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NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME

FULL PUBLIC REPORT

Polymer in Resin QRXP-1552

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Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT

Polymer in Resin QRXP-1552

1. APPLICANT

Rohm and Haas Australia Pty Ltd of 4th Floor, 969 Burke Rd CAMBERWELL VIC 3124 has submitted a limited notification statement in support of their application for an assessment certificate for Polymer in Resin QRXP-1552.

2. IDENTITY OF THE CHEMICAL

The following requests for exempt information were accepted: chemical name, molecular and structural formulae, exact molecular weight, constituents and spectral data.

Marketing Name:	Resin QRXP-1552 contains 25% of the notified polymer in water
Method of Detection and Determination:	gel permeation chromatography report and infrared spectrum were provided for assessment

3. PHYSICAL AND CHEMICAL PROPERTIES

Appearance at 20°C and 101.3 kPa:	the imported resin is a clear to hazy yellow/orange aqueous solution
Boiling Point:	100°C (resin solution)
Specific Gravity:	1.0 – 1.2 (resin solution)
Vapour Pressure:	2.3 kPa at 20°C (resin solution)
Water Solubility:	Resin QRXP-1552 is an aqueous solution of the notified polymer
Partition Co-efficient (n-octanol/water):	log $P_{ow} < 2$
Hydrolysis as a Function	loss of cationic functional group on polymer solids at

of pH:	pH 9.5 heated for 10 days at 60°C
Adsorption/Desorption:	not determined; based on log P_{ow}, not expected to bind strongly to organic matter in soil
Dissociation Constant:	$pK_{½}$ = 7.1 for cationic functional group and $pK_{½}$ = 9.5 for the carboxylic acid group.
Particle Size:	not applicable, as polymer not isolated from solution
Flash Point:	not determined (aqueous solution)
Flammability Limits:	not determined (aqueous solution)
Autoignition Temperature:	not determined (aqueous solution)
Explosive Properties:	not expected to be explosive
Reactivity/Stability:	not expected to be reactive

Comments on Physico-Chemical Properties

The polymer is very soluble in water. No test was conducted but it is imported in a 25% aqueous product. The high solubility is likely to be due to the presence of the charged amino group.

To determine the hydrolysis of the notified polymer the notifier heated a sample of the resin at pH 9.5 at 60°C for 10 days. This resulted in a 1% loss of the cationic functional group. From this result, it can be presumed that the hydrolysis of the polymer is low in the environmental pH range $4 \leq pH \leq 9$.

The partition coefficient was determined by a conventional flask method containing n-octanol and water. The low partition coefficient indicates low soil sorption. This supports the notifier's statement that the polymer is not expected to bind strongly to organic matter in soil. However, due to the presence of the cationic charge it is likely that the polymer will adsorb onto mineral and clay particles in soil.

4. PURITY OF THE CHEMICAL

Degree of Purity: > 99%

Toxic or Hazardous Impurities:

Chemical Name	*CAS No.*	*Weight %*
ammonium hydroxide	1336-21-6	0.3% (max.)

Non-hazardous Impurities (> 1% by weight): None

Maximum Content of Residual Monomers/Reactants: < 0.2%

Additives/Adjuvants: None

5. USE, VOLUME AND FORMULATION

Use
The notified polymer is to be used as a component in the manufacture of acrylic emulsion polymers, which in turn are to be used in road marking paints. The acrylic emulsion and the paint will contain less than 2% of the notified polymer.

Volume
The projected import volume is approximately 0.5 tonnes in the first year increasing to 2.5 tonnes per year by the fifth year. The notified polymer will be imported in an aqueous solution containing 25% of the notified polymer and 0.3% ammonium hydroxide.

Formulation
There will be three distinct stages of use of the notified polymer: Stage 1 is emulsion production, Stage 2 is paint production, and Stage 3 is paint application.

Stage 1: Polymer Emulsion Production
The resin will be stored and used at the notifiers plant in the manufacture of an acrylic polymer emulsion containing less than 2% of notified polymer.

