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NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME

FULL PUBLIC REPORT

Polymer in IRONGUARD

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Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT

Polymer in IRONGUARD

1. APPLICANT

NALCO AUSTRALIA PTY LTD of 2 Anderson Street, Botany NSW 2019 has submitted a limited notification statement in support of their application for an assessment certificate for the Polymer in IRONGUARD.

2. IDENTITY OF THE CHEMICAL

The chemical name, CAS number, molecular and structural formulae, molecular weight, spectral data, details of the polymer composition and details of exact import volume and customers have been exempted from publication in the Full Public Report and the Summary Report.

Other Names:	Cationic acrylic acid copolymer
Marketing Name:	IRONGUARD (IRGRD)
Spectral Data:	Supplied and exempted

Comments on Chemical Identity

The polymer contains a high density of both anionic and cationic charges, with the cationic (quaternary amine) groups predominating. Consequently, in an aqueous environment the polymer is expected to be very highly positively charged.

A GPC (Gel Permeation Chromatography) trace and associated print-out were supplied with the notification. The slice data confirmed that there was no species with molecular weight < 1,734 g/mol in the test sample.

The company supplied an infrared spectrum, which identifies the various functionalities within the polymer.

3. PHYSICAL AND CHEMICAL PROPERTIES

The physical and chemical properties have been provided for the product IRONGUARD containing 10-30% of the notified polymer (according to the MSDS).

Appearance at 20°C & 101.3 kPa:	Clear to hazy, colourless to off-white liquid
Boiling Point:	Not determined

Specific Gravity:	1.03-1.09 at 16°C
Vapour Pressure:	Not determined; expected to be negligible
Water Solubility:	Completely miscible in water at pH 2-12
Viscosity:	1 000-6 000 cps at 24°C (from MSDS)
PH:	4.2-5.8 at 25°C (for the neat product)
Partition Co-efficient (n-octanol/water):	Expected to be low due to high water solubility
Hydrolysis as a Function of pH:	Polymer decomposes to polyacrylic acid and amino salt
Adsorption/Desorption:	Not determined
Dissociation Constant:	Polymer expected to fully dissociate in water in the environmental pH range
Flash Point:	None (PMCC)- from MSDS
Flammability Limits:	Not flammable
Autoignition Temperature:	Not determined (not flammable)
Explosive Properties:	Not explosive
Reactivity/Stability:	Not reactive; Stable under conditions of use-no loss of monomers is expected; Polymer may degrade to polyacrylic acid

Comments on Physico-Chemical Properties

The notified polymer is imported and used as an approximately 10-30% w/w aqueous solution. It has a high charge density and is completely soluble in water between pH 2 and 12.

The polymer contains pendant ester groups on each alternate carbon of the acrylic backbone, which would be susceptible to hydrolysis under extremely high or low pH conditions. However, in the environmental pH range significant hydrolytic cleavage of these groups is unlikely, but complete hydrolysis would eventually yield acrylic acid and the amino salt.

No data for the n-octanol/water partition coefficient or soil adsorption/desorption were submitted, however, the partition coefficient would be low due to the very high water solubility. Accordingly, the polymer would be unlikely to bind strongly to the organic component of soils. Nonetheless, the expected high positive charge on the polymer would impart affinity for negatively charged colloidal material in soils (eg humic material) and the negatively charged surface of certain clay minerals. Although such electrostatic binding to soil components may be strong, the polymer may still be mobile in this medium, particularly in high ionic strength waters, where adsorbed polymer may be displaced from surfaces through ion exchange with metal cations.

The notified polymer is the sodium salt of a polycarboxylic acid, and as such is expected to have a pKa between 4.5 and 5.

