

File No: SN/5

June 1999

**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION
AND ASSESSMENT SCHEME**

FULL PUBLIC REPORT

Notified Chemical in Mortrace MP

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Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT

Notified Chemical in Mortrace MP

1. APPLICANT

Petrofin International Pty Ltd of 10th Floor 350 Kent St SYDNEY 2000 has submitted a standard notification statement in support of their secondary notification for Notified Chemical in Mortrace MP.

The new chemical was previously the subject of a standard notification (NA/580) but due to substantial deficiencies in the data provided during the associated assessments, Secondary Notification was required as a condition for granting the assessment certificate. The present report - SN/005 - is the full assessment of Environmental Hazard associated with use of the new chemical, and embraces information not available during preparation of the previous (interim) report.

It is considered that the additional data provided by the notifier under secondary notification will not result in any additional occupational health and safety or public health considerations. Therefore the relevant sections in the assessment report for NA/580 have not been altered. However, they have been reproduced in this report for completeness.

2. IDENTITY OF THE CHEMICAL

This section is unchanged from NA/580.

Trade Name: Mortrace MP (contains 40% on the notified chemical)

Method of Detection and Determination: no spectral data provided, but the colour producing reactions should suffice to identify the chemical in most situations

3. PHYSICAL AND CHEMICAL PROPERTIES

The physico-chemical properties listed below are for the formulation to be imported containing 40% of the notified chemical, 30% oleic acid and 30% (polyethyl)benzenes except where indicated

Appearance at 20°C and 101.3 kPa: light brown wax-like paste (notified chemical)

Boiling Point:	238°C
Specific Gravity:	0.96
Vapour Pressure:	< 0.27 kPa
Water Solubility:	stated to be insoluble (see below)
Partition Co-efficient (n-octanol/water):	$\log P_{OW} = 2.55$, for notified chemical (see below)
Hydrolysis as a Function of pH:	not determined (see below)
Adsorption/Desorption:	not determined (see below)
Dissociation Constant:	not determined (see below)
Flash Point:	not determined
Flammability Limits:	not flammable
Autoignition Temperature:	not determined
Explosive Properties:	not explosive

Comments on Physico-Chemical Properties

Data for the hydrolysis, adsorption/desorption and dissociation constant have not been provided for the notified chemical. The notifier has claimed that due to low water solubility and other factors, determination of these data would not be technically feasible, and has requested waivers on the provision of this data. Given the molecular structure of the chemical, its intended use pattern and the expected diffuse and low level release to the environment, this is considered acceptable. However, estimates of some of the physical properties were obtained from Quantitative Structure Activity Relationships (QSARs) of the United States EPA ASTER database (US Environmental Protection Agency, 1998). These are discussed below.

A full test report on the determination of the n-octanol/water partition coefficient was provided. This parameter was measured using the shake flask method whereby a solution of the chemical in water saturated n-octanol at a nominal concentration of 0.0078 mol/L was shaken with different volumes of n-octanol saturated water over an 18 hour period at $24 \pm 1^\circ\text{C}$ using an automated shaker. Three n-octanol:water ratios were used – viz. 1:5, 1:10 and 1:20, and each test was performed with four replicates. This procedure provided 12 samples (each consisting of an n-octanol phase mixed with water), and after the 18 hour incubation ($24 \pm 1^\circ\text{C}$), each sample was centrifuged for 5 minutes and then allowed to equilibrate ($24 \pm 1^\circ\text{C}$) for one hour. This procedure produced phase separation in each of the 12 samples, following which the concentration of the chemical in each of the oil and water phases was

determined using gas chromatography. The solute in the aqueous phase was extracted with methylene chloride prior to analysis. The value of P_{ow} for each sample was calculated from the ratio of the equilibrium concentration of the new chemical in n-octanol to that in the respective aqueous phase. The results for $\text{Log } P_{ow}$ ranged between 2.34 and 2.70, with a mean of 2.55 and a standard deviation of ± 0.16 . The pH of the aqueous phase was not reported, but it is likely that this would have been high due to the alkaline nature of the chemical.

