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M/V ROSS SEAL

HSE MANUAL

DIGICON

OR – 379A

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SECTION 1.0

M/V ROSS SEAL VESSEL SPECIFICATIONS AND EQUIPMENT**1.1 Recording Vessel:**

Name:	M/V Ross Seal
Radio Call Letters:	WYG7180
Owners:	Seal Fleet
Builders:	RYSCO
Year Built:	1977
Registration:	U.S. Registry No. 582641
Home Port:	Galveston, Texas USA

1.2 Classification

U.S. Flag
A.B.S. Class Maltese Cross A-1, AMS
A.B.S. International Load Line

1.3 Dimensions

Length:	176 Feet	(53.64 Meters)
Beam:	38 Feet	(11.59 Meters)
Draft:	10 Feet 9 inches	(3.28 Meters)
Tonnage:	N.R.T. 203	
	G.R.T. 299.17	

1.4 Machinery

Main Engines:	Caterpillar, Two D398D (1700 H.P.)
Speed:	12 Knots
Bow Thruster:	Caterpillar 3406
Propellers:	4 Blade S.S. 72162
Steering:	Sperry SR-130
Fuel Separator:	Deleval MAB 104
Generators:	Two caterpillar 3406, 210 KW each

1.5 Electronic Equipment

Radar:	Furuno
VHF/FM:	GenTroniks GT-5510
Navigation:	One Micrologic ML320 TI-9000A Loran C
SSB:	Drake TRM-150-12 Channel CAI CA-35 MS-20
Fathometer:	Decca LAZ-51 AT

1.6 Capacities

Fuel Oil:	66,000 U.S. Gallons (approximately)
Ballast:	68,000 U.S. Gallons (approximately)
Potable Water:	43,000 U.S. Gallons (approximately)
Lube Oil:	1600 U.S. Gallons (approximately)
Water	40 day supply

1.7 Safety Equipment

General:	Meets all A.B.S. requirements
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SECTION 2.0

GEOPHYSICAL EQUIPMENT2.1.1 DSS-240

2.1.1 Central Recording Unit:

Number of Channels	240 I.F.P. Recording Mode
Tape Format:	Demultiplexed IBM, Floating Point 6250 B.P.I. - SEGY
Display:	EPC 4600 Single Trace Plotter SIE ERC 10 c Osillograph (Electrostatic Camera) 64 Trace
Recording:	Field tape header includes data from Navigation, Data Logger, and Streamer Positioning

2.1.2 Source Control - CLASS II

Controls:	48 Guns
Accuracy:	0.2 mil
Adjustment:	Automatic Individual Source Control
Recording:	Firing and return times
Display:	Firing and returning times on CRT and Printer
Programmable:	For multiple arrays and programmed firing time

2.1.3 Data Logger (Printer)

Line Number	Tail Buoy Bearings
Date	Ship's Heading/Speed
Shotpoint Number	Engine RPM's
File Number	Remarks/System Status
Shot Time	Air Pressure
Fathometer Readout	Source Volume
Streamer Depth	Gun Depths
Client	Reel Number

2.2 Birddog

Three subsystems make up the BirdDog workstation

2.2.1 Front End Processor: This subsystem consists of a micro-computer equipped with a low resolution video card and monitor. This system computes the streamer shape and mid-point coordinates for up to 240 traces. The front End Processor provides to the text screen, on a per shot basis, the following: Shot number, feather angle, crossline distance to the steerpoint, crossline distance to far trace and crossline distance to the near, mid and far trace mid-points. The above listed attributes plus system heading and compass readings can be logged and printed.

2.2.2 Area Display Subsystem (ADSS):

This subsystem consists of a micro-computer equipped with an enhanced graphics adapter (EGA) and high resolution color display monitor. The ADSS graphically displays in color the following: Location of local boat, location of remote boat (if 2 boat operations), source location, steer point location, trail of the steer point to source mid-point for the last 40 shots, streamer shape, sail line. Sail lane and user defined objects (hazards).

2.2.3 Realtime Binning Subsystem:

This subsystem consists of a second micro-computer equipped with EGA and high resolution color monitor. This system performs the realtime binning of the data. Output of this system is a high resolution color representation of bin coverage on a moving screen 80 shots long by 23 lines

wide. This display can also be placed in a counts mode showing (in a non graphically form) the number of hits in a bin. A color hard copy figure of merit report is available. The purpose of this summarizing report is to show the coverage for each bin for each of 4 offset ranges.

A menu-driven, bin editing capability is available to the onboard geophysicist. This editing capability allows rebinning of the accumulated data, based upon editing of the data base. Some examples of changes would be: new bin size definition, deleting of bad shots or traces, hardware changes (i.e. a compass that went bad) and even deleting of entire lines. Upon viewing the rebinned data, decisions can be made in the field, as to what infill shooting would be necessary.

2.3 Streamer

2.3.1	Group Length: Total Length: Example:	12.5 or 25 meters Limited to 4500 meters or 240 channels 120, 25 meter groups = 3000 meters 144, 25 meter groups = 3600 meters 160, 25 meter groups = 4000 meters 180, 25 meter groups = 4500 meters 120, 12.5 meter groups = 1500 meters 160, 12.5 meter groups = 2000 meters 190, 12.5 meter groups = 2200 meters 240, 12.5 meter groups = 3000 meters 80, 25 meter groups + 160, 12.5 meter groups = 4000 meters
2.3.2	Depth Control:	Individual remote control cable depth regulator
2.3.3	Hydrophones:	7, DG-108 acceleration canceling hydrophones linearly spaced over 12.5 meters

- 2.3.4 Streamer Positioning:** Compass sections.
- 2.3.5 Streamer Spares:** Normal spare sections, tools and associated equipment (sufficient spare cable sections carried onboard).
- 2.3.6 Tailbuoy Location:** Strobe light/Radar reflector
- 2.3.7 Sample rates:** One Millisecond - 120 channels or less
Two Millisecond - 240 channels or less
Four Millisecond - 240 channels or less
- 2.3.8 Alias Filters:** 80 Hz slope of 72 db/Octave
160 Hz slope of 72 db/Octave
320 Hz slope of 72 db/Octave
- 2.3.9 Low Cut Filters:** 3 Hz slope of 6 db/Octave
8 Hz slope of 18 db/Octave
12 Hz slope of 18 db/Octave
- 2.3.10 Water Break Phones:** Maximum of 4 traces on 240 channel streamer can be used.

2.4 Energy Source Capabilities

2.4.1 Airguns

Number of Strings:	4
Number of Guns:	10 per string
Normal Operating Volume:	3800 cubic inch
Gun Type:	Bolt Airguns
Firing Sensor:	Shuttle Stroke Sensors
Array Width/length	84/70 feet (25.6/21.3 meters)

Pneumatic Gun Depth Monitoring System

Note: Array can be modified in volume, to satisfy requirements of the CLIENT.

2.4.2 Compressors

Type: 3 x 720 SCFM, 1 x 400 SCFM-LMF
units, 1900 psi normal operating pressure

2.4.3 Other

Raised Deck
Trolley system for easy recovery and deployment of arrays

2.5 Peripheral Equipment

Closed Circuit TV
Furuno Fathometer Model #FED 814 EF and Digital Readout Model ED 202
Deep Water Fathometer (Raytheon Bathymetric System)
Weather Map System

2.6 Communications

Marisat or Communications System using Telephone and Telex.
Scientific Atlanta Model 3055m
Cellular Telephone
Facsimile (FAX)

SECTION 3.0**NAVIGATION EQUIPMENT**

- 3.1** A comprehensive software package is provided to operate the following onboard system hardware:

Dual Channel Satellite Receiver/GPS upgrade
Sperry MK227 Gyro with Gyro Torque
Two Hewlett-Packard 2649 Operator Terminals
Two Navigation Displays
Two 9-track Tape Decks for Data Logging with hard copy printout
T.I. 820 System Printer/Terminal
Hewlett Packard 21MX System Computer
Austron 5000 Loran-C receiver
Rubidium Frequency Standard
Brother EP-44 Terminal
Two MX 40 System Interfaces

- 3.2** The above onboard system has the capabilities to interface with the following navigation systems, if and when provided (subject to contractual requirements).

- | | | | |
|----|-------------|-----|------------|
| 1. | Argo | 8. | Hifix - 6 |
| 2. | Syledis | 9. | Raydist |
| 3. | Mini-Ranger | 10. | Hyperfix |
| 4. | Shoran | 11. | Microphase |
| 5. | Maxiran | 12. | Starfix |
| 6. | Trisponder | 13. | Spot |
| 7. | Pulse-8 | | |

- 3.3** In addition to the systems listed above, GPS can also be provided as a stand alone system that can be used for post processing Quality Control applications.

SECTION 4.0**PERSONNEL/ACCOMODATIONS**

- 4.1** The vessel will be staffed with ship's crew and geophysical crew consisting of the following fully qualified and licensed personnel:

4.1.1. Ship's Crew

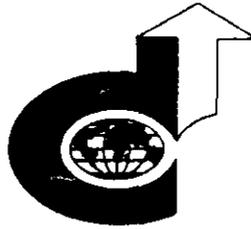
1	Captain
1	Officer
1	Engineer
2	AB Seamen
1	Cook
1	Messman
1	Utility
8	TOTAL

4.1.2 Geophysical Crew

1	Party Manager
2	Observers
2	Jr. Observers
2	Air gun Mechanics
2	2 Compressor Mechanics
2	Helpers
2	Navigators
13	TOTAL

4.1.3 Accommodations

35 Berths
Central Heating and Air Conditioning



COMMITMENT TO SAFETY

TO: All Digicon Employees - Worldwide

DATE: January 1, 1992

Digicon considers the safety, health and welfare of its employees and families to be among its greatest concerns and responsibilities.

There continues to be a profound movement around the world to become more aware of our environment and the safety conditions of our work place. In addition to our own commitment to a safe work place, our clients require that all of their associated contractors implement high quality safety and health practices in all phases of jobs performed. We, at Digicon, wholeheartedly endorse this movement and are committed to being exemplary as a safe company.

As all of you are aware, we have an active and aggressive safety department. It is the responsibility of the safety department employees to objectively and realistically point out to all of us how we can do our job more safely and, in the event of emergencies, how we can respond more effectively to minimize or contain the situation. To ensure success, we all must commit to make the safety management and enhancement program a top priority.

Rudy Prince
Chairman of the Board
Chief Executive Officer

Larry Lenig
President
Chief Operating Officer

M/V ROSS SEA SAFETY TRAINING

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NAME	PERSONAL SURVIVAL	FIRE FIGHTING	FIRST AID	BREATHING APP	FAST RESCUE CRAFT	OFFSHORE SAF/SUR
WARD, LARRY DEAN	Feb-91					
MATTHEWS, JOHN SHANNON	Oct-91	Sep-91	Sep-91			Sep-91
SPENCER, KIMBERLEY WALTER	Mar-93		Apr-92	Apr-92	Nov-92	
HALES, RAYMOND WALTER	Nov-91	Feb-93	Nov-91	Feb-93		Nov-91
CONSTABLE, PAUL	May-93					
WILLIAMS, DAVID JAMES	Jan-93					
LEPA, IAN FREDRIK	Feb-92		Apr-92	Apr-92		
HOLMES, CRAIG	May-93					
STONE, GEOFFREY	Feb-91					
HOPKINS, LES	Apr-93				Nov-92	
CLARK, ROY	Jul-92					
REINERTSEN, ALLEN	Dec-91					Dec-91
HUTCHINSON, PHILIP JOHN	Dec-91					
ROES, LARS	Oct-91	Oct-91	Oct-91	Oct-91		Oct-91
HARDGRAVE, RONALD DEAN	Feb-92					
SPARK, BRADLEY ALICK	Sep-92					
CAMPBELL, NOEL GRAHAM	Nov-91	Nov-91	Nov-91	Nov-91		Nov-91
HARMAN, NOEL EDWARD	Aug-92					
TIBOR, THOMAS	Apr-93					
MEALS, KENNETH JAMES	Jun-92					
SHAWCROSS, MARK	Jul-91	Jul-91	Jul-91	Jul-91	Feb-92	Jul-91
BARROGA, MARLON	Dec-91					
SORIANO, DANILO	Nov-91					
NEELEY, ROY	Oct-92					
ZELAYA, RALPH	Feb-92					
CRUZ, DAGOBERTO	Feb-92					
FLORES, ANTONIO						
BALAN EG, LEO	Feb-92	May-92	May-92	Feb-92		

WELCOME ABOARD

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Welcome aboard the "M/V ROSS SEAL". We hope that this Manual will answer some of the questions or concerns that you may have regarding Digicon's Marine Operations. Please read this guidebook thoroughly, even if you are an experienced seafarer, as it contains important information regarding Digicon's policies as well as general guidelines that you should know regarding the "M/V ROSS SEAL". We sincerely hope that your stay onboard will be a safe and pleasant one.

UPON ARRIVAL

Upon your arrival onboard you will be given a brief Safety Indoctrination by the ship's Safety Officer. This will include showing you your cabin and Life Raft assignment, as well as a complete tour of the vessel. Please note that when you are shown to your cabin, that it is neat and clean, we therefore expect you to leave it in the same condition upon your departure. If your cabin is not in order when you arrive, inform the Safety Officer, who will take the necessary steps to ensure that the problem is corrected. The "M/V ROSS SEAL" carries a large compliment of both Marine and Seismic crew's, together with the various support personnel, Client Representatives, Visitors, Guests etc. It is very likely that most of the cabins will be occupied. It is therefore likely that you will be sharing your cabin with someone else. We hope that you understand the reason for this and hope it does not cause too much of an inconvenience.

When you are shown to your cabin, please ensure that a Life Vest is present for your use. There should be a Life Vest and Survival Suit stored above the lockers for each bunk onboard. If these are not present inform the Safety Officer, who will see that this is corrected ASAP. Familiarize yourself with this equipment at the earliest opportunity. In the unlikely event that these items are needed, you should be able to use them confidently.

If you are a guest, visitor or otherwise not part of the ships regular compliment, your duty in an emergency situation will be to don your life jacket, (if you are in, or close to your cabin), and proceed to the muster point aft of the Bridge. If you are not close to your cabin there are Life Vests available in the lockers located at the muster points

DO NOT BRING ANY PERSONAL ITEMS WITH YOU TO THE MUSTER POINT AND DO NOT RETURN TO YOUR CABIN FOR ANY REASON UNTIL THE ALL CLEAR HAS BEEN GIVEN.

Take the time to learn all of the available escapeways from your cabin and work area as there is very likely more than one exit from where you sleep and work. Study the ships Fire Plan and Muster Bills so that you are familiar with the layout of the vessel and its Safety Equipment. Learn how to get to the Muster Point in the safest, quickest manner.



GENERAL HOUSEKEEPING

A you will likely be sharing your cabin with another person, you and your room-mate are expected to keep both your cabin and the common head, (Bathroom), area clean. These areas should have been clean when you arrived and you are expected to keep them that way while onboard and especially upon your departure.

Linens, towels and washcloths are supplied by Digicon for your use. Although a large supply is kept onboard, these items are not washed by the steward and therefore in the case of a long trip at sea, you will have to wash these items yourself. You are responsible for all of your own personal laundry. Washers and dryers are provided, along with soap, bleach etc.

Use common sense when using the Laundry room and do not leave your clothes unattended. You are solely responsible for your laundry and the vessel will not be accountable for any items lost. Please remove your laundry from the washers and dryers promptly so that others may use them.

The passageways, ladder ways and lounge are kept clean by the ships Steward, however, you are expected to clean up after yourself. Do not litter the ship with trash of any sort, and take care not to track in dirt or grease from the deck areas. All coffee cups, glasses, plates etc. are to be returned to the Galley/Mess area after use.

The Galley and Mess areas are kept clean by the Galley staff, but again you are expected to clean all of your own dishes if used outside of regular meal times. This includes coffee cups and glasses. Dispose of all waste in the trash compactor or the food waste disposal bins. **DO NOT THROW ANY PAPER, PLASTIC, ETC., INTO THE FOOD WASTE DISPOSAL BINS. THESE BINS ARE FOR THE EXCLUSIVE USE OF FOOD ITEMS THAT CAN BE SAFELY DISPOSED OF AT SEA.**

The Lounge area is available for use 24 hours a day. A sign is posted in the Lounge describing conduct expected of all personnel using this area. All items stated on this sign are to be observed at all times. If you have any questions regarding use of the Vessel's facilities contact the Safety Officer, Party Manager or Master for further information



ALCOHOL & DRUGS

Absolutely no Alcohol, Drugs or Firearms are permitted onboard any Digicon owned or operated vessel at any time for any reason.

Prescription medications are only permitted if the individual has the written prescription in their possession. All prescription drugs must be declared to the Safety Officer, Party Manager or Ships Master upon boarding the vessel. Any life threatening condition such as high blood pressure or heart conditions of any kind, sever allergies, Epilepsy etc. must also be declared when boarding the vessel, so that a decision can be made by the Master as to whether or not the individual can be included on the voyage. Anyone caught in possession of or attempting to bring aboard any illegal Drugs, Alcohol or Firearms will be terminated immediately. There are no exemptions to this policy whatsoever.

A word of advise, in some countries where Digicon is currently operating and in places where we will make future port calls, local laws are extremely strict and penalties severe in regard to possession of, or use of Drugs & Alcohol. In some countries mandatory jail sentences are imposed for even very small amounts of Drugs of any description. Some areas, particularly in South East Asia, the penalty for drug trafficking or possession, is DEATH.

Be warned that if you are arrested for a Drug, Alcohol or Firearms offence, there is nothing that Digicon, your Nations Embassy or Consulate, or anyone else can do to help you. You will be on your own and your rights as you know them may not exist. Also be aware that in some countries, possession of Drug related paraphernalia alone is a punishable offence.

DRUG & ALCOHOL POLICY

THE USE, POSSESSION, TRANSPORTATION, SALE, PURCHASE, MANUFACTURE, OR TRANSFER OF ILLEGAL DRUGS, CONTROLLED SUBSTANCES OR DRUG PARAPHERNALIA BY ON DUTY EMPLOYEE'S WHILE ON COMPANY BUSINESS, ON COMPANY PREMISES, IN A COMPANY VEHICLE OR WHILE ON ANY JOB SITE OF A CUSTOMER IS PROHIBITED.

THE TERM "COMPANY PREMISES" AS USED IN THIS POLICY INCLUDES ALL PROPERTY, FACILITIES, LAND, BUILDINGS, STRUCTURES, FIXTURES, EQUIPMENT, INSTALLATIONS, BOATS, AIRCRAFT, VEHICLES, AUTOMOBILES OR TRUCKS, OWNED LEASED OR USED BY THE COMPANY.

REPORTING TO WORK WITH THE PRESENCE OF CONTROLLED SUBSTANCES IN AN EMPLOYEE'S SYSTEM IS PROHIBITED. THE ONLY EXCEPTIONS SHALL BE FOR PROPERLY DOCUMENTED CURRENT PRESCRIPTION DRUGS WHICH ARE BEING USED AS PRESCRIBED BY A LICENSED PHYSICIAN AS MEDICATION FOR THE EMPLOYEE.

DIGICON RESERVES THE RIGHT TO CONDUCT DRUG ANALYSIS TESTING AT ANY TIME. IF AN EMPLOYEE IS FOUND TO HAVE A CONTROLLED SUBSTANCE IN THEIR SYSTEM THEY WILL BE TERMINATED.

IF AND WHERE FEDERAL REGULATIONS REGARDING DRUG TESTING AND OR SEARCHES CONFLICT WITH PROVISIONS CONTAINED IN THIS POLICY, THOSE FEDERAL REGULATIONS WILL SUPERSEDE THE COMPANY POLICY.

ADHERENCE TO POLICY

MANAGEMENT OF THE COMPANY STRONGLY SUPPORTS THE INITIATIVES CONTAINED IN THE POLICY. EACH EMPLOYEE IS URGED TO SUPPORT AND ENCOURAGE ADHERENCE TO THE PROVISIONS OF THIS POLICY. AS IS THE CASE WITH OTHER CORPORATE POLICY'S VIOLATION WILL RESULT IN TERMINATION.

REFER TO DIGICON'S POLICY GUIDEBOOK FOR FURTHER INFORMATION.



SAFETY OFFICER'S SAFETY INDOCTRINATION CHECKLIST

A safety indoctrination is to be given to all personnel boarding the vessel regardless of whether or not they are familiar with the boat or are new personnel, visitors, guests, clients, etc.

It is not necessary that the following be done in exact order but all points must be covered.

- 1) Show personnel to their cabins and muster point/life raft assignment. Ensure that they are familiar with the method of donning their life vests and assist them in donning vest if needed.
- 2) Show personnel the posting of Muster Bill and Ships plan. Explain alarms and what they are to do in an emergency situation. If applicable explain M.O.B. and or Response Team duties.
- 3) Ensure that they are aware of where the nearest or best exits from their cabin and work area are.
- 4) Briefly describe hazards associated with the back deck area and the necessary PPE to work on or visit the back deck. In the case of visitors, guests, clients etc. explain that they are not allowed on the back deck at any time unless accompanied by qualified personnel. No exceptions.
- 5) If applicable issue or re-issue PPE. Stress that this is **Personal Protective Equipment** and that is a violation of safety rules to use someone else's gear. All personnel will sign for Issued PPE and explain that they must immediately contact the Safety Officer or Party Manager if they lose or damage any PPE so that these items can be replaced promptly. Show guests, visitors, etc. where the PPE for their use is located. Describe any other areas of the vessel where PPE is required and where unauthorized personnel are not allowed.
- 6) Briefly explain Digicon's drug policy and inquire if they have brought any prescription medications with them. If so ask to see the medication and prescription to ensure that it is indeed prescribed for them. If they do not have a prescription with them the bottle must have their name and the name of the doctor who prescribed it inscribed on the bottle.
- 7) Inquire if they have any potentially life threatening condition such as severe allergies, heart condition, epilepsy etc. If so the Master and Party Manager should be notified immediately to determine if they should remain onboard. In the case that they are allowed to remain onboard the type of condition, any prescription medication and all other pertinent information should be logged in the ships copy of the safety booklet.



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- 8) Inquire as to whether or not they have had any safety training and what type. If so request to see their safety passport or certificate. All Digicon personnel should hand in their safety passports to you at this time. Explain that they will be held in your file cabinet so that they are available to be shown to clients, inspectors etc. and will be returned to them upon their departure.
- 9) Give all personnel a copy of the vessels safely booklet. Ensure that they read and sign the ships copy of this booklet as well as Digicon's safety manual.

A BRIEF GUIDE TO VESSEL SPECIFIC OPERATIONS

A BROADER OUTLINE CAN BE OBTAINED FROM THE SAFETY MANUAL

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 - c) GENERAL PRECAUTIONS
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 - b) START UP PROCEDURE
 - c) SHUTDOWN PROCEDURE
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12. CRANE OPERATIONS



1.0 INTRODUCTION

M/V ROSS SEAL is a 176-foot (54 meter) seismic survey vessel. The vessel is owned by Seal Craft Operators (USA) and chartered by DIGICON GEOPHYSICAL CORPORATION.

The vessel was built in 1977 and has worked in the Caribbean, Gulf of Mexico, Alaska, Australia, Indonesia and Malaysia. The last dry-docking period was March 1993 in Cairns, Australia. The vessel tows a single streamer with up to 240 channels and a tuned air gun array with up to 4000 cubic inch capacity.

If you are a recent addition to the ship's compliment or a temporary visitor, please review the following list of procedures and standards:

1. Garbage is to be disposed of in a responsible manner. Food scraps are the only items permitted "over the side". All other items should be packaged as required and placed in the bins on deck for disposal ashore. A trash compactor is available for appropriate items. Use special care when disposing of oily/flammable waste.
2. The vessel has one lounge/video area. A television, VCR, and radio are available for use, 24-hours a day. In addition, this compartment contains an assortment of board games and a small library. This compartment is in a berthing area, please be quiet and respect those personnel off-duty trying to rest. No food is to be consumed in the lounge.

Those personnel using the lounge areas have primary responsibility for their cleanliness. Do not wear dirty work gear (especially shoes) in the lounge areas. Empty all ashtrays and clear away any cups, glasses or wrappers. Rewind tapes and return to boxes and shelves.

3. The members of the ship's crew and the seismic crew work different schedules. Suffice to say that someone is trying to sleep at any given hour of the day. Keep that fact in mind when working and especially during your own time-off.
4. Emergency drills are held on a weekly basis. Safety meetings are held monthly. The drills and meetings are to acquaint everyone with the procedures and equipment onboard the vessel and provide an opportunity for questions, discussions and suggestions. If you are in doubt about anything concerning your own personal safety or the safe operation of the vessel, DO NOT WAIT, ask the Safety Officer/Party Manager/Ship's Captain immediately. Check the emergency safety equipment in your cabin as soon as you arrive. Each person should have a life-jacket (with light and whistle) and each cabin should have a flashlight and a working smoke detector. If anything is missing or not functioning, notify the Safety Officer/Party Manager/Ship's Captain.



Life raft muster lists, emergency station bills and diagrams of the ship's safety equipment plan are posted throughout the vessel. Become familiar with your responsibilities and the location of emergency equipment.

5. If you discover a hazard or believe a potential hazard exists, bring it to someone's attention. Satisfy yourself that appropriate correction measures have been taken.
6. Smoking is not permitted in many areas around the vessel. Please observe all "No Smoking" signs.
7. Meal times are as follows: Breakfast 0600-0700, Lunch 1130-1230, Dinner 1730-1830, Midnight Meal 2330-0030. The galley is open at all times: cold meats, cheeses and fruit are provided in the refrigerator outside the cooking area. Personnel should not go into the refrigerators in the cooking area or into the main walk-in cooler/freezers. If you eat outside regular meal hours, clean up afterwards. Wash plates, cups, glasses and cutlery.
8. This vessel DOES NOT have cabin attendants. Everyone is responsible for their own berthing compartment. Laundry service for linen is provided in port but you will have to wash your linen during extended time at sea. You will have to wash all of your own clothes, in port and at sea. Your cabin will be swept and mopped IF all gear is off the deck and you notify the Caterer or AB.

The laundry is located on the main deck, aft of the Galley. Two washers and two dryers are provided. Wash when you have enough to make a full load and once you start laundry, KEEP TRACK OF IT; do not expect someone to keep moving it for you if you forget.
9. Keep all valuable items in a safe place when the vessel is in port. Digicon is not responsible for lost or stolen items. It is the prerogative of the Ship's Captain to carry out baggage checks when anyone joins or leaves the vessel.
10. Emergency signals onboard are U.S.C.G. standard
Fire/Emergency alarm bell continuous ring
Abandon ship seven short rings followed by one long ring
Man Overboard three long rings
All Clear three short rings

2.0 SAFETY EQUIPMENT

SURVIVAL SUITS / LIFE VESTS AND LIFE RAFTS:

- 37 Survival Suits are provided. One located at each bunk onboard the vessel, the extra suits are in the Float Free Life Vest Container.
- 31 SOLAS approved Life vests are provided. One located at each bunk onboard.
- 32 SOLAS approved Life Vests are also stored in Float Free Containers on the Top Deck
- 4 INFLATABLE LIFE RAFTS
 - 1 x 15 Persons capacity
 - 1 x 20 Persons capacity
 - 2 x 16 Persons capacity

Total capacity 67 persons

MAN OVERBOARD EQUIPMENT:

- 1 17' Twin engined, fully equipped, purpose built Rescue Craft is located on the upper deck, launched by use of a Husky Crane, with a rating of 1,100 kgs.
- 9 Life Rings complete with line and lights are located at various positions around the vessel. M.O.B. Smoke Stations are located both on the Bridge wings and also the Reel Deck.

FIRE FIGHTING EQUIPMENT:

- 6 Fire Hose Stations with fog nozzles are located throughout the vessel.
- 1 Twin bottle Foam Deluge System, USCG Type A Size 2, is installed for the main cable reel. This system can be activated manually, at the unit itself, or by remote activator positioned at the bulkhead entrance to the work area.
- 2 Single bottle Foam Deluge Systems, QUELL 80 litre (each) are installed over the storage lofts. The system activators are located at the bulkhead entrance to the work area.
- 4 Single bottle Foam Deluge Systems, QUELL 50 litre (each) are installed, one over each compressor engine. Again the activators are located at the bulkhead entrance to the work area.

All the above mentioned Deluge Systems comprise of stainless steel storage cylinders, stainless steel distribution nozzle ring main, with nozzles angled to cover the fire risk, and a remote activator.

- 1 Four bottle KIDDE model 7101, Halon 1301 System is installed in the Engine Room. Each bottle has a capacity of 87 kgs (total capacity 348 kgs) The system is activated from either the Engine Room passageway or at the aft end of the lower passageway.
- 1 ANSUL R-101 model 30, Dry Chemical Fire Suppression System is installed in the Galley in case of a Range fire. The system has a capacity of 14 kgs and is manually operated.

- 1 CO2 Fire Suppression System of 4.5 kgs is installed in the Ship's paint locker.
- 21 Fire extinguishers are located throughout the vessel, types Foam, Dry Chemical, CO2 and Halon.
- 3 Breathing Apparatus units, complete with fire suits are supplied. Two suits are located aft of the Bridge. One suit is located in the Galley, outside the Engine Room.
- 35 Smoke Detectors are located throughout the vessel.

In addition to the above there are Fire Axes, Pry Bars etc. located at various locations throughout the vessel.

FIRST AID / MEDICAL SUPPLIES:

- 2 Fully stocked First Aid kits are located, one each in the aft end of the upper and lower passageways. These kits contain primarily bandages and non-prescription drugs.
- 5 Portable First Aid kits are located throughout the vessel.
- 1 Medical locker containing prescription drugs is located in the Masters cabin.
- 3 Stretchers, one fold away Robinson Litter, and two Stokes Helivac type are positioned round the vessel.

MISCELLANEOUS SAFETY EQUIPMENT:

- 8 Battery powered Emergency lights located throughout the vessel. These are automatically activated when ship's power is lost.
- 1 E.P.I.R.B. U.S.C.G. CLASS A FCC TX DATA - ACR/RLB 14 - located on the Bridge. The ship's Inmarsat system is also equipped to send distress messages.
- 2 U.S.C.G. Line Throwing Apparatus located on the Bridge.
- 1 K-500 Flare kit with 12 flares located on the Bridge. Additional Pyrotechnics are also stored to replace those used.

Adequate supplies of Hard Hats, Life Vests, Ear, Eye and Foot protection are provided to Personnel working on deck.

3.0 IN PORT

The vessel will normally be in port at least once a month for crew change and to re-supply with food stores and fuel, and it is probably the case that you will join the vessel at this point.

Upon arrival at the vessel, make yourself aware of your surroundings. A port facility is often a busy area, there will probably be various vehicles, cars, trucks, forklifts etc. moving around the wharf, always be aware of this and take extreme caution when walking around this area.

There are two other hazards that you should take particular note of before proceeding, a) **REFUELING OPERATIONS** and b) **CRANE OPERATIONS**.

- a) During Refueling Operations the vessel will be flying a red flag in indication of the fact. Portable signs will also be placed close to the gangway. Extinguish any smoking materials before proceeding. It should also be noted that other vessels may be fueling in the immediate vicinity.
- b) During Crane Operations it is a requirement for personnel in the immediate area to be wearing a **Hard Hat**, either wait until Crane Operations are completed, or don a hard hat before proceeding. It should also be noted that in a busy port several other vessels will be using cranes, always be cautious of this, and it is highly likely that you should be wearing your hard hat **at all times**.

Before proceeding up the Gangway, check its condition. During high and low tide, the gangway may be at a steep angle, check that the Gangway has a safety net, and always be sure that you have a firm footing, **DO NOT** try to proceed along the Gangway carrying several bags, take one bag at a time, leaving one hand free to grasp the handrail or rope.

Before undertaking any of your duties you should first advise the Ships Master, Party Manager or Safety Officer of your arrival. This is important in case of an emergency, or evacuation of the vessel. If this is your first time on this particular vessel you must attend a safety indoctrination. A tour of the vessel will be carried out by the safety officer.



4.0 MAN OVERBOARD

Upon sighting a man overboard, four (4) things must be accomplished immediately. The location of the observer will determine which action is performed first.

1. Seismic guns must be stopped by notifying the Gun Shack or the Instrument Room. Notification can be made by ship's telephone, PA system or voice.
2. Markers must be thrown over. Smoke floats and salt-water activated flashing lights are located on each Bridge wing and also on the Reel deck, aft of the cable reel. Life-rings (some with light attached) are distributed throughout the vessel exterior. Any item which floats and provides a visual reference can be thrown over; the closer to the person the better.
3. Notify the bridge by activating the Man Overboard Alarm located on the port side of the cable reel or by telephone, PA or voice.
4. Visual contact with the man overboard must be maintained. This is best accomplished by having the original observer spread the word and then assume a vantage point which allows him/her unobstructed vision.

When notified, the bridge will sound the Man Overboard signal which consists of three (3) short blasts on the ship's whistle and three short rings on the General Alarm bell. All Man Overboard Boat (MOB) personnel muster at the crane. All other personnel should stand clear of boat launching. No muster is required; do not go to emergency stations.

If the decision is made to recover the man overboard with the seismic vessel, the cable will be cut and all guns recovered immediately. The Captain will maneuver the vessel to bring the man alongside to either starboard or port at the RESCUE ZONE hatches located on the gun decks. The Ship's Mate will assemble personnel to assist in bringing the person onboard. If you are not assigned to the recovery party; STAY OUT OF THE WAY.

If the decision is made to recover the man overboard with the MOB, the boat will be crane launched over the vessels port side. The MOB team consists of the following personnel:

Ship's Mate	Direct boat launch and recovery
Ship's Bosun/AB	Operate crane
Ship's Greaser	Hook-up crane, Man bow line on ship
Seismic JO	Man stern line on ship
Ship's Bosun/AB	Man the MOB Seismic Observer Man the MOB

Personnel may be substituted at the discretion of the person in charge of launch/recovery.

If you do not have an assigned station; **GET OUT OF THE WAY.**

Only one person is in charge of launching/recovering. Do not impede the operation by offering conflicting suggestions or instructions.

Once the MOB is in the water, the designated operator and crew will board. **DO NOT RIDE THE MOB DOWN DURING LAUNCH.** Start the engine as soon as possible. Unhook the crane. The MOB will be cast-off when the boat crew is ready.

To recover the MOB, the boat crew will maneuver alongside the vessels port side. Fore and aft lines will be made fast to the seismic vessel. Stop the engines, tilt up to storage position and lock. Attach the crane hook to the lifting sling ring. All personnel are to leave the MOB. **DO NOT RIDE THE MOB UP DURING RECOVERY.** Lift and swing the MOB as directed.



5.0 FIRE-FIGHTING PROCEDURE/ABANDON SHIP

The first action of any person finding a fire (or even suspecting a fire) **MUST** be to notify someone else, preferably the bridge personnel. Once notification has been accomplished, further investigation and/or local fire-fighting may take place. **DO NOT ASSUME THAT YOU CAN HANDLE THE SITUATION ALONE, ALWAYS ALERT SOMEONE ELSE.**

The fire alarm will be sounded from the bridge. The alarm consists of a prolonged blast on the ship's horn and prolonged ringing of the General Alarm bell. When the alarm is sounded, all personnel proceed immediately to the muster station aft of the bridge. Galley personnel will check cabins to make sure everyone is awake. Do not return to your cabin for personal articles. If protective clothing is nearby, take it with you. Ideally you should arrive at the Muster Point wearing long sleeve shirt and long trousers, or coveralls, a hat and boots.

At the muster, the situation will be assessed and action taken. The fire party will consist of the Mate, the Bosun, the AB and the Greaser. The Second Engineer may be involved for an Engine Room fire. The Mate will be in charge of the fire party on the scene and will determine who will don the fire suit and breathing apparatus (if required). No seismic personnel are assigned to the initial fire party. All non-fire party personnel are to remain at muster stations for safety and to provide assistance/relief if required.

Each compressor, storage loft and the cable reel have overhead foam smothering systems installed. The actuation system for the foam, for each unit, is located either on the unit itself, or at the remote actuation station, located at the bulkhead entrance to the Back Deck. If a fire is found around the cable reel, the Compressors or the storage lofts, notify someone and then activate the foam system: **DO NOT WAIT FOR INSTRUCTIONS - START FOAM.**

The Galley Range has a Dry Chemical Fire Suppression System fitted over it. This system is manually operated from the Galley itself.

The Engine room is equipped with a Halon Fire Fighting System. The controls for this system are located adjacent to the Back Deck foam system controls and in the aft end of the Engine Room passageway, just outside the hatch to the Engine Room proper. This is only to be used in extreme circumstances, and only when it is determined that the engine room space is clear of all personnel and all hatches and vents have been sealed. The procedure for activating this system is as follows:-

1. Only the Master or Chief Engineer may give the order to activate the Halon System.
2. All Engine Room spaces will be cleared prior to activating the system.

3. All blowers, hatches and vents must be secured prior to activating the system.
4. Master, Mate or Chief Engineer will ensure themselves or designate someone to double check that the have been met before ordering the Halon system to be activated.
5. When the order is given to activate the Halon system, break the glass and pull the handles.
6. A warning alarm will sound for 25 seconds prior to the Halon release.
7. **NEVER ACTIVATE THE HALON UNLESS YOU ARE SURE THAT THE ENGINE ROOM SPACES ARE CLEAR OF PERSONNEL AND THAT ALL THE BLOWERS, HATCHES AND VENTS HAVE BEEN SECURED.**

Station bills and muster lists are posted throughout the vessel. Check the station bill and muster list to verify your responsibilities. Take the time to become familiar with the ship's fire-fighting equipment. A large diagram of the ship's fire-fighting plan is posted on the 01 accommodation passageway and smaller copies are in each cabin. Learn the locations of hoses and extinguishers. Learn at least two (2) escape routes from your cabin and from your work area. Take advantage of drills to learn how the equipment operates. Report any equipment that you believe is damaged, faulty or has been discharged.



ABANDON SHIP

The Life Raft assignments are listed on the Muster Bills. You will also be shown the location of your Life Raft when you board the vessel. **REMEMBER WHERE YOUR LIFE RAFT IS LOCATED.**

In the event that the vessel must be abandoned, the Abandon Ship alarm will be sounded. This alarm is seven short rings followed by one long ring, of the ship's main alarm bell. Upon hearing this alarm, proceed immediately to your Life Raft and standby for further instructions. If all personnel are mustered aft of the Bridge, the Mate or Master may also order everyone to the Rafts verbally.

Each raft has someone assigned to take charge of the launching and in effect take command of the raft once in the water.

the Life Raft commanders are:-

MASTER (AUST)	LIFE RAFT No. 1	STBD SIDE FORWARD
MASTER (U.S.)	LIFE RAFT No. 2	PORT SIDE FORWARD
MATE	LIFE RAFT No. 3	STBD SIDE AFT
CHIEF ENGINEER	LIFE RAFT No. 4	PORT SIDE AFT

THE ORDER TO ABANDON SHIP IS TO BE GIVEN BY THE MASTER AND ONLY BY THE MASTER. STANDBY UNTIL GIVEN THE ORDER TO LAUNCH, BY YOUR LIFE RAFT COMMANDER. OBEY HIS INSTRUCTIONS AT ALL TIMES WHILE LAUNCHING, BOARDING AND WHILE INSIDE THE RAFT.

The Life Rafts contain emergency rations, water and other supplies. If time allows, extra supplies should be gathered from the ship, including blankets and Medical supplies. Do not delay moving to your raft in an abandon ship situation.

6.0 BACK DECK GENERAL

a) HIGH PRESSURE HAZARDS AND SAFETY PRECAUTIONS:

Air guns are devices that rapidly release compressed air into the water creating the effect of an explosion. To provide sufficient energy for geophysical surveys, large compressors capable of generating extremely high air pressure are used to supply the required volume and PSI for these air guns.

Typical operating air pressures used in most air-gun operations are 70 times greater than those used in a car tire. Any release of air at these pressures can tear the flesh and force dust, air or even oil particles through the skin and into the blood stream. Loose and weakened gun parts can give way under pressure and become airborne missiles. Caution must be observed at all times when around air guns.

To minimize the risk associated with high air pressure, always observe the following:

- 1.** Never put hands in front of jet air or pressurize discharge ports.
- 2.** Only qualified persons shall operate the air-guns, the gun handling equipment and compressors.
- 3.** All personnel in the areas where there is a risk of sudden released air shall wear ear and eye protection while system is operating.
- 4.** An eyewash station should be located in the gun area.
- 5.** Never handle, tighten or loosen bolts or fittings, or hammer on any part of the air-gun while pressure is applied.

b) AIR GUN HANDLING:

The air gun is the system component that requires the most handling and maintenance and consequently presents the greatest danger to personnel.

The following safety precautions must be observed when handling air guns:

1. All Digicon required PPE for back deck work shall be worn at all times during the gun launch and recovery operation. (Hard hat, steel toe boots, ear and eye protection, gloves, life jacket and safety belt with lifeline.)
2. When retrieving, deploying or working on air guns, personnel should always be aware of entanglement and tripping hazards associated with hoses, lines, cables and tugger/towing wires.
3. Always bleed off the pressure in the guns before bringing them on board. Check and double check that the air supplied to the guns is at '0'
4. Observe all warning lights, sirens and signs during air-gun operations. Most will indicate when high pressure is present or when tests are being conducted.
5. Use lock-out, tag out system on gun tree pressure valves to prevent repressurisation of the system after bleed down.
6. Avoid test firing guns on deck whenever possible. If such test must be performed, do not test fire the air-gun on deck or in open air until the area has been cleared a safe distance. In test firing, air pressure must not exceed 500 PSI and all persons must be 8M (25 feet) from the gun. Never handle a gun during testing and always wear PPE.
7. All guns will be bled down to 0 PSI immediately after the gun strings have been recovered. No work is to proceed on guns or gun strings until pressure is off the system.

Before the end of line the Gun Mechanic should coordinate the gun maintenance with the instrument room and inform the gun crew by intercom which gun strings are being recovered. If time permits, a short safety meeting should be held by the Gun Mechanic with his gun crew to discuss the recovery and maintenance operations and go over all safety procedures.



c) GENERAL PRECAUTIONS

- 1.** No smoking in gun shack or aft of cable reel.
- 2.** Appropriate personnel only on aft deck during deployment and retrieval of guns
- 3.** All persons aft of cable reel are required to wear the following:
 - Personal floatation device or salt water activated work vest.
 - Steel capped protective footwear.
 - Hard hat.
 - Ear defenders (If compressors are running or guns being tested)
 - Lifeline (If working on stern, over-side or in rough weather)
 - Protective eyeware.
- 4.** Whenever guns are on deck and pressurized, an orange revolving light (positioned forward end of gun deck) and an orange flashing light (positioned outside gun shack door) are switched on.
- 5.** When a gun or gun string is to be aired up or down the gun mechanic alerts all personnel involved, or working in vicinity.
- 6.** If a gun is to be test fired on back deck the gun mechanic informs those personnel involved of his intent. He then returns to the gun shack where he verifies correct pressure on gun undergoing test (i.e. 500 PSI), announces on the ship's PA system that a gun is to be tested on the back deck and which side (port or stbd) and then test fire gun.
- 7.** N.B. No gun is to be pressurized above 500 PSI while on deck, during deployment or retrieval.

7.0 GUN DEPLOYMENT/RECOVERY

- 1.** Before the end of line the gun mechanic talks with the observer to establish which guns can be safely worked on in the line change time available.
- 2.** At the end of line the Gun Mechanic checks CLASS screen and listens for the observer to confirm "off-line" status. He then switches the CLASS from remote to local position.
- 3.** The air pressure in the guns being brought on deck is bled down to 500 PSI by the Gun Mechanic.
- 4.** Prior to venturing onto the back deck the Gun Mechanic switches on the "High Pressure Air" warning beacons and ensures that his team are wearing appropriate PPE.
- 5.** The Compressor Mechanic controls the winches. The JO/Helper operates pneumatic wrench to remove the crosby clamps and arranges the bundle to establish a clear working area and prevent damage to the bundle itself. The Gun Mechanic conducts the operation while at the same time he connects the overhead trolleys to the gun plates, disconnects and stores the buoys away from the work area. When the string is in as far as the 6th or 7th gun the Compressor Mechanic attaches the tugger winch to retrieve remaining guns.
- 6.** When the retrieval is complete the Gun Mechanic informs his team that he will be bleeding off the remaining air from the guns and assigns specific gun repairs to his crew. Each member of the crew will check to see that the tree and gun assigned to them is bled down. A "work in progress" sign is placed over the appropriate air valve by the individual carrying out maintenance on the gun.
- 7.** After completing all gun work the gun deck crew return to the gun shack while the gun mechanic pressurizes guns to 00 PSI.
- 8.** The guns are then deployed to their correct location using the reverse procedure to the recovery operation.
- 9.** Only after all the guns have been deployed the Gun Mechanic applies pressure to the guns to the level available in the holding tanks. Once the compressors have been brought on line and operating pressure has been achieved (typically on line 3Km back) the Gun Mechanic will then switch the CLASS from local to remote and inform the observer that he has "air and guns".
- 10.** NB. New crew or crew unfamiliar with the operation of the gun shack are prohibited from handling CLASS or valves.



8.0 STREAMER DEPLOYMENT/RECOVERY

DEPLOYMENT:

- 1.** Check for sufficient water depth as well as bathymetry of surrounding area
- 2.** All air guns should be on deck and pressure bled off.
- 3.** Check operation of all equipment involved in procedure.
 - cable reel, brake and emergency stop (bar)
 - PA system
 - tugger winch
 - ensure life rings, flares and fire extinguishers are in their correct locations
 - cable tool box complete and present
 - all birds are functioning with fresh batteries where necessary
 - tail buoy light is functioning and has fresh batteries
 - a canister summary with bird serial no's and stopping or ballast points marked
- 4.** Inform bridge that cable is about to be deployed.
- 5.** Assign personnel to their respective tasks and ensure that they are wearing appropriate PPE.
 - personnel on reel deck to wear safety work vest, hard hat and safety boots
 - all personnel working near stern to wear a life line
- 8.** Position tail buoy at the stern, deck about 20 metres of tail buoy rope and ask the Bridge to come to an "all stop".
- 9.** Push tail buoy off the stern and allow to float away from vessel (until all the rope that has been decked is out) before asking the bridge to come to "900 rpm on the pair"

NOTES:

900 to 1000 rpm's on the two engines will usually give sufficient tension on the cable depending on sea conditions and the amount of cable deployed.

If a Syledes (or similar) tail buoy is to be used it will be deployed using the winch. It will also need to be activated and Navigation to confirm its operation before the cable is deployed



8. Navigator to monitor course and advise aft deck of any course alterations that are necessary prior to any commitment.
9. Bridge to monitor traffic in area and keep seismic crew advised.
10. Someone is to monitor cable from instrument room throughout procedure.
11. The Bridge should be advised to come to all stop before cable is removed or put into its towing harness.
12. The transducers are to be calibrated at each deployment.
13. All bird functions are to be tested at each deployment
14. Whenever a connection is made in the cable the 'o' ring is to be replaced and the contacts thoroughly cleaned. Cable power should be turned off during this procedure.
15. Instrument room to be advised prior to and after any cable connections have been opened. A series of daily tests are then to be carried out before the cable is further deployed.
16. Any changes made to the cable will be logged in the observers log. All bad equipment is to be marked at the time of replacement. The cable status log will then be updated at the earliest opportunity.
17. All canisters, birds and compasses to be removed from the reel deck to ensure that they will not get washed overboard. They are delicate and sophisticated pieces of electronic equipment and should be handled carefully.
18. A Norwegian buoy is to be attached to the cable near the tow chains. This is to prevent the cable from sinking if the cable breaks or is cut in the event of a man overboard emergency.
19. The time that the cable is in tow position to be logged.
20. Before the guns are deployed the streamer is to be assigned to its specified depth to verify correct ballast, and a full set of daily tests is to be carried out.

