File No: NA/323

Date: 11 January 1996

NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME

FULL PUBLIC REPORT

COAGULANT 129

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Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT

COAGULANT 129

1. APPLICANT

Betz Laboratories Pty Ltd of 69-77 Williamson Road, Ingleburn NSW 2565 has submitted a standard notification with their application for an assessment certificate for Coagulant 129. The notified chemical will be used as the main active ingredient in an alkaline cooling water treatment to prevent corrosion and scaling of steel, copper and copper alloys.

2. IDENTITY OF THE CHEMICAL

Coagulant 129 is not considered to be hazardous based on the nature of the chemical and the data provided. Therefore the chemical name, CAS number, molecular and structural formulae have been exempted from publication in the Full Public Report and the Summary Report.

Trade name: Coagulant 129 (30% aqueous solution)

Number-average molecular weight: > 1000

Maximum percentage of low molecular weight species (molecular weight < 1000): weight fraction below 500 < 43.2%
weight fraction below 1000 < 72.9%

3. PHYSICAL AND CHEMICAL PROPERTIES

Unless otherwise indicated, all physicochemical properties listed are of the 30% aqueous solution.

Appearance at 20°C and 101.3 kPa: pale yellow liquid

Boiling Point: not determined (see below)

Specific Gravity: 1.270 g/mL at 21ºC

Vapour Pressure: 18 mm Hg (water)

Water Solubility: 100%

Partition Co-efficient (n-octanol/water) log P_{ow}: not determined (see below)

Hydrolysis as a function of pH:	not determined (see below)
Adsorption/Desorption:	not determined (see below)
Dissociation Constant:	not determined (see below)
Flash Point:	> 93°C
Flammability Limits:	not determined
Decomposition Temperature:	not determined
Decomposition Products:	elemental oxides
Autoignition Temperature:	not determined
Explosive Properties:	not determined, not expected to be explosive
Reactivity/Stability:	stable, but contact with oxidants should be avoided
Particle size distribution:	not applicable

Comments on physicochemical properties

The boiling point was not determined. It is expected that it would approach that of water.

Hydrolysis was not determined. It is noted the polymer contains no functionalities likely to undergo hydrolysis in the environmental pH range expected.

The experimentally derived value for the octanol/partition co-efficient was obtained for two components of the Coagulant 129 sample (first and last eluting components). This derived value, obtained for each component, was outside the applicable range for the method (0-6), and the accuracy could not be stated. The company also determined a log octanol/water partition co-efficient of 2.35 using software (v1.03, Syracuse Research Corporation LOGKOW software). The company explains the discrepancy between the two values thus: “is probably due to the uncertainty of the structure correction coefficients in the software. The estimated coefficients used for structure correction are probably much higher than the actual coefficients; hence a much higher software value than the experimental values.” This explanation is acceptable.

No dissociation constant was derived for the polymer. The notifier states that the polymer contains carboxylate functional groups which will dissociate completely in water. Further, Coagulant 129 (as a 30% aqueous solution of the notified substance) is expected to have a pH of 13.1. It is agreed that complete dissociation

is likely within the expected environmental pH range, and hence its usefulness as an antiscalant.

No adsorption/desorption constants were derived for the polymer. The notifier claims that because Coagulant 129 is a charged anionic polymer, it will not bind strongly to organic matter in soils. This is accepted although it is noted that Coagulant 129 is a relatively small and highly charged which is able to coordinate to metal ions. Therefore, although the adsorption to organic matter in soils is estimated to be low, it may interact with clays by coordinating to metal ions.

4. PURITY OF THE CHEMICAL

Degree of purity: 84.3%-97.5%

Toxic or hazardous impurities:

chemical	CAS no.	weight %
calcium hydroxide	1305-62-0	1.2%
sodium hydroxide	1310-73-2	<1.0%

Information on non-hazardous impurities has been granted exemption.

