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1 December 2000

**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION
AND ASSESSMENT SCHEME**

FULL PUBLIC REPORT

Z-41

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Director
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FULL PUBLIC REPORT**Z-41****1. APPLICANT**

Lubrizol International, Inc of 28 River Street, Silverwater, NSW 2128 (ARBN 002 747 944) has submitted a limited notification statement in support of their application for an assessment certificate for Z-41.

2. IDENTITY OF THE CHEMICAL

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

Marketing Name: Z-41

Other Names: OS 144264, ADIBIS 254D

**Number-Average
Molecular Weight (NAMW):** > 1000

3. PHYSICAL AND CHEMICAL PROPERTIES

As the polymer is never isolated, the following physicochemical properties are those of a polymer solution.

Appearance at 20°C & 101.3 kPa: Amber viscous liquid

Boiling Point: Not determined. Polymer decomposes before boiling (see comments below).

Pour Point: 34°C

Specific Gravity: 0.938 at 20°C (see comments below)

Vapour Pressure: 1.8×10^{-7} kPa at 25°C (see comments below)

Water Solubility: $< 9.62 \times 10^{-5}$ g/L at 20°C (see comments below)

**Partition Co-efficient
(n-octanol/water):**

Log P_{ow} > 6.2 at 21°C (see comments below)

Hydrolysis as a Function of pH:

Not determined due to low water solubility. The polymer contains no functional groups that are susceptible to hydrolysis and the polymer is expected to be stable to hydrolytic degradation in the environment.

Adsorption/Desorption:

Log K_{oc} > 5.63 (see comments below)

Dissociation Constant:

Not determined due to low water solubility. However, the primary and secondary amine groups would have pKa values between 9-10, and so at environmental pH conditions between 4 and 9 the polymer will be protonated.

Particle Size:

Not determined as the polymer does not exist in particulate form.

Flash Point:

252°C (closed cup)

Flammability Limits:

Not determined. Diluent is a combustible liquid.

Autoignition Temperature:

> 400°C

Explosive Properties:

Not explosive

Reactivity/Stability:

Stable

Fat Solubility:

Miscible in all proportions with standard fat.

Comments on Physico-Chemical Properties

The general physico-chemical properties were determined using EEC or OECD methods (Woolley and Mullee, 1999).

The boiling point of the notified polymer was not determined. The notified polymer decomposes from approximately 212°C at 100.83 kPa, measured by differential scanning calorimetry. Analysis for the boiling point was performed at various pressures as well as in air or nitrogen atmospheres. Since decomposition still occurred under nitrogen before a measurable boiling point was obtained, it can be concluded that decomposition is thermally derived and not a product of oxidation of the chemical species.

Specific gravity (relative density) was measured using the pycnometer method. As the polymer is very viscous in nature, glass Sterlin tubes were used for pycnometers to allow for ease in pouring the test material. These tubes were calibrated appropriately using distilled water before the determination.

Attempts to measure the vapour pressure (VP) were made using a VP balance whereby the

VP is determined over a range of elevated temperatures (typically 150-230°C), and then fitted by linear regression to a line of general form $\text{Log VP} = A + B(1/T)$ (Tremain, 1999). This regression relation is then used to estimate the VP at lower temperatures eg. 25°C. In the present case there was a great deal of scatter in the data which precluded fitting to a linear relationship and instead an in-house estimation method was used based on use of measured data coupled with a regression slope. These estimates may overestimate the VP. A low VP is expected for a high molecular weight polymer such as the notified material.