NOTES:

Anytime a component is disconnected the cable power must be isolated. If at any time the cable deployment is stopped the cable must not be left unattended while not in the tow harness.



9.0 RECOVERY:

1. Vessel should be turned and headed towards fair seas.
2. Check for sufficient water depth as well as bathymetry of surrounding area
3. All air guns should be on deck with pressure bled off.
4. Check operation of all equipment involved in procedure.
 - cable reel, brake and emergency stop (bar)
 - PA system
 - tugger winch
 - ensure life rings, flares and fire extinguishers are in their correct locations
 - cable tool box complete and present
5. Assign personnel to their respective tasks and ensure that they are wearing appropriate PPE.
 - personnel on reel deck to wear safety work vest, hard hat and safety boots
 - all personnel working near stern to wear a life line
6. Bridge to monitor traffic in area and keep seismic crew advised.
7. Someone is to monitor cable from instrument room throughout procedure to advise back deck personnel:
 - of water and cable depths.
 - of any course deviations.
 - of any telemetry failures or other difficulties.
8. Navigator to monitor recovery course.
9. Aft deck to advise Bridge that recovery is about to commence and to come to an "all stop".
10. As tension eases on streamer, release brake on cable reel and pick up sufficient cable to release tension on towing harness and enable it to be removed from the cable.

NOTE:

This operation should be done as quickly as possible, the cable is in a vulnerable position at this stage and any weight on the front end will cause the cable to sink rapidly.



11. Once the cable is out of the towing harness, begin retrieval as soon and as quickly as cable tension permits.

- Maneuver the vessel through voice commands to the Bridge.
- Commands should be clear, precise and be acknowledged by the Bridge.

e.g. "Bow to Port" (hard / easy)
"Bow to STBD" (hard / easy)
"Back down" (hard / easy)
"All stop on the bow"
"All stop"
"Clutch ahead"

NOTE:

The tension on the streamer should be such that it is slack enough to prevent damage to cable from being wrapped too tight, while taught enough to prevent any chance of the cable sinking and being in close proximity to the props.

12. The cable reel operator is to keep a constant track of which sections are being wrapped on the reel at any given time.

- So that he can anticipate and prepare reel deck crew when 'birds' are to be brought on deck (in readiness for swift removal of the birds)
- So that in the event of a telemetry failure he might have a better idea of the location of the fault.

13. On reaching the tail buoy rope the rope must be pulled from side to side on the reel to prevent it from digging in between the cable sections.

14. On reaching the tail buoy the winch operator slowly brings the tail buoy to the stern. The overhead winch is then attached and the tail buoy hoisted up and brought on board.

15. The tail buoy is then switched off, made secure and the Bridge and Navigation informed that the tail buoy is on board. The time is to be logged.

NOTE:

If at any time during the operation the retrieval has to stop, (e.g. to remove a bird) particular attention must be given to the cable at the stern to see that it is in no danger from the props. If in any doubt the command "Clutch Ahead" must be given.

10. LMF COMPRESSORS

a) PRE START PROCEDURE:

Detroit Diesel 12V - 149TI Inspection

- Check engine lube oil level.
- Check engine water level.
- Ensure air intake emergency flaps are open.

L.M.F. Compressor Inspection

- Check screw compressor oil level. (oil to reach middle of sight glass)
- Check piston compressor oil level.
- Check piston compressor reduction gearbox oil level.
- Check compressor cooling water level.
- Check piston compressor cylinder lubricator tank oil level.
- Check for adequate air pressure to control panel.
- Check that the compressor is unloaded.

b) START UP PROCEDURE:

- Start sea water pumps.
- Start upper deck extractor fans.
- Start compressor cooling water pump.
- Reset control panel.
- Start unit and check oil pressure of Detroit, screw compressor and piston compressor at 1200 rpm.
- After sufficient time has been allowed for turbo charger lubrication, raise engine speed to 1400 rpm to warm up.

- Load screw compressor.(stage 1 & 2)
- Load piston compressor.(stage 3 & 4)
- Run unit between 1400 and 1800 rpm.
- Perform regular perusal of control panel gauges and visual inspection of units whilst running.

c) SHUTDOWN PROCEDURE:

- Unload piston compressor.
- Unload screw compressor.
- Reduce engine speed to 1200 rpm to allow for turbo charger run down and engine cool down.
- After aprox 3 minutes, shut down engine.
- Stop compressor cooling pumps.
- Stop sea water pumps.
- Stop upper deck extractor fans.

11.0 LOST STREAMER RECOVERY

- 1.** On hearing telemetry failure alarm, the Observer on duty should:
 - instruct Navigation to make a 'mark'
 - confirm, using the bird screen, if the alarm is flagging because of a telemetry failure or if the streamer, or part of it, has been lost.
- 2.** If the cable has been lost, inform the Party Manager who will conduct the recovery operation from the bridge.
- 3.** Get Bridge to track tail buoy on radar if weather conditions permit.
- 4.** Get Gun Mechanics to recover up any guns necessary to turn vessel towards tail buoy.
- 5.** Bridge should then be instructed to turn towards the tail buoy.
- 6.** On route to tail buoy the guns should be brought on deck and any streamer left attached to the cable reel should be recovered.
- 7.** On reaching tail buoy, instruct the bridge to slowly back down to it and retrieve it using boat hook and winch.
- 8.** Detach tail buoy and attach cable to reel. The remaining cable can then be retrieved in the usual manner.
- 9.** The cable will then have to be coiled onto the deck to turn it around, assess the damage and render repairs.

NOTES:

If a platform is suspected of being involved the crew on board the structure must be informed immediately.

If the Argos CLS (cable locator system) is attached to the cable the instructions in the PRESTEL manual (pressure-release satellite transmitter for emergency location) should be followed to assist in finding the cable.

At no time should safety become a secondary issue during the recovery operation. The PPE should be worn as per usual for cable and gun work. Safety rules and procedures on the back deck must also be adhered to.



If it suspected that the cable may have sunk to a depth greater than 1000 feet the procedures outlined in the Digicon 'Lithium Batteries Safety and Handling Procedures' manual should be followed.

If the cable broke while on line it may be beneficial to play back the last few records to establish if the cable was hit by something prior to breaking.



12.0 CRANE OPERATIONS

The vessel is equipped with a deck crane which is most often used for the loading and unloading of supplies and equipment. This crane is also required for the deployment of the "Rescue Craft", and therefore should be operational at all times.

The crane should only be operated by qualified personnel, however you should make yourself familiar with the operation and safety procedures of this equipment.

The operator should always check the condition of the unit prior to its operation, particular attention should be paid to the cables, drum, boom and controls.

Should you notice a defect or feel that a particular component requires repair or maintenance, bring this to the attention of the ships Master, Party Manager or Safety Officer, immediately.

An illustrated chart of the "Standard Hand Signals" is posted close to the crane, and in various other locations around the vessel. Please review these charts and make yourself familiar with them.

For further information please refer to your copy of the I.A.G.C. Marine Geophysical Operations Safety Manual, or the Digicon Safety Handbook.

SAFETY MANUAL

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Halon 1211
Aqueous Film Forming Foam (AFFF)
LITH-X
Fire Hoses
Fixed Detection and Extinguisher System
Halon 1301 Smothering System
Aqueous Film Forming Foam Deluge System
Fire Fighting
Abandon Ship

1. Introduction

GENERAL SAFETY POLICY

Digicon's primary objective is the prevention of accidents and to insure the safety and well being of all employees whether Digicon's or its sub-contractors, as well as the protection of the environment and our working assets.

This objective crosses all levels of rank, organization and procedure while projecting as its ultimate goal, the elimination of all accidents and their cause.

The contents of this Marine Safety Manual, serve to provide information, instructions and guidelines for all personnel which will enable the appropriate standard of safety to be maintained at all times. This manual has been endorsed by the International Association of Geophysical Contractors and is designed as a guide for Marine operations. You are encouraged to read, understand and be familiar with its contents.

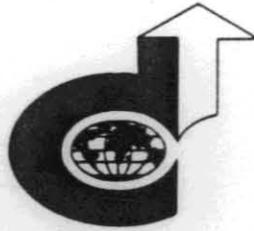
As a Digicon employee, you are our most valuable asset and every possible measure of protection and training is provided to insure your safety and well being.



Mike Arnold, Manager
Digicon Safety Department

DIGICON SAFETY POLICY**MAIN POINTS**

- * To prevent all injuries.
- * That safety is of equal importance to all other business objectives.
- * To create a safe work place and atmosphere while establishing safe working practices and procedures.
- * That safety is a line management responsibility and is supported from the executive director's own position
- * To ensure effective safety training and establish information gathering audits and investigations.
- * To develop personal responsibility for safety in every Digicon employee and create interest and enthusiasm for safety both at the work place and at home.
- * To establish and maintain all company policies, procedures and standards for health, safety and the environment which adhere to applicable laws and requirements.
- * To communicate these policies, procedures and standards to all Digicon employees and our sub-contractors.
- * To enforce all policies procedures and standards established by the company and its management
- * Build on the principle that every job can and should be done safely and that safety is a shared responsibility within all ranks of the company.



COMMITMENT TO SAFETY

TO: All Digicon Employees - Worldwide

DATE: January 1, 1992

Digicon considers the safety, health and welfare of its employees and families to be among its greatest concerns and responsibilities.

There continues to be a profound movement around the world to become more aware of our environment and the safety conditions of our work place. In addition to our own commitment to a safe work place, our clients require that all of their associated contractors implement high quality safety and health practices in all phases of jobs performed. We, at Digicon, wholeheartedly endorse this movement and are committed to being exemplary as a safe company.

As all of you are aware, we have an active and aggressive safety department. It is the responsibility of the safety department employees to objectively and realistically point out to all of us how we can do our job more safely and, in the event of emergencies, how we can respond more effectively to minimize or contain the situation. To ensure success, we all must commit to make the safety management and enhancement program a top priority.

A handwritten signature in cursive script, appearing to read 'Rudy Prince', written over a horizontal line.

Rudy Prince
Chairman of the Board
Chief Executive Officer

A handwritten signature in cursive script, appearing to read 'Larry Lenig', written over a horizontal line.

Larry Lenig
President
Chief Operating Officer

NOTHING WE DO IS SO IMPORTANT THAT IT
CANNOT BE DONE SAFELY. SAFETY IS A
COMBINED EFFORT INVOLVING EVERYONE

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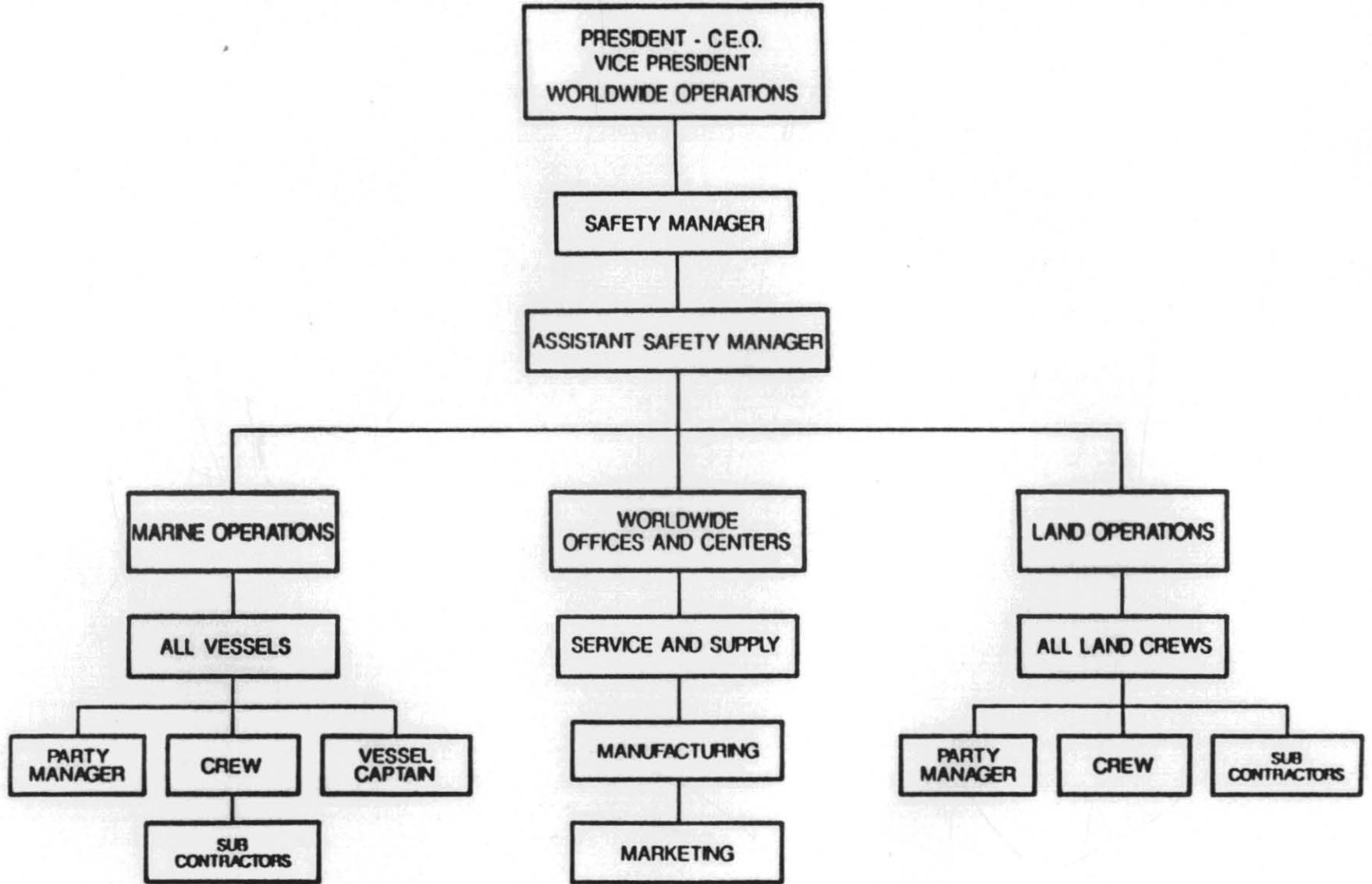
OBJECTIVES

The primary objective and total safety goal for Digicon during this seismic survey operation shall be:

- * A safe work environment.
- * A complete safety awareness program for all Crew members.
- * A commitment to safety by every crew member.
- * A total accident prevention program, in place, understood and enforced.

GOALS

- * No LTA's
- * No LTI's
- * No RWC's
- * No environmental damage or pollution.



Purpose

Seismic operations are a potentially hazardous environment. The objective of this manual is to highlight areas of concern and provide each crew member with a source of information and guideline to accomplish every phase of his/her job safely, professionally and efficiently.

Safety Orientation

Immediately upon joining a new crew or moving into a new area, geophysical personnel should become aware of local factors which may affect their personal safety. If you have any questions concerning safety or safety related matters, call your Safety Department at 1/800-DIGICON, Ext. 4054.

All persons joining a geophysical vessel shall be taken on a safety tour through the vessel.

1. This should happen immediately, and as a minimum should include --
 - A. The layout of the vessel including the location and operation of safety equipment, first-aid kits, alarm points and muster station.
 - B. Explanation of emergency procedures and safety regulations.
2. For all permanent employees joining the vessel, this should include in addition --
 - A. Chain of command, key personnel.
 - B. Station and duties in case of emergency.
 - C. Job and associated hazards.
 - D. Safety rules.
 - E. Company safety policy.
3. When in port, temporary visitors should be given a safety briefing. They should be advised in case of emergency to leave the ship immediately. All temporary service personnel and visitors should be accompanied.
4. Each person who visits a vessel at sea must immediately be given a safety orientation by the designated ship's officer. As a minimum, the following will be covered --
 - A. An explanation of the ship's muster list/station bill and its location.
 - B. Where the life jackets are stowed.
 - C. Which muster station they should report to in the event of an emergency.
 - D. Give each person a copy of the written safety orientation sheet.
 - E. Check to see if each person has their own personal protective equipment with them. If not, then they must be provided.

- F. If any visitors go to the back-deck area, they must be given a work vest to wear and always be accompanied by a crew member.

Safety Meetings

Short meetings, of at least 15-20 minutes duration, shall be conducted weekly to discuss safety, safety related matters, crew accidents and/or near miss accidents, as well as unsafe acts or conditions noted by the crew. Regularly schedule, well-organized, and properly conducted monthly meetings shall be held to discuss new material and to enlarge upon subjects not adequately covered at the short weekly meeting. A report of this meeting with attendance records shall be sent to the Safety Department for review and assistance. Digicon Safety has extensive safety materials that will be helpful in these meetings, and will assist in the presentation and introduction of SAFETY to all crew members.

General

Marine geophysical operations must be carried out in a safe manner by minimizing hazards. In order to act rationally and properly in an emergency or under adverse conditions, be sure to request and receive a safety briefing upon join a vessel.

The main points to observe are --

1. Responsibility for the vessel and all personnel aboard is firmly vested in the Master. The geophysical crew chief, in cooperation with the Master, is responsible for the seismic equipment.
2. Established safety procedures must be followed by the geophysical personnel, as well as by the ship's crew. Training and experience in following these procedures are of the utmost importance.
3. On board a geophysical vessel, the crew eats, works, and sleeps in close proximity to materials such as flammable gases, cable oil, and possibly explosives. Thus, the safe practices of each individual directly affect the lives of all others. There is no margin for error. Safe procedures must be followed.
4. The safe procedures for storing and using explosives, blasting agents, gases, and flammable liquids must be followed. Following these procedures with a constant alertness as to unsafe practices can protect your life and those of your shipmates. Learn from the Fire and Abandon Ship drills where to go in an emergency and how to act.
5. Drills to familiarize the crew with the safety equipment and its use should be held at least weekly.

6. In case of an emergency, crew assignments will be in accordance with the posted muster list (station bill). The stations and emergency duties of all personnel will be posted in a conspicuous position, preferably in the Mess Room. All personnel cabins shall have emergency station bills posted for the occupants.
7. A life jacket (PFD) must be placed in a rack or a designated location near each bunk. All life jackets must comply with SOLAS/USGC regulations. Life jackets must include at least 50% redundancy.
8. There must be at least 50% more life jackets on board beyond the maximum number of crew and passengers.

Additional life preservers must be available for visitors, bridge crew, and engine room personnel and kept near the muster station.
9. When docked a safe gangplank with a hand rail on at least one side should be used. A safety net should be placed under the gang plank.
10. Persons or supplies should be transferred from one ship to another only under well-controlled conditions, preferably when the ship is docked or tied to a platform. All personnel must wear approved personal flotation devices during transfer operations at sea. When working in the vicinity of rigs or platforms, communications should be maintained.
11. Know correct procedures for securing water tight doors. Keep the door and hatch gaskets clean and free of paint in order to maintain water-tight integrity.
12. Good housekeeping and preventative maintenance are essential for the prevention of accidents. Keep all areas and equipment clean of debris, dirt, and loose objects.
13. Keep all gear properly stowed and repaired.
14. Clean up all spills or leaks of oil, diesel fuel, cable oil, or other materials immediately.
15. Keep inboard of rails while aboard ship. Do not sit on gunwales, rail, or place hands on rub strakes.
16. When strain is being applied on rope, line, or cable in operations, a breaking or parting rope, line or cable could cause serious injury. Stand clear of lines and behind solid objects when possible. Ensure that ropes, lines, cables, and wires are in good order, and that force in excess of approved limits is not applied.
17. Keep a firm stance on deck when heavy seas cause rolling or pitching. Only proper footwear should be worn, which does not include sandals or shower

shoes (flip-flops). Do not work without appropriate footwear. Use lift or safety lines when appropriate.

18. Observe all "WARNING SIGNS" on the vessel.
19. Know the location of all emergency gear and equipment in your area, i.e., fire hoses, fire extinguisher, fire axes, life jackets, life rings, life rafts, flashlights and emergency lanterns, first-aid kits, etc.
20. Do not go on deck alone in rough sea conditions!
21. Seismic sources should not be operated in the vicinity of diving operations. Consult with the diving operation before operating in proximity of such an operation.

small quantities at frequent intervals. When occupied enclosed spaces should be well ventilated.

10. In tropical areas especially, exposure to the sun during the hottest part of the day should be avoided as much as possible. When it is necessary to work in very strong sunlight, appropriate clothing offering protection to both head and body should be worn. Use a sunblock or sunscreen cream or oil to protect parts of the body exposed to sun or drying winds.
11. Sexually transmitted diseases must be considered a major and potentially fatal health problem. Condoms are considered a significant preventative measure.

Protective Clothing --

1. Appropriate clothing for the area must be worn.
2. Work clothes should be close-fitting with no loose flaps, bulging pockets, or ties. Injuries may result from clothing being caught up by moving parts of machinery, obstructions, or projections. Clothing worn in galleys, etc., where there is a risk of burning or scalding, should adequately cover the body to minimize the risk and be of a material of low flammability such as cotton.
3. Shirts or overalls provide better protection if they have long sleeves.
4. Scarves, sweat rags and other neck wear, loose clothing, finger rings, and jewelry can be hazardous when working with machinery. Long hair should be covered.
5. Gloves should be worn for specified jobs.
6. Hard hats and protective footwear must be worn as directed by the crew chief or as by posted instructions.
7. When selecting eye and combined eye and face protectors, careful consideration should be given to the kind and degree of the hazard, and the degree of protection and comfort afforded. The main causes of eye injuries are --
 - A. Infrared rays (gas welding).
 - B. Ultraviolet rays (electric welding).
 - C. Exposure to chemicals (battery acid).
 - D. Exposure to particles and foreign bodies (helicopters, wind).
 - E. Strong sunlight or snowblindness.

F. Battery explosions or splashes.

Ordinary prescription glasses do not afford protection. Eye protection is available in a wide variety of styles and applications. Prescription eye protection is also available.

8. All persons exposed to high levels of noise should wear hearing protection suitable for the particular circumstances. If you must raise your voice to be heard, you are in an area requiring hearing protection.

Long-term exposure to high noise levels may cause long term hearing loss.

A noise survey should be made of any questionable area.

Personal Flotation Device (PFD) - Life Jackets/Work Vests

There is an extensive choice of life-saving equipment available, and the first decision is whether to use a buoyancy aid or a lifejacket for a particular type of operation.

The main difference is one of degree rather than function. Buoyancy aids will, at their best, assist a conscious person to stay afloat in the water, tilting the body 60° backward from the vertical, but not permitting forward swimming. A life jacket should turn an unconscious or exhausted person face upward, with the head held clear of the water.

Points worthy of note during any assessment of personal flotation equipment or buoyancy aids are as follows --

1. Has the equipment been approved by a recognized independent body such as SBBNF (U.K.) or USCG (U.S.A.)?
2. Is the device potentially unstable? In order to maintain a 60° face-up position, backward from the vertical position, it is necessary to have closed-cell foam padding all the way down the front, and half way or less down the back. Consideration should also be given to water wear and tear that causes foam to shift about, affecting the distribution of buoyancy.
3. If zips are used on the devices, they should be of good quality, preferably with ties at the top and bottom.
4. A belt or strap should be provided to assist in retrieving the victim from the water.
5. Consideration should be given to comfort and vision. The devices without crotch straps can result in the victim dropping down inside the device until the shoulder seams are on a level with the top of the head. A flotation collar that gives additional head support is also preferable.

6. A whistle should be provided that is housed in a loop or small pocket. The color should be orange or yellow for good visibility, and reflective strips on the shoulders or collar are an added advantage.

CHARACTERISTICS OF PFD's

TYPE	I	II	III	IV	V
					
Intended Use	Rough waters	Recreation where quick rescue is expected	Sport activities over water	Grasped, not worn; can be thrown to person overboard	Specialized for many purposes (work, rafting, etc.)
Minimum buoyancy	22 lbs. (more than adequate for humans)	15 1/2 lbs. (adequate for humans)	15 1/2 lbs.	16-32 lbs. (depends on size)	Work Vest 17 1/2 lbs.
Positive righting moment	Yes	Yes, but inferior to Type I	No	No	No
Sizes	Adult and child's sizes	Adult, 3 sizes for children	Many	Various	Adjustable
Comments	Bulky, easy to don; reversible. Coast Guard standards require retroreflective material, lights be attached on some	More comfortable than Type I	Vest, coat and jacket styles	Can be cushions, ring buoys	To be worn at all times when working or transferring over water

The three main types of life jackets, are --

1. Partially inherently buoyant life jacket, well-padded with closed-cell foam, with a top-up oral inflation tube.
2. Manual gas-inflatable life jackets with a pull-tag to activate the carbon-dioxide cylinder, with oral inflation tube.
3. Automatic gas inflatable life jackets in which the carbon-dioxide cylinder is activated when immersed in water, with both oral inflation and manual pull-tag override.

Both #2 and #3 types can be worn flat and folded against the body, but neither becomes a life jacket until fully inflated. If you fall into the water unconscious, a jacket requiring manual inflation will be of little use. Under no circumstances should an automatically inflatable or inherently buoyant life jacket be worn while in a helicopter, since in the event of ditching, it will inflate and trap the wearer inside the emergency exists.

Cold water can be the worst enemy because sudden emersion induces short, gasping breaths and panic. A novice will flounder, finding it difficult to grab at a pull-tag or inflate a jacket orally. This is another argument in favor of inherent buoyancy or automatic gas inflation.

Even if a life jacket is doing its job, in shallow sea conditions -- near sea walls, the sides of boats, or in estuaries -- waves breaking over the head will cause drowning. Splash guards are not a standard item but a number of manufacturers can supply them.

Life jackets should be able to be put on and adjusted within 30 seconds. They should have a conspicuous, centrally positioned lifting becket (a strong webbed loop with which to pull the wearer from the water), and a whistle housed in loop or small pocket. They should turn an exhausted or unconscious person face upward (within five seconds with inherent buoyancy, and ten seconds with auto or manual gas inflation), and hold the body inclined backward between 30° and 60° from the vertical with the mouth clear of the water. The life jackets must be either yellow or orange for good visibility.

Manual and automatic gas inflation models need more servicing than a jacket with inherent buoyancy. The cylinders should be weighed at regular intervals to ensure the carbon dioxide is not leaking.

Personal flotation devices are required by all persons operating in, over, through, or on water where there is a danger of drowning.

Personal flotation devices must have --

1. A buoyancy collar to hold the head out of the water.
2. Buoyancy over the chest to turn the individuals face up in the water.
3. A securing belt around the waist and/or chest to stop the personal flotation device from moving up over the individual's head.
4. A hoop or loop at the back of the collar by which the individual can be pulled through and out of the water.

Swim Test

Before being allowed to participate in water-borne operations or those involving river crossing, personnel should be swim tested while wearing personal flotation devices. The swim test will, as a minimum, require that the person demonstrate the ability to swim 50 meters (150 ft.) while clothed in less than 5 minutes, plus maintenance of position (treading water) for 2 minutes.

Tools

1. The improper use of hand tools is the major cause of many minor but painful injuries. Use the proper tools. Replace worn parts such as ratchet cogs, dies, handles, and shields. Keep chisels, screwdrivers, and punches properly

dressed. Dispose of defective tools that cannot be repaired. Use eye protection as required.

2. Do not use "cheaters" on wrenches that are too short.
3. All electric hand tools must be either grounded or double insulated. Three-wire cords must be used with grounded tools. Ground Fault Current Interrupters (GFCIs) should be utilized for tool use in wet areas.
4. Some tools are designed with protective guards. If the guard has been removed or does not work properly, do not use the tool until the guard has been repaired or replaced.

Lifting

Most back injuries are caused by negligence or violation of basic safe lifting rules. You can prevent a painful back injury if you first assume a squatting position. Keep the object close to your body and raise the object by straightening legs. Get help when needed.

You can prevent a painful back injury if you first assume a squatting position.



1. Be sure your footing is secure.
2. Keep your body erect. Always lift with your legs and not your back.

3. Assess the weight before lifting. If the object is too heavy, get help. To avoid the load on one person, pick up or lay down the object on a given signal.
4. Take advantage of skids, hoist, bars, jacks, blocking, rollers or hand trucks when moving heavy material.
5. Never pick up or put down an object while in a twisted position.
6. Never place yourself under a heavy object when it is being lifted.
7. Use the correct lifting procedures for light-weight objects as you would for heavy weight. Failure to do so results in needless injury.

Alcohol and Drugs

The use of alcohol and drugs increases the risk of accidents and injuries. Therefore, possession and/or use of alcohol and illicit drugs or being under the influence of these will not be tolerated while you are on duty.

Prescription and over-the-counter drugs may also impair performance. Consult your physical and/or label instruction as to any work-related risk. Advise your immediate supervisor of any drugs being used so proper safety precautions can be taken. The employee has the responsibility to report the use of all prescription or non-prescription drugs or medications prior to reporting to duty.

3. TRANSPORTATION

Boat-To-Boat Transfer

The choice of method should be regarded as a part of the detail planning. It should be remembered that as soon as the exchange craft comes alongside with its bulky fenders, practical problems can arise in transferring personnel by ladder due to the gap created by the fenders between the exchange craft and the ship. Personnel transfers at sea are quite often carried out using stand-by and diver craft. The man overboard boat/zodiac is preferred to bringing the exchange craft alongside.

Depending on the temperature and condition of the water, personnel involved in boat-to-boat transfers should be equipped with suitable personal flotation devices and immersion suits as appropriate.

The following procedure is designed to provide maximum safety during such transfers --

1. Clearance shall be obtained from both vessels' masters before the transfer commences.
2. Ensure that both points of transfer are cleared of all loose items and obstructions.
3. Ensure that the surfaces for transfer areas on vessels are non-slip.
4. Transfers must be undertaken during daylight, with good visibility (not less than 8 km., 5 mi).
5. There should be no obstruction along the side of the ship from which the workboat is launched (i.e., tow arms, gun arrays, etc.).
6. No person shall take along luggage when crossing over; luggage and goods are to be transferred separately.
7. Personal flotation devices, proper footwear, and appropriate clothing are to be worn during transfers.

Caution: Hyperthermia conditions/risks vary significantly around the world.

8. Ensure that order is observed in the transfer; one person at a time.
9. Personnel are to clear transfer points as soon as possible.
10. No personnel transfer should be made when the Master of vessel deems the conditions to be unsafe.

Personnel Basket Transfer

If it becomes necessary to transfer from a standby vessel onto a rig or platform by means of a personnel basket suspended from a platform crane, the following precautions should be observed --

1. When necessary, a survival suit is to be worn, in a fully zipped condition with the hood in position.
2. A personal flotation device is to be worn.
3. Deck crew, preferably two, must be available to assist on the boat.
4. Luggage should be stowed in the basket center to ensure both hands are free.
5. Personnel transferring should be evenly distributed around the baseboard to ensure maximum stability.
6. Personnel should stand outside the basket with feet apart on the board and the basket securely gripped with both arms looped through the ropes.
7. When the officer in charge is satisfied that all is ready, and at the appropriate moment with regard to the movement of the ship in a seaway, the basket should be lifted clear of the vessel and then swung up and out as quickly as possible before being carefully hoisted up to the rig.
8. Throughout the operation, a lifebuoy, boathook, and heaving line should be kept available on board the vessel for immediate use in case of emergencies.

Small Boats

1. Small boats may be deployed only with the permission of the captain. A minimum of two persons should be used to operate small boats.
2. Another suitable vessel shall stand by as a safety vessel. This vessel may be a high-speed rescue boat, a platform standby boat, a guard (chase) boat, or any other suitable craft. If the vessel is a high-speed rescue boat, and if this boat is not already deployed in the water, it shall be fully manned by its assigned crew ready for immediate launching. In such circumstances, the high-speed rescue boat shall be able to be deployed into the water and be away from the ship in less than two minutes.
3. Lifeboats or MOB's are specifically excluded from being assigned as routine standby rescue boats.
4. Personnel shall not be permitted to leave the work boat to enter the water without the captain's permission.

5. Life jackets must be donned prior to boarding the boat and must not be removed until back on board the mother vessel or onshore. Immersion suits must be worn as appropriate.
6. Small boats equipped with outboard engines should carry a spare engine.
7. Diesel engines are preferred over gasoline engines.
8. Do not exceed the maximum allowable capacity of any boat. Sea conditions and weather must always be considered.



Do Not Overload!

Prior to deployment, check that the following minimum equipment is carried –

1. Fully charged, water-resistant radio for communication with mother vessel.
2. Two (2) paddles.
3. First-aid kit.
4. Full, approved fuel tank.
5. Lifeline and buoy.

6. Simple tools and spark plugs to repair engine. Spare prop and shear pins.
7. Mooring lines
8. Fire extinguisher.
9. Torch (flashlight)/knife/flares.
10. Drinking water.
11. Sea anchor.

Crew shall not board until engine, radio, and equipment have been checked by the supervisor; then the lines may be detached.

Airboats

1. Wear life vests at all times.
2. Wear ear and eye protection when the airboat is in motion, or the engine is running.
3. Secure all objects preferably with a net or tarp. Keep all objects secure and away from the propeller. All propellers must have a full safety shroud.
4. Do not overload the airboat. Post the maximum load and/or passenger limit in the boat.
5. Balance the load.
6. Do not move or stand once the airboat is in motion.
7. Keep your hands and feet inside the airboat at all times until the airboat comes to a complete stop.
8. Airboats should operate at a reasonable limit (no more than 40-48 km/h - 25-30 mph).
9. Most airboats run with open exhaust. Watch for fires.
10. The air-boat operator is responsible for the safety on his boat.
11. Smoking will be prohibited when carrying flammable liquids of explosive materials, and signs shall be appropriately posted.
12. Do not approach the airboat from the rear. The rear of the airboat is a blind spot for the operator. Make the airboat driver aware of your presence at all times.

13. Seat belts shall be worn while the boat is in motion.

Helicopter Operations

All helicopter passengers should attend a helicopter survival course.

General

1. A landing net shall be available for use at all times. If used, the landing net should be secured every 1.5 m (4.9 ft) around its perimeter so that it is stretched taught. This net must be checked by the helicopter landing officer (HLO) after deployment. When using a net on deck, all persons must use care when approaching and leaving the helicopter.
2. Landing lights and floodlights should be checked by the helicopter landing officer after deployment.
3. Fire-fighting equipment should be checked prior to each landing by the helicopter landing officer to ensure serviceability and that adequate foam chemical is present.
4. Check the serviceability of radio communication systems and NDB (non-directional beacon) against other stations if possible.
5. Helideck must be cleared of obstructions and foreign objects before flight operations.
6. Helidecks should be marked with the International "No" symbol when out of service.

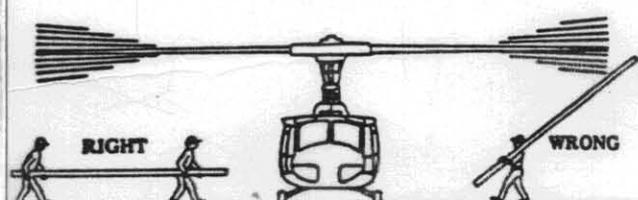
Pre-Flight Preparation

1. From the helicopter company --
 - A. Type of aircraft, weight, and rotor length.
 - B. Operating radio frequency of the aircraft.
 - C. Call sign of the aircraft.
 - D. Estimated time of departure and arrival of the aircraft.
 - E. Helideck surface requirements, i.e., with/without net, size, etc.
2. To the helicopter company --
 - A. Description of the ship's helideck surface, dimensions, and obstructions (cranes, antenna, etc.).

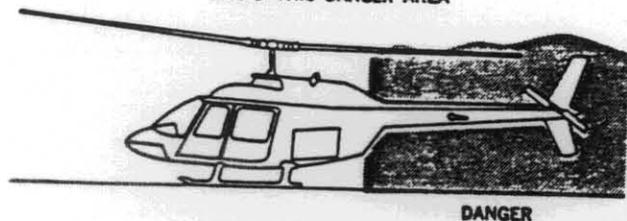
- B. Actual weather report in the area.
- C. The ability to monitor the working radio frequency of the aircraft, to and from the vessel.
- D. A position report of the vessel.
- E. Details of the vessel's non-directional beacon (NDB) frequency and code.
- F. Details of other installations in the area with NDB frequencies and code.
- G. Details of any other navigation assistance, such as the range and bearing from NDB or VOR/DME stations ashore.
- H. The obstacle-free angle of the helideck.
- I. Any refuelling facilities in the area, alternate emergency landing sites (rigs, platforms, islands, etc.) in the area.
- J. Number of passengers and weight of baggage and cargo. Weights should be determined with scales on board the vessel.
- K. In an emergency evacuation, give the extent of injuries or illness, number of stretcher cases, and number of walking casualties.

Prior To Aircraft Departure From Helibase

CARRY LONG OBJECTS FLAT WHEN
APPROACHING OR DEPARTING HELICOPTER.



AVOID THIS DANGER AREA



APPROACH AND DEPART UNSHADED AREA

1. When the aircraft type is known, brief the passengers as per the following safety instructions –
 - A. All persons flying in any helicopter shall be under the direct command of the helicopter's flight crew. While on the ship, prior to boarding and after disembarking from the helicopter, they shall be under the control of the ship's designated helicopter landing officer.
 - B. No person, unless otherwise directed by the helicopter landing officer, shall approach the helicopter while its red flashing anticollision light is on. All personnel shall avoid the tail and any air intakes of the helicopter.
 - C. No person shall wear any unsecured objects such as hats that may be blown away in the down draft from the helicopter's rotors if they are running.
 - D. All persons approaching the helicopter shall approach in such a manner that the flight crew can see them. The forward rotors of some helicopters dip low at the front of the aircraft and, therefore, personnel should not approach from directly ahead. Be aware of high winds which can cause the blades to dip in any direction.
 - E. All persons flying in helicopters shall wear seat belts, ear defenders, and approved personal flotation devices; these may take the form of inflatable life jackets or of flotation suits.
 - F. All helicopter passengers shall familiarize themselves with the helicopter's emergency exits and emergency equipment locations. This information will be made available to all helicopter all passengers normally in the form of a laminated safety card.
 - G. Upon landing, all passengers shall stay seated with their seat belts fastened until instructed by the flight crew that it is safe to leave the aircraft. All safety equipment should be returned immediately to the helicopter for use by future passengers.
2. Brief the cargo handlers on the type of aircraft to expect. One man will be nominated to ensure the cargo doors are opened and closed correctly. The cargo handlers should also be familiar with the lashing points of the aircraft.
3. Check that the helideck and surrounding deck is clear of equipment and loose objects.
4. Check that the ship's crane is stowed and secured in the lowered position.
5. Check that the work boat and its protective cover are securely lashed.

6. Connect and ready the fire-fighting equipment and protective clothing for fire fighters.
7. For emergency night operations, check the landing lights and floodlights.
8. Check the serviceability of communications, i.e., radio and NDB.
9. Inform air traffic control of nearby installations or rigs in the area of the intended aircraft movements.

Enroute to the Vessel

1. Maintain communication with the enroute aircraft.
2. Contact the enroute aircraft as soon as possible after Estimated Time of Departure (E.T.D.). The full call sign for the aircraft should be used. The call sign can be abbreviated to the first and last two letters once contact has been made, unless other aircraft with the same last two letters are operating in the area.
3. Inform the aircraft of NDB frequency, the call sign, and when it will be activated.
4. Inform the aircraft of the vessel's present position, with speed and heading.
5. With visual contact of the aircraft established and with a positive identification of the vessel by the pilot, request the pilot to QSY (change vessel frequency for landing clearance). The frequency should be acknowledged by the pilot before changing. The above procedure should be carried out with the aircraft within a 3 km (2 mile) radius of the vessel.

Landing on Vessel

1. The helicopter landing officer (HLO) has the responsibility to ensure the helipad and area are clear to accept an aircraft, and that the required minimum equipment is on board and readily available.

The HLO will ask the flight crew prior to landing if they intend to shut the helicopter down on landing or if they intend to leave the rotor running. If the intent is to shut the helicopter down, then the helicopter landing officer shall ensure that no one approaches the aircraft while its rotors are turning.

The HLO should check the following before landing clearance is given --

- A. The helideck area is clear of equipment and people.
- B. The landing lights are on.

- C. The firefighter is dressed in his protective clothing, and that the fire-fighting equipment is ready for use.
 - D. The lashings for the aircraft are ready if required.
 - E. The passengers are present and that they have been briefed.
 - F. The loaders are present and have been briefed and one person nominated as the aircraft cargo-door man.
 - G. The forward-corner safety rails and ship's stern mast have been lowered.
 - H. A MOB (man overboard) boat should be available during helicopter operations.
2. On hand-over from the working frequency to landing frequency, the aircraft pilot will call for landing clearance, i.e., vessel name and call sign, one mile from the vessel.
 3. No one should approach the aircraft until the pilot gives permission. This is normally done by switching off the flashing beacons or strobes.

Fueling Operations

1. Fuel pumps, motors, and fuel pump filters must be of the type manufactured for fuel operations.
2. Electrical systems must be grounded.
3. Fuel hoses and nozzles must meet regulations. In case of a leak in the hose, it must be repaired with material manufactured for this purpose.
4. nozzles and fittings must be of non-sparking material.
5. Fuel storage must be at least 15 m (50 ft) from any power source (electrical power supplies, switch boxes, and transformers).
6. The area around fuel storage is to be kept free and clear of all dried grass and weeds for at least 8 m (25 ft).
7. Fuel storage area should be surrounded by earth berms of sufficient height to fully contain the volume of fuel stored.
8. No smoking within 15 m (50 ft) of fuel storage and while refueling is in progress.

9. An approved fuel filtering system with effective water and contamination separation must be used in conjunction with the fuel storage and refueling facilities.

Prior To Take-Off From The Vessel

1. The HLO will check that the aircraft doors have been shut correctly.
2. The HLO will check that the helideck is cleared of equipment, loose objects, and that all personnel are clear of the deck.

After Take-Off

1. Maintain flight watch if required.

Deck Crew

1. The minimum deck crew will consist of --
 - A. One HLO.
 - B. One trained fireman in a protective suit and breathing apparatus (BA).
 - C. One baggage handler (depending on the quantity of freight).
 - D. One fire valve attendant.
2. Prior to landing, the deck crew will take up the following positions --
 - A. The HLO and a fireman with a clear view of the helideck.
 - B. The baggage handler(s) protected behind cover with the HLO in sight.
3. There will be no other personnel in the area.
4. Spectators should be on the bridge deck only.

Deck Equipment

The following equipment shall be immediately available during all helicopter traffic.

1. Fire Extinguisher

One or more dry-powder extinguishers with a total capacity of 45 kg (100 lb.) and one or more gas fire extinguishers (CO₂ or Halon 1211) with a total capacity of 18 kg (45 lb.) shall be available near to the helicopter landing area.

The ship's AFFF system must be able to provide foam to the stern of the helicopter landing area from two hoses, each on its own branch line.

2. Total Fire Protection Fire Suit

A total fire protection suit, made from aluminum or other suitable material, shall be provided. This suit shall cover the entire surface of the wearer but allow for self-contained breathing apparatus equipment to be worn. The suit shall include --

- A. Total head and neck hood.
- B. Nomex, or similar balaclava.
- C. Jacket and trousers or one piece-suit.
- D. Gloves that can be attached to the jacket sleeves.
- E. Boots.

3. Fire Suit

A conventional fireman's suit from one of the firemen's lockers shall also be immediately available.

4. Other

Axes, bolt croppers, heavy duty hacksaw, seat belt cutting knives, etc., stored in the emergency equipment box, should be checked and the box left open with the lid secured.

In addition, two sets of each of the following from the fireman's lockers shall be immediately available --

- A. SCBA system.
- B. Fireman's axe.
- C. Safety harness.
- D. Fireproof lifeline.
- E. Battery-operated, hand-held lantern.

5. Wind sock or other wind direction indicator.

Emergency Landing

In the event of an emergency landing, remain in your seat with your seat belt fastened. If the seat belts are removed, the motion of maneuvering for a landing may throw all passengers to one part of the cabin and cause the pilot to lose control.

1. Ensure that the survival suit is zipped up.
2. Remove the ear protectors.
3. Take up brace position before landing.
4. After impact, put one hand on the seat belt buckle and the other pointing to your exit door for orientation in case the aircraft inverts.
5. The man nearest the door is responsible for opening it.
6. Before releasing the seat belt count up to 10 to allow the aircraft to settle.
7. Do not inflate the life jacket until you are clear of the aircraft.
8. Do not stand on inflated floats if the aircraft remains upright.
9. If the aircraft remains upright, await the pilot's commands to evacuate. He may be able to keep the aircraft upright if blades are rotating.
10. Remain close to the aircraft as long as it remains afloat.
11. Remove life raft, flares, and other survival equipment.

4. VESSEL OPERATIONS

General

Safety on deck of a geophysical vessel must pertain to all personnel working on and traversing through the deck area.

Internationally designated symbols and colors should be displayed in all appropriate hazardous areas. This includes fire extinguisher types, and areas where ear/eye/foot protection is required.

Areas that require hard hats, non-smoking, life lines, placards, should be prominently displayed.

Luminescent arrows should be placed at close intervals along the deck to indicate the route to the nearest exit.

Crew members and visitors must treat deck areas as hazardous and adhere to the minimum guidelines listed below --

1. Approaches to ladders and stairs should be at least 400 mm (16 in.) wide, unobstructed, and treated with non-skid material.
2. Fixed ladders, landings and cages, etc., should be inspected frequently and properly maintained. Those in holds should be examined for damage immediately after the discharge of cargo.
3. All water-tight doors should be closed and latched while at sea, and should be opened only for the passage of personnel. Door and hatch gaskets should be kept clean in order to maintain water-tight integrity.
4. Sand or other suitable substances should be spread over areas made slippery by snow, ice, or rain. The utmost care must be taken in crossing such areas, and particularly in using gangways, stairs, and ladders under such conditions. Spillages of oil, grease, etc., should be cleaned up as soon as practical.
5. When rough weather may be expected, lifelines should be rigged across open decks.
6. Permanent fittings that may cause obstruction such as eye plates on deck, lashing points, and projections should be painted a conspicuous color in contrast to the background so that they are more easily seen. It may be useful to pad a sharp projection.
7. Any gear or equipment stowed to the side of a walkway or on the deck head should be securely lashed.
8. Machinery guards shall be kept in place and in good condition.

9. Cranes, winches and hydraulic equipment shall be operated by or under the supervision of trained personnel.
10. All loose objects should be secured immediately after they are received on board, no matter what type of weather may be expected.
11. Preventive maintenance on equipment, as recommended by manufacturer, should be practiced to ensure that the equipment is working as intended.
12. Guard rails or fencing should be of adequate strength, good construction, free from sharp edges, and properly maintained.
13. Obstructions, danger areas, and areas of high-noise levels shall be properly marked; ear protection shall be provided and used in designated areas.
14. A tool should not be placed where it can be accidentally knocked off to fall on someone below, nor should tools be carried in pockets from which they may easily fall. A belt designed to hold frequently used tools securely in loops is recommended.
15. Tools should be handled with extra care when hands are cold or greasy, and where the tools themselves are greasy.
16. Ropes should be kept free of contamination by chemicals (rust removers and paint strippers may be particularly damaging) and not stowed close to any source of heat. Any accidental contamination should be reported immediately for cleansing, replacement, or other action taken.
17. Persons who are working aloft, outboard, or below decks, or in any other area where there is a risk of falling more than 2 m (6 ft) should wear a safety harness (or belt with shock absorber) attached to a lifeline.
18. A man working at an extreme height may not be able to give his full attention to the job and at the same time guard himself against falling. A stage or ladder should always be utilized when work is to be done beyond normal reach.
19. A safety harness with lifeline or other arresting device should be continuously worn when working aloft. Where the work is overside, buoyancy garments should be worn, and a lifebuoy with sufficient line attached should be kept ready for immediate use.

