File No: LTD/1747

October 2016

NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME (NICNAS)

PUBLIC REPORT

Polymer in AIC Colorants

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 Department of Health, 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 Energy.

For the purposes of subsection 78(1) of the Act, this Public Report may be inspected at our NICNAS office by appointment only at Level 7, 260 Elizabeth Street, Surry Hills NSW 2010.

This Public Report is also available for viewing and downloading from the NICNAS website or available on request, free of charge, by contacting NICNAS. For requests and enquiries please contact the NICNAS Administration Coordinator at:

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Director
NICNAS

TABLE OF CONTENTS

SUMMARY

The following details will be published in the NICNAS *Chemical Gazette:*

ASSESSMENT REFERENCE	APPLICANT(S)	CHEMICAL OR TRADE NAME	HAZARDOUS CHEMICAL	INTRODUCTION VOLUME	USE
LTD/1747	Global Autocoat Pty Ltd	Polymer in AIC Colorants	ND*	≤ 10 tonnes per annum	Component of industrial coatings

*ND = not determined

CONCLUSIONS AND REGULATORY OBLIGATIONS

Hazard classification
As no toxicity data were provided, the notified polymer cannot be classified according to the *Globally Harmonised System of Classification and Labelling of Chemicals* (GHS), as adopted for industrial chemicals in Australia, or the *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 2004).

Human health risk assessment
Under the conditions of the occupational settings described, the notified polymer is not considered to pose an unreasonable risk to the health of workers.

When used in the proposed manner, the notified polymer is not considered to pose an unreasonable risk to public health.

Environmental risk assessment
On the basis of the low expected aquatic exposure and the reported use pattern, the notified polymer is not considered to pose an unreasonable risk to the environment.

Recommendations

CONTROL MEASURES

Occupational Health and Safety

- A person conducting a business or undertaking at a workplace should implement the following isolation and engineering controls to minimise occupational exposure to the notified polymer:
  - Enclosed and automated system during reformulation
  - Sufficient ventilation
  - Spray booth used for spray application where possible

- A person conducting a business or undertaking at a workplace should implement the following safe work practices to minimise occupational exposure during handling of the notified polymer:
  - Avoid contact with skin and eyes
  - Avoid inhalation of aerosols

- A person conducting a business or undertaking at a workplace should ensure that the following personal protective equipment is used by workers to minimise occupational exposure to the notified polymer:
  - Protective clothing
  - Impervious gloves
  - Eye protection
  - Respiratory protection during spray application

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

- Spray applications should be carried out in accordance with the Safe Work Australia Code of Practice for *Spray Painting and Powder Coating* (SWA, 2012) or relevant State or Territory Code of Practice.

- A copy of the (M)SDS should be easily accessible to employees.

- If products and mixtures containing the notified polymer are classified as hazardous to health in accordance with the *Globally Harmonised System of Classification and Labelling of Chemicals (GHS)* as adopted for industrial chemicals in Australia, workplace practices and control procedures consistent with provisions of State and Territory hazardous substances legislation should be in operation.

Disposal

- Where reuse or recycling are not appropriate, dispose of the notified polymer in an environmentally sound manner in accordance with relevant Commonwealth, state, territory and local government legislation.

Emergency procedures

- Spills or accidental release of the notified polymer should be handled by physical containment, collection and subsequent safe disposal.

Regulatory Obligations

Secondary Notification
This risk assessment is based on the information available at the time of notification. The Director may call for the reassessment of the chemical under secondary notification provisions based on changes in certain circumstances. Under Section 64 of the *Industrial Chemicals (Notification and Assessment) Act (1989)* the notifier, as well as any other importer or manufacturer of the notified chemical, have post-assessment regulatory obligations to notify NICNAS when any of these circumstances change. These obligations apply even when the notified polymer is listed on the Australian Inventory of Chemical Substances (AICS).

Therefore, the Director of NICNAS 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 polymer has a number-average molecular weight of less than 1000;

or

(2) Under Section 64(2) of the Act; if
  – the function or use of the polymer has changed from a component of industrial coatings, or is likely to change significantly;
  – the amount of polymer being introduced has increased, or is likely to increase, significantly;
  – the polymer has begun to be manufactured in Australia;
  – additional information has become available to the person as to an adverse effect of the polymer on occupational health and safety, public health, or the environment.

