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**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION
AND ASSESSMENT SCHEME**

FULL PUBLIC REPORT

E 5160

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

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Director
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FULL PUBLIC REPORT**E 5160****1. APPLICANT**

Ethyl Asia Pacific Company of 20 Berry Street, Level 12, NORTH SYDNEY NSW 2060 has submitted a limited notification with their application for an assessment certificate for E 5160.

2. IDENTITY OF THE CHEMICAL

E 5160 is not considered to be hazardous based on the nature of the chemical and the data provided. Therefore the chemical name, CAS number, molecular and structural formulae have been exempted from publication in the Full Public Report and the Summary Report.

Trade names: E 5160

Method of detection and determination: the notified polymer is never isolated, therefore the infrared spectrum available is for the polymer in petroleum naphthal solvent

Spectral data: major peaks in the IR spectrum at 700, 749, 767, 783, 847, 880, 1010, 1063, 1122, 1261, 1360, 1378, 1461, 1504, 1608, 2729, 2871, 2927, 2956 cm^{-1}

3. PHYSICAL AND CHEMICAL PROPERTIES

The polymer is prepared in petroleum solvent naphtha and never isolated. The following physico-chemical properties relate to the polymer and not the solvent solution unless indicated otherwise.

Appearance at 20°C and 101.3 kPa:	red-brown liquid (prepared in solvent)
Odour:	aromatic (based on solvent)
Melting Point/Boiling Point:	melting/boiling point of polymer cannot be measured separately from solvent
Specific Gravity:	0.900 at 15.6°C

Vapour Pressure:	for the polymer, vapour pressure is expected to be negligible
Water Solubility:	the polymer should have negligible water solubility
Partition Co-efficient (n-octanol/water) log P_{ow}:	not determined, the partition coefficient is expected to be high.
Hydrolysis as a function of pH:	the polymer is not water soluble
Adsorption/Desorption:	the polymer is insufficiently soluble in water for this to be determined
Dissociation Constant pK_a:	the polymer is insufficiently soluble in water for this to be determined
Flash Point:	60°C
Flammability Limits:	combustible as formulated
Combustion Products:	combustion produces oxides of carbon and nitrogen
Autoignition Temperature:	the polymer is prepared in solvent and never isolated; this property cannot be measured separately
Explosive Properties:	none
Reactivity/Stability:	this polymer is expected to be stable

Comments on physico-chemical properties

Many of the physico-chemical properties were not determined as the company expects the polymer to have a low water solubility of < 1 µg/L. The octanol-water partition coefficient may be expected to be log K_{ow} > 6. These predictions were based on the spacial geometry of the polymer; the polar functional groups are concentrated at one end of the molecule with a molecular weight of 325 while the two variable-length polymer chains each have a MW of approximately 836 (based on a peak MW of the entire polymer of 2396) and would occupy more space than the polar region. Water solubility would therefore not be expected at any pH despite the presence of slightly acidic and basic groups.

4. PURITY OF THE CHEMICAL

Degree of purity:	76.6%
Toxic or hazardous impurities:	none
Maximum content of residual monomers:	due to difficulties developing an analytical procedure for the polymer this could not be determined, however it has been estimated that <12% of the polymer has a NAMW < 1000
Additives/Adjuvants:	none

5. INDUSTRIAL USE

The notified polymer will be used as a detergent in a fuel additive package. It will be present in finished fuels at a maximum of 0.014%. E5160 will be imported as a component in a fuel additive package, E 5403, at 220 tonnes for each of the first five years.

6. OCCUPATIONAL EXPOSURE

The notified chemical will be imported in closed containers within fuel additive packages and then transported to warehouses in drums or to customers in ISO containers. The transportation will be via road or rail. The transportation of the notified chemical will be performed by up to 20 personnel annually. There is not expected to be any exposure to the notified chemical except in the event of a spill.

The storage of the notified chemical in drums at well ventilated storage sites will involve up to 24 operations and maintenance personnel. There is not expected to be any exposure to the notified chemical except in the case of a spill.

At the customer terminals the gasoline additive package, containing the notified chemical at 40% by weight, is blended into fuel just prior to the shipment of fuel from the terminal to a petrol station. Fuel additive is injected automatically as the fuel is pumped into the delivery vehicle. The additive is injected on a volumetric basis; as a given volume of the fuel passes through the delivery nozzle, a predetermined amount of additive is also injected to bring the concentration to 140 mg/L. As the entire process is automatic, the 100 operations and maintenance personnel at the customers terminals will be unlikely to come into direct contact with the notified chemical although potential exposure may occur during the connection/disconnection of pumping lines however the concentration of notified polymer reduces any significant exposure.

