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OIL SPILL CONTROL™

1. Corporate Introduction

Miyabi Industries Inc (MII) is a specialist researcher, manufacturer, blender and supplier of Dispersants, Specialty Chemicals and Fuel Additives for a number of Japanese & International companies. Our range of products includes:

a) Oil Spill Chemicals, Automotive, and Industrial Cleaning & Cleansing Chemicals, Tank Cleaning chemicals for petroleum and shipping industries.

b) Fuel Additives for all almost all type fuels including gasoline, diesel, boiler fuel, bunker fuel & aviation fuel and

c) Lube Oil Re-cycling Filtration System.

Our Research & Development Department span across 2 countries. Our highly qualified scientists and technicians, each with more than 12 years of experience in chemical and petroleum industries together with our field engineers whom were recruited from engine manufacturers, researched and developed our range of products. In other words our products are proven and field tested and not laboratory formulation.

As a responsible corporate organization, we are always mindful of Mother Nature and the Environment. Therefore, our priority is to ensure that our products are as safe and as environmentally friendly as possible.

We have offices in Japan and Singapore as well as agents, distributors in Malaysia, Indonesia, China, Thailand, Philippines, Australia and Germany.

2. Business Activities.

Our core business activities are classified into:

a) Marine Industries – Shipyards, Marine Engine Builders and Marine Chemical Suppliers.

b) Automotive Industries – Engine parts/chemical suppliers, Petrol Stations, Car repair workshops & car accessories chemical suppliers.

c) Heavy Industries -- Oil companies, Chemical Suppliers and Factories

3. Core Expertise

Marine Oil Spill

One of the worst nightmares for the maritime industry is open sea oil spill. Disasters such as the MV 'Exxon Valdez' and 'Sea Empress' are good cases on the impact both in terms of financial and environment. Literally hundreds of millions if not billions are spent on each oil spill disasters.

Clean up procedures for oil spills would involve many equipment and expertise such as oil booms, recovery crafts and dispersant chemicals. In the USA, oil spill contingency planning now include dispersant use as a response option under certain conditions. In other parts of the world, such as in Asia, Great Britain and Europe, dispersants have become the main response technique for oil spills. Dispersant use was considered to be a major factor in reducing shoreline oiling and biological impacts at the MV 'Sea Empress' oil spill in Wales in 1996.

Use of Dispersant in Marine Oil Spill

The environmental impact on the usage of dispersants in oil spills have been largely studied by many international agencies as some dispersants affects the marine ecology more than others.

The decision to use dispersants involves balancing the potential advantages of dispersant use--removing oil from the water surface and avoiding some shoreline impacts with the potential disadvantages, such as impacts to plankton or other water column organisms. Toxicity is the primary concern. To date international marine conservation and environmental agencies advocate only the use of dispersants that are very low in toxicity. Typically the dispersants are evaluated using toxicological test apparatus as in the Diagram 1 below to evaluate the impact on the marine ecology system.