The Director will then decide whether a reassessment (i.e. a secondary notification and assessment) is required.

(Material) Safety Data Sheet
The (M)SDS of a product containing the notified polymer provided by the notifier was reviewed by NICNAS. The accuracy of the information on the (M)SDS remains the responsibility of the applicant.

ASSESSMENT DETAILS

1. APPLICANT AND NOTIFICATION DETAILS

APPLICANT
Global Autocoat Pty Ltd (ABN: 35 067 632 946)
54-56 John Street
BENTLEY WA 6102

NOTIFICATION CATEGORY
Limited: Synthetic polymer with Mn ≥ 1,000 Da.

EXEMPT INFORMATION (SECTION 75 OF THE ACT)
Data items and details claimed exempt from publication: chemical name, other names, CAS number, molecular and structural formulae, molecular weight, analytical data, degree of purity, polymer constituents, residual monomers, impurities, additives, use details, import volume and identity of manufacturer/recipient.

VARIATION OF DATA REQUIREMENTS (SECTION 24 OF THE ACT)
Variation to the schedule of data requirements is claimed for all physical and chemical properties except glass transition temperature, flash point and autoignition temperature.

PREVIOUS NOTIFICATION IN AUSTRALIA BY APPLICANT
None

NOTIFICATION IN OTHER COUNTRIES
None

2. IDENTITY OF CHEMICAL

MARKETING NAME
Polymer in AIC Colorants

MOLECULAR WEIGHT
Number Average Molecular Weight (NAMW): > 1,000 Da and < 10,000 Da

ANALYTICAL DATA
Reference FTIR and GPC spectra were provided.

3. COMPOSITION

DEGREE OF PURITY
65% (as manufactured; contains 35% acetic acid, butyl ester (CAS No. 123-86-4) as solvent)

4. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE AT 20 °C AND 101.3 kPa: clear liquid*

Property	Value	Data Source/Justification
Glass Transition Temperature	15.7 - 17.9 °C	Measured
Boiling Point	123 °C*	(M)SDS
Density	990 kg/m^3*	(M)SDS
Vapour Pressure	1.8×10^{-1} kPa at 20 °C*	(M)SDS
Water Solubility	Not determined	Expected to be low based on the hydrophobic structure
Hydrolysis as a Function of pH	Not determined	Contains hydrolysable functionalities; however, not expected to rapidly hydrolyse under environmental conditions (pH 4-9)
Partition Coefficient (n-octanol/water)	Not determined	Expected to be high based on estimated low water solubility

Adsorption/Desorption	Not determined	Expected to adsorb to soil and sediment based on the high molecular weight and cationicity
Dissociation Constant	Not determined	Expected to be ionised under environmental conditions (pH 4-9)
Particle Size	Not determined	The notified polymer will be imported in a solution.
Flash Point	28.3 °C – closed cup*	Measured
Flammability	Lower: 1.38%* Upper: 7.6%*	(M)SDS
Autoignition Temperature	394-397 °C*	Measured
Explosive Properties	Not determined	Contains no functional groups that would imply explosive properties
Oxidising Properties	Not determined	Contains no functional groups that would imply oxidative properties

* Properties of a solution containing 65% notified polymer in acetic acid, butyl ester

DISCUSSION OF PROPERTIES
For full details of tests on physical and chemical properties, refer to Appendix A.

The low flash point and high flammability of the notified polymer solution are expected to be largely due to the presence of the organic solvent acetic acid, butyl ester at 35% concentration.

Reactivity
The notified polymer is expected to be stable under normal conditions of use.

Physical hazard classification
Based on the submitted physico-chemical data depicted in the above table, the notified polymer is not recommended for hazard classification according to the *Globally Harmonised System of Classification and Labelling of Chemicals (GHS),* as adopted for industrial chemicals in Australia.

5. INTRODUCTION AND USE INFORMATION

MODE OF INTRODUCTION OF NOTIFIED CHEMICAL (100%) OVER NEXT 5 YEARS
The notified polymer will not be manufactured in Australia. It will be imported at < 10% concentration as a component of solutions or factory package colours for reformulation into coatings.

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

Year	*1*	*2*	*3*	*4*	*5*
Tonnes	10	10	10	10	10

PORT OF ENTRY
Not specified

TRANSPORTATION AND PACKAGING
The formulations containing the notified polymer will be imported in round steel gallon containers that are fitted with friction lids. These containers will be sealed in corrugated shipping cartons staked on pallets that are further strapped and shrink wrapped.

