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**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION  
AND ASSESSMENT SCHEME**

**FULL PUBLIC REPORT**

**Polymer in E7576**

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Director  
Chemicals Notification and Assessment

**FULL PUBLIC REPORT****Polymer in E7576****1. APPLICANT**

Ethyl Asia Pacific Company has submitted a notification statement in support of their application for an assessment certificate for Polymer in E7576 under the provisions of Synthetic Polymer of Low Concern

**2. IDENTITY OF THE CHEMICAL**

The chemical name, CAS number, molecular and structural formulae, spectral data, details of the polymer composition and residual monomers, specific functional group identities, details of manufacture and formulation and details of exact import volume have been exempted from publication in the Full Public Report.

**Trade Name:** Polymer in E7576

**Method of Detection and Determination:** GPC using UV detector.

**Spectral Data:** A GPC (Gel Permeation Chromatography) trace and printout was supplied to determine the NAMW and percentage of low molecular species.  
No actual identity verification was provided, for example, Infra Red

**Reactive Functional Groups:** The notified polymer contains terminal aryl and alkyl hydroxyl groups. The polymer has been accepted under the category Synthetic Polymer of Low Concern on the basis that the aliphatic hydroxyl is of low concern and the phenolic OH is substituted in the para and ortho position

### 3. PHYSICAL AND CHEMICAL PROPERTIES

<b>Appearance at 20°C and 101.3 kPa:</b>	Clear water white viscous liquid
<b>Boiling Point:</b>	Not determined
<b>Density:</b>	0.995 g/mL at 20°C
<b>Particle Size:</b>	Not applicable
<b>Vapour Pressure:</b>	Not determined, however, expected to be low
<b>Water Solubility:</b>	Less than 1 ppm (see comments below)
<b>Partition Co-efficient (n-octanol/water):</b>	Not determined (see comments below)
<b>Hydrolysis as a Function of pH:</b>	Not determined (see comments below)
<b>Adsorption/Desorption:</b>	Not determined (see comments below)
<b>Dissociation Constant:</b>	Not determined (see comments below)
<b>Autoignition Temperature:</b>	Not determined
<b>Explosive Properties:</b>	None
<b>Flammability Limits:</b>	Not determined, solution is flammable
<b>Reactivity/Stability:</b>	Stable under normal conditions
<b>Charge Density:</b>	The polymer is not polycationic and does not contain chemical groups that have the potential to become cationic or anionic in the pH range 4 to 9
<b>Loss of monomers, additives, impurities:</b>	None expected

## Comments on Physico-Chemical Properties

The boiling point of the notified polymer was not determined. The notifier estimates that the polymer will have a low vapour pressure. However, the fuel additive package, which contains the notified polymer in petroleum solvent, has a vapour pressure of 0.58 mm Hg at 20°C and is highly flammable.

The water solubility of the notified polymer was not determined. However, the notifier states that the polymer is expected to be of low solubility (approximately 1 mg/L) by comparison, with firstly, the water solubilities of its constituent parts (5.4 ppm and <5%, respectively) and secondly, a similar polymer for which the notified polymer is a precursor (water solubility less than 10 mg/L). The molecular weights of the two polymers are the same and the only structural difference is the replacement of the  $\omega$ -hydroxy group with an amine group.

Due to the low water solubility of the notified polymer hydrolysis is unlikely in the environmental pH range of 4 to 9. Also the notified polymer contains no functional groups that can hydrolyse.

The determination of partition coefficient and adsorption/desorption of the notified polymer was not undertaken. The notified polymer has low water solubility and will largely partition into n-octanol rather than water. Due to its low water solubility, the polymer is expected to become associated with the organic component of soils and sediments.

No dissociation constant data was provided for the notified polymer. The polymer has no units likely to dissociate in the environmental pH range. At high pH the  $\omega$ -hydroxy group may be deprotonated leading to increased water solubility.

