MATERIAL SAFETY DATA SHEET

Date of Issue: February 14, 2007

1. IDENTIFICATION OF THE MATERIAL AND SUPPLIER

Product name	**Betanal® Herbicide Spray**
Other names	None
Product codes and pack sizes	4210645 (5 L)
Chemical group	Phenyl carbamate
Recommended use	Agricultural herbicide
Formulation	Emulsifiable concentrate (EC)
Supplier	Bayer CropScience Pty Ltd ABN 87 000 226 022
Address	391 - 393 Tooronga Road, East Hawthorn, Victoria 3123, Australia
Telephone	(03) 9248 6888
Facsimile	(03) 9248 6800
Website	www.bayercropscience.com.au
Contact	Development Manager (03) 9248 6888
Emergency Telephone Number	1800 033 111 – Orica SH&E Shared Services

2. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

HAZARDOUS SUBSTANCE (see Risk phrases below) – NON DANGEROUS GOOD (road/rail)

Combustible liquid. Very toxic to aquatic organisms.

Hazard classification Hazardous (National Occupational Health and Safety Commission - NOHSC)

Risk phrases
R21/22 - Harmful in contact with skin and if swallowed.
R36/37 - Irritating to eyes and respiratory system.
R43 – May cause sensitisation by skin contact.
R40 – Limited evidence of a carcinogenic effect.
R45 – May cause cancer.

Safety phrases See Sections 4, 5, 6, 7, 8, 10, 12, 13

ADG classification Not a "Dangerous good" for transport by road or rail according to the Australian Code for the Transport of Dangerous Goods by Road and Rail. Class 9 Dangerous Good, Marine Pollutant if shipped by sea. See Section 14.

SUSDP classification (Poison Schedule) Schedule 5 (Standard for the Uniform Scheduling of Drugs and Poisons)

3. COMPOSITION / INFORMATION ON INGREDIENTS

Ingredients	CAS Number	Concentration (g/L)
Phenmedipham	[13684-63-4]	157
Isophorone	[78-59-1]	596
Aromatic hydrocarbon solvent	[64742-95-6]	33
Other ingredients, including emulsifiers and buffer	Non-hazardous	204

4. FIRST AID MEASURES

If poisoning occurs, immediately contact a doctor or Poisons Information Centre (telephone 13 11 26), and follow the advice given. Show this Material Safety Data Sheet to the doctor.

Inhalation	If inhaled, remove to fresh air and keep at rest. Obtain medical advice. Support respiration if necessary.
Skin contact	Carefully remove contaminated clothing at once. Wash affected areas with soap and water and rinse well. Seek medical aid if symptoms persist.
Eye contact	Hold eyes open and flood with water for at least 15 minutes and obtain medical aid, preferably from an ophthalmologist.
Ingestion	Wash out mouth with water. Do NOT induce vomiting. Give a glass of water to drink. Keep patient at rest and seek immediate medical advice, as above. DO NOT attempt to give anything by mouth to a semi-conscious or unconscious person.
First Aid facilities	Provide eyewash and safety shower facilities in the workplace.
Medical attention	The following symptoms may occur: Coughing, confusion, dizziness, headache, sleepiness, unconsciousness, allergic reactions. There is a risk of respiratory disorders. There is a risk of the product entering lungs on vomiting following ingestion, and risk of pneumonia. Although this product is a carbamate, it is NOT a cholinesterase inhibitor. There have been no documented cases of human poisoning with phenmedipham, the active ingredient in this product. Initial treatment should be symptomatic and supportive. If a large amount is ingested the following measures should be considered: Endotracheal intubation and gastric lavage, followed by administration of charcoal. Avoid aspiration. Monitor kidney and respiratory functions. Oxygen may be required. Elimination by dialysis (forced alkaline diuresis) There is no specific antidote. Recovery is expected to be spontaneous.

5. FIRE FIGHTING MEASURES

Extinguishing media	Water spray, carbon dioxide, alcohol-resistant foam, dry chemical
Hazards from combustion products	In a fire hazardous decomposition products may be produced, such as carbon dioxide, carbon monoxide, oxides of nitrogen, dense black smoke.
Precautions for fire fighters	Combustible liquid. There is a possibility of re-ignition of vapours from a distance. Fire fighters should wear full protective gear, including self-contained breathing apparatus (AS/NZS 1715/1716). Toxic decomposition products may be produced in a fire. If it can be done safely, remove intact containers from exposure to fire. Otherwise, use water spray to cool them. Keep unnecessary people away. Bund area to prevent contamination of water sources. Dispose of fire control water and spillage safely later.
Hazchem code	3Z