While no experimental report on water solubility was submitted, it is possible to estimate this from measured values of $\text{Log } P_{ow}$. Lyman et al. (1982) present a number of relations for this purpose, and the equation 2.12 appears to be appropriate for aromatic amines. This relation is –

$$\text{Log } (1/S) = 0.996 \times \text{Log } P_{ow} - 0.339,$$

where S is the solubility in mole/L. Using the value of 2.55 for $\text{Log } P_{ow}$, the estimated water solubility is 1700 mg/L, which is a large value and at odds with the notifier's assertion that the chemical is "insoluble". However, as discussed below, the compound contains amino groups. These will be protonated in aqueous systems and the resultant positive electrical charge will favour solubility in water.

The notified chemical contains no functional groups likely to undergo hydrolysis in the environmental pH range of 4 - 9. The compound contains two amine functionalities, but only the tertiary nitrogen in the morpholine residue is likely to be appreciably basic (aromatic amino groups are only weakly basic), with a likely pK_a between 9 and 10. This means that in the normal environmental pH range of 4 - 9, the compound will be protonated and carry a positive charge.

Estimates of physico-chemical data based on the molecular structure were derived from the USEPA ASTER database. These are listed below, and where comparison is possible, the QSAR estimates are in reasonable accord with measured values.

The ASTER data indicates moderate water solubility, probably due (at least partly) to the positive charge resulting from protonation of the morpholine nitrogen. The data estimates $\text{Log } K_{oc}$ at 2.78, indicating that the compound has some affinity for the organic component of soils and sediments, but is nevertheless likely to be reasonably mobile in these media.

ASTER DATA (all calculated using QSARs)

Property	QSAR Estimate
Boiling Point:	370 °C
Vapour Pressure:	9.23×10^{-8} mm of Hg (16.4 Pa)
Water Solubility:	631 mg/L
Henry's Law Constant:	5.17×10^{-6} Pa.m ³ /mole
$\text{Log } P_{ow}$:	2.78
$\text{Log } K_{oc}$:	2.85

Hydrolytic degradation half life: Hydrolysis is unlikely.

4. **PURITY OF THE CHEMICAL**

Degree of Purity: 99.3%

Toxic or Hazardous Impurities: none

Non-hazardous Impurities (> 1% by weight): none

Additives/Adjuvants:

Name	CAS Number	% Weight
Oleic acid	112-80-1	30.0
Naphtha	6472-94-5	25.8
Naphthalene	91-20-3	4.2

5. **USE, VOLUME AND FORMULATION**

The notified chemical is to be imported as a 40% solution containing 30% oleic acid and 30% (polyethyl)benzenes. Import volumes for the notified chemical are expected to be between 10 and 20 tonnes per annum, and the notifier states imports are unlikely to exceed 20 tonnes over the next five years.

The use is as a marker of concessionally taxed fuels and solvents to test for adulteration of non-concessionally taxed fuels. Diesel fuel, distillate, leaded or unleaded petrol will not have the marker added unless specifically cleared for other than on-road use.

Fuels exempted from marking are:

- any fuels cleared for home consumption in a packaged state;
- fuel oil which is coloured black;
- aviation turbine fuel; and
- aviation gasoline

Also exempted are solvents for application or use in the following industries:

- foodstuffs;
- pharmaceuticals;
- oil seed extraction;
- paint, varnish and ink manufacturing;
- mining industry where 100% purity is required;
- adhesives; and

- resins

The industries which will be using marked product are most likely to be:

- home heating/lighting and industrial heating;
- rubber manufacturing, including tyres;
- plastics manufacturing; and
- chemical manufacturing

The petroleum products to be marked are: benzole, benzene, toluole, toluene, xylole, xylene, naphthenic and similar oils, condensate other than for use as a refinery feedstock, crude oil other than for use as a petroleum feedstock, topped crudes other than for use as a petroleum feedstock, diesel fuel, heating oil, kerosene, gasoline, mineral turpentine, liquefied paraffin, waster oil, white oil, naphthenic distillates and solvents under the tariff description of “other refined or partly refined petroleum products other than lubricants”.

