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

**FULL PUBLIC REPORT**

**Polymer in SUPERFLOC® C-515 Flocculant**

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**Director  
Chemicals Notification and Assessment**

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## **FULL PUBLIC REPORT**

### **Polymer in SUPERFLOC® C-515 Flocculant**

#### **1. APPLICANT AND NOTIFICATION DETAILS**

##### APPLICANT(S)

Cytec Australia Holdings Pty Ltd (ABN: 45 081 148 629)  
Suite 1, 1<sup>st</sup> Floor, 21 Solent Circuit  
Norwest Business Park  
BAULKHAM HILLS NSW 2153

PCA Hodgson Chemicals Pty Ltd (ABN: 50 050 053 033)  
19-25 Anne Street  
ST MARYS NSW 2760

##### NOTIFICATION CATEGORY

Limited: Polymer with NAMW  $\geq 1000$  (greater than 1 tonne per year).

##### EXEMPT INFORMATION (SECTION 75 OF THE ACT)

Data items and details claimed exempt from publication:

Chemical name  
Other name  
CAS number  
Molecular formula  
Structural formula  
Molecular weight  
Spectral Data  
Manufacturing Process  
Identity of sites  
Process description  
Weight percentage and ingredients  
Number average molecular weight  
Residual monomers/other reactants  
Low molecular weight polymer  
Degradation products  
Loss of monomers, additives, impurities

##### VARIATION OF DATA REQUIREMENTS (SECTION 24 OF THE ACT)

Variation to the schedule of data requirements is claimed as follows: *[List]*

Boiling/Melting Point  
Specific Gravity  
Vapour Pressure  
Water Solubility  
Hydrolysis  
Flash point  
Flammability Limits  
Autoignition Temperature  
Explosive Properties  
Reactivity

##### PREVIOUS NOTIFICATION IN AUSTRALIA BY APPLICANT(S)

None

##### NOTIFICATION IN OTHER COUNTRIES

USA, Canada, South Korea, China, and Philippines

## 2. IDENTITY OF CHEMICAL

MARKETING NAME(S)

Polymer in SUPERFLOC® C-515 Flocculant

METHODS OF DETECTION AND DETERMINATION

ANALYTICAL METHOD The notified polymer was identified using infrared spectroscopy.

METHOD

REMARKS A reference spectrum was provided.

## 3. COMPOSITION

DEGREE OF PURITY

>98%

HAZARDOUS IMPURITIES/RESIDUAL MONOMERS

<i>Chemical Name</i>	Hydrogen chloride		
<i>CAS No.</i>	7647-01-0	<i>Weight %</i>	<1%
<i>Hazardous Properties</i>	R34-Causes burns, R20- Harmful by inhalation		
<i>Exposure Standard</i>	TWA: 7.5 mg/m <sup>3</sup> (Peak limitation)		

<i>Chemical Name</i>	Formaldehyde		
<i>CAS No.</i>	50-00-0	<i>Weight %</i>	0.6%
<i>Hazardous Properties</i>	R43 – May cause sensitisation by skin contact		
<i>Exposure Standard</i>	TWA: 1.2 mg/m <sup>3</sup> STEL: 2.5 mg/m <sup>3</sup>		

## 4. INTRODUCTION AND USE INFORMATION

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

The notified polymer will be manufactured in Australia.

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>	22.5	22.5	22.5	22.5	22.5

USE

The notified cationic polymer will be manufactured as a component of a flocculant used in treating waters and wastewaters in the automotive industry. The major application of the product is as a paint detackification in automotive spray booths.

## 5. PROCESS AND RELEASE INFORMATION

### 5.1. Distribution, Transport and Storage

TRANSPORTATION AND PACKAGING

The finished product will be packaged and transported in 1000 L intermediate bulk containers or 205 L plastics drums.

### 5.2. Operation Description

The raw materials are received at the manufacture site in various forms of packaging. All material is stored in a bunded, dedicated Dangerous Goods Area. The raw materials are either pumped or manually added into a sealed stainless steel reaction vessel. On three occasions during the manufacture process, quality control samples are taken, from the reaction vessel via a sampling valve. The samples

are tested for pH, solid content, and appearance is graded. Once the manufacturing process is completed the finished product is transferred using dedicated pumps and hoses to either 1000 L intermediate bulk containers or 205 L plastic drums. The finished product is sold to major car manufacturers and automotive repair shops. The flocculant is used to detackify the paint overspray captured in spraying booth water curtains. At the end user site, the finished product is pumped from containers to the recycling water stream of the spray-booths water curtains.

### 5.3. Occupational exposure

#### *Number and Category of Workers*

<i>Category of Worker</i>	<i>Number</i>	<i>Exposure Duration</i>	<i>Exposure Frequency</i>
Manufacturing	1	8.0 hours/day	25 days/year
Quality Control	1	0.75 hours/day	25 days/year
Storage, warehousing and transport	6	2.0 hours/day	100 days/year
Automotive end user	>200	8.0 hours/day	200 days/year

#### *Exposure Details*

##### **Transport and warehousing**

Workers are not expected to be exposed to the notified chemical, as they will be handling sealed containers. Exposure is possible in the event of an accident where the packaging is breached.