Additives/Adjuvants: none

5. INDUSTRIAL USE

The notified chemical will be imported as a 30% pale yellow aqueous solution. It will be the main active ingredient in Betz Continuum ® AEC (alkyl epoxy carboxylate compounds) Alkaline Cooling Water Treatment, to inhibit calcium carbonate scaling and corrosion of mild steel, copper and copper alloys in industrial water cooling systems. The notified chemical will be imported in quantities greater than one tonne/year.

6. OCCUPATIONAL EXPOSURE

The notified chemical will be imported by ship in either 205L drums or 1500L intermediate bulk containers (IBC-also known as Betz Semi-Bulk Containers, SBC's). It will be imported as Coagulant 129 (30% solution of polymer) and loaded onto trucks for road transport. The containers will be taken to a warehouse facility in Sydney where they will be stored in a purpose built containment area. The transport and handling of the notified chemical will be performed by between 10 to 20 people. Exposure is only likely in the event of a spill.

The notified chemical will be reformulated into specialty blended products at the factory facility. The notified chemical will be pumped from the drums or containers into mixing tanks. There is potential here for exposure to the notified chemical from removing bungs and connecting pumping equipment. Local exhaust ventilation will

be used to capture any vapours during pumping. All employees will be required to wear impermeable gloves, chemical goggles and protective overalls. The formulated product will be pumped into 205 L drums or 1500 L SBC's for customer distribution. The potential exposure to the 6-10 warehouse workers during the storage and reformulation and the 2-5 transport workers during customer delivery is 10 times/year for 2-3 hours per day.

The plant operators at the customer site will be exposed to a maximum of 30% notified chemical, once per day for 0.5-1 hour/day. This will occur from potential exposure while handling the product containers, removing bungs and connecting pumping equipment to the storage containers. Coagulant 129 will be transferred from the containers by a hand pump or will be automatically pumped, depending on the type of storage container. Coagulant 129 will be either injected directly into the water cooling system or will be diluted in a holding tank before it is injected into the system. Local exhaust ventilation will be employed during decanting to capture any mist or vapour, while all personnel will be required to wear impermeable gloves, chemical goggles and protective overalls.

7. PUBLIC EXPOSURE

The notified chemical will be imported as a 30% solution in 205 L drums or 1500 L bulk containers. It will be reformulated into specialty blended products before being distributed to customers by road. The notifier stated that the notified chemical will be used for industrial applications and will not be available to the general public.

Waste material from Betz Laboratories and residues in the used containers, which are returned to Betz, will be disposed to a waste treatment plant. At the cooling water treatment sites, most of the notified chemical will be released to the environment in the cooling system discharge, and some may escape from the cooling system in the cooling tower drift. However, the concentration of the notified chemical in the cooling tower is low, a maximum of 10 ppm in the cooling water, and 6 ppm in the discharged effluent. Therefore, public exposure to the notified chemical from the discharge or cooling tower drift is expected to be low.

If accidental spillage occurs in storage or transport, the spills will be contained using inert absorbent material, such as sand, clay and vermiculite. The contaminated area will then be washed with water to sanitary sewer as recommended in the MSDS.

8. ENVIRONMENTAL EXPOSURE

Release

Coagulant 129 will be reformulated into specialty products, with any such reformulation performed at Betz, Sydney, in mixing tanks with appropriate engineering controls. Any residue from cleaning of equipment etc, will be disposed of through the Lidcombe Aqueous Waste Treatment Plant. Any residual product or empty containers returned to Betz will also be disposed of to that facility.

At customer sites, Coagulant 129 will be pumped from the transport containers into either the cooling water system directly, or into a mixing tank first. The notifier claims that appropriate engineering controls will be used, and will decrease the chance of spillage and wastage. The concentration of the polymer in cooling water is expected to be up to 10 ppm, and the feed rate will be adjusted to maintain that concentration. Release of the polymer to the environment might occur from leaking storage containers, accidental spills, cooling tower drift, short-term manual blowdown, or operational blowdown (ie release of excess water). The majority of the polymer is expected to be released via the latter two mechanisms.

Disposal of release water will be according to the relevant government regulations. Such disposal would include release to sewer, together with other process streams, and might involve secondary treatment.

