File No: NA/250

Date: January 1998

NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME

FULL PUBLIC REPORT

M52

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Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT

M52

1. APPLICANT

Union Carbide Chemicals (Australia) Pty Ltd of Suite 1, 1st Floor, 1-7 Jordan Street GLADESVILLE NSW 2111 has submitted a limited notification statement in support of their application for an assessment certificate for M52.

2. IDENTITY OF THE CHEMICAL

M52 is considered not to be hazardous based on the nature of the chemical and the data provided. Therefore the chemical name, CAS number, molecular and structural formulae, spectral data, details of the polymer composition and details of exact import volume have been exempted from publication in the Full Public Report and the Summary Report.

Trade Name:	Ucar Polyphobe 106HE, 208 AND 114
Number-Average Molecular Weight (NAMW):	17 500
Maximum Percentage of Low Molecular Weight Species Molecular Weight < 1 000:	1.1%
Method of Detection and Determination:	infrared (IR) spectroscopy
Spectral Data:	an IR spectrum was provided

3. PHYSICAL AND CHEMICAL PROPERTIES

The notified polymer is imported as a 25% colloidal dispersion in water and is not isolated as a pure substance. The physico-chemical properties of the dispersion are expected to be similar to those of water. Some other properties, which are not known for the notified polymer, are known for closely related polymers which have been notified previously. These polymers have been notified previously as NA/34 (polyphobe 102) and NA/155 (polymer 200 series) as indicated below.

Appearance at 20°C and 101.3 kPa:	white solid
Odour:	none
Melting Point/Boiling Point:	no melting point observed to 300°C (200 series)
Specific Gravity/Density:	1220 kg/m^3 (200 series)
Vapour Pressure:	expected to be negligibel for the notified polymer
Water Solubility:	colloidal dispersion of polymer particles in water
Partition Co-efficient (n-octanol/water) log P_{ow}:	not applicable as the polymer is surface active
Hydrolysis as a function of pH:	not applicable for a water insoluble substance
Dissociation Constant pK_a**:**	measured as 7.58 for polyphobe 102
Flash Point:	no flash point up to 110°C
Flammability Limits:	not flammable (200 series)
Autoignition Temperature:	> 420°C
Reactivity/Stability:	no hazardous polymerisation likely to occur

4. PURITY OF THE CHEMICAL

Degree of purity:	90% (approximately)
Toxic or hazardous impurities:	0.04%
Non-hazardous impurities (> 1% by weight):	none
Maximum content of residual monomers:	5%
Additives/Adjuvants:	none

5. USE, VOLUME AND FORMULATION

The notified chemical is intended to be used as a thickener and flow control agent for water-based paint formulations. Possible uses are:

Industry	*Approximate % of Importation*	*Methods of application*
Paper	50	Machine
Painting	20	Spray, brush, roller
Emulsion polymer (latexes)	15	Batch blending
Adhesives	10	Machine
Unidentified	5	Unknown

The notified chemical is to be imported as a 25% aqueous dispersion containing sodium dioctyl sulphosuccinate (4%), sodium lauryl sulphate (4%), 1,2-benzisothiazolin-3-one (0.02%), silicon dioxide (0.06%) and petroleum distillates (0.25%) at a rate of up to 250 tonnes per year for the first five years.

6. OCCUPATIONAL EXPOSURE

The 25% aqueous dispersion of the notified polymer will be imported in 208 L polypropylene drums. Exposure of workers during transport should only occur in the event of an accident.

The aqueous polymer emulsion is pumped to paint mixing machinery after removal of the drum bung and insertion of a drum lance. Exposure to spills, drips and splashes is possible during these operations. Typically, following formulation, the paint, containing the notified polymer at a concentration of about 2%, is drummed off into 4 L or 20 L cans.

Both professional and DIY painters will use paint containing the notified polymer for interior and exterior surfaces in architectural end uses to be applied by spray, brush and roller. Potentially, exposure to the paint may be frequent and prolonged.

7. PUBLIC EXPOSURE

Reformulation or industrial use of the water-based formulatios containing the notified polymer will result in little public exposure, as most of the waste is collected and recycled and the waste which is not recycled will be disposed of to approved landfill or by incineration. Polymer disposed of to landfill will be cured and movement in the soil is minimal.

Public use of the formulations containing the notified polymer may result in extensive public exposure mainly by dermal contact, and inhalation in the case of spray application of paints. Contact may also occur from using products treated or applied with water-based formulations containing the notified polymer. However,

the notified polymer is bound the treated products and becomes an integral part of the matrix, from which it is not available for absorption.

8. ENVIRONMENTAL EXPOSURE

. Release

Based on the assessment of a closely related submission (NA/155), up to 5% of the notified chemical may find its way to landfill with container residues and an estimated 1-2% will be highly diluted and washed into drains around Australia when brushes, spray equipment and rollers with domestic paints containing the notified polymer are cleaned. The commercial paints are applied by machine coating or dip techniques which have minimum wastage.