4. PURITY OF THE CHEMICAL

Degree of Purity:	100%
Maximum Content of Residual Monomers:	Information supplied and exempted from publication. The weight percentage of component is below the relevant concentration cut-off for classification
Hazardous Impurities:	Information supplied and exempted from publication. The weight percentage of component is below the relevant concentration cut-off for classification
Non-hazardous Impurities (> 1% by weight):	None
Additives/Adjuvants:	None

5. USE, VOLUME AND FORMULATION

The notified polymer will not be manufactured in Australia, but will be imported by sea in 200 and 1 000 L at 10-30% in non-returnable units and in bulk. It will be imported in final use form and used as an emulsion breaker for industrial waste treatment, where it will be utilised in a variety of industrial (eg. steel industry) wastewaters to promote process performance and efficiency. Less than 10 tonnes/year for the first five years will be imported.

6. OCCUPATIONAL EXPOSURE

Transport and Storage: 2-3 hours/day, 10-15 days/year
The notified polymer will be transported from the dockside to the notifier's warehouse by road for storage prior to further dispatch to customer sites. Waterside workers, transport drivers, warehouse and customer workers would only be exposed to the notified chemical in the event of a spill from a transport or handling incident. The nature of the packaging used for transport minimises the likelihood of accidental release or loss of the chemical. Two waterside workers, six transport drivers, six receiving clerks and two forklift drivers at the notifier's warehouse will be involved in transport and storage operations.

- *Quality control: 2 hours/day, 8 days/year*

Once the notified chemical is received and stored at the notifier's warehouse, the neat chemical product will be sampled and analysed by QC chemists. Although full details of the QC procedure are not described, these will entail opening and sampling of neat product containers for laboratory analysis to test the product against its specifications. Sampling of the containers is conducted by operators at the notifier's warehouse involved in the repackaging of the imported chemical (see below). Exposure to the notified chemical may occur via inhalation of aerosols, but this is expected to be negligible given the low volatility of the chemical and the small amounts handled during QC testing. Main route of exposure of QC chemists to the chemical is expected to be via skin and/or eye contact. However, dermal and ocular exposure is expected to be low given the engineering control measures such as general ventilation, and the use of personal protective equipment such as laboratory coats, gloves and safety glasses when handling the notified chemical. The notifier indicated that four chemists would be involved in QC testing.

- *Product packaging and clean up: 2-5 hours/day, 30 days/year*

Under some circumstances repackaging of the imported polymer product into stainless steel returnable units (Portafeeds) of various sizes will be carried out at the notifier's warehouse. The chemical will be decanted and repacked using automatic pumping equipment with secured pipes and valves either directly into the alternate containers (ie. Portafeeds) or via a decanting vessel in a well-ventilated area. The decanting vessel, when used, will be washed and cleaned out for further use. It is estimated that three operators will be involved in repackaging no more than 1 000 L of product per day. Further sampling will be conducted for QC testing following repackaging.

Operators may receive dermal and eye contact with IRONGUARD from drips and spills as pipes and valves are connected/disconnected and during clean up procedures. The notifier indicates that their facility has never experienced significant spills during the transfer/repackaging of similar products. It was also indicated that repackaging operators are required to wear coveralls, chemical resistant gloves and chemical splash goggles. Inhalation exposure is expected to be minimal given the low volatility of the chemical and the use of appropriate engineering controls and personal protective equipment.

Customer service and assurance: 1-4 hours/day, 60 days/year

The notifier indicated that they would supply the notified polymer directly or after repackaging to customers for use in wastewater treatment. Sales representatives will assist customers in setting up the appropriate feed equipment used to dose the chemical into the oily industrial wastewater. They will also assist in verifying dosage levels as required for each process application. Approximately seventy sales representatives will be involved in promotion and demonstration of the notified chemical product and its use. Exposure to the chemical may occur mainly by skin/eye contact during handling of the neat product. The notifier indicated that sales representatives are required to wear coveralls, chemical resistant gloves and chemical splash goggles. Exposure by inhalation is expected to be negligible for the same reasons described above.

The notifier indicated that their personnel undergo induction and refresher training in the safe handling of equipment and chemicals and emergency procedures. It was also indicated that Material Safety Data Sheets (MSDS) are made available to all personnel.