7. PUBLIC EXPOSURE

In Gasoline Performance Additive E5403, E5160 will contribute 40% by weight and be used in fuels at a maximum concentration of 0.014% by weight. Gasoline Performance Additive E 5403 will be imported to Australia in drums or ISO containers and transported by road or rail. In the case of accidental spillage during transport, the public may be exposed to the notified substance. However, any exposure can be minimised by containment and clean-up of the site via the recommended practices outlined in the Material Safety Data Sheet (MSDS) for both E 5160 and Gasoline Performance Additive E 5403.

Gasoline Performance Additive E 5403 will be blended into petrol at major refineries. Public exposure from blending the additive with petrol at refineries is expected to be negligible. Gasoline Performance Additive E 5403 is not intended to be sold directly to the public.

Public exposure may occur when filling automobiles with petrol containing the notified substance. However, given that the polymer has a number average molecular weight of 1076 and the low concentration in petrol, dermal absorption is expected to be low.

Disposal of this polymer will be by incineration. Combustion of fuel in the engine will completely destroy the polymer with oxides of nitrogen and carbon being released. Disposal of the notified substance is not expected to result in significant public exposure.

8. ENVIRONMENTAL EXPOSURE

. Release

As the polymer will be transported in closed containers, potential release would only be through accidental spills. The 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 (to a maximum concentration of 140 mg/L) at their facilities. In most cases, the additive is injected automatically as the fuel is pumped into a tanker for delivery to petrol stations. Recovery of fuel from hoses used to fill or unload tank trucks is complete as good engineering practice dictates that all lines drain without creating waste or releases to the environment. Spills do occur at service station pumps but no data were submitted on the frequency and magnitude. Unless the spill was unusually large, the concentration of polymer in the fuel (140 mg/L) would translate to a minimal release to the environment. Any environmental releases during normal use would be expected to be minimal.

The polymer and additive package will not be directly marketed to the public, but preblended into the petrol sold at service stations.

Although the notifier has not provided evidence, it is claimed that the polymer is not expected to survive the temperatures at which fuel is combusted in petrol engines; it

is just as likely to burn as the other constituents of petrol as most of the molecule is hydrocarbon. Thus uncracked polymer is not expected to be released in the exhaust.

. **Fate**

If the polymer is released to soil in 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.

Bioaccumulation of the chemical is not expected as its large molecular size is likely to inhibit membrane permeability and prevent uptake during exposure (1,2).

9. EVALUATION OF TOXICOLOGICAL DATA

Toxicological data are not required for polymers of number-average molecular weight (NAMW) > 1000 according to the *Industrial Chemicals (Notification and Assessment) Act, 1989 (the Act)*.

The notified chemical cannot be classified according to Worksafe Australia's *Approved Criteria for Classifying Hazardous Substances* (3).

10. ASSESSMENT OF ENVIRONMENTAL EFFECTS

No ecotoxicology studies have been provided which is acceptable for polymers with a NAMW > 1000 according to the Act. The notified polymer E 5160, is not expected to become water soluble at any pH found in the aquatic environment or exert toxicity to aquatic organisms (4).

11. ASSESSMENT OF ENVIRONMENTAL HAZARD

The intended use pattern of the polymer in the fuel additive is not expected to result in a significant release to the environment as it is expected to be completely combusted in the petrol engine, resulting in oxides of carbon, hydrogen and nitrogen. In the event of spills, the MSDS of the additive package containing the polymer contains information on procedures to reduce release to the environment. The notifier claims that NOx emissions were not significantly different between fuel containing the additive and unadditised fuel, however no supporting data were submitted. The notifier's claims of reduced engine deposits and subsequent improvement of exhaust emissions and urban air quality can not be assessed due to lack of comparative data.

12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

There is not expected to be any significant exposure to the notified chemical during importation or transportation due to the secure nature of the packaging. Exposure to the notified chemical is only likely in the event of a major spill, in which case emergency procedures specified in the recommendations will serve to minimise exposure.

There is also unlikely to be any significant exposure to the notified chemical during storage apart from the event of a major spill. Any fumes released from the spillage would be collected by general mechanical ventilation. As a matter of procedure employees will wear protective eye wear, gloves, footwear and clothing as well as utilising respiratory protection to reduce exposure to the solvent in the event that mechanical ventilation is inadequate. These will also serve to reduce exposure to the notified chemical.