Lighting

1. Adequate lighting should be provided where men are working. This is most important on stairs and ladders. If it is necessary to enter or cross unlighted areas, care should be taken.

2. Portable lights should never be lowered or suspended by their leads. The leads should be kept clear of running gear, moving parts of machinery, equipment, and loads; if they pass through doorways, the doors should be secured open; they should be kept out of walkways as far as practical to prevent people from tripping over them. Any slack should be coiled.
3. Lights should not be switched off or removed without checking that all people are out of the space or area illuminated.
4. All work areas should be properly illuminated.

Electrical Equipment and Wiring

1. Good workmanship and proper materials shall be used - all wiring will be installed according to the national electric code of that country, at least the U.S. national electrical code.
2. Equipment should be constructed, installed and protected, and be capable of being maintained, inspected, and tested so as to prevent danger in as reasonable a manner as possible.
3. Equipment should be suitable for the maximum power required by the current-using equipment.
4. Electrical conductors should be of sufficient size and current-carrying capacity for the purposes they are intended.
5. All conductors should be either --
 - A. Insulated, or
 - B. Properly safeguarded to prevent danger.
6. Electrical joints and connections should be of proper construction with respect to conductor size, insulation, and mechanical strength and protection.
7. Every installation and circuit should be protected against overcurrent by automatic devices.
8. Electrical equipment cabinets and metal housing could cause danger if the conduit or insulation should become defective, or if a fault should occur in any equipment. Electrical equipment metal housing should be grounded.
 - A. The metalwork should be grounded in order to discharge electrical energy without danger, or
 - B. Other equally effective precautions should be taken.

9. No fuse or circuit breaker, other than a linked circuit breaker, should be inserted in a grounded neutral conductor. Any linked circuit breaker inserted in a grounded neutral conductor should be arranged to also break all related energized conductors.
10. A single-pole switch should be inserted in the energized conductor only. Any switch connected in a grounded neutral conductor shall be a linked switch, and should be arranged to also break all the related energized conductors.
11. Effective means, suitably placed for immediate operation, should be provided so that all voltage may be cut off from every installation and circuit to remove and prevent danger.
12. For every electric motor, an efficient means of disconnection should be readily accessible, easily operated, and so placed as to prevent danger.
13. Every piece of equipment that requires operation or attention by a person in normal use should be installed so that adequate and safe means of access and working space are provided.
14. All equipment that is likely to be exposed to weather, corrosive atmospheres, or other adverse conditions should be constructed or protected to prevent danger arising from such exposure.
15. All equipment in surroundings susceptible to risk of fire or explosion should be constructed or protected to prevent danger.
16. No additions or alterations -- temporary or permanent -- shall be made to an existing installation, except by an authorized and competent person and only when it is.
17. All unsafe appliances, wires, and electrical apparatus should be reported immediately to the electrician or supervisor.
18. Treat all wires as live wires. Do not touch hanging or broken wires. Place a warning sign, and notify a supervisor or electrician immediately.
19. All electrical hand tools must be properly grounded. All galley equipment, including fry pans, griddles, and toasters must be grounded and kept in good working condition. Do not disconnect or break the ground wire on any equipment or fixtures.
20. Check drop lights for breaks in the insulation and before use. Ensure that the plug and socket are in good condition. Use only the bulb wattage rated for the light. All drop lights must be shrouded.

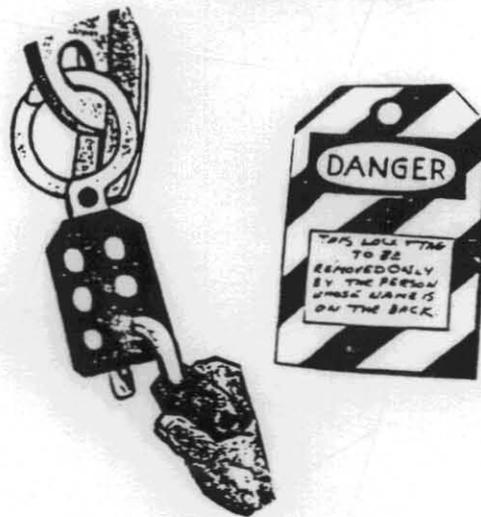
21. Use hand-held portable battery lights when working in damp areas or in metallic tanks. GFI (Ground Fault Interrupt) protection must be used in wet areas.
22. De-energize and tag or lock out all circuits before working on lines. Under certain conditions, low voltage can kill.

Lockout/Tagout

When maintenance is needed on any electrical powered line, motor, equipment, or fuel-powered engines, you should protect yourself and others from accidental turn-ons. Accidents occur when someone "thought" the machine or electricity was safety turned OFF.

This section explains the procedures to use when working on any type of equipment or electrical circuit. This is called the Lockout/Tagout System.

Lockout/Tagout



There are seven steps to follow:

1. The person in charge should identify all parts that are to be shut down, and which switches, equipment, and people will be involved in maintenance, repairs, or installation. At this time, the restarting procedures are planned -- who, when, and how.
2. Advise everyone involved that a lockout/tagout procedure will take place.

3. Identify all power sources for the project. What makes it work? This includes identifying all hydraulic and pneumatic systems, spring, compressed air, gravity systems, and all electrical circuits.
4. Disconnect the electricity. Block the movable parts. Release or block spring energy, bleed hydraulic, pneumatic, and high-pressure air lines. Lower suspended parts to a secure or rest position.
5. Each worker involved should have his own lock keyed differently from anyone else's lock, and it should be identified with his name, an assigned number or color code, and the name of their department or company. Clips, chains, and lockout boxes, which are available from locksmiths, electrical supply companies, or through the Safety Department or Purchasing Department, may also be used.
6. Tagout all the power sources and machines. Tags should indicate that the machine or circuit is out of order the reasons for the lockout (list time being repaired), your name, the date, the phone number at which you can be reached, and a the time of tagging. Tagging should be done by the person in charge, and removed only after everyone's lock has been removed, the system tested, and restart approved.
7. The person in charge should clear the area and make sure that all persons in the area and any unauthorized personnel are clear from the area. Double check all the steps listed above yourself. Remove locks, turn on power sources, or operate any valves to test the system. With all workers safe and the equipment ready, remove the "out of order" tab before turning the power on.

Radio, Radar, and Navigation

1. No radio transmissions from the ship are allowed while electric blasting caps are out of the magazine.
2. Contact and exposure to radio and radar radiation from an antenna can result in severe burns and tissue damage. Inform the vessel's Master before installing navigation antennas or any other time personnel are going aloft. Lockout-Tag all transmitters when personnel are aloft.
3. Only authorized personnel (except in emergency) will use radio, radar, and navigation equipment.

Galley

1. Persons employed in the preparation, cooking or serving of food or drink, or in the handling of eating/drinking utensils must have undergone a medical examination and fulfilled the necessary health requirements.

2. All persons engaged in the handling of food, drink, or eating/drinking utensils are to:
 - A. Maintain a high standard of personal and communal hygiene.
 - B. Be aware of the danger of diseases spread by contaminated food.
 - C. Report sick when suffering from throat infections, stomach disorders, or skin conditions.
3. A wash-hand basin with an adequate supply of hot and cold water with brush, soap, and clean towel is to be provided. "Wash your Hands" notices should be displayed prominently in toilet areas.
4. All persons within the kitchen, preparation room, server, or food stores are forbidden to smoke. Notices prohibiting smoking are to be prominently displayed.
5. Clean protective clothing, i.e., long sleeves and hair covering, is to be worn by all food handlers when working in these premises.
6. Refrigerators and freezers should be operated in accordance with the manufacturer's instructions. Attention is to be paid to the internal cleaning, defrosting, and correct arrangement of food held in these appliances. Freezer temperatures shall be maintained no higher than (-18° C) 0° F.
7. No waste food or refuse should be deposited or allowed to accumulate within any food room, and any spillage of liquids or solids should be cleaned immediately.
8. Sinks used for the washing and preparation of chicken, fish, fruit, vegetables, and for other forms of food preparation should not be used for the cleaning of cooking equipment, containers, or kitchen utensils, unless thoroughly sanitized.
9. Kitchen utensils, sinks, cooking equipment, and food preparation surfaces are to be thoroughly cleaned and sanitized after use.
10. The floors of all kitchens, annexes, food stores, and ancillary areas are to be kept clean and dry. Any evidence of rodent or insect pest infestation is to be reported immediately.
11. All kitchen and dining areas should be completely sanitized each week. This includes stoves, freezers, refrigerators, range hoods, fans, tables, floors, and non-refrigerated food storage areas.
12. Cleanliness of all food, crockery, cutlery, linens, utensils, equipment, and storage is vital. Cracked or chipped crockery and glassware should be

disposed of properly. Foodstuffs that may have come into contact with broken glass or broken crockery should be thrown away.

13. Thoroughly wash all fruits and vegetables with clean water before eating raw or before cooking.
14. Crockery and glassware should not be left submerged in wash water where it may easily be broken and cause injury. Such items should be washed individually as should knives and any utensils or implements with sharp edges.
15. Some domestic cleaning substances, for example caustic, soda and bleaches, can burn the skin. They may also react dangerously if mixed together.
16. A large proportion of injuries to catering staff arise from slips and falls caused by wearing unsuitable footwear; "flip-flops", sandals, plimsolls, etc., are especially dangerous on greasy decks, and they afford no protection to the feet from burns or scalds if hot or boiling liquids are spilled. Suitable footwear, preferably with slip-resistant soles, should be worn at all times.
17. Decks and gratings should be kept free of grease, rubbish, ice, etc., in order to minimize slipping that may result in serious injuries, especially when hot liquids or glass and crockery are being carried. Any spillage should be cleaned up immediately.
18. Broken glass or crockery should be cleared away with a brush and pan -- never with bare hands.
19. The area of deck immediately outside the entrance to refrigerated rooms should have an anti-slip surface.
20. Care should be taken when using stairs and companionways; one hand should always be kept free to grasp the handrail.
21. Catering staff should not attempt to repair electric ranges and appliances. Defects should always be reported so that proper repairs can be made. The equipment should be taken out of use until it is repaired.
22. Use of water in hosing down and washing equipment in the galley can be very dangerous, particularly where there are electrical installations. Whenever the galley deck is washed down, power to an electric range and all electric equipment should be switched off and isolated from the supply, and water kept from making contact with the electrical equipment.
23. Range guard rails should be used in rough weather. Pots and pans should never be filled to the extent that the contents slop over when the ship rolls or turns.

17. Wood, paints, and spirits, should not be kept in engine rooms or machinery spaces.
18. All electric wiring should be well maintained and kept clean and dry. The rated load capacity of the wires and fuses should never be exceeded.
19. Personnel using hydraulic and pneumatic equipment should be fully conversant with the proper procedures for its safe operation. Operating instructions should be followed at all times.
20. Operators should ensure that the system operating pressure shown on the pressure gauge is at the recommended level.
21. Prior to a hydraulic system activation or deactivation checks should be made to ensure that there is no air trapped in the system and that there are no external leaks. Trapped air causes erratic action that can lead to injury or damage to the installations or equipment.
22. Only the correct grade of hydraulic fluid should be used for topping up a hydraulic system. The correct grade should be clearly posted.
23. Any spillage of hydraulic fluid should be cleaned up immediately. Some fluids have a mineral oil base and should be thoroughly washed off the skin as soon as possible.
24. Hearing protection must be worn by any person remaining in the engine room or machinery compartment for more than 5 minutes. If the noise levels are such that you must shout in order to be heard, then hearing protection is appropriate.

Cranes & Lifting Devices

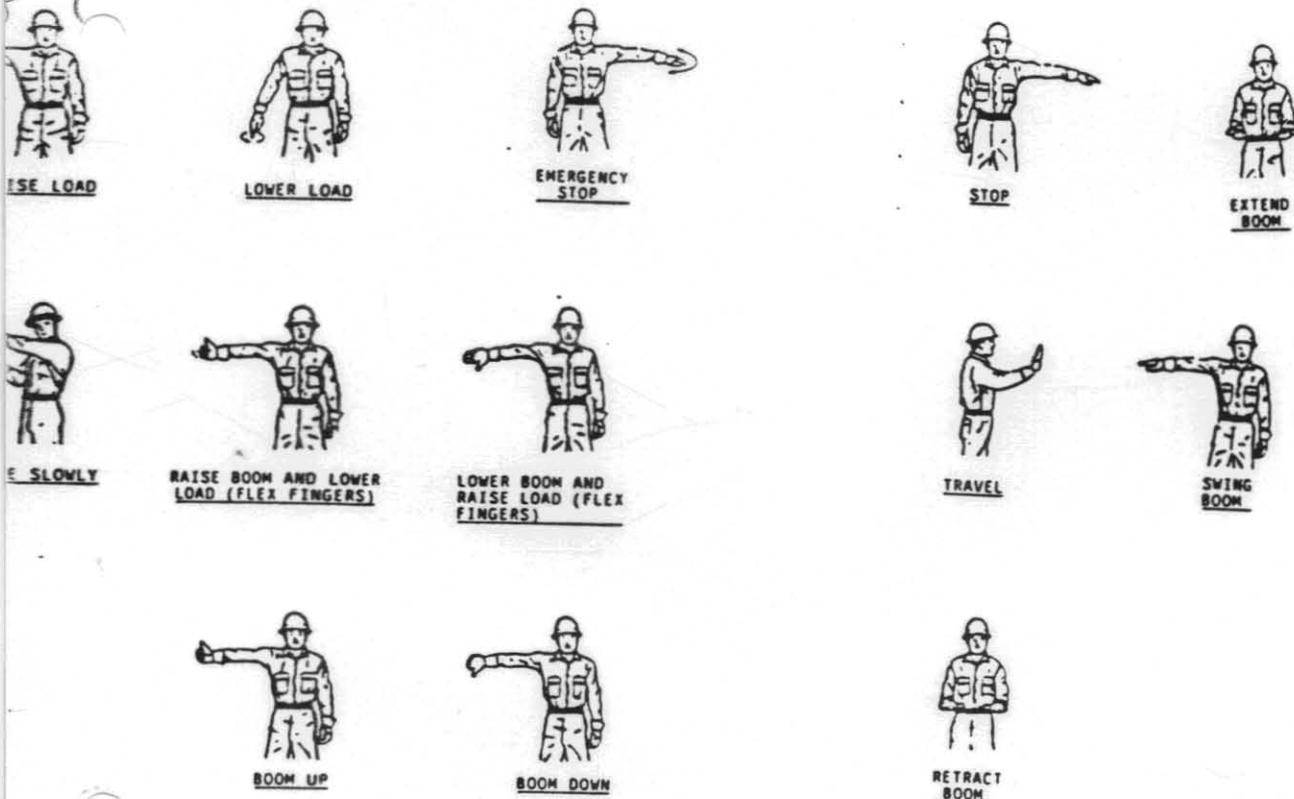
1. The crane shall be operated only by qualified persons. Auxiliary personnel, working in the area of cranes and cargo, shall be instructed and familiar with the operation and safety procedures of this equipment.

The operator should examine the crane foundation, cables, drum, dogs, brakes, boom, guard, pins, sheaves, load hook, and wireline for defects. Any defects must be repaired before the crane is used. Crane hooks which are defective should be replaced. Repair by welding or otherwise should not be attempted.

2. All cranes, winches, and other hoisting devices shall be certified and checked at regular intervals. Always ensure that all slings, hooks, wirelines, cables, and tag lines are secure and in good working order. All inspections should be documented, and these documents kept for reference. Slings, fittings, and fastenings should be inspected before use and daily during use. Equipment

- found to be defective **must** be discarded. The date that the slings are placed in service should be stenciled on the metal eye.
3. The maximum capacity and boom angle of the crane should be clearly marked and must not be exceeded. Boom-angle indicators must be permanently attached to the boom in order to show the operating radius.
 4. Crane hooks should have safety latches. Stops should be provided on all crane booms in order to prevent the possibility of overtopping the boom.
 5. The crane operator and auxiliary personnel must be mindful of overhead obstacles and hazards that may contact the crane boom. Power lines represent a serious lethal hazard that must be avoided.
 6. A qualified signal person **must** work with the crane operator. Standard signals should be used. Normally, all signals should be given by the signal person, but the operator should obey an emergency stop signal given by anyone. If signals are not utilized, the signalling method must be agreed upon by the crane operator and auxiliary personnel before commencement of the crane operations. The operator **must** properly secure the crane and boom before going off duty, or when shutting down operations. A tag **must** be placed on the controls, and the master or chief engineer notified if any defects are known.

**HAND SIGNALS
FOR
CRANES AND CHERRY PICKERS**



7. All personnel must be instructed in safe operating procedures before handling cargo.
8. Personal safety equipment must be worn by all personnel handling cargo and working around cranes. This equipment must include hard hats, safety boots with non-slip soles, leather gloves, and any other safety equipment that might be required to handle any other specific cargo.
9. Correct cargo handling tools must be used, and these tools must be regularly checked and maintained.
10. Never perform a potentially hazardous job alone. Get help before trying to cope with a situation by yourself. Cargo handling involving the use of cranes and hoists should always be considered a hazardous job.
11. Always watch the loads in the process of being lifted by cranes. Your eyes should be on the cargo until it is on deck and disconnected from the crane.
12. Never get under a suspended cargo load, and never get any part of your body between unsecured objects. Wind and water conditions may cause suspended cargo to swing or become disconnected. Unsecured cargo may shift, "pinching" you between equipment. Never put your hands or fingers in the possible track of any heavy machinery or cargo. When strain is being placed on a rope, line, or cable, never stand in the path it would follow. Never stand in the path the load would follow should the rope break. Tag lines should be used to guide heavy suspended loads.
13. Never wear loose clothing when near rotating machinery. Never handle rope or cables when wearing a ring.
14. Never ride on a load being hoisted.
15. Work areas must be kept free of oil, grease, and trash.
16. Take extra care when loading oxygen, acetylene, and other flammable gases.
17. Open cargo-loading hatches must have chain guards around the exposed hold. Hatches must be securely closed after the loading is completed.
18. Personnel must have a "clear head" when handling cargo and working around cranes and hoists.

Signs of Defective Wire Rope Slings

1. Ten randomly broken wires in one rope lay or five broken wires in one strand in one lay.
2. Wearing or scraping of one-third of the original diameter of the outside wires.

3. Kinking, gouging, bird caging, or other damage.
4. Evidence of corrosion or heat damage.
5. End attachments that are cracked, rusted, or deformed.
6. Splices.

Five Precautions To Be Followed In Dealing With Wire Rope Slings

1. Do not use knots to make slings.
2. Pad or block sharp corners.
3. Lift and lower loads slowly without jerking.
4. Use slings of adequate capacity and construction. Consult the specifications.
5. Know how much weight you are lifting.

Welding, Cutting, and Burning

Welding, cutting, and burning outside of the welding bay requires the following precautions -

1. The bridge must be informed before commencing and after finishing the work.
2. If working in a fire risk area, extra precautions must be taken. As a minimum, someone to stand close by with an appropriate fire extinguisher, or fire hose.
3. The work area shall be inspected prior to starting work in order to ensure that it is free of any flammable materials such as rubbish, streamer oil, oil, or metals. Caution against hot work on the vessel decking until the area below is clear, i.e., no fuel tank, etc.
4. The person carrying out the work should ensure that any fuel oil/kerosene tank vents or openings are suitably protected against ingress of hot metals.
5. The opening, draining, or filling of streamer cables shall not take place at the same time as any hot work.
6. Protective equipment (work boots, gloves, and goggles) must be used.
7. Tools and materials must be properly stored after completion of the work.
8. Never work alone in hazardous areas.

3. Station Safety Equipment

- First-Aid Kit - Each kit is equipped according to the number of personnel, duration of occupation, and location of station.
- Fire Extinguisher - Two CO₂ types, suitable for all classes of fires. These are for the generator tent and main tent with electronic equipment, and stove.
- Fire Blankets - Two of these are placed at the same locations as the fire extinguisher.
- Fire Buckets - Two of these are placed by the generator for a ground fire situation.
- Warning Bunting - Roll for identifying hazards, e.g., fuel store, guy wires on tower, tent pegs, gas cylinders, etc.
- Warning Signs - Hard Hat and "No Smoking" signs to be displayed at the appropriate locations. These should be in the local language as well.

Hazardous MaterialsExplosives

The use of explosives is potentially hazardous and should be avoided if possible. Alternate seismic sources should be considered.

1. Never store blasting caps in the same magazine with other explosives. Handle the blasting caps according to the local country regulations or manufacturer's regulations.
2. Except for placing the charge in the water instead of in the ground, the methods for handling and using explosives on board are the same as those used on land.
3. Ship's radios, radars, and other transmitting devices (such as navigation equipment) must be secured while handling electric blasting caps. No transmitting is allowed while handling caps.
4. Do not make up charges ahead of time.
5. Only use one firing line.
6. Be certain that people and boats are a safe distance away from any floating or loaded charge.

7. The shooter must have the charge marker in sight at all times.

See the Explosives section of the Land Manual for more details.

Batteries

1. Battery charging compartments should be kept adequately ventilated to prevent an accumulation of dangerous and explosive gas.
2. Smoking and any type of open flame must be prohibited in a battery compartment. A conspicuous notice shall be displayed at the entrance to the compartment.
3. Light fittings in battery compartments should be properly maintained at all times with protective glasses. If cracked or broken glasses cannot be replaced immediately, the electric circuit should be isolated until replaced.
4. No unauthorized modifications or additions should be made to electrical equipment (including light fittings) in the battery compartments.
5. Portable electric lamps, tools, and other portable power tools should not be used in the battery compartments.
6. The battery compartment should not be used as a storeroom for any materials.
7. A short circuit of even one cell may produce an arc or spark that may cause an explosion of any hydrogen that is present.
8. Insulation and/or guarding of cables in the battery compartments should be maintained in good condition.
9. All battery connections should be kept clean and tight to avoid sparking and overheating. Temporary clip-on connections should be avoided as they may work loose due to vibration, and cause a spark or short circuit.
10. Metal tools, such as wrenches and spanners, should never be placed on the top of batteries as they may cause sparks or short circuits. The use of insulated tools is recommended.
11. Jewelry, watches, rings, etc., should be removed when working on batteries. A short circuit through any of these items will heat the metal object rapidly and cause severe burns. If rings cannot be removed, they should be taped with insulating material.
12. All circuits fed by the battery should be switched off when the leads are being connected or disconnected. If a battery is in sections, it may be possible to reduce the voltage between cells in the work area, and hence, the severity of

an accidental short circuit or electric shock by removing the jumper leads between sections before the work is begun.

13. Battery cell vent plugs or caps should be tightly secured except when charging when they should be loose.
14. The ventilation tubes of battery boxes should be examined regularly to ensure that they are free from obstruction.
15. Lids of battery boxes should be fastened while open for servicing and properly secured again when the work is finished.
16. Batteries should be kept battened in position to prevent shifting in rough weather.
17. Alkaline and lead-acid batteries should be kept in separate compartments. Where both lead-acid and alkaline batteries are in use, great care should be exercised to separate the materials and tools used in servicing each type. Contamination of the electrolyte may cause deterioration of battery performance, and mixing of the two electrolytes produces a vigorous chemical reaction that could be dangerous.
18. Both acid and alkaline electrolytes are highly corrosive. Immediate remedial action should be taken to wash off any accidental splashes on the person or on equipment. Hands and clothes should always be washed as soon as the work is completed.
19. Batteries should always be transported in the upright position to avoid spillage of electrolyte. A sufficient number of men should be employed to transport the batteries since they are heavy, and painful strains or injury may result.
20. New technology in battery developments offers safer alternatives to electrolyte batteries and should be considered.

Lead-Acid Batteries

1. When the electrolyte is being prepared, the concentrated sulfuric acid should be added slowly to the water. Do not add water to concentrated acid. The heat generated may cause an explosion of steam or spattering acid.
2. Goggles, rubber gloves, and a protective apron should be worn when acid is handled.
3. To neutralize acid on skin or clothes, copious quantities of water should be used.
4. An eyewash station should be available in the compartment for immediate use on the eyes in case of an accident.

5. The corrosion products that form around the terminals of batteries are injurious to skin and eyes. These products should be removed by brushing them away from the body. The terminals should be protected with petroleum jelly.
6. Insulation of cables in battery compartments should be maintained in good condition.

Alkaline Batteries

1. The general safety precautions with this type of battery are the same as for the lead-acid batteries, with the following exceptions.
2. The electrolyte in these batteries is alkaline but similarly corrosive. It should not be allowed to come into contact with the skin or clothing. In the case of contact with the skin, the affected parts should be washed with copious quantities of water, but if burns ensue, boracic powder or a saturated solution of boracic powder should be applied. The eyes should be washed out thoroughly with clean water, followed immediately with a mild solution of boric powder. This solution should be always readily accessible when the electrolyte is handled.
3. Unlike lead-acid batteries, metal cases of alkaline batteries remain live at all times. Care should be taken not to touch them or to allow metal tools to come into contact with them.

Lithium Batteries

Lithium batteries are potentially very hazardous. When shorted, heated, or pressurized, lithium batteries can explode and ignite the lithium inside. Lithium fires burn in excess of 650° C (1200° F). Normal fire extinguishers may not be used. Water must never be used.

1. Transportation and storage of lithium batteries is highly regulated and usually restricted.
2. Special lithium fire extinguishers must always be used (Lith-X).
3. Lithium batteries require a unique, well ventilated storage area. Do not expose them to moisture.
4. They are to be disposed of only according to the manufacturer's specifications.
5. Never attempt to charge a lithium battery.

Storage and Handling of Gasoline

1. Containers storing or transporting gasoline and other flammable liquids must be clearly marked, allowing for identification of the contents.

- Accidental mixture of flammable liquids should be prevented. Gasoline mixed with fuel oil may change the flash point sufficiently to make the fuel oil hazardous in ordinary use.

LP Gas And LP Gas Tanks

Safety Guide for Gas Cylinders



- If you smell gas in a room, do not turn lights on or off. Sparks from the switch could cause a fire or explosion. It is much safer to turn off the power at the main breaker.



- A strong smell of gas may indicate a cylinder leak, open or faulty valve, or loose connection. Do not enter any area in which there may be a buildup of dangerous fumes. Sparks from static electricity, clothing, belt buckles, or nails in shoes could cause an explosion. Open the nearest doors and windows.



- Turn off the gas at the cylinder when moving camp or if the kitchen, camp, or bunks will be vacated over a week.



- Store and secure cylinders in an upright position, away from heat, electrical connections, open flames, or electrically- or fuel-operated motors. Post NO SMOKING signs and mount an appropriate fire extinguisher where it is easily accessible.



- Before connecting a line to a refilled cylinder, check the threads and valves for damage. An improperly fitting connection could cause serious leaks.



- Before turning on a gas valve, light a match first, moving it into the burner. Turn the valve on slowly to prevent too much gas from escaping into the air, which could cause an explosion.

Liquified petroleum gas (LPG) is explosive.

- When entering a room in which the odor of LPG is detected, do not touch any of the electrical switches – do not turn the lights on or off. Do not turn on ventilation fans. First, open all the doors and windows – do not go into the room alone. Go immediately to the tanks and turn off the valves. If there is a problem with the connection or valves, and if the tank still leaks after the valve is turned off, disconnect the line at the tank valve. Notify the Master and safety officer and evacuate the occupants. Return to the area or the structure only after either has been well ventilated.
- Use only those safety lights made especially for working in the vicinity of flammables and explosive materials. Nonsparking tools should be used to connect or disconnect lines from the tanks.
- Store LPG cylinders in open areas away from electrical connections and open flames. Always store LPG cylinders in an upright position and secured so they cannot be knocked over.

6. EMERGENCY PROCEDURES

Life-Saving and Protective Equipment

1. All personnel must wear personal flotation devices (PFDs) when in a dinghy or small craft.
2. All personnel must wear PFDs when on deck in heavy seas.
3. Personnel working on the stern must wear PFDs at all times. Personnel positioned near the stern should wear a safety belt and attached life line.
4. All personnel must wear specified footwear while on deck.
5. In case of a clothing fire, use a fire extinguisher or wrap the victim in a blanket, rug, woolen coat, or any other non-flammable article capable of smothering the fire.

Protect your eyes when hammering



Disabling of Fire Alarms

If it is necessary to disable the ship's fire alarm system in the immediate work area, permission must be obtained from the officer on watch. This permission will be given in writing for a specified time period.

The original permission shall be posted at the fire alarm station. On completion of the work, the officer on watch shall be informed. The officer will remove the posted permit and reset the alarms, either upon notification of work completion or the expiration of the specified time period, whichever comes first. It is the duty and responsibility of the person carrying out the work to ensure that the alarms have been reset by the officer on watch as soon as possible after completion of the work. The crew should be especially alert for fires during the period the fire alarm is disabled.

Survival at Sea

All personnel working in the marine environment should attend a recognized offshore survival training course. As a minimum, this training should include lifesaving equipment, helicopter emergency procedures, vessel abandonment procedures, basic fire fighting, first aid, and in-sea survival skills.

Survival

1. Protection can come in various forms such as extra clothing, gloves, hat, or an extra personal flotation device (PFD), as well as recognized lifesaving devices.
2. The enclosed lifeboat offers maximum protection if the need to evacuate arises.
3. Your PFD offers protection and flotation as well as insulation. Wear it.
4. Protect the body by wearing layers of clothing. If possible, wear a windproof and waterproof garment as the outer layer of clothing. Preserve your body heat whenever possible. Excessive body motion contributes to heat loss.

Detection (Color, Light, Sound, Movement)

1. Use a color that will stand out from the "natural" environment so that the rescue can be achieved.
2. Some lifesaving appliances have fluorescent coloring.
3. Signaling devices that can be used during the day are:

Sea Dye
Mirror
Whistle

MK-13 Flare and Smoke signal
Parachute flare
Smoke flares

4. Signaling devices that can be used at night are:

Flashlight	Night flare
Chemical light	Flare pistol
Strobe light	Whistle
Pen flare	Parachute flare
Fluorescent markings	Reflective tape

5. Movement can attract attention. Waving the arms, splashing water, and using material such as flags and other creative movements will attract attention.
6. When in the water, keep together with the other survivors. The more people, floats, rafts, etc., that are bunched together, the easier they will be to detect.
7. The use of light should be attempted only when the lighting device can be best seen. When using pyrotechnics, remember to get on the downwind side of the craft. Use your ears as well as your eyes in detecting rescue craft.
9. EPIRB and ELT.
- A. Emergency Position Indicating Radio Beacon (EPIRB) is a marine distress radio transmitter.
- B. Emergency Locator Transmitter (ELT) is an aircraft distress transmitter.
- C. Both automatically or manually transmit a distinctive tone on a frequency reserved worldwide for emergency purposes: 121.5 MHz and 243.0 MHz.
- D. These transmitters are small, waterproof and buoyant, self-righting; and attached to a line.
- E. Battery power is at least 48 hours in temperatures between 0° and 55°C (32° and 157° injury F).
- F. The radios should be stored in a readily accessible location where they will not be subject to damage.
- G. Once the transmitter is activated, leave it on until the rescue is complete -- it could seriously mislead the searching aircraft if it is turned on and off.
- H. Turn the transmitter off once the rescue is complete.

- I. The signals can be detected from a range of up to 200 nautical miles. They are also detectable by satellite tracking and SAR (Search And Rescue) aircraft.
- J. Test the batteries as per the manufacturer's recommendation.

Food and Water

1. Water is the key to your survival. This is particularly true in a long-term survival situation -- a situation that you will rarely face.
 - A. Never drink salt water or urine.
 - B. No water should be consumed within the first 24 hours. After that, one pint daily should be allowed.
 - C. If necessary, trap rain water or moisture (dew).
 - D. Use a desalting kit or solar still if it is available.
 - E. In the survival equipment packs, water may be found in cans or in metal foil or plastic pouches. Know how to identify a contaminated container. Do not use contaminated water unless it is absolutely necessary.
2. The food will be carbohydrate based in nature. You may have a biscuit or wafer or possibly candy. Avoid eating protein (birds, fish) because the body will need more water to digest it.

Emergency Treatment

Know basic first aid for --

Bleeding
Broken bones
Shock/cardiac arrest

Hypothermia and hyperthermia
Respiratory arrest
Back injury

First Aid information can be obtained from local authorities or Company documents.

Rescue

1. Surface to surface --
 - A. Prepare for pickup once the rescue craft has been spotted. Get signaling devices ready.
 - B. Let the rescue craft come to you. Do not try to go to the craft.

- C. Notify the rescuer if anyone is injured.
 - D. Climb a ladder, net, or rope with the assistance of a safety line or belt.
 - E. Keep your personal flotation device on at all times.
 - F. Follow orders.
2. Surface to air --
- A. Let the helicopter come to you.
 - B. The device that is lowered to you may have a static electric charge. Let the device ground out in the water before you touch it.
 - C. Priority should be given to those who have the most severe injuries or medical problems.
 - D. Do not remove your personal flotation device -- even when being lifted.
 - E. If assistance is needed from a crew member, wave him down or give the break signal, moving of thumbs up, and point to broken limb.
 - F. Follow orders from the crewmen. They will do the work for you.
 - G. In severe injury cases, a Stokes litter will be lowered. A crewman may also enter the water to assist in placing the injured person in the litter.

Emergency Drills

The Master of the vessel is responsible for conducting scheduled (at least monthly) man overboard and abandon ship (lifeboat) drills.

Fire Drill

A fire drill shall be held within 24 hours of the vessel sailing after a port call. Fire drills should be held regularly at sea. These drills should consist of simulated incidents and must include --

1. Checking the muster list.
2. Manning fire stations, equipment, and apparatus.
3. Testing the fire pump by starting it and spraying water.
4. Recording complete details of drills in the monthly safety report and in the ship's official log.

All hands aboard shall be accounted for by the fire team leader, or his designated assistant.

Manning Fire Stations

1. Trained fire fighters should dress in their fire-fighting suits and then proceed to the fire site.
2. Each man will go to his assigned station wearing his life jacket.
3. Start the emergency fire pump and foam pump.
4. Deploy fire hoses in the area of simulated fire.
5. The first-aid team should tend any simulated casualties.

Testing The Fire Pump

The fire pump(s) should be tested by actual use. Normally the foam system should be off, however, the system shall be fully tested for a short period at least once every three months. Fire hose nozzles should be tested to ensure that they can provide both jet and spray.

Only the minimum personnel essential for the operations shall be excused from drills. In order to ensure that all onboard personnel attend the drills, it is required that drill times be staggered.

There shall be a designated fire chief and assistant at all times. The fire chief shall be either the party manager, Master, or a trained fire fighter. It will be his duty to --

1. Coordinate with the party manager and the Master for holding drills.
2. Choose the site and type of fire.
3. Ensure that training on fire-fighting equipment and appliances is given.
4. Ensure that maintenance work on the fire-fighting equipment is carried out.
5. Ensure that all fire equipment is inspected monthly.

During fire drills, the fire chief will also be responsible for --

1. Sounding the alarm.
2. Directing the fire team.
3. Looking to see any areas that need improving.
4. Answering any fire-related subject at safety meetings.

Man-Overboard Drill

Man-overboard drills are intended to familiarize all members of the crew with the necessary procedures required to locate and recover a man-overboard victim. All persons aboard the ship shall be instructed --

1. In the deployment of the man-overboard life raft.
2. The use of the line throwers.
3. The use of the rescue boat.
4. The location of the automatic smoke floats.
5. Their assigned man-overboard station.

Man-overboard drills should be performed simulating various operational conditions.

Survival Suits

If you jump into the sea wearing a survival suit, the air in the suit will be pressed out through the face lining. This may cause a dislocation of the lining and some water may enter the suit. It is thus important to press as much air out of the suit as possible before you jump.

Even if the suit is damaged and becomes swamped, it will render protection as a wet suit. It may, however, be virtually impossible to enter a survival craft with a water-filled suit, even if you are assisted. It may become necessary to take off the suit or cut it so that water drains from the legs.

In most instances where the suit has become water filled, this has been due to inadequate tightening of the chin flap or inadequate closure of the zipper. If the face lining feels uncomfortably tight, it is a consolation to know that this is necessary to ensure watertightness.

Even if the suit itself is well insulated, the use of warm clothing underneath will increase your survival time.

The suit will float a person on his back and swimming is best performed by backstroke.

The suit is provided with reflective tape in order to facilitate discovery with the aid of searchlight. A hook is arranged in front to facilitate retrieval.

Emergency Evacuation Plan

Medical evacuation plans should be maintained for each operating area and operating condition. These plans should provide a means for communication to emergency services and transportation. Methods, routes, and contingency plans for weather conditions or when the primary plan fails should also be established. Remember, medical information and travel documents should accompany the patient.

Man-Overboard Procedures

Care must be taken by all personnel and the ship's crew not to put themselves at risk, both when the vessel is at sea and also when in port. Safety harnesses must be worn where appropriate.

The Master will decide whether to launch the ship's MOB boat and/or the rescue boat. If there is a chase boat on hand, then the chase boat will be the primary means for rescuing the man.

The probability that a man-overboard situation will result in a fatal accident is high, especially in cold water. If no life vest or survival unit is worn, then the odds increase to a near certainty of death. This should be borne in mind when working in exposed positions.

Due to the nature of back deck activities and the exposed areas at the stern of the vessel, the possibility of a man falling overboard does represent a real danger. All personnel should be aware of what action to take should this happen.

In the event of a man falling overboard, speed of action taken will be essential if the man's life is to be saved.

1. Keep your eyes on the man in the water and point at him with extended arm.
2. Throw a life ring.
3. Launch a smoke flare/light beacon.
4. Push the man-overboard alarm button.
5. Shut down air-gun firing.
6. Inform bridge and instrument room of the situation. The instrument room will take a position fix when the alarm sounds.
7. Throw any buoyant items overboard that will aid marking position.
8. Shut down compressors.
9. Prepare to disengage trailing gear.
10. Launch MOB boat, under the Master's directions.

Marine Fire Protection And Fire Procedures

General

The marine vessel environment poses particular fire risks because of its confined nature and the hazardous flammable materials that are carried on board.

Smoking Areas and Enforcement

Careless smoking habits are the major cause of fires. Smoking can be difficult to regulate. It is up to each and every operator to define their own smoking policy.

Areas on board the ship will be designated as "Smoking" or "No Smoking" zones. Some areas may also be classified as temporary "Non-Smoking," such as around fuel manifolds during refuelling.

Permanent No Smoking areas should include --

1. Streamer work areas.
2. Streamer storage areas/streamer reels.
3. Flammable liquid locker/paint locker.
4. Battery storage areas and battery boxes.
5. Oxygen and acetylene bottle vicinity.
6. Streamer oil storage areas.
7. Galley.
8. All food preparation, handling, and storage areas.

Permanent No Smoking areas may include --

1. Cabins.
2. Instrument Rooms.
3. Bridge.
4. Gun Shack.
5. Dining areas.

All "No Smoking" areas must be clearly marked.

Fire Drill And Equipment Inspection

Fire and Emergency Stations

1. Fire and Lifeboat stations are designated according to cabin numbers.

2. In every cabin, a notice listing the emergency stations for that cabin should be posted.
3. Full details of emergency procedures, fire parties, etc., should be displayed prominently on wall charts throughout the ship.

Fire Control Plan

Fire Control Plans are plans showing the general arrangement of the ship. This plan shall include the following information for each deck –

1. Location of machinery.
2. Fuel tanks.
3. Fire-control stations.
4. Fire detection systems.
5. Fire alarm systems.
6. Deck plans.
7. Location of fire extinguisher appliances.
8. Ventilating system including fan and damper positions.
9. Identification numbers of fans serving each section.

These plans may be laid out in booklet form to be issued to all key personnel and ship's officers.

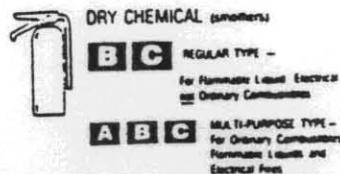
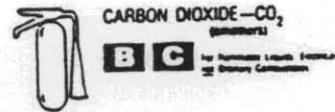
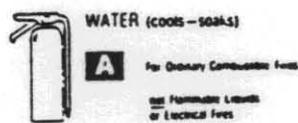
A copy of these plans shall be permanently exhibited aboard the ship. Another copy shall be permanently stored in a prominently marked, weather-tight enclosure outside the deckhouse for the assistance of shoreside fire-fighting personnel. The container shall be marked "FIRE-CONTROL PLANS".

Fire Extinguishers

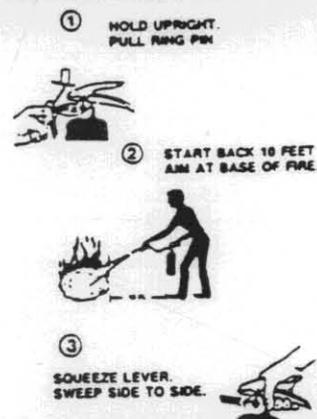
General

PORTABLE FIRE EXTINGUISHERS

Types:

**WHERE TO USE**

LETTER SYMBOL	TYPES OF FIRES
A	For wood, paper, cloth, straw and other ordinary combustibles
B	For gasoline, grease, oil, paint and other flammable liquids
C	For live electrical equipment

HOW TO USE

Fire extinguishers shall be located around the ship in such positions and locations that they are readily available. At least one extinguisher, of a suitable type, shall be positioned near the access door to the area it is designed to protect. The locations of fire extinguishers, and their type shall be agreed upon between the Party Manager, Master, and Fire Chief.

Each extinguisher shall -

1. Have its contents clearly marked.
2. Be suitable for the area that it protects.
3. Have its instructions clearly visible in English and in the prevailing national language of the crew.
4. Be clearly labeled as to the types of fire that it is suitable for.

Because of the damage caused to the environment by fluorocarbons, Halon extinguishers are becoming illegal in some countries. Where a suitable alternative exists, which has the same extinguishing power of Halon, these should be used.

Aqueous Film-Forming Foam (AFFF)

Aqueous film-forming foam (AFFF), sometimes called light water, fire extinguishers are highly effective for oil-related fires because of their ability to make water float on top of oil, thereby starving oxygen from any oil fire. AFFF is effective on both class A and class B fires. They should not be used on electrical fires due to the chance of electrocution.

Foam fire extinguishers or systems should be used to provide protection at the following locations –

1. Streamer storage areas.
2. Streamer work areas.
3. Streamer oil pump.
4. Diesel engines.
5. Any area where there is a potential hazard of an oil-related fire.

LITH-X

The Lith-X fire extinguisher is suitable for extinguishing lithium metal-based fires. Lith-X extinguishers work by interrupting the lithium's ability to complete the combustion cycle for itself.

Lithium batteries are potentially very hazardous. When shorted, heated, or pressurized, lithium batteries can explode and ignite the lithium inside them. Lithium-based fires burn at a temperature in excess of 650° C (1200° F), and normal fire extinguishers are of no use.

Lith-X extinguishers should be located –

1. Near the streamer cable reel.
2. Near the lithium battery storage area.

Fire Hoses

Fire hoses shall conform to the vessel's flag of registry and at a minimum –

1. Be of a suitable material.
2. Be fitted with suitable couplings.

3. Be stored beside its hydrant in a conspicuous position.
4. Have stored beside it any required tools or fittings.
5. Have the same diameter and couplings throughout the ship.
6. Have a suitable nozzle stored beside it.
7. All nozzles shall be capable of supplying both a water jet and spray, and incorporate a shutoff valve.

After any hose has been used for emergencies or drills, it shall be emptied of water and rolled up in such a fashion as to be readily available. All hoses should be pressure tested and inspected quarterly.

Fixed Detection System

Automatic fire and smoke detectors of a type suitable for the area being protected shall be located throughout the ship. In addition, manually activated fire alarms shall be located throughout the ship as required. All of the above shall be connected to a control panel on the bridge that is capable of giving a visual and audible signal, showing from which section of the ship the alarm was triggered.

Fire and/or smoke detectors shall be located --

1. In all stairwells.
2. Corridors.
3. Escape routes from accommodation spaces.
4. High fire-risk locations.

Manually operated call stations or boxes shall be installed --

1. In accommodation spaces.
2. Service spaces.
3. Control spaces.
4. At each exit.

The fire detection sectors shall be arranged so that --

1. No sector covers more than one deck level.
2. No sector includes both machinery space and accommodation.

3. No sector includes more than one machinery space.

Fire detection systems shall --

1. Be capable of being powered by two independent power sources.
2. Be capable of automatically switching power sources in the event of failure of one.
3. Have an indicator panel in the bridge.
4. Have a simple plan to show where each sector is located.
5. Be capable of detecting the failure of a sensor.

Fire and smoke detectors should be tested weekly and after every time an alarm condition, real or false, has been detected.

Halon 1301 Smothering System

Halon 1301 is a gas that extinguishes fires by interrupting the combustion chain chemically. In itself, it is non-toxic; however, it displaces some of the oxygen in the air and more importantly, when heated may become highly toxic. When Halon is drawn into a diesel engine, the exhaust from the engine is orange and extremely toxic.

Areas to be protected are --

1. All enclosed areas where the combined internal combustion power is greater than 500 HP (375 kW).
2. All areas where machinery necessary to the propulsion of the vessel is situated.
3. All areas where any oil-fired boiler or units exist, including oil-fired incinerators.

Protected areas shall be --

1. Capable of having all ventilation fans remotely turned off.
2. Be able to have all ventilation and access openings completely sealed.
3. Be fitted with an alarm system separate from all other alarm systems.
4. Each alarm shall be clearly marked HALON DISCHARGE - EVACUATE AREA IMMEDIATELY.

The Halon 1301 discharge control shall --

1. Be situated in an area readily accessible.
2. Easy to operate.
3. Have an alarm fitted so that when access to the discharge handle is gained, it is triggered.
4. Have clear operating instructions.
5. Have clear instructions with regards to the safety of personnel in the compartment.
6. Be only able to be manually operated.

The system shall be fitted with gauges to each of its containers to allow for the stored gas level to be monitored.

When required to be operated (discharged) the system shall --

1. Be activated only with permission from both the Master and chief engineer.
2. Sound an alarm in the protected area for a suitable period of time before discharging its gas.
3. Activate visual and audible alarms on the bridge.
4. Stop all diesel powered engines with the sole exception of the emergency fire pumps.
5. Discharge all its gas in 10 seconds.
6. Automatically shut down all ventilation fans.

After operation of the Halon 1301 system, the protected area should remain sealed for a minimum of 24 hours or until such time as all indications show that the temperature of all hot spots is less than the ignition temperature of any fuel or solvents stored in the protected area. On entering a protected area after Halon has been discharged, do so from the highest, most easily accessible level, wearing a SCBA (Self Contained Breathing Apparatus). A standby SCBA team should be in immediate readiness. A first-aid team equipped with a stretcher and oxygen should be ready. The oxygen must not be taken into the protected area or its immediate vicinity.

Aqueous Film-Forming Foam (AFFF) Deluge System

The AFFF deluge systems shall consist of --

1. A diesel-driven pump must be able to be remotely started from the navigation bridge and fire control point. It must not be one of the emergency fire pumps.
2. At least two foam hoses shall be located so that at least one is able to be reached in the event of a fire. They shall have a nozzle capable of providing a water jet, spray, or fog fitted at all times.
3. Deluge outlets shall be located in such a manner as to cover the area being protected with an even blanket of foam. They shall be inspected monthly.
4. The storage tanks, which shall be painted red, shall hold enough foam so that at a coverage of at least a 200 mm (8 in.) blanket of foam can be laid across the largest protected area, or so that at least 10 minutes of foam are available when two foam hoses are being used at the same time, whichever is the greater. The expiration date of the foam in the tank shall be clearly painted on the tank.
5. All control valves shall be individually and clearly marked as to their function. A simple flow diagram shall be located beside the control valves showing their function. Except for drills, the foam valve should be left in the ON position at all times.