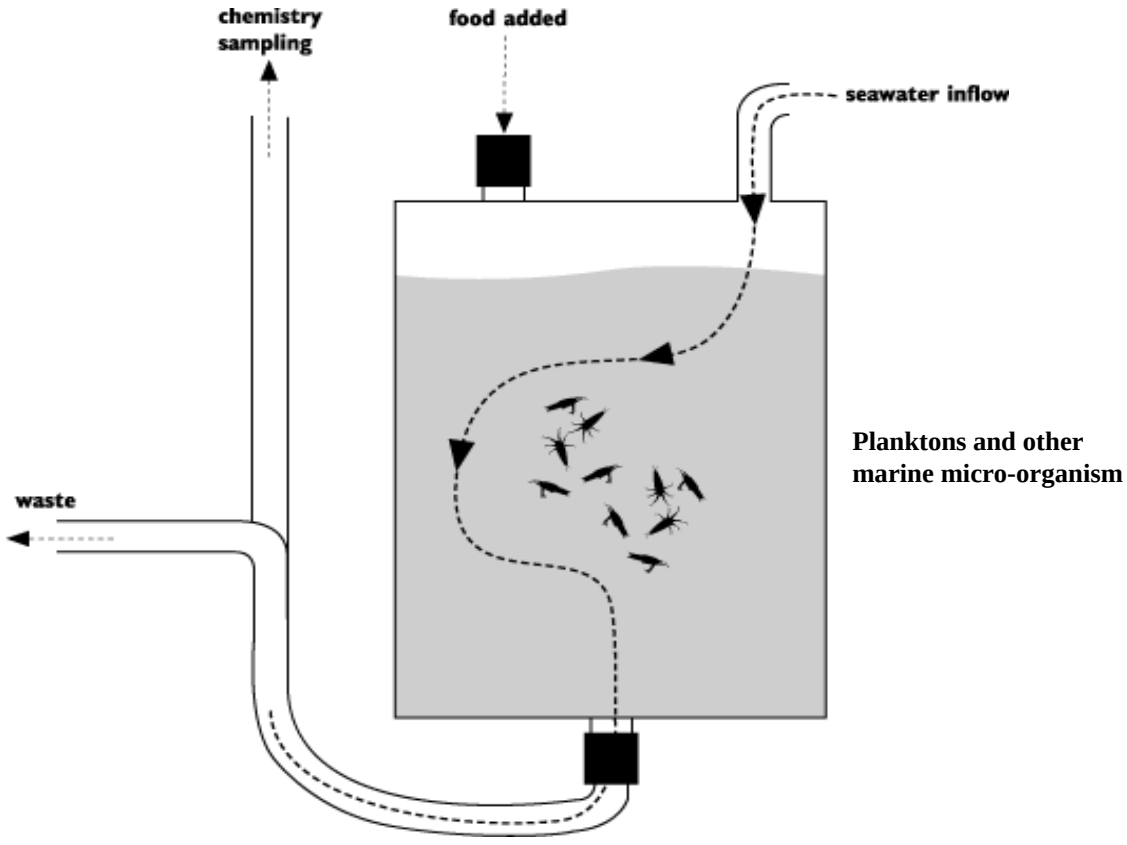

Diagram 1 – Toxicity Test Apparatus

4. Miyabi Dispersants

Developed under strict environmental regulations, Miyabi range of dispersants are OEM for many brands. Our Miyabi Oil Spill Aid™ (MOSA), Miyabi Oil Spill Control™ (MOSC), Miyabi Tank Cleaner™ (MiTaC), MiDeg™ (Miyabi Degreaser), Miyabi Car Wash™ (MiWash™) and Miyabi ECO Engine Flush™ (Miyabi ECO™) are few of the dispersants in the commercial market that meet such criteria.

Our dispersants are water based and hydrocarbon free, and extremely low in toxicity. We also develop an advance biodegradable range for sensitive ecological concerns.

- It is highly effective at emulsifying crude oils, fuel oils and water in oil emulsions.
- Do not adhere to rock walls and coastal walls
- Caused dispersed-emulsified oils to scatter, float on the water and do not settle to the bottom of the sea.

5. How does Miyabi Dispersants Work?

In layman terms, they work much like the detergent use in cleaning grease and oil from cooking utensils (but our dispersants are very much less toxic and more complex). They contain molecules with a water-compatible ("hydrophilic") end and an oil-compatible ("lipophilic") end. These molecules attach to the oil, reducing the interfacial tension between oil and water, breaking up the oil slick. Refer to Diagram 2 below.