Water solubility was determined in triplicate by stirring around 0.11 g of the test material in 550 mL of water for 3 hours at 30°C and then allowing to stand and equilibrate at 20°C for a further 3 hours. Following this, the samples were filtered and then freeze dried. The residual polymer remaining after removal of the water was then redissolved in tetrahydrofuran (THF) and the resulting solution analysed for the dissolved polymer using Gel Permeation Chromatography. Calibration of this method using THF solutions of the polymer indicated that recoveries of 70 and 78% were attainable. On eluting the THF solutions from the freeze dried samples, the detector responses were below the recognised detection limits, and so the water solubility at 20°C was determined as $< 9.62 \times 10^{-5}$ g/L. The results indicate low water solubility which is to be expected for a compound containing a high hydrocarbon content. The pH of the original aqueous solutions was 5.3-5.4 for all three replicates. This is surprising since the chemical composition suggests that it should have a basic reaction in an aqueous environment.

The value of $\log P_{ow}$ for the polymer was determined using the HPLC method. In this procedure the elution time of the unknown material is compared with that for a series of standards with known values for $\log P_{ow}$ and the value of $\log P_{ow}$ for the unknown estimated from the standard curve. In the present case the elution time of the new polymer was in excess of 34.7 minutes, and since this was well in excess of that for DDT (retention time 34.715 minutes, $\log P_{ow} = 6.2$), the value of $\log P_{ow}$ for the new material was inferred as being in excess of 6.2.

A HPLC screening method was used to establish the adsorption co-efficient through comparison of retention time of the test material with that of a series of reference compounds of known values for $\log K_{oc}$. The methodology of this technique is very similar to that used in the HPLC method for determination of $\log P_{ow}$. As with the $\log P_{ow}$ determination, the retention time of the test material on the column was larger than the 31.856 min found for DDT which has a $\log K_{oc}$ of 5.63. Accordingly, the value for $\log K_{oc}$ of the new material was determined as being > 5.63 . This indicates that the polymer will bind strongly to the organic component of soils and sediments, and is unlikely to be mobile in these media.

Preliminary results for fat solubility showed that the standard test method required modification as no upper limit for saturation mass fraction in standard fat was reached. It was determined that the test polymer was miscible in all proportions with standard fat. These results are in accord with the results of partition co-efficient and highlight the ability of the polymer to partition into oil and fatty phases.

4. PURITY OF THE CHEMICAL

Degree of Purity:

Not applicable as the notified polymer is a UVCB.

Hazardous Impurities:	Aliphatic amine monomer is present at concentrations below the cut-off level for hazardous classification
Non-hazardous Impurities (> 1% by weight):	Polyhydrocarbon monomer present at 20%.
Additives/Adjuvants:	None

5. USE, VOLUME AND FORMULATION

The notified polymer Z-41 will be used as a detergent for automotive fuel known as ADIBIS 254D (65% Z-41) and imported in a fuel additive package ADIBIS (TM) 4007 containing 25-50% ADIBIS 254D. The additive package containing 16-32.5% notified polymer will be imported in isotainers and sold to fuel manufacturers to blend into automotive fuel at 100-500ppm. No manufacturing will occur in Australia.

The notified polymer will be imported at a rate of <100 tonnes for the first year followed by <500 tonnes/year for the next 4 years.

The notified polymer is claimed to inhibit build up of solid deposits on intake valves, valve inlet ports and fuel injectors. The company supplied copies of a number of published reports (Tupa and Koehler, 1986; Tupa, 1987; Tupa and Koehler, 1988) which demonstrate that amine compounds such as the notified polymer mitigate such deposits and promote free flow of air/fuel mixture into the engine cylinders. This in turn allows for cleaner and more uniform burning of the fuel and to lower exhaust emissions of particulate material, carbon monoxide, hydrocarbons and nitrogen oxides (Tupa, 1987).

6. OCCUPATIONAL EXPOSURE

Import, Transport and Storage

The notified polymer will be imported in isotainers and transferred to customer depots or terminals by road or rail. Occupational exposure of dockside or transport workers to the notified polymer is not expected except in the event of a spill. No repackaging of drums or isotainers is required as these are delivered directly to the customer sites.