##### **Manufacture of the product containing the notified polymer**

The solid raw materials are manually handled and weighed out on platform scales prior to charging the blending vessels. The blending vessels are sealed at all times during the manufacture of a batch, except during the charging of the vessels. The transfer between vessels occurs via pipes with Camlock fittings. During the manufacturing process, QC samples are taken from the blending vessel from a sampling valve. Dermal exposure to the notified polymer may occur as result of drips and spills during the sampling process. Once manufacture is completed, the finished product is transferred using dedicated pumps and hoses to containers. Dermal exposure to the notified polymer may occur as result of drips and spills, during the connection/disconnection of hoses. Manufacturing areas are equipped with general and local exhaust ventilation. Manufacturing workers will wear overalls, chemical resistant gloves, safety glasses/face shield and safety shoes. Laboratory staff undertaking the QC activities wear lab coats, chemical resistance gloves and safety glasses.

##### **Users of finished products**

At automotive manufacturers and repair shops, the finished product pumped into the water streams of the water curtains in spray booths. Dermal exposure may occur during the connection/disconnection of drums and IBCs, as a result of drips and spills. Car manufacturers and automotive repair workshops areas are typically fitted with general and local ventilation, while spray booths have efficient downdraft ventilation. Workers at these sites will wear overalls, gloves, safety goggles, and safety shoes.

### 5.4. Release

#### **RELEASE OF CHEMICAL AT SITE**

During the manufacturing process, water used to flush the equipment, pipes and pump is reused as part of the finished batch. After transfer of the final product to storage containers, the tank is flushed with water, and all trade wastes are sent to the on-site trade waste treatment plant. A rotary vacuum drum filter removes solids from the trade waste. Clarified and pH neutral water is discharged to sewer under a trade waste agreement with Sydney Water. The effluent is sampled every 8 days by an independent contractor and analysed at a NATA certified laboratory.

The notifier indicates that no notified polymer enters the sewer system. A maximum of 12 kg of formaldehyde (10 kg found in trade waste and 2 kg at the wet scrubber outlet) have been reported as released to the environment resulting from the manufacture of 240 tonnes of the product in a 12 month period.

#### **RELEASE OF CHEMICAL FROM USE**

After the paint is detackified, the collected solids are dewatered and disposed of to landfill and in most cases the water is returned to the system. The notifier believes that the coagulant to behave similar to others i.e. virtually quantitative binding up to and somewhat beyond the optimum dose and virtually no residual polymer can be found in treated water at dosages up to 120-200% of the optimum. It is estimated that >95% will bind to the paint solids. Because of the high cost of paint spraying and of the product containing the notified polymer, the paint overspray is treated sparingly with the denaturant and not overdosed. Based on a daily release of 1% of the wastewater to the sewer, the notifier expects about 200 kg of the notified polymer to be release to the sewer from all the automotive manufacturing sites.

#### 5.5. Disposal

After emptying the product containing the notified polymer, the automotive manufacturers will return the 1000 L intermediate bulk containers (IBCs) to the supplier for reuse. The 205 L plastic drums are typically washed and the rinsate added to the process. Alternatively the IBCs and the drums may be sold to an agent for resale.

Recycling, recovery and reuse of materials is encouraged where permitted. The concentrated waste solids resulting from the paint detackifying process containing the majority of the notified polymer are disposed of via landfill and/or incineration as permitted by State and Federal regulations.

Organic materials, especially when classified as hazardous waste, are disposed of by thermal treatment or incineration at approved facilities.

#### 5.6. Public exposure

The notified polymer will be manufactured at one industrial site. The finished product containing the notified polymer will only be available for industrial use by automotive manufacturers and repair workshops. Public exposure to the notified polymer will only occur in the event of accidental spillage.

### 6. PHYSICAL AND CHEMICAL PROPERTIES

The notified polymer is unstable except in aqueous solution and therefore only physico-chemical properties for the product as manufactured have been provided.

<b>Appearance at 20°C and 101.3 kPa</b>	Light blue liquid
<b>Boiling Point</b>	100°C (based on water)
Remarks	For the solution; test report not provided.
<b>Density</b>	1010 to 1040 kg/m <sup>3</sup>
Remarks	For the solution; test report not provided.
<b>Vapour Pressure</b>	Not determined.
Remarks	A test report was not provided. The notifier indicated that the vapour pressure of the test substance is 18 mm Hg (2.4 x 10 <sup>3</sup> Pa) based on that for water. The vapour pressure can be expected to be very low due to the high molecular weight and cationic nature of the polymer.
<b>Water Solubility</b>	Infinitely soluble at low pH.
Remarks	The notification indicates the test substance to be readily dispersible in water at concentrations <10% and likely to precipitate out of solution above the target solid range and also at pH 4.0.  A test report on water solubility was not provided. The above conclusion was arrived by adding known amounts of the test substance (a colloidal suspension in water with a solids content of 8.5% at a pH of 1.7) to known amounts of water.