Areas to be covered by an AFFF deluge include --

1. Streamer reels.
2. Internal streamer storage areas.
3. Compressors, if not protected by Halon 1301.

Areas to be protected by the AFFF foam hoses include --

1. Streamer storage areas.
2. Streamer work areas.
3. Streamer oil pump.
4. Helicopter deck.

The system shall be tested weekly without foam. It shall be tested for a short period with foam at least once every three months. The system shall have sufficient spare AFFF liquid to allow the foam tanks to be completely refilled if empty.

Fire Fighting

The Master has overall responsibility and coordinates all activities according to his judgement of the total situation.

He will issue the emergency messages and notification to be dispatched, call for any possible outside assistance, or abandon the vessel.

The chief officer is his deputy, and is responsible for coordinating all activities concerned with the fire fighting fireteams, technical fireteams, and different operations that have to be executed during an emergency. He reports directly to the Master. The chief engineer is responsible for firefighting in the engine, compressor, and propeller room.

General precautions --

1. Upon detection or suspicion of fire, immediately raise fire alarm and request help.
2. Try to extinguish the fire with the use of hand-held extinguishers, blankets, clothing, or other similar items.
3. If unsuccessful, seal off all openings feeding air to the area to prevent spreading of the fire.
4. Search the surrounding area for people overcome by smoke or trapped by the fire. If rescue is impossible due to fire or smoke, report immediately to the bridge for help.
5. Do not open doors or hatches that may supply air to the fires until adequate equipment is ready. Normally, there will be a small explosion when operating doors or hatches.
6. Search the surrounding area for people overcome by smoke or trapped by the fire. If rescue is impossible due to fire or smoke, report immediately to the bridge for help.
7. Be aware that smoldering fires develop poisonous gases that are odorless and invisible.
8. When an alarm is raised, all personnel must immediately meet at their muster station in order to stand by for fire-fighting/searching efforts, and to establish if anyone is missing.
9. When a fire alarm sounds, be observant to any orders or information given on the PA system.
10. When the HALON alarm is sounded, evacuate the area immediately. All personnel should report to their assigned muster station.

11. If any person is trapped in the Halon area, it must be reported to the Master/bridge immediately.

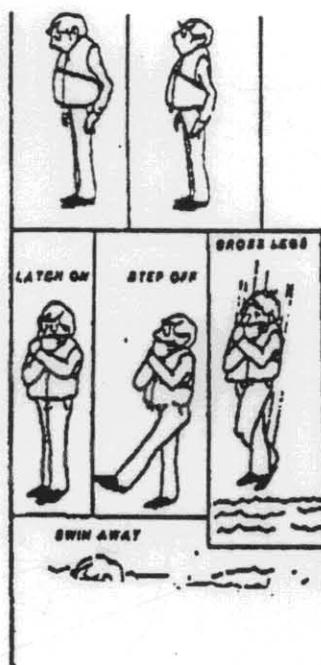
Abandon Ship

In the event of an abandon ship emergency --

1. Muster at assigned stations.
2. Do not take personal belongings.
3. Check that all personnel are accounted for.
4. Prepare the rescue craft for launching.
5. Only abandon ship upon command from the Master.
6. If time permits, launch the rescue boat.
7. Take on as many extra blankets, food, and water as is feasible.
8. Enter the rescue craft in as dry a condition, as possible.
9. Join all rescue craft together and stay together if at all possible.
10. Check that all personnel are accounted for.
11. Do not abandon the vessel except under the Master's command and/or unless absolutely necessary.
12. Do not re-board the ship unless given a verbal order from the Master.
13. If abandonment is required, the escape choices, in order of preference are: lifeboat, open life raft, and life float.
14. Avoid putting your body in the water. Only if all else fails should you enter the water.
 - A. An important factor in making a safe entry into the water is the distance from the water. The higher you are, the greater the chance of injury. Get as close as possible to the water before making the entry. Stairways, ropes, hoses, Jacob's ladders, and scramble nets are useful in getting closer to the water.
 - B. Steps when entering the water --
 1. Look down -- make sure that you have a clear area in which to jump. Be aware of the sea state, wind direction, and

current. If an obstruction is below, move to the side rather than attempting to jump past it.

2. Look straight ahead -- focus your eyes on a fixed point (the horizon). Do not enter the water looking down.
3. Latch on and apply maximum pressure to your personal flotation device (PFD) using your inner arms. Protect your face by covering your mouth and nose with one hand.
4. Step off -- take a big step out away from the structure. Lock your legs together.
5. After entry -- move to a safe area as quickly as possible and group together with the other survivors while awaiting rescue. Stay together if at all possible.
6. Move clear if the vessel is sinking.



DIGICON SAFETY
HEALTH, SAFETY AND ENVIRONMENTAL
ACTION PLAN
FOR
MARINE SEISMIC SURVEYS

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2. IDENTIFICATION OF MAIN RISKS
3. ACTION PLAN
4. SAFETY ACCOUNTABILITY FOR STAFF

**DIGICON SAFETY
HEALTH, SAFETY AND ENVIRONMENTAL ACTION PLAN**

1. OBJECTIVES

The target for the operation is:

- ZERO FATALITIES
ZERO LTI
ZERO RWC
ZERO ENVIRONMENTAL DAMAGE

It is considered that this target can actually be achieved.

- To improve continuously on accident and incident prevention by preplanning, implementation of procedures and a direct safety accountability scheme.
- To create the necessary safety awareness amongst all crew members and sub-contractor's staff.

**DIGICON SAFETY
HEALTH, SAFETY AND ENVIRONMENTAL ACTION PLAN**

2. IDENTIFICATION OF MAIN RISKS

A. Seismic Acquisition Vessel

1. Fire
2. Falling off stairs, falling off ladders, slipping in wet alleys, etc.
3. Handling of high pressure equipment
4. Work on deployed streamer
5. Confrontations with fishermen

B. Small Boat Operation

1. Operation in surf
2. Boat to boat transfer

C. Base Station Operation

1. Tower Construction
2. Environmental damage

D. Land Transport

1. Traffic accidents for one of the vehicles on hire

E. Support Vessel

1. Fire
2. Man overboard
3. Crane operation
4. Environmental pollution

**DIGICON SAFETY
HEALTH, SAFETY AND ENVIRONMENTAL ACTION PLAN**

3. ACTION PLAN

Standards for the operation are in line with Digicon, IAGC and EP-Forum guidelines, and all other regulations, requirements and rules as described in the Seismic Acquisition Contract.

A. Direct measures for identified high risk aspects:

See Chapter 2

Seismic Acquisition Vessel

- ad 1. - Regular fire drills
 - Sufficient fire extinguishers, proper type and in good condition
 - Proper storage of hazardous materials, chemicals
 - Four recognized fire fighters on board
 - Fire prevention procedure in place as per Digicon Safety Plan

- ad 2. - Special warnings and training given during safety meetings
 - Non-slip conditions where possible
 - Ladders and galleys to be well maintained

- ad 3. - Procedures from Digicon Safety and Safety Manual Instructions in place
 - Work permit for handling high pressure equipment

- ad 4. - No in water work at night time on deployed streamer
 - All work to be supervised by management

- ad 5. - Special safety liaison/damage team available

DIGICON SAFETY HEALTHY, SAFETY AND ENVIRONMENTAL ACTION PLAN

Small Boat Operation

- ad 1. - No work when wave height exceeds 2ms
- All occupants of small boats wear approved PPE and life saving equipment
- All occupants of small boats must have passed the swim test
- Safety procedure in place as per Digicon Safety

- ad 2. - Supervised by senior and line management personnel
- Safety procedure in place as per Digicon Safety

Base Station Operation

- ad 1. - Procedure for tower construction in place as per Digicon

- ad 2. - Procedure for base station operators in place as per Digicon Safety and per seismic acquisition

Land Transport

- as 1. - No night driving unless approved
- Defensive driving course for drivers
- Standards/procedures in place as per acquisition contract and Digicon Safety

**DIGICON SAFETY
HEALTH, SAFETY AND ENVIRONMENTAL ACTION PLAN**

Support Vessel

- ad 1. - All crew to attend fire fighting courses
 - Upgrade of vessel in line with Digicon guidelines
 - Regular fire drills
 - Breathing apparatus on board
 - Sufficient fire extinguishers on board
 - Sufficient fire fighting equipment on board (hose, pumps, monitors, etc.)

- ad 2. - MOB drills regularly
 - MOB boat launch and recovery drills
 - Emergency procedure in place as per Digicon Safety

- ad 3. - Crane operation work permit
 - Warning signs; hard hat area

- ad 4. - Ship's waste, management in line with Digicon Safety and Marpol regulations

B. Training

Sea Survival:

All those who go offshore for more that 5 days are required to have followed a Company recognized sea survival course. This includes the support vessel crew and all Company staff. (Contact Digicon Safety for approved courses)

**DIGICON SAFETY
CONTINGENCY PLAN FOR MARINE SEISMIC OPERATIONS**

4. ACCIDENT PROCEDURE

1. Procedure to follow in case of an accident:
 - 1.1 Call Party Manager or Navigation coordinator (see flow diagram).
 - 1.2 Indicate details of accident and advise on condition of injured personnel:

Name, date of birth and nationality
Location, date and time of accident
Cause of accident
Status of injuries
Treatment given and treatment prescribed
Passport number details
 - 1.3 Digicon operations to organize any medevac or follow-up, based on medical advise.
 - 1.4 In case of helicopter medevac or if desirable for any other reason the client operations will be contacted. The decision on helicopter medevac will be based on additional medical advise.

**DIGICON SAFETY
HEALTH, SAFETY AND ENVIRONMENTAL ACTION PLAN**

First Aid:

Each operational unit will have at least two certified first aid trained staff at all times.

Driver Training:

All drivers shall have followed a defensive driver training program.

Swimming:

Each crew or staff member traveling or working offshore, must be swim tested.

Safety Management Training:

All management (junior and senior) shall have Phase One of Safety Management (contact Digicon Safety for course).

Induction Training:

All newly arrived personnel, to be met, signed on log and given safety briefing upon boarding vessel. All crew to follow and induction program within 24 hours after joining the operation.

C. Audits

Digicon Vessel: Vessel audited twice a year by Digicon Safety (together with Client's audit team).

Surprised visits by Digicon Safety.

**DIGICON SAFETY
HEALTH, SAFETY AND ENVIRONMENTAL ACTION PLAN**

Support Vessel: At pre-hire audit by Digicon Safety and at any surprise visit.

One start-up audit (together with Client's audit team).

General Operation: Operation audited at each visit

D. Awards

Digicon Safety award system in place.

E. Contingency

Medevac contingency plan in place and known to all supervisors and radio operators.

F. Reporting

Reporting on daily base by Company Representative, on weekly basis by Company Rep in writing.

Digicon to report in Safety Meetings, operations report as required by client.

G. Drills

Abandon ship drills, fire drills, man overboard and recovery drills shall take place at least fortnightly in favorable weather conditions. Details of these drills shall be logged.

H. Safety Meetings

All personnel involved in the operation shall attend regular safety meetings (weekly).

**DIGICON SAFETY
HEALTH, SAFETY AND ENVIRONMENTAL ACTION PLAN**

I. Verification

Client representative to verify safety standards as required.

Client supervisors to visit operation as required.

Client management to visit the operation as required.

J. Work Permit - Personnel

Only those crew members who have had a medical check-up within the year prior to start of operations, attended the swim test and followed the required safety training.

K. Medical

Trained medical personnel shall be on board at all times.
Emergency medical assistance agency on contract/call at all times.

L. Contracts

All contracts to include safety standards and specify accountability.

M. As described by Digicon Safety, all appropriate regulations and requirements and as specified in the acquisition contract.

DIGICON SAFETY
CONTINGENCY PLAN
FOR
MARINE SEISMIC OPERATIONS

**DIGICON SAFETY
CONTINGENCY PLAN FOR MARINE SEISMIC OPERATIONS**

VIII. OIL SPILL

Oil Spill Action Plan

In the event that an oil spill should occur the party manager and/or navigation coordinator should be immediately informed.

- Priorities:
- 1) personnel safety
 - 2) fire prevention
 - 3) eliminating the source
 - 4) prevention of slick from reaching environmentally sensitive locations

Reporting

Any oil spill or discharge of oil/water mixtures should be reported to the client.

ENVIRONMENTAL GUIDELINES FOR WORLDWIDE GEOPHYSICAL OPERATIONS

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GENERAL OPERATING GUIDELINES

INTRODUCTION

Geophysical surveys are used to plan drilling and mining operations and reduce the number of surface locations needed for mineral resource development. Such information may help evaluate facility sites to avoid placement on fault, earthquake or other hazardous zones.

Geophysical operations are localized and of limited duration. These guidelines have been prepared in the interest of continuous improvement in environmental performance. Consideration in their preparation was given to:

- Various environments, ranging from the arctic to rain forests, deserts to oceans, highlands to marshes and wetlands.
- Work functions performed, including accessing, clearing, shot-hole drilling, logistical support, camps and clean-up.
- Both real and perceived environmental issues in the diverse operating areas.
- Varying environmental regulations across political boundaries and public interests.
- Balancing safety, health and environmental issues.

These General Operating Guidelines apply to Land and Marine operations, whereas the specific sections which follow apply only to certain operating conditions.

Procedures in the specific sections take precedence over the general section. For example, the general section for camps contains procedures for sewage sumps and water wastes, while the arctic section on camps states that these wastes must be contained and disposed of by other methods and vessels at sea may have their own sewage treatment systems.

These guidelines are intended to be applied with sound judgement, practical experience and technical competence. This document provides guidelines only. Under no circumstances does it replace existing legal requirements nor any operational conditions or agreements. IAGC members may supplement these guidelines as appropriate to specific circumstances.

ENVIRONMENTAL ISSUES

Care of the environment requires knowledge of the effects of geophysical operations. Issues which should be addressed in planning include:

Water

Drinking water supplies, biological habitats and recreational usage depend on water quality; therefore, surface and groundwater should be safeguarded by careful practices in the field.

Vegetation

Accessing and operating within an area may require some temporary alteration to vegetation. This should be minimized because disturbance to vegetation may result in subsequent erosion and can raise aesthetic issues. Cutting down or driving over vegetation can also affect feeding and nesting of animal wildlife.

Animal Wildlife

Operators should be alert to the presence of animal wildlife in an area during geophysical activities, which may cause temporary relocation of animals. Care should be taken to avoid adversely affecting nesting, feeding and migration.

Aquatic Life

At times it may be necessary to adjust geophysical operations due to effects on aquatic life such as migratory and breeding areas and seasons. Local authorities, experts, and/or agencies should be contacted for information early in the planning process. Coral reefs require special avoidance plans, particularly with respect to energy sources, recording cables, and anchoring. Consider noise and boat speed effects on aquatic life.

Erosion

Erosion is a gradual, natural process caused by wind and water. Altering surface conditions can change the rate and pattern of the erosion process. Erosion control measures can reduce the effect of operations, particularly in areas with steep slopes, high winds, rapid water flow or freezing and thawing weather conditions.

Air

Emissions and noise are factors which can disturb wildlife and humans. Emissions include exhaust and odors from engines, camps and incinerators. Properly designed, maintained and operated equipment can reduce these effects.

Waste

Waste materials may include petroleum products and solvents, general camp wastes such as food, trash and sewage, and equipment wastes such as worn-out parts. While some wastes can be disposed of properly on site, some will require transportation to an authorized recycling or disposal facility.

Archeological

Archeological sites are generally of historical or cultural significance. If a suspected site is encountered, crew personnel should be instructed not to alter the site. The proper authorities should be informed of the location.

Cultural and Subsistence

Varying cultures will be encountered by geophysical crews. Local customs, traditions and religious beliefs should be considered while planning and conducting an operation. Communication with area residents can often minimize concerns.

Commercial and Recreational Activities

Existing commercial and recreational activities are generally compatible with geophysical operations. Communication with area users can improve coordination among parties, whether on land or water.

In addition to real environmental effects, there are effects which those unfamiliar with geophysical operations perceive to be real. Educating the public during the planning stage could minimize these misperceptions.

ENVIRONMENTAL MANAGEMENT

Environmental responsibility should be incorporated into management systems to assure implementation of environmentally responsible operating practices. Environmental management is a line management responsibility which should include the following:

- Communicate management policies and commitment of those involved.
- Provide financial and personnel resources.
- Environmental accountability assignments to all parties and personnel for -
 - . Operating procedures.
 - . Standards and targets to be achieved.
 - . Training of affected personnel.
 - . Monitoring and auditing systems.
 - . Emergency response planning.

Environmental Monitoring

Monitoring before, during and after a geophysical operation measures the effectiveness of an environmental program. The monitoring will be site specific in many cases, with considerable variation from region to region. In some cases, there may be specific legal monitoring requirements. Operators should consider an evaluation of environmental performance at the conclusion of an operation to facilitate improvement.

Environmental Audits

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Environmental audits provide an internal control to ensure planned procedures are followed and should be an alert to potential problems that should be addressed. Audits should be undertaken on a timely basis in order to:

- Ensure that operations follow regulations, policy and site specific procedures.
- Verify that monitoring practices are effective.
- Identify procedures that can improve effectiveness.
- Ensure that field operations follow planned procedures.

Ideally, audits should be conducted by the environmental staff and line management. The audit results should be documented for follow-up by line management, and opportunities for improvement identified.

Project Review and Final Report

On completion of the survey, a review should be done to determine:

1. Was waste properly disposed of?
2. Was any fuel spilled?
3. Was any recording cable oil lost?
4. Was any equipment lost?
5. Were all applicable reports filed?
6. Have all regulations been satisfied?

A final report may be required by the client. It may include:

- Dates when the work was performed and the number of kilometers surveyed.
- A map showing the location of all lines.
- A map showing the location of significant environmental disturbances.
- A description of the disposal methods of waste.
- A statement of clean-up activities performed.
- Anchor log, with map, for vessels.

Environmental Training

Environmental operating procedures and policies must be understood for effective implementation. Training will provide this understanding. Emphasis should be placed on the importance of each individual's environmental performance.

Training should be conducted on appropriate environmental issues according to job responsibility. While managers should be trained on environmental regulations and how they affect company liability so they can prepare plans, operating personnel should be trained in procedures for specific tasks.

Operations training should include information on:

- Regulations which apply.
- Wildlife and aquatic life which might be encountered.
- Current land and water use.
- Local cultures and archaeological sites.
- Clearing, access and transportation.
- Waste minimization, handling and disposal methods.
- Fire prevention and control.
- Handling and storage of hazardous materials, fuels and oils.
- Shot hole plugging.
- Reclamation measures.

Environmental training should be addressed during planning and be continued into the routine safety and crew level meetings. Training can be accomplished through supervisory coaching, refresher courses, regular meetings, on-the-job training, newsletters, posters and video presentations.

PLANNING

The planning process of any geophysical operation is most important to its success. Environmental issues must be part of both pre-survey and daily planning. The contractor and client should mutually ensure that relevant environmental issues are addressed during the planning stage.

Environmental stipulations may be imposed by the client's and contractor's policies and procedures, the landowner, and local and national governments' regulations. An understanding of these regulations, together with an environmental description of the survey area provided by the client, are needed to successfully complete the pre-survey plan.

A meeting involving all on-board personnel should be scheduled to ensure that each person understands what can, and cannot, be done. Everyone should become familiar with reporting procedures. Early, positive action to assist with clean-up of all environmental problems, regardless of cause or responsibility, should be emphasized. An Emergency Response Coordinator with prior spill response training should be designated. Each vessel and crew should have adequate supplies of containment and clean-up equipment on board.

Pre-Survey Planning

Pre-survey planning should address the following questions where relevant:

Time of year -

- How will conditions change?
 - . Freezing and thawing.
 - . Rainy season - flooding.
 - . Animal and bird breeding areas.
 - . Hunting seasons.

Regulations -

- What regulatory agencies will be involved in the survey?
 - . Which is the lead agency?
 - . When should the project be discussed with regulatory agencies?

- Have the environmental regulations been reviewed concerning:
 - . pollution?
 - . hunting?
 - . access?
 - . timber cutting?
 - . endangered species?
 - . permitting?
 - . noise?
 - . harvesting?
 - . claims settlement?
 - . employment of labor?
 - . land use?
- What reporting is required for contractor, sub-contractors and client?
 - . Do all parties understand their reporting responsibilities?
 - . How is this information to be documented during operations?
- How far in advance do the notices or permit applications need to be submitted?

Scouting -

- What remote sensing information is available that may assist the planning of the operation?
- What operators have worked in the survey area?
- Are previous environmental profiles of the survey area available?
- Who needs to be contacted to establish mutual understanding?
 - . government representatives?
 - . general area landowners?
 - . interest groups?
- Are there seasonal access restrictions?
- Can survey lines and logistic access routes utilize existing trails?
- How can survey lines and logistics access routes be positioned to minimize water crossings?
- What are the environmental implications of the equipment selected?
- Can the survey be adjusted to avoid terrains for which the crew is not properly equipped?
- What are water supply aquifer depths?
 - . Should a pre-survey water sample be obtained from existing wells?
 - . Should the flow rate be measured and recorded?
- Is water removal from streams, lakes, rivers and/or stock tanks allowed?
- What information can be obtained and plotted on area maps or air photos to aid in operational planning?
 - . Area of responsibilities of the different regulatory agencies?
 - . Existing access, line, camp and other clearings that could be used for this survey?
 - . Springs, wells, dams and other water resource areas?
 - . High population areas?
 - . Commercial forests and cultivated farmland?
 - . Permanent structures such as pipelines, oil and gas wells, and buildings and their set-back zones?
 - . Flood plains and wetland areas?
 - . Steep slopes that require special access or erosion protection?
 - . Sensitive and unique areas (e.g., coral reefs, waste disposal sites and ordinance areas)?
 - . Significant known archaeological, historical or cultural places?
 - . Local hunting and fishing areas and trap lines?
 - . Native allotments or reservations?
 - . Special permit areas?
 - . Significant wildlife breeding, nesting, spawning or migration areas?
 - . Diving or underwater operations?
- Are there a sufficient number of maps for distribution?

Cultural -

- What cultural issues need to be addressed?
- What sites are of particular cultural importance?

Wildlife -

- What species of plants, animals and aquatic life are present?
 - . What procedures should crew members follow when they are encountered?
- Will any migration paths be occupied for significant periods?
- If the survey area contains endangered species, where can identification photographs be obtained?
 - . What identification training is needed?
 - . What special reporting procedures are needed?

Emergency Response -

- What emergency response plans are needed?
- What hazardous materials storage and use plans are needed?
 - . What are the appropriate area regulations?
 - . Can non-hazardous substitutes be used?

Operations -

- What are the regulatory restrictions or limitations on equipment?
- How will compliance with regulations and guidelines be monitored?
- What are the specifics on all permits?
- What field crew environmental and safety training is needed?
- What are the disposal requirements in the project area?
 - . What disposal facilities are available?
- What procedures should be followed, and who should be contacted in case of flowing shot-holes?
- What are the energy source adjustments when approaching set-back zones for structures, water wells and water bodies?
- What reclamation measures are appropriate and what will be needed?
- Will there be a congestion of land crews or vessels in the survey area?

Daily Planning

Daily planning should address the following questions where relevant:

- What steps will be taken to minimize -
 - . Vegetation clearing?
 - . Vehicle, boat, aircraft and foot traffic?
 - . Travel in sensitive wildlife areas?
 - . Stream crossings?
 - . Fire hazards?
 - . In-field equipment maintenance?
 - . Risk of fuel spills?

- What daily routine will ensure -
 - . Proper waste disposal?
 - . Progressive line and camp clean-up?
 - . Vehicle leak or spill detection?

EMERGENCY RESPONSE PLAN

Planning reduces the potential for emergencies and their severity. Operators should prepare an emergency response plan during pre-survey planning. The IAGC Safety Manuals for Land and Marine Geophysical Operations are recommended for assistance in developing safe operating procedures. Consider the following in developing the Emergency Response Plan:

- What events could require emergency response during this project?
 - . Significant spills.
 - . Other waste spills.
 - . Damage to wells, pipelines and other surface structures.
 - . Fires and explosions in the survey area.
 - . Medical evacuation.
 - . Other emergencies (e.g., floods, storms, civil unrest).
- What key steps are needed to recover from these incidents?
- Who is the Emergency Response Coordinator?
- How will the Emergency Response Plan be documented and posted?
- Who will act as public spokesperson?
- What are the responsibilities of individual crew members?
- What emergency response drills are needed?
- What reporting procedures are needed to government agencies by both the contractor and the client?

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LAND OPERATIONS

(To be used in conjunction with the General Operating Guidelines)

START-UP

An environmental and safety meeting should be conducted at start-up and should be attended by a client representative. It is important that field workers and their supervisors understand what is required of them. More background may be needed for those less experienced. Document attendance and topics covered at all environmental and safety meetings. Additionally, the following should be addressed prior to start-up:

- Reconcile environmental and safety conflicts.
- Explain the environmental planning to pertinent agencies.
- Discuss environmental issues and reporting procedures with crew supervisors and managers, senior crew personnel and sub-contractors.
- Describe the emergency response plan, including functional responsibilities, to all personnel.

CLEARING

When clearing areas for geophysical operations, whether preparing lines, access routes, campsites or helipads, the objective is to provide sufficient and safe access for personnel and equipment while minimizing environmental effects. Excessive clearing of trees can increase erosion, and clearing near water bodies can increase sedimentation and affect fish populations. Clearing activity may also disrupt wildlife; fallen vegetation can block natural drainage routes; and a straight, uninterrupted field of view down a survey line in a forest can be aesthetically disturbing. Lines may also be used to access new areas, possibly increasing poaching and colonization.

Reducing the effect of clearing can be achieved by minimizing the amount of vegetation that is cut. Regeneration can be assisted by leaving root stock in place or by reseedling or replacing with appropriate plants.

Hand Cut Lines

Lines should generally be hand cut for heliportable operations, on steep slopes, at water crossings, and in rain forests.

- Minimize the amount of vegetation disturbed.
 - . Minimize the width of the line consistent with safety (e.g., no wider than two meters).
 - . Do not cut trees of a diameter greater than the local regulations permit (or, in the absence of regulations, greater than 20 centimeters).
 - . Leave in place smaller vegetation, low shrubs and grasses consistent with a safe walking surface.
 - . Leaving the topsoil, root stock and seeds on the line will encourage better regeneration.
- Remove leaners (cut trees that have not completely fallen) to prevent them from pulling down other trees, to enhance decay and to prevent injury when it falls.

- Implement fire prevention measures if fire hazards exists.
 - . Do not build fires when the vegetation is dry.
 - . Prohibit unsupervised smoking or ban smoking entirely.
- Do not fell trees across pipeline right-of-ways, trails or watercourses.
- Try to cut and scatter limbs to ensure that tree trunks fall flat to the ground. Contact with the ground speeds up decay.

Access Roads and Vehicular Survey Lines

Clearing vehicular access to, or along, the line is generally done with a bulldozer or grader. When a line is cleared by this method, close supervision of equipment operators is needed to ensure adherence to procedures and regulations to avoid making such access deeper and wider than required.

- Use existing routes as much as practical.
 - . Isolated trees and significant stands of vegetation should be left undisturbed if practical.
 - . Weave around trees using the path of least resistance to minimize timber loss.
- Keep the route width to a minimum.
 - . Minimize the width of the route, particularly at water crossings.
 - . Clear minimal passing areas as needed and approved.
- Keep routes away from water bodies, if practical, except at crossings.
 - . Hand cut lines at water crossings to prevent putting sediment and brush into water.
- Do not block or fill any natural drainage paths.
- Allow cross route drainage.
- Access roads should be on contour to minimize erosion, where possible.
- Build periodic diversions to prevent the route from becoming a new drainage path.
- On side slopes, tilt route slightly downhill to allow better drainage and reduce erosion.
- Dragging is preferable to cutting and filling when preparing route for wheeled vehicles.
- Avoid bulldozing or grading steep slopes. If the route is on a steep slope, hand cut the line when practical.
- Build gates at fence crossings to reduce drive-arounds, if allowed by the fence owner.
- Interruptions in the line of sight make the route less obtrusive.
 - . Put in a dogleg in the route where it intersects a road or water body.
 - . Alternatively, do not clear a short portion along the line when practical.
- Routes should be abandoned to discourage use of routes after operations to reduce colonization effects.
 - . If a landowner requests a route for his own use after operations, make the landowner aware of any adverse environmental effects that may result.
 - . Check with local authorities before providing a route.
- Choose a direction in which to fell trees to reduce collateral effects and promote regeneration.
- Cut tree limbs so that tree trunks fall flat to the ground to speed up decay.
- Remove leaners when it can be done safely.
- Where needed back-sighting is blocked by a branch, remove it rather than the entire tree.
- Control visitors and noise.
- When bulldozers are necessary to obtain area access:
 - . Keep blade about 10 centimeters above the ground to leave the root stock in place.
 - . A cutter blade behind the main blade can cut off small shrubs above the ground.
 - . Lower the blade only to remove objects that could create a safety hazard.

Camp Clearings

The main goal is to minimize environmental impacts by minimizing the number of camps, as well as the size of the area that must be cleared.

- Ensure that camps are located in permitted areas.
- Plan camps to minimize the number of sites needed.
- Use natural or existing clearings to the maximum extent possible.
 - . Use camp sites from previous operations when possible.
 - . Use the same fly camps for all crews.
- Minimize the size of the cleared area, consistent with safety and health considerations.
- When clearing a camp site, minimize disturbance of top soil and vegetation root stock as much as possible.
- Minimize the area used by vehicles in the camp.
- Locate camps above the highest annual flood level, if practical.
- Do not permanently disrupt the natural drainage of the area.
- In areas of heavy rainfall, disperse runoff from the camp in order to minimize erosion.

Helipads and Airstrips

Clearing areas for helipads and airstrips is very similar to clearing for camps, except that more attention must be paid to any tall, surrounding trees that could interfere with the flight path on approach or take-off of an aircraft.

- Use existing or natural clearings rather than clearing new areas.
 - . Plan helipads and airstrips in areas of sparse vegetation.
 - . Use hilltops for helipads, or build them next to water bodies to reduce the need for clearing.
 - . Use line intersections as helipads where appropriate.
 - . Make multiple use of camps and helipads (i.e., use the survey fly camp as a helipad later).
- Keep the clearing to a minimum size consistent with safety. Consult the aviation sub-contractor for guidance.
- Do not disrupt the natural drainage of the area.

Brush disposal

Reducing the amount of vegetation cut reduces the amount of disposal necessary. Generally:

- In commercial logging areas, coordinate with forestry officials and permit holders.
- Dispose of brush progressively with clearing.
 - . Dispose of brush out of the way of access roads.
 - . Do not burn brush.
 - . Do not dispose of brush in water bodies.
- Remove obstructions to natural drainage created by the operation.
- If needed, windrows should be on the downhill side of the right of way to act as a sediment trap and to reduce erosion.
 - . On level terrain, windrows may leave visible signs and have the potential to block or channel water flows.
 - . To reduce the fire hazard, windrows should not be pushed against standing timber.
 - . Compact the windrow to speed up decay, or roll it back over the line to prevent access.
 - . Alternate windrows to opposite sides of the line to allow fire breaks and access.

RECORDING OPERATION

Recording crews should pay attention to fire prevention. Allow supervised smoking only at designated times and locations. Restore the line according to the reclamation plan, unless otherwise specified.

- Drive only on designated roads and trails.
- Prohibit unsupervised smoking or ban it entirely, especially when working in dry, vegetated areas.
- Clean-up lines progressively -
 - Clean up shot-hole locations.
 - Pick up debris, garbage, pin flags, survey stakes, flagging, etc.
- Restore according to the reclamation plan.

Report any remaining clean-up or restoration needed for attention by a special reclamation crew.

TRAVEL

Land Travel

Terrain and other environmental conditions vary to the extent that specific rules for land travel can only be stated in general terms. Where regulations do not exist, common sense should prevail.

The following recommendations apply to some or all of conditions existent in land travel and, in general, are intended to be useful in formulating a common sense approach to addressing environmental concerns for any given area of operations.

- Travel on existing roads, trails, or fence lines, wherever practical.
 - Use a "no short-cuts" policy.
 - Minimize travel along the line by good daily planning.
 - Minimize activity off the line.
- Limit vehicle speed to avoid damage to top soil and raising dust.
- In the absence of specific guidance, use vehicles which do not create ruts.
 - Try to prevent creation of ruts in order to minimize line width.
- Plan efficient refueling of vehicles daily to minimize travel and the chances of spills.
 - Periodically check for leaks under all operating vehicles; contaminated soil should be removed for proper disposal.
 - Keep a daily leak/spill report for each vehicle; repair at the next opportunity.
- To prevent fires when driving over dry grasslands, clear the undercarriage of brush.
 - Be especially careful of catalytic converters, as they operate at high temperatures.
 - Spark-arresting mufflers should be used in dry areas.
- Fire fighting equipment should be available while operating in dry areas.
 - All vehicles should carry a suitable fire extinguisher.
- Do not throw litter or cigarettes out of vehicles.
- Take special care while driving where there is wildlife to avoid accidents.
- Do not sound the vehicle's horn near colonies of birds or other wildlife.
- Control site access by visitors and unauthorized personnel.

Water Travel

Caution and common sense can help minimize environmental effects of travel on water. Water travel is preferred to off-road land travel. When travelling in water, care should be exercised to reduce the risk to aquatic life. Speeds should be adjusted to minimize wake to protect shorelines. Fuel transfer and handling should be done in such a way to prevent spills.

- Slow speeds will minimize bank erosion.
- Be cautious of aquatic life.
- Plan operations which are in nesting areas and areas where aquatic life exist to minimize disturbances.
- Fuel tanks must have caps and should not be filled over the water.
- Absorbent materials should be kept on board in case of small fuel spills.
- Docking areas should be planned such that safe and environmentally sound supply, maintenance and refueling activities can take place.

Air Travel

The physical effects of air travel are generally limited to the landing areas. Flight paths and approaches should be planned to minimize disruptions to animals due to noise and downdrafts, which may also create a nuisance in populated areas.

- Aircraft in flight should maintain a suitable altitude, consistent with local regulations and safe operating practices, to avoid unnecessarily disturbing wildlife and people.
 - Aircraft should keep an appropriate distance from sensitive wildlife areas.
 - Aircraft should maintain a suitable distance from cliff faces where there are nesting birds.
- Locate landing areas and flyways to minimize disturbance to wildlife and the public.

STREAM CROSSINGS

Types of stream crossings include fording, log fill bridges, timber bridges, culverts, snow and ice bridges, and boats. Stream crossings will depend on the terrain and the equipment being used. Vibrator operations have different requirements than portable crews.

When making stream crossings, care must be taken not to permanently disrupt the natural habitat. Disruptions include increased sediment in the stream, blockage of fish migration and removal of stream bank vegetation, as well as permanent alterations to the watercourse or its flow rate.

If temporary structures are required, construction materials should be removed once the crossing is no longer required. If a more permanent crossing is required, careful consideration must be given to the construction of the crossing so as to minimize the effect to the nearby land and water.

Fish migrate for reproduction, growth, and, for smaller fish, to escape predators by moving to smaller channels. Migrations can occur over long distances and durations. In cold climates, fish move downstream to deep pools for over-wintering before the winter freeze sets in. Schedule activities to minimize effects.

Stream bank vegetation shades the stream, keeping temperatures down. If the temperature rises, the fish population will move to more favorable habitats, if available, or may be replaced by a warmer water fish species. Stream bank vegetation should not be disturbed by survey line crossings, and camp construction near streams should be planned with environmental effects in mind.

Fords

Shallow fording is simply finding a good, safe spot in a stream and driving or walking across. Ideally, the crossing will be in a area with a firm or gravel bottom. Existing stream crossings should be used whenever practical. The key objectives are to reduce sediment disturbance in the stream and potential erosion of the banks.

- Scout for a place to ford the stream where:
 - There is a shallow, stable approach.
 - The water is not too deep and has a firm or gravel stream bed.
 - Minimal clearing of stream bank vegetation is necessary.
 - The approach is not on the outside of a bend in the stream.
 - Sediment disturbances will not affect fisheries or fish pools immediately downstream.
- Minimize the number of fords created by utilizing nearby existing crossings.
- Hand cut vegetation at the approach and move it away from the stream. Do not allow debris to fall into the stream. If necessary, stabilize the approach with a clean, coarse granular material or by using wooden planks or metal runners.
- Ensure that approaches do not permanently alter the natural drainage into the stream. Temporary run-off diversion may be appropriate to minimize erosion and vegetation loss.
- Cross at right angles to the stream. Drive slowly and do not spin the vehicle's wheels.
- Minimize the number of fordings by good daily planning.

Log Fill Bridges

Log fill bridges may be used in operations requiring unusually heavy equipment to cross a stream. These bridges are structurally superior to piling brush and debris over a stream in order to cross. Log fill bridges are best used when there are no fish present in a stream, when fish passage is not required, or when the stream channel is dry. The logs can be re-used for other bridges and, in any case, should be removed from the stream bed upon completion of the survey.

Snow and Ice Bridges

Snow and ice bridges facilitate safe crossings of frozen streams where they are not already frozen down to the stream bed, and which otherwise would not bear the weight of vehicles crossing. They may also be used to reduce bank erosion. These bridges thaw at the end of the winter season. They should not alter the water flow or quality of the stream in the process. If the bridge could form a temporary dam while thawing, a "V" should be cut into it when abandoned.

- Scout the area to find the best place to construct the bridge.
- It is desirable to construct the bridge where:
 - Approaches are of low slope.
 - Minimal hand clearing of stream bank vegetation is necessary.
 - There are no pools for over-wintering fish.
 - Fish migration channels will not be closed.
- Ensure that the bridge is thick enough to support passage and check it frequently. Check the weights and ground pressure of all vehicles which may use the bridge.
- Do not build an ice bridge that will stop the flow of the stream under the ice. Full depth freezing will cause icings further upstream and could reduce the pool size for over-wintering fish.
- Culverts can be used to handle overflow but must be removed before the thaw.

- Use only snow and ice to construct the bridge or its approaches. Do not use soil or debris in construction.
- Construct approaches with snow or ice of sufficient thickness to protect the stream bank.
- Equipment which falls through the ice must be removed as quickly as possible.
- Cross ice bridges quickly to avoid crushing.
- Minimize the number of crossings by efficient planning.

Timber Bridges

Timber bridges may be used for crossing small creeks, streams, and swamps to ensure employee safety. The use of bridging over the stream minimizes the effects on fish. However, unauthorized use potentially promotes adverse secondary environmental effects; therefore, bridges should be removed according to the reclamation plan. Local timber may be used to build bridging, but tree cutting and clearing should be kept to a minimum.

Culverts

Culverts are sometimes used as temporary crossings of streams. They must be properly designed, installed and maintained to protect the stream and its environment. Other methods of stream crossing should be considered first.

Boats

Boat crossings do not normally present significant environmental problems, but do present significant safety issues. Adequate water depth is required to minimize effects on aquatic life. Docking facilities should be built to avoid erosion of banks. Measures must be taken to prevent discharge of fuels, oils and lubricants.

BASE CAMPS

Managing a base camp should assure health and hygiene while minimizing pollution due to camp wastes. Disposal of water usually can be through a properly functioning sump. Disposal of raw sewage can be through an approved septic system. Food wastes and packaging must not be left lying around, as they attract wildlife and are unsightly. Further, some packaging doesn't decay. Fuel and oils must be handled and disposed of properly.

Land Camps

- Locate sumps in a position where they are:
 - . In absorbent soil.
 - . Downslope and away from the camp (and downwind, if practical).
 - . Downstream from the camp water source and above the high water mark of any nearby water body.
- Construct a sump deep enough to contain the volume of waters from the camp, plus enough volume for rainwater, or cover the sump.
- Construct the sump so that surface water cannot run into it.
- Cover the sump to reduce access to insects and animals.
- When abandoning sumps, place an extra cap of soil to allow for compaction.
- Locate latrines a suitable distance from any water body.
- Handle sewage so that surface and groundwater are not contaminated.

- Store and handle fuels in accordance with the guidelines in the "Hazardous Material, Fuels and Oils" section.
- Separate waste materials and ensure appropriate disposal.
 - Materials suitable for recycling should be stored separately and recycled accordingly if such facilities exist.
 - Contain refuse prior to disposal.
 - Incinerate appropriate combustible waste daily. Ashes should be disposed of properly.
 - Do not incinerate hazardous materials.
 - Non-combustible garbage should be sent to a local, authorized disposal facility, if available, according to local regulations. In the absence of such facilities, waste should be buried at least one meter below surface.
 - It may be appropriate to bury biodegradable waste, provided health issues are addressed.
 - When burying waste, ensure that it is not in an area subject to rapid erosion or groundwater contamination.
- Level trailers by jacks rather than by levelling the ground.
- Ensure that drinking water meets health standards.
- Ensure that any fires are controlled, and that fire extinguishing equipment is available.
- Abandon campsites according to the reclamation plan.

Floating Camps-Quarter Boats

In some operating environments, camps and other facilities may be on boats or barges. This allows the camp to be moved intact, eliminating the need for land camps. These vessels should be self-contained with water and sewage treatment facilities.

- Choose mooring sites to minimize environmental disturbances.
- Remove waste and garbage to an approved facility for proper disposal.
 - Waste should not be discharged overboard.
- Explosives, fuels and oils should be stored in accordance with the section "Hazardous Materials, Fuels and Oils".
- Emergency procedures should be in place for containing inadvertent spills.

SHOT-HOLES

Environmental concerns include minimizing surface damage during shot-hole drilling operations, shallow aquifer protection, and proper plugging. If the hole is wet, it may have penetrated an aquifer and care may be needed to preserve its integrity. If aquifer contamination is perceived to be a problem, then coarse ground, chipped bentonite, or an equivalent can be used to backfill the hole. Bentonite in contact with water will expand, sealing off the aquifer. Special procedures are required to deal with flowing holes.

General Practices

- Ensure that the charge is deep enough and small enough to prevent the hole from cratering.
 - Do not drill holes deeper than the limit set by regulations or the permit.
 - Small charges in shallow holes (mini-holes) may be preferable in some operations.
 - Consider using certain types of explosions to minimize cratering.
 - Consider using biodegradable charges where appropriate.
- Ensure that appropriate offsets are used at structures and water bodies.

- Do not leave any refuse around the drill location. Do not burn trash at the location; remove it for proper disposal.
- Measures should be taken to ensure all charges are fired. Misfired charges should be disabled by breaking the capwire as deep as practical.
- After drilling and loading the shot-hole, backfill it with cuttings or another authorized material.
 - Avoid adding backfill material too quickly because it can cause bridging.
 - Place the shot-hole plug near the surface to avoid wash-in.
- Excess drill cuttings should be leveled out around the shot-hole, if regulations permit.

Wet Holes

- Backfill wet holes to just above the standing water level to protect aquifers.
 - When necessary, use loading poles to ensure the material is properly backfilled.
 - After covering the standing water level, cuttings and/or other authorized material should be used to fill the remainder of the hole.
 - Avoid adding backfill too quickly because it can cause bridging.
- Plugging and site reclamation for wet shot-holes is the same as specified in the General Practices section.

Flowing Holes

- If a flowing shot-hole occurs:
 - Attempt to plug it immediately.
 - Notify the Party Manager, who will then notify the authorities.
- Do not load explosives into flowing holes.
- If the flow is too great for backfilling, an inflatable plug can be placed at the top of the aquifer to stop the flow.

POULTER METHOD

The Poulter method uses explosive-filled pouches held on stakes commonly detonated above ground. Several pouches, each on an individual stake, are detonated simultaneously in a source array. The Poulter method has very little effect on the environment because the explosives are detonated above ground. The main concerns are safety, fire prevention and the effects on animals and people.

- The distance between the detonations and vegetation should be adequate for fire prevention (usually greater than one meter) and to minimize vegetation disturbance.
 - Low flash explosives should be used to minimize risk of fire.
 - Proper fire-fighting equipment should be readily available to the shooting crew.
 - Personnel should be trained in proper fire-fighting methods.
- The shooting crew should check behind them frequently for possible fires.
- Procedures should be used to keep personnel, livestock and wildlife safely away from the shot area.
- A clean-up crew should pick up all trash. Their search width should be adequate to retrieve all debris. They should also carry fire-fighting equipment.

VIBRATORS and LAND AIRGUNS

Appropriate steps should be taken to minimize the effect of compaction of soft ground caused both by access and by multiple energy inputs at a single base plate location.

Oil spill clean-up material should be near source equipment or in the service unit for use in case of a hydraulic fluid leak. In urban areas, special mufflers may be required on engines to keep noise within acceptable limits.

HAZARDOUS MATERIALS

Fuel and Oils

General

Geophysical operations require that some vehicles and generators be refueled and maintained in the field, while others are serviced in local towns. Small fuel and oil spills that might occur may result in contaminated soil, surface and groundwater. Clean-up procedures and equipment should be available. Operating procedures should minimize the chance and size of a spill during maintenance, refueling or storage.

Storage

- Fuel storage facilities should be installed to contain spills and protect soil and groundwater.
 - . Stationary fuel storage facilities should not be placed within the annual flood plain of a water course or closer than the locally recommended distance to a water body.
 - . Stationary fuel storage should be located above the high water mark of any lake or stream.
 - . Stationary storage should be on flat, stable terrain or in natural depressions separated from water bodies.
 - . Stationary fuel storage facilities should have a secondary containment system, such as a berm, capable of holding the capacity of the largest container plus an appropriate volume to accommodate rainfall.
- Locate fuel storage a safe distance downslope from camps.
- Stationary fuel storage areas should be free of other combustible material to isolate potential fires.
- Fuels should be stored in a manner which minimizes the potential for spills.
 - . Fuel tanks should be inspected routinely for leaks and a report made by the person responsible for the vehicle or tank.
 - . Fuel tanks which are manifolded together should have the valves between them normally closed.
 - . Fuel trucks should have a valve between the output of the tank and the refueling hose.
 - . Emergency repair equipment for the refueling hose and connections should be kept at the tank site and on the fuel truck.
 - . Drums should be stored above the ground to prevent corrosion and to facilitate leak detection.
 - . Fuel drums may be off-loaded from aircraft on frozen lakes or rivers, but they should not be stored on the ice unless required.
- All fuel tanks or drums must be marked with their contents and the name of the company which owns or operates them.

Lubricating Oil

- Lubricating oil should be recycled or burned. In some cases, it may be possible to mix used lube oil with diesel for use as fuel.
- Used lube oil should not be poured onto the ground or into the sump.

Refueling

- Fuel transfer operations should be done so that there is no spillage.
 - If practical, vehicles should be refueled directly from the fuel truck to reduce the number of fuel transfers.
 - Avoid fuel transfer operations in the flood plain of a river if possible.
 - Catch drips and spills during the refueling operations.
 - Place drip pans or absorbent material or drip basins under unsealed connections during refueling.
 - Do not fill fuel trucks or tanks to maximum capacity; leave room for expansion and vehicle movement.
 - Automatic shut-off nozzles (similar to those used in petrol stations) are recommended for the dispensing hose.
- The fuel handler must never leave the refueling operation while it is in progress.
- The fuel handler should be trained to respond to and contain a fuel spillage.
- While performing maintenance on a vehicle, ensure that there are sufficient drip trays in position to catch any spills or leaks. A large impermeable plastic sheet placed under the whole vehicle could act as a secondary catchment system.
- While refueling boats, if automatic shut-off nozzles are not available, transfer the fuel to a portable tank on dry land and then transfer the tank to the boat. Where this is not practical, be prepared to deploy a containment boom quickly.
- If a fuel barge is used, appropriate spill response equipment should be available.