## 4. PURITY OF THE CHEMICAL

**Degree of Purity:** >99%

**Maximum Content of Hazardous Residual Monomers:** Residual monomers are present at less than 0.1% and below the concentration cut-off level for classification of the polymer as a hazardous substance (NOHSC, 1999b)

### Additives/Adjuvants:

*Chemical name:* Solvent naphtha (containing less than 0.03% (w/w) benzene)

*CAS No.:* 64742-95-6

*Weight percentage:* 40-50%

*Toxic Properties:* R65 – may cause lung damage if swallowed\*;  
R45(2) – may cause cancer, carcinogen category 2 (containing  $\geq 0.1\%$  benzene) (NOHSC, 1999b);  
\*applicable to low viscosity substances (NOHSC, 1999a)

## 5. USE, VOLUME AND FORMULATION

The polymer is intended for use as a carrier fluid for detergent/dispersant additives in unleaded petrol. The notifier claims that the polymeric carrier will serve to reduce the formation of deposits in carburettors, fuel injectors and intake valves as well as reduce combustion chamber deposits in petrol engines.

The notified polymer will not be manufactured in Australia but will be imported as a component in fuel additive packages at less than 30 wt %. The estimated import volume of the notified polymer in the fifth year is less than 400 tonnes. Based on estimates of a similar product, approximately 20% will be imported in 200 L drum containers and approximately 40% in ISO containers. The remaining 40% will be shipped in bulk and loaded into tank trucks or repackaged into ISO containers. The notifier foresees that this will entail a maximum of two bulk shipments a year.

At the refinery/terminal facility the petrol additive is typically blended just prior to transport of the fuel to the petrol station. The additive package is injected automatically as the fuel is pumped into the delivery tanker. The additive is injected into unleaded petrol on a volumetric basis that will result in less than 0.1% w/w notified polymer in the final fuel.

Initial use of the additive product containing the notified polymer will be at approximately 20 refinery and terminal sites with a projected maximum of 100 such sites by the fourth year.

## 6. OCCUPATIONAL EXPOSURE

### *Number and Category of Workers*

Import and Transportation: 20 workers;  
Storage Facility: 24 plant operators and maintenance workers;  
Refinery/Terminal Facility: 100 plant operators and maintenance workers.

### *Dockside and Transport*

The notified polymer will be imported in bulk, drums or ISO containers. Occupational exposure is not expected except in the event of a spill.

### *Repackaging*

No repackaging of drums or ISO containers is required as these are delivered directly to the customer site. Repackaging of bulk additive product into tank trucks or ISO containers is anticipated to occur twice per year. Opportunity for dermal exposure exists as connections between the bulk vessel and receiving vessel/container are being made or broken. Exposure may also occur during maintenance of equipment or in the event of a spill.

### *Refinery/Terminal Facility*

Exposure is expected to be minimal during addition of the additive package to the fuel because of the use of automated processes and dedicated delivery lines and equipment. Exposure is expected to be confined to skin contact to drips and spills that may occur during

the connection and disconnection of transfer lines and equipment.

#### *Service Stations*

As the notified polymer is present at very low concentrations in the final fuel, exposure to the notified polymer for mechanics and service station personnel is expected to be negligible.

#### *Control measures*

Chemical goggles and chemical resistant gloves are recommended by the notifier. Engineering controls, that is, automated delivery systems already in place at the repackaging site and refineries, will minimise the potential for exposure during repackaging and blending.

#### *Worker Education and Training.*

The notifier states that the additive product containing the notified polymer will be handled by trained workers knowledgeable of safe handling procedures for fuels and fuel additives.

## **7. PUBLIC EXPOSURE**

There is little potential for exposure of the public to the notified polymer. The product will not be available for use by the public. The public will only come into contact with the notified polymer in unleaded petrol at less than 0.1% w/w in the final fuel and public exposure will be unlikely at or best intermittent.