Refinery/Terminal Facilities

Despite the use of automated processes and dedicated delivery lines, worker exposure to the notified polymer may occur during transfer of the additive package from imported isotainers to a storage tank and during the transfer of the additive package from storage to fuel in tankers. These operations will occur at 4 sites. Exposure is expected to be confined to dermal contamination with drips and spills during the connection and disconnection of transfer lines and equipment. A protective apron, chemical goggles and chemical resistant gloves and boots are recommended by the notifier for workers when handling the additive package and the worker environment is expected to be well ventilated.

Skin contamination may occur also when rinsing out drums and isotainers prior to dispatch to

reconditioners.

End Use - Service Stations

At service stations, the fuel containing Z-41 will be transferred to underground tanks. Exposure of transport drivers, service station personnel and mechanics to very low concentrations of the notified polymer in the final fuel may occur due to spillage. Exposure is expected to be confined to dermal contamination with drips and spills during the connection and disconnection of transfer lines and dipping of tanks.

7. PUBLIC EXPOSURE

There is limited potential for public exposure to the notified polymer during importation, reformulation, transportation and distribution. Products containing the notified polymer will be sold to the general public and limited dermal exposure is possible. However, the concentration of the notified polymer in the end-use products is very low and given the high NAMW (>1000), it is unlikely to cross biological membranes.

Since environmental releases are expected to be low, the concentration of the notified polymer in the end-use products is low and a majority of the notified polymer is likely to be incinerated during combustion within automotive engines, public exposure via environmental sources is likely to be negligible.

8. ENVIRONMENTAL EXPOSURE

Release

The polymer will be transported by road in the closed ISO containers, and any potential release would be through accidental spills. Once received at the refinery terminals, the imported additive package is pumped into storage tanks and then pumped through metering equipment into the tanker trucks for addition to the base fuel and transport to petrol service stations.

The residue remaining in the ISO containers is estimated to be 1%. It is assumed that a total loss of the imported product due to pumping from one tank to another and during filling of tanker trucks would be around 1% of the total import volume. This estimated maximum of 2% of the new polymer equates to a maximum release of < 10 tonnes of the polymer each year.

The empty containers are cleaned by mineral oil at the reconditioning facility, and the washing oil is sent for incineration. Spills at the refinery would be contained within bunded enclosures and would most likely be sent with other waste material to an on site water treatment plant where most of the hydrocarbon material (including the new polymer) would be recovered into waste sludge. This material is usually incinerated, or possibly placed into landfill.

Some small loss through pumping of the finished fuel containing the notified polymer at service stations is also possible, and the notifier provided the following loss estimates likely to result from this operation.

Amount of finished fuel produced per year:	1,750,000 MT or 23,500,000,000 L
Estimated spill at service stations per 40 L tank fill:	590,000 L or 439,255 kg
Total loss from service stations per year:	87.5 kg

Fate

Most of the polymer will be destroyed during fuel combustion processes in engine cylinders with production of water vapour and oxides of carbon and nitrogen.

The ready biodegradability of the notified polymer was not determined, although that for a close structural analogue known as OS 46227 was determined. The biodegradation was studied through exposure of a nominal 100 mg/L solution to activated sewage sludge microorganisms at 21°C using the test protocols of OECD TG 301F, whereby the rate of carbon dioxide evolution is measured over the 28 day test period (Kung, 1998).

Degradation of 21% was attained after 28 days and the test material cannot be considered to be readily biodegradable. The reference compound (sodium benzoate) was degraded 89% over the same period, indicating the viability of the bacterial culture used. The notified polymer is similar to the test material used in the biodegradation study and so, for the purposes of this biodegradation test, it is reasonable to conclude that the notified material would have similar biodegradation properties. Although not readily biodegradable, the test material appears to be ultimately degradable, and if released to the soil or sediment, it is expected that the notified polymer would undergo slow mineralisation to water, carbonates and ammonia.

Polymer released to soil in either a spill or leak from a storage tank is expected to bind strongly to the organic component of soils and sediments due to its low water solubility and high value of K_{oc}. In this situation it is expected to slowly degrade as described above.

