File No: STD/1459

May 2014

NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME (NICNAS)

PUBLIC REPORT

Chemical in GLO 33 Yellow

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

For the purposes of subsection 78(1) of the Act, this Public Report may be inspected at our NICNAS office by appointment only at Level 7, 260 Elizabeth Street, Surry Hills NSW 2010.

This Public Report is also available for viewing and downloading from the NICNAS website or available on request, free of charge, by contacting NICNAS. For requests and enquiries please contact the NICNAS Administration Coordinator at:

Street Address:	Level 7, 260 Elizabeth Street, SURRY HILLS NSW 2010, AUSTRALIA.
Postal Address:	GPO Box 58, SYDNEY NSW 2001, AUSTRALIA.
TEL:	+ 61 2 8577 8800
FAX:	+ 61 2 8577 8888
Website:	www.nicnas.gov.au

Director
NICNAS

TABLE OF CONTENTS

SUMMARY

The following details will be published in the NICNAS *Chemical Gazette:*

ASSESSMENT REFERENCE	APPLICANT(S)	CHEMICAL OR TRADE NAME	HAZARDOUS CHEMICAL	INTRODUCTION VOLUME	USE
STD/1459	Russell Fraser Sales Pty Ltd	Chemical in GLO 33 Yellow	ND*	≤ 5 tonnes per annum	Fluorescent dye in oils

*ND = not determined

CONCLUSIONS AND REGULATORY OBLIGATIONS

Hazard classification
As limited toxicity data were provided, the notified chemical cannot be classified according to the *Globally Harmonised System for the Classification and Labelling of Chemicals* (GHS), as adopted for industrial chemicals in Australia, or the *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 2004).

Human health risk assessment
Provided that the recommended controls are being adhered to, under the conditions of the occupational setting, the notified chemical is not considered to pose an unreasonable risk to the health of workers.

When used in the proposed manner, the notified chemical is not considered to pose an unreasonable risk to public health.

Environmental risk assessment
On the basis of the PEC/PNEC ratio and the assessed use pattern, the notified chemical is not considered to pose an unreasonable risk to the environment.

Recommendations

CONTROL MEASURES

Occupational Health and Safety

- A person conducting a business or undertaking at a workplace should implement the following safe work practices to minimise occupational exposure during handling of the notified chemical as introduced:
  - Avoid contact with skin and eyes

- A person conducting a business or undertaking at a workplace should ensure that the following personal protective equipment is used by workers to minimise occupational exposure to the notified chemical as introduced:
  - Impervious gloves
  - Protecting clothing
  - Goggles

  Guidance in selection of personal protective equipment can be obtained from Australian, Australian/New Zealand or other approved standards.

- A copy of the (M)SDS should be easily accessible to employees.

- If products and mixtures containing the notified chemical are classified as hazardous to health in accordance with the *Globally Harmonised System for the Classification and Labelling of Chemicals (GHS)* as adopted for industrial chemicals in Australia, workplace practices and control procedures consistent with provisions of State and Territory hazardous substances legislation should be in operation.

Disposal

- When incorporated into oils, the notified chemical should be disposed of in accordance with local regulations for recycling, re-use or recovery of calorific content.

Emergency procedures

- Spills or accidental release of the notified chemical should be handled by physical containment, collection and subsequent safe disposal.

Regulatory Obligations

Secondary Notification
This risk assessment is based on the information available at the time of notification. The Director may call for the reassessment of the chemical under secondary notification provisions based on changes in certain circumstances. Under Section 64 of the *Industrial Chemicals (Notification and Assessment) Act (1989)* the notifier, as well as any other importer or manufacturer of the notified chemical, have post-assessment regulatory obligations to notify NICNAS when any of these circumstances change. These obligations apply even when the notified chemical is listed on the Australian Inventory of Chemical Substances (AICS).

Therefore, the Director of NICNAS must be notified in writing within 28 days by the notifier, other importer or manufacturer:

(1) Under Section 64(1) of the Act; if
  - Additional information becomes available on the sensitisation or repeat dose toxicity of the notified chemical;

(2) Under Section 64(2) of the Act; if
  - the function or use of the chemical has changed from fluorescent dye in oils, or is likely to change significantly;
  - the amount of chemical being introduced has increased, or is likely to increase, significantly;
  - the chemical has begun to be manufactured in Australia;
  - additional information has become available to the person as to an adverse effect of the chemical on occupational health and safety, public health, or the environment.

The Director will then decide whether a reassessment (i.e. a secondary notification and assessment) is required.

(Material) Safety Data Sheet
The (M)SDS of the notified chemical provided by the notifier was reviewed by NICNAS. The accuracy of the information on the (M)SDS remains the responsibility of the applicant.

ASSESSMENT DETAILS

1. APPLICANT AND NOTIFICATION DETAILS

APPLICANT(S)
Russell Fraser Sales Pty Ltd (ABN: 79 074 258549)
Unit 7, 38 Waratah St
KIRRAWEE NSW 2232

NOTIFICATION CATEGORY
Standard: Chemical other than polymer (more than 1 tonne per year).

EXEMPT INFORMATION (SECTION 75 OF THE ACT)
Data items and details claimed exempt from publication: chemical name, other names, CAS number, molecular and structural formulae, molecular weight, analytical data, degree of purity, residual monomers, impurities, additives/adjuvants, import volume, identity of manufacturer.

VARIATION OF DATA REQUIREMENTS (SECTION 24 OF THE ACT)
Variation to the schedule of data requirements is claimed as follows: Melting point, density, water solubility, hydrolysis as a function of pH, dissociation constant, particle size, flash point, flammability limits and reactivity.

PREVIOUS NOTIFICATION IN AUSTRALIA BY APPLICANT(S)
None

NOTIFICATION IN OTHER COUNTRIES
United States
Canada

2. IDENTITY OF CHEMICAL

MARKETING NAME(S)
GLO 33 Yellow
Spectroline GLO 33 Yellow

MOLECULAR WEIGHT
<500 Da

ANALYTICAL DATA
Reference NMR, IR, and UV spectra were provided.