- *Customer site operations: 1-2 hours/day, 340 days/year*

Wastewater treatment involves setting up the dosing/feeding equipment to the effluent generated from typical industrial operations, eg. food processing plants, machinery manufacturers or iron and steel industries. In a typical industrial setting, the wastewater treatment process is enclosed and automated. In general, the imported product is diluted to a dispersion concentration of approximately 1-2 ppm, depending on the particular application. Exposure to the neat chemical may occur by skin and/eye contact from spills or drips during connection/disconnection of dosing/feeding equipment, testing and calibration of the feed system. The notifier indicated that this occurs over a period of approximately 5-10 minutes. Workers may also be exposed to a diluted form of the chemical in treatment waters, however, this is expected to be negligible given that the water treatment system is fully enclosed and automated. The notifier indicated that automatic dosing/feed equipment and good general ventilation are recommended to customers, and operators would be required to wear coveralls, chemical resistant gloves and chemical splash goggles. Approximately seventy workers (2 at each customer site) are expected to be involved in these operations.

7. PUBLIC EXPOSURE

The notified polymer will be used in industrial sites for the treatment of wastewater, hence members of the public are unlikely to come into contact with the notified polymer. Potential of exposure to the public via contact with treated wastewater is expected to be minimal. If contact occurs, exposure will be negligible because of high molecular weight (> 1 000), which will preclude absorption across the skin or other biological membranes.

8. ENVIRONMENTAL EXPOSURE

Release

The new polymer will be used in industrial waste water treatment, and potentially all will be released to the environment, primarily in association with residual sludge from these facilities or possibly in water discharged from the factories. Although dosing of the polymer would normally be under automatic control, in the event of pump or control equipment failure or in the case of large spills of IRONGUARD, it is possible that effluent discharged from the factories may contain high concentrations of the new polymer. Although it is not possible to realistically quantify the amount of material possibly released in this manner, in view of the potentially high toxicity of the polymer to aquatic species (see further below) such releases could be of significant environmental concern.

Some of the imported product (actual percentage not specified in the notification) will be repackaged from the imported 200 L and 1,000 L drums into PORTA-FEED®[1] shuttle containers at the notifier's site, before distribution to customer sites. Approximately 0.1% of the imported IRONGUARD may be left as residual in empty

[1] The PORTA-FEED® system contains a 'shuttle' tank and a 'base' tank, and eliminates the need for drums. The shuttle tank is used for the transportation of the product. The two tanks are connected via the transfill line hose. Transfer of the product from the shuttle tank is done automatically by the influence of gravity. When the shuttle tank becomes empty it is disconnected and returned to the notifier for reuse.

containers, which would be washed out of the drums, and the wash water sent for on site water treatment before being discharged to the municipal sewer. A maximum of 1,000 L of IRONGUARD would be repackaged on any given day; assuming that this contains 30% of the new polymer, a maximum of 300 grams of polymer would be released from the plant each day as a consequence of repackaging.

Some material would be left in the original (non-returnable) 200 L drums and 1,000 L containers. The fate of residuals in these containers was not described, but usual industrial practice would suggest that the residuals would be washed out and added to the combined plant wastewater, and the cleaned containers sent for recycling. As a worst case scenario it is assumed that 5% of the IRONGUARD is left in the containers, which equates to a maximum residual of 500 kg of the new polymer each year. If this is not washed out, and the drums are simply placed into landfill, then this would be released to the soil compartment at landfill sites.

Fate

The high cationic charge on the polymer imparts a high affinity for negatively charged colloidal material in wastewater, for which it acts as an emulsion breaker and flocculant. In an industrial wastewater treatment plant, the flocculated material would settle to the bottom of thickeners or retention ponds and become assimilated with the waste sludge. The latter would be periodically removed from the plant, and would be either incinerated or placed into landfill. Under normal operating conditions very little of the polymer is expected to be released with effluent water. However, control equipment malfunction or accidents could lead to overdosing in the treatment circuit. In such situations, unless there is sufficient oily or solid material present in the waste with which the polymer can interact (and then become assimilated in the waste sludge), the excess would remain in the water and be released to receiving waters with plant effluent. If the receiving waters contain high concentrations of particulate or colloidal organic matter (eg sewage), then the excess polymer would be expected to interact with this material and become associated with sludge.