The imported resin solution containing 25% notified polymer will be pumped from 200 L drums to a pressure-rated reaction vessel of 500 L to 1 000 L capacity and produce polymer emulsions via exothermic thermal polymerisation. The vessel is vented to a caustic scrubber to remove vapours and contains a pressure-rated bursting disk. The polymer emulsion is transferred through a hard piped system to a secondary holding vessel where more ingredients, usually water, are added. The final concentration of notified polymer in the polymer emulsion is less than 2%. The emulsion is then filtered and transferred via hard

piping into 15 to 20 tonne bulk storage tanks. The emulsion is then transferred to bulk road tankers or 200 L drums. The polymer emulsion will be distributed to potentially 5 to 10 paint manufacturers throughout Australia for reformulation into aqueous road marking paints.

Stage 2: Paint Manufacturing
The polymer emulsion is added to paint mixing vessels. The final paint will be filled into 1, 4, 10 or 20 L epoxy lined steel cans. Exhaust ventilation systems are used to handle any vapours/volatile material that may be released during these activities. In this process, the addition of the emulsion to the mixing vessels may be done either by a manual or a fixed system. The final concentration of the notified polymer in paint is less than 2%.

Stage 3: Paint Application
The paint is applied to roads via a spray system. The size and type of spray equipment used will vary from large truck mounted systems down to small hand pushed units.

6. OCCUPATIONAL EXPOSURE

Transport and Storage
The notified polymer will be imported in 200 L steel drums and transported to the notifier's plant. The notifier states that 5 waterside workers, 15 transport drivers and 5 warehouse workers will work up to 2 hours per days on 20 days per year. Exposure to the notified polymer should only occur in the event of accidental spillage.

Polymer Emulsion Production
The notifier states that 15 plant operators will be potentially exposed for 0.5 hours per day, 30 days per year loading resin solution to the reactor and 40 days per year filtering the emulsion and loading it to drums or road tankers. The notifier states that all manufacturing areas are fitted with local and general ventilation and the mixing vessels are within bunded areas. The most likely exposure to plant operators and transport workers would be from drips, leaks and spills during pumping of the resin solution to the reactor vessel and transfer of the polymer emulsion to road tankers and drums. Exposure would most likely be dermal with the possibility of transfer from the hands to other parts of the body. The notifier states that plant operators who come into contact with the resin solution must wear safety glasses, impervious (neoprene) gloves, coveralls and safety boots. Plant operators and transport workers who come into contact with the polymer emulsion wear safety glasses and impervious gloves. Five laboratory technicians are involved in sampling and testing the reaction mix for 0.5 hours per day, 30 days per year. Typically, small samples will be removed from a dedicated port in the reactor vessel and it is assumed the workers would wear impervious gloves and safety glasses since the samples may be at an elevated temperature.

Paint Manufacturing
At the paint manufacturer, workers will transfer the polymer emulsion to paint mixing vessels from bulk storage tanks or from 200 L drums. Pumping from drums is done by placing a spear into the drum and pumping out the contents. The notifier states that 40 to 50 paint makers are involved in loading polymer emulsion to the mixer and taking QC samples of paint from the mixer for 4 hours per day, 30 days per year. Exposure to drips, leaks and spills is possible. Twenty paint technicians are involved in manufacture of paint and testing for 6 hours per day, 30 days per year and QC testing of manufactured paint for 1 hour per day, 30

days per year. The notifier states that paint technicians involved in paint formula development, quality control testing and plant operators involved in paint manufacture, sampling and packing must wear impervious gloves, coveralls and safety glasses. Manufactured paint is filled into 1, 4, 10 or 20 L epoxy lined steel cans under local exhaust ventilation.

Paint Application
The notifier states that the paint is applied by spray in road marking by professional paint contractors and workers within certain Government departments. An estimated 50 to 100 workers are involved. After use, spray nozzles are cleaned under pressure. Workers are anticipated to follow safety instructions on the can and specific industry guidance material. No other details on end use were provided

7. PUBLIC EXPOSURE

The notified polymer in Resin QRXP-1552 will be imported and stored at the notifier's warehouse. At this site the resin is reformulated into acrylic emulsion polymers, then distributed in bulk road tankers or steel drums to five to ten paint manufacturers throughout Australia.