3. COMPOSITION

DEGREE OF PURITY
> 90%

HAZARDOUS IMPURITIES/RESIDUAL MONOMERS
None

NON HAZARDOUS IMPURITIES/RESIDUAL MONOMERS (> 1% by weight)
None

ADDITIVES/ADJUVANTS
None

4. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE AT 20 °C AND 101.3 kPa: Orange powder

Property	Value	Data Source/Justification
Melting Point/Freezing Point	67 °C	Calculated using US EPA ECOSAR
Boiling Point	Decomposes before boiling	Calculated using US EPA ECOSAR and expected to decompose before boiling
Density	1,100 kg/m^3 at 20 °C	Measured
Vapour Pressure	< 2.9 × 10^{-9} kPa at 25 °C	Measured
Water Solubility	<1.0 × 10^{-4} g/L at 20 °C	Measured
Hydrolysis as a Function of pH	Not determined	Does not contain readily hydrolysable functionalities
Partition Coefficient (n-octanol/water)	log Pow > 6	Measured
Adsorption/Desorption	Not determined	Expected to partition to sludge/sediment due to its low water solubility
Dissociation Constant	Not determined	Contains dissociable functionalities. However, the notified chemical is not expected to ionise under normal environmental conditions (pH 4–9).
Flash Point	155 °C at 100 kPa	Measured
Flammability	Not highly flammable	Estimated
Autoignition Temperature	Not determined	The notified chemical will be introduced and used in solvent carrier fluid.
Explosive Properties	Not explosive	Estimated
Oxidising Properties	Not oxidising	Estimated

DISCUSSION OF PROPERTIES
For full details of tests on physical and chemical properties, refer to Appendix A.

Reactivity
The notified chemical is expected to be stable under normal conditions of use.

Physical hazard classification
Based on the submitted physico-chemical data depicted in the above table, the notified chemical is not recommended for hazard classification according to the *Globally Harmonised System for the Classification and Labelling of Chemicals (GHS),* as adopted for industrial chemicals in Australia.

5. INTRODUCTION AND USE INFORMATION

MODE OF INTRODUCTION OF NOTIFIED CHEMICAL (100%) OVER NEXT 5 YEARS
The notified chemical will be imported into Australia as a component (5–35% concentration) of an oil product.

MAXIMUM INTRODUCTION VOLUME OF NOTIFIED CHEMICAL (100%) OVER NEXT 5 YEARS

Year	*1*	*2*	*3*	*4*	*5*
Tonnes	≤5	≤5	≤5	≤5	≤5

PORT OF ENTRY
Sydney

TRANSPORTATION AND PACKAGING
The finished oil-based product will be imported in sealed bottles, drums and totes. The bottles will be packed in cardboard cartons and these will be packed into a shipper. These will be transported by road to a central warehouse.

USE
The notified chemical is a dye which fluoresces in very low doses when dissolved in oils and oil-based fluids. It will be used at 5–35% concentration in finished industrial-based oil solutions. Service personnel will use an ultraviolet inspection lamp to scan the outside of equipment for leaks.

OPERATION DESCRIPTION
The oil-based solutions containing the notified chemical (5–35% concentration) will be added to the oil reservoir of industrial machinery. This may include hydraulic fluids, compressor oils, engine oils and gearbox oils. Dosage rates will be between 0.0005 and 1.0% of the total volume of the reservoir. The equipment will then be scanned with a UV lamp in order to identify any faults or leaks. Once the equipment has been treated with the solution, the oil in the reservoir will be handled in the same way as untreated oils.

6. HUMAN HEALTH IMPLICATIONS

6.1. Exposure Assessment

6.1.1. Occupational Exposure

CATEGORY OF WORKERS

Category of Worker	*Exposure Duration (hours/day)*	*Exposure Frequency (days/year)*
Transport workers	0.5	245
Warehouse workers	2	245
Industrial service personnel	4	25

EXPOSURE DETAILS
Transport and storage
Transport and storage workers may come into contact with the notified chemical, as a component of finished oil-based products (5–35% concentration), only in the event of an accidental rupture of containers.

End use
Exposure to the notified chemical in end-use products (at 5–35% concentration) may occur in industrial service personnel performing maintenance on equipment. Given the low vapour pressure of the notified chemical ($< 2.9 \times 10^{-9}$ kPa at 25 °C) inhalation exposure is not expected. However, service technicians may be exposed (dermal and ocular) to the notified chemical when adding the product to the oil reservoir, when disposing of oil and also in the event of any spills and leaks. The notifier states that personal protective equipment (PPE) including goggles, protective clothing and impervious gloves should be worn when handling the product containing the notified chemical. The notified chemical will be disposed of in the same manner as the oils that it has been formulated.

6.1.2. Public Exposure
Products containing the notified chemical will not be sold to the public. The notified chemical is intended for use in industrial machinery and not consumer machinery. Hence, the public is not expected to come into contact with the notified chemical.

6.2. Human Health Effects Assessment
The results from toxicological investigations conducted on the notified chemical and Analogue 1 are summarised in the following table. For full details of the studies, refer to Appendix B.

Endpoint	*Result and Assessment Conclusion*
Rat, acute oral toxicity	LD50 > 2,000 mg/kg bw; low toxicity
Rat, acute dermal toxicity*	LD50 > 2,000 mg/kg bw; low toxicity
Rat, acute inhalation toxicity*	LC50 > 5.12 mg/L/4 hour; low toxicity
Skin irritation (in vitro)	non-irritating
Skin corrosive (in vitro)	non-corrosive
Eye irritation (in vitro)	non-corrosive
Mouse, repeat dose oral toxicity – 90 days*	NOAEL = 157 mg/kg bw/day
Rat, repeat dose oral toxicity – 90 days*	NOAEL = 40.6 mg/kg bw/day
Dog, repeat dose oral toxicity – 90 days*	NOAEL = 44 mg/kg bw/day

Mutagenicity – bacterial reverse mutation	non mutagenic

* Analogue 1 data

Analogue 1 is not structurally close to the notified chemical. Therefore there is uncertainty in using data from Analogue 1 to infer the hazard profile of the notified chemical, particularly for repeat dose toxicity.

Toxicokinetics
No data on toxicokinetics for the notified chemical was provided. Based on the molecular weight (<500 Da), the notified chemical has a potential to be dermal absorbed after exposure. However, the potential may be reduced to some extent given the partition coefficient (n-octanol/water) log Pow > 6. Inhalation exposure is not expected based on the low vapour pressure of the notified chemical (< 2.9×10^{-9} kPa at 25 °C).

Acute toxicity
The notified chemical was found to be of low toxicity via the oral route in rats (LD50 > 2,000 mg/kg bw).

No acute dermal or inhalation toxicity for the notified chemical was provided. Analogue 1 was found to be of low acute dermal toxicity in rats (LD50 > 2,000 mg/kg bw) and of low acute inhalation toxicity in rats (LC50 > 5.12 mg/L/4 hour).

Irritation and sensitisation
The notified chemical was found to be non-corrosive in a human skin model test and non-irritating in a reconstructed human epidermis test.