The notification included no information on biodegradation, but ready biodegradation of polymers such as the notified IRONGUARD is unlikely. However, once the polymer has become associated with soils or sediments it is expected to biodegrade slowly through biological and abiotic processes, with ultimate formation of oxides of carbon and nitrogen under aerobic conditions. If the soils or sediments are anaerobic, some methane and ammonia may also be produced.

Biological membranes are not permeable to polymers of very large molecular size and therefore bioaccumulation of the notified polymer is not expected. Also, its high water solubility and expected low P_{OW} will limit its bioavailability and hence bioaccumulation.

9. EVALUATION OF TOXICOLOGICAL DATA

No toxicological data were submitted for evaluation.

10. ASSESSMENT OF ENVIRONMENTAL EFFECTS

Ecotoxicity tests were conducted using US EPA protocols. The results of these tests indicate that the new polymer is essentially non-toxic to all four species tested, with algae being the most sensitive with an EC_{50} (5 day) = 150 mg/L. However, these results appear to be different from the significant toxicity usually exhibited by cationic polymers, and this is discussed further below.

Test	***Species***	***Results (Nominal)***
Acute Toxicity TSCA 797.1400 (US EPA)	Fathead minnow *Pimephales promelas*	LL_{50} (96 h) > 1,000 mg/L NOEC* (96 h) > 1,000 mg/L
Acute Toxicity TSCA 797.1400 (US EPA)	Rainbow trout *Oncorhynchus mykiss*	LL_{50} (96 h) > 1,000 mg/L NOEC (96 h) > 1,000 mg/L
Acute Immobilisation TSCA 797.1300 (US EPA)	Water Flea *Daphnia magna*	EL_{50} (48 h) > 1,000 mg/L NOEC (48 h) > 1,000 mg/L
Growth Inhibition TSCA 797.1050 (US EPA)	Algae *Scenedesmus capricornutum*	ECb_{50} (120 h) =150 mg/L NOEC (120 h) = 37 mg/L ECr_{50} (120 h) = 710 mg/L

* NOEC - no observable effect concentration

The definitive acute toxicity test with fathead minnow was performed under static conditions using a control (no test substance) and a single solution of IRONGUARD prepared with nominal concentration of 1,000 mg/L; no insoluble material was observed throughout the duration of the test (Boeri & Ward, 1999a). The temperature, pH and dissolved oxygen levels during the tests were 22 ± 2^{o}C, between 6.6 and 7.7 and between 4.3 and 9.0 mg/L, respectively, while the water hardness was around 48 mg/L as $CaCO_3$. The test was performed in triplicate using ten fish in each 20 L test vessel. No mortality of the test animals or sub-lethal effects was observed over the 96 hours test period, and it was concluded that the 96 hours LL_{50} is greater than 1,000 mg/L, and that the polymer is non toxic to this species.

The definitive acute toxicity test with rainbow trout was performed in a similar manner to the fathead minnow test, except that the temperature was maintained at 12 ± 2^{o}C, the pH between 6.5 and 7.7, the dissolved oxygen between 7.9 and 10.2 mg/L, and water hardness was around 44 mg/L as $CaCO_3$ (Boeri & Ward, 1999b). The test was performed in triplicate using ten fish in each 20 L test vessel. No fish mortality or sub lethal effects were observed over the 96 hours test period, and it was concluded that the 96 hours LL_{50} is greater than 1,000 mg/L, and that the polymer is non toxic to this species.