Fate

Using OECD test guideline 301D (closed bottle test), Coagulant 129 can not be classified as ready biodegradable, with 5% dissolved oxygen loss after 28 d (cf with lower limit of 60% needed for ready biodegradation). Also, Coagulant 129 was further tested for biodegradation in a 28 days using OECD test guideline 302B (Zahn-Wellens test). This indicated that Coagulant 129 was not inherently biodegradable, with a minimum calculated Total Organic Carbon (TOC) loss of 12% (a loss of 20-70% would indicate that the test substance was inherently biodegradable).

No bioaccumulation of the chemical is expected due to its very high water solubility and low (measured) octanol/water partition coefficient.

9. EVALUATION OF TOXICOLOGICAL DATA

While a number of studies were performed on the notified chemical, others were obtained on analog data from published literature. While some of these studies may not meet laboratory report standard, their findings were accepted as representative of the notified chemical.

9.1 Acute Toxicity

Table 1 Summary of the acute toxicity of Coagulant 129

Test	Species	Outcome	Reference
Acute oral toxicity	Rat - male	LD_{50}:= 3430 mg/kg	(1)
	female	LD_{50}:= 2240 mg/kg	
	combined	LD_{50} =3005 mg/kg	
Acute dermal toxicity	Rat	LD_{50} >900 mg/kg	(3)
Skin Irritation	Rabbit	non irritant	(5)
Eye irritation	Rabbit	non irritant	(3)
Skin sensitisation	Guinea-pig	non sensitiser	(3)

9.1.1 Oral Toxicity (1)

LD_{50}: male LD_{50}:= 3430 mg/kg
female LD_{50}:= 2240 mg/kg
combined LD_{50} =3005 mg/kg

Species/strain: Sprague -Dawley rats

Number/sex of animals: 30 male, 20 female

Observation period: 14 days

Method of administration (vehicle): 291 mg/ml of Coagulant 129 (30% notified chemical) was administered orally by gavage at dose levels of:
1.00, 2.00, 2.51 and 5.01 g/kg for females and 1.00, 2.51, 2.83, 3.17, 3.99, 5.01 g/kg for males.

Clinical observations: In male rats dosed at 1.0 g/kg and 2.51 g/kg no significant observations were noted. At 2.83 g/kg male rats developed ruffled fur within 5 hours and 1 rat died. At 3.99 g/kg male rats developed ruffled fur within 5 hours and 2 rats died. At 5.01 g/kg animals developed lethargy between 90 minutes to 6 hours, an additional rat dying by 6 hours.

In the female rats, all rats were normal at 1.00 g/kg. At 2.00 g/kg all animals developed ruffled fur by 4 hours, with 1 animal dying at day 1. The four remaining animals developed dark staining around the anogenital region. At 2.51 g/kg, 4 rats died by day 1, the remaining rats developing ruffled fur and lethargy. At 5.01 g/kg one animal died by 90 minutes, another by 6 hours. The remaining rats showed signs of lethargy by 90 minutes.

Mortality: No rats died at 1.00 g/kg, 1 female rat at 2.00 g/kg, 4 female rats died at 2.51 mg/kg, 1 male rat died at 2.83 g/kg and 3.17 g/kg, 5 male rats died at 3.99 g/kg and 5 males and 5 females died at 5.01 g/kg.

Morphological findings: There were no gross abnormalities in the male rats dosed at 1.00 g/kg and 2.51 g/kg. In the male animals that died at 2.83 g/kg and 3.17 g/kg a yellow liquid was found in the lower gastrointestinal tract. No gross abnormalities were observed in the other 4 rats. The male rats that died at 3.99 g/kg had a dark liquid in the stomach and lower gastrointestinal tract. At 5.01 g/kg most of the male rats that died had pale yellow liquid in the stomach and lower gastrointestinal tract.

Three of these rats also had up to 50% irritation in the stomach lining. One rat had also developed a yellow muzzle and genital staining, while another had pale red liquid in the stomach.