The shipping containers used to import formulations containing the notified polymer by see will then be transported by road to storage facilities where the formulations will be stored in dangerous goods warehouses suitable for storage of flammable liquids (due to the presence of the flammable solvent acetic acid, butyl ester). The formulations containing the notified polymer at < 10% concentration will then be transported by road for distribution. Finished products containing the notified polymer at < 5% concentration, packaged in 1 gallon (128 liquid ounces) containers, will also be transported by road for distribution.

USE
The notified polymer will be used as a component of industrial coatings for trucks, trailers and heavy equipment by spray applications. The finished coatings will contain the notified polymer at < 5% concentration.

OPERATION DESCRIPTION

Reformulation
The imported formulation containing the notified polymer at < 10% concentration will be transferred to the coating mixing tank by gravity feed or low pressure pumps. The formulation containing the notified polymer will be blended with other ingredients in the mixing tank, with local exhaust ventilation being expected to be in use. Following blending, the finished coatings will be filled into containers through gravity feed or low pressure pumps. At the end of the reformulation process the equipment will be flushed with solvent for cleaning. Quality control staff may test samples of the finished products.

End-use
Finished coatings may be manually decanted and the subsequent application is expected to be automatic or semi-automatic through use of robotics and applicator-operated spray guns.

6. HUMAN HEALTH IMPLICATIONS

6.1. Exposure Assessment

6.1.1. Occupational Exposure

CATEGORY OF WORKERS

Category of Worker	*Exposure Duration (hours/day)*	*Exposure Frequency (days/year)*
Transportation and storage	accidental only	200
Reformulation	2	200
Application	4	200

EXPOSURE DETAILS
Transport and storage workers are not expected to be exposed to the notified polymer except in the unlikely event of an accident.

Reformulation processes
Dermal, ocular and inhalation exposure to the notified polymer at < 10% concentration may occur when weighing, mixing and connecting or disconnecting transfer hoses, and during cleaning and maintenance of equipment. Exposure should be minimised through the use of enclosed and automated systems, local exhaust ventilation and personal protective equipment (PPE: goggles, impervious gloves, protective clothing and respirators during spray operations as recommended by the notifier).

Coating application
Dermal, ocular and inhalation exposure to the notified polymer (at < 10% concentration) may occur during spray applications of the finished coatings, and when cleaning equipment. Exposure should be minimised through the use of automatic or semi-automatic processes (including robotics and applicator-operated spray guns), local exhaust ventilation, spray booths and PPE (including goggles, impervious gloves, protective clothing and respirators as recommended by the notifier).

Once the coating is dried and cured, the notified polymer will be bound into an inert solid matrix and will be unavailable for exposure.

6.1.2. Public Exposure
The finished products containing the notified polymer (< 10% concentration) will be used in industrial settings only and will not be made available to the public. Once the coating is dried and cured, the notified polymer will be bound into an inert solid matrix and will be unavailable for exposure.

6.2. Human Health Effects Assessment
As no toxicological data were submitted, it is not possible to establish the hazard potential of the notified polymer. Based on the high molecular weight (> 1,000 Da) and low proportion of low molecular weight species (< 500 Da), absorption across biological membranes is not expected. Furthermore, the notified polymer does not contain any structural alerts of concern for human health.

Health hazard classification
As no toxicity data were provided, the notified polymer cannot be classified according to the *Globally Harmonised System of Classification and Labelling of Chemicals (GHS),* as adopted for industrial chemicals in Australia, or the *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 2004).

6.3. Human Health Risk Characterisation

6.3.1. Occupational Health and Safety
During reformulation and applications, exposure to the notified polymer is expected to be low given the proposed low concentrations (< 10% and < 5% respectively) and use of engineering controls and PPE. Once the coatings have dried and cured, the notified polymer will be bound within an inert matrix and will not be bioavailable.

Therefore, given the expected low hazardous nature of the notified polymer and low exposure under the conditions of the occupational settings, the risk to workers from use of the notified polymer is not considered to be unreasonable.

6.3.2. Public Health
The notified polymer will be used in industrial settings only and will not be made available to the public. Members of the public may come into contact with surfaces coated with products containing the notified polymer. However, once the coatings have dried and cured, the notified polymer will be bound within the solid matrix and will not be available for exposure.