The notified chemical was found to be non-corrosive/not severely irritating to eyes in a bovine corneal opacity and permeability test. However, no data were submitted to rule out the potential for irritation.

The notified chemical was not a sensitiser at a concentration up to 10% in a local lymph node assay. However, a clear dose response was observed in the assay. Given the notified chemical is used as a component of finished products at 5–35% concentration, the potential for skin sensitisation cannot be ruled out.

Repeated dose toxicity
No repeated dose toxicity data for the notified chemical were submitted. In a 90-day repeated dose oral toxicity study in mice for Analogue 1, the No Observed Adverse Effect Level (NOAEL) was established to be 157 mg/kg bw/day based on increase liver weight in females at dose level of 787 mg/kg bw/day.

In another 90-day repeated dose oral toxicity study in rats for Analogue 1, the NOAEL was established to be 40.6 mg/kg bw/day based on leukopenia, the excretion of proteins in urine of males and increased relative liver weight (21–24%) occurring at 412 mg/kg bw/day onwards.

In a third 90-day repeated dose oral toxicity study in dogs for Analogue 1, the NOAEL was established to be 44 mg/kg bw/day based on increased relative liver weight females, increased relative thyroid and parathyroid weight, centrilobular and mid-zonal hepatocyte hypertrophy at dose level of 221 mg/kg bw/day.

No data on repeated dose toxicity by the dermal or inhalation route were provided.

Mutagenicity/Genotoxicity.
The notified chemical was negative in a bacterial reverse mutation assay.

Carcinogenicity.
No data on carcinogenicity for the notified chemical were submitted. Analogue 2, which is closer structurally to the notified chemical, compared to Analogue 1, has shown antitumor activities in research and clinical trials. Analogue 2 was administered by intraperitoneal injection to male nu/nu mice at 34 mg/kg bw/day for 35 consecutive days. Nine out of ten animals survived until the end of the study period of 49 days. There was a 10% decrease in body weight between test animals and the controls. Animal activity and stools were not significantly different to controls. Tumour growth was significantly reduced. Analogue 2 was significantly less toxic than other structurally related lower molecular weight chemicals tested in the study.

Health hazard classification

As limited toxicity data were provided, the notified chemical cannot be classified according to the *Globally Harmonised System for the Classification and Labelling of Chemicals (GHS),* as adopted for industrial chemicals in Australia, or the *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 2004).

6.3. Human Health Risk Characterisation

6.3.1. Occupational Health and Safety

The main route of exposure for all workers is dermal. This is expected to occur during transfer of the oil containing the notified chemical (at 5–35% concentration) into the reservoirs of industrial machinery and during the detection of oil leaks (at up to 1% concentration). Based on the limited information provided, the potential of the notified chemical to cause eye irritation, skin sensitisation or be harmful after repeated exposure cannot be ruled out.

The anti-cancer study demonstrates that there is a potential for adverse effects from chemicals of the same class as the notified chemical. However, the study administered analogue 2 by intraperitoneal injection and the most likely route of exposure to the notified chemical is dermal. The high log Pow of the notified chemical, is likely to limit its absorption through the skin. Inhalation exposure by workers to the notified chemical is not expected as the vapour pressure of the notified chemical at ambient temperature is low and it will be imported in oil formulations.

Exposure to the notified chemical is expected to be limited by the use of PPE including goggles, protective clothing and impervious gloves. Therefore, provided that the stated PPE is used to minimise exposure to the notified chemical, the risk to the health of workers is not considered to be unreasonable.

6.3.2. Public Health

Products containing the notified chemical will not be sold to the public and hence the public is not expected to come into contact with the notified chemical. Therefore, when used in the proposed manner, the risk to public health is not considered to be unreasonable.

7. ENVIRONMENTAL IMPLICATIONS

7.1. Environmental Exposure & Fate Assessment

7.1.1. Environmental Exposure

RELEASE OF CHEMICAL AT SITE

The products containing the notified chemical will not be manufactured nor reformulated in Australia. It will be imported into Australia as a finished product. Significant release of the notified chemical to the environment is not expected during transport and storage except in the unlikely event of accidental spills or leaks.

RELEASE OF CHEMICAL FROM USE

The oil-based solutions containing the notified chemical (5–35% concentration) will be added as oil dye to the oil reservoir of industrial machinery. Service personnel will use an ultraviolet inspection lamp to scan the outside of equipment for leaks. This may include hydraulic fluids, compressor oils, engine oils and gearbox oils.

The notified chemical may be released during product usage or accidental breakage or spillage. While the notified polymer in oil dye is being used to find leaks or engine faulty, the leaked oil may be contained and disposed of according to the State/Territory regulations or uncontained and spilled. The leaked oil containing the notified polymer may enter the sewer via stormwater. Most of the chemical in a spill will be absorbed by absorbent material such as clay, soil or any commercial absorbents and be disposed in approved landfills.

RELEASE OF CHEMICAL FROM DISPOSAL

The notified chemical is expected to be either recycled or disposed of to landfill. The used lubricant formulation containing the notified chemical, which is expected to be disposed of in accordance with the State/Territory regulations, is likely to be recycled for calorific value.

7.1.2. Environmental Fate

The notified chemical is not readily biodegradable. For the details of the environmental fate studies please refer to Appendix C. Most of the notified chemical will be either thermally decomposed during use or oil recycling for

calorific value. The leaked notified chemical in oil dye may either be released to soil or potentially enter the sewer via stormwater which will be directed to Sewage Treatment Plants (STPs).

Notified chemical released to sewer is expected to partition to sludge in the STP due to its very low water solubility (<1.0×10^{-4} g/L) and expected affinity to soil/sediment. Sludge from the wastewater treatment plants containing the notified chemical is expected to be disposed of to landfill or applied to agricultural soils. Notified chemical released to surface water is expected to partition to sediment based on its limited water solubility and expected affinity to soil/sediment. With a high partition coefficient of log Pow > 6 and low water solubility, the notified chemical is expected to partition to organic matter and, to sediments and soils in the environment, and is therefore considered highly immobile in soil or in landfill.

The notified chemical may be bioaccumulative due to its high log Pow value (log Pow > 6). However, it is not expected to be significantly bioavailable due to its very low water solubility. It is anticipated to ultimately be degraded into water and oxides of carbon and nitrogen by thermal decomposition or by natural processes in water, soil and landfill.

7.1.3. Predicted Environmental Concentration (PEC)

The calculation for the Predicted Environmental Concentration (PEC) is summarised in the table below. Based on the reported use in oil or oil-based fluid as oil dye to identify any faults or leaks, it is assumed by the notifier that 100% of the total import volume of the chemical is released to sewer via stormwater throughout Australia over 365 days per year. It was assumed conservatively that none of the notified chemical is removed during STP processes.