The mixture remained clear upon addition of the test substance (which has a slightly cloudy appearance) to water.

Therefore, it was concluded that measurement of solubility of the material was not logical or appropriate and that the test substance as supplied was considered to be infinitely soluble in water. The effect of pH on the state of the suspension of colloidal material such as the test substance was noted. However, initial addition of a small quantity to water did not indicate any gelling of the material due to changed pH conditions.

The solubility of the test substance was also tested when the acute toxicity to daphnia was studied (summarised under 8.2.1). The results showed that the test substance was soluble at a concentration of approximately 100 mg/L, however, it was noted that a slight uniform cloudiness was observed after the stock solution was prepared. Since the pH of this solution was about 7.5, much lower solubility of the notified polymer may be expected.

**Hydrolysis as a Function of pH** Not determined.

Remarks The test substance does not contain any groups which are hydrolysable.

**Partition Coefficient (n-octanol/water)** Not determined.

Remarks The notification states the test substance contains salts of secondary amines and is water dispersible at concentrations <10%. It was not possible to obtain a meaningful partition coefficient as it becomes unstable outside an aqueous environment, forming heavily cross-linked colloids.

Based on the high solubility the test substance is likely to favour the aqueous phase at acidic pH. At environmental pH, the notified polymer is not water soluble and is not likely to partition to the aqueous phase.

**Adsorption/Desorption** Not determined.

Remarks The submission states it was not possible to determine the adsorption/desorption coefficients due to the unstable nature of the test substance outside an aqueous environment.

The high water solubility may indicate a potential for high mobility in soil. However, due to its cationic character, the test substance would have affinity to humic material in soils, which contain a high content of carboxylic acid residues that are anionic. Also, at environmental pH, the notified polymer is likely to precipitate in cross-linked form and become immobilised. Therefore, the notified polymer is not expected to be mobile in soil.

**Dissociation Constant** Not determined.

Remarks The test substance contains secondary amines, which are expected to be fully protonated at pH < 4. It will precipitate out of solution at pH 4.0.

**Flash Point** > 100°C

METHOD (Pensky-Martens Closed Cup)  
Remarks Test report not provided.

**Flammability Limits** Not determined.

Remarks The notified polymer is manufactured in an aqueous solution and will not be flammable.

**Autoignition Temperature**

Not determined

Remarks            The notified polymer is manufactured in an aqueous solution and will not autoignite.

**Explosive Properties**

Not determined

Remarks            Product containing the notified polymer is not explosive.

**Reactivity**

Remarks            Product containing the notified polymer is incompatible with oxidising agents, strong acids, and alkalis. It will corrode iron, copper, and aluminium.

**7. TOXICOLOGICAL INVESTIGATIONS**

<i>Endpoint and Result</i>	<i>Assessment Conclusion (finished product)</i>
Rat, acute oral LD50 >5000 mg/kg bw	low toxicity
Rat, acute dermal LD50 >2000 mg/kg bw	low toxicity
Rabbit, skin irritation	irritating
Rabbit, eye irritation	slightly irritating

**7.1. Acute toxicity – oral**

TEST SUBSTANCE            SUPERFLOC ® C-515 Flocculant Lot#205094

METHOD            In house method  
Species/Strain            Rat/Sprague Dawley  
Remarks - Method        Morality, toxicity, and pharmacological effects were recorded 1, 4 and 24 hours following administration. Mortality was recorded daily thereafter for 7 days. Body weight was recorded pretest and at termination of the study.

**RESULTS**

<i>Group</i>	<i>Number and Sex of Animals</i>	<i>Dose mg/kg bw</i>	<i>Mortality</i>
1	5 males	5000	0

LD50                            >5000 mg/kg bw  
Signs of Toxicity            Soiling of the anogenital area was noted in one male at 1 hour and 4 hours after administration.  
Effects in Organs            An examination of the organs was not undertaken.  
Remarks - Results        Body weight changes were normal.

CONCLUSION                The test substance is of low toxicity via the oral route.

TEST FACILITY              MB Research Laboratories (2002a)

**7.2. Acute toxicity – dermal**

TEST SUBSTANCE            SUPERFLOC ® C-515 Flocculant Lot#205094

METHOD            In house method  
Species/Strain            Rabbit/New Zealand  
Type of dressing        Occlusive.



# Remarks - Method

The test article was kept in contact with skin for 24 hours. Dermal responses were recorded 24 hours postdose and on day 7. Mortality, toxicity, and pharmacological effects were recorded 1, 4 and 24 hours following administration. Mortality was recorded daily thereafter for 7 days. Body weight was recorded pretest and at termination of the study.

## RESULTS

<i>Group</i>	<i>Number and Sex of Animals</i>	<i>Dose mg/kg bw</i>	<i>Mortality</i>
1	5 males	2000	0

# LD50

## Signs of Toxicity - Local

> 2000 mg/kg bw

Well-defined erythema and very slight oedema was observed in one male and very slight erythema in another at 24 hours. No dermal responses were observed on day 7.

