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**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME
(NICNAS)**

PUBLIC REPORT

Polymer in GCP-A14

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.

This Public Report is 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
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TABLE OF CONTENTS

SUMMARY	3
CONCLUSIONS AND REGULATORY OBLIGATIONS	3
ASSESSMENT DETAILS.....	5
1. APPLICANT AND NOTIFICATION DETAILS.....	5
2. IDENTITY OF CHEMICAL.....	5
3. COMPOSITION.....	5
4. PHYSICAL AND CHEMICAL PROPERTIES	5
5. INTRODUCTION AND USE INFORMATION.....	6
6. HUMAN HEALTH IMPLICATIONS	7
6.1. Exposure Assessment.....	7
6.1.1. Occupational Exposure.....	7
6.1.2. Public Exposure.....	8
6.2. Human Health Effects Assessment	8
6.3. Human Health Risk Characterisation	8
6.3.1. Occupational Health and Safety.....	8
6.3.2. Public Health.....	9
7. ENVIRONMENTAL IMPLICATIONS.....	9
7.1. Environmental Exposure & Fate Assessment	9
7.1.1. Environmental Exposure.....	9
7.1.2. Environmental Fate	9
7.1.3. Predicted Environmental Concentration (PEC).....	9
7.2. Environmental Effects Assessment.....	10
7.2.1. Predicted No-Effect Concentration.....	10
7.3. Environmental Risk Assessment.....	10
BIBLIOGRAPHY	11

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/2107	GCP Australia Pty Ltd	Polymer in GCP-A14	ND*	≤ 60 tonnes per annum	Industrial cement additive

*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.

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 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 engineering controls to minimise occupational exposure to the notified polymer during cement admixture formulation and cement production:
 - Enclosed/automated processes, where possible
- A person conducting a business or undertaking at a workplace should implement the following safe work practices to minimise occupational exposure to the notified polymer during cement admixture formulation and cement production:
 - Avoid contact with skin and eyes
- 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 during cement admixture formulation and cement production:
 - Impervious gloves
 - Safety glasses or goggles
 - Protective clothing
 - Respiratory protection if exposure to dust or aerosols is possible

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

- A copy of the 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.

Emergency procedures

- Spills or accidental release of the notified polymer should be handled by collection using absorbent materials and disposal to landfill by licensed waste contractors.

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.

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 g/mol;or
- (2) Under Section 64(2) of the Act; if
 - the function or use of the polymer has changed from an industrial cement additive, 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.

Safety Data Sheet

The SDS of the notified polymer provided by the notifier was reviewed by NICNAS. The accuracy of the information on the SDS remains the responsibility of the applicant.

ASSESSMENT DETAILS

1. APPLICANT AND NOTIFICATION DETAILS

APPLICANT(S)

GCP Australia Pty Ltd (ABN: 41 080 660 117)
40 Scanlon Drive
EPPING VIC 3076

NOTIFICATION CATEGORY

Limited: Synthetic polymer with $M_n \geq 1,000$ g/mol

EXEMPT INFORMATION (SECTION 75 OF THE ACT)

Data items and details exempt from publication include: chemical name, CAS number, molecular and structural formulae, molecular weight, analytical data, degree of purity, polymer constituents, residual monomers, impurities, additives/adjuvants, use details, and import volume.

VARIATION OF DATA REQUIREMENTS (SECTION 24 OF THE ACT)

Schedule data requirements are varied for all physical and chemical properties.

PREVIOUS NOTIFICATION IN AUSTRALIA BY APPLICANT(S)

None

NOTIFICATION IN OTHER COUNTRIES

Canada
China
Europe
Korea
New Zealand
Taiwan
USA

2. IDENTITY OF CHEMICAL

MARKETING NAME(S)

GCP-A14 (notified polymer at 40-50% concentration in aqueous solution)

MOLECULAR WEIGHT

Number average molecular weight (M_n) is $> 1,000$ g/mol.

ANALYTICAL DATA

Reference IR and GPC spectra were provided.