Predicted Environmental Concentration (PEC) for the Aquatic Compartment		
Total Annual Import/Manufactured Volume	5,000	kg/year
Proportion expected to be released to sewer	100%	
Annual quantity of chemical released to sewer	5,000	kg/year
Days per year where release occurs	365	days/year
Daily chemical release:	13.70	kg/day
Water use	200	L/person/day
Population of Australia (Millions)	22.613	million
Removal within STP	0%	
Daily effluent production:	4,523	ML
Dilution Factor - River	1.0	
Dilution Factor - Ocean	10.0	
PEC - River:	3.03	µg/L
PEC - Ocean:	0.30	µg/L

STP effluent re-use for irrigation occurs throughout Australia. The agricultural irrigation application rate is assumed to be 1,000 L/m^2/year (10 ML/ha/year). The notified chemical in this volume is assumed to infiltrate and accumulate in the top 10 cm of soil (density 1500 kg/m^3). Using these assumptions, irrigation with a concentration of 3.0 µg/L may potentially result in a soil concentration of approximately 20.2 µg/kg. Assuming accumulation of the notified chemical in soil for 5 and 10 years under repeated irrigation, the concentration of notified chemical in the applied soil in 5 and 10 years may be approximately 101.0 µg/kg and 201.9 µg/kg, respectively.

7.2. Environmental Effects Assessment

The results from ecotoxicological investigations conducted on the notified chemical are summarised in the table below. Details of the studies of the analogue can be found in Appendix C.

Endpoint	*Result*	*Assessment Conclusion*
Daphnia Toxicity	EC50 (48 h) > 100 mg/L (WAF)	Not harmful aquatic invertebrates
Algal Toxicity	E_rC50 (72 h) > 100 mg/L (WAF)	Not harmful to algae

On the basis of the acute toxicity data, the notified chemical is considered not to be acutely harmful to aquatic invertebrates and algae. Therefore, under the Globally Harmonised System of Classification and Labelling of Chemicals (GHS; United Nations, 2009), the notified chemical has not been formally classified for acute and long term hazard.

7.2.1. Predicted No-Effect Concentration

The Predicted No-Effect Concentration (PNEC) was calculated based on the endpoint for the test species (Daphnia/algae; EC50/E_rC50) and an assessment factor of 1,000. The conservative assessment factor of 1,000 was used since measured ecotoxicological data for only two trophic levels are available.

Predicted No-Effect Concentration (PNEC) for the Aquatic Compartment		
EC50 (Invertebrates).	>100	mg/L
Assessment Factor	1,000	
PNEC:	>100	µg/L

7.3. Environmental Risk Assessment

Risk Assessment	***PEC µg/L***	***PNEC µg/L***	***Q***
Q - River:	3.03	< 100	< 0.030
Q - Ocean:	0.30	< 100	< 0.003

The Risk Quotients (Q = PEC/PNEC), as a worst case scenario of the entire release of the notified chemical through leaks and spills, for the notified chemical has been calculated to be < 1 for the river and ocean compartments. Therefore, the notified chemical is unlikely to result in ecotoxicologically significant concentrations in the aquatic environment from the assessed use pattern. The notified chemical is not readily biodegradable, but it has very low water solubility. Thus it is unlikely to be significantly bioavailable in the aquatic environment. Therefore, the notified chemical is not expected to pose an unreasonable risk to the aquatic environment from the assessed use pattern.

APPENDIX A: PHYSICAL AND CHEMICAL PROPERTIES

Density 1,100 kg/m^3 at 20 °C

Method	OECD TG 109 Density of Liquids and Solids. EC Council Regulation No 440/2008 A.3 Relative Density.
Remarks	Only a study summary was available for review. Density was determined using a water displacement method. The material (10 g) was weighed and placed in a 100 mL graduated cylinder containing 50 mL of water. The increased volume was recorded and the density calculated as the mass of the sample divided by the volume of water displaced.
Test Facility	DayGlo Colour corp. (Unknown date)

Vapour Pressure < 2.9 × 10^{-9} kPa at 25 °C

Method	OECD TG 104 Vapour Pressure. EC Council Regulation No 440/2008 A.4 Vapour Pressure.
Remarks	No significant protocol deviations.
Test Facility	Notox (2012a)

Water Solubility < 1.0 × 10^{-4} g/L at 20 ± 5 °C

Method	OECD TG 105 Water Solubility
Remarks	Column elution method. A detection limit of <0.1 mg/L was observed for each fraction.
Test Facility	Intertek (2012)

Partition Coefficient (n-octanol/water) log Pow > 6

Method	OECD TG 117 Partition Coefficient (n-octanol/water).
Remarks	HPLC Method. Log Pow by HPLC method is generally valid for log Pow values up to 6, but can be used for log Pow values of 6 and 10 in exceptional cases. In this instance, a value of 8.5 was determined from retention time. However, extrapolation was used due to the high log Pow value of the test item. The guideline states that if extrapolated values are used to determine log Pow, then a limit value should be quoted. In this instance, the available highest log Pow value for a reference standard is 5.7. With allowance for the significantly higher log Pow value calculated experimentally, it is reasonable to report a value of > 6 for the test substance.
Test Facility	Intertek (2012)

Flash Point 155 °C at 100 kPa

Method	EC Council Regulation No 440/2008 A.9 Flash Point.
Remarks	Only a study summary was available for review. The Pensky-Martin Closed Cup method was used to determine the flash point.
Test Facility	DayGlo Colour corp. (Unknown date)

Flammability Not highly flammable

Method	EC Council Regulation No 440/2008 A.12 Flammability (Contact with Water).
Remarks	No protocol deviations
Test Facility	Notox (2012a)

Pyrophoric properties No pyrophoric properties

Method	EC Council Regulation No 440/2008 A.135 Pyrophoric properties of solids and liquids.
Remarks	No protocol deviations
Test Facility	Notox (2012a)

Explosive Properties No explosive properties

Method	EC Council Regulation No 440/2008 A.14 Explosive Properties.
Remarks	No protocol deviations
Test Facility	Notox (2012a)

Oxidizing Properties No oxidizing properties

Method	EC Council Regulation No 440/2008 A.17 Oxidizing Properties (Solids).
Remarks	No protocol deviations
Test Facility	Notox (2012a)

APPENDIX B: TOXICOLOGICAL INVESTIGATIONS

B.1. Acute toxicity – oral

TEST SUBSTANCE	Notified chemical
METHOD	OECD TG 423 Acute Oral Toxicity – Acute Toxic Class Method. EC Directive 96/54/EC B.1tris Acute Toxicity (Oral) - Acute Toxic Class Method.
Species/Strain	Rat/Wistar
Vehicle	Corn oil
Remarks - Method	No significant protocol deviations.