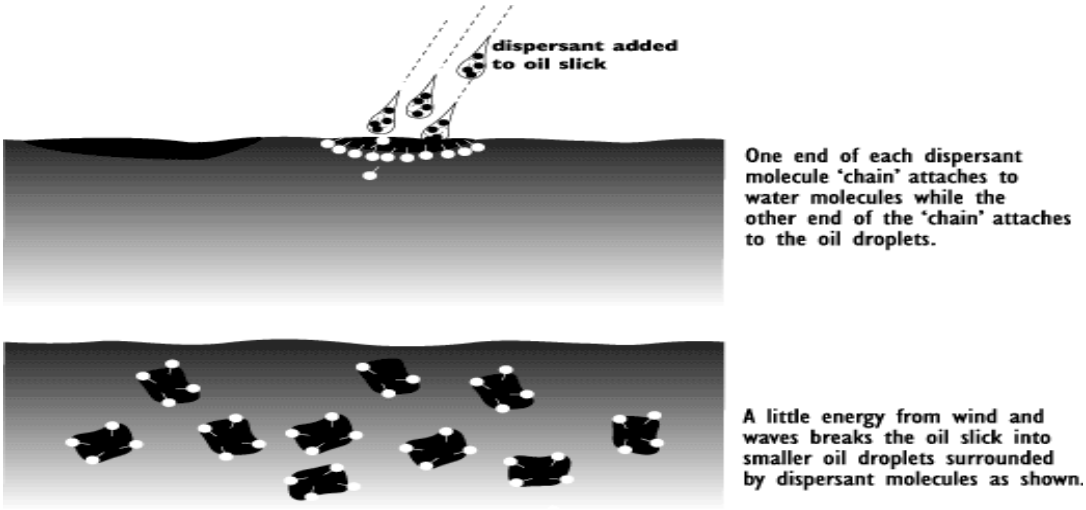

Diagram 2 – How dispersant works.

Upon application with Miyabi dispersants, oil slick beaks down into oil droplets and globules. This enables the suction pumps to 'skim' off the oil droplet and globules from the surface of the sea with ease and greater efficiency as compared to large sticky mass of oil. Furthermore the break down to oil mass into oil droplets and globules increases the surface area of the emulsified oil and therefore increasing the oxidation and ultraviolet radiation of the sun which aid in the degradation of the oil. Eventually these emulsified oil droplet and globules are degraded into naturally occurring substances.

Researches by international environmental agencies on dispersants had shown dispersed oil degrades more quickly than oil that has not been dispersed. Diagram 3 illustrates how the oil may be processed in the marine ecological system. Initially, the droplets of oil and dispersant are swarmed by bacteria which begin to degrade them. Then protozoans and nematodes (small worms) join the colonies. Eventually, the oil may be further broken down and incorporated into the food web.