6. ACCIDENTAL RELEASE MEASURES

Avoid contact with spilled material or contaminated surfaces. Extinguish or remove possible sources of ignition. Do not smoke. Do not eat or drink, and wear protective clothing and equipment as described in Section 8 – PERSONAL PROTECTION. Keep people and animals away and upwind. Prevent spilled material from entering drains or watercourses. Contain spill and absorb with earth, sand, clay, or other absorbent material. Collect and store in properly labelled, sealed drums for safe disposal. Deal with all spillages immediately. If contamination of drains, streams, watercourses, etc. is unavoidable, warn the local water authority.

7. HANDLING AND STORAGE

Handling

Keep out of reach of children. Will irritate the eyes, nose, throat and skin. Avoid contact with eyes and skin. Do not inhale vapour or spray mist. After use and before eating, drinking or smoking, wash hands, arms and face thoroughly with soap and water. After each day's use, wash gloves and any other protective equipment. Do not smoke while handling and keep product away from any ignition sources.

Storage

Store in the closed, original container in a cool, dry, well-ventilated area. Do not store for prolonged periods in direct sunlight. Keep away from sources of heat, ignition or electrostatic charges.

Flammability

Combustible liquid, Class C1 – flashpoint between 61° C and 150º C.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure standards

The NOHSC exposure standard for isophorone is:
TWA 5 ppm (28 mg/m^3) Peak limitation.

Definitions:
Exposure standard – Time Weighted Average (TWA) means the average airborne concentration of a particular substance when calculated over a normal eight-hour working day, for a five-day working week.

Peak limitation – A maximum or peak airborne concentration determined over the shortest analytically practicable period of time which does not exceed 15 minutes.

Biological limit values

None allocated

Engineering controls

Control process conditions to avoid contact and to comply with exposure standards above. Ensure adequate ventilation, especially in confined areas. Use local exhaust ventilation during manufacturing operations. Use in a well-ventilated area only.

Personal Protective Equipment

- Face-shield or goggles.
- Cotton overalls buttoned to the neck and wrist to avoid skin contact.
- Elbow-length PVC or nitrile gloves
- If inhalation exposure is likely to exceed the exposure levels above, an AS/NZS 1715/1716 approved respirator suitable for organic vapours should be worn.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance:	Amber liquid
Odour:	Sweet
pH:	2.7 – 4.0 at 20º C (100 g/L in water)
Vapour pressure:	0.4 hPa at 20º C (isophorone)
Vapour density:	5.8 kg/m^3 (isophorone)
Boiling point:	Not available
Freezing/melting point:	Not available
Solubility:	Emulsifies in water
Specific Gravity:	0.99 at 20º C
Flash Point:	74º C – Tagliabue Closed Cup
Flammability (explosive) limits:	LEL: 0.8; UEL: 3.8 Vol. % in air (isophorone)
Auto-ignition temperature:	455° C
Partition coefficient (octanol/water):	*Phenmedipham*: Log P_{ow} = 3.59 at 22° C *Isophorone*: Log P_{ow} = 1.66

10. STABILITY AND REACTIVITY

Chemical stability	Stable under normal conditions of use.
Conditions to avoid	Avoid sources of ignition and extreme heat.
Incompatible materials	Oxidising agents, strong bases, hydrogen peroxide, nitric acid.
Hazardous decomposition products	In a fire hazardous decomposition products may be produced, such as carbon dioxide, carbon monoxide, oxides of nitrogen, dense black smoke.
Hazardous reactions	None known

11. TOXICOLOGICAL INFORMATION

POTENTIAL HEALTH EFFECTS

Inhalation	Will irritate the respiratory system.
Skin contact	Will irritate the skin. The product has low dermal toxicity.
Eye contact	Will irritate the eyes.
Ingestion	The product has low oral toxicity.

11. TOXICOLOGICAL INFORMATION - continued

ANIMAL TOXICITY DATA - *PRODUCT*

Acute:

Oral toxicity	LD_{50} rat: 4000 mg/kg
Dermal toxicity	LD_{50} rat: 2000 mg/kg
Inhalation toxicity	Inhalation LC_{50} rat: 2.6 mg/L) (4 h). Irritating to the respiratory system.
Skin irritation	Slightly irritating (rabbit)
Eye irritation	Slightly irritating (rabbit)
Sensitisation	Sensitising (guinea pig)

Chronic:

In animal studies, phenmedipham was not mutagenic, carcinogenic, teratogenic, embryotoxic or neurotoxic, and did not affect reproduction.
Results from *in vitro* and *in vivo tests* showed isophorone was not genotoxic. Isophorone has shown some evidence of carcinogenicity in male rats and equivocal evidence of carcinogenicity in male mice in National Toxicology Program studies.