There were no gross abnormalities in female rats that received 1.00 g/kg of the notified chemical. At 2.00 g/kg dark liquid was found the stomach and lower gastrointestinal tract of the one animal that died but no significant pathological abnormalities. Female rats dosed at 2.51 g/kg that had died had nasal staining and yellow liquid in the lower gastrointestinal tract but no gross abnormalities were observed. All the female rats that died at 5.01 g/kg had pale yellow liquid in the stomach and lower gastrointestinal tract. Two of these rats had also developed up to 50% irritation of the stomach lining.

Test Method: According to (US)EPA Health Effects Testing Guideline 40 CFR 798 (2).

9.1.2 Dermal Toxicity (3)

No studies on dermal toxicity were performed, however analogue literature data has been provided using the related succinate tartrates.

LD_{50}: > 900 mg/kg *Species/strain:* New Zealand White Rabbits

Number/sex of animals: not specified *Observation period:* 14 days

Method of administration: administered under gauze.

Clinical observations: no significant observations

Mortality: none *Morphological findings:* no significant observations

Test Method: none specified but similar to OECD Guideline No. 402 (4)

9.1.4 Skin Irritation (5)

Result: Coagulant 129 is not a skin irritant *Species/strain:* New Zealand White rabbits

Number of animals: 6

Method of administration: A dose of 0.5 ml of Coagulant 129 was applied to 3 shaved dorsal dose sites on 6 rabbits. Semi occlusive dressing was placed over the test sites and secured. Test sites were evaluated either 3 minutes, 1 hour, 4 hours or 48 hours after administration.

Test Method: According to (US)EPA Pesticide Registration, Re-registration and Classification Procedures (40 CFR 162.10 (h), 1975) (6).

Table 2 Draize (7) Scores[i]:

Animal	Time after decontamination			
	3 minutes	1 hour	4 hours	48 hours
ERYTHEMA				
1	1	1	1	1
2	0	0	1	0
3	0	1	1	0
4	0	0	1	0
5	0	0	1	0
6	0	1	1	1
OEDEMA				
1	0	0	0	0
2	0	0	0	0
3	0	0	0	0
4	0	0	0	0
5	0	0	0	0
6	0	0	0	0

9.1.5 Eye Irritation (3)

No studies on eye irritation were performed with the notified chemical, however analogue literature data has been provided using the related succinate tartrates.

Result: The study performed on the analogous succinate tartrates found that they are not eye irritants. It should be noted however that Coagulant 129 has a pH of 13.1, probably due to the presence of residual calcium and sodium hydroxide and therefore any eye contact should be avoided.

Species/strain: New Zealand White rabbits *Number of animals:* 9

Method of administration: 0.01 mL of undiluted succinate tartrate (44% solution) was instilled into one eye of the rabbits, the other eye being used as a control. The eyes of three animals were rinsed with water immediately after instillation. Eye irritation was scored on days 1,4,7,14,21 and 28 after treatment.

Test Method: Griffith et al (1980) low volume eye irritation (8).

9.1.6 Skin Sensitisation (3)

No studies on skin sensitisation were performed with the notified chemical, however analogue literature data has been provided using the related succinate tartrates.

Result: The succinate tartrate analogues were not found to be skin sensitisers.

Species/strain: Hartley Albino Guinea Pigs *Number of animals:* not supplied

Induction: exposed once per week for three weeks to a 20% solution of succinate tartrate under a 6 hour occluded patch. All animals were challenged with a 10% aqueous solution of succinate tartrate under a 6 hour occluded patch 2 weeks after the final exposure. Patch sites were visually scored 2 and 26 hours later. The guinea pigs were rechallenged 1 week later with 5% succinate tartrate under a 6 hour occluded patch.

Test Method: According to the Buehler method (Ritz and Buehler, 1980) (9)

9.2 Repeated Dose Toxicity (10)

Species/strain: Sprague-Dawley Crl:CD®BR rats *Number/sex:* 40/sex

Method of administration (vehicle): Oral administration by gavage in deionised water. Rats were observed daily for signs of toxicity, subjected to behavioural tests involving the assessment of sensory and motor function 2 days prior to the commencement of the study and on days 30 and 31, clinical chemistry on week 5 and a pathological examination was conducted at the end of the study or after death for cases of mortality prior to completion of the study.