3. COMPOSITION

DEGREE OF PURITY

$> 98\%$

4. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE AT 20 °C AND 101.3 kPa: faint yellow liquid*

<i>Property</i>	<i>Value</i>	<i>Data Source/Justification</i>
Melting Point	-5 °C*	SDS
Boiling Point	Approximately 100 °C* at 101.3 kPa	SDS
Specific Gravity	1.10 at 25 °C*	SDS
Vapour Pressure	Not determined	Based on the high molecular weight of the notified polymer, the vapour pressure is expected to be low

Property	Value	Data Source/Justification
Water Solubility	Fully soluble	SDS
Hydrolysis as a Function of pH	Not determined	Contains hydrolysable functional groups; however, hydrolysis is expected to be slow under normal environmental conditions
Partition Coefficient (n-octanol/water)	Not determined	Based on its high water solubility the notified polymer is expected to partition to the aqueous phase
Adsorption/Desorption	Not determined	Based on its high water solubility the notified polymer is expected to be mobile in soil and sediment
Dissociation Constant	Not determined	Contains functional groups which are expected to dissociate under normal environmental conditions (pH 4 – 9)
Flash Point	Not determined	Introduced in aqueous solution
Flammability	Not determined	Introduced in aqueous solution
Autoignition Temperature	Not determined	Introduced in aqueous solution
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

*For the imported product containing the notified polymer at 40-50% concentration in aqueous solution.

DISCUSSION OF PROPERTIES

Reactivity

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

Physical Hazard Classification

As no physico-chemical data were submitted for the notified polymer, the notified polymer cannot be 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. The notified polymer will be imported at 40-50% concentration in aqueous solution for reformulation into cement admixtures.

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

<i>Year</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>
<i>Tonnes</i>	20 – 60	20 – 60	20 – 60	20 – 60	20 – 60

PORT OF ENTRY

Major ports of Australia

TRANSPORTATION AND PACKAGING

The notified polymer will be imported at 40-50% concentration in aqueous solution in 1,000 L intermediate bulk containers (IBCs) or 10,000 L isotainers. The formulated cement admixtures containing the notified polymer at $\leq 15\%$ concentration will be filled into tanker trucks or totes for distribution to cement producers.

USE

The notified polymer will be used as a cement additive. The notified polymer will be present in reformulated liquid cement admixtures at $\leq 15\%$ concentration. End use packaged cement products will contain the notified polymer at $< 1\%$ concentration.

OPERATION DESCRIPTION

Cement admixture production

The notified polymer will be reformulated using typical liquid blending operations. The notified polymer will be weighed and transferred from the import containers into a closed mixing vessel and blended with other ingredients to produce a cement admixture. The concentration of the notified polymer in admixture will be $\leq 15\%$. Samples will be collected at the end of the blending process for quality control testing. The formulated admixture will then be transferred via pipelines into bulk storage tanks and subsequently into tanker trucks or totes. The mixing vessel and fill lines will be cleaned by flushing the system with water and the residues collected will be used in subsequent batches.

Cement production

The formulated admixture containing the notified polymer at $\leq 15\%$ concentration will be transported by road to cement producers in tanker trucks or totes. In the cement mill, it will be blended into cement at the post-kiln stage, using automated dosing systems. The finished cement mixture containing the notified polymer at $< 1\%$ concentration will be packaged for distribution and transported by road, rail or sea to concrete production facilities, industrial customers or construction sites.

Concrete production

Concrete production will involve the mixing of cement (containing the notified polymer at $< 1\%$ concentration) with aggregate, water and other materials within a concrete batching plant. The finished concrete containing $< 1\%$ concentration of the notified polymer will be transported to construction sites by concrete trucks and pumped via hoses, or gravity fed into the construction area. Workers will direct the hose and shovel or rake the wet concrete into the formwork and finish the surface with vibrators and trowels.