Any released material reaching the aquatic compartment is likely to form a distinct oily layer on top of the water. The low water solubility and high partition co-efficient suggests that the notified polymer would assimilate into onshore sediment, rocks, aquatic life and algae. Assimilated polymer would eventually become associated with aquatic sediments, although biodegradation processes are expected to preclude any large build up of concentration in these sediments.

The polymer is not expected to cross biological membranes, due to the low water solubility and high molecular weight (Connell, 1989). The mechanism for accumulation in aquatic wild life would be by ingestion of the notified polymer adsorbed to organic particles (Guiney et al, 1987), rather than the crossing of biological membranes.

Effects of new fuel additive on vehicle exhaust emissions

Due to future Commonwealth fuel quality legislation which will require motor fuels to meet certain standards in respect of vehicle exhaust emissions, the notifier was asked to provide documentation of the effects of the new material on these emissions. The notifier provided a summary report from Sweden (Almen, 1997) on tests conducted on a close analogue of the notified polymer (chemical structure not specified) in order to meet the requirements of the Swedish authority, together with copies of three published papers (Tupa, 1987; Tupa and Koehler, 1986; Tupa and Koehler, 1988) which discuss aspects of the exhaust emission issue.

The pertinent information contained in these publications is summarised as follows.

The summary Swedish test report described a single light passenger vehicle run using base fuel, and base fuel amended with 800 ppm of an additive known as ADX 1007A, which is reportedly similar (again the exact analogies were not specified) to the additive ADIBIS 4007 intended for use in Australia. Emission levels of CO, NO_x, hydrocarbons, particulate material and semi-volatile material were measured and compared for both fuels. Although test details such as total test duration, cleanliness of engine fuel intake port components and other parameters were not provided, the summary report concluded that the presence of the additive in the fuel resulted in no significant increase (or decrease) in exhaust levels of carbon monoxide, nitrogen oxides, particulate emissions or emissions of hydrocarbons. However, in respect of hydrocarbon emissions there was an indication that levels of poly aromatic hydrocarbons (PAHs) were slightly elevated (by around 8 %) in the fuel containing the additive compared with the base fuel. Given that this is the result of one fairly poorly defined test, the real significance of this result should be treated with caution.

Although the papers by Tupa and co-workers did not specifically address the effects of amine additives on the vehicle exhaust emissions, they provided valuable information on the deleterious effects of intake valve deposits on the emissions. Deposits result from restrictions on the flow of air/fuel mixture into the cylinders which may lead to uneven and incomplete fuel combustion. Tupa (1987) indicated that flow reduction in the intake ports of 30% could lead to approximately 40% increase in NO_x, around 100% increase in CO and several hundred percent increase in hydrocarbons in the exhaust emissions (ie. around 1.2 g per mile with “dirty” injection ports compared with around 0.2 g per mile in the case of “clean” ports).

Although this information is not directly relevant to the effects of the notified polymer on emissions, the papers suggest that such additives are beneficial in preventing/cleaning inlet port deposits.

9. EVALUATION OF TOXICOLOGICAL DATA

Toxicological studies were not provided for the notified polymer. The Material Safety Data Sheet (MSDS) for the notified polymer indicates that based on similar materials, the notified polymer is expected to have an oral LD₅₀ >5000mg/kg and a dermal LD₅₀ >2000mg/kg. The notified polymer is not expected to be a skin or eye irritant nor a skin sensitiser.

Based on its high molecular weight and chemical composition, the polymer is unlikely to be a hazardous substance according to the NOHSC *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 1999a).

10. ASSESSMENT OF ENVIRONMENTAL EFFECTS

The notifier has supplied ecotoxicity studies summarised in the following table.

The tests were performed in compliance with OECD/EEC Test Methods and according to OECD Principles of Good Laboratory Practices. Ecotoxicity and biodegradation studies were performed using the same analogue material. It is to be noted that in respect of suitability as an analogue for ecotoxicity tests, there are significant structural differences between this

analogue and the notified polymer. Nevertheless, the reported results for this analogue (referred to as OS 99970) are reproduced and commented on below.