The definitive immobilisation tests with daphnia were also performed under static conditions using a control (no test substance) and a single solution of IRONGUARD prepared with nominal concentration of 1,000 mg/L; no insoluble material was observed at any time (Boeri & Ward, 1999c). The temperature, pH and dissolved oxygen levels during the tests were 20.4 ± 0.4°C, 7.1 ± 0.2 and 8.5 ± 0.2 mg/L, respectively, while water hardness was around 170 mg/L as $CaCO_3$. The test was performed in triplicate using ten daphnia in each test vessel. No immobilisation of any of the test animals was observed over the 48 hours test period, and it was concluded that the 48 hours EL_{50} is greater than 1,000 mg/L, and that the polymer is non toxic to this species.

Tests on algal growth inhibition were also performed with solutions of the new polymer prepared at the nominal concentrations of 0 (control), 37, 75, 125, 250, 500 and 1,000 mg/L (Boeri & Ward, 1999d). The test was conducted under static conditions at a temperature of 24±1 °C. Both growth of algal biomass and the rate of biomass growth were monitored over the 120 hours test period; the results are tabulated above. The results indicate that the new chemical is practically non toxic to algae. Further, a supplementary test conducted at the conclusion of the definitive test, using samples taken from the 1,000 mg/L test vessels over, indicated that the material is algicidal rather than algistatic at this concentration, since no increase in algal biomass was observed over 216 hours.

The data was analysed using statistical methods detailed by Bruce and Versteeg (Bruce & Versteeg, 1992), and the No Observed Effect Concentration (NOEC) estimated as 37 mg/L from the growth in biomass. These results indicate that the new polymer is practically non toxic to this species of green algae.

The new polymer is cationic with a high density of quaternary amine groups. There exists a large body of information indicating that polymers with these structural features may be highly toxic to aquatic species. For example, Boethling and Nabholz (Boethling & Nabholz, 1997) state *"Cationic polymers of concern for aquatic toxicity include polymers that contain a net positively charged atom or that contain groups that can reasonably be anticipated to become cationic in water (U.S. EPA, 1996)."* These authors also supply a list of toxicities associated with representative polymers containing amino nitrogen. Typical toxicities towards fish, daphnia and algae for polymers containing around 6% amino nitrogen (as does the present polymer) are 0.1-1.0 mg/L, 0.07-3.0 mg/L and 0.01-0.04 mg/L, respectively. These toxicity levels are between 3 and 5 orders of magnitude higher than the measured toxicity values for the new polymer.

However, it should be pointed out that neither measured analytical data for the actual concentration of test material was presented in any of the four reports submitted, nor was any data on the concentration of total organic matter (dissolved and particulate), that may associate with the polymer and effectively reduce or remove its potential exposure to the test organisms in the test media presented. While the apparent low toxicity of the new polymer to aquatic species is of great interest, given that similar polymers have been shown to be several orders of magnitude more toxic, without having further corroborating evidence it would be prudent to treat the present results with caution. Further comment on these very encouraging toxicity results was requested from the company during the present assessment, but no response was obtained.

11. ASSESSMENT OF ENVIRONMENTAL HAZARD

On those days where repackaging of IRONGUARD takes place, up to 300 grams of the notified polymer may be released to the notifier's on-site wastewater treatment facility. This effluent treatment plant treats a minimum of 50,000 L per day that is released via sewer to the Malabar Sewage Treatment Works (STW). The effluent from the STW is released via deep ocean outfall discharge. Therefore, in a worst case scenario where none of the polymer is removed in sludge, the notifier estimates that a concentration of 6 ppm may be released to sewer. Assuming a 1:100 dilution factor at the STW, the polymer will be released at a concentration of approximately 60 ppb to the ocean, where further dilution of 1:10 is expected to occur. Therefore, the predicted environmental concentration (PEC) from repackaging activities is estimated to be approximately 6 ppb.