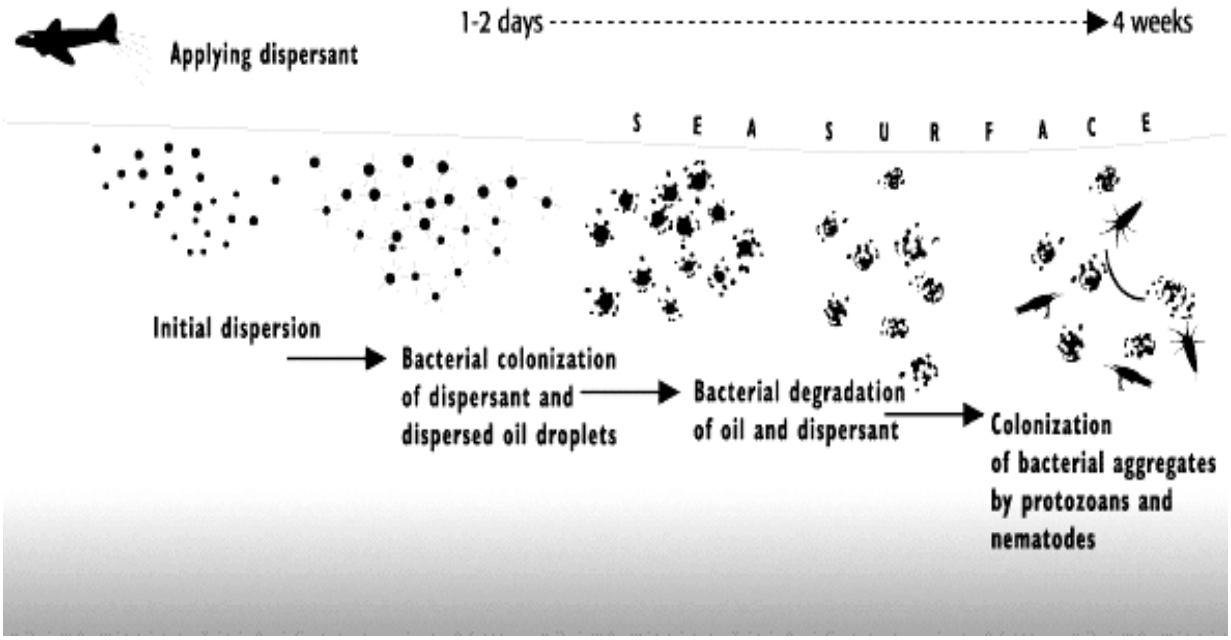

Diagram 3 – Degradation of oil in oil spill by applying dispersants.

Miyabi Oil Spill Chemicals (MOSC™) & Miyabi Oil Spill Aid (MOSA™)

MOSC™ & MOSA™ are water based, non toxic and bio-degradable.

- It is highly effective at emulsifying crude oils, fuel oils and water in oil emulsions.
- Do not adhere to rock walls and coastal walls
- Caused dispersed-emulsified oils to scatter, float on the water and do not settle to the bottom of the sea.
- MOSC™ is effective on unrefined oils and bunker fuels.

MOSA™

MOSA™ is used for oil spills' stained and/or adhere to surfaces such as sand, rock walls and other permanent structures. Its purpose is to disperse the oil stain from the surfaces through its unique tensides properties.

Application is directly through spraying on the stained surfaces. Efficacy will greatly be enhanced with increase kinetic energy of the sea wave motion.

MOSC™

MOSC™ is used for oil spills in the open seas. Its purpose is to break down the think oil spill into a large oil surface area for the ease to removal. It also reduces the tendency of the oil spill to form ballsor mousse and keeps the dispersed oil droplets and globules in suspension instead to sinking to the bottom of the sea.

Application is direct spraying through emergency response boats/vessels and/or aero planes. Efficacy will greatly be enhanced with increase kinetic energy of the sea wave motion.

For Application and Dosage of MOSC™, refer to attached Table and Annexes.

ASSESING THE APPROPRIATENESS OF GENERAL DISPERSANT USE

- The most important to ask is: ***Will dispersant use significantly reduce the impact of the oil spill?***
- Rapid decisions on dispersant use are essential as dispersant must be applied quickly to be effective.
- Decision makers must consider the various environmental, social, economical, political, and cultural factors unique to each spill.
- Tradeoffs will be necessary, as no response is likely to satisfy all parties and protect all resources. Remember that ecological impacts of oil are generally longer lasting and more persistent than other impacts.
- Ecological effects will due primary to the spilt oil. Dispersant applied at appropriate rates is unlikely to cause significant adverse effects, even in multiple applications/doses.
- Oil dispersed into greater than 10m of water will quickly dilute to levels where acute toxic effects are unlikely.
- Few acute toxic effects have been reported for crude oil dispersed into less than 10m of well-flushed water.
- Small spills of light oil seldom require dispersant use.

OIL DISPERSIBILITY

- ✧ The best indication of oil dispersibility is from specific oil weathering and dispersion data from field trials.
- ✧ Dispersant use should not be rejected exclusively on the basis of predictive model.
- ✧ Unless certain that oil is non-dispersible, testing dispersant on the actual spill is recommended (Refer to Chart 1 and Chart 2)

Generally if;

- ✧ Oil is able to spread, it is likely to disperse
- ✧ Viscosity is <2000 cSt, dispersion is probable
- ✧ Viscosity is greater than > 2000 cSt, dispersion is possible
- ✧ Viscosity is greater > 5000 cSt, dispersant is possible with concentrated dispersant
- ✧ Sea temperature > 10^0C below pour point, dispersant is unlikely.