It was indicated in the notification statement that the majority of the Mortrace MP will be used for marking fuels, and that a maximum of three tonnes per annum would be used in marking solvents and other commodities. Since the Mortrace MP contains 40% of the new chemical, this equates to an annual maximum of 1,200 kg used for purposes other than fuel marking, or a maximum of 12% of annual imports.

6. OCCUPATIONAL EXPOSURE

This section is unchanged from NA/580.

The notified chemical will be imported in 20 L and 205 L drums on shrink wrapped pallets.

The notified chemical will be metered into fuel to a final concentration of 20 ppm by at least three methods as disclosed by three oil companies.

One company proposes to send 200 L drums to a contractor who will dispense the imported formulation into 100 or 200 mL bottles. The contractor has specific systems in place for this purpose involving a pump connected to an automatic bottle filling line. Exposure to a limited residue on the drum bung and from connecting lines is possible. It is stated that there should only be a thin film of residue in lines following bottle filling. The bottles will be manually tipped into tankers by the drivers with a small chance of spillage.

An alternate approach for larger terminals will be to attach a pump to the 200 L drum directly to injection equipment. In this case exposure to a limited amount of residue on bungs and in pump lines and injection equipment lines is possible. A similar method by a second company will involve use of 20 L drums in which case the imported formulation will be pumped to a storage tank connected to injection equipment. Again limited exposure to residues on drum bungs and in lines is possible.

In a third case the 20 L drum will be decanted manually into a storage tank connected to injection machinery. Here there is some likelihood of accidental spillage which may lead to ocular or dermal exposure.

Empty drums will be collected and cleaned by a licensed drum reconditioner. Exposure in this instance is expected to be low.

7. PUBLIC EXPOSURE

This section is unchanged from NA/580.

The notified chemical will not be directly available to the public, and most members of the public will not come into contact with concessionally taxed fuels treated with the marker. Where the public does gain access to concessionally taxed fuels, such as heating oils and mineral turpentine, the low concentration of the additive (20 ppm) will result in negligible exposure levels to the notified chemical.

Transport of the Mortrace MP additive is unlikely to result in significant public exposure in the event of an accident as the material is a wax-like paste, is insoluble in water, and has a low vapour pressure (< 0.27 kPa). During a transport accident the hazard presented by a spill of the bulk fuel or solvent treated with Mortrace MP, and the subsequent risk to the public, will greatly outweigh any risk presented by the Mortrace MP additive itself.

Addition of Mortrace MP to fuel is accomplished by either pouring the required quantity directly into a fuel tanker or injecting it into filling lines. In either case the small quantities required in each operation, the non-volatile nature of the Mortrace MP product, and the buffer zones and safety procedures required for bulk handling of petroleum products, will prevent public exposure to the notified chemical from its industrial application.

8. ENVIRONMENTAL EXPOSURE

Release

The notifier indicated that the imported product, Mortrace MP, would be added to the fuels and solvent products using automated additive injection equipment or through manual addition from prepacked 100 and 200 mL bottles. While automatic dosing equipment is often used in the petrochemical industry for adding dye and other additives to fuel and other products, the notifier did not specify what volume of Mortrace MP is likely to be dispensed using this method. However, releases of the chemical using such automated processes are expected to be of small volume and contained within the terminal. The spills would be adsorbed onto clay or sawdust and disposed of in accordance with local state and federal regulations, either at an authorised incinerator or a waste treatment facility. Also, as filling the 100 and 200 mL bottles from the imported 200 L drums would be performed using automated equipment, little release is anticipated during this activity. However, some chemical would be left in the drums after filling these smaller containers. This is likely to be washed out of the drums during refurbishment and the wash water or solvents used during this activity disposed of through accepted waste disposal practices. Again, the notifier gave no estimate of the residuals likely to be left in the drums, but an estimate of 2% of import volume, up to 400 kg per annum, may be appropriate.

It is likely that much of the Mortrace MP will be added from the 100 and 200 mL bottles directly to the contents of road or rail tankers by drivers or oil company terminal workers. Given that the new chemical will be present in the marked fuel at approximately 20 ppm, and that the new chemical comprises 40% of the Mortrace MP, a typical 20,000 L road tanker load would require 1 L of the Mortrace MP, or ten 100 mL bottles. It is presumed that the marker chemical would be mixed homogeneously through the load through agitation during the journey from petrochemical terminal to the retail outlets.

