File No: PLC/255

September 2001

**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME**

**FULL PUBLIC REPORT**

**MVA 2453L**

This Assessment has been compiled in accordance with the provisions of the *Industrial Chemicals (Notification and Assessment) Act* 1989 (the Act) and Regulations. This legislation is an Act of the Commonwealth of Australia. The National Industrial Chemicals Notification and Assessment Scheme (NICNAS) is administered by the National Occupational Health and Safety Commission which also conducts the occupational health & safety assessment. The assessment of environmental hazard is conducted by the Department of the Environment and the assessment of public health is conducted by the Department of Health and Aged Care.

For the purposes of subsection 78(1) of the Act, copies of this full public report may be inspected by the public at the Library, National Occupational Health and Safety Commission, Plaza level, Alan Woods Building, 25 Constitution Avenue, Canberra ACT 2600 between 9am to 5pm Monday to Friday.

Copies of this full public report may also be requested, free of charge, by contacting the Administration Coordinator on the fax number below.

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Director
Chemicals Notification and Assessment

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# FULL PUBLIC REPORT

## MVA 2453L

## 1. APPLICANT

MBT (Australia) Pty Ltd of 11 Stanton Rd SEVEN HILLS NSW 2147 (ACN 000 450 288) has submitted a notification statement in support of their application for an assessment certificate for the synthetic polymer of low concern (PLC) MVA 2453L.

## 2. IDENTITY OF THE CHEMICAL

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

**Marketing names:** MVA 2453L

## 3. POLYMER COMPOSITION AND PURITY

Details of the polymer composition have been exempted from publication in the Full Public Report.

**Purity (%):** approximately 90%

**Hazardous impurities (other than residual monomers and reactants):** none

**Non-hazardous impurities at 1% by weight or more:** one monomer hydrolysis product at a concentration of approximately 10%.

**Additives/adjuvants:** none

## 4. PLC JUSTIFICATION

The notified polymer meets the PLC criteria.

## 5. PHYSICAL AND CHEMICAL PROPERTIES

| Property | Result | Comments |
|---|---|---|
| **Appearance** | clear amber liquid (imported aqueous solution) | |
| **Boiling point** | > 100$^{o}$C (aqueous solution) | |
| **Density** | 1080 – 1120 kg/m$^{3}$ (aqueous solution) | |
| **Water solubility** | 550 g/L | |
| **Particle size** | N/A for aqueous solution. | |
| **Flammability** | N/A for aqueous solution | |
| **Autoignition temperature** | Not determined. | |
| **Explosive properties** | Not determined. | |
| **Stability/reactivity** | The polymer is not anticipated to decompose, degrade or depolymerise. | |
| **Hydrolysis as function of pH** | Not determined | See comments below |
| **Partition coefficient** | Not determined | See comments below |
| **Adsorption/desorption** | Not determined | See comments below |
| **Dissociation constant** | Not determined | See comments below |

N/A = not applicable

### 5.1 Comments on physical and chemical properties

The notifier has stated that the water solubility of the notified polymer is likely to be greater than 550 g/L but the resulting solution becomes very viscous. This solubility is consistent with the high polyethoxylate and carboxylate content of the polymer, which can be regarded as readily soluble (Mensink, 1995).

The notified polymer does not contain any functionalities that would be expected to hydrolyse under environmental conditions (pH 4 - 9).

The partition coefficient of the notified polymer was not determined. However, its high water solubility indicates that it is likely to preferentially partition to the aqueous phase.

The adsorption/desorption behaviour of the polymer was not determined and its high water solubility indicates that it will be mobile in soils and sediments. However, there is evidence to suggest that polyethoxylates have a propensity to bind to sludges in sewage treatment plants.

The notified polymer includes a sodium salt of a weak (carboxylic) acid (pKa ~ 5) and would dissociate to the free acid at the lower end of the environmental pH range (pH 4 - 9).

## 6. USE, VOLUME AND FORMULATION

**Use:** The notified polymer is a concrete additive.

**Import volume:** Less than 100 tonnes per annum for the first five years.

**Formulation details:** The notified polymer will be imported as a 44% aqueous solution in bulk trucks, 1000 L totes or 200 L drums.

## 7. OCCUPATIONAL EXPOSURE

The aqueous solution of the notified polymer is transported to an admixture plant and transferred to a storage tank. Exposure of workers during transport should be restricted to events where containers are breached and spillage occurs.

Unloading of the imported solution at the admixture plant involves 1 worker for 1 hour/day, 40 days/year electronically controlled pumping to a storage tank. Dermal and ocular exposure from drips and spills are prevented by the use of goggles and gloves. Release of the notified polymer via spillage was estimated at 10 g/day. Water and other additives may be added to the tank and emptied containers are rinsed with water and the resulting solution used in production.

From the storage tank the aqueous solution of the notified polymer pumped by one worker (2 hours/days, 40 days/year) to bulk transport tankers. At the concrete plant 1 worker (0.5 hours/day, 40 days/year) unloads the tanker into the holding tank. At this stage the concentration of the polymer is less than 20% and workers use goggles and gloves to control exposure from drips and spills. Release at this and subsequent operations is estimated at less than 1 g/day.