Dose/ Duration of administration: Daily oral dosage for 28 days at 5 mL/kg in a concentration range of 0, 250, 500 and 1000 mg/kg/day.

Toxicologically Significant Observations:

1. Clinical

Two high dose (1000 mg/kg/day) males exhibited perinasal crust and two high dose females had abnormal respiratory sounds. Neurobehavioural examination revealed that high-dose animals exhibited a greater incidence of abnormal findings for the righting reflex after four weeks of treatment.

2. Clinical Chemistry/Haematology

There was a slight but statistically significant increase in the mean potassium values in the 1000 mg/kg/day dose females and total bilirubin in the 500 and 1000 mg/kg/day dose females. A mild, but statistically significant decrease in the mean total protein and albumin values in these groups was also noted but tis did not have any apparent effect on albumin/globulin ratios.

3. Necropsy Findings/ Histopathology

There were few gross abnormalities identified, these being distributed among the 1000 mg/kg/day dose level groups. Three of the four animals found dead had enlarged, dark and/or mottled livers in a 500 mg/kg/day male and female and 1000 mg/kg/day dose female. This finding correlates with the increased bilirubin levels in the female rats. There were no statistical differences in organ weights between the control and test groups. Histopathology revealed sporadic findings but there did not appear to be any pronounced test substance related differences between the control and test groups.

Administration of Coagulant 129 at doses of 250, 500 and 1000 mg/kg/day produced no clear indications of treatment related toxicity, however at 1000 mg/kg/day the higher incidence of findings suggest possible treatment related effects.

Test Method: According to OECD Guideline No. 407 (4).

9.3 Genotoxicity

9.3.1 Salmonella typhimurium Reverse Mutation Assay (3)

No studies on bacterial mutagenicity were performed on the notified chemical, however literature on analogue data has been provided using the related succinate tartrate.

Result: Succinate tartrates were not found to be mutagenic.

Strains: *Salmonella typhimurium* TA 98, TA 100, TA 1535, TA 1537, and TA 1538 and *Escherichia coli* WP-2 and WP-2*uvr.*

Concentration range: highest dose tested, 8.8 mg/ plate, with and without metabolic activation in the presence of rat liver S9.

Test Method: According to Ames et al (1975)(11)

9.3.2 Micronucleus Assay in the Bone Marrow Cells of the Mouse (12)

Result: No statistically significant and dose dependent increases in the number of micronucleated polychromatic erythrocytes were observed. The males from the 250 mg/kg and 72 hours harvest group had significantly lower ratios of polychromatic to normochromatic erythrocytes compared to vehicle control males, indicating cytotoxicity at this dose level. Coagulant 129 was not found to induce significant increases in micronuclei in bone marrow polychromatic erythrocytes.

Species/strain: ICR Sprague-Dawley mice

Number and sex: 73 male, 75 female *Doses:* 62.5, 125 and 250 mg/kg

Method of administration (vehicle): 9 groups of 10 mice (3m/5f) were dosed by intraperitoneal injection of Coagulant 129 in deionised water. Mice were sacrificed 24, 48 and 72 hours post dose

Test Method: According to Heddle et al (1983) (13)

9.4 Overall Assessment of Toxicological Data

Coagulant 129 was found to be of low acute oral toxicity, not a skin irritant and was not found to be clastogenic. Analogue data suggests that Coagulant 129 would not be an eye irritant, that it would not be a skin sensitiser and is unlikely to be mutagenic. There was no significant toxicity associated with repeated dose testing although the mid to high doses indicated that possible significant hepatotoxicity may occur at doses > 1000 mg/kg/day. Although the dermal toxicity could not be classified by Worksafe Australia criteria, it is not believed to be significantly toxic.

Although the notified chemical is not a skin irritant, nor believed to be an eye irritant, Coagulant 129 as a 30% aqueous solution has a pH of 13, suggesting that any dermal contact to the notified chemical should be avoided.