The company did not indicate the amount of liquid likely to be left in the bottles after emptying into the tankers, but this could be as high as 5% of the contents, equating to one tonne of the notified chemical annually. The Material Safety Data Sheet (MSDS) supplied with the notification statement recommends the following order of preference for disposal for used containers: (1) recycle or rework, if feasible; (2) incinerate at an authorised facility; or (3) treat at an acceptable waste treatment facility. However, in reality, most of the empty bottles will be disposed of with industrial waste at the oil terminals, and are likely to be either incinerated or placed into landfill.

Most of the notified chemical will be destroyed through combustion in fuels (see below), and the notifier has indicated that even when used in solvents or other products, most of the notified chemical would eventually be destroyed through incineration. Some of the oil products containing the new chemical may be used in preparation of agricultural pesticide or herbicide formulations. These could be applied over large areas resulting in widespread but low level release of the chemical to the soil and water compartments. Also, although it is inevitable that some of the products (fuels or otherwise) containing the product will be spilt or be disposed of in inappropriate manner, the associated release of the chemical will be at low levels and it will be distributed in a diffuse manner across the nation.

The Australian Customs Service has indicated that it is unlikely that marked solvent products will be sold to the general public.

Fate

The fate of the majority of the notified chemical will be strongly associated with the fate of the fuels or solvents into which it is incorporated. It is anticipated that combustion of fuels containing the notified chemical will result in the destruction of the notified chemical, with production of water vapour and oxides of carbon and nitrogen.

There is some potential environmental exposure from the use of solvents and other products containing the new chemical, which are not used directly as fuels. Due to the diversity of the uses for the solvents, the new chemical will become incorporated into a variety of products, e.g. bitumen in roads. Also, some of the chemical may be released to the soil and water compartments as a result of spray application of agricultural formulations. The new chemical has an estimated Log K_{oc} of 2.68, indicating a tendency to associate with the organic component of soils and sediments. However, as the binding is unlikely to be strong, the compound will be mobile in these media, and will eventually leach into the water compartment.

Although the new chemical may be present in a variety of industrial solvents, most waste solvent is likely to be collected and either recycled or disposed of in acceptable manner,

probably incineration.

The notifier provided a test report on biodegradability conducted according to OECD TG 301B (CO₂ evolution test) (Organisation for Economic Co-operation and Development, 1995-1996). The results showed 2 % degradation after 28 days. Consequently, the compound is not classified as being readily biodegradable, but when associated with soils or sediments is likely to be slowly degraded through biological processes. The ASTER database estimates the half-life for Biological Oxygen Demand (BOD) associated with the compound as > 100 days. The product MSDS states that the notified chemical has the potential to bioaccumulate in aquatic organisms, based on the partition coefficient, although data from the ASTER database estimates a modest bioaccumulation factor of around 63. While some of the chemical is likely to be released to the water compartment, release would be diffuse and at low levels.

9. EVALUATION OF TOXICOLOGICAL DATA

This section is unchanged from NA/580.

9.1 Acute Toxicity

Summary of the acute toxicity of the notified chemical in Mortrace MP

<i>Test</i>	<i>Species</i>	<i>Outcome</i>	<i>Reference</i>
acute oral toxicity	rat	LD ₅₀ = 6.77 g/kg	(Reagan, 1981)
acute dermal toxicity	rat	LD ₅₀ > 2.0 g/kg	(Reagan, 1981a)
skin irritation	rabbit	slight irritant	(Reagan, 1981c)
eye irritation	rabbit	slight irritant	(Reagan, 1981b)

9.1.1 Oral Toxicity (Reagan, 1981)

<i>Species/strain:</i>	rat/Sprague-Dawley				
<i>Number/sex of animals:</i>	5/sex/dose				
<i>Doses:</i>	3.50, 4.49, 5.77, 7.40, 9.50 g/kg				
<i>Observation period:</i>	14 days				
<i>Method of administration:</i>	gavage				