Leaks/Spills

- Tools and materials should be available to clean up any spills or drips.
 - Equipment should include absorbent material, shovel and plastic bags.
 - The absorbent material should be a color contrasting with the background to avoid being left on the ground after the clean-up (e.g., not white in snow-covered areas).
- Spills or leaks of oil or fuel should be cleaned up and be disposed of properly.
- After cleaning up a spill, mark the site on the map for follow-up inspection.
- All spills or leaks should be reported in accordance with both operator's procedures and local regulations.
- Waste fuels, oils, lubricants, hydraulic fluids, solvents and certain paints must be stored appropriately and labeled with the contents and operator's name. Storage procedures should be the same as for unused fuel and oil.
- Energy recovery from some wastes may be appropriate by burning it with diesel.
- An emergency response plan must be available for spills. It should be communicated to responsible crew members and reviewed regularly at training or safety meetings.

Engine Exhaust

- The exhaust systems of all vehicles and equipment should be serviced on a regular basis to ensure that noise and emissions are kept to appropriate levels.
- Unburnt fuels and exhaust gases should not be allowed to create localized soil pollution.
- Spark arrestors should be used to prevent fires in dry areas.

Other Hazardous Materials

Hazardous materials apart from fuels and oils are sometimes used by geophysical crews. These are generally small quantities of solvents used for cleaning equipment. The preferred practice is to find substitute solvents which are not hazardous.

Explosives are considered a "hazardous material" in most countries. Regulations for their storage, use and transportation are well established in most countries, and procedures are strictly enforced. Explosive safety is covered in detail in the IAGC Land Geophysical Operations Safety Manual.

- Identify all hazardous materials used on the crew and attempt to find less hazardous substitutes.
- Ensure that any hazardous materials used by the crew are handled correctly, and that the safety information provided by the manufacturer is available to the crew.
 - . Waste materials should be disposed of in the manner approved by regulations.
 - . Do not incinerate hazardous waste materials on-site; remove for proper disposal.
 - . Keep complete records of hazardous material purchases, usage, storage, disposal and spills according to the local or company requirements.
 - . Ensure that hazardous materials are stored correctly according to regulations and manufacturer's directions.
- CFC (chlorofluorocarbon) products and aerosol propellants should not be used, except with refrigeration equipment where closed recovery recharge systems are employed.
 - . Alternates to CFC systems should be considered for new installations.
- All batteries, especially lithium and nickel cadmium, should be transported, stored, utilized and disposed of in an approved manner. (See the IAGC safety manual for additional information.)
- Consider use of recyclable or reusable materials whenever prudent.

WILDLIFE and LIVESTOCK

Animals

The interaction between geophysical operations and animals can vary greatly, depending on the type and area of operation and the kind of animal. Consideration should be given to potential loss of grazing range, foraging area, modification of migration routes, and disruption of animals or nesting areas vulnerable to predators.

There are times of the year when wildlife is more sensitive to external influences. Such times include mating, birthing, denning and spawning.

Plan the survey to avoid animals and their living areas whenever practical. Where interaction is unavoidable, take steps to minimize disruption to animals and habitat. Always protect personnel in life-threatening situations.

- Stay clear of wildlife areas marked on the planning map to avoid active denning, nesting, spawning, migration and feeding areas.
- Simultaneous operations on closely-spaced survey lines, such as during a 3-D survey, may have an increased effect on wildlife. Where practical, conduct operations in a manner that will not restrict animal movement.
- Make a spotting report for endangered species if required by the authorities.
- Hunting and trapping of animals by non-native workers is strictly forbidden.
- Do not purchase wildlife killed for consumption from local hunters, as this may encourage further killing. Purchase food only from recognized vendors.
- Crew members should not purchase or accept gifts that would encourage the locals to exploit wildlife.
- Wildlife should be killed only when it threatens human life, and then only when all deterrents have been exhausted.
- Report incidents and any significant problems with wildlife to the appropriate authorities.
- Precautions should be taken to avoid putting wildlife to flight when avoidable.
- Intentional harassment of animals is not permitted.
- Minimize disturbance to traditional native hunting and fishing areas.
- Crew members must not take part in locally authorized culls without management approval.
- Where practical, have livestock moved away from the operation.
- Pets are not to be allowed on the crew.

Plants

Plant growth and vegetation balance can be affected by vehicle passage and by the transfer of vegetation and seeds from one area to another. People and vehicles should be directed around endangered species. If such plants are known to exist in an area, attempt to operate during dormant seasons.

- Train personnel to recognize and avoid endangered species known to be present in the work area.
- Attempt to avoid known areas of endangered plants or operate during dormant seasons.
- Check with local residents on the location of endangered plant species.
- Report to authorities as required.
- Wash down equipment to avoid transporting seeds or plant diseases to non-native areas.

HISTORICAL, ARCHEOLOGICAL AND CULTURAL SITES

Evidence of past cultures may be encountered during geophysical operations. Archeological sites should not be disrupted and the taking of artifacts should not be allowed. Newly discovered sites should be recorded and reported to the appropriate authorities at the completion of the survey. Crews generally can lay cables and geophones across archeological sites without disruption. The survey may need to be adjusted to avoid a known site.

- Geophysical operations can be conducted on or over archaeological sites without adverse impact on sites, especially in the absence of dozing or any activity known to cause significant disturbance.

RECLAMATION

For the most part, reclamation should be performed during the survey operations. Each part of the crew should be responsible for ensuring that no refuse is left in their area of operations and that all the equipment they use is collected. Additionally, the back line crew should double check that the line is clear of refuse and equipment. In some circumstances, it may be necessary to employ an additional reclamation crew responsible for restoring the area according to the reclamation plan. It is the responsibility of line management to ensure the reclamation program is being followed.

A reclamation plan should be prepared before the survey and be agreed to by the operator, local authorities and landowners. It may include promoting regrowth through seeding, fertilization and replacement of vegetation with an approved species. In some cases, it may be appropriate to drag or plow the lines to recondition and loosen the surface prior to revegetation. Before and after photographs can assist documentation of the reclamation. A closure inspection by management should ensure adherence to the planned environmental stipulations.

- Pick up all pin flags, signs and refuse.
- Ensure that the natural drainage of the area is restored.
- Install cross drainage ditches on steep slopes to divert run-off into the adjacent vegetation.
- Remove all temporary stream crossings. Stabilize the stream banks at the crossings.
- Active revegetation measures may be necessary if natural growth is not considered sufficient.
- Additional erosion control measures may be needed in some areas.
- Take appropriate measures to discourage access to the area after completion of the operation.
- Ensure that campsites are clean and that no refuse has been left.
- Ensure that the sump has been filled in. An extra cap of soil should be put on top to account for compaction.
- Ensure that fences and gates are restored.

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DESERT AND SEMI-ARID CLIMATE OPERATIONS (To be used in conjunction with the General Operating Guidelines)

INTRODUCTION

The deserts and semi-arid regions addressed in this section typically have low annual rainfall, high rates of evaporation and high mean annual temperatures. Surface terrain may be mountains or plains, exposed bedrock, gravel, boulders or shifting sand.

Because of the low rainfall, vegetation is sparse; plants are slow growing, thorny, with small or no leaves and have an extensive root system. Damaged vegetation may take several seasons to recover. Vegetation loss compounds the erosional effects due to wind, heavy rainfall and flash flooding. Dune movement may also be reinitiated by loss of vegetation.

Vegetation is an important component of the food chain in the desert. Animals, such as insects, reptiles, rodents and a few larger mammals rely on succulent plants for their water supply or, alternatively, on their prey.

These conditions require that great care should be taken in conserving both vegetation and water sources.

PLANNING

- Water wells may be used as a source of camp water provided the water table is not affected.
- Water should be tested prior to use.
- Plan the survey to bypass oases.

OPERATING PRACTICES

- Isolated trees and stands of vegetation should be left undisturbed.
- Do not drive over vegetation, where avoidable.
- Use previously made tracks for travel in deserts or savannah.
- Dispose of sewage in such a way that fresh water supplies will not be affected as a result of the high permeability of the soils.
- Waste disposal practices should consider that in a dry climate some wastes will be preserved for a much longer period than in moist climates.

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ARCTIC AND SUB-ARCTIC OPERATIONS

(To be used in conjunction with the General Operating Guidelines)

INTRODUCTION

For the purpose of this document, arctic and sub-arctic areas are generally defined as those having a mean annual temperature less than 10°C and which show evidence of permafrost, either continuous or discontinuous. Generally, these areas lie at latitudes greater than 60°, although they do extend to lower latitudes in some parts of Asia. These conditions can also be found at very high elevations.

In the arctic, the permafrost is generally continuous and the surface thaws only to a shallow depth during the short summer months. This surface melt cannot soak into the topsoil due to the permafrost below and, thus, it either remains in place or drains to a natural water body. Vegetation consists mainly of grasses, mosses and lichens which make up the tundra; occasional stands of willow can be found along riverbanks. Maintaining this active layer is extremely important, as it is this layer which supports the wildlife of the area. Minimizing disturbance to the tundra is one of the main objectives of these arctic environmental guidelines. For this reason (and because of the ease of access over frozen rivers), geophysical operations in the arctic generally are conducted in the winter when sufficient snow cover exists. Summer operations can be conducted provided vehicles of low ground pressure or helicopters are used.

Farther south in the sub-arctic, the permafrost is generally discontinuous and water drainage is less a problem. Vegetation consists of grasses and coniferous trees for the most part. Geophysical operations are conducted mainly in the winter, but summer operations are not uncommon.

During the winter, when the majority of geophysical operations take place, wildlife activity tends to be at its least active period. Nevertheless, there is the possibility of interaction and conflict with wildlife, and precautions need to be taken. Concerns include wildlife being attracted to camp food waste (particularly foxes), disturbance of denning areas where females may be caused to leave their young, and pools for over-wintering fish where vehicular travel may result in greater freeze-down, thereby restricting the volume of water available to the fish.

Other issues specific to the arctic include pingos (gravel mounds caused by frost upwelling) which should be bypassed, protecting the underlying tundra by use of low ground pressure vehicles, and waste management due to the preserving effect of the cold.

PLANNING

- Mark the location of pingos on the survey map and plan an adequate exclusion zone around them according to their size.
- Check the permit to determine whether it contains any stipulations on the ground pressure of vehicles, and plan to use the correct ones.
- Provide the crew with environmental training pertinent to the area.
- Biodegradable products, including lubricants, should be considered.

OPERATING PRACTICES

Clearing

- Do not lower the blade of a bulldozer to the level of the tundra while in motion. Keep the blade at least ten centimeters above the tundra. Use a shoe below the dozer blade only if it does not cause damage; otherwise, suspend the blade hydraulically.
- Never drop the blades of a bulldozer to the tundra; gently lower them.
- Never remove the tundra, as this provides insulation for the underlying permafrost. Take special care not to damage the organic mat in areas of patterned ground.
- When filling low spots on the tundra, use only ice or snow.
- If damage does occur to the tundra, put down locally recommended seed and fertilizer on the exposed spot. Mark the spot on the map. (Keep a log and map for each vehicle and camp train, as well as a supply of seed and fertilizer).

Winter Travel

- Operate only when the surface of the ground is firm enough to avoid breaking through and when it has sufficient snow cover to avoid tundra damage, or is allowed by the authorities.
- Use vehicles with low ground pressure to minimize surface disturbance.
- Do not make hard, tight turns that break through the snow cover and damage the tundra.
- Ensure that vehicle drivers are adequately trained in how to start their vehicles to avoid "jackrabbit starts" or spinning the drive wheels.
- When moving the camp, use enough tractors for each train to reduce the chance of surface disturbance.
- When vehicular travel is necessary near frozen rivers and streams, consider travelling on the ice rather than on the land to reduce erosion of the banks.
- Do not travel closer to a pingo than is allowed by the local regulations. This distance should be marked on the survey map.

Summer Travel

- Try not to make more than three passes on the same off-road track except at stream crossings. Offset each pass and distribute vehicle travel as much as practical to each side of the survey line. Check local regulations, however, as they may specify a different procedure.
- Avoid rutting the surface and damming drainage routes because the resulting concentration of water can warm the permafrost.
- All travel must be for the purpose of the survey; no side trips for sightseeing should be permitted.

Wildlife

- Try to avoid native willow vegetation, low shrubs and other ground vegetation.
- Bypass sensitive areas identified by the local authorities, such as denning areas and pools for over-wintering fish.

Camps

- Store grey water (shower and basin drainage) separate from black water (toilet drainage).
- Grey water can be disposed of by several methods:
 - It can be discharged to the surface, if permitted by authorities.
 - It can be boiled off to the atmosphere: or
 - It can be returned to a central disposal facility.
- Solid sewage and sludge may be incinerated or sent to a disposal facility. Black water production is sometimes avoided by the use of special incinerating (non-flushing) toilets.
- Melted snow should be used only for washing. It should not be used as drinking water unless passed through a suitable purification system.
- Kitchen wastes should be incinerated daily. Metal and plastic cans should be disposed of in accordance with local regulations.
- Garbage should be contained in animal-proof containers until incinerated.
- Any residue (ashes) from incinerating combustible solid waste should be bagged and returned for proper disposal.
- Each time the camp is moved, check around the area and pick up any debris found.

RECLAMATION

- Visit each area that has been reseeded during the survey (by helicopter when appropriate to minimize ground damage) to check that the seed germinated and the vegetation is growing. Reseed again as necessary.
- Visit each camp location and survey line to ensure that the area is clear of debris.
- Over the summer period when the crew is inactive, store camp trailers on logs or gravel pads to prevent extensive depression of the ground surface and freezing the runners into the ground.

RAIN FOREST OPERATIONS

(To be used in conjunction with the General Operating Guidelines)

INTRODUCTION

Tropical rain forests are found in Africa, Central and South America, Southeast Asia and on many islands. They contain a large variety of plant and animal species, many of which are yet to be identified. Many rain forests are in areas of steep terrain, which are prone to erosion in the heavy rainfall.

Rain forests are a delicate balance between the forces of nature. They typically receive between 60-400 inches of rainfall per year. The forest regulates this large amount of rainfall, controlling flooding and erosion in the process. The thin, poor quality topsoil found in the rain forest is protected by the multi-layered canopy of the forest trees. Simple disruption of the canopy can expose the fragile ground level ecosystem to the harsh effects of the tropical rains; erosion is the major concern. The shallow root system and heavy canopy of the rain forest is susceptible to the high wind loads from helicopters when the supporting trees have been cleared.

A geophysical operation in a rain forest can involve several hundred people in the field at any one time. Generally, the majority of the crew are locally-employed, and turnover can be significant during an operation. The potential consequences of several hundred people on the environment must be controlled and monitored in accordance with specific measures. In order to support the operation, it is necessary to provide food and shelter to crew members. Supply may be made by helicopter, boat or truck, provided sufficient access exists. Travel along the survey line is usually by foot; equipment is usually hand and helicopter portable.

Following are specific issues which are significant to tropical rain forests and may be applied in more temperate rain forests as well:

- Interaction with undeveloped or underdeveloped cultures.
- Effects of heavy rainfall, such as erosion and increased turbidity.
- Interruption of migration and mating patterns of forest animals.
- Fragile forest structure due to shallow root systems.
- Contamination of groundwater in highly permeable soils.
- Poor soil conditions and/or loss of topsoil.
- Reduction of the canopy habitat of animals.
- Loss of endangered or unknown plant and animal species.
- Reduction of the rain forest as a source of oxygen.

PLANNING

- The size and number of camps and helipads should be limited to minimize the amount of forest cleared.
- Erosion control and reseedling or planting should be defined where natural regrowth is not considered an adequate reclamation measure.

OPERATING PRACTICES

Due to the large number of personnel required for a rain forest geophysical operation, it is critical that an additional burden is not placed on the rain forest.

- Do not allow camps to be provided with meat or food obtained from the forest.
- Minimize removal of roots and topsoil for all installations to reduce erosion and enhance vegetation regrowth.
- To prevent migration of people into less developed areas, restrict the creation of new access roads or tracks.

Helipads and Helicopter Operations

- Space helipads at intervals as far apart as is practical.
- Locate helipads in existing clearings, secondary growth areas or areas in which there is not significant hardwood growth.
- Attempt to locate helipads away from habitats or breeding areas of protected, sensitive or endangered animal species.
- Minimize the size of flyways, provided appropriate safety considerations are taken into account.
- Where practical, cut trees to a minimum height of one meter above ground level in flyways to allow those trees to regrow from their existing root systems.
- If using large helicopters, use long sling lines consistent with safety to minimize the effects of down draft from the rotor.

Line Preparation

- Attempt to clear lines by cutting only with machetes or brush hooks, supplemented only as necessary with chain saws.
- Avoid cutting trees greater than 20 centimeters in diameter or trees identified as hardwoods or of value to the local population.
- Move lines around large trees and areas with significant hardwood growth.
- Minimize the width of survey lines. Narrow lines minimize the effect on the ecosystem and generally result in cost savings as the amount of cutting is reduced.
- When tree cutting is done, ensure that trees have fallen to the ground. Leaners (cut trees that have partially fallen) are a safety hazard and can pull down other trees, further damaging the root system of the forest. Contact with the ground also accelerates decomposition of fallen trees.
- Remove and scatter branches from felled trees. Branch removal helps the tree lie in contact with the ground. Branch and brush dispersal should be carried out as clearing progresses.
- Cut timber for bridging only as necessary; use soft-wood trees from secondary growth where practical.
- Bridging should be used on steep slopes to prevent erosion and to provide safe footing for crews.
- If bridging is not used in steep terrain, avoid creating well defined paths that will contribute to erosion. Where this is unavoidable, a biodegradable erosion control material can be used (e.g., woven jute, straw mats, etc.).
- When cutting of trees cannot be avoided in line preparation or for helipad flyways, tree stumps should not be cut closer than one meter above ground level. This practice will allow for faster regrowth of the trees cut and provide added protection from erosion.

- When operating near water bodies, cut only the amount of vegetation necessary along the banks to avoid erosion. River and lake levels can vary significantly in rain forests. Consider the high water mark in planning river and lake approaches.

Additional Pollution Prevention

In designing all facilities, include a provision for heavy rainfall and the resulting swift currents along some watercourses. Special care should be given to fuel storage, water and sewage disposal facilities in these conditions.

SPECIAL CONSIDERATIONS IN WET FORESTS

Some rain forest areas may also be considered wetlands, which are called "wet forests". See the wetlands section of this document for operating guidelines in such areas.

RECLAMATION

Natural re-vegetation is the most effective method for reclaiming survey lines. However, in some sensitive areas, access roads, helipads and campsites may require special treatment. Methods will depend on local conditions.

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WETLAND OPERATIONS

(To be used in conjunction with the General Operating Guidelines)

INTRODUCTION

Wetlands are characterized by the presence of water, saturated soil, plants adapted to wet soil conditions, and soil chemistry. The wet conditions may be seasonal.

Wetlands are both coastal (tidal) and inland (non-tidal), and may be categorized into the following groups:

- Coastal wetlands; consist mainly of tidal marshes, mud flats and mangroves which are periodically flooded by salt or brackish water.
- Inland wetlands; consist of swamps and marshes located mostly in river flood plains, isolated depressions and along the margins of lakes and ponds.
- Swamps are characterized by trees, shrubs, and mosses as the principal vegetation, and are generally inundated.
- Mangroves are areas subject to constantly changing flows of fresh and salt water with specifically adapted vegetation.

Wetlands vegetation is generally resilient to mechanical stress but soils recover slowly from compaction and displacement. Channelling may affect the water flow, which can cause erosion and changes to the water chemistry.

Wetlands can serve vital functions such as providing wildlife habitat, groundwater recharge, flood control, improved water quality, and subsistence, commercial and sport usage. The size of a wetland does not affect its sensitivity; even wetlands less than an acre can support an abundance of wildlife. These environments are frequently breeding and nesting grounds for many types of animals, including some protected species.

Special care must be taken to maintain the equilibrium of the wetland environment and the surrounding transition areas. The binding of soils in the roots of marsh grasses controls water flow. Disruption of water flow by dredging existing channels, creating new channels (or deep vehicle tracks), or construction of roads may cause changes in salinity, vegetation, and erosion. Clearing of trees can result in increased underbrush and subsequent accumulation of organic material, thereby altering water quality.

OPERATING PRACTICES

Beyond the general guidelines, operations in wetlands must address the following issues:

- Where practical, the lines should follow waterways or bypass stands of vegetation to minimize disturbance to vegetation and soils.
- Consideration should be given to the direction of tidal flow when planning line paths to avoid inducing erosion.

Camps and Quarter Boats

Barge mounted operations bases and crew quarters are preferred over land camps because there is less disruption to the soil and vegetation, they are self contained and can be moved as operations progress, reducing the amount of travel required. Mooring locations should be selected to minimize the effects on banks and vegetation. The general guidelines address the other issues to be considered.

TRAVEL

The choice of vehicles to transport personnel and equipment in wetlands includes airboats, helicopters, small boats, low ground pressure (Terra-tired) vehicles, tracked buggies, pontoon equipment, and other specialized equipment.

In general, the following guidelines apply to travel in wetlands operations:

- Minimize number of vehicles on crews.
- Minimize travel, and prohibit joy-riding.
- Use airborne or water transport wherever feasible to reduce effect on soft surface and vegetation.
- Towing pontoon equipment can cause channelling and may be inappropriate.
- Attempt to avoid floating marsh and unvegetated spots in marshes.
- Attempt to use open waterways where practical.
- Reduce turning maneuvers. Where available, use waterways for turns.
- Do not traverse on previously made tracks to avoid creating ruts or channels unless required by permits.
- Endeavor to leave tracked or wheeled vehicles in the field overnight, using airborne or water transportation to and from camp.
- Minimize maintenance performed in the field.

Airboats and Hovercraft

Airboats leave only a temporary footprint on the vegetation and soil, but operate at a noise level which may temporarily displace animals.

- Airboat hulls should be covered with a solid lubricant wear-pad, such as Teflon or an equivalent.
- Biodegradable materials should be used when liquid hull lubrication is required.
- Utilize airboats and hovercraft where their noise effects on animals are minimal.
- Noise can be reduced by engine mufflers and dual propellers on each engine.

Small boats

Small boats are generally quieter than airboats, hovercraft and helicopters but are limited to open waterways. They can effectively be used for individual and crew transport. Care should be taken to control speed and to avoid contact with aquatic animals. Maintenance should ensure that fuels, lubricants or other foreign materials do not enter the water. Engine tuning should ensure that pollutants in engine exhausts are minimized.

Helicopters

Helicopters have little environmental effect. Their use can be costly yet may be cost-effective in some operations. Noise concerns are similar to those for airboats.

- Locate landing zones away from high populations of wildlife.
- Plan flight paths to minimize effects of noise.
- Maintain sufficient altitude to reduce downdraft effects.
- Helipads should be located in natural clearings as much as practical.
- Helicopters equipped with pontoons can reduce the need for building helipads in wet areas.

Wheeled and Tracked Vehicles

Wheeled vehicles which have low contact pressures are preferred to tracked vehicles due to the reduction of surface effects.

- Endeavor to keep loading at a minimum to reduce ground pressure.
- Approach levees at an appropriate angle to avoid cutting through them.
- Immediately report, flag and repair any inadvertent levee or dike damage.
- Avoid creating unnatural levees, dikes, channels and drainage routes.
- Lubricate tracks with biodegradable lubricant only.

Pontoons

Lightweight pontoon equipment with special underside coatings (Teflon, for example) can be effective in minimizing tracks and compression of grasses and vegetation in wetlands. Avoid heavy loading of pontoons.

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MOUNTAINOUS OPERATIONS

(To be used in conjunction with the General Operating Guidelines)

INTRODUCTION

Generally, mountainous areas are defined as those that lie at least 500 meters above their surroundings. Their land surfaces consist of long slopes, deep canyons or valleys, and high, narrow ridges. Mountain areas cover about one-fifth of the world's land surface. In addition to reviewing the general guidelines, operations at high altitude may encounter alpine conditions similar to the arctic, in which case the arctic section should be consulted.

OPERATING PRACTICES

Mountainous terrain and valleys may enable sound to travel a greater distance than in flat terrain. Sound may temporarily displace wildlife and cause annoyance to inhabitants. There may be an additional stress on animals in winter due to snow cover and the corresponding reduction in food supply, and daily monitoring may be required to assure that wildlife is not unduly disturbed.

The noise level and its effect can be reduced by:

- Selection of helicopter type.
- Planning of flight paths or routes.
- Selection of shot-hole drilling equipment including noise suppression accessories.
- Considering the topography in the placement of the program.
- Choice of energy source.

Erosion potential in mountains may be more severe than in level terrain, particularly in non-forested areas. Consequently, measures for erosion prevention found in the general and rain forest sections should be reviewed.

Fire can spread rapidly in the sometimes dry mountains. Fire prevention is critical because steep terrain, strong winds and heavy vegetation impede access for fire control. Fire prevention measures include:

- Awareness of seasonal conditions.
- Use of fire retardant detonating cord.
- Use of spark suppression accessories on equipment.
- A documented fire prevention plan.
- Limited and supervised smoking.
- Training in fire prevention and fire-fighting.

Fire reporting procedures are important because quick response is critical due to the speed at which fires can spread. This extends to sightings of fires not associated with the operation.

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MARINE OPERATIONS

(To be used in conjunction with the General Operating Guidelines)

INTRODUCTION

Marine geophysical surveys are used to plan offshore drilling and subsea mining operations and reduce the number of surface locations needed for mineral resource development. Such information can also help evaluate sites to avoid placement on fault, earthquake, shallow gas or other hazardous zones.

Marine operations may create a localized temporary disturbance, but generally no lasting effects on the environment. Pre-survey planning should consider the effects on coral reefs and other life, particularly with regard to breeding, spawning, feeding and migration habits.

OPERATING PRACTICES

Start-up

An environmental and safety review should be conducted at start-up. This may be the first time that on-board personnel will be exposed to the environmental concerns for this survey. It is important that workers and their supervisors understand what is required of them. More background will be needed for those less experienced in the area. Document attendance and the topics covered at all environmental and safety meetings. Additionally, it is recommended that the following meetings, with client participation, be held:

- A meeting to reconcile conflicting environmental and safety concerns.
- A meeting with the permitting agencies to explain the crew's environmental planning.
- A meeting with crew supervisors and managers, senior crew personnel and sub-contractors to cover environmental concerns and reporting procedures. The emergency response plan should be discussed in detail.

Base camps and shore-based navigation installations will need to be established and operated according to the guidelines for land operations.

TRAVEL

Water Travel

Caution and common sense can minimize environmental effects of travel on water. Care should be exercised to reduce the risk to aquatic life. Fuel transfer and handling should be done in such a way to prevent spills.

- Slow speeds will minimize bank erosion when near protected shores.
- Be cautious of aquatic life.
- Fuel tanks must have caps and should not be filled over the water.
- Absorbent materials should be kept on board in case of small fuel spills.

- Operations in nesting areas and areas where marine mammals exist should be planned to minimize disturbances.
- Docking areas should be planned such that safe and environmentally sound supply, maintenance and refueling exercises can take place.

Air Travel

The physical effects of air travel are generally limited to the shore-based landing areas. Flight paths and approaches should be planned to minimize disruptions to animals due to noise and downdrafts, which may also create a nuisance in populated areas.

- Aircraft in flight should maintain a suitable altitude, consistent with local regulations and safe operating practices, to avoid unnecessarily disturbing aquatic/land wildlife and people.
- Aircraft should keep an appropriate distance from sensitive aquatic/land wildlife areas.
- Aircraft should maintain a suitable distance from cliff faces where there are nesting birds.
- Locate landing areas and flyways to minimize disturbance to aquatic/land wildlife and the public.

HAZARDOUS MATERIALS

Fuel and Oils

Storage

- Fuel tanks which are manifolded together should have the valves between them normally closed.
- All fuel tanks or drums must be marked with their contents
- On deck tanks and drums should also be marked with the name of the company which owns or operates them.

Refueling

- The Master and Chief Engineer shall be responsible for carrying out a safe and orderly transfer of petroleum products.
- Before transfer operations commence, the appropriate warning signals shall be posted; the "bravo" flag hoisted for daylight transfers; one, all-around red light used for nighttime and periods of reduced visibility transfers; hand-held VHF and UHF radios should be tested and personnel assigned to their duty stations.
- All hot work shall stop and a "no smoking" policy will be strictly enforced.
- One person shall be assigned to stand by the receiving station. This person shall be in direct communication with the pumping facility. The Chief Engineer shall continuously monitor tank levels during transfer operations.
- The times and quantities of product transferred will be logged by both the Master and Chief Engineer.
- To prevent product from entering the water should spillage occur, adequate supplies of absorbent material should be provided at both the pumping and receiving stations.
- The Master will determine when conditions are suitable for transferring products at sea.
- The supply vessel should be equipped with fenders capable of preventing damage to the supply and receiving vessels. Transfer hoses shall be of sufficient length to allow maneuvering of the vessels should sea conditions dictate.
- To prevent spillage, all product transfer hoses should be drained into a container and capped before being moved.

Storage

All petroleum products loaded on vessels should be stored in approved tanks labeled for that product (e.g., fuel oil, lube oil, streamer cable oil, etc.).

Should it become necessary to load barrels of product that cannot be put into tanks, these barrels must all be clearly labeled as to their content. A barrel rack permanently mounted on the vessel should be used so that the barrels can be stored on their sides and secured to prevent shifting at sea. A spill containment pan shall be mounted under the rack(s) to catch any accidental spillage. Sufficient absorbent material should be stored nearby to ensure that no products can enter the waterway or become a safety hazard.

Leaks/Spills

- All spills or leaks should be reported in accordance with both operator's procedures and local regulations.
- Tools and materials should be available to clean up any spills or drips. Recommended items include absorbent material and plastic bags.
- Spills or leaks of oil or fuel should be cleaned up and disposed of properly.
- Waste fuels, oils, lubricants, hydraulic fluids, solvents and certain paints must be stored appropriately and labeled with the contents. Storage procedures should be the same as for unused fuel and oil.
- Energy recovery from some waste oils may be appropriate by burning it with diesel.
- An Emergency Response Plan must be available for spills. It should be communicated to responsible crew members and reviewed regularly at training or safety meetings.

Engine Exhaust

- The exhaust systems of all equipment should be serviced on a regular basis to ensure that noise and emissions are kept to appropriate levels.

Other Hazardous Materials

Hazardous materials apart from fuels and oils are sometimes used by geophysical crews. These are generally small quantities of solvents used for cleaning equipment. The preferred practice is to find substitute solvents which are not hazardous.

Explosives are considered a "hazardous material" in most countries. Regulations for their storage, use and transportation are well established in most countries, and procedures are strictly enforced. Explosive safety is covered in detail in the IAGC Land and Marine Geophysical Operations Safety Manuals.

- Identify all hazardous materials used on the crew and attempt to find less hazardous substitutes.
- Ensure that any hazardous materials used by the crew are handled correctly, and that the safety information provided by the manufacturer is available to the crew.
- Waste materials should be disposed of in the manner approved by regulations.
- Do not incinerate hazardous materials on-site; remove for proper disposal.
- Keep complete records of hazardous material purchases, usage, storage, disposal and spills according to the local or company requirements.
- Ensure that hazardous materials are stored correctly according to regulations and manufacturer's directions.
- CFC (chlorofluorocarbon) products and aerosol propellants should not be used, except with refrigeration equipment where closed recovery recharge systems are used.

- Alternates to CFC systems should be considered for new installations.
- All batteries, especially lithium and nickel cadmium, should be transported, stored, utilized and disposed of in an approved manner. (See the IAGC safety manuals for additional information.)
- Consider use of recyclable or reusable materials whenever prudent.

AQUATIC LIFE

The interaction between geophysical operations and aquatic life can vary greatly, depending on the type and area of operation and the kind of aquatic life. Consideration should be given to potentially interfering with migration routes, and disruption of reef ecosystems or displacing aquatic life vulnerable to predators.

There are certain times of the year when aquatic life is more sensitive to external influences. Such times include migration, mating, birthing and spawning.

Plan the survey to avoid interfering with known migrations and spawning periods whenever practical. Where interaction is unavoidable, take steps to minimize the disruption.

- Stay clear of aquatic life areas marked on the planning map to avoid active spawning, migration and feeding areas.
- Make a spotting report for endangered species if required by the authorities.
- Fishing and trapping of aquatic life by non-native workers is strictly forbidden at all times.
- Do not purchase aquatic life killed for consumption from local hunters, as this will just encourage further killing. Purchase food only from recognized vendors.
- Crew members should not purchase or accept gifts that would encourage locals to exploit wildlife.
- Aquatic life should be killed only when it threatens human life, and then only when all deterrents have been exhausted.
- Report incidents and any significant problems with aquatic life to the appropriate authorities.
- Intentional harassment of aquatic life is not permitted.
- Minimize disturbance to traditional native fishing areas.
- Pets are not to be allowed on the vessel.

WASTE MANAGEMENT

A waste management program should be developed to maximize the use of recyclable and bio-degradable items and minimize waste. Only certain waste is suitable for overboard disposal, as indicated in the following guidelines. Regulations of various countries and/or local governments vary extensively. These regulations may not allow incineration as suggested. Restrictions on the equipment a vessel can carry onboard have to be taken into consideration. (Refer to MARPOL Annex V for international minimum standards for waste disposal.)

- Plastic or plastic products of any kind should be disposed of properly. This includes such items as styrofoam cups, wire rings, plastic bags, tape, line, etc. Waste of this type should be bagged and placed in the proper containers for onboard incineration or for disposal ashore. Plastics suitable for recycling should be stored separately and recycled accordingly if such facilities exist.
- Domestic waste (i.e., cans, glass, paper, or other garbage/waste from living spaces aboard) should be disposed of properly. All burnable items should be separated and burned if an incinerator is available. All other items (i.e., glass, cans, metal, etc.), should be separated, compacted and stored in a designated area for proper recycling or disposal ashore. Materials suitable for recycling should be stored separately and recycled accordingly if such facilities exist.

- Maintenance waste (i.e., paint sweeping, rags, deck sweeping, oil soaks, machinery deposits, etc.) should be disposed of properly. All burnable items should be incinerated. All other items are to be compacted, if possible, properly bagged and placed in a designated area for disposal ashore.
- Operational waste (i.e., cargo residues, work space trash and waste, incinerator ashes including plastic clinkers and metals, etc.) should be disposed of properly. Cargo residues will be kept aboard for proper disposal ashore. Work space trash and waste will be separated into burnable and non-burnable categories and disposed of according to the previously mentioned procedures. Incinerator ashes, when cold, should be compacted, bagged and stored in the designated area for disposal ashore.
- All batteries should be stored onboard and disposed of onshore according to the manufacturer's specifications and local regulations.
- All sewage wastes should be treated in the ship's sewage treatment facility, according to all applicable international and/or local government standards, before overboard discharge.
- Local regulations will indicate the distance offshore for discharge of food and cooking wastes.
- Pump bilges only if oil/water separators are used and are functioning effectively.
- Prior to entry into port, the local authorities should be notified of the types and qualities of waste and/or garbage being brought ashore for disposal.

VESSEL OPERATIONS

Onboard environmental effects can be reduced by the following guidelines.

- The cable deck, cable storage and under streamer reel areas should be constructed to act as drip trays to capture all spilled oil.
- The drip trays should drain into a holding tank where the cable oil can be stored for a period of time.
- Used or spilled cable oil should be recycled on board using separators or sent/pumped ashore via the correct containers for disposal or recycling.
- All hoses and associated tools for pumping and filling cable sections should be kept in good operational condition and regularly checked for leaks.
- An operator should be present while cable oil is being pumped into a section.
- Cable sections that are being drained, filled or flushed with cable oil must be contained within the drip tray area.
- Cable sections being transferred off a vessel (either at sea or at the dock) must be void of leaks, or should be drained and dry, to avoid spillage during transfer and transportation.
- Cable skin material, O-rings, etc., should be disposed of in the correct manner.
- When reporting oil spills to the local authorities, follow appropriate reporting guidelines.
- CFC (chlorofluorocarbon) products and aerosol propellants should not be used, except with refrigeration equipment where closed recovery recharge systems are employed.
 - Alternates to CFC systems should be considered for new installations.
- Spray cleaners used on connectors during connection/disconnection of sections should not contain CFCs as found in some aerosols.
 - The use of freon as a cleaning agent should be prohibited.
- Oil absorbent pads/material should be available for spills. Correct procedures should be used for disposal of such pads/materials after use.

Auxiliary Boat Operations

- Boats used to assist in streamer deployment, retrieval and maintenance should be operated in compliance with all applicable laws and regulations.
- Dumping trash from auxiliary boats is prohibited. All trash should be collected and taken back to the main vessel or ashore.

- Portable fuel tanks should be secured to the boat for safety and to prevent loss.
- Engine fuel mixtures should be adjusted to maximize clean burning and reduce emissions.
- Boats should carry oil-absorbing packs for use in cleaning up small spills that may occur during streamer handling operations.
- Propeller guards or tunnel hull designs can reduce the potential hazard to hoses, recording cables and aquatic life.

Deployed Equipment

- All towed surface equipment should be highly visible.
- All batteries should be used and disposed of in the correct manner according to manufacturer's specifications and local regulations.
- Bio-degradable lubricants and rust preventatives should be used on towed equipment.
- All equipment and fairings should be securely attached to avoid loss.
- All towed equipment should be labeled with the vessel's name, company name, company address and company telephone number.
- All bridles and tow harnesses should be checked for wear and replaced as necessary. A regularly scheduled inspection and maintenance program is the best deterrent for loss. All old hardware removed should be disposed of according to the procedures outlined for the disposal of solid waste.
- A secondary retaining device should be used to prevent loss of attachable units, should they become disengaged from the primary mounting.
- If fluid filled recording cables are used, they should be inspected for leaks and resealed prior to deployment, whenever damaged.
- Proper handling procedures for lithium batteries exposed to seawater should be followed.
- The use of tape to patch holes and fasten weights on streamer cables should be minimized.
- Loose tape should be replaced before deploying equipment.
- When tape is used for fastening, appropriate methods should be used to ensure that the tape remains attached.
- The use of petroleum based adhesives in conjunction with tape should be avoided.
- Weights that can be attached to the streamer without the use of tape are preferred.
- Used firing line hoses and hardware should be disposed of according to the procedures for the disposal of solid wastes.
- All air system components should be continually maintained to prevent oil from being discharged into the water.

Retrieval of Lost Equipment

Contingency plans for retrieval of lost equipment should be documented and communicated.

- A reasonable effort should be made to retrieve lost equipment.
- Active acoustic location devices attached to auxiliary equipment should be used to aid in location and retrieval.
- Strobe lights and radar reflectors mounted on floating, towed equipment will aid in its location.
- All local traffic and the appropriate regulatory agencies should be notified when equipment is lost.
- Lost equipment should be picked up as soon as possible after a location is reported.

IMPORTANT NOTICE

These IAGC Environmental Guidelines have been prepared by volunteers drawn from IAGC member companies who have used their best efforts to provide the industry with useful information for conducting seismic field operations in an environmentally sensitive manner. However, IAGC does not represent that these guidelines address every environmental topic or risk that may be encountered. Users of these guidelines are especially cautioned that adherence to these guidelines will not ensure that any particular operation will be in compliance with prevailing law in the place where the operation is carried out. Environmental laws and regulations vary from country to country, state to state, and locality to locality. All seismic operators and others using these guidelines are advised to seek appropriate counsel concerning the environmental requirements in their particular areas of operation.

REFERENCES

Environmental legislation that applies to geophysical operations varies greatly between countries. As a result, a copy of the country's environmental regulations must be obtained before starting the planning for any geophysical survey. National ministries would be the best starting point in determining what environmental regulations apply to the geophysical survey to be conducted. Regulations also may be obtained from:

IUCN, Environmental Impact Assessment Services
International Union for the Conservation of Nature
Avenue du Mont Blanc,
CH-1196 Gland,
Switzerland

References: E&P FORUM OIL INDUSTRY OPERATING GUIDELINES FOR RAIN FORESTS

E&P FORUM OIL INDUSTRY OPERATING GUIDELINES FOR MANGROVES (in preparation)

E&P Forum
2528 Old Burlington Street,
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OIL EXPLORATION IN THE TROPICS:

Guidelines for Environmental Protection
IUCN, Environmental Impact Assessment Services
International Union for Conservation of Nature
Avenue du Mont-Blanc,
CH-1196 Gland,
Switzerland

AMERICAN PETROLEUM INSTITUTE
Strategy for Today's Environmental Partnership
(in preparation)

MARPOL Annex V

ACKNOWLEDGEMENTS

These IAGC environmental guidelines are the result of hundreds of hours of conscientious, professional effort by environmental specialists and operating managers throughout the worldwide petroleum industry.

The end product is a comprehensive set of background information and procedures designed to assist geophysical contractors and their clients in carrying out field operations in the most environmentally sensitive and compatible manner possible. However, these guidelines are not intended to fully cover all circumstances encountered by geophysical crews nor to replace the environmental operating policies and practices of individual companies.

To the following individuals and companies, which compose IAGC's Environmental Affairs Committee, we offer our sincere appreciation and commendation for a job well done:

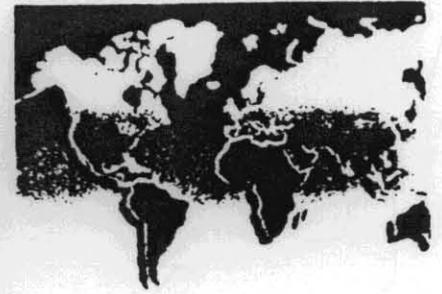
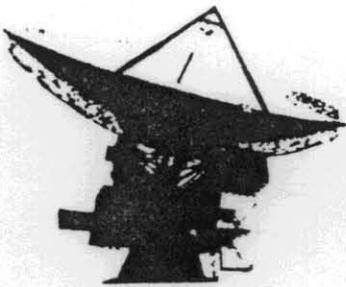
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Paul E. Hummel	- Grant Tensor Geophysical Corp. (Far East Chapter)
Tony Lauhoff	- Grant Tensor Geophysical Corp.
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Charles H. Ritchie	- IAGC Honorary Life Member
Glynn Breaux	- Mobil E&P U.S.
Jim Labo	- Mobil Oil Corporation
Richard S. Pender	- NCS International
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Brian Starrett	- Phillips Petroleum Company
Robert Balaguer	- Seismograph Service
Horace Calvert	- Seitel, Inc.
Kerry Stein	- Shell Offshore, Inc.
Lynn M. Chenault	- Shell Oil Company
Joe Dykes	- Shell Western E&P Inc.
J.F. Krater	- Shell Western E&P Inc.

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John Schulstad	- Western Geophysical (Austral Chapter)

We also extend a special "thank you" to the many others, both within and outside our industry, who participated in the review and editing of this document. Special commendation is due various people at the E&P Forum in London and the Canadian National Energy Board.

SOS[®] Maritime Services[™]



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If your company personnel travel by ship from port to port, work on offshore facilities, or operate from remote locations, you need the comfort and protection of SOS!

We provide:

Medical Advice and Information

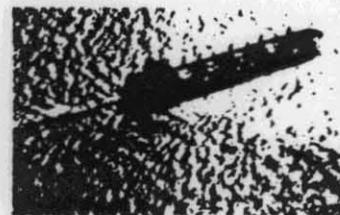
- 24 hour hot line manned by trained nurses and physicians
- Medical Protocol Handbook
- Employee health history on file
- Coordination of evacuation to nearest medical facility

Pharmaceutical and Medical Supplies

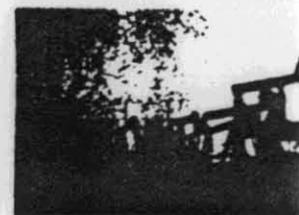
- Recommend & supply medications
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- Easy reference guide
- Compatibility with USPHS & IMO standards

Medical Training

- Provided on a scheduled basis for clients on site, aboard ship or at other locations
- Classes in CPR, recognizing life threatening problems, and basic life support techniques
- Other procedures as necessary



Prevent unplanned diversions



Protect personnel in remote locations

Medical Assistance Services

- Pre-trip medical information
- Emergency medication dispatch
- Hospital admittance deposit guarantee
- Medical monitoring when hospitalized abroad
- Medical evacuation and repatriation

Personal Assistance Services

- Emergency message transmission
- Legal access
- Translations and interpreters
- Claim coordination for cost containment

Travel Assistance

- Emergency family travel arrangements
- Transportation for replacement employee
- Return of member to worksite

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When you need it!**

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173036 ISOS

271349 ISOS

High Seas Operator - SSB Radio

Call *AT&T High Seas Radiotelephone Service*
 at any of the following locations:

(llamarse a la operadora de AT&T / HSO Á Cualquier de
 los siguientes sitios:)

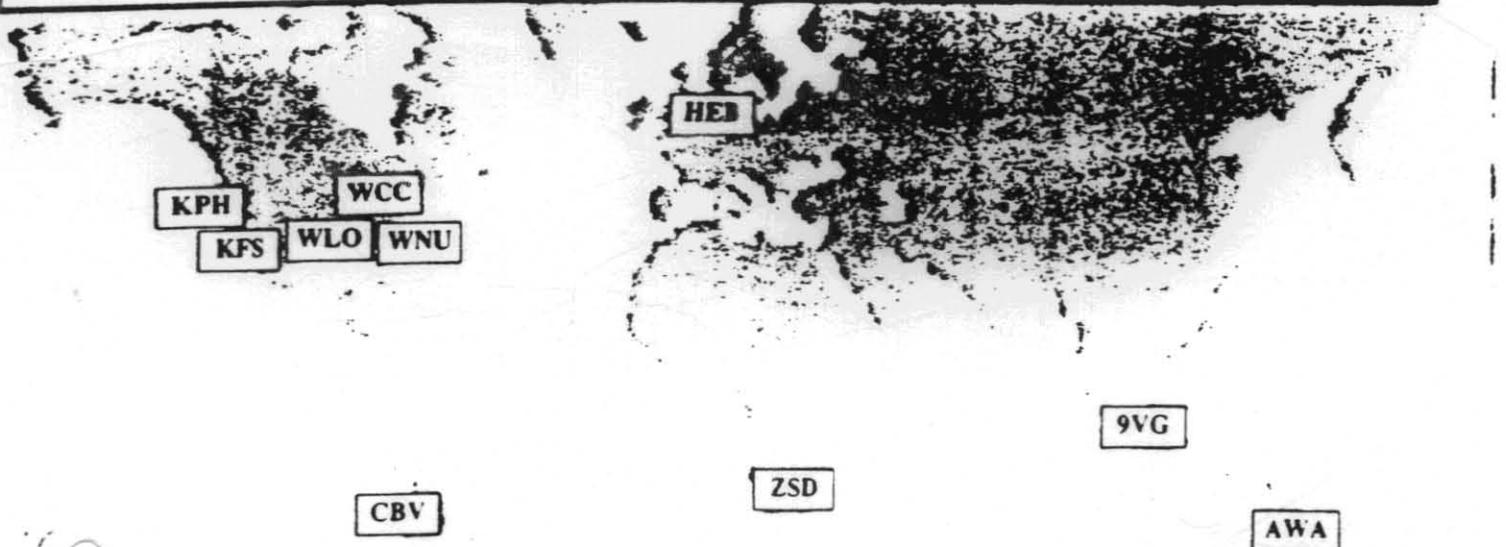
KMI	Inverness, CA
WOM	Ft. Lauderdale, FL
WOO	Manahawkin, NJ

Marine Telex

WLO	Mobile, AL
WCC	Chatham, MA
KPH	San Francisco, CA
KFS	Palo Alto, CA
WNU	Slidell, LA
9VG	Singapore
ZSD	Durban, South Africa
HEB	Bern, Switzerland
AWA	Sydney, Australia
CBV	Playa de Ancha, Chile

* Telecommunication numbers listed on
 reverse side.

* Números de telecomunicaciones están escritas en
 el lado de atrás.



When to Call for Medical Advice

482173

Quando llamar para pedir asesoria medica

For illness or injury for which you would consult a physician shoreside.

Para toda enfermedad o lesión para la cual usted consultaría un médico en tierra firme.)

