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**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION
AND ASSESSMENT SCHEME**

FULL PUBLIC REPORT

Polymer in NeoCryl A-1110

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TABLE OF CONTENTS

FULL PUBLIC REPORT	3
1. APPLICANT	3
2. IDENTITY OF THE CHEMICAL.....	3
3. POLYMER COMPOSITION AND PURITY	3
4. PLC JUSTIFICATION.....	3
5. PHYSICAL AND CHEMICAL PROPERTIES.....	3
5.1 Comments on physical and chemical properties	4
6. USE, VOLUME AND FORMULATION.....	4
7. OCCUPATIONAL EXPOSURE	4
8. PUBLIC EXPOSURE	6
9. ENVIRONMENTAL EXPOSURE.....	6
9.1. Release	6
9.2. Fate	7
10. EVALUATION OF HEALTH EFFECTS DATA	7
11. EVALUATION OF ENVIRONMENTAL EFFECTS DATA	8
12. ENVIRONMENTAL RISK ASSESSMENT.....	8
13. HEALTH AND SAFETY RISK ASSESSMENT.....	8
13.1. Hazard assessment.....	8
13.2. Occupational health and safety.....	8
13.3. Public health.....	9
14. MSDS AND LABEL ASSESSMENT	9
14.1. MSDS	9
14.2. Label.....	9
15. RECOMMENDATIONS	10
16. REQUIREMENTS FOR SECONDARY NOTIFICATION	10
17. REFERENCES.....	10

FULL PUBLIC REPORT**Polymer in NeoCryl A-1110****1. APPLICANT**

Orica Australia Pty Ltd of 1 Nicholson Street, Melbourne, Victoria 3000 (ABN 99 04 117 828) has submitted a notification statement in support of their application for an assessment certificate for the synthetic polymer of low concern (PLC) **Polymer in NeoCryl A-1110**.

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: NeoCryl A-1110

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

The following physicochemical properties relate to the imported 58% aqueous polymer dispersion.

Property	Result	Comments
Appearance	Milky white liquid	
Melting point	Not applicable	Polymer is a dispersion in water
Boiling point	100°C (approx)	

Density	1053 kg/m ³	
Viscosity	400 mPa.s at 25°C	
Water solubility	Practically insoluble	See comments below.
Vapour pressure	2.4 kPa at 20°C	Due to the presence of water.
Particle size	Not applicable	Polymer is a dispersion in water

5.1 Comments on physical and chemical properties

The notified polymer is practically insoluble in water due to its high molecular weight, but it will behave as a dispersion in water if a surfactant is added. The imported polymer formulation contains 58% polymer solids (typical dispersion polymers contain 40-50% polymer solids).

When surfactant is added to the polymer, it is adsorbed at the polymer-water interface to disperse the polymer solids in water. In addition, the presence of ammonia imparts an anionic charge to the surface of the particle by partially neutralising the carboxylic acid groups. Even in the presence of surfactants, however, dispersion polymers are virtually (99.95%) insoluble in water.

Dispersion polymers will bind tightly to organics found within soils and sediments and are not readily biodegradable. The leaching of dispersion polymer fractions is not anticipated within a landfill situation (Guiney et al, 1997). Hydrolysis of the ester linkages is possible but would not be expected under environmental conditions (pH 4-9).

6. USE, VOLUME AND FORMULATION

Use:

The notified polymer is intended for use as a binder in waterborne printing inks applied by flexographic printing processes onto paper and cardboard containers.

Manufacture/Import volume:

The notified polymer will not be manufactured in Australia but imported as a 58% aqueous dispersion in 120L open head polyethylene drums or 1000 L polyethylene IBCs. Less than 250 tonnes of the notified chemical will be imported per annum for each of the first five years.

Formulation details:

The notified polymer will be reformulated to 20% w/w into inks transported in 60 L open head plastic containers or 1000 L plastic bins.