## Signs of Toxicity - Systemic Effects in Organs Remarks - Results

No signs of systemic toxicity were observed.

An examination of the organs was not undertaken.

Body weight changes were normal.

## CONCLUSION

The test substance is of low toxicity via the dermal route.

## TEST FACILITY

MB Research Laboratories (2002b)

## 7.3. Irritation – skin

### TEST SUBSTANCE

SUPERFLOC ® C-515 Flocculant Lot#205094

### METHOD

#### Species/Strain

In house method

Rabbit/New Zealand White

#### Number of Animals

3

#### Vehicle

None

#### Observation Period

7 days

#### Type of Dressing

Semi-occlusive

#### Remarks - Method

The test article (0.5 mL) was applied to one intact and one abraded site on clipped back of each rabbit. To allow observation during the 4 hour exposure period, the wrapping were fitted with a window which was opened to examine the treated sites at 3 minutes and 1 hour post application. At 4 hours the wrappings were removed and the skin reaction were scored at 24, 48, and 72 hours and again on day 7 after patch removal. Body weight was recorded pretest.

## RESULTS

<i>Lesion</i>	<i>Mean Score* Animal No.</i>			<i>Maximum Value</i>	<i>Maximum Duration of Any Effect</i>	<i>Maximum Value at End of Observation Period</i>
	1	2	3			
<i>Erythema/Eschar</i>	0	4	0	4	7 days	4
<i>Oedema</i>	0	1.33	0	2	72 hours	0

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

#### Remarks - Results

As per OECD Test Guidelines, the results in the intact skin are used in the table above and for classification purposes.

In one female, severe erythema was observed at 24 hours, and persisted until the termination of the study at 7 days. On day 7, flaking skin and very small area of eschar was observed in the female.

In the same female, slight oedema was observed at 24 hours. At 48 hours

and 72 hours very slight oedema was observed. On day seven no oedema was observed in the female. In testing the material on abraded skin, similarly severe responses were seen in a different animal, while lower level responses (up to scores of 2 for erythema, resolving prior to 7 days) were seen for the animal which showed severe responses on intact skin.

CONCLUSION

The test substance is irritating to skin.

TEST FACILITY

MB Research Laboratories (2002c)

#### 7.4. Irritation – eye

TEST SUBSTANCE SUPERFLOC ® C-515 Flocculant Lot#205094

METHOD In house method  
Species/Strain Rabbit/New Zealand White  
Number of Animals 3  
Observation Period 7 days  
Remarks – Method The same three rabbits used in the dermal study were used of the ocular phase. Initially the right eye of one rabbit was dosed. The test article (0.1 mL) was placed into the conjunctival sac. Since no evidence of discomfort was observed, the left eye of the first animal and both eyes of the remaining two animals were dosed. After twenty to thirty seconds the left eye of each animal was then flushed with lukewarm water. The right eye remained unwashed. All eyes were examined and scored by the Draize technique at 1 hour, 24, 48 and 72 hours and again at 7 days post dose. Body weights were recorded pretest.

#### RESULTS

<i>Lesion</i>	<i>Mean Score*</i> <i>Animal No.</i>			<i>Maximum Value</i>	<i>Maximum Duration of Any Effect</i>	<i>Maximum Value at End of Observation Period</i>
	1	2	3			
<i>Conjunctiva: redness</i>	0.33	1	0.33	1	72 hours	0
<i>Conjunctiva: chemosis</i>	0.33	0.66	0.33	2	7 days	2
<i>Conjunctiva: discharge</i>	0.33	2	0.33	2	7 days	2
<i>Corneal opacity</i>	0	0	0	-	-	-
<i>Iridial inflammation</i>	0	0	0	-	-	-

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

Remarks – Results As per OECD Test Guidelines, the results in the unwashed eye are used in the table above and for classification purposes. Corneal opacity was not observed in any animal at any observation period. Iridial inflammation was observed in 3 animals at 1 hour but cleared by 24 hours. Conjunctival irritation was noted in 3 animals. Chemosis was observed in one animal at 24 hours and day 7, but was not present at 48 hours and 72 hours. Discharge was observed in the same animal at each observation period and at the termination of the study at day 7. Similar results were seen at 1 hour in washed eyes but all effects cleared before 48 hours.

CONCLUSION The test substance is slightly irritating to the eye.

TEST FACILITY MB Research Laboratories (2002c)

## 8. ENVIRONMENT

### 8.1. Environmental fate

#### 8.1.1. Ready biodegradability

A ready biodegradability test was not conducted.

#### 8.1.2. Bioaccumulation

No bioaccumulation data were provided. However, if there is any release to the aquatic compartment the potential for bioaccumulation is considered to be low due to the high molecular weight and water solubility of the notified substance (Connell 1990).

### 8.2. Ecotoxicological investigations

#### 8.2.1. Acute toxicity to fish

The pertinent pages of a report on a study that tested the toxicity of 20 products to bluegill sunfish and rainbow trout were provided.