Clinical observations and Mortality:

<i>Dose (g/kg):</i>	3.50	4.49	5.77	7.40	9.50
<i>Clinical observations:</i>					
decreased activity	7/10	10/10	10/10	10/10	10/10

ataxia	7/10	4/10	6/10	10/10	3/10
diarrhea	10/10	9/10	8/10	8/10	
<i>Mortality:</i>	0/10	1/10	5/10	4/10	9/10

Test method: according to OECD guidelines (Organisation for Economic Co-operation and Development, 1995-1996)

LD₅₀: > 5 g/kg

Result: the notified chemical was of low acute oral toxicity in rats

9.1.2 Dermal Toxicity (Reagan, 1981a)

Species/strain: rabbit/NZW

Number/sex of animals: 3/sex

Observation period: 14 days

Method of administration: 2 g/kg of the notified chemical was applied to the exposed skin of each rabbit under occlusive dressing for 24 hours

Clinical observations: none

Mortality: none

Morphological findings: none

Test method: according to OECD guidelines (Organisation for Economic Co-operation and Development, 1995-1996)

LD₅₀: LD₅₀ > 2.0 g/kg

Result: the notified chemical was of low dermal toxicity in rats

9.1.3 Inhalation Toxicity

not determined

9.1.4 Skin Irritation (Reagan, 1981c)

Species/strain: rabbit/New Zealand White

Number/sex of animals: 6

Observation period: 72 hours

Method of administration: 0.5 mL under occluded dressing for 24 hours

Draize scores (Ref):

<i>Time after treatment (days)</i>	<i>Animal #</i>					
	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>
<i>Erythema</i>						
1	2 ^a	1	2	1	1	2
2	1	0	0	0	0	1
3	0	0	0	0	0	0
<i>Oedema</i> no scores above zero						

^a see Attachment 1 for Draize scales

Test method: according to OECD guidelines (Organisation for Economic Co-operation and Development, 1995-1996)

Result: the notified chemical was a slight skin irritant in rabbits

9.1.5 Eye Irritation (Reagan, 1981b)

Species/strain: rabbit/New Zealand White

Number/sex of animals: 6 (one animal died on day 5 due to non-treatment related causes)

Observation period: 7 days

Method of administration: 0.1 mL of the notified chemical into the conjunctival sac of one eye

Test method: according to OECD guidelines (Organisation for Economic Co-operation and Development, 1995-1996)

Result: the notified chemical was a slight eye irritant in rabbits; no cornea or iridal effects were seen up to 7 days post-instillation; the only conjunctival effects seen were slight redness and chemosis at the 1 hour time point in all animals

9.1.6 Skin Sensitisation

not determined

9.2 Repeated Dose Toxicity

not determined

9.3 Genotoxicity

9.3.1 *Salmonella typhimurium* Reverse Mutation Assay (Godek, 1983)

<i>Strains:</i>	TA 1535, TA 1537, TA 1538, TA 98 and TA 100
<i>Concentration range:</i>	100 - 10000 µg/plate
<i>Test method:</i>	similar to OECD guidelines (Organisation for Economic Co-operation and Development, 1995-1996)
<i>Result:</i>	the notified chemical exhibited toxicity towards strains TA 98 and TA 100 at 3333 and 10000 µg/plate; the notified chemical was not mutagenic in the system either in the presence or absence of metabolic activation provided by rat liver S9 fraction

9.4 Overall Assessment of Toxicological Data

The notified chemical was of low acute oral ($LD_{50} > 5000$ mg/kg) and dermal ($LD_{50} > 2000$ mg/kg) toxicity in rats and rabbits, respectively. It was a slight skin and eye irritant and was non-mutagenic in *Salmonella typhimurium*. It would not be classified as hazardous according to the National Commission's *Approved Criteria for Classifying Hazardous Substances*. (National Occupational Health and Safety Commission, 1994a).

However, the notified chemical is only commercially available as Mortrace, a mixture of the notified chemical, oleic acid and naphtha. This formulation would be classified as hazardous according to the National Commission's *Approved Criteria for Classifying Hazardous Substances*, based on the skin and eye irritation potential of naphtha and its ability to cause lung damage with chronic exposure.