KEY BENEFITS OF OIL SPILL DISPERSANTS

- Dispersant use minimizes the effects of an oil spill principally by dispersing oil before it reaches shorelines or sensitive areas (eg. Mangroves, estuaries)
- Removing oil from surface of water reduces the potential for impacts to birds and marine ecology, and limits the action of wind on oil spill.
- Dispersants can prevent oil from sticking to solid surfaces, and enhance degradation.
- Dispersants can effectively treat large spills more quickly and cheaply than most other response methods.
- Dispersants can be effective in rough weather and strong currents where mechanical responses are limited.
- Effective dispersant responses can greatly reduce the quantity of oil requiring recovery and disposal.
- Dispersant use is often the only feasible response to oil spills that exceed mechanical response capabilities.
- Dispersant use does not limit other options (eg. can be use together with mechanical response).
- Dispersed oil that cannot be mechanically recovered generally poses fewer significant environment problems.

CONSIDERATION OF DISPERSANT USE

Dispersant use should be considered if;

- ✓ Oil is likely to significantly impact birds, marine ecology, or other floral and fauna at the water surface.
- ✓ Oil is likely to significantly impact shorelines, structures and facilities (eg. marine wharfs, harbors or jetties).
- ✓ Oil is likely to significantly impact economically important resources (eg. shellfish beds, fish farming, tourist beaches).
- ✓ Natural dispersant is limited.
- ✓ Other response techniques are likely to be adequate, effective or economical.
- ✓ Sea/weather conditions preclude the use of other response techniques
- ✓ The oil could emulsify and form tar balls.

OIL SPILL EMERGENCY CHECKLIST 1

EXTEND OF SPILL

1. Overall length of spill ……km
2. Overall width of spill ……km
3. Calculate **TOTAL SPILL AREA** = ……..km^2 = *spill length (1) X spill width (2)*
4. Estimated portion of total spilled area (3) covered by oil ……... (maximum 100%)
5. **ESTIMATED SLICK AREA** = ……..km^2 = *total spill area (3) X portion covered by oil (4)*

ESTIMATED SPILL VOLUME – As a rule of thumb use: 1 ton (1000L) of oil per Ha, 0.1mm average thickness

Use the following chart to :

i. Record the portion of oil slick are (5) made up by the oil appearance listed below (=A)

ii. Multiply (A) by the slick area (5), (=B)

iii. Multiply (B) by (C) to estimate oil volume (=D)

iv. Add (D) to estimate oil volume

Oil appearance	i. Proportion of slick area	ii. Slick Area (km^2)	Approximate oil volume (m^3/km^2)	Estimated oil volume (m^3)
Silvery sheen *Approx. 0.0001mm thick (0.1 micron)*	(A) ……	X slick area (5) = (B) ……	X (C) 0.1 *(1 litre/Hectre)*	= (D) ……
Rainbow sheen *Approx. 0.0003mm thick (0.3 micron)*	(A) ……..	X slick area (5) = (B) ……	X (C) 0.3 *(3 litres/Hectare)*	= (D) ……
Fresh dark/black oil *Approx. 0.1mm thick (100 microns)*	(A) …….	X slick area (5) = (B) ……	X (C) 100 *(1,000 litres/Hectare)*	= (D) …….
Brown/orange mousse *Approx. 1.0mm thick (1000 microns)*	(A) ……	X slick area (5) = (B) ……	X (C) 1000 *(10,000 litres/Hectare)*	= (D) …….
TOTAL	Maximum 100%	…… km^2 Estimated slick area (5)	Estimated total oil volume	…… m^3