The polymer in Resin QRXP-1552 will not be sold to the public. Public exposure to the resin will only occur in the event of an accidental spill. The material safety data sheet (MSDS) give instructions to enable workers to deal with accidental spills. The procedure involves containment of the spillage, absorption onto inert material, for example, sand or earth, and collection into containers, which are then sealed and disposed of according to local regulations. Disposal is by coagulating the emulsion by stepwise addition of ferric chloride and lime. Prompt attention to spillages is needed to prevent spill and clean up material from entering waterways.

The road marking paints will be applied with paint spray equipment by both contractors and Government departments.

The potential for public exposure to the notified polymer during transport, reformulation and road marking operations or from disposal is assessed as negligible. The notified polymer will be present in low concentration in the road marking paint (less than 2% of the polymer) has a low volatility and roads are closed to the public during road marking operations, hence public exposure to the notified polymer will be negligible.

8. ENVIRONMENTAL EXPOSURE

Release

Polymer Emulsion Production
During the transfer of the resin from the imported drums it is estimated that there will be a 1% loss of the notified polymer. This equates to an annual loss of 5 kg in year one up to 25 kg in year five. Spills will be contained by bunding and washed into the on-site plant latex disposal system.

The notifier has estimated that 2% of the drum contents (ie 4 kg) will remain in the drum after the resin has been emptied. This means that in every empty drum 1 kg of notified polymer will remain as waste. Annually, this would produce 10 kg in year 1 and 50 kg in year 5 of waste notified polymer.

Washing of production equipment would produce 1.25 kg per batch. The estimated 30 batches in year five, would generate 37.5 kg of waste notified polymer. The washwater will then go to the on-site plant latex disposal system.

The notifier has estimated that the waste streams from emulsion production will contain 0.002% (20 ppm) of the notified polymer. The waste streams are treated with ferrous sulphate and sodium hydroxide in concrete lined flocculation pits. This causes the notified polymer to precipitate. The clear supernatant undergoes pH neutralisation and as long as the polymer concentration is less than 1 ppm, is used for irrigation on site. The precipitated polymer is transferred to a settling pit to dry then is disposed of to a licensed waste landfill site. This description is assumed to represent the on-site plant latex disposal system mentioned in the report.

The total amount of waste notified polymer generated in year 5 would be 112.5 kg (50+25+37.5), which will go to landfill or for incineration.

Waste drums will go to licensed drum reconditioners.

The notified polymer has a low volatility, so there will be negligible amounts released into the atmosphere.

Paint Manufacture
Licensed industrial waste contractors will remove all residues and spills. They will treat the waste then dispose of the material at a liquid waste treatment facility. The amount of waste notified polymer per paint producer is estimated to be 0.5 kg/year. If the polymer emulsion is distributed to 5-10 paint manufactures (as indicated by the notifier) the maximum amount of waste generated annually will be 5 kg. This may increase during the first five years.

Any contaminated solids will be disposed of at a licensed landfill or incinerated.

Any water used to clean the production equipment will be utilised in subsequent production batches.

Paint Application
The notifier has indicated that there will be a range of size and type of spray equipment used to apply the road marking paint (e.g. truck mounted units for highway marking and hand pushed units for carpark marking). However, the notifier has only discussed the highway marking scenario, which is likely to include the worst case situation.

The spray equipment is not cleaned at the end of a run. However, at the beginning of a run the spray nozzles are cleared under pressure. The waste material is collected in a can, which is allowed to dry and disposed of to landfill. It is estimated that a maximum of 0.5 mL of notified polymer will be lost each time spray nozzles are cleared. These systems should be 'closed', however, the notifier has indicated that the nozzles maybe cleared onto the ground and the paint covered with soil. In country areas the line marking trucks clear spray nozzles two to three times a day. If the nozzles are cleared three times a day then 1.5 mL or 1.8 mg (specific gravity 1.0–1.2) of notified polymer will be wasted a day by each truck. No indication has been given as to how many trucks will be involved or how may days per year they will be used. Therefore, an annual loss of notified polymer from this source cannot be calculated.

As expected of a 'closed' system, the truck carries a tank of water that is used to supply water for washing and store the resultant washwater. The notifier has indicated that all such washings will be done on council or contract sites. The notifier indicates that the washwater should be disposed of in accordance with EPA and local council regulations, but believes that current practice, namely, 'washwater may also be washed down the drain with copious amounts of water' will also occur. The amount of waste notified polymer generated via washings is estimated to be 30 kg/year. If the drain concerned is the stormwater drain there is the potential for the paint to end up in a watercourse.