The primary need for disposal will occur with unused inventory or product which is spoiled by freezing or microbial attack, in which case the emulsion may be incinerated, or landfilled after the addition of absorbents for consolidation.

In all existing end-uses the notified chemical is a minor additive to water-based formulations. Such formulations are normally applied and dried into an article in which the cured polymer is bound into and becomes an integral part of the matrix. Wash waters from the manufacturing of water based formulations and the rinsing of product containers are recycled.

. Fate

Most of the polymer will be used as surface coating on a variety of products. The polymer used as a paper coating is likely to be disposed of at landfill or by recycling of the paper products. The cured polymer should not be mobilised during the recycling process and is expected to be contained within the sludge. When used in paints, a low percentage of the polymer could be discharged to sewer, where it may remain in colloidal suspension or be removed with sludge during treatment. Due the low solubility and high Pow of the polymer, the majority is expected to be associated with the sludge and be disposed to landfill or incineration. Any of the polymer that remains in the aqueous phase will be discharged to the wider aquatic environment where it will be associated with sediment and suspended particulates and likely to persist despite the presence of carboxylic ester and carbamate linkages. However, possibilities such as oxidative cleavage of the polyether chain or ester hydrolysis indicate that the polymer may eventually degrade.

Similar considerations lead to the expectation that residues consigned to landfill will slowly degrade. Significant leaching appears unlikely, although the polymer, as a colloidal suspension, may move with bulk water flow.

9. EVALUATION OF TOXICOLOGICAL DATA

Toxicological data for a close analogue have previously been evaluated as file no. NA/155 - 'Polymer in UCAR POLYPHOBE 200 SERIES'. These data are summarised at the end of this section. Further data were submitted on this analogue - 2 subchronic 28-day feeding studies - and are evaluated below.

9.1 Repeated Dose Toxicity {Reijnders, 1993 #84; Reijnders, 1994 #85}

9.1.1 28-Day Feeding Study with UCAR Polyphobe Thickener 205 (25%) {Reijnders, 1993 #84}

Species/strain:	rat/Wistar
Number/sex of animals:	5 males/ 5 females per dose
Method of administration:	gavage; distilled water as vehicle
Dose/Study duration::	0, 5, 25, 150 mg/kg/day (referred to as control, low (L), mid (M) and high (H) dose, respectively)
Clinical observations:	no toxicologically significant observations
Clinical chemistry	slightly elevated sodium in MD and HD females; slightly depressed sodium in MD males; slightly depressed alanine transaminase in LD and MD males; these effects were considered to have arisen by chance
Haematology	high mean cell volumes in high dose females; fluctuations of some differential white blood cell counts in males of the low and mid dose groups; these effects were considered to have arisen by chance
Histopathology:	no treatment-related macroscopic findings; no treatment-related microscopic findings
Test method:	according to OECD Guidelines {Organisation for Economic Co-operation and Development, 1995-1996 #15}
Result:	no target organ toxicity was identified in a 28-day oral gavage study in rats at doses up to 37.5 mg/kg/day of UCAR Polyphobe 205

9.1.2 28-Day Feeding Study with UCAR Polyphobe Thickener 205 (25%) {Reijnders, 1994 #85}

Species/strain:	rat/Wistar
Number/sex of animals:	5 males/ 5 females per dose
Method of administration:	gavage; distilled water as vehicle
Dose/Study duration::	0, 500, 1000 mg/kg/day (referred to as control, low (L) and high (H) dose, respectively)
Mortality:	one male (HD) and one female (LD) died from lung inflammation unrelated to treatment
Clinical observations:	significantly decreased body weight and body weight gain in HD males
Clinical chemistry	decreased calcium in LD males was not considered to be treatment-related
Haematology	no toxicologically significant observations
Histopathology:	decreased liver weight in HD males; no other treatment-related macroscopic findings; no treatment-related microscopic findings
Test method:	according to OECD Guidelines {Organisation for Economic Co-operation and Development, 1995-1996 #15}
Result:	no target organ toxicity was identified in a 28-day oral gavage study in rats at doses up to 250 mg/kg/day of UCAR Polyphobe 205

9.4 Overall Assessment of Toxicological Data

Studies on a close analogue of the notified polymer suggested that it would exhibit low acute oral and dermal toxicity in rats, would not be a skin irritant but may be a slight eye irritant in rabbits and would not be genotoxic in *in vitro* short term tests. Subchronic toxicity studies suggest that no systemic toxicity would be exhibited on repeated administration. The notified polymer would not be classified as hazardous according to NOHSC's *Approved Criteria for Classifying Hazardous Substances* {National Occupational Health and Safety Commission, 1994 #9} with respect to the toxicological data provided.

10. ASSESSMENT OF ENVIRONMENTAL EFFECTS

Ecotoxicity testing is not normally required for high molecular weight polymers as they are not transported readily across membranes and thus cannot affect living organisms. However, the company provided ecotoxicity data for a closely related submission (NA/155) and the results showed that no toxic effects to either carp or daphnia were observed at a nominal concentration of 1000 $mg.L^{-1}$.