DOSAGE OF MOSC™ AND MOSA™

		Suggested Application Rate	
Product	Dilution	Light Oil or Shinny surface Good weather -- cold weather litres per m3 of oil	Black oil or brown oil Good weather / cold weather litres per m3 of oil
MOSC™	1 : 2	2 -- 4 litres	4 -- 10 litres
MOSA™	1 : 2	Direct application	Direct application

MATERIAL SAFETY DATA SHEET

PRODUCTS & SERVICES: OIL DISPERSANT
Country Of Origin: JAPAN
Manufacturer's Name : MIYABI INDUSTRIES PTE LTD
Trade Name: Miyabi Oil Spill Aid™ (MOSA™)

General Information

Item Name:	OIL DISPERSANT
Record No. For Safety Entry:	001
Tot Safety Entries This Stk#:	001
Status:	SM
Date MSDS Prepared:	01Mar96
Safety Data Review Date:	01Mat96
Supply Item Manager:	CX
MSDS Serial Number Code:	O1
Unit Of Issue:	CN
Unit Of Issue Container Qty:	24 liters and 200 liters
Type Of Container:	Drum
Net Unit Weight:	Per Water
Export Classification Code:	3402190001

Ingredients/ Identity Information

Proprietary:	YES
Ingredient:	NON-HAZARDOUS INGREDIENTS (INERT) DISPERSANT& TRACE SURFACTANT
Ingredient Sequence Number:	01
OSHA PEL:	NOT APPLICABLE
ACGIH TLV:	NOT APPLICABLE
Other Recommended Limit:	NONE RECOMMENDED

Physical / Chemical Characteristics

Appearance And Odor:	CLEAR, SLIGHT BLUISH AND SLIGHT ODOR.
Boiling Point:	212F, 100c
Specific Gravity:	1
Evaporation Rate And Ref:	PER WATER
Solubility In Water:	COMPLETE
pH	9.5 $\pm$ 0.3 (in neat form)

Fire and Explosion Hazard Data

NOT APPLICABLE

Reactivity Data

NOT APPLICABLE

Health Hazard Data

LD50-LC50 Mixture:	UNKNOWN
Carcinogenicity – OSHA:	UNKNOWN
Explanation carcinogenicity:	NOT APPLICABLE
Emergency / First Aid Pro:	N/R, NONE REQUIRED

Precautions for Safe Handling and Use

Steps if Material Released / Spill:	FLUSH WITH CORPOUS AMOUNT OF WATRE AND TREAT DISPOSAL AS WATER.
Waste Disposal Method:	TREAT AS WATER.
Precautions-Handling / Storing:	TREAT AS WATER.
Other Precautions:	NONE

Control Measures

Protective Gloves:	NONE NORMALLY REQUIRED
Eye Protection:	NONE NORMALLY REQUIRED
Other Protective Equipment:	NONE NORMALLY REQUIRED
Suppl. Safety & Health Data:	NONE

Transportation Data

Trans Data Review Date:	970109
DOT PSN Code:	ZZZ
DOT Proper Shipping Name:	NOT REGULATED BY THIS MODE OF TRANSPORTATION
IMO PSN Code: ZZZ	
IMO Proper Shipping Name:	NOT REGULATED FOR THIS MODE OF TRANSPORTATION
IATA PSN Code: ZZZ	
IATA Proper Shipping Name:	NOT REGULATED BY THIS MODE OF TRANSPORTATION
AFI PSN Code: ZZZ	
AFI Prop. Shipping Name:	NOT REGULATED BY THIS MODE OF TRANSPORTATION
Additional Trans Data: NONE	