Typically, the new polymer would be dosed into industrial water treatment circuits at a concentration of 1-2 mg/L, but much of the polymer is then expected to become associated with waste sludges from these facilities, with little remaining in effluent water discharged to the environment. However, in the event of failure of process control equipment waters could be released containing significant concentrations of the new polymer. As a worst case scenario, a large industrial effluent plant may treat 5,000,000 L of waste each day, and assuming a dosing concentration of 2 mg/L, this equates to a daily use of 10 kg of the new polymer. Assuming all this is released into the waste stream in one hour (overall flow = 5 x 106/24 = 200,000 L/hr, approximately) as a result of control failure, the discharged effluent may have a polymer concentration as high as 50 mg/L. If this was discharged to a metropolitan sewer system (dilution factor 10), followed by sewage plant effluent dilution by a further factor of 10, and assuming no removal through association with solid material in the sewage, the final PEC may be as high as 0.5 mg/L. Considering that the reported toxicity of the polymer against algae gives an ECb_{50} (120 h) of 150 mg/L, this PEC indicates a considerable safety margin. In addition, this is a worst case scenario, and exposures at this level should in any case be of relatively short duration assuming control equipment faults are noticed and rectified promptly. However, for reasons discussed further below, this result should be treated with caution.

Some of the effluent from industrial plants likely to use the new polymer (for example, dairy food processing factories) is used for irrigation of pasture. Consequently, some of the polymer may be discharged to the soil compartment. Although biodegradation in this situation may not be very rapid, it is considered unlikely that residual polymer would build up to toxic levels in this compartment.

These scenarios would indicate a low environmental hazard as according to ecotoxicity test reports submitted, the polymer is non toxic to fish and daphnia, and practically non toxic to algae with the 120 hour ECb_{50} = 150 mg/L and corresponding No Observed Effect Concentration (NOEC) = 37 mg/L. However, these results are significantly different from other highly cationic polymers with significant amine group content. Typically, such polymers have been shown to be several orders of magnitude more toxic than IRONGUARD. For example, toxicity data from Boethling and Nabholz (1997) for polymers with carbon backbones containing around 6% amino nitrogen indicate that acute toxicity towards aquatic species may be very high, with EC_{50} for algae as low as 0.01 mg/L. This is more than two orders of magnitude lower than the PEC estimated above, and even taking into account that this was based on a worst case release scenario, indicating that there may be a low safety margin for detrimental environmental effects.

Consequently, since there is considerable uncertainty in respect of the ecotoxicity of the polymer (see above), the apparent safety margins may grossly underestimate the potential environmental hazard posed by accidental release of the polymer to receiving waters. In the absence of additional corroborating evidence, such as provision of measured analytical concentrations of the polymer or TOC data (see above), the presently available ecotoxicity results and safety margins for environmental effects should be treated with caution.

Conclusions

The notified polymer is not likely to present a hazard to the environment when it is stored, transported and used in the typical manner. However, while the material has been shown to exhibit only moderate toxicity to algae and is not toxic to either fish or daphnia, these results should be treated with caution. Many similar cationic polymers have been shown to be many times more toxic to fish, daphnia and algae, and there is no obvious reason why the present material is so significantly less toxic.

12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

No toxicological studies were submitted for the notified polymer and therefore it was not possible to assess the polymer against the *NOHSC Approved Criteria for Classifying Hazardous Substances* (National Occupational Health and Safety Commission, 1999). The polymer solution is not classified as a dangerous good according to the Australian Dangerous Goods Code.

The MSDS for the polymer solution lists a number of potential health effects, namely mild eye and skin irritation, which likely relate to the weak acidity of the polymer solution.

The MSDS recommends rubber or PVC gloves for workers handling the notified polymer.

Occupational Health and Safety

Transport and Storage

Exposure to the notified polymer is not expected during transport or storage as long as the packaging remains intact. Exposure after a spill would be controlled by use of the recommended practices for spillage clean up given in the MSDS supplied by the notifier. The risk of adverse health effects for transport and storage workers is considered low.