RESULTS

Group	*Number and Sex of Animals*	*Dose mg/kg bw*	*Mortality*
1	3F	2,000	0/3
2	3M	2,000	0/3

LD50	> 2,000 mg/kg bw
Signs of Toxicity	No toxicologically important clinical signs were noted during the study.
Effects in Organs	No abnormalities were noted in macroscopic post-mortem examination.
Remarks - Results	All animals dosed at 2,000 mg/kg bw showed expected body weight gains.

CONCLUSION	The notified chemical is of low toxicity via the oral route.
TEST FACILITY	Notox (1999)

B.2. Acute toxicity – dermal

TEST SUBSTANCE	Analogue 1
METHOD	EC Directive 92/69/EEC B.3 Acute Toxicity (Dermal).
Species/Strain	Rat/Sprague-Dawley
Vehicle	Not known
Type of dressing	Occlusive
Remarks - Method	No significant protocol deviations. The test substance was applied to the skin of 10 rats for 24 hours.

RESULTS

Group	*Number and Sex of Animals*	*Dose mg/kg bw*	*Mortality*
1	5F	2,000	None
1	5M	2,000	None

LD50	> 2,000 mg/kg bw
Signs of Toxicity - Local	None.
Signs of Toxicity - Systemic	No death and systemic response were noted.
Effects in Organs	No abnormalities were recorded at the macroscopic examination at study termination on day 15.

CONCLUSION	The test substance is of low toxicity via the dermal route.
TEST FACILITY	Exempt information

B.3. Acute toxicity – inhalation

TEST SUBSTANCE	Analogue 1

METHOD	Similar to EC Directive 92/69/EEC B.2 Acute Toxicity (inhalation).
Species/Strain	Rat/CD(SD) IGS BR, Sprague-Dawley in origin
Vehicle	Not known
Method of Exposure	Snout-only exposure.
Exposure Period	4 hours
Physical Form	Solid aerosol (particulate).
Particle Size	5.2 μm
Remarks - Method	Variations include the particle size (5.2 μm) was outside limit of acceptability (1-4 μm) cited, respirable (< 7 μm) was estimated at 62%, and clinical signs were not fully reported.

RESULTS

Group	*Number and Sex of Animals*	*Concentration <mg/L>*	*Mortality*
1	5F	5.12	None
1	5M	5.12	None

LC50	5.12 mg/L/4 hours
Signs of Toxicity	Exaggerated breathing was evident in all treated animals immediately following exposure, persisting to at least 2 hours post exposure. Brown staining around snout/jaws was noted for a female animal on day. It was considered by the reviewer these signs were insufficient to classify the test substance to be a respiratory irritant.
Effects in Organs	No treatment-related findings were noted at necropsy and lung weights were normal.
CONCLUSION	The test substance is of low toxicity via inhalation.
TEST FACILITY	Exempt information

B.4. Irritation – skin (in vitro)

TEST SUBSTANCE	Notified chemical
METHOD	OECD TG 439 In vitro Skin Irritation: Reconstructed Human *Epidermis* Test Method.
Vehicle	Deionised water
Remarks - Method	No significant protocol deviations.

RESULTS

Test material	*Mean OD_{570} of triplicate tissues*	*Relative mean Viability (%)*	*SD of relative mean viability*
Negative control	1.312	100.0	0.7
Test substance	1.372	104.5	7.2
Positive control	0.276	21.0	2.3

OD = optical density; SD = standard deviation

Remarks - Results	The mean relative absorbance value of the test item as compared to the negative control, corresponding to the cell viability, did not decrease (104.5%; threshold for irritancy: ≤ 50%). Treatment with the positive control induced a decrease in the mean relative absorbance to 21.0%.
CONCLUSION	The notified chemical was non-irritating to the skin under the conditions of the test.
TEST FACILITY	Harlan (2012a)

B.5. Corrosion – skin (in vitro)

TEST SUBSTANCE	Notified chemical
METHOD	OECD TG 431 In vitro Skin Corrosion - Human Skin Model Test. EC Council Regulation No 440/2008 B.40 BIS. In vitro Skin Corrosion - Human Skin Model Test.
Vehicle	Deionised water
Remarks - Method	No significant protocol deviations.

RESULTS

Test material	*Exposure*	*Mean OD_{570} of triplicate tissues*	*Relative mean Viability (%)*
Negative control	3 minutes	1.345	100.0
Test substance	3 minutes	1.074	72.7
Positive control	3 minutes	0.073	6.0
Negative control	1 hour	1.152	100.0
Test substance	1 hour	1.005	80.7
Positive control	1 hour	0.021	1.3

OD = optical density

Remarks - Results	The test substance was considered to be non-corrosive to skin based on that the viability after 3 minutes exposure was greater than 50% and after 1 hour exposure was greater than 15%.
CONCLUSION	The notified chemical was non-corrosive to the skin under the conditions of the test.
TEST FACILITY	Harlan (2012b)

B.6. Irritation – eye (in vitro)

TEST SUBSTANCE	Notified chemical
METHOD	OECD TG 437 Bovine Corneal Opacity and Permeability Test Method for Identifying Ocular Corrosives and Severe Irritants.
Vehicle	0.9% (w/v) Sodium chloride in deionised water
Remarks - Method	No significant protocol deviations.

RESULTS

Test material	*Mean opacities of triplicate tissues (SD)*	*Mean permeabilities of triplicate tissues (SD)*	*IVIS (SD)*
Vehicle control*	2.00	0.058	2.87
Test substance*	-1.66	0.026	0.00 (-1.27)
Positive control*	183	0.033	183.50

SD = Standard deviation; IVIS = in vitro irritancy score
*Corrected for background values

Remarks - Results	Relative to the negative control, the test substance did not cause any increase of the corneal opacity or permeability. The positive control showed clear opacity effects.
CONCLUSION	The notified chemical was not corrosive or a severe eye irritant under the conditions of the test.
TEST FACILITY	Harlan (2012c)

B.7. Skin sensitisation – mouse local lymph node assay (LLNA)

TEST SUBSTANCE	Notified chemical
METHOD	OECD TG 429 Skin Sensitisation: Local Lymph Node Assay. EC Council Regulation No 440/2008 B.42 Skin Sensitisation: Local Lymph Node Assay.
Species/Strain	Mouse/CBA/CaOlaHsd
Vehicle	Dimethylformamide
Remarks - Method	A preliminary study was conducted at concentrations of 25% and 50% in the vehicle with two mice (one per concentration) being treated daily for three consecutive days. Prior to the first application and before sacrifice the body weight was determined. Clinical signs were recorded at least once daily. Eventual signs of local skin irritation were recorded. Ear thickness was determined on day 1, 3 and 6. A second preliminary study was conducted at concentrations of 5% and 10% on 2 animals (one per concentration). The main study was conducted at 2.5%, 5% or 10% concentration in the vehicle based on the findings in the two preliminary tests. Positive control is α-hexyl-cinnamaldehyde.