When there are two or more similar illnesses.

Possible contagious disease. Cuando haya dos o más personas que padecen de enfermedades similares. Posiblemente una enfermedad contagiosa).

When you have questions concerning medications such as adverse reactions or a need for substitutions for medications prescribed on shore or on board.

(Cuando tenga preguntas con respecto a medicamentos, tales como reacciones adversas o la necesidad de sustituir medicamentos recetados en tierra firme o a bordo.)

When common illness such as colds, coughs, minor cuts, bruises or headaches don't get better after two days of treatment with standard medicines and treatment.

En casos de enfermedad comunes tales como resfriados, tos, cortaduras, contusiones o dolores de cabeza en donde no hay mejoría después de dos días de tratamiento con los medicamentos y tratamientos de rigor.)

When you need guidelines for a crew member's ability to work or return to work, or for insurance claim information or liability related information.

(Cuando necesite guía acerca de la capacidad de trabajar o de regresar a trabajar de un tripulante o para información sobre reclamaciones de seguro o información relacionada con la responsabilidad.)

	WLO Mobile, AL	WOC Charleston, VA	WPI New York, AL	WNU Mobile, LA	WVG Virginia
LEPHONE:	205-666-9041	508-945-9602	415-669-1003	504-863-5311	65-4800326
CSIMILE:	205-666-8339	508-945-5399	415-726-1656	504-863-5313	65-4818050
LEX:	505444	235955	278333	142142	786-34403
	HEB Bern, Switzerland	AWA Sydney, Australia	CBV Playa de Ancha, Chile	ZSD Durban, S. Africa	KFS Palo Alto, CA
LEPHONE:	41-31-657111	61-2-887-7182	56-32-281001	27-31-7014921	415-726-6588
CSIMILE:	41-31-262516	61-2-887-7285	56-32-281099	27-31-727995	415-726-8604
LEX:	845-919199	790-20623	352-230428	625298	184208

Message Format

Formato del Mensaje

The message format has been specially designed to assist non-medical personnel in facilitating communication with the SOS medical staff. Information has been organized so that the SOS medical staff can quickly and easily determine the extent of the medical problem and provide an appropriate response. All of the information requested may not be required in the initial communication; however, it will be requested later by the Alarm Center Staff in order to fully document the medical incident.

The message format should be completed as accurately as possible. If answers to any of the questions are not known or if the information is unavailable, they should be answered UNKNOWN or NOT AVAILABLE. This information should be sent directly to SOS at any of the numbers listed in the communications section of this handbook. An example of a completed message is displayed below.

After the SOS medical staff receives the request for medical advice, a response will be formulated and returned to the sender as soon as possible. The response will include any additional questions that the medical staff believes necessary as well as medical advice describing the actions to be taken. After the SOS medical staff has responded, the reply should be logged onto the Medical Notes page in this handbook. A photocopy of the Medical Notes can be used to log the medical staff's reply, or it can be written directly into this handbook using the wax pencil supplied with this handbook. Be sure to include any medications prescribed, time and quantity to be administered, and the scheduled follow-up time.

El formato del mensaje fue diseñado especialmente para ayudar al personal no médico a facilitar las comunicaciones con el personal médico de SOS. La información se organizó de forma que el personal médico de SOS pueda determinar pronto y fácilmente la medida del problema médico y proporcionar una respuesta apropiada. No toda la información solicitada será necesaria en la comunicación inicial; sin embargo, será solicitada posteriormente por el personal del Alarm Center para documentar completamente el incidente médico.

El formato del mensaje se debe llenar con la mayor precisión posible. Si se desconoce la respuesta a alguna de las preguntas o si no dispone de los datos, se debe contestar SE DESCONOCE o NO SE DISPONEN. Esta información se debe enviar directamente a cualquiera de los números indicados en la sección comunicaciones de este manual. Un ejemplo de un mensaje llenado se muestra al final la página.

Después que el personal médico de SOS reciba la solicitud de asesoría médica, se formulará una respuesta que será remitida al remitente cuanto antes posible. La respuesta incluirá todas las preguntas adicionales que el personal médico considere necesarias, así como la asesoría médica indicando las medidas que se deben tomar. Después de que haya contestado el personal médico de SOS, la respuesta se debe registrar en la página Notas Médicas de este manual. Para registrar la respuesta del personal médico se puede usar una fotocopia de las Notas Médicas, o se puede escribir directamente en este manual, con el lápiz de cera que se suministra con este manual. No olvide incluir los medicamentos recetados, la hora y la dosis para su administración y el tiempo de seguimiento planificado.

EXAMPLE:

- | | |
|------------------------------------|------------------------|
| 1. M/V Good Hope | 10. A. Stomach Pain |
| 2. WXYZ | B. Started last night |
| 3. John Doe - Master | C. Unknown |
| 4. ABC Shipping Company | D. Area 20 |
| 5. 20 N - 140 W | E. Dull Ache |
| 6. 026 - 14 Knots | 11. A. 160/80 |
| 7. Singapore - 27 July | B. 70 |
| 8. San Francisco - 1400Z - 10 Aug. | C. 17 |
| 9. A. Joe Smith | D. 98 F |
| B. Chief Engineer | 12. A. NO |
| C. Male | B. Yes - Acetaminophen |
| D. 42 | C. Yes - Sulfa Drugs |
| E. 180 lbs. | 13. A. Yes |
| F. 5 ft. 10 in. | B. Bob Stone |
| G. 345-89-3838 | C. Nurse |
| H. U.S. | |

Message Format

Formato del mensaje

-  **Vessel Name** _____
Nombre de llamada de la embarcación
2. **Vessel Call Sign** _____
Señal de llamada de la embarcación
3. **Caller/Title** _____
Persona que llama/Cargo
4. **Owner/Operator** _____
Propietario/Operario
5. **Location** Latitude: _____ Longitude: _____
Ubicación Latitud Longitud
6. **Course/Speed** _____
Rumbo/Velocidad
-  **Last Port of Call** _____ Date _____
Último puerto de escala Fecha
8. **Next Port of Call** _____ ETA _____
Próximo puerto de escala HLE
9. **Patient Information:**
Datos del paciente
- a. **Name** _____
Nombre
- b. **Rating** _____
Clasificación
- c. **Sex** _____
Sexo
- d. **Age** _____
Edad
- e. **Weight** _____
Peso
- f. **Height** _____
Estatura
- g. **SS# or Z#** _____
de SS o # de Z
- h. **Nationality** _____
Nacionalidad

10. History of Present Illness/Injury*Historial de la actual enfermedad lesión*

- a. Chief Complaint/Problem _____
Queja problema principal
- b. When did it start? _____
¿Cuándo comenzó?
- c. What caused it? _____
¿Cuál es la causa?
- d. Number of area involved (use diagram) _____
Número de la parte implicada (use el diagrama)
- e. Describe the pain _____
Describe el dolor

11. Vital Signs*Signos vitales*

- a. Blood Pressure _____
Tensión
- b. Pulse Rate _____
Pulso
- c. Breathing Rate _____
Respiración
- d. Temperature _____
Temperatura

12. Past Medical History*Antecedentes médicos*

- a. Has the patient had this problem before? When? _____
¿Ha tenido el paciente este problema anteriormente? ¿Cuándo?
- b. Is the patient taking any medications? _____
¿Está tomando medicamentos el paciente?
- c. Does the patient have any known allergies? To what? _____
¿Padece el paciente de alergias conocidas? ¿A qué?

13. Personnel On Board Ship*Personal a bordo del barco*

- a. Is there any medically trained personnel on board? _____
¿Hay personal con capacitación médica a bordo?
- b. Name _____
Nombre
- c. Level of Training _____
Nivel de capacitación

Medical Notes
Notas Medicinas

Blood Pressure
Tension

/

____ minute

/

____ minute

/

____ minute

/

____ minute

Respiration
Respiración

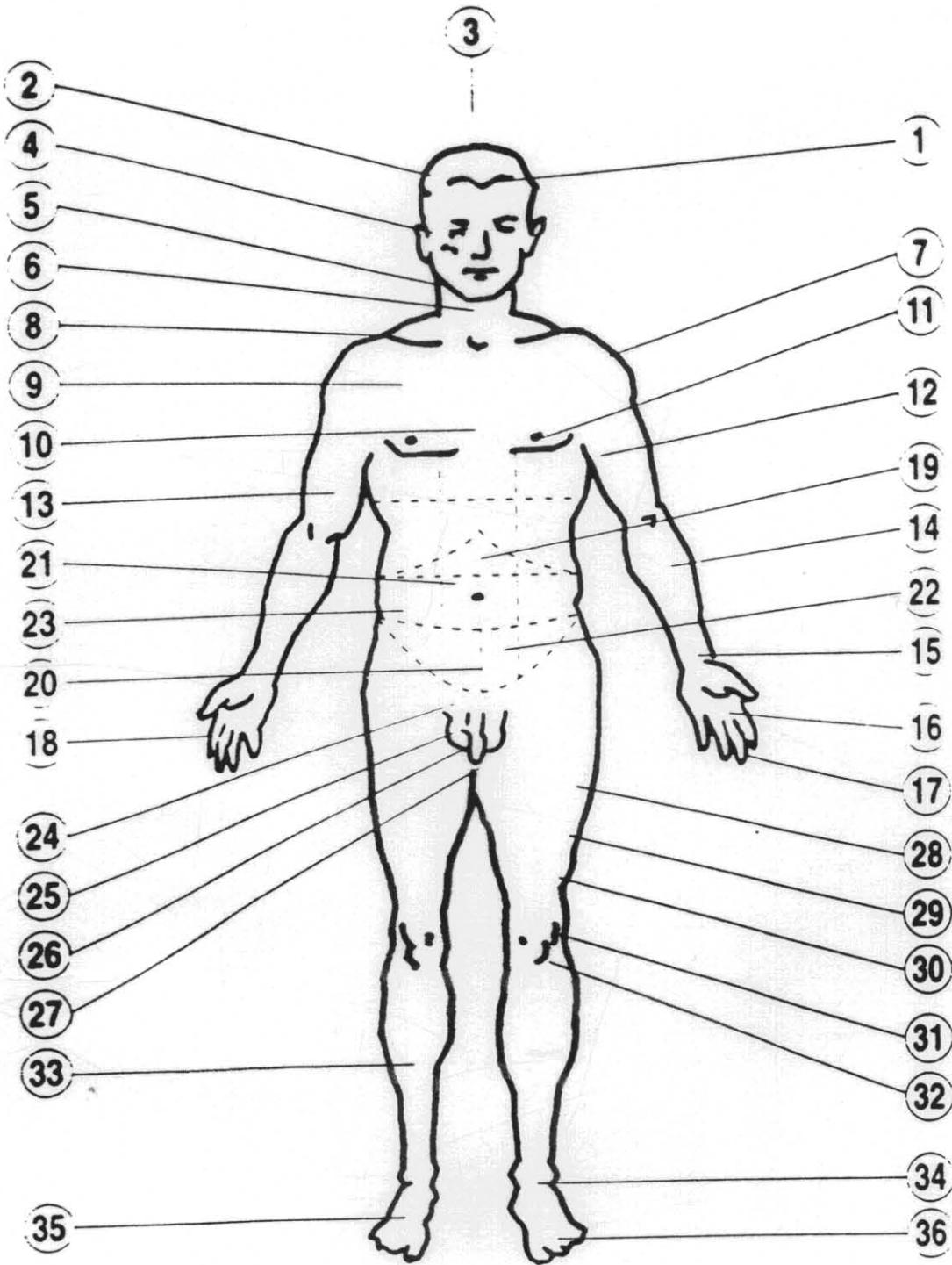
____ / minute

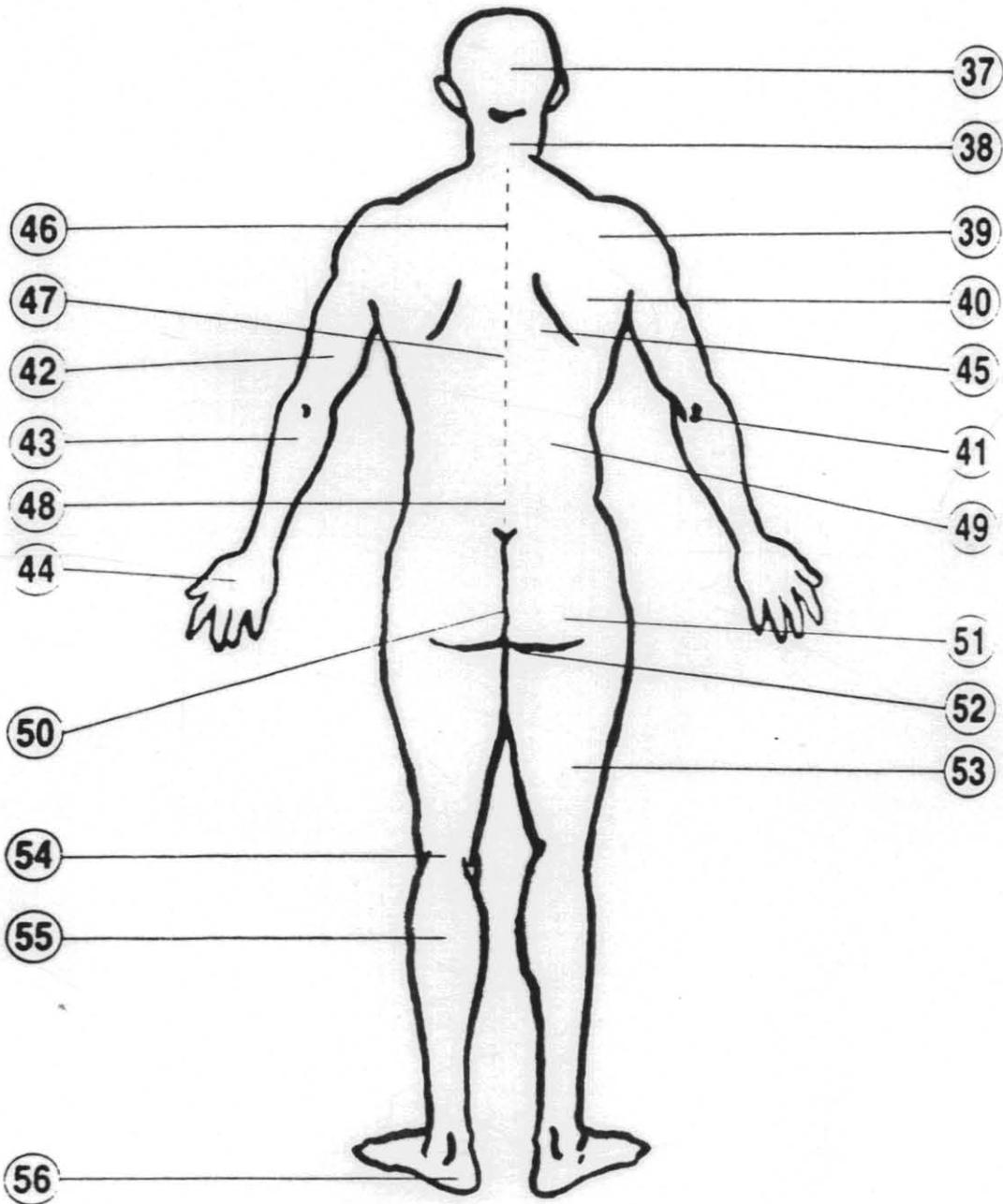
C
 F

Medical Advice from SOS:

Medication Prescribed	Amount / Quantity	Time/Date Given	Administered By:
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

Follow Up Date: _____ Time: _____







**SAFETY DEPARTMENT
MATERIAL SAFETY DATA SHEET
(FIELD USE REFERENCE FORM)**

Proper Name: _____

Section 1 - Product Identification And Use

Product Identifier: (User's name(s)): RED - 2

Product Identification Number: CAS # 2893-78-9

Product Use: Clean-up of potentially infectious and harmful blood/body fluid spills

Section 2 - Hazardous Ingredients

Hazardous: Sodium Dichloroisocyanurate 3%

Section 3 - Physical Data

Physical State: Granular powder - off white color

Odor & Appearance: Slight chlorine odor

Section 4 - Fire And Explosion Data

Flammability: Yes No If yes, under which conditions? _____

Means of Extinction: Water

Explosion Data: Sensitivity to Impact: None

Sensitivity to Static Discharge: None

Section 5 - Reactivity Data

Chemical Stability: Yes No If no, under which conditions? _____

Compatibility with other substances: Yes No If no, which ones? _____

Reactivity and under which conditions? Water; forms an oxidizing bleach solutions. Absorbs water and becomes slippery

Section 6 - Toxicological Properties

Route of Entry:

SI Contact Skin Absorption

Eye Contact

Inhalation Ingestion

Section 7 - Preventive Measures

Personal Protective Equipment Requirement: (Specify): Eye Protection, Gloves

Handling Procedures and Equipment: Practice good housekeeping

Storage Requirements: Keep container sealed and store in cool dry place; avoid exposure to sunlight and high humidity

Leak and Spill Procedure: Avoid generating dust. Shovel and sweep into a suitable container. Becomes extremely slippery when wet.

Waste Disposal: Dispose of within federal, local and facility guidelines

Section 8 - First Aid Measures

Specific Measures HEALTH HAZARDS: SYMPTOMS OF EXPOSURE: Organic matrix may act as a mechanical irritant. Chlorine may burn skin. Excessive exposure may irritate eyes, nose or airway.

CONDITIONS GENERALLY AGGRAVATED: Contact wearers may be sensitive to dust.

EMERGENCY FIRST AID: Flush with water as required. If irritation occurs seek medical aid

RESPIRATORY PROTECTION: Not ordinarily required

VENTILATION: Not ordinarily required with normal use in a reasonably ventilated area.

EYE PROTECTION: As with any finely divided chemical, recommended. Exposure of sensitive areas to oxidizing agent may cause burning

GLOVES: As with any hand exposure to chemicals, recommended. Exposure to sensitive areas to oxidizing agent may cause burning.

Section 9 - Preparation

Prepared by: Mike Arnold

Phone Number: (713) 630-4054

Fax Number: (713) 526-5842

Emergency Contact:

Company: Digicon Safety Department

Company: _____

Phone Number: 713-526-5611

Phone Number: _____

Fax Number: 713-526-5842

Fax Number: _____

482182

482182



**SAFETY DEPARTMENT
MATERIAL SAFETY DATA SHEET
(FIELD USE REFERENCE FORM)**

Proper Name: BLEACH

Section 1 - Product Identification And Use

Product Identifier: (User's name(s)): Bleach

Product Identification Number: _____

Product Use: To whiten textiles or paper by chemical reaction

Section 2 - Hazardous Ingredients

Hazardous: Calcium Hypochlorite, Lime, Chlorinated

Section 3 - Physical Data

Physical State: Clear Liquid

Odor & Appearance: N/A

Section 4 - Fire And Explosion Data

Flammability: Yes No If yes, under which conditions? Around Organic Materials

Means of Extinction: Dry Chemical, Co2, or copenous amounts of water

Explosion Data: Sensitivity to Impact: _____

Sensitivity to Static Discharge: _____

Section 5 - Reactivity Data

Chemical Stability: Yes No If no, under which conditions? _____

Compatibility with other substances: Yes No If no, which ones? _____

Reactivity and under which conditions? When used in its purposed role

Section 6 - Toxicological Properties

Route of Entry:

Skin Contact Skin Absorption

Eye Contact

Inhalation Ingestion

Section 7 - Preventive Measures

Personal Protective Equipment Requirement: (Specify): Level C, SCBA

Handling Procedures and Equipment: Absorbent materials, 80 gal overpack, diking material

Storage Requirements: Store in drums or plastic containers

Leak and Spill Procedure: Pick up with absorbent materials such as vermiculite, sand, earth

Waste Disposal: Call CHEMTREC 1/800-424-9300 or controlled agency

Section 8 - First Aid Measures

Specific Measures: _____

EYES - flush immediately with water for 15 minutes. Get medical attention immediately.

SKIN - remove contaminated clothing. Wash skin with soap and water.

INHALATION - remove to fresh air. Give artificial respiration if needed. Get medical attention.

INGESTION - call a physician immediately to determine whether or not to induce vomiting.

Section 9 - Preparation

Prepared by: Mike Arnold Phone Number: 713/630-4054

Fax Number: 713/526-5842

Emergency Contact: _____

Company: Digicon Safety Department

Company: _____

Phone Number: 713-526-5611

Phone Number: _____

Fax Number: 713-526-5842

Fax Number: _____



**SAFETY DEPARTMENT
MATERIAL SAFETY DATA SHEET
(FIELD USE REFERENCE FORM)**

Proper Name: CHLORINE

Section 1 - Product Identification And Use

Product Identifier: (User's name(s)): CHLORINE

Product Identification Number: CAS 7782-50-5

Product Use: Used as a cleaning agent or used to produce other materials

Section 2 - Hazardous Ingredients

Hazardous: Chlorine

Section 3 - Physical Data

Physical State: Greenish-yellowish gas

Odor & Appearance: Irritating Odor

Section 4 - Fire And Explosion Data

Flammability: Yes No If yes, under which conditions? _____

Means of Extinction: _____

Explosion Data: Sensitivity to Impact: _____

Sensitivity to Static Discharge: _____

Section 5 - Reactivity Data

Chemical Stability: Yes No If no, under which conditions? _____

Compatibility with other substances: Yes No If no, which ones? Turpentine, Ether, Amonia

Reactivity and under which conditions? Normal Conditions

Section 6 - Toxicological Properties

Route of Entry: _____

Skin Contact Skin Absorption

Eye Contact

Inhalation Ingestion

Section 7 - Preventive Measures

Personal Protective Equipment Requirement: (Specify): Level A, SCBA, Chemical resistant gloves
and boots, Chlorine kit

Handling Procedures and Equipment: Evacuate if necessary, stop leak if possible

Storage Requirements: Pressure vessels, or if in granular form store in plastic container
keeper

Leak and Spill Procedure: Evacuate, reduce vapor with water spray, isolate area until
gas has dissipated

Waste Disposal: Call CHEMTREC 1/800-424-9300, or manufacturer

Section 8 - First Aid Measures

Specific Measures: _____

EYES - flush immediately with water for 15 minutes. Get medical attention
immediately.

SKIN - remove contaminated clothing. Wash skin with soap and water.

INHALATION - remove to fresh air. Give artificial respiration if needed. Get
medical attention.

INGESTION - call a physician immediately to determine whether or not to induce
vomiting.

Section 9 - Preparation

Prepared by: Mike Arnold

Phone Number: 713/630-4054

Fax Number: 713/526-5842

Emergency Contact:

Company: Digicon Safety Department

Company: _____

Phone Number: 713-526-5611

Phone Number: _____

Fax Number: 713-526-5842

Fax Number: _____



**SAFETY DEPARTMENT
MATERIAL SAFETY DATA SHEET
(FIELD USE REFERENCE FORM)**

Proper Name: Conch Degreaser

Section 1 - Product Identification And Use

Product Identifier: (User's name(s)): Degreaser

Product Identification Number: 111-76-2/27176-87-0

Product Use: Degreaser

Section 2 - Hazardous Ingredients

Hazardous: Ether
Sulfonic Acid

Section 3 - Physical Data

Physical State: Liquid
Odor & Appearance: Detergent - blue liquid

Section 4 - Fire And Explosion Data

Flammability: Yes No If yes, under which conditions? _____

Means of Extinction: N/A

Explosion Data: Sensitivity to Impact: N/A

Sensitivity to Static Discharge: _____

Section 5 - Reactivity Data

Chemical Stability: Yes No If no, under which conditions? _____

Compatibility with other substances: Yes No If no, which ones? Oxidizing agents

Reactivity and under which conditions? High temperatures/freezing

Section 6 - Toxicological Properties

Route of Entry:

Skin contact Skin Absorption Eye Contact

Inhalation Ingestion

Section 7 - Preventive Measures

Personal Protective Equipment Requirement: (Specify): Gloves, goggles and rubber apron.

Handling Procedures and Equipment: Gloves, goggles and rubber apron.

Storage Requirements: Keep from freezing and exposure to extreme high temperatures.

Leak and Spill Procedure: Flush to drain, observing local, state and federal regulatios

Waste Disposal: Check local ordinances for accepted pH of discharge waters

Section 8 - First Aid Measures

Specific Measures: For eye contact, flush with water for 15 minutes. If irritation persists, seek immediate medical attention.

Section 9 - Preparation

Prepared by: Mike Arnold Phone Number: 713/630-4054

Fax Number: 713/526-5842

Emergency Contact:

Company: Digicon Safety Department

Phone Number: 713-526-5611

Fax Number: 713-526-5842

Company: Ace Soap Factory

Phone Number: 512/646-0881

Fax Number: N/A



**SAFETY DEPARTMENT
MATERIAL SAFETY DATA SHEET
(FIELD USE REFERENCE FORM)**

Proper Name: Davisolvent TF

Section 1 - Product Identification And Use

Product Identifier: (User's name(s)): Freon TF

Product Identification Number: 76-13-1

Product Use: Freon

Section 2 - Hazardous Ingredients

Hazardous: Trichloro
Trifluoroethane

Section 3 - Physical Data

Physical State: Freon Gas
Odor & Appearance: N/A

Section 4 - Fire And Explosion Data

Flammability: Yes No If yes, under which conditions? _____
Use media suitable for surrounding fire

Means of Extinction: _____

Explosion Data: Sensitivity to Impact: N/A
Sensitivity to Static Discharge: N/A

Section 5 - Reactivity Data

Chemical Stability: Yes No If no, under which conditions? _____

Compatibility with other substances: Yes No If no, which ones? Sodium, barium metal

Reactivity and under which conditions? N/A

Section 6 - Toxicological Properties

Route of Entry:

Skin Contact Skin Absorption Eye Contact
Inhalation Ingestion

Section 7 - Preventive Measures

Personal Protective Equipment Requirement: (Specify): Gloves, apron, goggles and eyewash in work area.

Handling Procedures and Equipment: Gloves, apron, goggles and eyewash station in work area.

Storage Requirements: Cool area with good ventilation. Enforce no smoking rules in area.

Leak and Spill Procedure: Recover any liquid and ventilate spill area. Use SCBA to avoid suffocation.

Waste Disposal: Dispose of in facility permitted for non hazardous waste.

Section 8 - First Aid Measures

Specific Measures: Ingestion - give one or two glasses of water to drink. If gastrointestinal symptoms develop, consult medical personnel. Never give anything by mouth to an unconscious person.

Skin - Remove contaminated clothing. Wash skin with soap and water. If redness, itching or a burning sensation develop, get medical attention.

Eyes - immediately flush with water for 15 minutes. If redness, itching or a burning sensation develop, have eyes examined and treated by medical personnel.

Inhalation - remove victim to fresh air. If cough or other respiratory symptoms develop, consult medical personnel. If not breathing, give artificial respiration, preferably mouth-to-mouth. If breathing is difficult, give oxygen. Consult medical personnel

Section 9 - Preparation NOTE TO PHYSICIAN: Gastric lavage may be effected within four hours of ingestion. Product is an asphyxiant and can induce cardiac muscle sensitiation resulting in fatal heart arrhythmias.

Prepared by: Mike Arnold

Phone Number: 713/630-4054

Fax Number: 713/526-5842

Emergency Contact:

Company: Digicon Safety Department

Phone Number: 713-526-5611

Fax Number: 713-526-5842

Company: ICI Americas, Inc.

Phone Number: 302/886-3000

Fax Number: N/A



**SAFETY DEPARTMENT
MATERIAL SAFETY DATA SHEET
(FIELD USE REFERENCE FORM)**

Proper Name: DIESEL FUEL

Section 1 - Product Identification And Use

Product Identifier: (User's name(s)): Fuel Oil No. 2

Product Identification Number: N/A

Product Use: Fuel for Engines

Section 2 - Hazardous Ingredients

Hazardous: Unbranched Paraffins

Section 3 - Physical Data

Physical State: Liquid

Odor & Appearance: Brownish Liquid

Section 4 - Fire And Explosion Data

Flammability: Yes No If yes, under which conditions? 110-190 Degrees F

Means of Extinction: Water, Foam, CO²

Explosion Data: Sensitivity to Impact: N/A

Sensitivity to Static Discharge: N/A

Section 5 - Reactivity Data

Chemical Stability: Yes No If no, under which conditions? _____

Compatibility with other substances: Yes No If no, which ones? _____

Reactivity and under which conditions? _____

Section 6 - Toxicological Properties

Route of Entry:

Skin Contact Skin Absorption

Eye Contact

Inhalation Ingestion

Section 7 - Preventive Measures

Personal Protective Equipment Requirement: (Specify): LEVEL D or Firefighting Equipment

Handling Procedures and Equipment: Use fire hoses if wash down is needed, and pumps to pick up product

Storage Requirements: Store in drums or tanks

Leak and Spill Procedure: Dike around material to prevent from getting into water systems

Waste Disposal: Contain product, then pick up the product and store in drums labeled waste

Section 8 - First Aid Measures

Specific Measures:

EYES - flush immediately with water for 15 minutes. Get medical attention immediately.

SKIN - remove contaminated clothing. Wash skin with soap and water.

INHALATION - remove to fresh air. Give artificial respiration if needed. Get medical attention.

INGESTION - call a physician immediately to determine whether or not to induce vomiting.

Section 9 - Preparation

Prepared by: Mike Arnold

Phone Number: 713/630-4054

Fax Number: 713/526-5842

Emergency Contact:

Company: Digicon Safety Department

Phone Number: 713-526-5611

Fax Number: 713-526-5842

Company: _____

Phone Number: _____

Fax Number: _____



**SAFETY DEPARTMENT
MATERIAL SAFETY DATA SHEET
(FIELD USE REFERENCE FORM)**

Proper Name: Finish Remover

Section 1 - Product Identification And Use

Product Identifier: (User's name(s)): Finish Remover

Product Identification Number: 2W349 A

Product Use: Cleaning liquid

Section 2 - Hazardous Ingredients

Hazardous: Butoxy Ethanol

Ethanolamine

Section 3 - Physical Data

Physical State: Liquid

Odor & Appearance: Floral-Green Liquid

Section 4 - Fire And Explosion Data

Flammability: Yes No If yes, under which conditions?

Means of Extinction: Carbon Dioxide, Foam

Explosion Data: Sensitivity to Impact: N/A

Sensitivity to Static Discharge: N/A

Section 5 - Reactivity Data

Chemical Stability: Yes No If no, under which conditions?

Compatibility with other substances: Yes No If no, which ones?

Reactivity and under which conditions?

Section 6 - Toxicological Properties

Route of Entry:

Skin Contact Skin Absorption

Eye Contact

Inhalation Ingestion

Section 7 - Preventive Measures

Personal Protective Equipment Requirement: (Specify): N/A

Handling Procedures and Equipment: As with all chemicals, handle with caution.

Storage Requirements: Dry location

Leak and Spill Procedure: Solubility in water is 100%

Waste Disposal: Same as above

Section 8 - First Aid Measures

Specific Measures: Eyes: Slight irritant

Skin: Slight irritant. Butoxyethanol is readily absorbed through the skin where it exerts a toxic effect on the kidneys, liver and the blood forming system. Repeated overexposure may aggravate any preexisting disfunction of these systems.

Inhalation: Extremely high concentrations or fire sprays may be irritating to the eyes and respiratory tract.

Ingestion: Slight to moderately toxic.

Section 9 - Preparation

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Company: _____

Phone Number: _____

Fax Number: _____



**SAFETY DEPARTMENT
MATERIAL SAFETY DATA SHEET
(FIELD USE REFERENCE FORM)**

Proper Name: Freon 12

Section 1 - Product Identification And Use

Product Identifier: (User's name(s)): Freon Gas

Product Identification Number: DP 23-00-1

Product Use: _____

Section 2 - Hazardous Ingredients

Hazardous: Methane

Dichlorodifluoro

Section 3 - Physical Data

Physical State: Liquified Gas

Odor & Appearance: Colorless

Section 4 - Fire And Explosion Data

Flammability: Yes No If yes, under which conditions? _____

Means of Extinction: Water

Explosion Data: Sensitivity to Impact: N/A - may rupture under fire conditions

Sensitivity to Static Discharge: Will not burn - may rupture under fire conditions

Section 5 - Reactivity Data

Chemical Stability: Yes No If no, under which conditions? _____

Compatibility with other substances: Yes No If no, which ones? Alkali/Alkaline

Reactivity and under which conditions? N/A

Section 6 - Toxicological Properties

Route of Entry:

Skin Contact Skin Absorption

Eye Contact

Inhalation Ingestion

Section 7 - Preventive Measures

Personal Protective Equipment Requirement: (Specify): SCBA if cylinder ruptures. Gloves and goggles.

Handling Procedures and Equipment: Normal ventilation for standard manufacturing procedures is generally adequate.

Storage Requirements: Clean, dry area. Do not heat above 125 degrees F.

Leak and Spill Procedure: Ventilate area - especially low places where heavy vapors might collect. Remove open flames.

Waste Disposal: Reclaim by distillation or remove to a permitted waste facility. Comply with federal, state and local regulations.

Section 8 - First Aid Measures

Specific Measures: Inhalation - remove to fresh air. Keep person calm. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call physician.

Skin - flush with water. Treat for frostbite if necessary by gently warming affected area.

Eye - flush eyes with water for 15 minutes. Call a physician.

Ingestion - not considered a potential route of exposure.

NOTE TO PHYSICIAN: Because of a possible disturbance of cardiac rhythm, catecholamine drugs, such as epinephrine, should be used with special caution in situations of emergency life support.

Section 9 - Preparation

Prepared by: Mike Arnold

Phone Number: 713/630-4054

Fax Number: 713/526-5842

Emergency Contact:

Company: Digicon Safety Department

Company: DuPont Chemicals

Phone Number: 713-526-5611

Phone Number: 1-800-441-9450

Fax Number: 713-526-5842

Fax Number: N/A



**SAFETY DEPARTMENT
MATERIAL SAFETY DATA SHEET
(FIELD USE REFERENCE FORM)**

Proper Name: Freon 22

Section 1 - Product Identification And Use

Product Identifier: (User's name(s)): Freon Gas

Product Identification Number: DP 31-32-7

Product Use: _____

Section 2 - Hazardous Ingredients

Haz ^{ous}: Methane
Chlorodifluoro

Section 3 - Physical Data

Physical State: Liquefied gas
Odor & Appearance: Clear, colorless
slight ethereal

Section 4 - Fire And Explosion Data

Flammability: Yes No If yes, under which conditions? _____

Means of Extinction: As appropriate for combustibles in area. Water

Explosion Data: Sensitivity to Impact: N/A - may rupture under fire conditions

Sensitivity to Static Discharge: N/A - may rupture under fire conditions

Section 5 - Reactivity Data

Chemical Stability: Yes No If no, under which conditions? _____

Compatibility with other substances: Yes No If no, which ones? Alkali/Alkaline

Reactivity and under which conditions? N/A

Section 6 - Toxicological Properties

Route of Entry: _____

Skin Contact Skin Absorption Eye Contact

Inhalation Ingestion

Section 7 - Preventive Measures

Personal Protective Equipment Requirement: (Specify): SCBA if cylinder ruptures. Gloves and goggles

Handling Procedures and Equipment: Normal ventilation for standard manufacturing procedures is generally adequate.

Storage Requirements: Clean, dry area. Do not heat above 125 degrees F.

Leak and Spill Procedure: Ventilate area - especially low places where heavy vapors might collect. Remove open flames.

Waste Disposal: Reclaim by distillation or remove to a permitted waste facility. Comply with federal, state and local requirements.

Section 8 - First Aid Measures

Specific Measures: Inhalation - immediately remove to fresh air. Keep person calm. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

Skin - flush skin with water for 15 minutes. Treat for frostbite if necessary by gently warming affected area. If irritation is present, call a physician.

Eye - flush eyes with water for 15 minutes. Call a physician.

Ingestion - not considered a potential route of exposure.

NOTE TO PHYSICIAN: Because of possible disturbances of cardiac rhythm, catecholamine drugs, such as epinephrine, should only be considered as a last resort in life-threatening emergencies.

Section 9 - Preparation

Prepared by: Mike Arnold

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Emergency Contact:

Company: Digicon Safety Department

Company: DuPont Chemicals

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Phone Number: 1-800-441-9442

Fax Number: 713-526-5842

Fax Number: N/A



SAFETY DEPARTMENT
MATERIAL SAFETY DATA SHEET
(FIELD USE REFERENCE FORM)

Proper Name: Freon 502 Refrigerant

Section 1 - Product Identification And Use

Product Identifier: (User's name(s)): Freon Gas

Product Identification Number: DP 10-39-3

Product Use: _____

Section 2 - Hazardous Ingredients

Hazardous: Methane
Chlorodifluoro

Section 3 - Physical Data

Physical State: Liquified Gas
Odor & Appearance: Slight ethereal, clean, colorless

Section 4 - Fire And Explosion Data

Flammability: Yes No If yes, under which conditions? _____

Means of Extinction: As appropriate for combustibles in area water.

Explosion Data: Sensitivity to Impact: N/A - may rupture under fire conditions

Sensitivity to Static Discharge: N/A - may rupture under fire conditions

Section 5 - Reactivity Data

Chemical Stability: Yes No If no, under which conditions? _____

Compatibility with other substances: Yes No If no, which ones? Alkali/Alkaline

Reactivity and under which conditions? N/A

Section 6 - Toxicological Properties

Route of Entry: _____

Skin Contact Skin Absorption Eye Contact

Inhalation Ingestion

Section 7 - Preventive Measures

Personal Protective Equipment Requirement: (Specify): SCBA if cylinder ruptures, gloves, goggles.

Handling Procedures and Equipment: Normal ventilation for standard manufacturing procedures is generally adequate.

Storage Requirements: Clean, dry area. Do not heat above 125 degrees F.

Leak and Spill Procedure: Ventilate area - especially low places where heavy vapors might collect. Remove open flames.

Waste Disposal: Reclaim by distillation or remove to a permitted waste facility. Comply with federal, state and local requirements.

Section 8 - First Aid Measures

Specific Measures: Inhalation - immediately remove to fresh air. Keep person calm. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call physician.

Skin - flush with water for 15 minutes. Treat for frostbite if necessary by gently warming affected area.

Eye - immediately flush eyes with plenty of water for 15 minutes. Call a physician.

Ingestion - not considered a potential route of exposure.

PHYSICIANS NOTE: Because of possible disturbances of cardiac rhythm, catecholamine drugs, such as epinephrine, should be used with special caution only in situations of emergency life support.

Section 9 - Preparation

Prepared by: Mike Arnold

Phone Number: 713/630-4054

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Emergency Contact:

Company: Digicon Safety Department

Company: DuPont Chemicals

Phone Number: 713-526-5611

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Fax Number: 713-526-5842

Fax Number: N/A



**SAFETY DEPARTMENT
MATERIAL SAFETY DATA SHEET
(FIELD USE REFERENCE FORM)**

Proper Name: HYDROCHLORIC ACID

Section 1 - Product Identification And Use

Product Identifier: (User's name(s)): Hydrochloric

Product Identification Number: CAS 7647-01-0

Product Use: Industrial Cleaning

Section 2 - Hazardous Ingredients

Hazardous: Hydrochloric Acid

Section 3 - Physical Data

Physical State: Liquid

Odor & Appearance: Slightly Yellow, Pungent

Section 4 - Fire And Explosion Data

Flammability: Yes No If yes, under which conditions? _____

Means of Extinction: _____

Explosion Data: Sensitivity to Impact: _____

Sensitivity to Static Discharge: _____

Section 5 - Reactivity Data

Chemical Stability: Yes No If no, under which conditions? _____

Compatibility with other substances: Yes No If no, which ones? _____

Reactivity and under which conditions? When applied to acids, metals, etc.

Section 6 - Toxicological Properties

Route of Entry: _____

Skin Contact Skin Absorption Eye Contact

Inhalation Ingestion

Section 7 - Preventive Measures

Personal Protective Equipment Requirement: (Specify): SCBA, Level B Suit

Handling Procedures and Equipment: Dikeing Material, Poly Drums, if in drums overpacks are needed

Storage Requirements: Poly Drums, Acid Tanks

Leak and Spill Procedure: Dike and Flush with copious amounts of water

Waste Disposal: Pickup material and water put in drums for disposal

Section 8 - First Aid Measures

Specific Measures: _____

EYES - flush immediately with water for 15 minutes. Get medical attention immediately.

SKIN - remove contaminated clothing. Wash skin with soap and water.

INHALATION - remove to fresh air. Give artificial respiration if needed. Get medical attention.

INGESTION - call a physician immediately to determine whether or not to induce vomiting.

Section 9 - Preparation

Prepared by: Mike Arnold Phone Number: 713/630-4054
Fax Number: 713/526-5842

Emergency Contact:

Company: Digicon Safety Department Company: _____
Phone Number: 713-526-5611 Phone Number: _____
Fax Number: 713-526-5842 Fax Number: _____



**SAFETY DEPARTMENT
MATERIAL SAFETY DATA SHEET
(FIELD USE REFERENCE FORM)**

Proper Name: Chemprine

Section 1 - Product Identification And Use

Product Identifier: (User's name(s)): Chemprine

Product Identification Number: N/A

Product Use: Rust Remover

Section 2 - Hazardous Ingredients

Hazardous: Phosphoric Acid

Section 3 - Physical Data

Physical State: Liquid

Odor & Appearance: Slight odor - green liquid

Section 4 - Fire And Explosion Data

Flammability: Yes No If yes, under which conditions? _____

Means of Extinction: Non-flammable, water base

Explosion Data: Sensitivity to Impact: N/A

Sensitivity to Static Discharge: N/A

Section 5 - Reactivity Data

Chemical Stability: Yes No If no, under which conditions? _____

Compatibility with other substances: Yes No If no, which ones? Alkaline/Oxidizers

Reactivity and under which conditions? N/A

Section 6 - Toxicological Properties

Route of Entry:

Skin Contact Skin Absorption

Eye Contact

Inhalation Ingestion

Section 7 - Preventive Measures

Personal Protective Equipment Requirement: (Specify): Rubber gloves, goggles, cannister mask in closed area and rubber clothing if spraying in closed area.

Handling Procedures and Equipment: Handle as an acid.

Storage Requirements: Keep away from alkaline and oxidizing agents.

Leak and Spill Procedure: Flush area with water to thoroughly dilute before pumping to disposal area.

Waste Disposal: Same as above. 30 parts water to 1 part chemical.

Section 8 - First Aid Measures

Specific Measures: Wash areas of skin exposed with soap and water followed by a rinse of a solution of sodium bicarbonate, apply lanolin based cream such as unqantine, bactine, etc.

Section 9 - Preparation

Prepared by: Mike Arnold

Phone Number: 713/630 4054

Fax Number: 713/526-5842

Emergency Contact:

Company: Digicon Safety Department

Company: A1-Con Chemical Co., Inc.

Phone Number: 713-526-5611

Phone Number: 504/945-8530

Fax Number: 713-526-5842

Fax Number: N/A

482204



**SAFETY DEPARTMENT
MATERIAL SAFETY DATA SHEET
(FIELD USE REFERENCE FORM)**

Proper Name: Interlac

Section 1 - Product Identification And Use

Product Identifier: (User's name(s)): Gloss White Alkyd Finish

Product Identification Number: CL 8000

Product Use: Industrial Paint

Section 2 - Hazardous Ingredients

Hazardous: Eyhyl Alcohol, Mineral
Spirits, Ligroine, Pentanone

Section 3 - Physical Data

Physical State: Liquid
Odor & Appearance: White, thick liquid

Section 4 - Fire And Explosion Data

Flammability: Yes No If yes, under which conditions? 100 degrees F

Means of Extinction: Foam, CO₂ or dry chemical

Explosion Data: Sensitivity to Impact: N/A
Sensitivity to Static Discharge: Yes

Section 5 - Reactivity Data

Chemical Stability: Yes No If no, under which conditions? _____

Compatibility with other substances: Yes No If no, which ones? Oxidizing agents

Reactivity and under which conditions? Stay away from direct heat, flame or spark

Section 6 - Toxicological Properties

Route of Entry:

Skin Contact Skin Absorption Eye Contact
Inhalation Ingestion

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Section 7 - Preventive Measures

Personal Protective Equipment Requirement: (Specify): Respiratory protection, ventilation,
protective gloves, eye protection. Wear appropriate impervious protective clothing.

Handling Procedures and Equipment: Avoid breathing dust or chips from sanding or blasting
surfaces coated with this product.

Storage Requirements: Store in building designed and protected for storage of liquids
with NFPA class.

Leak and Spill Procedure: Remove all sources of ignition. Avoid prolonged inhalation of
vapor. Ventilate area. Clean up with absorbant materials.

Waste Disposal: Dispose in accordance with local, state and federal regulations. Do
not incinerate unopened containers.

Section 8 - First Aid Measures

Specific Measures: Eyes - flush immediately with water for 15 minutes

Skin - remove clothing, wash skin with soap and water

Inhalation - remove to fresh air. Give CPR if needed

Ingestion - call a physician immediately to determine if induced vomiting necessary.

For all of the above, get medical attention immediately.

Section 9 - Preparation

Prepared by: Mike Arnold Phone Number: 713/630-4054

Fax Number: 713/526-5842

Emergency Contact:

Company: Digicon Safety Department

Phone Number: 713-526-5611

Fax Number: 713-526-5842

Company: International Paint

Phone Number: 713/682-1711

Fax Number: 713/939-1406



**SAFETY DEPARTMENT
MATERIAL SAFETY DATA SHEET
(FIELD USE REFERENCE FORM)**

Proper Name: Interlac Caribbean Blue Alkyc

Section 1 - Product Identification And Use

Product Identifier: (User's name(s)): Paint

Product Identification Number: CLC 935

Product Use: Paint

Section 2 - Hazardous Ingredients

Hazardous: Hydrocarbons

Lead

Section 3 - Physical Data

Physical State: Liquid

Odor & Appearance: Slight, blue liquid

Section 4 - Fire And Explosion Data

Flammability: Yes No If yes, under which conditions? Sparks, flame

Means of Extinction: Foam, CO2, dry chemical

Explosion Data: Sensitivity to Impact: N/A

Sensitivity to Static Discharge: Yes

Section 5 - Reactivity Data

Chemical Stability: Yes No If no, under which conditions? _____

Compatibility with other substances: Yes No If no, which ones? Oxidizing agents

Reactivity and under which conditions? Store away from heat, flame or spark.

Section 6 - Toxicological Properties

Route of Entry:

Skin Contact Skin Absorption Eye Contact

Inhalation Ingestion

Section 7 - Preventive Measures

Personal Protective Equipment Requirement: (Specify): Respirator, gloves, goggles and hygienic practices. Impervious protective clothing.

Handling Procedures and Equipment: Respirator, gloves, goggles and hygienic practices. Impervious protective clothing.

Storage Requirements: Store in compartment designed for flammable and combustible materials.

Leak and Spill Procedure: Remove all sources of ignition. Clean up with absorbant materials.

Waste Disposal: Dispose in accordance with local, state and federal regulations.

Section 8 - First Aid Measures

Specific Measures: Eyes - can cause irritation with redness, tearing and blurred vision.

Skin - irritating, may result in dermatitis.

Inhalation - irritation of respiratory trace, headache and dizziness and unconsciousness.

Ingestion - gastro-intestinal irritation, nausea, vomiting, diarrhea.

Section 9 - Preparation

Prepared by: Mike Arnold

Phone Number: 713/630-4054

Fax Number: 713/526-5842

Emergency Contact:

Company: Digicon Safety Department

Company: Courtaulds Coatings Inc.