Fate

The notified polymer is not reactive, is not expected to bind strongly to soil organic matter and is highly soluble. Taking these factors into account the notified polymer may leach out of landfills or soil at sites of nozzle clearing. This is not of concern at the sites of paint disposal, because the notified polymer is present in the paint at a very low percentage.

A large proportion of the wastes generated will end up in a landfill. Polymer that comes into contact with the soil should bind with the clay/mineral particles due to the presence of a positive charge. The immobilisation and the large NAMW indicate that the polymer should not cause a problem in the environment.

The road paint will deteriorate upon exposure to the elements and traffic, however the notified polymer is expected to remain bound in the paint matrix. Once the paint has dried the matrix will be stable.

9. EVALUATION OF TOXICOLOGICAL DATA

No toxicological data needed to be supplied as this is a limited notification. However, some data were available for an analogue, QR-1160. The analogue is somewhat similar in structure to the notified polymer. It contains two of the same constituent monomers, at different concentrations to the notified polymer. The analogue polymer is present at 5 to 7%, compared to 25% notified polymer in aqueous formulation. Consequently, the toxicity evaluation for the notified polymer is adjusted to account for the difference in concentration.

9.1 Acute Toxicity

Summary of the acute toxicity of Component of QR-1160

Test	*Species*	*Outcome*	*Reference*
acute oral toxicity	rat	LD_{50} > 5 000 mg/kg	(Krzywicki, 1986c)
acute dermal toxicity	rabbit	LD_{50} > 5 000 mg/kg	(Krzywicki, 1986a)
skin irritation	rabbit	non-irritant	(Krzywicki, 1986d)
eye irritation	rabbit	slight to moderate irritant	(Krzywicki, 1986b)

9.1.1 Oral Toxicity (Krzywicki, 1986c)

Species/strain:	rat/albino, Charles River CRCD
Number/sex of animals:	10/male
Observation period:	14 days
Method of administration:	oral gavage, vehicle unspecified but notified polymer administered as a viscous liquid
Clinical observations:	None
Mortality:	None
Morphological findings:	None
Test method:	similar to OECD TG 401
LD_{50}:	> 5 000 mg/kg
Result:	QR-1160 was of very low acute oral toxicity in rats

9.1.2 Dermal Toxicity (Krzywicki, 1986a)

Species/strain:	rabbit/New Zealand White
Number/sex of animals:	6/male
Observation period:	14 days
Method of administration:	viscous test liquid under occlusive dressing for 24 hours
Clinical observations:	well-defined to moderate erythema and very slight to slight oedema were observed on day 1; oedema was no longer evident on day 3; erythema persisted throughout the study (actual data was not shown)
Mortality:	None
Morphological findings:	None
Test method:	similar to OECD TG 402
LD_{50}:	> 5 000 mg/kg
Result:	QR-1160 was of low acute dermal toxicity in rabbits

9.1.3 Skin Irritation (Krzywicki, 1986d)

Species/strain:	rabbit/New Zealand White
Number/sex of animals:	6/male
Observation period:	72 hours
Method of administration:	0.5 mL of the viscous liquid test substance under occlusive dressing for 4 hours
Test method:	similar to OECD TG 404
Comment:	no Draize score greater than zero was observed in any animal at 1, 24, 48 or 72 hours after patch removal
Result:	QR-1160 was not a skin irritant in rabbits