12. ECOLOGICAL INFORMATION

Very toxic to aquatic organisms. Low toxicity to birds, bees and earthworms.
DO NOT contaminate streams, rivers or waterways with the chemical or used containers.

Ecotoxicity

Betanal:
Fish toxicity: LC_{50} (96 h flow through) rainbow trout 8.4 mg/L
Daphnia toxicity: EC_{50} (48 h semi-static test) water flea (*Daphnia magna*) 5.7 mg/L
Algal toxicity: IC_{50} (72 h static test) Algae (*Pseudokirchneriella subcapitata*) 0.192 mg/L

Phenmedipham:
Fish toxicity: LC_{50} (96 h) rainbow trout 1.4 - 3 mg/L
Daphnia toxicity: EC_{50} (48 h) water flea (*Daphnia magna*) 6 mg/L
Algal toxicity: IC_{50} (96 h) algae (*Scenedesmus subspicatus*) 0.13 mg/L
Bird toxicity: Acute oral LD_{50} mallard duck > 2100 mg/kg
Acute oral LD_{50} chickens > 2500 mg/kg

Isophorone
Fish toxicity: LC_{50} (96 h) 140 to 255 mg/L
Daphnia toxicity: EC_{50} (48 h) water flea (*Daphnia magna*) 120 mg/L
Algal toxicity: IC_{50} (72 h) Algae (*Scenedesmus subspicatus*) 475.4 mg/L

Environmental fate, persistence and degradability, mobility

Phenmedipham is not readily biodegradable. In bluegill sunfish the bioconcentration factor (BCF) is 165. In rainbow trout the BCF is 321. The DT_{50} in soil is approximately 25 days; DT_{90} approximately 108 days. Phenmedipham does not accumulate in soil. No risk of groundwater contamination is expected. K_{oc} is 2400.
In aqueous environment the evaporation half life of isophorone is 7.5 days. It shows slight adsorption to soils and sediments. Isophorone is readily biodegradable. Its bioconcentration factor (BCF) in fish (*Oryzias latipes*) = 1.1 – 1.8, and it has a slight tendency to bioaccumulate. .

13. DISPOSAL CONSIDERATIONS

Triple or preferably pressure rinse containers before disposal. Add rinsings to spray tank. Do not dispose of undiluted chemicals on site. If recycling replace cap and return clean containers to recycler or designated collection point. If not recycling, break, crush, or puncture and bury empty containers in a local authority landfill. If no landfill is available, bury the containers below 500mm in a disposal pit specifically marked and set up for this purpose clear of waterways, desirable vegetation and tree roots. Empty containers and product should not be burnt. Dispose of waste product via a licensed disposal contractor to an approved landfill.

14. TRANSPORT INFORMATION

UN number	Not applicable (road/rail)
Proper shipping name	Not applicable (road/rail)
Class and Subsidiary Risk	Not applicable (road/rail)
Packing Group	Not applicable (road/rail)
EPG	Not applicable (road/rail)
Hazchem code	3Z
Marine Pollutant	Yes. If Betanal is shipped by sea, it is classified as a Class 9, ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (phenmedipham solution), Packing Group III, UN 3082, Marine Pollutant.

15. REGULATORY INFORMATION

Registered according to the Agricultural and Veterinary Chemicals Act 1988.
Australian Pesticides and Veterinary Medicines Authority approval number: 31826
See also Section 2.

16. OTHER INFORMATION

Trademark information	Betanal® is a Registered Trademark of Bayer.
Preparation information	Replaces August 1, 2002 MSDS. Reasons for revision: 16 heading format, product codes and pack sizes, change in risk phrases, aromatic hydrocarbon solvent declared in Ingredients list, more information on isophorone, Marine Pollutant, expanded Ecological Information.

This MSDS summarises our best knowledge of the health and safety hazard information of the product and how to safely handle and use the product in the workplace. Each user should read this MSDS and consider the information in the context of how the product will be handled and used in the workplace including in conjunction with other products.

If clarification or further information is needed to ensure that an appropriate risk assessment can be made, the user should contact this company.

Our responsibility for products sold is subject to our standard terms and conditions, a copy of which is sent to our customers and is also available on request.

END OF MSDS