Phone Number: 713-526-5611

Phone Number: 713/682-1711

Fax Number: 713-526-5842

Fax Number: N/A

482208

482208



SAFETY DEPARTMENT MATERIAL SAFETY DATA SHEET (FIELD USE REFERENCE FORM)

Proper Name: Interlac Green

Section 1 - Product Identification And Use

Product Identifier: (User's name(s)): Paint

Product Identification Number: DWM 443H

Product Use: Paint

Section 2 - Hazardous Ingredients

Hazardous: Ligroine

Section 3 - Physical Data

Physical State: Liquid

Odor & Appearance: Slight, green liquid

Section 4 - Fire And Explosion Data

Flammability: Yes No If yes, under which conditions? Flame, sparks

Means of Extinction: Foam, CO₂, dry chemical

Explosion Data: Sensitivity to Impact: N/A

Sensitivity to Static Discharge: Yes

Section 5 - Reactivity Data

Chemical Stability: Yes No If no, under which conditions? _____

Compatibility with other substances: Yes No If no, which ones? Oxidizing agents

Reactivity and under which conditions? store away from heat, flame or spark

Section 6 - Toxicological Properties

Route of Entry:

Skin Contact Skin Absorption Eye Contact

Inhalation Ingestion

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Section 7 - Preventive MeasuresPersonal Protective Equipment Requirement: (Specify): Gloves, goggles and protective clothing.

Respirator when working in restricted ventilation areas.

Handling Procedures and Equipment: Gloves, goggles and protective clothing, Respirator
when working in restricted ventilation areas.Storage Requirements: Store in building designed and protected for storage of flammable
and combustible materials.Leak and Spill Procedure: Remove all sources of ignition. Avoid prolonged inhalation
of vapors. Ventilate area. Clean up with absorbant materials.Waste Disposal: Dispose in accordance with local, state and federal regulations. Do
not incinerate unopened containers.**Section 8 - First Aid Measures**Specific Measures: Eyes - flush immediately with water for 15 minutes. Get medical
attention immediately.

Skin - remove contaminated clothing. Wash skin with soap and water.

Inhalation - remove to fresh air. Give artificial respiration if needed. Get medical
attention.

Ingestion - call a physician immediately to determine whether or not to induce vomiting.

Section 9 - PreparationPrepared by: Mike ArnoldPhone Number: 713/630-4054Fax Number: 713/526-5842**Emergency Contact:**Company: Digicon Safety DepartmentCompany: International PaintPhone Number: 713-526-5611Phone Number: 713/682-1711Fax Number: 713-526-5842Fax Number: N/A



**SAFETY DEPARTMENT
MATERIAL SAFETY DATA SHEET
(FIELD USE REFERENCE FORM)**

Proper Name: International Thinner

Section 1 - Product Identification And Use

Product Identifier: (User's name(s)): Thinner

Product Identification Number: GTA 004

Product Use: Thinner

Section 2 - Hazardous Ingredients

Hazardous: Ligroine

Section 3 - Physical Data

Physical State: Liquid

Odor & Appearance: Slight, clear liquid

Section 4 - Fire And Explosion Data

Flammability: Yes No If yes, under which conditions? Sparks, flame

Means of Extinction: Foam, CO2, dry chemical

Explosion Data: Sensitivity to Impact: N/A

Sensitivity to Static Discharge: Yes

Section 5 - Reactivity Data

Chemical Stability: Yes No If no, under which conditions? _____

Compatibility with other substances: Yes No If no, which ones? Oxidizing agents

Reactivity and under which conditions? Store away from heat, flame or spark.

Section 6 - Toxicological Properties

Route of Entry:

Skin Contact Skin Absorption Eye Contact

Inhalation Ingestion

Section 7 - Preventive Measures

Personal Protective Equipment Requirement: (Specify): Gloves, goggles and protective clothing.

Handling Procedures and Equipment: Gloves, goggles and protective clothing.

Storage Requirements: Store in building designed and protected for storage of flammables and combustible materials.

Leak and Spill Procedure: Remove all sources of ignition, ventilate area and clean up with absorbent material.

Waste Disposal: Dispose in accordance with local, state and federal regulations.

Section 8 - First Aid Measures

Specific Measures: Eyes - flush immediately with water for 15 minutes, Call a physician.

Skin - remove contaminated clothing, wash skin with soap and water.

Inhalation - remove to fresh air. Give artificial respiration. If needed, call a physician.

Ingestion - call a physician immediately to determine whether or not to induce vomiting.

Section 9 - Preparation

Prepared by: Mike Arnold

Phone Number: 713/630-4054

Fax Number: 713/526-5842

Emergency Contact:

Company: Digicon Safety Department

Phone Number: 713-526-5611

Fax Number: 713-526-5842

Company: International Paint

Phone Number: 713/683-1711

Fax Number: N/A



**SAFETY DEPARTMENT
MATERIAL SAFETY DATA SHEET
(FIELD USE REFERENCE FORM)**

Proper Name: Interprime Multi-Purpose Primer - Red

Section 1 - Product Identification And Use

Product Identifier: (User's name(s)): Red Primer
Product Identification Number: CPA 099
Product Use: Primer

Section 2 - Hazardous Ingredients

Hazardous: Ligroine

Section 3 - Physical Data

Physical State: Liquid
Odor & Appearance: Slight

Section 4 - Fire And Explosion Data

Flammability: Yes No If yes, under which conditions? Sparks, flames
Means of Extinction: Foam, CO₂, dry chemical
Explosion Data: Sensitivity to Impact: N/A
Sensitivity to Static Discharge: Yes

Section 5 - Reactivity Data

Chemical Stability: Yes No If no, under which conditions? _____
Compatibility with other substances: Yes No If no, which ones? Oxidizing agents
Reactivity and under which conditions? Store away from heat, flame or spark

Section 6 - Toxicological Properties

Route of Entry:
Skin Contact Skin Absorption Eye Contact
Inhalation Ingestion

Section 7 - Preventive Measures

Personal Protective Equipment Requirement: (Specify): Gloves, goggles and protective clothing.
Respirator in restricted ventilation areas.

Handling Procedures and Equipment: Gloves, goggles and protective clothing. Respirator in
restricted ventilation areas.

Storage Requirements: Store in building designed and protected for storage of flammable
and combustible products.

Leak and Spill Procedure: Remove all sources of ignition. Ventilate area. Avoid prolonged
inhalation of vapors.

Waste Disposal: Dispose in accordance with state, local and federal regulations. Do
not incinerate unopened containers.

Section 8 - First Aid Measures

Specific Measures: Eyes - flush immediately with water for 15 minutes. Get medical
attention immediately.

Skin - remove contaminated clothing, wash skin with soap and water.

Inhalation - remove to fresh air. Give artificial respiration. If needed, get medical
attention.

Ingestion - call a physician immediately to determine whether or not to induce vomiting.

Section 9 - Preparation

Prepared by: Mike Arnold

Phone Number: 713/630-4054

Fax Number: 713/526-5842

Emergency Contact:

Company: Digicon Safety Department

Company: International Paint

Phone Number: 713-526-5611

Phone Number: 713/682-1711

Fax Number: 713-526-5842

Fax Number: N/A



**SAFETY DEPARTMENT
MATERIAL SAFETY DATA SHEET
(FIELD USE REFERENCE FORM)**

Proper Name: Mobil DTE Oil Extra Heavy

Section 1 - Product Identification And Use

Product Identifier: (User's name(s)): DTE Heavy 10 Wt

Product Identification Number: N/A

Product Use: Oil

Section 2 - Hazardous Ingredients

Hazardous: None

Section 3 - Physical Data

Physical State: Liquid

Odor & Appearance: Mild - dark liquid

Section 4 - Fire And Explosion Data

Flammability: Yes No If yes, under which conditions? Extreme heat

Means of Extinction: Carbon dioxide, foam, dry chemical, water fog

Explosion Data: Sensitivity to Impact: N/A

Sensitivity to Static Discharge: N/A

Section 5 - Reactivity Data

Chemical Stability: Yes No If no, under which conditions? _____

Compatibility with other substances: Yes No If no, which ones? _____

Reactivity and under which conditions? Extreme heat

Section 6 - Toxicological Properties

Route of Entry:

Skin Contact Skin Absorption Eye Contact

Inhalation Ingestion

Section 7 - Preventive Measures

Personal Protective Equipment Requirement: (Specify): Gloves, good judgement

Handling Procedures and Equipment: No special precautions required. Use good judgement.

Storage Requirements: Away from heat.

Leak and Spill Procedure: Absorb with fire retardant materials.

Waste Disposal: Appropriate waste disposal facility.

Section 8 - First Aid Measures

Specific Measures: Eyes - flush with water.

Skin - wash contact areas with soap and water.

Inhalation - not expected to be a problem.

Ingestion - not expected to be a problem. However, if greater than 1/2 liter (pint)

ingested, immediately give 1 to 2 glasses of water and call a physician, hospital

emergency room or poison control center for assistance. Do not induce vomiting or give

anything by mouth to an unconscious person.

Section 9 - Preparation

Prepared by: Mike Arnold Phone Number: 713/640 4054

Fax Number: 713/526-5842

Emergency Contact:

Company: Digicon Safety Department

Phone Number: 713-526-5611

Fax Number: 713-526-5842

Company: Mobil Oil Corp.

Phone Number: 212/883-4411

Fax Number: N/A

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**SAFETY DEPARTMENT
MATERIAL SAFETY DATA SHEET
(FIELD USE REFERENCE FORM)**

Proper Name: Mobilegrease Special

Section 1 - Product Identification And Use

Product Identifier: (User's name(s)): Gray Grease

Product Identification Number: As above

Product Use: Grease

Section 2 - Hazardous Ingredients

Hazardous: None

Section 3 - Physical Data

Physical State: Grease

Odor & Appearance: Mild-Gray Gresse

Section 4 - Fire And Explosion Data

Flammability: Yes No If yes, under which conditions? _____

Means of Extinction: CO₂, foam, dry chemical, water fog

Explosion Data: Sensitivity to Impact: N/A

Sensitivity to Static Discharge: N/A

Section 5 - Reactivity Data

Chemical Stability: Yes No If no, under which conditions? _____

Compatibility with other substances: Yes No If no, which ones? Strong Oxidizers

Reactivity and under which conditions? Extreme Heat

Section 6 - Toxicological Properties

Route of Entry:

Skin Contact Skin Absorption Eye Contact

Inhalation Ingestion

Section 7 - Preventive Measures

Personal Protective Equipment Requirement: (Specify): No special equipment required. Use good safe work habits.

Handling Procedures and Equipment: No special equipment required. Use good safe work habits.

Storage Requirements: Away from extreme heat

Leak and Spill Procedure: Shovel up and dispose of at any appropriate waste disposal facility.

Waste Disposal: In accordance with applicable laws and regulations.

Section 8 - First Aid Measures

Specific Measures: Eyes - Flush with water.

Skin - Wash contact areas with soap and water. High pressure accidental injection through the skin requires immediate medical attention for possible incision irrigation and/or debridement.

Inhalation - Not expected to be a problem.

Ingestion - Not expected to be a problem. However, if greater than 1/2 liter (pint) ingested, immediately give 1 to 2 glasses of water and call a physician, hospital emergency room or poison control center for assistance. Do not induce vomiting or give anything by mouth to an unconscious person.

Section 9 - Preparation

Prepared by: Mike Arnold

Phone Number: 713-630 4054

Fax Number: 713-526-5842

Emergency Contact:

Company: Digicon Safety Department

Company: Mobil Oil Corp.

Phone Number: 713-526-5611

Phone Number: 609-737-4411

Fax Number: 713-526-5842

Fax Number: N/A



**SAFETY DEPARTMENT
MATERIAL SAFETY DATA SHEET
(FIELD USE REFERENCE FORM)**

Proper Name: Nalcool 2000 Cooling Treatment

Section 1 - Product Identification And Use

Product Identifier: (User's name(s)): Nalcool water treatment

Product Identification Number: N/A

Product Use: Water treatment

Section 2 - Hazardous Ingredients

Hazardous: Sodium Nitrate

Sodium Tetraborate

Section 3 - Physical Data

Physical State: Liquid

Odor & Appearance: None - red liquid

Section 4 - Fire And Explosion Data

Flammability: Yes No If yes, under which conditions? _____

Means of Extinction: N/A

Explosion Data: Sensitivity to Impact: N/A

Sensitivity to Static Discharge: N/A

Section 5 - Reactivity Data

Chemical Stability: Yes No If no, under which conditions? _____

Compatibility with other substances: Yes No If no, which ones? Nitrous acids

Reactivity and under which conditions? Strong acids

Section 6 - Toxicological Properties

Route of Entry:

Skin Contact

Skin Absorption

Eye Contact

Inhalation

Ingestion

Section 7 - Preventive Measures

Personal Protective Equipment Requirement: (Specify): SCBA in enclosed area. Gloves and goggles.

Handling Procedures and Equipment: As non-hazardous material.

Storage Requirements: Cool dry place.

Leak and Spill Procedure: Small spill, contain with absorbent material. Large spill, dike to prevent movement and reclaim.

Waste Disposal: Solidify and dispose in sanitary landfill.

Section 8 - First Aid Measures

Specific Measures: Eyes - flush with water for 15 minutes. Call a physician.

Skin - flush with water for 15 minutes.

Ingestion - induce vomiting, give water. Call a physician at once.

NOTE TO PHYSICIAN: No specific antidote is known. Based on the individual reaction

of the patient, the physician's judgment should be used to control symptoms and

clinical condition. Caution: if unconscious, having trouble breathing or in convulsions,

do not induce vomiting or give water.

Section 9 - Preparation

Prepared by: Mike Arnold

Phone Number: 713/630 4054

Fax Number: 713/526 5842

Emergency Contact:

Company: Digicon Safety Department

Company: Nalco Chemical Co.

Phone Number: 713-526-5611

Phone Number: 312/920-1510

Fax Number: 713-526-5842

Fax Number: N/A



**SAFETY DEPARTMENT
MATERIAL SAFETY DATA SHEET
(FIELD USE REFERENCE FORM)**

Proper Name: SAE 40 & 60 WEIGHT OIL

Section 1 - Product Identification And Use

Product Identifier: (User's name(s)): Lubrication Oil

Product Identification Number: N/A

Product Use: Lubricating Machinery

Section 2 - Hazardous Ingredients

Hazardous: N/A

Section 3 - Physical Data

Physical State: Liquid

Odor & Appearance: Dark Liquid

Section 4 - Fire And Explosion Data

Flammability: Yes No If yes, under which conditions? Under Extreme Heat

Means of Extinction: Water, Foam, A, B, C Powder

Explosion Data: Sensitivity to Impact: None

Sensitivity to Static Discharge: None

Section 5 - Reactivity Data

Chemical Stability: Yes No If no, under which conditions? _____

Compatibility with other substances: Yes No If no, which ones? _____

Reactivity and under which conditions? None

Section 6 - Toxicological Properties

Route of Entry:

Skin Contact Skin Absorption Eye Contact

Inhalation Ingestion

Section 7 - Preventive Measures

Personal Protective Equipment Requirement: (Specify): Level D

Handling Procedures and Equipment: Use Oil Dry

Storage Requirements: Store in Drums or Containers

Leak and Spill Procedure: Plug Leak and Put Down Oil Dry

Waste Disposal: Contact Manufacturer about recycling

Section 8 - First Aid Measures

Specific Measures: _____

EYES - flush immediately with water for 15 minutes. Get medical attention immediately.

SKIN - remove contaminated clothing. Wash skin with soap and water.

INHALATION - remove to fresh air. Give artificial respiration if needed. Get medical attention.

INGESTION - call a physician immediately to determine whether or not to induce vomiting.

Section 9 - Preparation

Prepared by: Mike Arnold

Phone Number: 713/630-4054

Fax Number: 713/526-5842

Emergency Contact:

Company: Digicon Safety Department

Company: _____

Phone Number: 713-526-5611

Phone Number: _____

Fax Number: 713-526-5842

Fax Number: _____



**SAFETY DEPARTMENT
MATERIAL SAFETY DATA SHEET
(FIELD USE REFERENCE FORM)**

Proper Name: Rigwash

Section 1 - Product Identification And Use

Product Identifier: (User's name(s)): Rigwash

Product Identification Number: 27276-87-0

Product Use: Washing equipment

Section 2 - Hazardous Ingredients

Hazardous: Sulfonic Acid

Section 3 - Physical Data

Physical State: Powder

Odor & Appearance: Detergent - white powder

Section 4 - Fire And Explosion Data

Flammability: Yes No If yes, under which conditions? _____

Means of Extinction: N/A

Explosion Data: Sensitivity to Impact: N/A

Sensitivity to Static Discharge: N/A

Section 5 - Reactivity Data

Chemical Stability: Yes No If no, under which conditions? _____

Compatibility with other substances: Yes No If no, which ones? _____

Reactivity and under which conditions? N/A

Section 6 - Toxicological Properties

Route of Entry:

Skin Contact Skin Absorption Eye Contact

Inhalation Ingestion

Section 7 - Preventive Measures

Personal Protective Equipment Requirement: (Specify): Gloves

Handling Procedures and Equipment: Gloves

Storage Requirements: Cool, dry area. Keep lid tightly closed

Leak and Spill Procedure: Sweep up excess. Flush with water to drain.

Waste Disposal: Usually flushing to drain is sufficient.

Section 8 - First Aid Measures

Specific Measures: Eyes - flush eyes for 15 minutes with clear water. If irritation persists, call a physician. If swallowed, do not induce vomiting.

Section 9 - Preparation

Prepared by: Mike Arnold

Phone Number: 713/630-4054

Fax Number: 713/526-5842

Emergency Contact:

Company: Digicon Safety Department

Company: Ace Soap Factory

Phone Number: 713-526-5611

Phone Number: 512/646-0881

Fax Number: 713-526-5842

Fax Number: N/A



**SAFETY DEPARTMENT
MATERIAL SAFETY DATA SHEET
(FIELD USE REFERENCE FORM)**

Proper Name: Shell Rotella T Oil 40

Section 1 - Product Identification And Use

Product Identifier: (User's name(s)): Rotella T 40 oil

Product Identification Number: 54104

Product Use: Oil

Section 2 - Hazardous Ingredients

Hazardous: None

Section 3 - Physical Data

Physical State: Liquid

Odor & Appearance: Mild - dark liquid

Section 4 - Fire And Explosion Data

Flammability: Yes No If yes, under which conditions? Extreme heat

Means of Extinction: Water fog, foam, dry chemical, CO2

Explosion Data: Sensitivity to Impact: N/A

Sensitivity to Static Discharge: N/A

Section 5 - Reactivity Data

Chemical Stability: Yes No If no, under which conditions? _____

Compatibility with other substances: Yes No If no, which ones? _____

Reactivity and under which conditions? Avoid heat, open flames, oxidizing materials

Section 6 - Toxicological Properties

Route of Entry:

Skin Contact

Skin Absorption

Eye Contact

Inhalation

Ingestion

Section 7 - Preventive MeasuresPersonal Protective Equipment Requirement: (Specify): Gloves, goggles and protective clothingHandling Procedures and Equipment: Gloves, goggles and protective clothingStorage Requirements: Away from heatLeak and Spill Procedure: Take up with an absorbent materialWaste Disposal: Place in appropriate disposal facility, comply with local regulations.**Section 8 - First Aid Measures**Specific Measures: Eyes - flush with water for 15 minutes while holding eyelids shut.Get medical attention.Skin - remove contaminated clothing and wipe excess off. Wash with soap and water or a waterless hand cleaner followed by soap and water. If irritation occurs, get medical attention.Inhalation - Remove victim to fresh air and provide oxygen if breathing is difficult.Get medical attention.Ingestion - Do not induce vomiting. In general no treatment is necessary unless large quantities of product are ingested. However, get medical attention.NOTE TO PHYSICIAN: In general emesis induction is unnecessary in high viscosity, low volatility products, i.e. most oils and greases.**Section 9 - Preparation**Prepared by: Mike ArnoldPhone Number: 713/630-4054Fax Number: 713/526-5842**Emergency Contact:**Company: Digicon Safety DepartmentPhone Number: 713-526-5611Fax Number: 713-526-5842Company: Shell Oil Co.Phone Number: 713/241-4819Fax Number: N/A



**SAFETY DEPARTMENT
MATERIAL SAFETY DATA SHEET
(FIELD USE REFERENCE FORM)**

Proper Name: Shell S01 71

Section 1 - Product Identification And Use

Product Identifier: (User's name(s)): Naroma - Cable Oil

Product Identification Number: 83195

Product Use: Cable Oil

Section 2 - Hazardous Ingredients

Hazardous: Naphtha
Alkylate

Section 3 - Physical Data

Physical State: Liquid
Odor & Appearance: Slight - colorless

Section 4 - Fire And Explosion Data

Flammability: Yes No If yes, under which conditions? Heat, flame

Means of Extinction: Water fog, foam, CO2, dry chemical

Explosion Data: Sensitivity to Impact: N/A

Sensitivity to Static Discharge: Yes

Section 5 - Reactivity Data

Chemical Stability: Yes No If no, under which conditions? _____

Compatibility with other substances: Yes No If no, which ones? Oxidizing agents

Reactivity and under which conditions? Heat, flame and contact with oxidizing agents.

Section 6 - Toxicological Properties

Route of Entry:

Skin Contact Skin Absorption Eye Contact

Inhalation Ingestion

Section 7 - Preventive Measures

Personal Protective Equipment Requirement: (Specify): Goggles, gloves and protective clothing.

Handling Procedures and Equipment: Goggles, gloves and protective clothing.

Storage Requirements: Well marked containers away from heat, flames and sparks.

Leak and Spill Procedure: Remove sources of ignition. Dike and contain. Use absorbent material to pick up.

Waste Disposal: Must be considered ignitable hazardous waste material.

Section 8 - First Aid Measures

Specific Measures: Eyes - flush with water. If irritation occurs, get medical attention.

Skin - remove contaminated clothing. Flush skin with water. Follow by washing with soap and water. If irritation occurs, get medical attention.

Inhalation - remove victim to fresh air and provide oxygen if breathing is difficult.

Give artificial respiration if not breathing. Get medical attention.

Ingestion - No not induce vomiting. If vomiting occurs spontaneously, keep head below hips to prevent aspiration of liquid into the lungs. Get medical attention.

Section 9 - Preparation

Prepared by: Mike Arnold

Phone Number: 713/630-4054

Fax Number: 713/526-5842

Emergency Contact:

Company: Digicon Safety Department

Company: Shell Oil Co.

Phone Number: 713-526-5611

Phone Number: 713/473-9461

Fax Number: 713-526-5842

Fax Number: N/A



**SAFETY DEPARTMENT
MATERIAL SAFETY DATA SHEET
(FIELD USE REFERENCE FORM)**

Proper Name: Shell Spirax (R)

Section 1 - Product Identification And Use

Product Identifier: (User's name(s)): Heavy duty 80 w/90

Product Identification Number: 592.10

Product Use: Oil

Section 2 - Hazardous Ingredients

Hazardous: N/A

Section 3 - Physical Data

Physical State: Liquid

Odor & Appearance: Slight - dark liquid

Section 4 - Fire And Explosion Data

Flammability: Yes No If yes, under which conditions? Preheated conditions

Means of Extinction: Water fog, form, dry chemical

Explosion Data: Sensitivity to Impact: N/A

Sensitivity to Static Discharge: N/A

Section 5 - Reactivity Data

Chemical Stability: Yes No If no, under which conditions? _____

Compatibility with other substances: Yes No If no, which ones? _____

Reactivity and under which conditions? avoid heat, open flames and oxidizing agents.

Section 6 - Toxicological Properties

Route of Entry:

Skin Contact Skin Absorption Eye Contact

Inhalation Ingestion

Section 7 - Preventive MeasuresPersonal Protective Equipment Requirement: (Specify): Gloves, goggles and protective clothing.Handling Procedures and Equipment: Gloves, goggles and protective clothing.Storage Requirements: Cool, dry place with adequate ventilation.Leak and Spill Procedure: Take up with an appropriate disposal facility in compliance with local regulations.

Waste Disposal: _____

Section 8 - First Aid MeasuresSpecific Measures: Eyes - flush with water for 15 minutes while holding eyelids open.Get medical attention.Skin - remove contaminated clothing and wipe excess off. Wash with soap and water or a waterless hand cleaner followed by soap and water. If irritation occurs, get medical attention.Ingestion - do not induce vomiting. In general no treatment is necessary unless large quantities of product are ingested. However, get medical advice.Inhalation - remove victim to fresh air and provide oxygen if breathing is difficult.Get medical attention.**NOTE TO PHYSICIAN:** In general emesis induction is unnecessary in high viscosity, low volatility products, i.e. oils and grease.**Section 9 - Preparation**Prepared by: Mike ArnoldPhone Number: 713/630-4054Fax Number: 713/526-5842**Emergency Contact:**Company: Digicon Safety DepartmentCompany: Shell Oil Co.Phone Number: 713-526-5611Phone Number: 713/473-9461Fax Number: 713-526-5842Fax Number: N/A



**SAFETY DEPARTMENT
MATERIAL SAFETY DATA SHEET
(FIELD USE REFERENCE FORM)**

Proper Name: Shell Tellus Oil 68

Section 1 - Product Identification And Use

Product Identifier: (User's name(s)): Hydraulic Fluid
Product Identification Number: 65211
Product Use: Hydraulic Fluid

Section 2 - Hazardous Ingredients

Hazardous: None

Section 3 - Physical Data

Physical State: Liquid
Odor & Appearance: Slight - dark liquid

Section 4 - Fire And Explosion Data

Flammability: Yes No If yes, under which conditions? Flames
Means of Extinction: Water fog, foam, dry chemical, CO₂
Explosion Data: Sensitivity to Impact: N/A
Sensitivity to Static Discharge: Yes

Section 5 - Reactivity Data

Chemical Stability: Yes No If no, under which conditions? _____
Compatibility with other substances: Yes No If no, which ones? Flames, heat
Reactivity and under which conditions? Avoid oxidizing materials

Section 6 - Toxicological Properties

Route of Entry:
Skin Contact Skin Absorption Eye Contact
Inhalation Ingestion

Section 7 - Preventive MeasuresPersonal Protective Equipment Requirement: (Specify): Gloves and protective clothingHandling Procedures and Equipment: Gloves and protective clothingStorage Requirements: Cool, dry place with adequate ventilation. Keep away from open flames and high temperatures.Leak and Spill Procedure: Take up with an absorbent material.Waste Disposal: Appropriate waste disposal facility.**Section 8 - First Aid Measures**Specific Measures: Eyes - flush with water. If irritation occurs, get medical attention.Skin - remove contaminated clothing. Flush skin with water. Wash with soap and water.If irritation occurs, get medical attention. If material is injected under the skin, get medical attention promptly.Inhalation - remove person to fresh air and provide oxygen if breathing is difficult. Get medical attention.Ingestion - do not induce vomiting. In general, no treatment is necessary unless large quantities of product are ingested. However, get medical advice.NOTE TO PHYSICIAN: In general, vomiting induction is unnecessary in high viscosity, low volatility products, i.e., most oils and bases.**Section 9 - Preparation**Prepared by: Mike ArnoldPhone Number: 713/630-4054Fax Number: 712/526-5842**Emergency Contact:**Company: Digicon Safety DepartmentCompany: Shell Oil Co.Phone Number: 713-526-5611Phone Number: 713/241-4519Fax Number: 713-526-5842Fax Number: N/A



**SAFETY DEPARTMENT
MATERIAL SAFETY DATA SHEET
(FIELD USE REFERENCE FORM)**

Proper Name: SULFURIC ACID

Section 1 - Product Identification And Use

Product Identifier: (User's name(s)): Hydrogen Sulfate (Battery Acid)

Product Identification Number: CAS 7667-93-9

Product Use: Used in Batteries

Section 2 - Hazardous Ingredients

Hazardous: Hydrogen Sulfate

Section 3 - Physical Data

Physical State: Oily Liquid

Odor & Appearance: None

Section 4 - Fire And Explosion Data

Flammability: Yes No If yes, under which conditions? _____

Means of Extinction: _____

Explosion Data: Sensitivity to Impact: _____

Sensitivity to Static Discharge: _____

Section 5 - Reactivity Data

Chemical Stability: Yes No If no, under which conditions? _____

Compatibility with other substances: Yes No If no, which ones? Other Acids

Reactivity and under which conditions? Normal

Section 6 - Toxicological Properties

Route of Entry:

Skin Contact Skin Absorption Eye Contact

Inhalation Ingestion

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Section 7 - Preventive Measures

Personal Protective Equipment Requirement: (Specify): SCBA, Level B Suit (Fully Encapsulated)

Handling Procedures and Equipment: Diking Material, Water Monitors for Vapor Reduction

Storage Requirements: Poly Drums, Acid Tanks

Leak and Spill Procedure: Stop Leak, Dike Area, Call Safety Dept.

Waste Disposal: Contact Owner

Section 8 - First Aid Measures

Specific Measures: _____

EYES - flush immediately with water for 15 minutes. Get medical attention immediately.

SKIN - remove contaminated clothing. Wash skin with soap and water.

INHALATION - remove to fresh air. Give artificial respiration if needed. Get medical attention.

INGESTION - call a physician immediately to determine whether or not to induce vomiting.

Section 9 - Preparation

Prepared by: Mike Arnold

Phone Number: 713/630-4054

Fax Number: 713/526-5842

Emergency Contact:

Company: Digicon Safety Department

Company: _____

Phone Number: 713-526-5611

Phone Number: _____

Fax Number: 713-526-5842

Fax Number: _____

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**SAFETY DEPARTMENT
MATERIAL SAFETY DATA SHEET
(FIELD USE REFERENCE FORM)**

Proper Name: Summit DSL-100

Section 1 - Product Identification And Use

Product Identifier: (User's name(s)): Synthetic Compressor Lubricant

Product Identification Number: DSL-100

Product Use: Lubricating (Hi-Temp, General)

Section 2 - Hazardous Ingredients

Hazardous: None

Section 3 - Physical Data

Physical State: Liquid

Odor & Appearance: Slight, cark liquid

Section 4 - Fire And Explosion Data

Flammability: Yes No If yes, under which conditions? Flames

Means of Extinction: Carbon dioxides, foam, dry chemical

Explosion Data: Sensitivity to Impact: N/A

Sensitivity to Static Discharge: N/A

Section 5 - Reactivity Data

Chemical Stability: Yes No If no, under which conditions? _____

Compatibility with other substances: Yes No If no, which ones? Strong oxidizers

Reactivity and under which conditions? Extreme heat

Section 6 - Toxicological Properties

Route of Entry:

Skin Contact Skin Absorption Eye Contact

Inhalation Ingestion

Section 7 - Preventive MeasuresPersonal Protective Equipment Requirement: (Specify): No special equipment requiredHandling Procedures and Equipment: No special equipment requiredStorage Requirements: Dry, cool placeLeak and Spill Procedure: Absorb with fire retardant treated materialWaste Disposal: Appropriate waste disposal facility**Section 8 - First Aid Measures**Specific Measures: Eyes - flush with water

Skin - wash contact areas with soap and water

Inhalation - not expected to be a problem

Ingestion - not expected to be a problem. However, if greater than 1/2 liter (pint)

ingested, immediately give 1 to 2 glasses of water and call a physician, hospital

emergency room or poison control center for assistance. Do not induce vomiting or give

anything by mouth to an unconscious person.

Section 9 - PreparationPrepared by: Mike ArnoldPhone Number: 713/630-4054Fax Number: 713/526-5842**Emergency Contact:**Company: Digicon Safety DepartmentPhone Number: 713-526-5611Fax Number: 713-526-5842Company: Mobil Oil Corp.Phone Number: 609/737-5596Fax Number: N/A

482236



**SAFETY DEPARTMENT
MATERIAL SAFETY DATA SHEET
(FIELD USE REFERENCE FORM)**

Proper Name: Commercial Detonator

Section 1 - Product Identification And Use

Product Identifier: (User's name(s)): Commercial Detonator

Product Identification Number: _____

Product Use: _____

Section 2 - Hazardous Ingredients

Hazardous: Aluminum, Barium Chromate
Barium Peroxide, Ferric Oxide

Section 3 - Physical Data

Physical State: _____
Odor & Appearance: Metal cylinder of varying length in diameter

Section 4 - Fire And Explosion Data

Flammability: Yes No If yes, under which conditions? _____

Means of Extinction: None

Explosion Data: Sensitivity to Impact: _____

Sensitivity to Static Discharge: _____

Section 5 - Reactivity Data

Chemical Stability: Yes No If no, under which conditions? _____

Compatibility with other substances: Yes No If no, which ones? Corrosives

Reactivity and under which conditions? _____

Section 6 - Toxicological Properties

Route of Entry:

Skin Contact Skin Absorption Eye Contact

Inhalation Ingestion

Section 7 - Preventive Measures

Personal Protective Equipment Requirement: (Specify): Cotton clothing suggested, safety glasses
suggested

Handling Procedures and Equipment: _____

Storage Requirements: Store in cool dry place

Leak and Spill Procedure: Re-package devices in original packing. Account for every device

Waste Disposal: Dispose in accordance with Federal, State and local regulators. Consult manufacturer for best disposal method.

Section 8 - First Aid Measures

Specific Measures: Inhalation: If detonation fumes are inhaled, remove to fresh air. If breathing stops, give artificial respiration

Systemic or other effect: Accident detonation or an explosive device can cause lacerations, punctures and/or traumatic injury. Severity of injuries is dependent on the number and the proximity of the detonations.

Section 9 - Preparation

Prepared by: Mike Arnold

Phone Number: (713) 630-4054

Fax Number: (713) 526-5842

Emergency Contact:

Company: Digicon Safety Department

Company: _____

Phone Number: 713-526-5611

Phone Number: _____

Fax Number: 713-526-5842

Fax Number: _____



**SAFETY DEPARTMENT
MATERIAL SAFETY DATA SHEET
(FIELD USE REFERENCE FORM)**

Proper Name: AXD - 512

Section 1 - Product Identification And Use

Product Identifier: (User's name(s)): Dynamites & Blasting Gelatins

Product Identification Number: _____

Product Use: _____

Section 2 - Hazardous Ingredients

Hazardous: Nitroglycerin

Ethylene Glycol Dinitrate

Section 3 - Physical Data

Physical State: _____

Odor & Appearance: Powdery to gelatinous solid,
: Light tan to dark brown color, faint waxy odor

Section 4 - Fire And Explosion Data

Flammability: Yes No If yes, under which conditions? Can explode under fire cond.

Means of Extinction: _____

Explosion Data: Sensitivity to Impact: _____

Sensitivity to Static Discharge: _____

Section 5 - Reactivity Data

Chemical Stability: Yes No
(Under normal conditions)

Compatibility with other substances: Yes No

If no, under which conditions? May explode when subjected to fire, super-sonic shock, or high energy projectile impact especially when confined or in large quant.

If no, which ones? Mineral acids, bases, Strong acids.

Reactivity and under which conditions? _____

Section 6 - Toxicological Properties

Route of Entry:

Skin Contact Y Skin Absorption Y

Eye Contact Y

Inhalation Y Ingestion Y

Section 7 - Preventive Measures

Personal Protective Equipment Requirement: (Specify): Forced ventilation may be necessary where natural ventilation is limited, cotton gloves suggested, safety glasses are suggested

Handling Procedures and Equipment: _____

Storage Requirements: Store in cool, dry, well-ventilation location. Store in compliance with Federal and State and Local regulations. Keep away from heat, flame, ignition sources.

Leak and Spill Procedure: In case of fire evacuate area not less than 2,500 ft. Notify authorities in accordance to emergency response procedure. Only personnel trained in emergency response should respond. Follow applicable Federal and State and Local spill reporting requirements.

Waste Disposal: Disposal must comply with Federal, State and local regulations. If product becomes a waste it is potentially regulated as a hazardous waste under the Resource Conserv. and Recovery Act

Section 8 - First Aid Measures

Specific Measures: Eyes: Irrigate with running water for at least 15 minutes. If irritation persists seek medical attention; Skin: Wash with soap and water; Ingestion: Induce vomiting, seek medical attention; Inhalation: Remove to fresh air

It is recommended that users of explosives material be familiar with the Institute of Makers of Explosives Safety Library Publications.

Section 9 - Preparation

Prepared by: Mike Arnold

Phone Number: (713) 630-4054

Fax Number: (713) 526-5842

Emergency Contact:

Company: Digicon Safety Department

Company: _____

Phone Number: 713-526-5611

Phone Number: _____

Fax Number: 713-526-5842

Fax Number: _____

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SAFETY DEPARTMENT MATERIAL SAFETY DATA SHEET (FIELD USE REFERENCE FORM)

Proper Name: PENTOLITE

Section 1 - Product Identification And Use

Product Identifier: (User's name(s)): PENTOLITE

Product Identification Number: _____

Product Use: _____

Section 2 - Hazardous Ingredients

Hazardous: Pentaerythritol Tetranitrate
Trinitrotoluene (TNT)

Section 3 - Physical Data

Physical State: Solid
Odor & Appearance: Yellow to brown solid

Section 4 - Fire And Explosion Data

Flammability: Yes No If yes, under which conditions? _____

Means of Extinction: Should be allowed to burn: Firemen should not approach closer than 2500 ft. and should be prepared to fight incipient fires started by exploding Pentolite

Explosion Data: Sensitivity to Impact: _____

Sensitivity to Static Discharge: _____

Section 5 - Reactivity Data

Chemical Stability: Yes No If no, under which conditions? _____

Compatibility with other substances: Yes No If no, which ones? Strong acids, Alkalines, Oxidizers

Reactivity and under which conditions? _____

Section 6 - Toxicological Properties

Route of Entry:

Skin Contact _N Skin Absorption _N Eye Contact _N

Inhalation _Y Ingestion _Y

Section 7 - Preventive Measures

Personal Protective Equipment Requirement: (Specify): Dust Mask recommended for exposures level under 0.5mg/m³; Safety glasses, washable clothing; protective gloves

Handling Procedures and Equipment: Handle as high explosive Class "A"

Storage Requirements: Store as high explosive Class "A"

Leak and Spill Procedure: Must be collected. Isolate area and sweep up Pentolite -

DO NOT USE SPARKING METAL TOOLS

Waste Disposal: Must be recovered and destroyed, preferably by burning: Contaminated earth should be removed, subjected to fire buried. Small spills can be dissolved in acetone and acetone solution burned in accordance with State and Federal Regulations

Section 8 - First Aid Measures

Specific Measures: Irritation of Eyes, Nose and Throat from dust: Possible liver damage from TNT; Component: May affect ability of blood to carry oxygen; Eyes: Wash with large amounts of water; Breathing: Move to fresh air - give artificial respiration if breathing has stopped. Ingestion: Administer emetic. rest. In all cases get medical attention

Wash with soap and water

Section 9 - Preparation

Prepared by: Mike Arnold

Phone Number: (713) 630-4054

Fax Number: (713) 526-5842

Emergency Contact:

Company: Digicon Safety Department

Company: _____

Phone Number: 713-526-5611

Phone Number: _____

Fax Number: 713-526-5842

Fax Number: _____



**SAFETY DEPARTMENT
MATERIAL SAFETY DATA SHEET
(FIELD USE REFERENCE FORM)**

Proper Name: Sodium Montmorillonite

Section 1 - Product Identification And Use

Product Identifier: (User's name(s)): Economy Gel

Product Identification Number: CAS NO. 1318-93-0

Product Use: _____

Section 2 - Hazardous Ingredients

Hazardous: Crystalline Silica (SiO₂)

Section 3 - Physical Data

Physical State: Liquid

Odor & Appearance: Bluegray to green as moist solid,
light tan to gray as dry powder
No Odor

Section 4 - Fire And Explosion Data

Flammability: Yes No If yes, under which conditions? _____

Means of Extinction: None for Product

Explosion Data: Sensitivity to Impact: n/a

Sensitivity to Static Discharge: _____

Section 5 - Reactivity Data

Chemical Stability: Yes No If no, under which conditions? _____

Compatibility with other substances: Yes No If no, which ones? _____

Reactivity and under which conditions? _____

Section 6 - Toxicological Properties

Route of Entry:

Skin Contact Y Skin Absorption Y Eye Contact N

Inhalation Y Ingestion Y

Section 7 - Preventive Measures

Personal Protective Equipment Requirement: (Specify): None

Handling Procedures and Equipment: Use NIOSH/MSHA respirators approved for silica approved for silica bearing containing airborne bentonite dust levels exceed PEL/TLV's

Storage Requirements: _____

Leak and Spill Procedure: Avoid breathing dust; wear respirator approved for silica bearing dust. Avoid using water. Product slippery when settled.

Waste Disposal: Product should be disposed of in accordance with applicable local, state and federal regulations.

Section 8 - First Aid Measures

Specific Measures: SKIN: Wash with soap and water until clean.

EYES: Flush with water until irritation ceases

INHALATION: Move to area free from dust. If symptoms of irritation persist contact physician. Inhalation may aggravate existing respiratory illness.

Section 9 - Preparation

Prepared by: Mike Arnold

Phone Number: (713) 630-4054

Fax Number: (713) 526-5842

Emergency Contact:

Company: Digicon Safety Department

Company: _____

Phone Number: 713-526-5611

Phone Number: _____

Fax Number: 713-526-5842

Fax Number: _____



**SAFETY DEPARTMENT
MATERIAL SAFETY DATA SHEET
(FIELD USE REFERENCE FORM)**

Proper Name: LIQUID POLY GEL

Section 1 - Product Identification And Use

Product Identifier: (User's name(s)): LIQUID POLY GEL

Product Identification Number: N/A

Product Use: _____

Section 2 - Hazardous Ingredients

Hazardous: _____

Section 3 - Physical Data

Physical State: Liquid

Odor & Appearance: Tan to Brown viscous slurry,
light oil odor

Section 4 - Fire And Explosion Data

Flammability: Yes No If yes, under which conditions? _____

Means of Extinction: Dry chemical CO₂, Foam, Water Fog

Explosion Data: Sensitivity to Impact: N/A

Sensitivity to Static Discharge: N/A

Section 5 - Reactivity Data

Chemical Stability: Yes No If no, under which conditions? _____

Compatibility with other substances: Yes No If no, which ones? _____

Reactivity and under which conditions? _____

Section 6 - Toxicological Properties

Route of Entry:

Skin Contact N Skin Absorption N Eye Contact N

Inhalation N Ingestion Y

Section 7 - Preventive Measures

Personal Protective Equipment Requirement: (Specify): Rubber gloves, Safety glasses

Handling Procedures and Equipment: Wash affected areas with water and mild soap

Storage Requirements: Store away from open flames

Leak and Spill Procedure: Wipe up undiluted material, wash down spill with water.

CAUTION: Material becomes very slippery when wet.

Waste Disposal: Comply with regulations concerning disposal in landfills.

Section 8 - First Aid Measures

Specific Measures: Prolonged contact with gross material may cause skin irritation in sensitive individuals. Prolonged and or repeated contact with undiluted material may cause slight skin irritation.

Acute sensitivity to petroleum products

Section 9 - Preparation

Prepared by: Mike Arnold

Phone Number: (713) 630-4054

Fax Number: (713) 526-5842

Emergency Contact:

Company: Digicon Safety Department

Phone Number: 713-526-5611

Fax Number: 713-526-5842

Company: _____

Phone Number: _____

Fax Number: _____



**SAFETY DEPARTMENT
MATERIAL SAFETY DATA SHEET
(FIELD USE REFERENCE FORM)**

Proper Name: TELLUS 68

Section 1 - Product Identification And Use

Product Identifier: (User's name(s)): HYDRAULIC OIL

Product Identification Number: N/A

Product Use: USED TO OPERATE HYDRAULIC MACHINERY

Section 2 - Hazardous Ingredients

Hazardous: N/A

Section 3 - Physical Data

Physical State: LIQUID

Odor & Appearance: ETHER ODOR, OILY LIQUID

Section 4 - Fire And Explosion Data

Flammability: Yes No If yes, under which conditions? FIRE

Means of Extinction: WATER, FIRE EXTINGUISHER

Explosion Data: Sensitivity to Impact: N/A

Sensitivity to Static Discharge: N/A

Section 5 - Reactivity Data

Chemical Stability: Yes No If no, under which conditions? _____

Compatibility with other substances: Yes No If no, which ones? _____

Reactivity and under which conditions? Not Reactive

Section 6 - Toxicological Properties

Route of Entry:

Skin Contact N Skin Absorption N Eye Contact Y

Inhalation N Ingestion Y

Section 7 - Preventive Measures

Personal Protective Equipment Requirement: (Specify): LEVEL D PROTECTION

Handling Procedures and Equipment: IF PRODUCT IS SPILLED PICK UP WITH OIL DRY, VERMICULITE, ETC.

Storage Requirements: STORED IN EITHER DRUMS OR SMALL PLASTIC CONTAINERS

Leak and Spill Procedure: IF DRUM OR CONTAINER IS LEAKING PLUG OR TRANSFER MATERIALS

Waste Disposal: CONTACT MANUFACTURER

Section 8 - First Aid Measures

Specific Measures: N/A

Section 9 - Preparation

Prepared by: MIKE ARNOLD

Phone Number: (713) 630-4054

Fax Number: (713) 526-5842

Emergency Contact:

Company: Digicon Safety Department

Phone Number: 713-526-5611

Fax Number: 713-526-5842

Company: _____

Phone Number: _____

Fax Number: _____



**SAFETY DEPARTMENT
MATERIAL SAFETY DATA SHEET
(FIELD USE REFERENCE FORM)**

Proper Name: SULFURIC ACID

Section 1 - Product Identification And Use

Product Identifier: (User's name(s)): HYDROGEN SULFATE (BATTERY ACID)

Product Identification Number: CAS: 7667-93-9

Product Use: USED IN BATTERIES

Section 2 - Hazardous Ingredients

Hazardous: HYDROGEN SULFATE

Section 3 - Physical Data

Physical State: OILY LIQUID

Odor & Appearance: NONE

Section 4 - Fire And Explosion Data

Flammability: Yes No If yes, under which conditions? _____

Means of Extinction: N/A

Explosion Data: Sensitivity to Impact: N/A

Sensitivity to Static Discharge: N/A

Section 5 - Reactivity Data

Chemical Stability: Yes No If no, under which conditions? _____

Compatibility with other substances: Yes No If no, which ones? OTHER ACIDS

Reactivity and under which conditions? NORMAL

Section 6 - Toxicological Properties

Route of Entry:

Skin Contact Skin Absorption Eye Contact

Inhalation Ingestion

Section 7 - Preventive Measures

Personal Protective Equipment Requirement: (Specify): SCBA, LEVEL B SUIT (FULLY ENCAPSULATED)

Handling Procedures and Equipment: DIKEING MATERIAL, WATER MONITORS FOR VAPOR REDUCTION

Storage Requirements: POLY DRUMS, ACID TANKS

Leak and Spill Procedure: STOP LEAK, DIKE AREA, CALL SAFETY DEPARTMENT

Waste Disposal: CONTACT OWNER

Section 8 - First Aid Measures

Specific Measures: DO NOT USE WATER UNLESS VAPORS ARE HEAVY BUT ONLY TO KEEP VAPORS DN

Section 9 - Preparation

Prepared by: MIKE ARNOLD

Phone Number: (713) 630-4054

Fax Number: (713) 526-5842

Emergency Contact:

Company: Digicon Safety Department

Company: _____

Phone Number: 713-526-5611

Phone Number: _____

Fax Number: 713-526-5842

Fax Number: _____



**SAFETY DEPARTMENT
MATERIAL SAFETY DATA SHEET
(FIELD USE REFERENCE FORM)**

XENYO® RESIN 6230-1001

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1. CHEMICAL PRODUCT & COMPANY IDENTIFICATION

MANUFACTURER / SUPPLIER	
General Electric Company One Plastics Avenue Pittsfield, MA 01201	GE Plastics Canada, Ltd. 2300 Meadowvale Blvd. Mississauga, ONT L5N 5P9
EMERGENCY TELEPHONE	
(812) 831-7245 (24 hour) (812) 831-7444 (24 hour)	Medical (812) 831-7245 (24 hour) Other (812) 831-7444 (24 hour)
NON-EMERGENCY TELEPHONE	
(800) 845-0600	(800) 845-0600
PRODUCT IDENTIFIER:	XENYO
PRODUCT DESCRIPTION:	Poly(butylene terephthalate) (PBT) (CAS# 30965-26-5) / Poly(Bisphenol-A carbonate) (CAS# 25971-63-5) polymer blend, glass filled.
PRODUCT USE:	May be used to produce molded or extruded articles or as a component of other industrial products.