9.1.4 Eye Irritation (Krzywicki, 1986b)

Species/strain:	rabbit/New Zealand White
Number/sex of animals:	9/male
Observation period:	7 days
Method of administration:	0.1 mL of the viscous liquid test substance applied to the corneal surface; eyelids held open momentarily then released
Test method:	similar to OECD TG 405
Observations:	observation times were 24, 48 or 72 hours and 7 days *irrigated eyes (6 animals)* no iridal effects were observed in any animal Draize scores for the cornea were zero but following application of 2.0% sodium fluorescein at 48 hours, the entire cornea appeared hazy in 1 rabbit, a streaky haze was observed in 1 rabbit and a stain to the center of the cornea was observed in 1 rabbit conjunctival effects were observed at 24 hours; were reported as a sum of the Draize scores for redness, chemosis and discharge; it must be assumed (for it is not stated) that the sum of the effects were multiplied by 2 as implied in the protocol; therefore, the actual sums of conjunctival effects were 1 in 4 rabbits and 5 in 1 rabbit at 24 hours *non irrigated eyes (3 animals)* the sum of the scores of the conjunctival effects in one rabbit was 1; no other scores greater than zero were recorded for corneal, iridal or conjunctival effects
Result:	QR-1160 was a slight to moderate eye irritant in rabbits

9.2 Overall Assessment of Toxicological Data

QR-1160 containing the analogue polymer at 5 to 7% exhibited very low acute oral toxicity in rats (LD_{50} > 5 000 mg/kg) and low acute dermal toxicity in rabbits (LD_{50} > 5 000 mg/kg). It was not a skin irritant in rabbits and was a slight to moderate eye irritant in rabbits.

No toxicological data were required for the notified polymer. However, the notifier furnished data on a solution of an analogue, QR-1160. QR-1160 contains an acrylic polymer at a concentration of 5 to 7%, up to 5 times lower than for the notified polymer in QRXP-1552. This extrapolates roughly to an oral and dermal LD_{50} for the aqueous formulation of QRXP-1552 of >1 000 mg/kg. Other parameters, such as high number-average molecular weight, low levels of residual monomers (< 0.2%) and low levels of low molecular weight species would not add to the systemic toxicity. The observation that QR-1160 is not a skin irritant is of little value in determining the irritancy of the notified polymer. However, given that QR-1160 is a slight to moderate eye irritant, QRXP-1552 and the notified polymer would be at least moderately irritating to the eye.

QR-1160 is not determined to be a hazardous substance according to NOHSC *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 1999) in terms of the toxicological data supplied.

10. ASSESSMENT OF ENVIRONMENTAL EFFECTS

No ecotoxicological data for the polymer or resin QRXP-1552 were provided. However, the notifier did provide ecotoxicological data for an analogue resin QR-1160.

The analogue polymer was composed of three functional groups, two of which occur in the notified polymer. The analogue contains 5 to 7% acrylic polymer and 93% water while QRXP-1552 contains 25% acrylic polymers (up to 5 times the acrylic polymer content) and 75% water.

Ecotoxicology studies were conducted with the four organisms under controlled laboratory conditions by the Aquatic Toxicology Division of Analytical Bio-chemistry Laboratories, Columbia. The procedure used for the fish and daphnia came from the Methods of Acute Toxicity Tests with Fish, Macroinvertebrates and Amphibians and Standard Methods for Examination of Water and Wastewater.

Ecotoxicity data (mg/L) for the analogue QR-1160			
Species	***Test***	***Concentrations (mg/L)***	***Result (mg/L)***
Rainbow trout	96 h acute	0, 0.3, 0.6, 1.2, 2.5, 5, 10	LC50 = 3.3
(Oncorhynchus mykiss)			NOEC = 0.6
Bluegill sunfish	96 h acute	0, 3.2, 5.6, 10, 18, 32, 56	LC50 = 8.0
(Lepomis macrochirus)			NOEC = 3.2
Water Flea	48 h acute	0, 10, 18, 32, 56, 100	EC50 = 43
(*Daphnia magna*)			NOEC = 18
Alga	96 h growth	0, 0.5, 1.0, 2.0, 4.0, 8.0	EC50 = 1.6
(*Selenastrum capricornutum)*			NOEC = 1.0

10.1 Fish Acute Toxicity (Bowman, 1986a; Bowman, 1986b)

Duplicate, 96-hr static acute studies were conducted on Rainbow trout and Bluegill sunfish. The studies used soft reconstituted water. For each replicate concentration, 10 fish were assigned, 30 minutes after QR-1160 had been added. Observations were made once every 24 hours at which time any dead animals were removed. Duplicate dilution water controls were also conducted and temperature, mortality, abnormal effects (such as surfacing, loss of equilibrium and rapid respiration) and feeding times were recorded. A computer program was used to conduct a statistical analysis of nominal concentrations versus observed effect. This gave the LC_{50} and the 95% confidence limits. The NOEC for rainbow trout was determined based on abnormal effects such as surfacing, loss of equilibrium, and dark discolouration observed at 1.2, 2.5, 5 and 10 mg/L. The NOEC for the bluegill sunfish was determined based on abnormal effects of mortality, surfacing and/or rapid respiration observed at 5.6, 10, 18, 32 and 56 mg/L.