10. ASSESSMENT OF ENVIRONMENTAL EFFECTS

The notifier provided the following ecotoxicity data. The ecotoxicity tests were performed in accordance with OECD Test Guidelines (Organisation for Economic Co-operation and Development, 1995-1996).

Test	Species	Result (nominal), mg/L
Acute Toxicity 96 hr acute, static [OECD TG 203]	Fathead Minnow (<i>Pimephales promelas</i>)	LC ₅₀ = 4.8 LOEC = 2.2
Acute Immobilisation 48 hr acute, static [OECD TG 202]	Water Flea (<i>Daphnia magna</i>)	EC ₅₀ = 5.1 LOEC = 2.2
Growth Inhibition 72 hr [OECD TG 201]	Algae (<i>Scenedesmus capricornutum</i>)	EC _{b50} = 1.0 EC _{r50} = 2.60 NOEC = 0.63

The tests on fathead minnow were performed using solutions of the test material in a semi-static (renewal) system over a 96 hour period at a controlled temperature of $22 \pm 1^\circ\text{C}$. The water was removed daily and replaced with fresh water containing the respective concentrations of the test material. Five solutions of the chemical with nominal concentrations of 1.3, 2.2, 3.6, 6.0, and 10 mg/L were tested, together with two blank controls, namely one dilution water control and one solvent control containing 95 mg/L of dimethylformamide. Ten fish were tested at each concentration; tests were performed in duplicate. During the tests the pH of the test solutions was always between 8.0 and 8.4. Dissolved oxygen (DO) levels were usually between 7.0 and 9.0 mg/L; there was an aberration after 48 hours when DO levels fell as low as 4.3 mg/L, but this was corrected by applying gentle aeration. Water hardness was always around 170 mg/L as CaCO₃.

No adverse effects were observed for the fish in either the blank or solvent control over the 96 hour test period. Sublethal effects observed during the fish test in those solutions containing the new chemical included a darkening in colour, lethargy and swimming on the bottom of the test vessels, but no adverse effects on fish behaviour were observed till the fish had been exposed to a nominal 3.6 mg/L for 48 hours. The first fish deaths (20% in one of the replicates) were observed after exposure to a nominal 3.6 mg/L of the chemical for 96 hours. All the fish had died after 24 hours exposure to a nominal 10 mg/L of the test chemical. The tests indicate that the new chemical is moderately toxic to the Fathead minnow with a 96 hour LC₅₀ of 4.8 mg/L (95% confidence interval 4.2-5.4 mg/L) determined using the methods of Stephan (1983) and probit analysis. The 96 hour NOEC was determined as 2.2 mg/L.

The acute immobilisation tests on daphnia were performed using solutions of the test material in a static non renewal system over a 48 hour period at a controlled temperature of $20 \pm 1^\circ\text{C}$. Five solutions of the chemical with nominal concentrations of 1.3, 2.2, 3.6, 6.0 and 10 mg/L were tested, together with two controls, namely a blank control and a solvent control containing 95 mg/L of dimethylformamide. Ten daphnia were tested at each concentration, with each test performed in duplicate. During the tests the pH of the test solutions was always between 7.7 and 7.9, while dissolved oxygen levels were always between 8.6 and 8.8 mg/L. No immobilisation was observed with either the blank or solvent control over the 48 hour test period, while some immobilisation was observed after 48 hours exposure to the test compound at 3.6 mg/L. The tests results indicate that the new chemical is moderately toxic to the daphnia with a 48 hour EC₅₀ of 5.1 mg/L (95% confidence interval 4.4 – 6.0 mg/L) determined using the methods of Stephan (1983) and probit analysis. The 48 hour NOEC was 2.2 mg/L.