RESULTS

Concentration (% w/w)	*Proliferative response (DPM/lymph node)*	*Stimulation Index (Test/Control Ratio)*
Test Substance		
0 (vehicle control)	320.0	1.00
2.5	403.6	1.26
5	457.5	1.43
10	674.0	2.11
Positive Control		
5	224.6	0.88
10	577.4	1.51
25	1,424.4	3.73

Remarks - Results	In the first preliminary study, both animals showed an increase of ear thickness to ≥ 25%. In the second preliminary study, the animals did not show any signs of local skin irritation or systemic toxicity. In the main study, the highest concentration tested was the highest concentration that could be achieved whilst avoiding systemic toxicity and excessive skin irritation as confirmed by the two preliminary studies. There was neither death nor signs of systemic toxicity noted. Local skin irritation could not be evaluated due to the color of the test substance. A clear dose response was observed based on that SI values increased as the test concentrations increased.
CONCLUSION	There was inadequate evidence of induction of a lymphocyte proliferative response indicative of skin sensitisation to the notified chemical under the conditions of test.
TEST FACILITY	Harlan (2012d)

B.8. Repeat dose toxicity

TEST SUBSTANCE	Analogue 1
METHOD	EC Directive 2001/59/EC B.26 Sub-Chronic Oral Toxicity Test: 90-Day Oral Toxicity Study in Rodents.
Species/Strain	Rat/Wistar

Route of Administration	Oral – diet
Exposure Information	Total exposure days: 90 days Dose regimen: not known Post-exposure observation period: 14 days
Vehicle	Not known
Remarks - Method	No significant protocol deviations.

RESULTS

Group	*Number and Sex of Animals*	*Dose mg/kg bw/day*	*Mortality*
control	10M/10F	0	0
low dose	10M/10F	40.6M/44.7F	0
mid dose	10M/10F	412M/467.6F	0
high dose	10M/10F	4356.9M/4892.9F	1
control recovery	5M/5F	0	0
high dose recovery	5M/5F	4356.9M/4892.9F	0

Mortality and Time to Death

One male rat in the high dose group was killed during week 11 and the death was considered by the study authors not to be treatment-related.

Clinical Observations

Brown staining of the tail was observed from week 7 in males and from week 8 in females at high dose. The origin of this effect was not established as there was no evidence of any change in the colour of the urine in these animals. Following cessation of treatment, the incidence of this sign declined in both sexes, indicating recovery.

Laboratory Findings – Clinical Chemistry, Haematology, Urinalysis

Hematology: Lymphocyte counts in females at mid dose and in male and females at high dose were low. Monocyte count was reduced in females at mid dose or high dose. These differences resulted in a reduction of total leukocyte count in males and females at mid dose and high dose, though in males at mid dose this difference was not statistically significant. The cause of reduced lymphocyte numbers at mid dose and high dose in both sexes and reduced monocytes in females was not established in this study. There was no evidence of inflammatory change in any tissue, nor was there any effect of treatment upon lymphoid tissue. The sponsor considered these effects as of uncertain toxicological significance. Monocyte counts were still slightly low at the end of the recovery period in females previously given top dose though the difference was not a great as seen at the end of the treatment period, indicating some recovery occurred.

There was complete recovery in respect of the changes in lymphocyte count. Other differences were attributed to normal biological variations.

Clinical chemistry: Low phosphorus concentrations in females at mid dose and in males and females receiving high dose and slightly low K^+ and high creatinine in females receiving top dose. These changes showed full recovery by the end of the period of recovery. BUN was unchanged.

An effect upon renal function is indicated by variations of plasma electrolyte concentrations and the increased plasma creatinine concentrations and urinary specific gravity and protein content in females. There was, however, no effect upon the weight or histopathological appearance of the kidneys and these changes are considered most likely to represent an adaptive response to the excretion of the compound and/or metabolites and are not considered by the company of toxicological significance.

Urinalysis: Specific gravity of males at high dose and urinary proteins were identified in males at mid dose and high dose.

Effects in Organs

Organ weight: Relative liver weight of female rats was increased at mid dose and high dose.

Histopathology: There was centrilobular hepatocyte hypertrophy in males and females in the high dose group. This effect disappeared at the end of the 4 week recovery period. This change was considered by the study authors to represent enzyme induction and, as such, was considered an adaptive response to treatment. However,

liver enzyme induction was not measured.

CONCLUSION
The No Observed Adverse Effect Level (NOAEL) was established as 40.6 mg/kg bw/day in this study, based on based on leukopenia, the excretion of proteins in urine of males and increased relative liver weight (21–24%) occurring at 412 mg/kg bw/day onwards.

TEST FACILITY Exempt information

B.9. Repeat dose toxicity

TEST SUBSTANCE Analogue 1

METHOD Similar to OECD TG 408 Repeated Dose 90-Day Oral Toxicity Study in Rodents.

Species/Strain	Mouse/CD-1 (ICR) BR
Route of Administration	Oral – diet
Exposure Information	Total exposure days: 90 days Dose regimen: not known
Vehicle	Not known
Remarks - Method	Deviations include coagulation time was not measured; epididimydes, thymus, uterus and ovary were not weighed. Salivary glands, stomach and urinary bladder were not examined for histopathology; blood chemistry was limited to proteins. Duration of treatment and sacrifice time was not clearly reported.

RESULTS

Group	*Number and Sex of Animals*	*Dose mg/kg bw/day*	*Mortality*
control	10M/10F	0	0
low dose	10M/10F	15.5M/20.2F	0
mid dose 1	10M/10F	157M/207F	0
mid dose 2	10M/10F	787M/1127F	0
high dose	10M/10F	1616M/2150F	0

Mortality and Time to Death
No test substance related deaths occurred during the study.

Clinical Observations
No treatment-related clinical signs were evident.