6. HUMAN HEALTH IMPLICATIONS**6.1. Exposure Assessment****6.1.1. Occupational Exposure**

CATEGORY OF WORKERS

<i>Category of Worker</i>	<i>Exposure Duration (hours/day)</i>	<i>Exposure Frequency (days/year)</i>
<i>Cement admixture production</i>		
Plant operator	2	20
Truck driver	2	20
Quality control	1	20
Supervisor	1	20
Salesman	4	20
<i>Cement production</i>		
Process engineers	2	30
Lab technician	1	30
Maintenance fitter	1	30
Mill workers	8	30
<i>Concrete production</i>		
Quality control	4	30
Labourer	4	240
Truck driver	4	240
Placing & finishing crew	8	240
Technician – concrete testing	6	100

EXPOSURE DETAILS

Cement admixture production

During cement admixture formulation, exposure of workers to the notified polymer at 40-50% concentration will be primarily via the dermal route with the possibility of ocular exposure when connecting and disconnecting hoses to transfer pumps, collecting samples for quality control analysis or during the cleaning of mixing vessels and fill lines. According to the notifier, exposure to the notified polymer will be minimised through the use of largely enclosed and automated processes and personal protective equipment (PPE) by workers including gloves, goggles

and protective clothing. Inhalation exposure to the notified polymer is not expected given the expected low vapour pressure of the polymer and aerosols are not expected to be generated.

Workers may also come into dermal contact with the notified polymer at $\leq 15\%$ concentration in the cement admixture during transfer of the formulated admixture into storage tanks or totes. However, limited exposure is anticipated due to the use of a closed delivery system, and the routine flushing of hoses used on cement trucks with compressed air, reducing worker exposure to any material remaining in the hoses.

Cement production

Dermal and ocular exposure to the notified polymer at $\leq 15\%$ concentration may occur during cement manufacture. According to the notifier, exposure will be minimised by the use of automated systems and equipment, as well as PPE such as gloves, goggles and protective clothing. Inhalation exposure to powdered finished cement containing the notified polymer at $< 1\%$ concentration could occur during the packaging of cement. It is stated that the level of exposure will be reduced by the use of bag filters or electrostatic precipitators to collect dust during transfer, and the use of appropriate respiratory protection including respirators or face masks.

Concrete production and use

The primary route of exposure for workers involved in preparing concrete containing the notified polymer at $< 1\%$ concentration is dermal, but inhalation of cement dust may also occur. Widespread dermal exposure to wet concrete containing the notified polymer at $< 1\%$ concentration is likely during the use of the concrete in construction and other industries. Exposure to the notified polymer by end users would be limited through the use of mechanised methods for handling the final concrete product and if PPE including goggles, gloves and protective clothing are used by workers. Construction workers may experience extensive dermal exposure to solidified concrete or cement. At this stage, the notified polymer will be bound within the hardened concrete matrix and is not expected to be available for exposure.

6.1.2. Public Exposure

The notified polymer will be for industrial use only and will not be sold to the public. Though public exposure to solidified concrete containing the notified polymer at $< 1\%$ concentration is likely to occur, the notified polymer will be bound within the hardened concrete matrix and is not expected to be available for further exposure.

6.2. Human Health Effects Assessment

No toxicity data were submitted for the notified polymer. The notified polymer is not expected to be readily absorbed across biological membranes, based on its high molecular weight ($> 1,000$ g/mol) and low levels of low molecular weight species ($< 1,000$ g/mol).

The notified polymer contains structural alerts for irritation.

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.

6.3. Human Health Risk Characterisation

6.3.1. Occupational Health and Safety

No toxicity data were provided for the notified polymer. Based on chemical structure, the notified polymer may have irritant properties.

Workers may be at risk of irritation effects when handling the notified polymer at $\leq 50\%$ concentration during cement admixture formulation and cement production. However, use of enclosed and automated processes and PPE (protective clothing, goggles and gloves) by workers, should minimise the risk of eye and skin irritation.

During end use, irritation effects are not expected given the low concentration of the notified polymer ($< 1\%$) in the finished cement.

Although there is potential for inhalation exposure to cement dust containing the notified polymer at $< 1\%$ concentration, the risk of adverse effects from the notified polymer is not expected given the low concentration. Furthermore, the level of exposure will be reduced by the use of bag filters or electrostatic precipitators to collect dust during transfer, and the use of appropriate respiratory protection including respirators or face masks.

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

6.3.2. Public Health

The notified polymer will be for industrial use only and will not be available to the general public. The public may come into contact with cured concrete containing the notified polymer; however, once the concrete is cured the notified polymer will not be available for exposure.