TEST SUBSTANCE	MAGNIFLOC 515C (confirmed by the notifier to be the same as SUPERFLOC ® C-515)
METHOD	Report indicated that the test methodology followed recommended bioassay practices (U.S. Environmental Protection Agency, 1975) and refers to EPA-660/3-75-001 and EPA-660/3-75-009 - Static.
Species	Bluegill sunfish ( <i>Lepomis macrochirus</i> ) Rainbow trout ( <i>Salmo gairdneri</i> )
Exposure Period	96 hours
Auxiliary Solvent	None
Water Hardness	Bluegill sunfish 44 mg/L Rainbow trout 46 mg/L
Analytical Monitoring	None
Remarks – Method	Oxygen content, temperature and pH (~7.4) were satisfactorily maintained. Replicate concentrations of the test substance were not used. The test substance was indicated to be slightly water soluble.

#### RESULTS

Concentration (mg/L) Nominal	Number of Fish	Mortality (Bluegill sunfish)		
		24 h	48 h	96 h
Control	10	0	0	0
56	10	1	1	1
100	10	5	5	5
180	10	6	6	6
320	10	10	10	10
560	10	10	10	10

Concentration (mg/L) Nominal	Number of Fish	Mortality (Rainbow trout)		
		24 h	48 h	96 h
Control	10	0	0	0
18	10	0	0	0
32	10	0	0	0
56	10	0	0	1
100	10	0	0	0
180	10	0	0	0

LC50 (Bluegill sunfish) 118.5 mg/L at 96 hours (Confidence interval 88.4 to 158.8 mg/L)

LC50 (Rainbow trout) > 180 mg/L at 96 hours (the highest concentration tested)

NOEC (Bluegill sunfish)	< 56.0 mg/L at 96 hours
NOEC (Rainbow trout)	56.0 mg/L at 96 hours
Remarks – Results	<p>The NOEC values were based upon observed abnormal behaviour and may not necessarily be related to death. The report indicated that the rainbow trout mortality at 56 mg/L is not test substance related as no mortalities were observed at higher concentrations.</p> <p>During the 96 hour period bluegill sunfish exposed to the 180 mg/L concentration were quiescent and irritated and rainbow trout exposed to the 100 mg/L and higher concentrations exhibited abnormal surfacing behaviour.</p>
CONCLUSION	The test substance is practically non-toxic toxic to fish.
TEST FACILITY	UCES (1978)

### 8.2.2. Acute/chronic toxicity to aquatic invertebrates

TEST SUBSTANCE	SUPERFLOC ® C-515 Flocculant
METHOD	OECD TG 202 Daphnia sp. Acute Immobilisation Test and Reproduction Test - Static
Species	<i>Daphnia magna</i>
Exposure Period	48 hours
Auxiliary Solvent	None
Water Hardness	62 mg/L as CaCO <sub>3</sub>
Analytical Monitoring	None
Remarks - Method	<p>Based upon the results of a preliminary range finding test with 0% mortality after 48 hours in all test concentrations and control, a limit test was conducted at 100 mg/L.</p> <p>An initial solubility test showed that the water solubility of the test substance to be approximately 100 mg/L. However, a slight uniform cloudiness was observed after the stock solution was prepared.</p>

### RESULTS

Concentration (Test Substance) mg/L Nominal	Number of <i>D. magna</i>	Percent mortality	
		24 h	48 h
Control	20	0	0
100	20	0	0

LC50	> 100 mg/L at 48 hours
NOEC (or LOEC)	100 mg/L at 48 hours (the single concentration tested)
Remarks - Results	<p>The test water temperature, oxygen content and pH were satisfactorily maintained. The results are expressed in terms of the nominal values.</p> <p>The test solution was slightly cloudy with flocculant material observed accumulated on the bottom of the test chambers.</p>
CONCLUSION	The test substance is practically non-toxic to daphnia.
TEST FACILITY	Toxicon Corporation (2003a)

### 8.2.3. Algal growth inhibition test

TEST SUBSTANCE	SUPERFLOC ® C-515 Flocculant
METHOD	OECD TG 201 Alga, Growth Inhibition Test.
Species	Green alga ( <i>Selenastrum capricornutum</i> )
Exposure Period	72 hours
Concentration Range	0.010, 0.026, 0.064, 0.16, 0.40 and 1.0 mg/L (based upon a preliminary range finding test)
Nominal	None
Auxiliary Solvent	None
Water Hardness	Standard test medium was used.
Analytical Monitoring	None
Remarks - Method	Both in the range finding test and the definitive test, soap-like bubbles were observed on the surface of the stock solution. In the definitive test, from Day 1 onward it was observed that the test substance was not completely in solution in the 0.16 mg/L and all higher concentrations. On Day 3, clumps of cells were observed on the bottom of test flasks at 0.64 mg/L and all higher concentrations.  The pH of the test solutions contributed to the insolubility of the test substance. The pH of the control and all test solutions ranged from 7.3 to 7.5 initially and from 7.6 to 8.2 after 72 hours.
RESULTS	
E <sub>b</sub> C50	0.24 mg/L at 72 hours (Confidence Limits 0.10 and 1.2 mg/L)
ErC50	Not calculated due to the lack of significant effect at maximum tested concentration.
NOEC	0.40 mg/L at 72 hours (the highest concentration tested at which growth was not statistically reduced from that of the control following 72 hours of exposure).
Remarks - Results	The test results are valid as the control population exceeded 1000000 cells/mL. Algal cells in treatment samples did not appear different from the control cell samples under microscopic observation.  The EC50 value was determined by probit analysis. Statistical calculations were conducted using only the concentrations where inhibition was observed and discarding the others as outliers. The 0.16 mg/L data point was excluded in the ANOVA calculation of the 72 hour NOEC due to the extremely large variation in cell counts at this concentration.  The report raised concerns regarding the flocculant material present in the pH adjusted stock, which was used to dose the lower stock test concentrations. It was not known whether the flocculant suspension is stable and thus how the concentration load varied between the stocks or the replicates. It was indicated that due to the flocculant nature of the test substance and the unavailability of a usable analytical method, the particulates were not filtered prior to definitive exposure. This may have contributed to the cell clumping resulting in significant variation between replicates and the non-monotonic dose-response.
CONCLUSION	The test substance is very toxic to <i>Selenastrum capricornutum</i> .
TEST FACILITY	Toxikon Corporation (2003b)