10.2 Aquatic Invertebrate Acute Toxicity (Schoen,1986)

Duplicate 48-hour static acute immobilisation studies was conducted on daphnia. Duplicate controls and five duplicate concentrations of QR-1160 using aged well water with 10 daphnia were observed over 48 hours for death, immobility and abnormal effects. The beakers were maintained at 20ºC, with a lighting of 50–70 footcandles on a 16-hour daylight photoperiod including 30 minute dawn and dusk periods. Records were kept of all observations, temperature and feedings. The NOEL was based on the observation of lack of mortality, immobility and other abnormal effects. Abnormal effects, including immobility, surfacing and/or lying on the bottom were observed at 32, 56 and 100mg/L. The EC_{50} values and 95% confidence interval were calculated using an EC_{50} computer program.

10.3 Alga Growth Inhibition Test (Burgess, 1986)

A 96-hour static algal inhibition study using *Selenastrum capricornutum* was conducted in triplicate. Each test flask contained 100 mL of synthetic algal nutrient medium and 1.0 mL of algal inoculum. The resultant mean cell count was 10 000 cells/mL. The temperature was maintained at 24ºC, light intensity was maintained at 400 footcandles and shaker speed was 100 rpm. Records were kept of all observations, temperature and lighting. Statistical analysis was done on the data and the EC50 was calculated using regression analysis models.

10.4 Conclusion

The test procedures and methods used are acceptable for the environment assessment.

The above table shows that the analogue is moderately toxic to fish and alga, but only slightly toxic to daphnia. It is likely that this toxicity is due to the presence of the cationic functional group in the polymer. Since QRXP-1552 contains a high percentage of cationic functional groups, and on the presumption that the composition of the two products is similar (ie there are no unidentified additives present) the likelihood is that it will be more toxic than the analogue. The notified polymer could be on the boundary of being classified as highly toxic to fish and algae and moderately toxic to daphnia.

11. ASSESSMENT OF ENVIRONMENTAL HAZARD

When the notified polymer is used in the production of aqueous road marking paint and used as specified by the notifier, it should pose little environmental hazard. Given that the polymer contains a functional group, which is potentially toxic to aquatic organisms there would be concern if the contents of the imported containers were lost to sewer or receiving waters. However, most of the exposure will come from the materials containing the polymer in small amounts which reduces the hazard.

The greatest hazard will be if some of the imported material is lost to sewer. On this basis a worst case scenario would be if two of the imported 200 mL drums ruptured and lost the entire contents, that is, 100 kg of notifier polymer, to the sewer.

In a metropolitan area:

Volume of water handled	250 ML/day
Quantity of Notified Polymer entering STP[1]	100 kg
Concentration in STP outfall	0.4 mg/L
Dilution in receiving water	1:10
Concentration in receiving water	0.04 mg/L

If it is presumed that QRXP-1552 is up to 10 times more toxic, ie EC_{50} alga = 0.16 mg/L, this worst case PEC is below the likely LC_{50} and EC_{50} levels for fish, daphnia and algae. However, it does underline the need to keep the concentrated polymer out of the aquatic compartment.

[1] Sewage Treatment Plant

The 112.5 kg of waste polymer generated annually by emulsion production will be contained in the precipitate generated in the on site latex disposal system. This material will be taken to landfill. Since the polymer will be in a precipitated form it should be stable and is unlikely to leach out of the landfill.

Generally, at the paint manufacturing plants equipment washwater, containing notified polymer, will be used in the process. It is estimated that the maximum amount of waste polymer that will leave the sites is 5 kg. This will be handled by a licensed liquid waste treatment facility. Any resultant sludges will most probably, go to landfill. This material is not likely to be a hazard to the environment.