Sampling, repackaging and application

Occupational exposure to IRONGUARD, which contains 10-30% of the notified polymer, may occur during quality control sampling and testing and during repackaging operations from drips and spills as workers connect/disconnect pumping equipment. Additionally, exposure may occur during clean up procedures of containers and vessels used. Inhalation exposure is expected to be insignificant since aerosol formation is unlikely to occur since the notified polymer is of low volatility. Also, general ventilation is employed throughout the manufacturing process to minimise aerosols/vapours in the work area.

Skin and eye contact will be the main routes of exposure. The notified polymer has a high molecular weight (NAMW > 1 000) and significant dermal absorption through intact skin is not expected. Despite the anticipated non-hazardous nature of the notified polymer, the potential for mild skin/eye irritation exists given its weak acidic nature. Workers will need to wear coveralls, chemical resistant gloves and chemical splash goggles.

Dermal or ocular exposure may also occur while setting up the dosing/feeding equipment and testing the dosage level. Exposure to the notified polymer during these procedures would be restricted to spills generated from connection/disconnection of dosing equipment and is expected to be minimal because the process is enclosed and automated. Exposure to the polymer once dosed into wastewater is also negligible given its dilution to a dispersion concentration of 1-2 ppm (as product). Accordingly, the risk of adverse health effects is also negligible. The notifier states that workers will be wearing the same personal protective equipment described above.

Overall, the controls employed in the workplace minimise dermal and ocular exposure and therefore reduce the risk of workers experiencing dermal and eye irritation.

Public health
The notified polymer will be used in industrial sites for the treatment of wastewater, which may be reused on site. Potential of exposure to the public via contact with treated wastewater is expected to be minimal. If contact with the notified polymer occurs, exposure will be negligible because the high molecular weight (> 1 000) precludes absorption across the skin or other biological membranes.

Based on the above information, it is considered that the notified polymer in IRONGUARD will not pose a significant hazard to public health when used in the proposed manner.

13. RECOMMENDATIONS

To minimise occupational exposure to the polymer in IRONGUARD the following guidelines and precautions should be observed:

- Safety goggles should be selected and fitted in accordance with Australian Standard (AS) 1336 (Standards Australia, 1994) to comply with Australian/New Zealand Standard (AS/NZS) 1337 (Standards Australia/Standards New Zealand, 1992); industrial clothing should conform to the specifications detailed in AS 2919 (Standards Australia, 1987) and AS 3765.1 (Standards Australia, 1990); impermeable gloves should conform to AS/NZS 2161.2 (Standards Australia/Standards New Zealand, 1998); all occupational footwear should conform to AS/NZS 2210 (Standards Australia/Standards New Zealand, 1994);

- Spillage of the notified chemical should be avoided. Spillages should be cleaned up promptly with absorbents which should be put into containers for disposal;

- Good personal hygiene should be practised to minimise the potential for ingestion;

- A copy of the MSDS should be easily accessible to employees.

14. MATERIAL SAFETY DATA SHEET

The MSDS for the notified polymer in IRONGUARD was provided in a format consistent with the *National Code of Practice for the Preparation of Material Safety Data Sheets* (National Occupational Health and Safety Commission, 1994).

This MSDS was provided by the applicant as part of the notification statement. It is reproduced here as a matter of public record. The accuracy of this information remains the responsibility of the applicant.

15. REQUIREMENTS FOR SECONDARY NOTIFICATION

Under the Act, secondary notification of the notified polymer may be required if:

i) the conditions of use are varied from that notified (ie. as an agent to treat wastewater at industrial sites), as greater exposure of the public may occur. In such circumstances, further information may be required to assess the hazards to public health any of the circumstances;

ii) the method of use changes in such a way as to greatly increase the environmental exposure of the notified polymer;

iii) additional information becomes available on adverse environmental effects of the polymer- for example, revised ecotoxicity data;

iv) other conditions stipulated under subsection 64(2) of the Act arise.

No other specific conditions are prescribed.

16. REFERENCES

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