7. OCCUPATIONAL EXPOSURE

Exposure route	Exposure details	Controls indicated by notifier
<i>Formulation</i>		
<i>Transferring polymer dispersion from import containers to mixer (20 workers, 2 hours/day, 10 days/year)</i>		
Dermal and/or ocular	Possible skin and eye contamination from slops and spills during removing and replacing drum lids and inserting and removing drum lance.	Impervious gloves, coveralls and safety glasses worn. Exhaust ventilation fitted to mixer.
<i>QC Testing (10 workers, 1 hour/day, 20 days/year)</i>		
Dermal and/or ocular	Possible skin and eye contamination from slops and spills during removal of samples from mixer.	Impervious gloves, laboratory coats and safety glasses worn
<i>Filling Ink Containers (20 workers, 2 hours/day, 10 days/year)</i>		
Dermal and/or ocular	Possible skin and eye contamination from spills during filling machine malfunction and replacing container lids.	Automated filling process. Exhaust ventilation at filling machine. Impervious gloves, coveralls and safety glasses worn.
<i>Equipment Cleaning and Maintenance</i>		
Dermal and/or ocular	Possible skin and eye contamination from fugitive spills.	Impervious gloves, coveralls and safety glasses worn.
<i>End use</i>		
<i>Transferring Inks from Transport Containers to Printer Machine Trays (50 workers, 1 hour/day, 200 days/year)</i>		
Dermal and/or ocular	Possible skin and eye contamination from slops and spills during the removal of lids and connection and disconnection of pump feed lines.	Impervious gloves, coveralls and safety glasses worn. Polymer diluted by other ink components.
<i>Equipment Cleaning and Maintenance (50 workers, 1 hour/day, 200 days/year)</i>		
Dermal and/or ocular	Possible skin and eye contamination from fugitive spills.	Impervious gloves, coveralls and safety glasses worn. Polymer diluted by other ink components.
<i>Transport and storage</i>		
<i>Unloading and Transporting Containers of Polymer Dispersion (4 workers, 10 days/year)</i>		
Dermal and/or	Possible skin and eye contamination from accidental	Coveralls worn.

ocular puncture of containers.

Loading, Transporting and Unloading Containers of Ink (8 workers, 10 days/year)

Dermal and/or ocular	Possible skin and eye contamination from accidental puncture of containers.	Coveralls worn. Polymer diluted by other ink components.
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Disposal

Collection of Used Drums

Dermal and/or ocular	Possible skin and eye contamination from fugitive spills on containers.	Coveralls worn.
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Collection of Waste Ink

Dermal and/or ocular	Possible skin and eye contamination from fugitive spills during pumping of waste ink from storage pit into tanker.	Coveralls worn. Polymer diluted by other ink components.
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8. PUBLIC EXPOSURE

The notified polymer and products containing the notified polymer will not be available for sale to the general public. Members of the public will make dermal contact with the dried form of the notified polymer when handling items such as cardboard packaging materials printed with ink containing the notified polymer.

9. ENVIRONMENTAL EXPOSURE

9.1. Release

Site of Manufacture/Reformulation

The ink formulation will be manufactured in accordance with the following process:

Polymer and Blending in Batch adjustment Filling of Warehouse for
adjuvants ⇒ mixer ⇒ and testing ⇒ containers ⇒ distribution

There is potential for the environmental release of the notified polymer during the blending and batch adjustment/testing phases. Should a spill occur, however, it would be contained within the plant through bunding.

It is estimated that waste material, containing approximately 6,000 kg per annum of the notified polymer, will be generated by minor spills (200 kg), cleaning out manufacturing equipment during ink manufacture (4,000 kg), and residual in drums (1,800 kg). This aqueous waste will be treated with flocculants and the solids from the polymer dispersion and ink will

be disposed of to landfill by licensed contractors. There is no atmospheric emission hazard as the polymer is not volatile.

Coating Application

Stirring of ink Pump into Application of Ink air dried Finished article
 ⇒ trays ⇒ ink ⇒ onto surface ⇒

There is potential for the environmental release of ink, containing the notified polymer, to occur during the pumping phase.

It is estimated that waste material, containing up to 2,000 kg per annum of the notified polymer, will be generated during the printing process from washing equipment. This waste will be collected from the source by licensed waste contractors and, after treatment with flocculants, will be disposed of to landfill. Empty containers may contain up to 500 kg of residual polymer waste. These are sent to drum recyclers for rinsing with water. The rinsate is treated as above.

Storage and Transport

Transport to the customer is by road. There is little potential for environmental release during storage and transport, except in the case of an accidental spill.

Overall Release

Standard engineering controls should greatly lessen the chance of direct environmental release of the notified polymer during the manufacture and use of the notified polymer in the printing process. Overall, waste containing up to 8,500 kg of the notified polymer may be released to landfill per annum.

9.2. Fate

The majority of the notified polymer from spills, cleaning, wash water and recycling of packaging will go to landfill. Estimated Henry's Law coefficients for typical dispersion polymers are in the range of 10^{-16} atm-m³/mole, indicating that these polymers will not volatilise from water. They do, however, exhibit a strong potential to sorb to soils, sludges, and sediments, and will therefore be virtually immobile when associated with organic matter. (Guiney et al, 1997).

In water, the notified polymer would be expected to dilute and disperse and eventually partition into sediments. The polymer is not expected to cross biological membranes due to its high molecular weight, and is therefore not expected to bioaccumulate.

10. EVALUATION OF HEALTH EFFECTS DATA

No toxicological data were submitted.

11. EVALUATION OF ENVIRONMENTAL EFFECTS DATA

No ecotoxicological data were provided.