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

7. ENVIRONMENTAL IMPLICATIONS

7.1. Environmental Exposure & Fate Assessment

7.1.1. Environmental Exposure

RELEASE OF CHEMICAL AT SITE

The notified polymer will not be manufactured in Australia. During reformulation up to 1% of the import volume is expected to be released to the environment during transport to the reformulation facility and a further 2% is expected to be released from equipment washings. Accidental spills of the notified polymer are anticipated to account for up to 1% of the total import volume which are expected to be collected using absorbent materials and disposed of to landfill by licensed waste contractors. Further release may occur during the transport and transfer of the reformulated product which is expected to account for up to 1% of the total import volume.

RELEASE OF CHEMICAL FROM USE

The notified polymer is to be incorporated into cement and concrete materials at low concentrations and cured into the construction matrix. Any unused concrete material containing the notified polymer is expected to be disposed of to landfill in a cured, solid form. Release of the notified polymer into the environment is expected to be negligible.

RELEASE OF CHEMICAL FROM DISPOSAL

The notified polymer is expected to share the fate of the cement and concrete construction matrix and is expected to be disposed of to landfill at the end of its useful life. Residues on application equipment are expected to be rinsed, and the wash water collected and allowed to cure before disposal as solid wastes to landfill. A minor amount of the notified polymer may be disposed of to the sewer from washing of application equipment. Empty packaging, residues, and spilt materials will be disposed of in accordance with local government regulations, most likely to landfill.

7.1.2. Environmental Fate

No environmental fate data were submitted. The majority of the notified polymer is expected to be cured within an inert construction matrix and is expected to share the fate of the construction materials, which will eventually be disposed of to landfill. The notified polymer is also expected to enter landfill as collected wastes and residues. Once cured, the notified polymer is not expected to be mobile nor bioavailable. In surface waters and in landfill, the notified polymer is not expected to bioaccumulate based on its high molecular weight (> 1,000 g/mol) and is expected to eventually degrade via biotic and abiotic processes to form water and oxides of carbon, phosphorus and nitrogen.

7.1.3. Predicted Environmental Concentration (PEC)

A Predicted Environmental Concentration (PEC) worst case scenario has been calculated. It was assumed that 5% of the annual import quantity of the notified polymer is released to the sewer over 260 days per year, corresponding to releases occurring only on work days assuming a five day work week. Release to sewer were expected due to accidental spills, equipment washings and transport during reformulation. The extent to which the notified polymer is removed from the effluent in STP processes based on the properties of the notified polymer has not been considered in this worst-case scenario.

Predicted Environmental Concentration (PEC) for the Aquatic Compartment		
Total Annual Import/Manufactured Volume	60,000	kg/year
Proportion expected to be released to sewer	5	%
Annual quantity of chemical released to sewer	3,000	kg/year

Days per year where release occurs	260	days/year
Daily chemical release:	11.54	kg/day
Water use	200	L/person/day
Population of Australia (Millions)	24.386	million
Removal within STP	0	%
Daily effluent production:	4,877	ML
Dilution Factor – River	1	
Dilution Factor – Ocean	10	
PEC – River:	2.37	µg/L
PEC – Ocean:	0.24	µg/L

7.2. Environmental Effects Assessment

No ecotoxicological data were submitted. Anionic polymers are generally of low toxicity to fish and daphnia; however, they are known to be moderately toxic to algae. The mode of toxic action is over-chelation of nutrient elements needed by algae for growth. The highest toxicity is when the acid is on alternating carbons of the polymer backbone, leading to chelation of essential nutrients (Boethling & Nabholz, 1997). However, the notified polymer contains functionalities that dilute the chelating effect, which would result in significantly reduced toxicity to algae.

7.2.1. Predicted No-Effect Concentration

The Predicted No-Effect Concentration (PNEC) could not be calculated as no ecotoxicological endpoints were provided.

7.3. Environmental Risk Assessment

The Risk Quotient, Q ($= PEC/PNEC$), has not been calculated as a PNEC is not available. The majority of the notified polymer will be irreversibly incorporated into the cement and concrete materials and limited release of the notified polymer to waterways is expected.

Therefore, on the basis of its reported use pattern, the notified polymer is not considered to pose an unreasonable risk to the environment.

BIBLIOGRAPHY

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