## **8. ENVIRONMENTAL EXPOSURE**

### ***Release***

The transfer operations of product from bulk vessel to tank trucks, ISO tanks and drums potentially give rise to spills when connections between the bulk vessel and the receiving container are either made or broken. As transfer operations are anticipated to occur only twice a year, the notifier states that the rupture of transfer lines and the need for maintenance is unlikely and a maximum of 20 kg per year will be lost due to spillage. The polymer will be transported via road or rail in closed containers; potential release would only be through accidental spills. The Material Safety Data Sheet (MSDS) details procedures to protect the environment in these cases. Once received by the customers, the fuel additive package containing the polymer will be blended into the petrol (less than 0.1% w/w). This is an automatic process using dedicated delivery lines and equipment. The notifier claims that no measurable amount of the notified chemical is expected to be lost due to spills during the formulation process.

The notifier expects that a maximum of 2000 service stations may store fuel containing the notified polymer. The probability of a spill for 2000 service stations would be 5.4 per year. If each spill at a service station were 200 L, this would result in a total of 2.3 kg of the notified polymer being lost. These figures given by the notifier are based on a research project carried out at the University of British Columbia, Canada, which investigated incidents of petrol spills at service stations in the Greater Vancouver region. The figures do not take into account frequent minor spills (less than 1 L) that would occur at petrol bowsers

as customers re-fuel their vehicles. The loss of notified polymer during such spills is low because it is in very low concentrations.

The polymer and additive package will not be directly marketed to the public.

### ***Fate***

If the polymer is released to soil in either a spill or leak from a storage tank, it is expected to bind strongly to soil due to its low water solubility. If released to an aquatic environment, the polymer would tend to partition out of water and into sediment. Once adsorbed to soil/sediment, the fate of the polymer is unknown. The polymer is not expected to cross biological membranes, due to the low solubility and high molecular weight, and as such should not bioaccumulate (Connell, 1989).

There is no negative effect of the notified substance with regard to tailpipe emissions. Test results provided show no statistical difference in Hydrocarbon, CO and NO<sub>x</sub> emissions between test fuel with and without the additive. The long term result of detergent fuel additives is to both “keep clean” and “clean up” existing engine deposits, leading to a reduction in tail pipe emissions. The notified polymer in conjunction with the detergent additive have been shown to significantly reduce Port Fuel Injector plugging after the addition of the fuel additive.

The notified polymer is listed on the US TSCA inventory. In combination with certain detergent/dispersant additives, it is said to be registered for use with US EPA and the California Air Resources Board as a fuel additive.

## **9. EVALUATION OF TOXICOLOGICAL DATA**

No toxicology data were provided, which is acceptable for polymers of NAMW greater than 1 000.

## **10. ASSESSMENT OF ENVIRONMENTAL EFFECTS**

No ecotoxicology data were provided, which is acceptable for polymers of NAMW greater than 1 000.

## 11. ASSESSMENT OF ENVIRONMENTAL HAZARD

The intended use pattern of the notified polymer in the fuel additive is not expected to result in a significant release to the environment.

Although no direct data was provided it is claimed that the polymer is completely destroyed by combustion within the petrol engine, resulting in oxides of carbon and hydrogen. In the event of spills, the MSDS of the additive package containing the notified polymer contains information on procedures to enable clean-up operations to contain release to the environment.

The polymer is present in fuel in very low concentrations, and it is evident that both the polymer and the petrol constituents made up of hydrocarbon and which is made up of hydrocarbon and oxygen will not survive the temperatures at which the fuel is exploded within the internal combustion engine.

Given the above, environmental exposure and the overall environmental hazard is expected to be low.

## 12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

The high molecular weight (>1 000) indicates that the notified polymer is unlikely to be bioavailable. No toxicological data is provided for the notified polymer. Therefore, no hazard assessment can be made against the NOHSC *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 1999a).

The MSDS indicates that the additive package containing the notified polymer is not classified as hazardous and the product is not expected to irritate the skin or eye, though respiratory irritation may occur following inhalation of mists or vapours at elevated temperatures. Solvent naphtha (petroleum) an ingredient of the additive package is listed on the NOHSC *List of Designated Hazardous Substances* (NOHSC, 1999b) and meets the kinematic viscosity criteria for classification as an aspiration hazard. The additive package is not an aspiration hazard, however, the notifier has indicated in the submission that because the risk of aspiration cannot be excluded, a precautionary statement to this effect is included in the MSDS.