Based on the assessed use patterns, the risk to the public from use of the notified polymer is not considered to be unreasonable.

7. ENVIRONMENTAL IMPLICATIONS

7.1. Environmental Exposure & Fate Assessment

7.1.1. Environmental Exposure

RELEASE OF CHEMICAL AT SITE
The notified polymer will be imported as a component of a formulation for reformulation into finished industrial coatings. No significant release of the notified polymer is expected from transportation and storage, except in the unlikely event of accidental spills or leaks. In the event of spills, the product containing the notified polymer is expected to be collected with adsorbents, and disposed of to landfill in accordance with local government regulations.

The reformulation process will involve blending operations. The formulation containing the notified polymer will be blended with other ingredients to create a finished coating suitable for spray applications. Therefore, the major release of the notified polymer to the environment from this process is expected to be from equipment washings and accidental spills or leaks. Wastes containing the notified polymer generated during reformulation are expected to be collected with adsorbents and disposed of to landfill in accordance with local government regulations. Container residues containing the notified polymer and empty import containers are expected to be disposed of to landfill, in accordance with local government regulations.

RELEASE OF CHEMICAL FROM USE
Industrial coatings containing the notified polymer will be used by professional users in industrial settings only. During use, coatings containing the notified polymer are expected to be applied by spray techniques. Spray applications are expected to occur within spray booths with engineering controls to collect particulate overspray.

Overspray and solid wastes from applications of the industrial coatings containing the notified polymer will be collected and disposed of to landfill. Residues containing the notified polymer in application equipment are expected to be rinsed into containers, and then allowed to cure before disposal as solid wastes to landfill. During use, the notified polymer may also be released to the environment as accidental spills and container residues. These releases are expected to be collected and disposed of to landfill in accordance with local government regulations.

RELEASE OF CHEMICAL FROM DISPOSAL

The notified polymer in industrial coatings is expected to share the fate of the substrate to which it has been applied. These are predominantly expected to be disposed to landfill, or thermally decomposed during metal reclamation.

7.1.2. Environmental Fate

No environmental fate data were submitted for the notified polymer. The majority of the notified polymer is expected to be cured within an inert coating matrix, and is expected to share the fate of the articles to which it has been applied. These will involve eventual disposal to landfill, or undergo thermal decomposition during metal reclamation. The notified polymer is also expected to enter landfill as collected wastes and residues. Once cured, the notified polymer is not expected to be bioavailable or biodegradable. The notified polymer is expected to adsorb strongly to soil and sediment and is unlikely to be mobile, due to its high molecular weight, expected low water solubility and cationicity. Based on its high molecular weight, the notified polymer is not expected to cross biological membranes, and is therefore unlikely to be bioaccumulative. In landfill and during metal recycling, the notified polymer is expected to eventually degrade via biotic and abiotic processes to form water and oxides of carbon and nitrogen.

7.1.3. Predicted Environmental Concentration (PEC)

The predicted environmental concentration (PEC) has not been calculated, as significant release of the notified polymer to the aquatic environment is not expected, based on its reported use patterns in industrial coatings.

7.2. Environmental Effects Assessment

No ecotoxicity data were submitted for the notified polymer. Ecotoxicological endpoints for aquatic organisms for the notified polymer were calculated based on structure-activity relationship (SAR) equations, assuming a worst case cationic charge density for the polymer (Boethling and Nabholz, 1997). The acute and chronic endpoints are summarised in the table below.

Endpoint	*Result*	*Assessment Conclusion*
Acute Toxicity		
Fish Toxicity	96 h LC50 = 6.20 mg/L	Predicted to be toxic to fish (acute)
Daphnia Toxicity	48 h EC50 = 57.92 mg/L	Predicted to be harmful to aquatic invertebrates (acute)
Algal Toxicity	96 h EC50 = 4.95 mg/L	Predicted to be toxic to algae (acute)
Chronic Toxicity		
Fish Toxicity	ChV = 0.34 mg/L	Predicted to be toxic to fish (chronic)
Daphnia Toxicity	ChV = 3.22 mg/L	Not predicted to be harmful to aquatic invertebrates (chronic)
Algal Toxicity	ChV = 1.43 mg/L	Not predicted to be harmful to algae (chronic)

The notified polymer is predicted to be toxic to fish and algae, and is predicted to be harmful to aquatic invertebrates on an acute basis. The notified polymer is also predicted to be toxic to fish on a chronic basis. The SAR estimation procedure used here is a standard approach, and is considered reliable to provide general indications of the likely environmental effects of a chemical. However, this method is not considered sufficient to formally classify the acute and chronic hazards of the notified polymer to aquatic life under the Globally Harmonised System of Classification and Labelling of Chemicals (GHS) (United Nations, 2009).