From the customer's holding tanks 1 worker (0.5 hours/day, 220 days/year) operates a dosage pump to a concrete mixing tank from where it is pumped to concrete trucks for distribution. Eight further workers (0.5 hours/day, 220 days per year) are involved at this stage. Workers use protective clothing, goggles and gloves to prevent exposure to the concrete. There will be negligible exposure to the notified polymer.

The concrete containing typically 0.05% of the notified polymer is distributed to a variety of buildings sites where it is used for buildings structures, paths and driveways. Workers will use protective clothing and gloves to prevent exposure to the concrete.

## 8. PUBLIC EXPOSURE

Public exposure during transportation is limited to accidental rupture of containers. The MSDS for the imported products advise that small spills can be washed into the sewer and larger spills absorbed by dry inert filler for disposal. Residues in washings from cleaning production systems will be recycled into subsequent mixtures. Public exposure through processing and transportation should be negligible.

Products containing the notified polymer will not be sold to the public. There is potential for public exposure through dermal contact with wet cement purchased for minor jobs (e.g. concreting driveways). Once the concrete hardens the chemical becomes bound within the cement matrix. Bioavailability of the chemical is essentially nil. Surplus concrete is allowed to set and disposed of in landfill. Public exposure is negligible.

## 9. ENVIRONMENTAL EXPOSURE

### 9.1. Release

The notifier has stated that little release of the notified polymer is expected from the addition of the imported solution into storage tanks at the site of admixture, as the transfer of the solution from containers into the storage tank takes place with a transfer line within an enclosed system. 'Empty' containers may contain as much as 1% (up to 1 tonne from all containers) of the notified polymer, but these are rinsed with water and the resulting solution is recycled and reused in production. However, it is likely that a portion of this will be released to the environment.

Similarly, during transfer of the formulated polymer at the site of admixture, there will be little release as closed system transfer lines are employed, and containers with residual material (up to 1 tonne may be contained in total drums) are rinsed and reused. Again, it is likely that a portion of this will be released to the environment.

There is also potential for release of notified chemical via waste water from external and internal washing of ready mix concrete mixing trucks. Previous experience with similar processes indicates that this waste water is stored temporarily in concrete setting bays and then reused in subsequent admixtures, and that setting bays are designed to minimise risk of overflow during significant rainfall events. Where occasional overflow does occur, contaminated waste water will be discharged to the sewer in a diluted form.

Ultimately, almost all of the notified polymer is likely to be disposed of to landfill as a component of discarded concrete products.

### 9.2. Fate

The majority of the notified polymer will be bound within the matrix of the concrete and once the concrete is hardened, the polymer will remain essentially immobile. Thus, its fate will be linked to the disposal of the concrete fabrications into which it has been incorporated. The concrete rubble from building demolitions is usually directed to landfill where the notified polymer is expected to remain immobile and not leach out.

If the spilt material cannot be recycled it is likely that it will end up in landfill. Container residue may be disposed of to landfill if it also cannot be recycled. Due to its water solubility it is not likely to adsorb to soil but rather will leach out.

No information was provided regarding the degradability of the notified polymer. It is possible that the notified polymer will partition between the solution and the aquatic sediments and organic particles in suspension via reactive carboxyl and ether functional groups. Under these circumstances it is anticipated that the notified polymer will degrade very slowly via biotic and abiotic processes. Polymers of high molecular weight are considered to be impermeable to biological membranes (Connell, 1990) and consequently bioaccumulation of the notified polymer is not expected.

## 10. EVALUATION OF HEALTH EFFECTS DATA

No toxicological data were submitted.

## 11. EVALUATION OF ENVIRONMENTAL EFFECTS DATA

No ecotoxicological data were provided.

Data from literature documents that polycarboxylate polymers may be slightly toxic to algae with an EC50 of 37 mg/L. This apparent toxicity at 15 mg/L hardness may be associated with excess sequestration of essential cationic nutrients by the polycarboxylates. However, algae do not appear to be sensitive to polycarboxylates under realistic hardness conditions (Hamilton JD, Morici IJ and Freeman MB, 1997). Ecotoxic effects of the notified polymer will be further moderated by its low polycarboxylate content, and expected low aquatic release.

## 12. ENVIRONMENTAL RISK ASSSESSMENT

The majority of the notified polymer will be incorporated into a concrete matrix. Once the matrix is solidified the notified polymer is expected to pose minimum risk to the environment.

There is little potential for the notified polymer to be released into the environment as a consequence of spillage, drum residues and equipment washing as these processes take place within closed systems and residues are likely to be reused. Spillages, if they occur, are expected to be dispersed and not restricted to a single site. This would minimise the degree of risk to the environment. If the spilt imported material or raw product cannot be recycled then it is likely that it will end up in landfill adsorbed to the inert material used for the spill clean-up (such as sand), where it is likely to leach out in a diffuse manner at low concentrations.