An algal growth inhibition test was conducted on the freshwater green algae *Selenastrum capricornutum* over a 72 hour incubation period at $24 \pm 1^\circ\text{C}$, with nominal concentrations of the test material of 0.31, 0.63, 1.3, 2.5 and 5.0 mg/L, together with a blank control containing no chemical and a solvent control containing 47 mg/L of dimethylformamide. The solutions were made up in deionised water with an initial pH of approximately 7.6. The pH increased with time, and the extent of increase reflected the extent of algal growth. The 72 hour EC_{50} was 1.0 mg/L when based on cell density, and 2.6 mg/L when based on the average specific growth rate. The 72 hour NOEC was 0.63 mg/L. These data indicate that the chemical is moderately to highly toxic to this species of green algae.

The QASR calculations of the ASTER database also furnished estimates of LC_{50} for a number of freshwater fish species: Fathead minnow (38.3 mg/L), Rainbow trout (16.0 mg/L), Channel catfish (16.5 mg/L) and Bluegill (30.2 mg/L). The estimated LC_{50} for *Daphnia magna* was 21.0 mg/L, while the Maximum Allowable Toxic Concentration (MATC) for chronic exposure for Fathead minnow was 6.3 mg/L. Where these estimates can be compared with measured experimental results, the QSAR indicates lower toxicity.

The imported product is referred to as a marine pollutant in the MSDS.

11. ASSESSMENT OF ENVIRONMENTAL HAZARD

The ecotoxicity data indicates that the new chemical is moderately to highly toxic to those aquatic species against which it was tested. However, the intended use pattern of the chemical as a marker for fuels and solvents indicates that little of the compound is likely to be released to waterways. However, assuming that 20% of the chemical is released to the water compartment through the use of cleaning products, degreasers and cosmetics (a maximum of 4 tonnes per annum), it is possible to estimate a worst case Predicted Environmental Concentration (PEC) assuming all the chemical is released through the sewerage system in a diffuse manner over the whole country. Based on a nationwide population of 18,000,000, and assuming that each person contributes an average of 150 L per day to total sewage flow, the calculated PEC in sewage effluent is 23 $\mu\text{g/L}$. This would be further diluted by a factor of at least 10 on discharge to receiving waters, giving a final PEC of 2.3 $\mu\text{g/L}$. This is at least two orders of magnitude below toxic levels.

The chemical is moderately hydrophobic with $\text{Log } P_{\text{ow}} = 2.55$ and an estimated value for $\text{Log } K_{\text{oc}}$ of 2.85. These data indicate some affinity for the organic component of soils and sediments, but the compound is likely to be mobile in these media. However, the relatively high water solubility indicates that if the compound were to enter waterways (e.g. as a result of spills), it would tend to remain in the aqueous phase. Mackay Level 1 calculations (US Environmental Protection Agency, 1998) indicate a partitioning of 91.5 % to water and 8.5 % to soils and sediments. Any of the chemical which becomes associated with soils or sediments is expected to be slowly degraded to water, carbon dioxide and methane through biological processes. These mechanisms would operate to continuously remove the chemical from the environmental compartments, and the overall environmental concentrations would diminish. Also, bioaccumulation is unlikely and the US EPA ASTER database estimates a bioaccumulation factor of 63.

The above considerations indicate a low hazard to the environment when the new chemical is

used as a marker for fuel oils and solvents in the manner indicated by the notifier.

12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

This section is unchanged from NA/580.

The notified chemical will be imported in 20 L or 205 L drums at a concentration of 40% in oleic acid and aromatic hydrocarbon solvent. Exposure of transport and storage workers is unlikely except in the event of an accident.

A number of methods, as described in the section on occupational exposure, will be employed to add the notified chemical in Mortrace MP to fuels and solvents. Dermal exposure and, to a lesser extent, ocular exposure to residues in lines, on line connectors and on drum bungs, is possible. Exposure to spills when decanting small bottles on 20 L drums is also possible. Thus gloves, goggles, clothing and footwear as described below should be worn during decanting, cleaning up of spillages and cleaning of lines and connectors. The risk to workers of acute toxic effects, skin and eye irritancy and genotoxicity is expected to be low based on animal data. The risk of skin sensitisation and chronic toxic effects is unknown at present. However, it should be noted that most operations are of short duration.

The imported formulation contains oleic acid and solvent naphtha so there is a risk of eye and skin irritation and acute toxic effects if swallowed (see MSDS).