7.2.1. Predicted No-Effect Concentration

The predicted no-effects concentration (PNEC) has been calculated from the most sensitive endpoint for fish. A safety factor of 1,000 was used given only modelled endpoints are available.

Predicted No-Effect Concentration (PNEC) for the Aquatic Compartment		
ChV (Fish)	0.34	mg/L
Assessment Factor	1,000	
Mitigation Factor	1.00	
PNEC:	0.34	µg/L

7.3. Environmental Risk Assessment

The Risk Quotient (Q = PEC/PNEC) of the notified polymer has not been calculated as a PEC is not available. The notified polymer is not expected to be present at ecotoxicologically significant concentrations in the aquatic environment, due to the low potential for release based on its assessed use patterns in industrial coatings. Once

cured within an inert coating matrix, the notified polymer is not expected to be bioavailable or bioaccumulative. On the basis of the maximum annual importation volume, low expected aquatic exposure and assessed use patterns in industrial coatings, the notified polymer is not expected to pose an unreasonable risk to the environment.

APPENDIX A: PHYSICAL AND CHEMICAL PROPERTIES

Glass Transition Temperature 15.7 – 17.9 °C

Method	Differential scanning calorimetry (DSC)
Remarks	DSC sample preparation: About 0.7 g of the test substance was placed in the aluminium pan. 3mL of methyl ethyl ketone was added into the pan and dried in the oven for 10 minutes. The pan was then transferred into vacuum oven to dry for about 4 hours at 100 °C.
Test Facility	Sherwin-Williams (2009)

Flash Point 28.3 °C

Method	Closed-cup
Remarks	Tested on the notified polymer in 35% acetic acid, n-butyl ester
Test Facility	Sherwin-Williams (2015)

Autoignition Temperature 394-397 °C

Method	ASTM Method E 659 Standard Test Method for Autoignition Temperature of Liquid Chemicals
Remarks	Tested on the notified polymer in 35% acetic acid, n-butyl ester
Test Facility	Chilworth (2015)

BIBLIOGRAPHY

Boethling, RS, Nabholz, JV (1997). "Environmental Assessment of Polymers under the US Toxic Substances Control Act", in: Hamilton, JD, Sutcliffe, R (ed). Ecological Assessment of Polymers: Strategies for product stewardship and regulatory programs. Van Nostrand Reinhold, New York.

Chilworth (2015) Determination of Autoignition Temperature Testing (Report No. SH16567RP, July, 2015). Princeton, NJ, USA, Chilworth Technology Inc (Unpublished report submitted by the notifier).

NOHSC (2004) Approved Criteria for Classifying Hazardous Substances, 3rd edition [NOHSC:1008(2004)]. National Occupational Health and Safety Commission, Canberra, AusInfo.

Sherwin-Williams (2009) Glass Transition Temperature of In-House Resin by DSC (File No. 1090349, April, 2009). Warrensville, OH, USA, Sherwin-Williams Automotive Finishes Corporation (Unpublished report submitted by the notifier).

Sherwin-Williams (2015) Analysis of [Notified Polymer Solution] for Residual Monomer and Flash Point for Regulatory Purposes (File No. 1150632, October, 2015). Warrensville, OH, USA, Sherwin-Williams Automotive Finishes Corp. (Unpublished report submitted by the notifier).

SWA (2012) Code of Practice: Spray Painting and Powder Coating, Safe Work Australia, http://www.safeworkaustralia.gov.au/sites/swa/about/publications/pages/spray-painting-and-powder-coating.

United Nations (2009) Globally Harmonised System of Classification and Labelling of Chemicals (GHS), 3rd revised edition. United Nations Economic Commission for Europe (UN/ECE), <http://www.unece.org/trans/danger/publi/ghs/ghs_rev03/03files_e.html>.