## **13. HEALTH AND SAFETY RISK ASSESSMENT**

### **13.1. Hazard assessment**

The notified polymer has low acute oral toxicity. It is not irritating to the skin but slightly irritating to the eyes. Considering the high molecular weight, the notified polymer is unlikely to cross biological membranes. The polymer meets the PLC criteria.

Based on the information provided, the notified polymer is unlikely to be a hazardous substance according to the NOHSC *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 1999a).

### **13.2. Occupational health and safety**

Exposure of workers to the notified polymer during transport and storage of paint components is unlikely except in the event of accidental spillage. Consequently, the risk of adverse health effects to workers is low.

Paint manufacture will be carried out in a closed mixing vessel and under exhaust ventilation. Skin contact may occur during weighing and addition of the polymer into the mixer, and drumming off finished paint. Intermittent dermal exposure to small quantities of the notified polymer can also occur during quality testing prior to automatic drum or can filling. When formulated into paint, the polymer is present at very low concentration. Exposure to the polymer during the above activities would be low due to predominantly enclosed and automated operations, the low concentration of the polymer in the paint mix and the use of PPE including overalls, impervious gloves and goggles.

Prior to application, the paint mix is thinned and loaded into automated spray equipment. For applications other than automotive and OEM refinish coatings, the paint mix is applied by roller or paintbrush. Dermal exposure to the paint mix can be extensive during application and equipment cleaning. Ocular and inhalation to fine mist of paint particles is also possible during spray application.

The final paint mix containing the notified polymer could contain a wide variety of additional ingredients once fully mixed. This is likely to introduce human health hazards. The presence of many potential 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, 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 most of the solvents and other components of the paint mix. The low concentration of the notified polymer in the paint mix means a low risk of adverse health effects from the polymer alone.

The employer is responsible for ensuring that the exposure standards for solvents, which may be present in the final paint mix, are not exceeded in the workplace. The paint products 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 disposal of the polymer. The wastes containing the notified polymer may be hazardous substances on the basis of the solvent. The precautions used on the basis of these additional materials should be adequate for protection from the notified polymer.

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

## Conclusion

The notified polymer presents a low hazard to human health, and the control measures required due to the more hazardous components of the products containing the notified polymer will ensure sufficient protection against the notified polymer itself.

### 13.3. Public health

The notified polymer is unlikely to penetrate biological membranes. Consequently, the toxicological hazard from the infrequent application of architectural coatings containing 0.05 to 1% of the notified polymer to members of the public is likely to be low.

The notified polymer in dried coatings on automobiles, architectural and industrial surfaces will be encapsulated within an inert, very high molecular weight film matrix. This will render the notified polymer biologically unavailable, consequently public exposure to the notified chemical from dried surface coating films is considered to be low.

The notified polymer will not pose a significant hazard to public health when used in the proposed manner.

## 14. MSDS AND LABEL ASSESSMENT

### 14.1. MSDS

The MSDS provided by the notifiers for the notified polymer and products containing it were in accordance with the NOHSC *National Code of Practice for the Preparation of Material Safety Data Sheets* (NOHSC, 1994a). The MSDS of the notified polymer is published here as part of the assessment report. The accuracy of the information on the MSDS remains the responsibility of the applicant.

### 14.2. Label

The label provided by the notifiers for the notified polymer and products containing it were 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.

## 15. RECOMMENDATIONS

### *Control Measures*

#### Occupational Health and Safety

No specific measures are required for the notified polymer. However, in the interest of good occupational health and safety, the following guidelines and precautions should be observed for use of paints containing the notified polymer:

- Employers should implement the following engineering controls to minimise occupational exposure to the notified polymer as introduced in paint products:
  - Exhaust ventilation during weighing, mixing, filling containers and spray application
  - Spray application should be conducted in a down draft spray booth

- Employers should implement the following safe work practices to minimise occupational exposure during handling of the notified polymer as introduced in paint products:
  - During transfer operations, cleaning of equipment, avoid spills and splashing
  - Spray application is in accordance with NOHSC *National Guidance Material for Spray Painting*
- Employers should ensure that the following personal protective equipment is used by workers to minimise occupational exposure to the notified polymer as introduced in paint products:
  - Chemical resistant gloves
  - Goggles or face shield
  - Protective clothing which protects the body, arms and legs (during paint manufacture, QC testing and paint application other than spray painting) or anti static flame retardant overalls (during spray painting)
  - Anti-static footwear and air supplied respirator during spray application

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.

### 15.1 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.

and

- (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.

## 16. REFERENCES

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