Polymers with free carboxylic acid functions are known to be moderately toxic to green algae, especially those with large numbers of free carboxylic acids. The toxicity values range from 1 - 100 ppm, depending on the number of carboxylic acids that are free. The most potent structure for polycarboxylic acid polymers is paired acids which are equidistant from the polymer backbone and which have one acid on alternating carbons {Nabholz, 1993 #8}. Based on the provided structure of the notified polymer this is unclear but unlikely to occur and it may be presumed to be slightly toxic to green algae.

11. ASSESSMENT OF ENVIRONMENTAL HAZARD

The notified polymer is of a high molecular weight with minimal chemical reactivity and no obvious ecotoxicological potential. It will be used in aqueous based coating products and become essentially immobile after incorporation in the dried coatings. Small amounts could be discharged to sewers around Australia when paint brushes, rollers and spray equipment is washed, which will then be treated at municipal treatment works.

Assuming that 2% of the polymer which is used in paints is discharged to sewers around Australia, 4 tonnes per annum of polymer could be discharged. For a metropolitan area of 1 million people and 300 ML of sewage discharge per day (average figures for Australia) with average release of polymer from paints per capita and all of the polymer is discharged to the environment, a maximum of 2 ppb of polymer could be discharged.

The above concentration is well below the toxic levels to fish and daphnia and that expected for green algae. Further, the majority of the polymer will be contained in the sludge and disposed of by incineration or at landfill. Any polymer that leaves the sewerage plant will be highly diluted, resulting in widespread but low level environmental exposure of the aquatic compartment. Therefore, the environmental hazard is expected to be low.

12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

Based on toxicological studies in model systems on a close analogue, it is expected that the notified polymer would not exhibit acute or subacute toxicity, may be a slight eye irritant but would not be a skin irritant and would not be genotoxic.

The polymer is unlikely, therefore, to present a hazard to workers handling the emulsion to be imported.

Exposure of workers during transport or handling of polythene drums containing the polymer emulsion to be imported is unlikely to result in exposure except in the event of an accident.

Transfer of the polymer emulsion to paint mixing machinery may result in exposure to drips, spills and splashes. Exposure of workers during drumming off and during use of paint containing the polymer (application to surfaces by spray, roller or brush) will be low as the polymer is present in the paint at a low concentration (2%).

The risk of adverse health effects to workers involved in transport, storage, use or disposal of the notified polymer or is considered to be minimal.

Extensive public exposure may occur as a result of the use of paints containing the notified polymer or products treated or applied with the paints. However, the polymer will at a low concentration in the paints and when bound to treated products should not be available for absorption. The risk of adverse public health effects from the transport, storage, use or disposal of the notified polymer is expected to be minimal.

13. RECOMMENDATIONS

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

- Spillage of the notified chemical should be avoided, spillages should be cleaned up promptly which should then be put into containers for disposal or recycling;
- Good personal hygiene should be practised to minimise the potential for ingestion;
- A copy of the relevant MSDS should be easily accessible to employees.

14. MATERIAL SAFETY DATA SHEET

The MSDS for the emulsion to be imported was provided in accordance with the *Code of Practice for the Preparation of a Material Safety Data Sheets* {National Occupational Health and Safety Commission, 1994 #13}.

This MSDS was provided by the notifier as part of their notification statement. The accuracy of this information remains the responsibility of the notifier.

15. REQUIREMENTS FOR SECONDARY NOTIFICATION

Under the *Industrial Chemicals (Notification and Assessment) Act* 1989, secondary notification of the notified chemical 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

1. Reijnders, J.B.J, 1993, *Subacute 28-Day Oral Toxicity with UCAR Thickener 205, 25% by Daily Gavage in the Rat*, Project no., 102263, RCC Notox, 's-Hertogenbosch, The Netherlands.

2. Reijnders, J.B.J, 1993, *Subacute 28-Day Oral Toxicity with UCAR Thickener 205, 25% by Daily Gavage in the Rat*, Project no., 119969, RCC Notox, 's-Hertogenbosch, The Netherlands.

3. Organisation for Economic Co-operation and Development 1995-1996, *OECD Guidelines for Testing of Chemicals on CD-Rom*, OECD, Paris.

4. National Occupational Health and Safety Commission 1994, *Approved Criteria for Classifying Hazardous Substances [NOHSC:1008(1994)]*, Australian Government Publishing Service Canberra.

5. Nabholz, J.V., Miller, P. & Zeeman, M. 1993, 'Environmental Risk Assessment of New Substances under Toxic Substances Control Act Section Five', in *Environmental Toxicology and Risk Assessment, American Society for Testing for Testing and Materials*, ASTM STP 1179, Philadelphia, pp.40-55.

6. National Occupational Health and Safety Commission 1994, *National Code of Practice for the Preparation of Material Safety Data Sheets. [NOHSC:2011(1994)]*, Australian Government Publishing Service Canberra.