Test	Species	Test concentrations (nominal) mg/L	Results (nominal) mg/L
Acute Toxicity (Static Test) (OECD TG 203)	Fathead Minnow <i>Pimephales promelas</i>	0, 9, 15.0, 25.0, 42.0, 70.0	96 h LC50 = 31 96 h NOEC* = 9
Acute Toxicity - Immobilisation (Static Test) T.R Wilbury Test Protocol 246-LU	Water Flea <i>Daphnia magna</i>	0, 0.1, 1, 10, 100	48 h EC50 = > 100 48 h NOEC = >100
Growth Inhibition Growth & Biomass (Static Test) (OECD TG 201)	Green Algae <i>Selenastrum capricornutum</i>	0, 0.3, 3.3, 33, 330, 3300	EC50 > 330 NOEC = 3.3 (WAF)
Respiration Inhibition (OECD TG 209)	Activated Sludge - Aerobic Waste Water Bacteria	0, 1, 10, 100, 1000, 10000	3 h EC50 > 10000 NOEC = 10000

*NOEC – no observable effect concentration

Fish

Fathead minnow were exposed to the analogue compound at nominal test material loading rates of 0 (control), 9, 15, 25, 42, and 70 mg/L for a period of 96 hours under static-renewal test conditions (Morris et al, 1993). The test media used were prepared by mixing the appropriate amount of neat substance directly into the test water contained in each test container. The test media were prepared and mixed for approximately 30-60 minutes prior to the addition of the fish, and prior to renewal of the media. The temperature, dissolved oxygen and pH of the test media were always between 21.4-22.9°C, 87.1-98.5% saturation (8.73 mg/L at 22°C) and 8.1-8.6 respectively, while water hardness was around 140 mg/L as CaCO₃. The test was performed in duplicate at each loading, using ten fish in each test. The fish exposed to the 15, 25, 42 and 70 mg/L test concentration exhibited a 10, 25, 25 and 95% mortality rate, respectively within the first 24 hours. Mortality rates increased to 21, 30, 42 and 100% at 96 hours in respect to increasing test concentrations. Other symptoms of toxicity observed included surfacing, lethargy, hyperventilation and discolouration. The concentration, homogeneity and stability of the test material in the test solutions were not determined. It was noted that a light brown solution formed in test chambers. As test concentrations increased, brown droplets were noted on the surface of the tanks. The results suggest that the notified polymer is slightly toxic to this species of fresh water fish but it is difficult to exclude physical effects due to the presence of undissolved material.

Aquatic Invertebrates

The tests on *Daphnia magna* were conducted over a 48 hour test period at $20\pm 1^{\circ}\text{C}$ using the analogue (OS 99970) at exposures to Water Accommodated Fractions (WAFs) of the notified substance at nominal loading rates of 0 (control), 0.1, 1, 10 and 100 mg/L under static test conditions (Ward et al, 1993). WAFs were obtained by stirring the notified test material at the above nominal concentrations for 24 hours followed by standing for 1 hour prior to siphoning the water phase containing the WAF. Ten daphnia were exposed at each WAF loading, and after 48 hours exposure of the notified polymer no immobilisation or sub-lethal effects among the test animals were observed. Accordingly the No Observed Effect Loading (NOEL) was determined to be >100 mg/L (WAF). No insoluble material was noted in any test vessels containing the WAFs of the test substance, though the measured concentration, homogeneity and stability of the test material in the test media were not determined. The results indicate that the notified polymer is not toxic to this species up to the limits of its water solubility.