The main environmental hazard would arise from release of the notified polymer during storage or transport. The use of bunded containment minimises the risk of release at storage sites. The MSDS appears to adequately address spills and disposal.

A further environmental hazard could arise from release of untreated polymer-contaminated water into the aquatic compartment. However, this risk is greatly reduced by the likely recycling of major volumes of truck wash water for subsequent batches of cement.

The low expected environmental exposure of the notified polymer, when integrated into concrete, suggests the overall environmental risk should be limited.

## 13. HEALTH AND SAFETY RISK ASSESSMENT

### 13.1. Hazard assessment

The notified polymer meets the criteria for a synthetic polymer of low concern and is unlikely to be a human health hazard. According to the MSDS, the imported aqueous solution is not hazardous according to the NOHSC *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 1999).

### 13.2. Occupational health and safety

Transport workers are only likely to be exposed to the notified polymer in the event of a breach of bulk containers or drums in which the 44% polymer solution is imported.

The notified polymer solution is transferred to a holding tank in which the solution is adjusted with water and to which other additions may be made. The finished solution is pumped out into tanker trucks for transport to plants followed by transfer to a holding tank and addition to concrete. The concrete is then transported to work sites for use in construction. The notifier has stated that there is virtually nil handling of the polymer solution or finished product as closed systems for pumping and electronic dispensation are employed. This is reflected in the maximum estimated release of 10 g/day. For the low exposure to workers gloves and goggles will be used for personal protection. The MSDS for the imported polymer solutions suggests the use of nitrile rubber or PVC gauntlets, chemical worker's goggles and overalls. Given the low level of polymer released coupled with its low hazard, the risk of adverse health effects to workers involved in formulation of the concrete additive, its transport, storage and addition to the wet concrete is considered to be low. Worker exposure (mainly dermal) to concrete used in construction is potentially high unless gloves are employed. However, the concentration of the notified polymer in finished concrete is 0.05% and there is negligible risk of adverse health effects to workers from exposure to the polymer.

### 13.3. Public health

The product containing the notified chemical is not available to the public. Dermal exposure to the chemical through contact with wet concrete is not expected to pose a significant health risk due to the low concentration and low irritancy of the polymer product. Also the polymer will be bound within the cement matrix of the concrete and will not be bioavailable. The risk to public health is not expected to be significant.

## 14. MSDS AND LABEL ASSESSMENT

### 14.1. MSDS

The MSDS of the products containing the notified polymer provided by the notifier were in accordance with the NOHSC *National Code of Practice for the Preparation of Material Safety Data Sheets* (NOHSC, 1994a). They are published here as part of the assessment report. The accuracy of the information on the MSDS remains the responsibility of the applicant.

### 14.2. Label

The labels for products containing the notified polymer provided by the notifier were in accordance with the NOHSC *National Code of Practice for the Labelling of Workplace Substances* (NOHSC, 1994b). The accuracy of the information on the label remains the responsibility of the applicant.

## 15. RECOMMENDATIONS

*Control Measures*

Occupational Health and Safety

No specific precautions are required to control exposure to the notified polymer. However, in the interest of good OHS practice the following measures should be implemented:

- Employers should implement the following engineering controls to minimise occupational exposure to the notified polymer as introduced and as diluted for use:
  - automated pumping
- Employers should ensure that the following personal protective equipment is used by workers to minimise occupational exposure to the notified polymer as introduced or as diluted for use:
  - nitrile rubber or PVC gauntlets, chemical worker's goggles and overalls

  Guidance in selection of personal protective equipment can be obtained from Australian, Australian/New Zealand or other approved standards.
- A copy of the MSDS should be easily accessible to employees.
- If products and mixtures containing the notified polymer are classified as hazardous to health in accordance with the NOHSC *Approved Criteria for Classifying Hazardous Substances*, workplace practices and control procedures consistent with provisions of State and Territory hazardous substances legislation must be in operation.

### 15.1 Secondary notification

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

(1) Under Section 64(1) of the Act; if

- the notified polymer is introduced in a chemical form that does not meet the PLC criteria.

or

(2) Under Section 64(2) of the Act:

- if any of the circumstances listed in the subsection arise.

The Director will then decide whether secondary notification is required.

## 16. REFERENCES


Connell D W (1990) General characteristics of organic compounds which exhibit bioaccumulation. In Connell D W. (Ed) Bioaccumulation of Xenobiotic Compounds. CRC Press, Boca Raton, USA.

Hamilton J D, Morici I J and Freeman M B (1997) Polycarboxylates. In: Hamilton JD and Sutcliffe R ed. Ecological Assessment of Polymers. New York, Van Nostrand Reinhold, pp 87-109.

Mensink B J W G et al (1995) Manual for Summarising and Evaluating the Environmental Aspects of Pesticides. Report No. 679101022. National Institute of Public Health and the Environment, The Netherlands.

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

National Occupational Health and Safety Commission (1994b) National Code of Practice for the Labelling of Workplace Substances [NOHSC:2012(1994)]. Australian Government Publishing Service, Canberra.

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