## 9. RISK ASSESSMENT

### 9.1. Environment

#### 9.1.1. Environment – exposure assessment

During the manufacturing process, the notified polymer is not expected to be released to the environment. The product containing the notified polymer will be used as a wastewater coagulant in car spray booths, where the notified polymer will bind to the paint particles and remove them from solution. The sludge containing the bound notified polymer will be dewatered prior to disposal via landfill and/or incineration as permitted by government regulations. Therefore, almost all of the manufactured polymer will be eventually released to the environment.

The majority of the polymer will be bound to paint solids (85%) and a small amount is expected to be residual in wastewater released to the sewer from the automotive manufacturing plants. The polymer released via the sewer is subjected to physical, chemical and biological treatment processes at the industrial facility and/or at a downstream public sewerage treatment works. Eventually it is expected to be adsorbed to the sludge in the wastewater system, both in the primary clarifier and in the biosolids in secondary treatment system.

In landfill, the notified polymer will remain bound to the paint solids or sludge. The unbound polymer is water-soluble under acidic conditions and therefore may be expected to be mobile in both the terrestrial and aquatic compartments. However, as a consequence of its cationic nature, and its low water solubility at higher pH, the notified polymer is expected to associate with the soil matrix and sediments. Incineration of the polymer will generate water vapour and oxides of carbon and nitrogen.

Based on the annual use of the product containing the notified polymer by all automotive manufacturers, about 200 kg of the polymer is expected to be released to the sewer annually. The amounts of the product used and hence the amounts of polymer released vary between the sites. The predicted environmental concentrations (PECs) are calculated below using a worst-case scenario based on manufacturing sites located in 2 to 3 major cities in Australia. It is assumed that production occurs on 350 days and the total quantity of waste polymer (200 kg) is released into a sewerage system into which water used by 50% of the Australian national population is discharged.

Australia has a population of ~19.5 million people, and an average value for water consumption of 200 L/person/day has been adopted for this national-level assessment (3900 ML/day for total population).

Amount entering sewer annually	200 kg
Population of Australia	
19.5 million	
Population of the metropolitan areas considered	9.75 million
Amount of water used per person per day	200 L
Number of production days in a year	350
Estimated PEC in effluent	0.29 µg/L

Therefore, the concentration of notified polymer in the Australian sewerage network may approximate 0.29 µg/L (ie.  $200 \times 10^6 \text{ mg} \div 350 \text{ days/year} \div 9.75 \times 200 \times 10^6 \text{ L}$ ). Based on dilution factors of 1 and 10 for inland and ocean discharges of STP-treated effluents, outfall PECs of the notified polymer in freshwater and marine surface waters may approximate 0.29 µg/L and 0.029 µg/L, respectively. No adsorption to sludge has been considered.

No bioaccumulation data were provided. However, if there is any release to the aquatic compartment the potential for bioaccumulation is considered to be low due to the high water solubility of the notified polymer and large molecular weight (Connell 1990).

#### 9.1.2. Environment – effects assessment

The results of the aquatic toxicity tests are listed below. The most sensitive species was algae

with a 72 hour E<sub>b</sub>C<sub>50</sub> of 0.24 mg/L.

<i>Organism</i>	<i>Duration</i>	<i>End Point</i>	<i>mg/L</i>
Fish			
Bluegill sunfish	96-h	LC <sub>50</sub>	118.5
Rainbow trout	96-h	LC <sub>50</sub>	>180
Daphnia	48-h	LC <sub>50</sub>	>100
Algae	72-h	E <sub>b</sub> C <sub>50</sub>	0.24

A predicted no effect concentration (PNEC) for aquatic ecosystems of 0.0024 mg/L (2.4 µg/L) has been derived by dividing the EC<sub>50</sub> value by a worst-case scenario uncertainty (safety) factor of 100.