Algae

The tests on green algae *Selenastrum capricornutum* were performed in duplicate using WAFs of the analogue material (OS 135608) at nominal WAF loadings of 0.3, 3.3, 33, 330 and 3300 mg/L over a 96 hour period at $24\pm 1^{\circ}\text{C}$ (Ward et al, 1998). The WAFs were prepared as described above for the daphnia tests, and had nominal loadings of 0 (control), 0.3, 0.33, 33, 330 and 3,300 mg/L. The growth in biomass was determined at 72 and 96 hours after commencement of the test. After 96 hours, significant inhibition of algal growth was observed for all WAF loadings in excess of 3.3 mg/L and the EC₅₀ (determined on the basis of both biomass and growth rate) was determined as between 330 and 3,300 mg/L WAF. The 96 hour NOEL was determined as 3.3 mg/L WAF. The higher loading WAFs had a cloudy yellow appearance, indicating the presence of insoluble material and the possibility that the WAF preparation may not have been satisfactory.

The results indicate the polymer to be at worst slightly toxic to this algal species. Also, when algae from the highest WAF medium were removed and placed into “clean” growth medium and incubated over 192 hours, these regained normal growth characteristics. This result indicates that the effects of the test material are algistatic rather than algicidal to this species.

Microorganisms

The effect of the analogue OS 99970 on the respiration of activated sewage sludge microorganisms was studied according to the protocols of OECD TG 209A (Goodrich and Teer, 1993). A 3 hour EC₅₀ of greater than 10000 mg/L was determined. The test substance did not inhibit respiration of the activated sludge in the tested range of WAF loadings between 1 and 10,000 mg/L (test material added directly to test vessels containing the sewage sludge) and accordingly the NOEL was found to be the nominal 10,000 mg/L. A reference test was conducted using 3,5-dichlorophenol at nominal concentrations of 10, 20 and 40 mg/L, and produced significant inhibition of bacterial respiration in all three cases (43%, 78% and 90% inhibition respectively). This result demonstrated the viability of the sewage bacteria used in the test.

Conclusion

The ecotoxicity data for the analogue indicates that the notified polymer is at worst slightly toxic to fish and algae, and is non toxic to daphnia and sewage bacteria up to the limits of its water solubility. However, since no direct measurements of dissolved concentrations of the test material were undertaken in any of the tests it is possible that the material is more toxic to

aquatic species than indicated on the basis of the nominal loadings. Also, in those cases (fish and algae) where toxic effects were observed, it is possible that the effects were physical in origin rather than due to true chemical toxicity.

11. ASSESSMENT OF ENVIRONMENTAL HAZARD

The proposed use pattern of the polymer as a petrol fuel additive intended to prevent the deposition of solid deposits around the fuel import ports of engines is not expected to result in a significant release to the environment. Less than 10 tonnes of the material may be released as a result of leaks and spills during transfer of the additive package to fuel and in transfer of fuel to end use motor vehicles, but most of this is expected to be recovered into waste sludge and then either incinerated or placed into landfill.

Small quantities of fuel lost as a result of spills from petrol pumps would become adsorbed by soil. The notified polymer is not readily biodegradable and in this situation is expected to be slowly mineralised to water and oxides of carbon and nitrogen through biological processes. The same fate is expected for any polymer placed into landfill with waste sludge from refineries. The majority of the imported polymer is expected to be completely destroyed by combustion within the petrol engine, resulting in oxides of carbon, nitrogen and hydrogen.

Except in the case of transport accident, very little of the polymer is likely to enter the water compartment. Polymer in the water compartment would become associated with aquatic sediments and be slowly mineralised through biological processes. The polymer is not expected to have high potential for bioaccumulation.

Tests on the toxicity of a structurally related analogue to the notified polymer have shown this material to be at worst slightly toxic to fish and algae, and to be non toxic to daphnia and sewage bacteria. In the two cases where toxicity was noted, it is possible that these effects originated in physical processes rather than true chemical toxicity.

The available evidence indicates that the use of the notified polymer as a fuel additive has no significant deleterious effects on the quality or quantity of noxious or toxic vehicular exhaust emissions, and overall use of the polymer as intended is not considered to pose any hazard to the environment.