12. ENVIRONMENTAL RISK ASSESSMENT

The majority of notified polymer released to the environment would be generated by the recycling of used packaging. This will be disposed of as waste sludge from the recycling process into landfill. The notified polymer will be strongly adsorbed to the soil matrix and mobility within landfill will be extremely limited. Significant biodegradation is not expected, as dispersion polymers are virtually immobile when bound to organics. Therefore, leaching of the dispersion polymer fractions is not anticipated under landfill conditions.

The notified polymer is practically insoluble in water and therefore represents limited bioavailability to aquatic organisms. Aquatic toxicity studies have indicated that dispersion polymers, similar to the notified polymer, are of low concern as they will tend to strongly sorb to available organics, thereby reducing exposure to aquatic species (Guiney et al, 1997). This, coupled with the likely low and dispersed nature of release to the aquatic sector, would indicate that the risk of significant aquatic damage is negligible.

Overall, the environmental risk associated with the introduction of the notified polymer is minimal.

13. HEALTH AND SAFETY RISK ASSESSMENT

13.1. Hazard assessment

No toxicological information has been provided for the notified polymer and so the polymer cannot be assessed against the NOHSC *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 1999b). However, due to its high molecular weight and presence of only low concern reactive functional groups, it is unlikely to be classified as a hazardous substance. The notified polymer meets the criteria for a Polymer of Low Concern and thus is unlikely to represent a health hazard.

The MSDS indicates that NeoCryl A-1110 may be a slight skin and eye irritant. This may be due to the presence of small quantities of free ammonia rather than the notified polymer.

13.2. Occupational health and safety

For workers involved in formulation and quality analysis of the inks, the main exposure routes will be dermal and ocular from splashes and spills. Exposure is most likely to occur during manipulation of drum spears for transferring polymer from import containers to the mixing vessel and during manual sampling of imported polymer dispersion and formulated inks for quality analysis. The low likelihood of vapour or aerosol formation during transfer makes inhalation exposure to the notified polymer unlikely.

A combination of personal protective equipment worn by workers and engineering controls in the form of enclosed transfer lines and exhaust ventilation will control exposure to the

polymer during formulation. The low possibility of exposure and the low health hazard associated with the notified polymer renders the health risk for these workers low.

Dermal and ocular exposure to the notified polymer may also occur during end-use when inks are transferred to the printer machine trays. At this point, the notified polymer is diluted with additional ink components to 20% and so the health risk due to exposure to the notified polymer for workers involved in this end-use would be assessed as low.

Maintenance workers and disposal workers may come into contact with the notified polymer as residue on machinery and in containers respectively. Disposal workers may also be exposed to diluted polymer in waste ink. Although exposure to the polymer may be envisaged, the low health hazard associated with the notified polymer renders the health risk for these workers low.

The polymer is unavailable for absorption by workers once inks are dried.

Exposure to the notified polymer is not expected during import and storage of the polymer dispersion nor storage and transport of the formulated inks and would only be envisaged in the case of accidental puncture of containers.

Conclusion

The health risk due to exposure to the notified polymer is low. However, due to the presence of free ammonia, there is a risk of skin and eye irritation when handling the imported dispersion.

13.3. Public health

Although members of the public will make dermal contact with the dried forms of the notified polymer when handling items such as cardboard packaging materials printed with ink containing the notified polymer, the risk to public health from the notified polymer is likely to be low because the notified polymer is unlikely to be bioavailable.

14. MSDS AND LABEL ASSESSMENT

14.1. MSDS

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 part of the assessment report. The accuracy of the information on the MSDS remains the responsibility of the applicant.

14.2. 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.

15. RECOMMENDATIONS

No special precautions are required for the notified polymer. However, due to the presence of ammonia in the imported dispersion, the following guidelines and precautions should be observed to minimise occupational exposure to NeoCryl A-1110:

- Protective eyewear, chemical resistant industrial clothing and footwear and impermeable gloves should be used during occupational use of the products containing the notified polymer.
- Spillage of the notified polymer should be avoided. Spillages should be cleaned up promptly with absorbents which should then be put into containers for disposal;
- A copy of the MSDS should be easily accessible to employees.

If products containing the notified polymer 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 protective eyewear 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 3765.2 (Standards Australia, 1990); for impermeable gloves or mittens, in AS 2161.2 (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) or other internationally accepted standards.

16. REQUIREMENTS FOR SECONDARY NOTIFICATION

Secondary notification may be required if:

- (i) any of the circumstances stipulated under subsection 64(2) of the Act arise. If any importer or manufacturer of the notified polymer becomes aware of any of these circumstances, they must notify the Director within 28 days; or
- (ii) the notified polymer is introduced in a chemical form that does not meet the PLC criteria.

17. REFERENCES

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