Laboratory Findings – Clinical Chemistry, Haematology, Urinalysis
Hematology: Male mice had decreased mean total leucocytes at mid dose 1 onwards and this effect was related to decreased neutrophils, lymphocytes and monocytes (affected at 45-day sampling). A similar trend was observed in mid dose and high dose females at 45-day sampling period, although differences were not statistically significant. At the 90-day sampling period, the neutrophil count was lower for the high dose females. The leucopenia observed in males and females at mid dose and high dose was initially considered to be compound related. At the 45-day evaluation period, male mice administered at mid dose 1 onwards had significantly increased RBC counts. In addition, Hb was significantly higher at mid dose 1and high dose males and males at all dose levels had higher hematocrit values compared to controls. At the 90-day evaluation, females at mid dose and high dose had significantly higher hematocrit values and mean corpuscular Hb values, which were however within the range of biological variations and not considered to be biologically significant. During peer review, the WBC effects were finally disregarded for the establishment of the mouse subchronic NOAEL.

Clinical chemistry: Plasma proteins were slightly increased in males at 5,000 and 10,000 ppm. Other parameters were not measured.

Effects in Organs

Organ weight: Relative liver weight was increased in females at high dose.

Histopathological findings: A higher incidence of extramedullary hematopoiesis was seen in females at high dose in liver and spleen.

CONCLUSION
The No Observed Adverse Effect Level (NOAEL) was established as 157 mg/kg bw/day in this study, based on increase liver weight in females at dose level of 787 mg/kg bw/day.

TEST FACILITY Exempt information

B.10. Repeat dose toxicity

TEST SUBSTANCE Analogue 1

METHOD OECD TG 409 Repeated Dose 90-Day Oral Toxicity Study in Non-Rodents.

Species/Strain	Dog/Beagle
Route of Administration	Oral – diet
Exposure Information	Total exposure days: 90 days Dose regimen: not known
Vehicle	Not known
Remarks - Method	No significant protocol deviations.

RESULTS

Group	*Number and Sex of Animals*	*Dose mg/kg bw/day*	*Mortality*
control	4M/4F	0	0
low dose	4M/4F	44.07M/45.77F	0
mid dose	4M/4F	221.19M/224.85F	0
high dose	4M/4F	1120.67M/1101.92F	0

Mortality and Time to Death
No test substance related deaths occurred during the study.

Clinical Observations
There were no signs of ill health, behavioural change or reaction to treatment.

Laboratory Findings – Clinical Chemistry, Haematology, Urinalysis
Hematology: there were no differences from controls considered by the study authors to be related to treatment.

Clinical chemistry: During week 6 and 13, higher mean alkaline phosphatase was seen at high dose for both sexes. There were no other differences from controls thought to be related to treatment as they tended to reflect pre-dose trends and/or were minor in magnitude and did not follow dosage relationships when noted in more than one treatment group.

Urinalysis: no differences from controls.

Effects in Organs
Organ weight: Mean liver weight for all treated groups was increased in comparison with controls, the differences being dose-related, though statistical significance was not attained.

At high dose, thyroid weights were higher for males and as the individual values showed some degree of overlap with the control values and in the absence of corroborative macroscopic or microscopic finding, this was not considered by the study authors to be of toxicological importance.

Thymus weight was reduced for all male dogs in comparison with controls, with a dose related effect at high dose, though statistical significance was not achieved and some degree of overlap of individual values between treated dogs and controls was evident.

Histopathological findings: Treatment related microscopic changes were noted in the liver for both sexes at high dose and males only at mid dose and was characterized as centrilobular and mid-zonal hepatocyte hypertrophy.

Marginally increased incidences of involution/atrophy in the thymus were seen in all male treated groups, when compared with controls. This finding was associated with lower thymus weight at mid dose and high dose. This finding was low in incidence and severity, and the toxicological importance was equivocal.

CONCLUSION
The No Observed Adverse Effect Level (NOAEL) was established as 44 mg/kg bw/day in this study, based on increased relative liver weight females, increased relative thyroid and parathyroid weight, centrilobular and mid-zonal hepatocyte hypertrophy at dose level of 221 mg/kg bw/day.

TEST FACILITY Exempt information

B.11. Genotoxicity – bacteria

TEST SUBSTANCE Notified chemical

METHOD OECD TG 471 Bacterial Reverse Mutation Test.
EC Directive 2000/32/EC B.13/14 Mutagenicity – Reverse Mutation Test using Bacteria.
Plate incorporation procedure and Pre incubation procedure

Species/Strain *S. typhimurium*: TA1535, TA1537, TA98, TA100
E. coli: WP2uvrA

Metabolic Activation System S9 mix

Concentration Range in Main Test a) With metabolic activation: 0, 10, 33, 100, 333, 1000, 2500, 5000 µg/plate
b) Without metabolic activation: 0, 10, 33, 100, 333, 1000, 2500, 5000 µg/plate

Vehicle Dimethyl sulfoxide

Remarks - Method A preliminary toxicity test (0–5000 µg/plate) was performed to determine the toxicity of the test substance.

In the mutation studies, aliquots of 0.1 mL of either test substance, negative control or positive control was used at 7 concentrations up to 5,000 µg/plate. The negative control was dimethyl sulfoxide and positive controls were sodium azide, 4-nitro-O-phenylene-diamine and methyl methane sulfonate in the absence of S9 mix and 2-aminoanthracene in the presence of S9 mix.

RESULTS

Metabolic Activation	*Test Substance Concentration (µg/plate) Resulting in:*			
	Cytotoxicity in Preliminary Test	*Cytotoxicity in Main Test*	*Precipitation*	*Genotoxic Effect*
Absent				
Test 1	>5,000	>5,000	≥1,000	Negative
Test 2		>5,000	≥1,000	Negative
Present				
Test 1	>5,000	>5,000	≥333	Negative
Test 2		>5,000	≥1,000	Negative

Remarks - Results No toxicologically significant increases in the frequency of revertant colonies were recorded for any of the bacterial strains, with any dose of the test substance, either with or without metabolic activation.

All the positive control chemicals used in the test induced marked increases in the frequency of revertant colonies thus confirming the activity of the S9-mix and the sensitivity of the bacterial strains.

CONCLUSION	The notified chemical was not mutagenic to bacteria under the conditions of the test.
TEST FACILITY	Harlan (2012e)

APPENDIX C: ENVIRONMENTAL FATE AND ECOTOXICOLOGICAL INVESTIGATIONS

C.1. Environmental Fate

C.1.1. Ready biodegradability

TEST SUBSTANCE	Notified chemical
METHOD	OECD TG 301 B Ready Biodegradability: CO_2 Evolution Test
Inoculum	Activated sludge
Exposure Period	28 days
Auxiliary Solvent	None reported
Analytical Monitoring	Titration Method
Remarks - Method	The test was conducted according to the guidelines above using good laboratory practice (GLP). No significant deviations from the test guidelines were reported.