### 9.1.3. Environment – risk characterisation

The majority (85%) of the polymer will be bound to paint solids and disposed of via landfill and/or incineration. The residual in wastewater released to the sewer is expected to be adsorbed to the sludge in the wastewater systems, both in the primary clarifier and in the biosolids in secondary treatment system.

Although highly water soluble, water treatment polymers rapidly react with various natural substances in aquatic and soil environments (e.g., humic acids, lignins, silts and clays). The efficiency of moving these polymers from liquid waste streams to an aggregated solid state is often greater than 99% (Lyons and Vasconcellos 1997). If 99% of the notified polymer is assumed to be adsorbed to sludge in sewage treatment plant, the PEC can be expected to be significantly reduced to 0.0029 µg/L.

The risk quotient (PEC/PNEC) values presented in the table below, determined using the above worst-case PEC estimates are less than 1. However, these values are expected to be much lower given that the level of exposure of the notified polymer will further reduce due to the association with naturally occurring substances in the aquatic environment. Based on the above risk assessment, the manufacture and use of the notified polymer as proposed is unlikely to pose an unacceptable risk to the aquatic life.

<i>Location</i>	<i>PEC</i>	<i>PNEC</i>	<i>Risk Quotient (RQ)</i>
<u>Australia-wide STPs</u>			
Ocean outfall	0.029 µg/L * (2.9 x 10 <sup>-4</sup> µg/L) #	2.4 µg/L	0.012* (1.21 x 10 <sup>-4</sup> )#
Inland River	0.29 µg/L * (2.9 x 10 <sup>-3</sup> µg/L) #	2.4 µg/L	0.12* (1.21 x 10 <sup>-3</sup> )#

\* PEC and RQ values calculated assuming no removal in STP prior to release into the aquatic environment.

# PEC and RQ values calculated assuming 99% of the notified polymer partitioned into sludge and 1% partitioned into water during the STP process.

## 9.2. Human health

### 9.2.1. Occupational health and safety – exposure assessment

Worker exposure may occur during the manufacture of the final product containing the notified polymer. Accidental dermal exposure may occur during the QC sampling and testing during manufacture. Worker exposure will be minimised by use of the appropriate personal protection equipment. Workers undertaking QC sampling and testing will wear lab coats, chemical resistance gloves, and safety glasses. General and local exhaust ventilation will be used manufacturing areas. The finished product is transferred using dedicated pumps and hoses to 1000L IBC and plastic drums. Dermal exposure may occur as a result of drips and spills during the connection/disconnection of hoses. The product is sold to end-user without further decanting or reformulation. Ocular exposure is likely only in the event of accidental splashing

Worker exposure during the transport, storage, and distribution of the finished product containing the notified polymer is unlikely to occur unless there is an accidental spillage or packaging breach.



At automotive manufacturers and repair shops, the finished product pumped into the water streams of the water curtains in spray booths. Dermal exposure, as a result of spills and drips, can occur during the connection/disconnection of pumps and hoses. Worker exposure will be further minimised by use of the appropriate personal protection equipment and engineering controls. Car manufacturers and automotive repair workshops areas are typically fitted with general and local ventilation. Workers at these sites will wear overalls, gloves, safety goggles, and safety shoes.

#### **9.2.2. Public health – exposure assessment**

The notified polymer will be manufactured at one industrial site. The finished product containing the notified polymer will only be available for industrial use by automotive manufacturers and repair workshops. The public exposure to the notified polymer will only occur in event spillage as a result of an accident during transport.

#### **9.2.3. Human health - effects assessment**

Due to its large molecular weight, it unlikely that the notified polymer will cross biological membranes and cause systemic toxicity.

The toxicological studies provided in this notification were undertaken using the finished product containing the notified polymer. The studies indicate that this product has low oral and dermal acute toxicity.

The finished product containing the notified polymer was found to be irritating to the skin of the rabbit. Based on the result of the study, the notified polymer could not be classified. The effects observed in the study may be attributable to the components of the products such as hydrochloric acid and the low pH of the finished product, rather than the notified polymer. The results were variable, ranging from severe persistent irritation to no observed irritation.

The finished product containing the notified polymer was applied to eyes of rabbits. Corneal opacity was not observed in any animal at any observation period. Iridial inflammation was observed in 3 animals at 1 hour but cleared by 24 hours. Conjunctival irritation was noted in 3 animals. Chemosis was observed in one animal at 24 hours and day 7, but was not present at 48 hours and 72 hours. Discharge was observed in the same animal at each observation period and at the termination of the study at day 7. The effects may be due other components of the product such as hydrochloric acid and the low pH of the finished product, rather than the notified polymer.