The notified chemical is not classed as hazardous according to Worksafe Australia's Approved Criteria for the Classifying of Hazardous Substances (14) in relation to the toxicity data provided.

10. ASSESSMENT OF ENVIRONMENTAL EFFECTS

The ecotoxicity studies were conducted using Coagulant 129 dissolved in water. The results in Table 3 were provided by the notifier, using nominal concentrations only.

The test reports indicate that even with a moderately high pH (about 10 starting at the beginning of the test and mostly falling to about 8 by the end of the test) in the no-observed-effect-level (NOEL), no sublethal effects (such as loss of equilibrium, lying on the bottom of the container and lethargy) were observed for fish and water

fleas. The relatively steep slope of the dose response curve, together with the high (100%) mortality associated with test solutions above the NOEL, which maintained a high pH to the end of the test, would indicate that mortality in these test solutions were associated with the consistent high pH.

The data shows that the notified chemical is potentially slightly toxic to algae in soft water (E_BC_{50} = 66 mg/L). In various experimental manipulations, results indicated that toxicity would be modified in hard water, as indicated by the decreased toxicity when hardness was increased about 10-fold. Some uncertainty exists for the experimental value obtained from stock solution enriched with Coagulant 129 (E_BC_{50} > 3333 mg/L). No explanation is given by the notifier for why this experimental variation led to a higher E_BC_{50}, neither is this clear from the experimental procedure. The EPA also notes that the E_BC_{50} is probably lower than stated[1], though still within the practically non-toxic range.

Table 3. Ecotoxicity test results

Species	**Test**	**Result**[a] (mg/L)
Fathead minnow (*Pimephales promelas*)	96 h acute	LC_{50} = 1680 *(504)*
Water Flea (*Daphnia magna*)	48 h acute	EC_{50} = 1635 *(491)*
Green Alga (*Selenastrum capricornutum*)	96 hour growth:	
	- @ 14 mg/L hardness[b]	E_BC_{50} = 219 *(66)*
	- @ 152 mg/L hardness[b]	E_BC_{50} > 1000 *(300)*
	- enriched[c] and @ 152 mg/L hardness[b]	E_BC_{50} > 3333 *(1000)*

a. Actual concentration of polymer given in brackets; b. Hardness as $CaCO_3$ c. Stock solution was enriched by 3.3 times to give a stock solution of effectively made from a 100% solution of polymer (cf 30% polymer in Coagulant 129)

11. ASSESSMENT OF ENVIRONMENTAL HAZARD

Coagulant 129 is to be used as an antiscalant in industrial cooling water treatments, and where there is potential for its release to the environment in effluent which could lead to wide-spread environmental exposure.

The notifier estimates that on release of cooling water, at a maximum concentration of 10 ppm of polymer, it would typically comprise 60% of the total effluent discharged

1 A linear interpolation estimate using Environment Canada software to derive the IC50 (similar to EC50, but derived using different model assumptions), gives 2790 mg/L Coagulant 129 (actual polymer concentration of 837 mg/L). Visual inspection of the data also indicates that the EC50 should be below the upper concentration of 3333 mg/L.

from the facility; the remaining water would come from boiler and process water. The maximum polymer concentration would therefore be 6 ppm. If the combined facility waste water was released to sewer, and involved some form of secondary treatment plant, the notifier estimates that there would be an order of magnitude dilution, which would reduce the typical discharge concentration to around 0.5 ppm. The degree to which it might adsorb to particulate matter such as clay particles is unknown, but is not likely to be a major source of loss given its high water solubility and low octanol/water co-efficient.

The above seems reasonable, and would indicate that the worst case environmental concentration (ie in receiving waters with no dilution after release from treatment plant) would be 0.5 ppm. This is at least two orders of magnitude below the lowest effect concentration (green algae, E_BC_{50} = 66 mg/L). The actual concentration in receiving waters is likely to be much less, when given further dilution of the treatment plant discharge with the receiving waters. Therefore, the use of Coagulant 129 is not likely to cause any significant environmental impact when used as an antiscalant in industrial cooling water treatments.