The total amount of waste produced is estimated to be 112.5 kg (emulsion manufacture), 5.0 kg (paint manufacture) and 30.0 kg (paint users) per annum. The amount of waste polymer produced annually from nozzle cleaning during application cannot be calculated since it is not know how many trucks will be used or how many days of the year the paint will be applied. In the release section, above, the daily amount of waste polymer from nozzle cleaning is estimated to be 1.8 mg.

The notified polymer will be blended in the paint matrix, and once the paint has cured, the notified polymer it will be very immobile and not available. After curing, losses from exposure to sunlight, weathering and mechanical breakdown will be negligible. Any polymer that comes into contact with the soil should bind with the clay/mineral particles. This, together with the large NAMW of the polymer, indicates that it should not cause a problem in the environment.

12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

No toxicological data were required for the notified polymer. However, the notifier furnished data on a solution of an analogue, QR-1160. QR-1160 contains an acrylic polymer at a concentration of 5 to 7%, up to 5 times lower than for the notified polymer in QRXP-1552. This extrapolates roughly to an oral and dermal LD_{50} for the aqueous formulation of QRXP-1552 of greater than 1 000 mg/kg. Other parameters, such as high number-average molecular weight, low levels of residual monomers (< 0.2%) and low levels of low molecular weight species would not add to the systemic toxicity. The observation that QR-1160 is not a skin irritant is of little value in determining the irritancy of the notified polymer. However, given that QR-1160 is a slight to moderate eye irritant, QRXP-1552 and the notified polymer would be at least moderately irritating to the eye.

QR-1160 is not determined to be a hazardous substance according to the *Approved Criteria for Classifying Hazardous Substances (*NOHSC, 1999) in terms of the toxicological data supplied.

Occupational Health and Safety
The risk of adverse health effects to transport and storage workers is expected to be low except in the event of accidental spillage.

Polymer Emulsion Production
There is a substantial risk of eye irritation to workers handling the imported resin solution containing 25% notified polymer. This may occur during transfer from 200 L drums to the reactor vessel, from splashes or spills or secondary transfer from hands to eyes. Plant operators will need to wear the personal protective equipment specified by the notifier namely, impervious gloves, safety glasses, coveralls and safety boots to reduce opportunities for eye irritation. After transfer of the resin solution, the reactor system is enclosed and contains the notified polymer at less than 2%. Thus, workers coming into contact with the polymer emulsion should not be at risk of adverse health effects. These workers include plant operators, laboratory technicians and transport workers. However, the polymer emulsion is at an elevated temperature in the reactor vessels so workplaces will need to have the appropriate measures in place to prevent contact with the high temperature contents.

Paint Manufacture
There is little risk of adverse health effects for workers involved in paint manufacture from exposure to the notified polymer at less than 2%.

Paint Application
There is little risk of adverse health effects for painters from exposure to the notified polymer at less than 2%.

Public Health
The polymer in Resin QRXP-1552 will not be sold to the public and will be used only as a road marking paint by both contractors and Government departments. Although the notified polymer is a slight to moderate eye irritant, public exposure to the polymer is negligible because of the low concentration in the road marking paint (less than 2% of the polymer), low volatility and closure of roads to the public during road marking operations. Based on the above information, it is considered that the polymer in Resin QRXP-1552 will not pose a significant hazard to public health when used in the proposed manner.

13. RECOMMENDATIONS

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

- Safety goggles should be selected and fitted in accordance with Australian Standard (AS) 1336 (1994) to comply with Australian/New Zealand Standard (AS/NZS) 1337 (1992); industrial clothing should conform to the specifications detailed in AS 2919 (1987) and AS 3765.1 (1990); impermeable gloves should conform to AS/NZS 2161.2 (1998); all occupational footwear should conform to AS/NZS 2210 (1994c);
- Spillage of the notified polymer should be avoided. Spillage should be cleaned up promptly with absorbents which should then 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.

If the conditions of use are varied from the notified use, greater exposure of the public may occur. In such circumstances, further information may be required to assess the hazards to public health.

14. MATERIAL SAFETY DATA SHEET

The MSDS for Polymer in Resin QRXP-1552 was provided in accordance with the *National Code of Practice for the Preparation of Material Safety Data Sheets* (NOHSC, 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 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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