Disposal Data

NOT APPLICABLE

Label Data

Label Required:	YES
Technical Review Data:	15May96
Label Status:	F
Common Name:	MIYABI OIL SPILL AID™
Chronic Hazard:	NO
Signal Word:	NONE
Acute Health Hazard-None:	X
Contact Hazard-None:	X
Fire Hazard-None:	X
Reactivity Hazard-None:	X
Special Hazard Precautions:	TREAT AS WATER. FIRST AID: NONE REQUIRED.
Label Name:	MIYABI OIL SPILL AID™
Label Emergency Number:	(65) 6281-1376 / (65) 62811376
E-mail:	miyabi8@singnet.com.sg

MATERIAL SAFETY DATA SHEET

PRODUCTS & SERVICES:	OIL DISPERSANT
Country Of Origin:	JAPAN
Manufacturer's Name :	MIYABI INDUSTRIES PTE LTD
Trade Name:	MIYABI OIL SPILL CONTROL™ (MOSC™)

General Information

Item Name:	OIL DISPERSANT
Record No. For Safety Entry:	001
Tot Safety Entries This Stk#:	001

Status:	SM
Date MSDS Prepared:	01Mar96
Safety Data Review Date:	01Mat96
Supply Item Manager:	CX
MSDS Serial Number Code:	O2
Unit Of Issue:	CN
Unit Of Issue Container Qty:	24 liters and 200 liters
Type Of Container:	Drum
Net Unit Weight:	Per Water
Export Classification Code:	3402190002

Ingredients/ Identity Information

Proprietary:	YES
Ingredient:	NON-HAZARDOUS INGREDIENTS (INERT) DISPERSANT& TRACE SURFACTANT
Ingredient Sequence Number:	01
OSHA PEL:	NOT APPLICABLE
ACGIH TLV:	NOT APPLICABLE
Other Recommended Limit:	NONE RECOMMENDED

Physical / Chemical Characteristics

Appearance And Odor:	CLEAR, SLIGHT BLUISH AND SLIGHT ODOR.
Boiling Point:	212F, 100c
Specific Gravity:	1
Evaporation Rate And Ref:	PER WATER
Solubility In Water:	COMPLETE
pH	9.0 $\pm$ 0.3

Fire and Explosion Hazard Data

NOT APPLICABLE

Reactivity Data

NOT APPLICABLE

Health Hazard Data

LD50-LC50 Mixture:	UNKNOWN
Carcinogenicity – OSHA:	UNKNOWN
Explanation carcinogenicity:	NOT APPLICABLE
Emergency / First Aid Pro:	N/R, NONE REQUIRED

Precautions for Safe Handling and Use

Steps if Material Released / Spill:	FLUSH WITH CORPOUS AMOUNT OF WATER AND TREAT DISPOSAL AS WATER.
Waste Disposal Method:	TREAT AS WATER.
Precautions-Handling / Storing:	TREAT AS WATER.
Other Precautions:	NONE

Control Measures

Protective Gloves:	NONE NORMALLY REQUIRED
Eye Protection:	NONE NORMALLY REQUIRED
Other Protective Equipment:	NONE NORMALLY REQUIRED
Suppl. Safety & Health Data:	NONE

Transportation Data

Trans Data Review Date: 970109
DOT PSN Code: ZZZ
DOT Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
IMO PSN Code: ZZZ
IMO Proper Shipping Name: NOT REGULATED FOR THIS MODE OF TRANSPORTATION
IATA PSN Code: ZZZ
IATA Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
AFI PSN Code: ZZZ
AFI Prop. Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
Additional Trans Data: NONE

Disposal Data

NOT APPLICABLE

Label Data

Label Required: YES
Technical Review Data: 15May96
Label Status: F
Common Name: MIYABI OIL SPILL CONTROL™
Chronic Hazard: NO
Signal Word: NONE
Acute Health Hazard-None: X
Contact Hazard-None: X
Fire Hazard-None: X
Reactivity Hazard-None: X
Special Hazard Precautions: TREAT AS WATER. FIRST AID: NONE REQUIRED.
Label Name: MIYABI OIL SPILL CONTROL™
Label Emergency Number: (65) 6281-1376 / (65) 62811376
E-mail: miyabi8@singnet.com.sg