There is minimal potential for exposure to the notified chemical during the addition of the notified chemical in the fuel additive to fuel as the entire process is automated. Again, mechanical ventilation will typically be utilised to reduce any potential exposure to petroleum based fumes to an acceptable level, as well as the usage of personal protective equipment such as protective eyewear, respirator, gloves, footwear and clothing.

The overall risk of adverse health effects from the notified polymer should be low as the high number-average molecular weight (>1000) should preclude absorption of the molecules across biological membranes. The polymer will $< 12\%$ low molecular weight (NAMW < 1000) species, low molecular weight polymers. This may include trace amounts of an aldehyde, however none was detected during analysis. There is also little opportunity for significant exposure to the notified chemical as a result of packaging, the automated system of delivery directly into fuel reducing the need for any worker intervention and the low levels of notified chemical used in fuel (0.014%).

13. RECOMMENDATIONS

To minimise occupational exposure to E 5160 the following guidelines and precautions should be observed:

- if engineering controls and work practices are insufficient to reduce exposure to E 5160 or formulations containing E 5160 to a safe level, then the following personal protective equipment which conforms to Australian Standards (AS) or Australian/New Zealand Standards (AS/NZS) should be worn:
 - a respirator with organic vapour cartridges should be selected and used in accordance to AS/NZS 1715 (5) and should comply to AS/NZS 1716 (6).
 - safety goggles should be selected and fitted in accordance to AS 1336 (7) to comply with AS/NZS 1337 (8).
 - industrial clothing should conform to the specifications detailed in AS 2919 (9).

- impermeable gloves or mittens conforming to AS 2161 (10).
- use of the notified polymer should take into account the presence of petroleum naphthal solvent and should therefore utilise local exhaust ventilation where there is the likelihood of exposure to fumes from solvent.
- good personal hygiene should be practised to minimise the potential for ingestion.
- spillage of the notified chemical should take into account the presence of petroleum naphthal solvent. Should spillage occur the area should be ventilated and the spill contained with dikes or absorbents to prevent release into water ways. Small spills should be taken up with a dry chemical absorbent. Large spills should be taken up with a pump or vacuum. Dispose of as an industrial waste according to Local and State regulations.
- E 5160 contained within petroleum naphthal solvent may be flammable; store in a cool, dry, well ventilated area away from sources of ignition.
- a copy of the MSDS should be easily accessible to employees.

14. MATERIAL SAFETY DATA SHEET

The MSDS for E 5160 was provided in an acceptable format according to Worksafe Australia's *National Code of Practice for the Preparation of Material Safety Data Sheets* (11).

This MSDS was provided by Ethyl Asia Pacific Company as part of their notification statement. The accuracy of this information remains the responsibility of Ethyl Asia Pacific Company.

15. REQUIREMENTS FOR SECONDARY NOTIFICATION

Under the Act, secondary notification of E 5160 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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3. Worksafe Australia, 1994, *Approved Criteria for Classifying Hazardous Substances [NOHSC:1008(1994)]*, AGPS, Canberra.
4. Nabholz, JV, Miller, P and Zeeman, M, 1993, Environmental risk assessment of new chemicals under the Toxic Substances Control Act (TSCA) Section Five. Environmental Toxicology and Risk Assessment, ASTM STP 1179, W.G. Landis, J.S. Hughes and M.S. Lewis, Eds. American Society for Testing and Materials, Philadelphia. pp. 40-55.
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6. Standards Australia/ Standards New Zealand, 1991, *Australian/New Zealand Standard 1716 - 1991 Respiratory Protective Devices*, Standards Association of Australia Publ., Sydney, Australia.
7. Standards Australia, 1994, *Australian Standard 1336-1994, Recommended Practices for Eye Protection in the Industrial Environment*, Standards Association of Australia Publ., Sydney, Australia.
8. Standards Australia, Standards New Zealand 1992, *Australian/ New Zealand Standard 1337-1992, Eye Protectors for Industrial Applications*, Standards Association of Australia Publ., Sydney, Australia, Standards Association of New Zealand Publ. Wellington, New Zealand.
9. Standards Australia, 1987, *Australian Standard 2919 - 1987 Industrial Clothing*, Standards Association of Australia Publ., Sydney, Australia.
10. Standards Australia, 1978, *Australian Standard 2161-1978, Industrial Safety Gloves and Mittens (excluding Electrical and Medical Gloves)*, Standards Association of Australia Publ., Sydney, Australia.
11. National Occupational Health and Safety Commission, 1990, *Guidance Note for the Completion of a Material Safety Data Sheet*, 2nd. edition, AGPS, Canberra.