Customs inspectors testing fuel for adulteration should only be exposed to at most 8 ppm of the notified chemical. Consequently the risk of adverse health effects due to the notified chemical are negligible.

The general public may be exposed to fuel marked with the notified chemical. However, at 8 ppm public exposure is negligible and consequently so is the risk of adverse health effects.

The notified chemical is likely to be of low acute toxicity and may be a slight skin and eye irritant. It is unlikely to be mutagenic on the basis of a bacterial study. Skin sensitisation and repeat dose toxicity studies have not been conducted.

13. RECOMMENDATIONS

To minimise occupational exposure to Notified Chemical in Mortrace MP 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);

- Impermeable gloves or mittens should conform to AS 2161 (Standards Australia, 1978);
- 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; following tipping of the contents of the 100 and 200 mL bottles containing the formulation to be imported into tankers, the empty bottles should be returned to their source for reuse;
- Good personal hygiene should be practised to minimise the potential for ingestion;
- A copy of the relevant MSDS should be easily accessible to employees.
- All labels on formulations containing greater than 1% of the notified chemical should carry the risk phrases: R43 'May cause sensitisation by skin contact' and R48 'Danger of serious damage to health by prolonged exposure'.

14. MATERIAL SAFETY DATA SHEET

The MSDS for the notified chemical was provided in accordance with the *National Code of Practice for the Preparation of Material Safety Data Sheets* (National Occupational Health and Safety Commission, 1994b).

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 under Subsection 64(1) will be required if the method of use changes in such a way as to greatly increase the environmental exposure of the notified chemical, or if additional information becomes available on adverse environmental effects of the chemical. If annual release of the new material to water exceeds 10 tonnes the environmental assessment will need to be revised and the notifier will be required to provide full test data for the physico-chemical properties and a test report on chronic exposure for daphnia.

Secondary notification of the notified chemical shall be required if any of the circumstances stipulated under subsection 64(2) occur.

16. REFERENCES

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Attachment 1

The Draize Scale for evaluation of skin reactions is as follows:

<i>Erythema Formation</i>	<i>Rating</i>	<i>Oedema Formation</i>	<i>Rating</i>
No erythema	0	No oedema	0
Very slight erythema (barely perceptible)	1	Very slight oedema (barely perceptible)	1
Well-defined erythema	2	Slight oedema (edges of area well-defined by definite raising)	2
Moderate to severe erythema	3	Moderate oedema (raised approx. 1 mm)	3
Severe erythema (beet redness)	4	Severe oedema (raised more than 1 mm and extending beyond area of exposure)	4

The Draize scale for evaluation of eye reactions is as follows:

CORNEA

<i>Opacity</i>	<i>Rating</i>	<i>Area of Cornea involved</i>	<i>Rating</i>
No opacity	0 none	25% or less (not zero)	1
Diffuse area, details of iris clearly visible	1 slight	25% to 50%	2
Easily visible translucent areas, details of iris slightly obscure	2 mild	50% to 75%	3
Opalescent areas, no details of iris visible, size of pupil barely discernible	3 moderate	Greater than 75%	4
Opaque, iris invisible	4 severe		

CONJUNCTIVAE

<i>Redness</i>	<i>Rating</i>	<i>Chemosis</i>	<i>Rating</i>	<i>Discharge</i>	<i>Rating</i>
Vessels normal	0 none	No swelling	0 none	No discharge	0 none
Vessels definitely injected above normal	1 slight	Any swelling above normal	1 slight	Any amount different from normal	1 slight
More diffuse, deeper crimson red with individual vessels not easily discernible	2 mod.	Obvious swelling with partial eversion of lids	2 mild	Discharge with moistening of lids and adjacent hairs	2 mod.
Diffuse beefy red	3 severe	Swelling with lids half-closed	3 mod.	Discharge with moistening of lids and hairs and considerable area around eye	3 severe
		Swelling with lids half-closed to completely closed	4 severe		

IRIS

<i>Values</i>	<i>Rating</i>
Normal	0 none
Folds above normal, congestion, swelling, circumcorneal injection, iris reacts to light	1 slight
No reaction to light, haemorrhage, gross destruction	2 severe