### *Occupational Health and Safety*

During import and transport of the notified polymer, there is unlikely to be any worker exposure, except in the event of a spill. 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.

Exposure to the additive package containing the notified polymer during transfer operations may occur as delivery lines are connected/disconnected, and during equipment maintenance. Dermal exposure is expected to be infrequent and minimal, as these activities will occur infrequently (twice per year) and the level of the notified polymer in the additive package is low (less than 30%). Workers also wear personal protective equipment, namely chemical



resistant gloves and chemical goggles. Therefore, the risk of adverse health effects arising from exposure of workers to the additive package is low.

At refineries and terminals, fuels and fuel products could cause a health risk if adequate precautions are not taken. Workers at these sites are required to wear appropriate personal protective equipment to control exposure to these substances. The use of protective measures in addition to the use of dedicated and automatic transfer lines and enclosed, automated mixing to fuel will reduce the likelihood of exposure to the additive package. Therefore, no significant health risk is expected for these workers.

Service station workers and mechanics will receive negligible exposure because of the very low concentration (less than 0.1% w/w) of polymer present in the final fuel.

#### *Public Health*

Based on the negligible potential for public exposure to the notified polymer arising from its intended use, it is considered that the notified polymer will not pose a significant hazard to public health when used in the proposed manner.

### **13. RECOMMENDATIONS**

To minimise occupational exposure to Polymer in E7576 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 or mittens should conform to AS 2161.2 (Standards Australia, 1998b);
- 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 then be put into containers for disposal;
- Good personal hygiene should be practised to minimise the potential for ingestion; and
- A copy of the MSDS should be easily accessible to employees.

The notified polymer will need to be tested to ensure that it will meet the upcoming criteria in the Australian Standard, *Evaluation of Devices and Additives which Claim to Improve Vehicle Performance*, to be AS 4430.2 (Standards Australia, 1998a).

If the conditions of use are varied from the notified use, greater exposure of the public to the product 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 the E7576 additive package containing the notified polymer was provided in a format consistent with the requirements of 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 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**

Connell. (1989). General characteristics of organic compounds which exhibit bioaccumulation. In *Bioaccumulation of Xenobiotic Compounds*, DW, C. (ed). CRC Press: Boca Raton.

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

NOHSC. (1999a). *Approved Criteria for Classifying Hazardous Substances [NOHSC:1008(1999)]*. Australian Government Publishing Service, In press.: Canberra.

NOHSC. (1999b). *List of Designated Hazardous Substances [NOHSC:10005(1999)]*. Australian Government Publishing Service, In Press: Canberra.

Standards Australia. (1987). *AS 2919-1987, Australian Standard Industrial Clothing*. Standards Australia: Sydney.

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Standards Australia. (1994). *AS 1336-1994, Australian Standard Eye protection in the Industrial Environment*. Standards Australia: Sydney.

Standards Australia. (1998a). *AS 4430.2 Evaluation of Devices and Additives which Claim to Improve Vehicle Performance, Part: 2 General Claims on Improved Engine System Performance, Draft, (Supersedes DR 97520)*. Standards Australia: Sydney.

Standards Australia. (1998b). *AS/NZS 2161.2:1998, Australian/New Zealand Standard Occupational Protective Gloves Part 2: General Requirements*. Standards Australia and Standards New Zealand: Sydney/Wellington.

Standards Australia/Standards New Zealand. (1992). *AS/NZS 1337-1992, Australian/New Zealand Standard Eye Protectors for Industrial Applications*. Standards Australia and Standards New Zealand: Sydney/Wellington.

Standards Australia/Standards New Zealand. (1994). *AS/NZS 2210-1994, Australian/New Zealand Standard Occupational Protective Footwear*. Standards Australia and Standards New Zealand: Sydney/Wellington.