RESULTS

Test substance		*Sodium acetate*	
Day	*% Degradation*	*Day*	*% Degradation*
3	0	3	19
14	0	10	61
29	0	14	69

Remarks - Results	All validity criteria for the test were satisfied. The reference compound, sodium acetate, reached the 60% pass level by day 10 indicating the suitability of the inoculum. The toxicity control exceeded 25% biodegradation within 14 days showing that toxicity was not a factor inhibiting the biodegradability of the test substance. The degree of degradation of the notified chemical was 0%. Therefore, the test substance cannot be classified as readily biodegradable according to the OECD (301 B) guideline.
CONCLUSION	The notified chemical is not readily biodegradable.
TEST FACILITY	Notox (2012b)

C.2. Ecotoxicological Investigations

C.2.1. Acute toxicity to aquatic invertebrates

TEST SUBSTANCE	Notified chemical
METHOD	OECD TG 202 *Daphnia* sp. Acute Immobilisation Test – Static Test
Species	*Daphnia magna*
Exposure Period	48 hours
Auxiliary Solvent	None reported
Water Hardness	250 mg $CaCO_3$/L
Analytical Monitoring	None reported
Remarks - Method	The test was conducted according to the guidelines above using GLP principles. No significant deviations from the test guidelines were reported. Water Accommodated Fractions (WAF) of the test substance at the loading rates of 1, 10, and 100 mg/L were prepared in dilution water by vigorously shaking the flasks. All three treatment suspensions were filtered (0.2 µm filter) before the test organisms were exposed. No test substance could be detected in the treatments. An unfiltered treatment

concentration, 100 mg/L, was also added to the toxicity test.

RESULTS

Nominal Concentration (mg/L)	*Number of D. magna*	*Cumulative % Immobilised 48 h*
Control	20	0
1 (filtered)	20	0
10 (filtered)	20	0
100 (filtered)	20	0
100 (unfiltered)	20	0

LL50	>100 mg/L (WAF) at 48 hours
NOEL	≥100 mg/L (WAF) at 48 hours
Remarks - Results	All validity criteria for the test were satisfied.

CONCLUSION The notified chemical is not harmful to aquatic invertebrates.

TEST FACILITY LPT (2012a)

C.2.2. Algal growth inhibition test

TEST SUBSTANCE Notified chemical

METHOD OECD TG 201 Alga, Growth Inhibition Test

Species	*Desmodesmus subspicatus*
Exposure Period	72 hours
Concentration Range	Nominal: 1, 10, and 100 mg/L (filtered) 100 mg/L (unfiltered)
Auxiliary Solvent	Not reported
Water Hardness	Not reported
Analytical Monitoring	Not reported
Remarks - Method	The test was conducted according to the guidelines above using GLP. No significant deviations from the test guidelines were reported. Water Accommodated Fractions (WAF) of the test substance at the loading rates of 1, 10, and 100 mg/L were prepared in dilution water by vigorously shaking the flasks. All three treatment suspensions were filtered (0.2 µm filter) before the test organisms were exposed. No test substance could be detected in the treatments. An unfiltered treatment concentration, 100 mg/L, was also added to the toxicity test.

RESULTS

Growth (72 h)	
E_rL50 (mg/L)	*NOE_rL (mg/L)*
>100	≥100

Remarks - Results All validity criteria for the test were satisfied.

CONCLUSION The notified chemical is not harmful to algae

TEST FACILITY LPT (2012b)

BIBLIOGRAPHY

Harlan (2012a) In Vitro Skin Irritation Test: Human Skin Model Test with [Notified chemical] (Study No. 1485500, July, 2012). Rossdorf, Germany, Harlan Cytotest Cell Research GmbH (Unpublished report submitted by the notifier).

Harlan (2012b) In Vitro Skin Corrosion: Human Skin Model Test with [Notified chemical] (Study No. 1477002, July, 2012). Rossdorf, Germany, Harlan Cytotest Cell Research GmbH (Unpublished report submitted by the notifier).

Harlan (2012c) Bovine Corneal Opacity and Permeability Assay (BCOP) with [Notified chemical] (Study No. 1477001, July, 2012). Rossdorf, Germany, Harlan Cytotest Cell Research GmbH (Unpublished report submitted by the notifier).

Harlan (2012d) Local Lymph Node Assay (LLNA) in Mice with [Notified chemical] (Study No. 1477004, August, 2012). Rossdorf, Germany, Harlan Cytotest Cell Research GmbH (Unpublished report submitted by the notifier).

Harlan (2012e) Salmonella Typhimurium and Escherichia Coli Reverse Mutation Assay with [Notified chemical] (Study No. 1477003, July, 2012). Rossdorf, Germany, Harlan Cytotest Cell Research GmbH (Unpublished report submitted by the notifier).

Intertek (2012) Determination of Water Solubility and Partition Coefficient of [Notified chemical] (Study No. 1326178, July, 2012). UK, Intertek Pharmaceutical Services Manchester (Unpublished report submitted by the notifier).

LPT (2012a) Examination of [Notified chemical] in an Acute Immobilisation Test in *Daphnia magna* (Report No. 28410, July, 2012). Germany, LPT (Unpublished report submitted by the notifier).

LPT (2012b) Algal Growth Inhibition Test (Desmodesmus subspicatus) of [Notified chemical] (Report No. 28411, July, 2012). Germany, LPT (Unpublished report submitted by the notifier). NOHSC (2004) Approved Criteria for Classifying Hazardous Substances, 3rd edition [NOHSC:1008(2004)]. National Occupational Health and Safety Commission, Canberra, AusInfo.

Notox (1999) Assessment of Acute Oral Toxicity with [Notified chemical] (Study No. 265927, September, 1999). The Netherlands, Notox B.V. (Unpublished report submitted by the notifier).

Notox (2012a) Determination of Physico-Chemical Properties of [Notified chemical] (Study No. 499253, June, 2012). The Netherlands, Notox B.V. (Unpublished report submitted by the notifier).

Notox (2012b) Determination of 'Ready' Biodegradability: Carbon Dioxide (CO_2) Evolution Test (Modified Sturum Test) of [Notified chemical] (Study No. 499254, June, 2012). The Netherlands, Notox B.V. (Unpublished report submitted by the notifier).

United Nations (2009) Globally Harmonised System of Classification and Labelling of Chemicals (GHS), 3rd revised edition. United Nations Economic Commission for Europe (UN/ECE), <http://www.unece.org/trans/danger/publi/ghs/ghs_rev03/03files_e.html>.