12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

Hazard Assessment

Toxicological studies were not provided. The notified polymer is unlikely to be a hazardous substance according to the NOHSC *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 1999a). The MSDS for the notified polymer indicates that based on analogue data, oral toxicity is expected to be very low and dermal toxicity is expected to be low. Also, the notified polymer is not expected to be a skin or eye irritant nor a skin sensitiser.

Occupational Health and Safety

During import and transport of the notified polymer, worker exposure to the polymer is unlikely except in the event of a spill. Exposure after a spill would be controlled by use of the

recommended practices for spillage clean up outlined in the MSDS supplied by the notifier.

At refineries and terminals, the handling of fuels and fuel products in general containing solvents may cause eye, dermal and respiratory irritation. In addition, small amounts of amine monomer, a skin and respiratory sensitiser, may be present. Although these levels are below that required for hazardous classification, the unpredictable nature of allergic sensitisation means that precautions should be taken to minimise exposure. Workers at these sites are required to wear personal protective equipment consisting of a protective apron, chemical goggles, chemical resistant gloves and boots to control exposure. Engineering controls and personal protective equipment for handling the solvent components of the additive package should be sufficient to limit exposure to the notified polymer.

The use of automatic, dedicated transfer lines and enclosed, automated injection into fuel will reduce the likelihood of exposure to the additive package. Therefore, for the notified polymer, the health risk expected for refinery and terminal workers would be assessed as low due to its expected low toxicity and high level of exposure control.

Tanker drivers, service station workers and mechanics will receive low exposure to the notified polymer. Considering the very low concentration ($< 0.05\%$) present in the final fuel, the risk of adverse health effects for these workers arising from exposure to the notified polymer is negligible.

Public Health

There is limited potential for public exposure to the notified polymer arising from its use as a fuel additive. Although dermal contact with fuel containing the notified polymer is possible, the notified polymer is present at low concentrations and is unlikely to be bioavailable.

Based on the toxicity profile and use pattern of the notified polymer, it is considered that the notified polymer will not pose a significant risk to public health.

13. RECOMMENDATIONS

The imported product containing the notified polymer should not be allowed to enter the aquatic environment.

To minimise occupational exposure to Z-41, the following guidelines and precautions should be observed:

- Protective eyewear, chemical resistant industrial clothing, footwear and gloves should be used during occupational use of the products containing the notified polymer. Refer to the MSDS for the suppliers recommended glove material. Where engineering controls and work practices do not reduce aerosol and vapour exposure to safe levels, an organic vapour respirator should also be used;
- Spillage of the notified polymer should be avoided. Spillages should be cleaned up promptly with absorbents which should then be put into containers for disposal;

- A copy of the MSDS should be easily accessible to employees.

If products containing the notified polymer are hazardous to health in accordance with the NOHSC *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 1999a), workplace practices and control procedures consistent with State and territory hazardous substances regulations must be in operation.

Guidance in selection of protective eyewear may be obtained from Australian Standard (AS) 1336 (Standards Australia, 1994) and Australian/New Zealand Standard (AS/NZS) 1337 (Standards Australia/Standards New Zealand, 1992); for industrial clothing, guidance may be found in AS 3765.2 (Standards Australia, 1990); for impermeable gloves or mittens, in AS 2161.2 (Standards Australia/Standards New Zealand, 1998); for occupational footwear, in AS/NZS 2210 (Standards Australia/Standards New Zealand, 1994c); for respirators, in AS/NZS 1715 (Standards Australia/Standards New Zealand, 1994a) and AS/NZS 1716 (Standards Australia/Standards New Zealand, 1994b).

14. MATERIAL SAFETY DATA SHEET

The MSDS for the notified polymer was provided in a format consistent 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

Secondary notification under subsection 64(1) of the Act may be required if (i) either the method of use changes in such a way as to greatly increase the environmental exposure of the notified polymer; or (ii) if additional information becomes available on adverse environmental effects of the polymer; or (iii) when details of the new Commonwealth fuel legislation have been clarified.

Secondary notification of the notified polymer may be required under subsection 64(2) of the Act if any of the circumstances stipulated arise.

16. REFERENCES

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