The product containing the notified polymer is classified as a hazardous substance due to the content of formaldehyde. The product is also strongly acidic, and the acidic reserves present in the product are much higher than for an equivalent pH (1.2 to 2.1) arising solely from hydrochloric acid. The severity of erythema and eschar observed in the one animal is likely to be due to the high acidic reserves present, and the notifier has classified the product as irritating to skin. The notifier has indicated that the recommended handling and personal protection are sufficient to protect those handling the notified polymer from skin irritation. The appropriate risk phases are:

R38 Irritating to skin (NOHSC, 1999b)

R43 May cause sensitisation by skin contact (NOHSC, 1999b)

Hydrogen chloride and formaldehyde have exposure standards of (TWA) of 7.5 mg/m<sup>3</sup> and 1.2 mg/m<sup>3</sup>, respectively (NOHSC, 1995)

#### **9.2.4. Occupational health and safety – risk characterisation**

Workers involved in manufacture of the flocculant will handle solutions containing less than 10% of the notified polymer. The manufacturing process will occur in enclosed vessels and the finished product will be pumped to containers for transport and resale. Exposure to the notified polymer may occur as a result of accidental drips and spill during the connection /disconnection of hoses used to transfer the finished product. Exposure to notified polymer may occur during

the QC sampling and testing process as result of drips and spill. The main route of exposure to the notified polymer for manufacturing workers will be dermal.

At automotive manufacturers and automotive repair shops, the finished products will be pumped into the water stream of spray-booth water curtains. Dermal and ocular exposure may occur as result of the drips and spill during the connection/disconnection of hose used to transfer the finish product.

Based on the data provided, the notified polymer can not be classified for hazardous properties. However, the toxicological testing was carried out on finished product and the results indicate finished product is irritating to the skin and slightly irritating to the eyes. Therefore, workers should avoid dermal contact by wearing chemical resistant gloves and coveralls. The notified polymer is also slightly irritating to the eyes; workers should avoid ocular exposure in the event of splashing or mist formation by wearing safety eyewear.

#### **9.2.5. Public health – risk characterisation**

The public will not be exposed notified polymer. The finished product containing the notified polymer will only be for industrial use. The public may be exposed to the notified chemical in the case of accident where packaging is breached

### **10. CONCLUSIONS – ASSESSMENT LEVEL OF CONCERN FOR THE ENVIRONMENT AND HUMANS**

#### **10.1. Hazard classification**

Based on the available data the notified polymer is classified as a hazardous substance under the NOHSC *Approved Criteria for Classifying Hazardous Substances*.

The risk phrases are:

R38 Irritating to skin

R43 May cause sensitisation by skin contact.

and

As a comparison only, the classification of notified polymer using the Globally Harmonised System for the Classification and Labelling of Chemicals (GHS) (United Nations, 2003) is presented below. This system is not mandated in Australia and carries no legal status but is presented for information purposes.

Category 1: Corrosive (1C) with Irritant (Category 2)

For the environment, the notified polymer should be classified as very toxic (Chronic I – Very toxic to aquatic life with long lasting effects).

#### **10.2. Environmental risk assessment**

On the basis of the PEC/PNEC ratio, the chemical is not considered to pose a risk to the environment based on its reported use pattern.

#### **10.3. Human health risk assessment**

##### **10.3.1. Occupational health and safety**

There is Low Concern to occupational health and safety under the conditions of the occupational settings described.

### 10.3.2. Public health

There is Negligible Concern to public health when used in as described in the notification.

## 11. MATERIAL SAFETY DATA SHEET

### 11.1. Material Safety Data Sheet

The MSDS of the product containing 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 a matter of public record. The accuracy of the information on the MSDS remains the responsibility of the applicant.

### 11.2. Label

The label for the product containing 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.

## 12. RECOMMENDATIONS

### REGULATORY CONTROLS

#### Hazard Classification and Labelling

- The MSDS for the product should contain the following risk phrases:
  - R43 May cause sensitisation by skin contact
  - R38 Irritating to skin
- The following safety phrases should be used for the notified polymer:
  - S24/25 Avoid contact with skin and eyes
  - S36/37/39 Wear suitable protective clothing gloves and eye/face protection

### CONTROL MEASURES

#### Occupational Health and Safety

- Employers should implement the following safe work practices to minimise occupational exposure during handling of the notified polymer
  - Prevent splashes and spills
- Employers should ensure that the following personal protective equipment is used by workers to minimise occupational exposure to the notified polymer in the finished product:
  - Chemical resistant gloves, protective clothing, safety goggles or glasses

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 chemical 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.

#### Environment

#### Disposal

- Recycling, recovery and reuse of materials is encouraged where permitted. If disposal is necessary, organic materials, especially when classified as hazardous waste, should be disposed of by thermal treatment or incineration at approved facilities. All local and national regulations should be observed.
- Waste material containing the notified polymer may be disposed of to landfill in accordance with government regulations.

#### Emergency procedures

- Spilled material containing the notified polymer should be absorbed onto an inert material and scooped up.
- Flush spill area thoroughly with water and scrub to remove residue.

#### Transport and Packaging

- The product containing the notified polymer has been classified by the notifier as Corrosive, and hence it should be packaged and transport should be in accordance with ADG.

### 12.1. Secondary notification

The Director of Chemicals Notification and Assessment must be notified in writing within 28 days by the notifier, other importer or manufacturer:

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(2) of the Act:
  - if any of the circumstances listed in the subsection arise.

The Director will then decide whether secondary notification is required.

No additional secondary notification conditions are stipulated.

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