12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

Coagulant 129 did not display any significant oral toxicity, skin irritancy, and was not found to be toxic by repeated dose or exhibit any clastogenic properties. Additional analogue data also suggests that the notified chemical would not be an eye irritant, skin sensitiser and is not mutagenic. There is potential however for skin or eye irritancy to occur on the basis of the notified chemicals pH in a 30% solution (pH 13). Coagulant 129 is not classed as hazardous according to Worksafe Australia's Approved Criteria for Classifying Hazardous Substances (14).

There is little potential for exposure to Coagulant 129 during importation due to the nature of the containers used for importation and transport. It is only envisaged that exposure would occur in the case of a spill, in which case the measures outlined in the MSDS involving containment of the spill with an inert absorbent material for disposal will be implemented.

During reformulation there is potential for occupational exposure by splashing or exposure to vapour during the connection of pumping equipment. Any potential exposure should be reduced by the employees' usage of impermeable gloves, chemical goggles and protective overalls. The risk of exposure will be further reduced by the implementation of local exhaust ventilation to capture any fumes that may be released during pumping.

There will also be the same potential for exposure at the customer plant during the pumping of the notified chemical into holding tanks or directly into the water cooling systems. The risk of exposure will be reduced significantly in this instance if automatic pumping is used rather than hand operated pumping. All employees will be wearing impermeable gloves, chemical goggles and protective overalls to reduce the risk of exposure. Any mist or vapour will be captured by local exhaust ventilation.

The notifier indicated that Coagulant 129 containing the notified polymer will be only used in industrial plants, and will not be available to the general public. Although the notified chemical will be released to the environment in the discharge effluent and may also escape from the water cooling system to the environment in the water cooling drift, the concentration of the notified chemical in the cooling water discharge and cooling tower drift will be low. The low toxicity of this chemical, together with low public exposure suggest that its use should not pose a significant risk to public health.

13. RECOMMENDATIONS

if engineering controls and work practices are insufficient to reduce exposure to Coagulant 129 to a safe level, then the following personal protective equipment which conforms to Australian Standard (AS) or Australian/New Zealand Standard (AS/NZS) should be worn:

a respirator with dust/mist cartridges should be selected and used in accordance to AS/NZS 1715 (15) and should comply to AS/NZS 1716 (16).

safety goggles should be selected and fitted in accordance with AS 1336 (17) to comply with AS/NZS 1337 (18).

industrial clothing must conform to the specifications detailed in AS 2919 (19) and AS 3765.1 (20).

impermeable gloves or mittens conforming with AS 2161 (21) and AS 3765.1 (20).

all occupational footwear should conform AS/NZS 2210 (22).

spillage and splashing of the notified chemical should be avoided.

good personal hygiene should be practised to minimise the potential for ingestion.

a copy of the Material Safety Data Sheet should be easily accessible to employees.

14. MATERIAL SAFETY DATA SHEET

The Material Safety Data Sheet (MSDS) for Coagulant 129 was provided in an acceptable format (23).

This MSDS was provided by Betz Laboratories Pty Ltd as part of their notification statement. The accuracy of this information remains the responsibility of Betz Laboratories Pty Ltd.

15. REQUIREMENTS FOR SECONDARY NOTIFICATION

Under the *Industrial Chemicals (Notification and Assessment) Act 1989*, secondary notification of Coagulant 129 shall be required if any of the circumstances stipulated under subsection 64(2) of the Act arise. No other specific conditions are prescribed.

16. REFERENCES

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[ii] The Draize Scale for evaluation of skin reactions is as follows:

Erythema Formation	rating	Oedema Formation	rating
No erythema	0	No oedema	0
Very slight erythema (barely perceptible)	1	Very slight oedema (barely perceptible)	1
Well-defined erythema	2	Slight oedema (edges of area well-defined by by definite raising)	2
Moderate to severe erythema	3	Moderate oedema (raised approx. 1mm)	3
Severe erythema (beet redness)	4	Severe oedema (raised more than 1 mm and extending beyond area of exposure)	4