2. COMPOSITION/INFORMATION ON INGREDIENTS

This product consists primarily of high molecular weight polymers which are not expected to be hazardous.

Additional compositional data are provided in the REGULATORY INFORMATION section for WHMIS, SARA 313, California Proposition 65, and various state right-to-know laws.

CAS NUMBER	OSHA	UNITS	ACGIH	UNITS
65997-17-3				
glass			10.0	mg/m3(resp.fr.)

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW: Solid pellets with slight or no odor. Spilled pellets create slipping hazard. Can burn in a fire creating dense toxic smoke. Molten plastic can cause severe thermal burns. Fumes produced during melt processing may cause eye, skin and respiratory tract irritation. Secondary operations, such as grinding, sanding or sawing, can produce dust which may present an explosion or respiratory hazard.

POTENTIAL HEALTH EFFECTS

EYE:	Product may cause irritation or injury due to mechanical action.
SKIN:	Pellets not likely to cause skin irritation.
INGESTION:	Not acutely toxic.
INHALATION:	Pellet inhalation unlikely due to physical form.

CHRONIC/CARCINOGENICITY

NTP:	Not Tested
OSHA:	Not Regulated
IARC:	Not Listed

MELT PROCESSING HEALTH EFFECTS: Molten plastic can cause severe burns.

Processing fumes may cause irritation to the eyes, skin and respiratory tract, and in cases of severe over-exposure, nausea and headache.

Grease-like processing fume condensates on ventilation duct work, molds and

XENYO® RESIN 6230-1001

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other surfaces can cause irritation and injury to skin.

MEDICAL RESTRICTIONS: There are no known human health effects aggravated by exposure to this product. However, certain sensitive individuals and individuals with respiratory impairments may be affected by exposure to components in the processing fumes.

NOTE: Additives containing certain heavy metal compounds may be present. These ingredients are essentially bound in the plastic matrix and are unlikely to contribute to workplace exposure under recommended processing conditions.

4. FIRST AID MEASURES

EYES: Remove contact lenses at once. Immediately flush eyes well with copious quantities of water or normal saline for at least 20-30 minutes. Seek medical attention.

SKIN: Wash skin thoroughly with soap and water. Seek medical attention if rash or burn occurs.

INGESTION: Not probable. If a large amount is swallowed, seek medical attention.

INHALATION: Not likely to be inhaled due to physical form.

MELT PROCESSING: For molten plastic skin contact, cool rapidly with water and immediately seek medical attention. Do not attempt removal of plastic without medical assistance. Do not use solvent for removal.

For processing fume inhalation irritation, leave contaminated area and breathe fresh air. If coughing, difficult breathing or any other symptoms develop seek medical attention at once, even if symptoms develop at a later time.

For skin contact with fume condensate, immediately wash thoroughly with soap and water. If irritation develops seek medical attention.

5. FIRE FIGHTING MEASURES

FIRE FIGHTING: Approved pressure demand breathing apparatus and protective clothing should be used for all fires. Water spray is the preferred extinguishing medium. This product will melt but will not be carried on the surface of water.

EXTINGUISHING MEDIA: Water spray and foam. Water is the best extinguishing medium. Carbon dioxide and dry chemical are not generally recommended because their lack of cooling capacity may permit re-ignition.

HAZARDOUS COMBUSTION PRODUCTS: Hazardous combustion products may include intense heat, dense black smoke, carbon monoxide, carbon dioxide and hydrocarbon fragments.

FLASH POINT: Not Applicable

LOWER FLAMMABLE LIMIT: Not Established

UPPER FLAMMABLE LIMIT: Not Established

AUTOIGNITION: 360C (680F), estimated

CONDITIONS OF FLAMMABILITY: Requires a continuous flame source to ignite.

EXPLOSION DATA

IMPACT SENSITIVITY: Not sensitive to mechanical impact.

STATIC DISCHARGE: Not sensitive to static discharge.

(See HANDLING AND STORAGE)

6. ACCIDENTAL RELEASE MEASURES

GENERAL: Sweep or gather up material and place in proper container for disposal or recovery. (See DISPOSAL INFORMATION)

7. HANDLING AND STORAGE

HANDLING: Follow recommendations on label and in processing guide. Prevent contact with skin and eyes. Use good industrial hygiene practices. Provide adequate ventilation. Secondary operations such as grinding, sanding or sawing may produce a dust explosion hazard. Use aggressive housekeeping activities to prevent dust accumulation; employ bonding, grounding, venting and explosion relief provisions in accordance with accepted engineering practices.

STORAGE: Store in a dry place away from moisture, excessive heat and sources of ignition. Avoid storage near foods to prevent food contamination.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

ENGINEERING CONTROLS: A continuous supply of fresh air to the workplace together with removal of processing fumes through exhaust systems is recommended. Processing fume condensate may be a fire hazard and toxic; remove periodically from exhaust hoods, duct work and other surfaces using appropriate personal protection. For powders and residual dusts refer to **HANDLING AND STORAGE** section.

Ventilation requirements must be locally determined to limit exposure to materials at their point of use. Design techniques and guidelines may be found in publications such as:

Industrial Ventilation; available from the American Conference of Governmental Industrial Hygienists, Committee on Industrial Ventilation, P.O. Box 16153, Lansing, MI 48901.

PERSONAL PROTECTION

EYE/FACE: Wear safety glasses with side shields or chemical goggles. In addition, use full face shield when cleaning processing fume condensates from hoods, ducts and other surfaces.

SKIN: When handling pellets avoid prolonged or repeated contact with skin. When melt processing product wear long pants, long sleeves, well insulated gloves and face shield when applicable. Use appropriate protective clothing, including chemical resistant gloves, to prevent any contact with processing fume condensates.

RESPIRATORY: When processing fumes are not adequately controlled, use respirator approved for protection from organic vapors and acid gases. When dust or powder from secondary operations, such as grinding sanding or sawing, are not adequately controlled use respirator approved for protection from dust.

9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE:	Solid
ODOR AND APPEARANCE:	Plastic pellet with slight odor.
BOILING POINT:	Not Applicable
MELTING POINT:	See COMMENT below.
VAPOR PRESSURE (mmHg):	Negligible
VAPOR DENSITY (air=1):	Not Applicable
SPECIFIC GRAVITY (water=1):	>1
WATER SOLUBILITY:	Insoluble
% VOLATILES:	Negligible
pH:	Not Applicable
ODOR THRESHOLD:	Not Established
EVAPORATION RATE:	Negligible
COEFFICIENT WATER/OIL DISTR:	Not Established
COMMENT:	This product does not exhibit a sharp melting point, but softens gradually over a wide temperature range.

10. STABILITY AND REACTIVITY

STABILITY: Stable under recommended conditions of storage and handling.

REACTIVITY: Not reactive under recommended conditions of handling, storage, processing and use.

CONDITIONS TO AVOID: Do not exceed melt temperature recommendations in product literature. In order to avoid autoignition/hazardous decomposition of hot thick masses of plastic, purgings should be collected in small, flat shapes or thin strands to allow for rapid cooling and quench in water. (See EXPOSURE CONTROLS/PERSONAL PROTECTION section for respiratory protection advice.)

HAZARDOUS DECOMPOSITION: Processing fumes evolved at recommended processing conditions contain trace levels of tetrahydrofuran (THF) and may contain trace levels of phenol, alkylphenols, diarylcarbonates and acrylates.

11. TOXICOLOGICAL INFORMATION

PRODUCT:

EYE: Product not considered primary eye irritant. When similar products, in finely divided form, were placed into the eyes of rabbits, slight transient redness or discharge occurred - consistent with the expected slightly abrasive nature of the resin particles.

XENYO® RESIN 6230-1001

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SKIN: Resin is not a skin irritant and does not cause sensitization. Finely ground resin, applied at a dose of 0.5g to abraded and non-abraded rabbit skin, did not produce detectable irritation or other clinical signs. When tested for skin sensitization potential in guinea pigs, no skin reactions were seen with either the inductive or challenge applications of resin.

ACUTE ORAL: Oral LD50 (Rat) >5 g/kg, estimated.

ACUTE INHALATION: Processing fumes from similar products are not considered toxic. In acute inhalation tests, laboratory rats were exposed to processing fumes at concentrations exaggerating those that would likely occur in workplace situations. No deaths or signs of toxicity, except transient irritancy in some cases, were noted during the 6 hour fume exposure tests. There were no distinct or consistent treatment related tissue or organ changes noted in gross necropsies.

12. ECOLOGICAL INFORMATION

GENERAL: Not expected to present any significant ecological problems.

13. DISPOSAL INFORMATION

RCRA HAZARDOUS WASTE: Product is not a RCRA hazardous waste.

WASTE DISPOSAL: Recycling is encouraged. Landfill or incinerate in accordance with federal, state and local requirements. Collected processing fume condensates and incinerator ash should be tested to determine waste classification.

14. TRANSPORTATION INFORMATION

DOT HAZARD CLASS: Not Regulated

PROPER SHIPPING NAME: Not Regulated

IDENTIFICATION NUMBER: Not Listed

TDGA: Not Listed

15. REGULATORY INFORMATION

Listed below are chemical substances subject to supplier notification requirements. The percentages, when present, represent average values.

CAS NUMBER	SARA	WHMIS	CA-65	FL	RI
65997-17-3	313%	%	%		X
glass					

TSCA STATUS: This product complies with the Chemical Substance Inventory requirements of the US EPA Toxic Substances Control Act (TSCA).

WHMIS CLASSIFICATION: Not a controlled product.

16. OTHER

Prepared by: Mike Arnold Phone Number: (713) 630-4054

Fax Number: (713) 526-5842

Emergency Contact:

Company: Digicon Safety Department Company: _____

Phone Number: 713-526-5611 Phone Number: _____

Fax Number: 713-526-5842 Fax Number: _____



SAFETY DEPARTMENT
MATERIAL SAFETY DATA SHEET
 (FIELD USE REFERENCE FORM)

TRADE NAME (Common Name or Synonym)
Aluminum Alloy

CHEMICAL NAME
Alloy Series 1000, 2000, 3000, 5000, 6000 and 7000

I. INGREDIENTS

Material or Component	CAS Number	% Weight	EXPOSURE LIMITS	
			OSHA PEL (mg/m ³)	ACGIH TLV (mg/m ³)
Base Metal				
Aluminum (Al)	7429-90-5	90-99.7	15 Dust	10.0 Metal Dust & Oxide 5.0 Welded Fume
Alloying Elements				
Chromium (Cr)	7440-47-3	<0.01-0.4	1.0 Chrome Metal	0.5 Chrome Metal
Copper (Cu)	7440-50-8	<0.05-6.0	0.1 Fume/1.0 Dust	0.2 Fume/1.0 Dust
Iron (Fe)	7439-89-6	<0.35-1.0	10 Oxide Fume	5 Oxide Fume
Magnesium (Mg)	1309-48-4	<0.03-4.9	15 Oxide Fume	10 Oxide Fume
Manganese (Mn)	7439-96-5	<0.02-1.5	5c Dust/5c Fume	5c Dust/1 Fume
Silicon (Si)	7440-21-3	<0.25-1.2	15 Dust	10 Total Dust
Titanium (Ti)	7440-32-6	<0.02-0.2	15 Ti Dioxide	10 Ti Dioxide
Zinc (Zn)	1314-13-2	<0.05-6.1	5 Oxide Fume	10 Dust/5 Fume
Bismuth (Bi)	7440-69-9	<0.40-0.7	Not Established	Not Established
Boron (B)	7440-42-8	0.06 max	15 Oxide Fume	10 Oxide Fume
Lead (Pb)	7439-92-1	<0.40-0.7	.05 Dust & Fume	0.15 Dust & Fume
Vanadium (V)	7440-62-2	0.05 max	0.5c Dust/0.1c Fume	0.05 Dust/0.05 Fume

Note: Aluminum alloys will be comprised of various combinations of the elements shown above. In addition, other alloying elements may be present in minute quantities. No permissible exposure limits (PEL) or threshold limit values (TLV) exist for aluminum alloys. Values shown are applicable to component elements.

II. PHYSICAL DATA

MATERIAL IS (At Normal Conditions) <input type="checkbox"/> LIQUID <input checked="" type="checkbox"/> SOLID <input type="checkbox"/> GAS <input type="checkbox"/> OTHER	APPEARANCE AND ODOR Silvery-Grey, Odorless	% VOLATILE BY VOLUME N/A	VAPOR DENSITY N/A
ACIDITY/ALKALINITY pH = N/A	Melting Point 900-1200 ° F Boiling Point N/A ° F	Specific Gravity (H₂O = 1) Approx. 2.5-2.9 Solubility in water (% by weight) Negligible	VAPOR PRESSURE (mm Hg at 20° C) N/A

III. PERSONAL PROTECTIVE EQUIPMENT

RESPIRATORY PROTECTION Appropriate dust/mist/fume respirator should be used to avoid excessive inhalation of particulates. If exposure limits are reached or exceeded, use NIOSH approved equipment.	HANDS, ARMS AND BODY Protective gloves should be worn as required for welding, burning or handling operations.
EYES AND FACE Safety glasses should be worn when grinding or cutting. Face shields should be worn when welding or cutting.	OTHER CLOTHING AND EQUIPMENT As required depending on operations and safety codes.

IV. EMERGENCY MEDICAL PROCEDURES

INHALATION:	Remove to fresh air; if condition continues, consult a physician.
EYE CONTACT:	Flush thoroughly with running water to remove particulate; obtain medical attention.
SKIN CONTACT:	Remove particles by washing thoroughly with soap and water. Seek medical attention if condition persists.
INGESTION:	If significant amounts of metal are ingested, consult physician.

Health	<p>For standard operations (e.g. melting, cutting, grinding), aluminum alloys present a low health risk by inhalation and are usually considered a nuisance dust. Toxicity by ingestion - none expected. Skin and eyes - not an irritant. Welding and plasma cutting of alloys high in copper (2000 and 7000 series) may present the potential for overexposure to copper fumes which can result in upper respiratory tract irritation, nausea, and metal fume fever. Nickel and chromium are other alloying elements considered hazardous as fumes; however, they do not present a carcinogenic or other health concern due to their low concentrations of the chemical form in which they are present. Overexposure to lead fumes over an extended period of time can result in such toxic effects as central nervous system disturbances, renal changes, peripheral neuropathy, gastrointestinal disturbances, anemia, and chromosomal changes. The welding of aluminum alloys may generate carbon monoxide, carbon dioxide, ozone nitrogen oxides, infrared radiation and ultraviolet radiation.</p> <p>MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Individuals with chronic respiratory disorders (i.e.: asthma, chronic bronchitis, emphysema, etc.) may be adversely affected by any fume or airborne particulate matter exposure.</p> <p>OCCUPATIONAL EXPOSURE LIMITS: See Products Ingredients Section I.</p>			
	Fire and Explosion	FLASH POINT	AUTO IGNITION TEMPERATURE	FLAMMABLE LIMITS IN AIR
N/A °F		N/A	Lower Upper N/A %	For molten aluminum use dry powder or sand.
Reactivity	<p>STABILITY</p> <p><input checked="" type="checkbox"/> Stable <input type="checkbox"/> Unstable</p>		<p>INCOMPATIBILITY (MATERIALS TO AVOID)</p> <p>Reacts with strong acids to form hydrogen gas.</p>	
	<p>CONDITIONS TO AVOID: Aluminum products under normal conditions are stable during use, storage and transportation. Halogen acids and sodium hydroxide in contact with aluminum may generate explosive mixtures of hydrogen. Finely divided aluminum, such as small chips and fines, will form explosive mixtures in air. It also will form explosive mixtures in air in the presence of bromates, iodates, or ammonium nitrate. Strong oxidizers cause violent reactions with considerable heat generation.</p>			

VI. ENVIRONMENTAL

<p>SPILL OR LEAK PROCEDURES</p> <p>Fine turnings and small chips should be swept or vacuumed. Scrap metal can be reclaimed for re-use.</p> <p>WASTE DISPOSAL METHOD*</p> <p>Used or unused product should be disposed of in accordance with Federal, State or Local Laws and Regulations. *Disposer must comply with Federal, State and Local disposal or discharge laws.</p>

VII. ADDITIONAL INFORMATION

<p>Do not touch cast aluminum metal or heated aluminum product without knowing metal temperature. Aluminum experiences no color change during heating. Burns could result. Series 2000 and 7000 alloys should be stress relieved prior to sawing or cutting to avoid cracking. Aluminum powder must be packaged and shipped as a flammable solid. Minimize and control operations producing dust and fume.</p> <p>DISCLAIMER</p> <p>The information in this MSDS was obtained from sources which we believe are reliable, however, the information is provided without any representation or warranty, express or implied, regarding the accuracy or correctness.</p> <p>The conditions or methods of handling, storage, use and disposal of the product are beyond our control and may be beyond our knowledge. For this and other reasons, we do not assume responsibility and expressly disclaim liability for loss, damage or expense arising out of or in any way connected with the handling, storage, use or disposal of the product.</p>

Emergency Contact:

Company: Digicon Safety Department

Phone Number: 713-526-5611

Fax Number: 713-526-5842

Company: _____

Phone Number: _____

Fax Number: _____



482256

**SAFETY DEPARTMENT
MATERIAL SAFETY DATA SHEET
(FIELD USE REFERENCE FORM)**

TRADE NAME (Common Name or Synonym)
Stainless Steels

CHEMICAL NAME
AISI/SAE Grades 300 Series, 400 Series, Special Alloys

I. INGREDIENTS

Material or Component	CAS Number	% Weight	EXPOSURE LIMITS	
			OSHA PEL (mg/m ³)	ACGIH TLV (mg/m ³)
Base Metal				
Iron (Fe)	7439-89-6	38.0-86.5	10 Oxide Fume	5 Oxide Fume
Alloying Elements				
Aluminum (Al)	7429-90-5	<.01-0.5	15 Dust	10 Dust/5 Fume
Carbon (C)	7440-44-0	<.03-2.0	Not Established	3.5 AS Carbon Black
Chromium (Cr)	7440-47-3	<10-27	1.0 Chrome Metal	0.5 Chrome Metal
Cobalt (Co)	7440-48-4	<.01-.75	0.1 Cobalt Metal	0.05 Cobalt Fume
Copper (Cu)	7440-50-8	<.18-4.5	0.1 Fume/1.0 Dust	0.2 Fume/1.0 Dust
Manganese (Mn)	7439-96-5	<2-10	5c Dust/5c Fume	5c Dust/1 Fume
Molybdenum (Mo)	7439-98-7	<.04-5	15 Insoluble Compounds	10 Insoluble Compounds
Nickel (Ni)	7440-02-0	<.12-34	1 Nickel Metal	1 Nickel Metal
Phosphorous (P)	7723-14-0	<.01-.06	0.1 Phosphorous	0.1 Phosphorous
Selenium (Se)	7782-49-2	<.01-0.3	0.2 Se Metal	0.2 Se Metal
Silicon (Si)	7440-21-3	<.15-2.0	15 Dust	10 Total Dust
Sulfur (S)	7704-34-9	<.01-.06	13 Sulfur Dioxide	5 Sulfur Dioxide
Titanium (Ti)	7440-32-6	<.01-0.70	15 Ti Dioxide	10 Ti Dioxide
Columbium } (Cb + Ta)	7440-03-1	<.01-1.10	Not Established	Not Established
Tantalum }	7440-25-7		5.0 Ta Metal	5.0 Ta Metal

Note: The above listing is a summary of elements used in alloying stainless steels. Various grades of steel will contain different combinations of these elements. Trace elements may also be present in minute amounts. No permissible exposure limits (PEL) or thresholds limit values (TLV) exist for stainless steel. Values shown are applicable to component elements.

II. PHYSICAL DATA

MATERIAL IS (At Normal Conditions) <input type="checkbox"/> LIQUID <input checked="" type="checkbox"/> SOLID <input type="checkbox"/> GAS <input type="checkbox"/> OTHER	APPEARANCE AND ODOR Silvery-Grey, Odorless	% VOLATILE BY VOLUME N/A	VAPOR DENSITY N/A
ACIDITY/ALKALINITY pH = N/A	Melting Point Approx. 2400-2800 ° F Boiling Point N/A ° F	Specific Gravity (H₂O) = 1) Approx. 8 Solubility in water (% by weight) N/A	VAPOR PRESSURE (mm Hg at 20° C) N/A

III. PERSONAL PROTECTIVE EQUIPMENT

RESPIRATORY PROTECTION Appropriate dust/mist/fume respirator should be used to avoid excessive inhalation of particulates. If exposure limits are reached or exceeded, use NIOSH approved equipment.	HANDS, ARMS AND BODY Protective gloves should be worn as required for welding, burning or handling operations.
EYES AND FACE Safety glasses should be worn when grinding or cutting. Face shields should be worn when welding or cutting.	OTHER CLOTHING AND EQUIPMENT As required depending on operations and safety codes.

IV. EMERGENCY MEDICAL PROCEDURES

INHALATION:	Remove to fresh air; if condition continues, consult a physician.
EYE CONTACT:	Flush thoroughly with running water to remove particulate; obtain medical attention.
SKIN CONTACT:	Remove particles by washing thoroughly with soap and water. Seek medical attention if condition persists.
INGESTION:	If significant amounts of metal are ingested, consult physician.

V. HEALTH/SAFETY INFORMATION

482257

Health	<p>Stainless steel products in their solid state present no inhalation, ingestion, or contact health hazard. Operations such as burning, welding, sawing, grinding, and machining, which result in elevating the temperature of the product to, or above its melting point, or result in the generation of airborne particulates may present hazards. The major exposure hazard is inhalation. Effects of overexposure to fume and dust are as follows:</p> <p>ACUTE: Excessive inhalation of metallic fumes and dust may result in irritation of eyes, nose and throat. High concentrations of fumes and dust of iron-oxide, manganese, copper, zinc and lead may result in metal fume fever. Typical symptoms last from 12 to 48 hours and consist of a metallic taste in the mouth, dryness and irritation of the throat, chills and fever.</p> <p>CHRONIC: Chronic and prolonged inhalation of high concentrations of fumes or dust of the following elements may lead to the conditions listed opposite the element: Aluminum: Irritation of the eyes, nose and throat. Chromium: Lesions of the skin and mucous membranes, possibly cancer of the nose or lungs-bronchogenic carcinoma Cobalt: Respiratory tract irritation, skin rash Copper: Irritation of the eyes, nose and throat, metal fume fever Iron: Pulmonary effects, siderosis Manganese: Bronchitis, pneumonitis, lack of coordination Molybdenum: Respiratory tract irritation, possible liver and kidney damage, bone deformity Nickel: Lesions of the skin and mucous membranes, possibly cancer of the nose or lungs-bronchogenic carcinoma Phosphorous: Necrosis of the mandible Selenium: Nasal and bronchial irritation, gastrointestinal disturbances, garlic breath odor Sulfur: (As sulfur dioxide) Edema of the lungs Titanium: No chronic debilitating symptoms indicated Columbium/Tantalum: No chronic debilitating symptoms indicated</p> <p>MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Individuals with chronic respiratory disorders (i.e.: asthma, chronic bronchitis, emphysema, etc.) may be adversely affected by any fume or airborne particulate matter exposure.</p> <p>OCCUPATIONAL EXPOSURE LIMITS: See Products Ingredients Section I. Chromium and Nickel have been identified by the International Agency for Research on Cancer (IARC) and/or the National Toxicology Program (NTP) as potential cancer causing agents.</p>			
	FLASH POINT		AUTO IGNITION TEMPERATURE	
N/A ° F		N/A		
Fire	FLAMMABLE LIMITS IN AIR		EXTINGUISHING MEDIA	
	Lower	N/A %	Does not present fire or explosion hazards under normal conditions. Use dry powder or sand on molten metal.	
Reactivity	EXTINGUISHING MEDIA NOT TO BE USED		EXTINGUISHING MEDIA	
	Do not use water on molten metal or fires caused by fine metal particles.		Does not present fire or explosion hazards under normal conditions. Use dry powder or sand on molten metal.	
<p>EXPLOSION AND EXPLOSION HAZARDS Stainless tubular products do not present fire or explosion hazards under normal conditions. Fine metal particles such as produced in grinding or sawing can burn. High concentrations of metallic fines in the air may present an explosion hazard.</p>				
STABILITY		INCOMPATIBILITY (MATERIALS TO AVOID)		
<input checked="" type="checkbox"/> Stable <input type="checkbox"/> Unstable		Reacts with strong acids to form hydrogen gas.		
<p>CONDITIONS TO AVOID: Stainless steel at temperatures above the melting point may liberate fumes containing oxides of iron and oxygen elements.</p> <p>HAZARDOUS DECOMPOSITION PRODUCTS: Metallic dust or fumes may be produced during welding, burning, grinding and possibly machining. Refer to ANSI Z49.1.</p>				

VI. ENVIRONMENTAL

<p>SPILL OR LEAK PROCEDURES Fine turnings and small chips should be swept or vacuumed. Scrap metal can be reclaimed for re-use.</p> <p>WASTE DISPOSAL METHOD* Used or unused product should be disposed of in accordance with Federal, State or Local Laws and Regulations. *Disposer must comply with Federal, State and Local disposal or discharge laws.</p>	
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VII. ADDITIONAL INFORMATION

<p>When welding, precautions should be taken for airborne contaminants which may originate from components of the welding rod. Spark generated when welding or burning could be a source of ignition for combustion and flammable materials.</p>	
<p>DISCLAIMER</p> <p>The information in this MSDS was obtained from sources which we believe are reliable, however, the information is provided without any representation or warranty, express or implied, regarding the accuracy or correctness.</p> <p>The conditions or methods of handling, storage, use and disposal of the product are beyond our control and may be beyond our knowledge. For this and other reasons, we do not assume responsibility and expressly disclaim liability for loss, damage or expense arising out of or in any way connected with the handling, storage, use or disposal of the product.</p>	

Emergency Contact:

Company: Digicon Safety Department
 Phone Number: 713-526-5611
 Fax Number: 713-526-5842

Company: _____
 Phone Number: _____
 Fax Number: _____



SAFETY DEPARTMENT
MATERIAL SAFETY DATA SHEET
 (FIELD USE REFERENCE FORM)

TRADE NAME (Common Name or Synonym)
Chrome Plated Carbon Steel

CHEMICAL NAME
Chrome Plated 1045, 1050

I. INGREDIENTS

Material or Component	CAS Number	% Weight	EXPOSURE LIMITS	
			OSHA PEL (mg/m ³)	ACGIH TLV (mg/m ³)
Base Metal				
Iron (Fe)	7439-89-6	95-99	10 (Oxide Fume)	5 (As Iron Oxide)
Alloying Elements				
Aluminum (Al)	7429-90-5	<2	15 Dust	10 (Dust)
Carbon (C)	7440-44-0	<2	N/A	3.5 AS Carbon Black
Manganese (Mn)	7439-96-5	<2	5	5 (Dust Ceiling)
Bismuth (Bi)	7440-69-9	<1	N/A	N/A
Chromium (Cr)	7440-47-3	<1	1 (Cr. & insol. salts)	.5
Copper (Cu)	7440-50-8	<1	0.2	1 (Dust & Mist)
Molybdenum (Mo)	7439-98-7	<1	5	10 (insol. salts)
Nickel (Ni)	7440-02-0	<1	1.0	1.0
Niobium (Nb)	7440-03-1	<1	N/A	N/A
Phosphorous (P)	7723-14-0	<1	0.1 (as yellow Phos.)	N/A
Silicon (Si)	7440-21-3	<1	15 Dust	10 Total Dust
Sulfur (S)	7704-34-9	<1	13 (as SO ₂)	5 (as SO ₂)
Vanadium (V)	7440-62-2	<1	0.05 (V ₂ O ₅ dust & fume)	0.05 (V ₂ O ₅) dust & fume)
Metallurgical Coating				
Chromium (Cr)	7440-47-3	>98	1 (Cr. & insol. salts)	0.5

Note: The above listing is a summary of elements used in alloying steel. Various grades of steel will contain different combinations of these elements. Trace elements may also be present in minute amounts. No permissible exposure limits (PEL) or threshold limit values (TLV) exist for steel. Values shown are applicable to component elements.

II. PHYSICAL DATA

MATERIAL IS (At Normal Conditions) <input type="checkbox"/> LIQUID <input checked="" type="checkbox"/> SOLID <input type="checkbox"/> GAS <input type="checkbox"/> OTHER		APPEARANCE AND ODOR Gray w/Metallic Luster, Odorless	% VOLATILE BY VOLUME N/A	VAPOR DENSITY N/A
ACIDITY/ALKALINITY pH = N/A	Melting Point Greater than 1600 °F Boiling Point N/A	Specific Gravity (H ₂ O = 1) Approx. 7 Solubility in water (% by weight) N/A	VAPOR PRESSURE (mm Hg at 20° C) N/A	

III. PERSONAL PROTECTIVE EQUIPMENT

RESPIRATORY PROTECTION Appropriate dust/mist/fume respirator should be used to avoid excessive inhalation of particulates. If exposure limits are reached or exceeded, use NIOSH approved equipment.	HANDS, ARMS AND BODY Protective gloves should be worn as required for welding, burning or handling operations.
EYES AND FACE Safety glasses should be worn when grinding or cutting. Face shields should be worn when welding or cutting.	OTHER CLOTHING AND EQUIPMENT As required depending on operations and safety codes.

IV. EMERGENCY MEDICAL PROCEDURES

INHALATION:	Remove to fresh air; if condition continues, consult a physician.
EYE CONTACT:	Flush thoroughly with running water to remove particulate; obtain medical attention.
SKIN CONTACT:	Remove particles by washing thoroughly with soap and water. Seek medical attention if condition persists.
INGESTION:	If significant amounts of metal are ingested, consult physician.

Health	<p>Steel products in their solid state present no inhalation, ingestion, or contact health hazard. Operations such as burning, welding, sawing, grinding, and machining, which result in elevating the temperature of the product to, or above its melting point, or result in the generation of airborne particulates may present hazards. The major exposure hazard is inhalation. Effects or overexposure to fume and dust are as follows:</p> <p>ACUTE: Excessive inhalation of metallic fumes and dust may result in irritation of eyes, nose and throat. High concentrations of fumes and dusts of iron-oxide, manganese, copper, zinc and lead may result in metal fume fever. Typical symptoms last from 12 to 48 hours and consist of a metallic taste in the mouth, dryness and irritation of the throat, chills and fever.</p> <p>CHRONIC: Chronic and prolonged inhalation of high concentrations of fumes or dust of the following elements may lead to the conditions listed opposite the element:</p> <p>Aluminum: May initiate fibrotic changes to lung tissue Bismuth: No chronic debilitating symptoms indicated Chromium: Lesions of the skin and mucous membranes, possibly cancer of the nose or lungs-bronchogenic carcinoma Copper: No chronic debilitating symptoms indicated Iron: Siderosis, pulmonary effects. No chronic debilitating symptoms indicated Manganese: Bronchitis, pneumonitis, lack of coordination Molybdenum: Respiratory tract irritation, possible liver and kidney damage, bone deformity Nickel: Lesions of the skin and mucous membranes, possibly cancer of the nose or lungs-bronchogenic carcinoma Phosphorous: Necrosis of the mandible Sulfur: (As sulfur dioxide) Edema of the lungs Vanadium: (As vanadium pentoxide) Emphysema, pneumonia</p> <p>MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Individuals with chronic respiratory disorders (i.e.: asthma, chronic bronchitis, emphysema, etc.) may be adversely affected by any fume or airborne particulate matter exposure.</p> <p>OCCUPATIONAL EXPOSURE LIMITS: See Products Ingredients Section I. Chromium and Nickel have been identified by the International Agency for Research on Cancer (IARC) and/or the National Toxicology Program (NTP) as potential cancer causing agents.</p>			
	FLASH POINT		AUTO IGNITION TEMPERATURE	
N/A ° F		N/A		
Fire and Explosion	FLAMMABLE LIMITS IN AIR		EXTINGUISHING MEDIA	
	Lower Upper	N A	% %	
FIRE AND EXPLOSION HAZARDS		EXTINGUISHING MEDIA NOT TO BE USED		
<p>Steel tubular products do not present fire or explosion hazards under normal conditions. Fine metal particles such as produced in grinding or sawing can burn. High concentrations of metallic fines in the air may present an explosion hazard.</p>		<p>Do not use water on molten metal.</p>		
Reactivity	STABILITY		INCOMPATIBILITY (MATERIALS TO AVOID)	
	<p><input checked="" type="checkbox"/> Stable <input type="checkbox"/> Unstable</p>		<p>Reacts with strong acids to form hydrogen gas.</p>	
	<p>CONDITIONS TO AVOID: Steel at temperatures above the melting point may liberate fume containing oxides of iron and alloying elements. Avoid generation of airborne fume and dust.</p> <p>HAZARDOUS DECOMPOSITION PRODUCTS: Metallic dust or fumes may be produced during welding, burning, grinding and possibly machining. Refer to ANSI Z49.1.</p>			

VI. ENVIRONMENTAL

<p>SPILL OR LEAK PROCEDURES</p> <p>Fine turnings and small chips should be swept or vacuumed. Scrap metal can be reclaimed for re-use.</p>
<p>WASTE DISPOSAL METHOD*</p> <p>Used or unused product should be disposed of in accordance with Federal, State or Local Laws and Regulations. *Disposer must comply with Federal, State and Local disposal or discharge laws.</p>

VII. ADDITIONAL INFORMATION

<p>In welding, precautions should be taken for airborne contaminants which may originate from components of the welding rod.</p> <p>Arc or spark generated when welding or burning could be a source of ignition for combustion and flammable materials.</p>
<p>DISCLAIMER</p> <p>The information in this MSDS was obtained from sources which we believe are reliable, however, the information is provided without any representation or warranty, express or implied, regarding the accuracy or correctness.</p> <p>The conditions or methods of handling, storage, use and disposal of the product are beyond our control and may be beyond our knowledge. For this and other reasons, we do not assume responsibility and expressly disclaim liability for loss, damage or expense arising out of or in any way connected with the handling, storage, use or disposal of the product.</p>

Emergency Contact:

Company: Digicon Safety Department

Phone Number: 713-526-5611

Fax Number: 713-526-5842

Company: _____

Phone Number: _____

Fax Number: _____



482260

**SAFETY DEPARTMENT
MATERIAL SAFETY DATA SHEET
(FIELD USE REFERENCE FORM)**

TRADE NAME (Common Name or Synonym)
Nickel Based Alloy Steel

CHEMICAL NAME
Alloys 200, 400, 600, 800 series

I. INGREDIENTS

NOTE: PRODUCTS UNDER NORMAL CONDITIONS DO NOT REPRESENT AN INHALATION, INGESTION OR CONTACT HEALTH HAZARD

Ingredients	CAS Number	TLV (2)	Ingredients	CAS Number	TLV (2)
Aluminum (Al)	7429-90-5	10	Nickel (Ni)	7440-02-0	1
Chromium (Cr)	7440-47-3	.5	Niobium (Nb)	7440-03-1	None Established
Cobalt (Co)	7440-48-4	.1 (Dust & Fume)	Silicon (Si)	7440-21-3	10 (Total Dust)
Copper (Cu)	7440-50-8	1 (Dust & Fume)	Tantalum (Ta)	7440-25-7	5
Iron (Fe)	7439-89-6	10 (As Oxide-Iron)	Titanium (Ti)	7440-32-6	10 (Total Dust)
Manganese (Mn)	7439-96-5	5 (As Dust-Ceiling)	Tungsten (W)	7440-33-7	5
Molybdenum (Mo)	7439-98-7	10 (Insoluble Comp.)	Yttrium (Y)	7440-65-5	1

% Alloying Elements (1)

UNS Numbers	Al	Cr	Co	Cu	Fe	Mn	Mo	Ni	Nb	Si	Ta	Ti	W	Y
NO2200 series (Commercially Pure Ni Alloy)		<2				<5		95-99				<5	<5	
NO4400- NO5500 Series (Ni-Cu Alloy)	<5	<1		27-68	<1	<5		31-67		<1	<2			
NO6000- NO6900 Series (Ni-Cr Alloy)	<5	15-48	0-13		1-40	<5	2-10	39-80	<5		<2	<3	<5	<1
NO8800- NO9900 Series (Ni-Fe-Cr Alloy)	<5	.1-30	0-15	<2	30-84	<1	<5	.1-42	<5			<3		<1

(1) % OF ALLOYING MATERIAL VARIES WITH GRADE OF MATERIAL

(2) 1985-1986 ACGIH THRESHOLD LIMIT VALUE

II. PHYSICAL DATA

MATERIAL IS (At Normal Conditions) <input type="checkbox"/> LIQUID <input checked="" type="checkbox"/> SOLID <input type="checkbox"/> GAS <input type="checkbox"/> OTHER	APPEARANCE AND ODOR Grey-Black, Odorless	% VOLATILE BY VOLUME N/A	VAPOR DENSITY N/A
ACIDITY/ALKALINITY pH = N/A	Melting Point Approx. 2300 °F Boiling Point N/A °F	Specific Gravity (H₂O = 1) Approx. 7 Solubility in water (% by weight) N/A	VAPOR PRESSURE (mm Hg at 20° C) N/A

III. PERSONAL PROTECTIVE EQUIPMENT

RESPIRATORY PROTECTION Appropriate dust/mist/fume respirator should be used to avoid excessive inhalation of particulates. If exposure limits are reached or exceeded, use NIOSH approved equipment.	HANDS, ARMS AND BODY Protective gloves should be worn as required for welding, burning or handling operations.
EYES AND FACE Safety glasses should be worn when grinding or cutting. Face shields should be worn when welding or cutting.	OTHER CLOTHING AND EQUIPMENT As required depending on operations and safety codes.

IV. EMERGENCY MEDICAL PROCEDURES

INHALATION:	Remove to fresh air; if condition continues, consult a physician.
EYE CONTACT:	Flush thoroughly with running water to remove particulate; obtain medical attention.
SKIN CONTACT:	Remove particles by washing thoroughly with soap and water. Seek medical attention if condition persists.
INGESTION:	If significant amounts of metal are ingested, consult physician.



**SAFETY DEPARTMENT
MATERIAL SAFETY DATA SHEET
(FIELD USE REFERENCE FORM)**

TRADE NAME (Common Name or Synonym)
Carbon and Alloy Steels

CHEMICAL NAME
AISI/SAE Grades 10xx thru 93xx

I. INGREDIENTS

Material or Component	CAS Number	% Weight	EXPOSURE LIMITS	
			OSHA PEL (mg/m ³)	ACGIH TLV (mg/m ³)
Base Metal				
Iron (Fe)	7439-89-6	86.5-99.5	10 Oxide Fume	5 Oxide Fume
Alloying Elements				
Aluminum (Al)	7429-90-5	<0.1-0.5	15 Dust	10 Dust/5 Fume
Bismuth (Bi)	7440-69-9	<0.2-0.5	Not Established	Not Established
Boron (B)	7440-42-8	<.01-1.0	15 Oxide Fume	10 Oxide Fume
Carbon (C)	7440-44-0	<.10-1.5	Not Established	3.5 AS Carbon Black
Chromium (Cr)	7440-47-3	<.40-10	1.0 Chrome Metal	0.5 Chrome Metal
Columbium (Cb)	7440-03-1	<.15-.35	Not Established	Not Established
Copper (Cu)	7440-50-8	<.30-1.90	1.0 Fume/1.0 Dust	0.2 Fume/1.0 Dust
Lead (Pb)	7439-92-1	<.01-.15	.05 Dust & Fume	.15 Dust & Fume
Manganese (Mn)	7439-96-5	<.04-0.7	5c Dust/5c Fume	5c Dust/1 Fume
Molybdenum (Mo)	7439-98-7	<.15-1.10	15 Insoluble Compounds	10 Insoluble Compounds
Nickel (Ni)	7440-02-0	<.01-10	1 Nickel Metal	1 Nickel Metal
Phosphorous (P)	7723-14-0	<.040-.12	0.1 Phosphorous	0.1 Phosphorous
Silicon (Si)	7440-21-3	<.15-2.00	15 Dust	10 Total Dust
Sulfur (S)	7704-34-9	<.050-.35	13 Sulfur Dioxide	5 Sulfur Dioxide
Vanadium (V)	7440-62-2	<.01-0.15	0.5c Dust/0.1c Fume	0.05 Dust/0.05 Fume
Zinc Coating	1314-13-2	2 oz/ft ²	5 Oxide Fume	10 Dust/5 Fume
Aluminum Coating	7429-90-5	0.5 oz/ft ²	Not Established	10 Dust/5 Fume

Note: The above listing is a summary of elements used in alloying steel. Various grades of steel will contain different combinations of these elements. Trace elements may also be present in minute amounts. No permissible exposure limits (PEL) or thresholds limit values (TLV) exist for steel. Values shown are applicable to component elements.

II. PHYSICAL DATA

MATERIAL IS (At Normal Conditions) <input type="checkbox"/> LIQUID <input checked="" type="checkbox"/> SOLID <input type="checkbox"/> GAS <input type="checkbox"/> OTHER	APPEARANCE AND ODOR Grey-Black, Odorless	% VOLATILE BY VOLUME N/A	VAPOR DENSITY N/A
ACIDITY/ALKALINITY pH = N/A	Melting Point Approx. 2800 ° F Boiling Point N/A ° F	Specific Gravity (H₂O = 1) Approx. 7 Solubility in water (% by weight) N/A	VAPOR PRESSURE (mm Hg at 20° C) N/A

III. PERSONAL PROTECTIVE EQUIPMENT

RESPIRATORY PROTECTION Appropriate dust/mist/fume respirator should be used to avoid excessive inhalation of particulates. If exposure limits are reached or exceeded, use NIOSH approved equipment.	HANDS, ARMS AND BODY Protective gloves should be worn as required for welding, burning or handling operations.
EYES AND FACE Safety glasses should be worn when grinding or cutting. Face shields should be worn when welding or cutting.	OTHER CLOTHING AND EQUIPMENT As required depending on operations and safety codes.

IV. EMERGENCY MEDICAL PROCEDURES

INHALATION:	Remove to fresh air; if condition continues, consult a physician.
EYE CONTACT:	Flush thoroughly with running water to remove particulate; obtain medical attention.
SKIN CONTACT:	Remove particles by washing thoroughly with soap and water. Seek medical attention if condition persists.
INGESTION:	If significant amounts of metal are ingested, consult physician.

Health	<p>Steel products in their solid state present no inhalation, ingestion, or contact health hazard. Operations such as burning, welding, sawing, brazing, grinding, and machining, which result in elevating the temperature of the product to, or above its melting point, or result in the generation of airborne particulates may present hazards. The major exposure hazard is inhalation. Effects or overexposure to fumes and dust are as follows:</p> <p>ACUTE: Excessive inhalation of metallic fumes and dust may result in irritation of eyes, nose and throat. High concentrations of fumes and dust of iron-oxide, manganese, copper, zinc and lead may result in metal fume fever. Typical symptoms last from 12 to 48 hours and consist of a metallic taste in the mouth, dryness and irritation of the throat, chills and fever.</p> <p>CHRONIC: Chronic and prolonged inhalation of high concentrations of fumes or dust of the following elements may lead to the conditions listed opposite the element: Aluminum: May initiate fibrotic changes to lung tissue Bismuth: No chronic debilitating symptoms indicated Boron: No chronic debilitating symptoms indicated Chromium: Lesions of the skin and mucous membranes, possibly cancer of the nose or lungs-bronchogenic carcinoma Copper: No chronic debilitating symptoms indicated Iron: Siderosis, pulmonary effects. No chronic debilitating symptoms indicated Lead: Anemia, urinary dysfunction, weakness, constipation, nausea, nervous disorder Manganese: Bronchitis, pneumonitis, lack of coordination Molybdenum: Respiratory tract irritation, possible liver and kidney damage, bone deformity Nickel: Lesions of the skin and mucous membranes, possibly cancer of the nose or lungs-bronchogenic carcinoma Phosphorous: Necrosis of the mandible Sulfur: (As sulfur dioxide) Edema of the lungs Vanadium: (As vanadium pentoxide) Emphysema, pneumonia Zinc: Gastrointestinal inflammation reported in animal studies</p> <p>MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Individuals with chronic respiratory disorders (i.e.: asthma, chronic bronchitis, emphysema, etc.) may be adversely affected by any fume or airborne particulate matter exposure.</p> <p>OCCUPATIONAL EXPOSURE LIMITS: See Products Ingredients Section I. Chromium and Nickel have been identified by the International Agency for Research on Cancer (IARC) and/or the National Toxicology Program (NTP) as potential cancer causing agents.</p>				
	Fire and Explosion	<p>FLASH POINT N/A ° F</p>	<p>AUTO IGNITION TEMPERATURE N/A</p>	<p>FLAMMABLE LIMITS IN AIR Lower N % Upper A %</p>	<p>EXTINGUISHING MEDIA For molten metal use dry power or sand.</p>
	<p>FIRE AND EXPLOSION HAZARDS Steel tubular products do not present fire or explosion hazards under normal conditions. Fine metal particles such as produced in grinding or sawing can burn. High concentrations of metallic fines in the air may present an explosion hazard.</p>		<p>EXTINGUISHING MEDIA NOT TO BE USED Do not use water on molten metal.</p>		
Reactivity	<p>STABILITY <input checked="" type="checkbox"/> Stable <input type="checkbox"/> Unstable</p>		<p>INCOMPATIBILITY (MATERIALS TO AVOID) Reacts with strong acids to form hydrogen gas.</p>		
	<p>CONDITIONS TO AVOID: Steel at temperatures above the melting point may liberate fume containing oxides of iron and alloying elements. Avoid generation of airborne fume and dust.</p>				
	<p>HAZARDOUS DECOMPOSITION PRODUCTS: Metallic dust or fumes may be produced during welding, burning, grinding and possibly machining. Refer to ANSI Z49.1.</p>				

VI. ENVIRONMENTAL

<p>SPILL OR LEAK PROCEDURES Fine turnings and small chips should be swept or vacuumed. Scrap metal can be reclaimed for re-use.</p> <p>WASTE DISPOSAL METHOD* Used or unused product should be disposed of in accordance with Federal, State or Local Laws and Regulations. *Disposer must comply with Federal, State and Local disposal or discharge laws.</p>

VII. ADDITIONAL INFORMATION

<p>In welding, precautions should be taken for airborne contaminants which may originate from components of the welding rod. Arc or spark generated when welding or burning could be a source of ignition for combustion and flammable materials.</p>
<p>DISCLAIMER</p> <p>The information in this MSDS was obtained from sources which we believe are reliable, however, the information is provided without any representation or warranty, express or implied, regarding the accuracy or correctness.</p> <p>The conditions or methods of handling, storage, use and disposal of the product are beyond our control and may be beyond our knowledge. For this and other reasons, we do not assume responsibility and expressly disclaim liability for loss, damage or expense arising out of or in any way connected with the handling, storage, use or disposal of the product.</p>

Emergency Contact:

Company: Digicon Safety Department
 Phone Number: 713-526-5611
 Fax Number: 713-526-5842

Company: _____
 Phone Number: _____
 Fax Number: _____

482264

**Lithium Batteries
Safety and Handling
Procedures**



DIGICON, INC.
Safety Department

482265

DATE: February 5, 1992

TO: Kevin Callaghan
Nick Bright
Elwyn Jones
Carlos Sepeda

FROM: Mike Arnold
Digicon Safety Department

RE: LITHIUM BATTERIES, SAFETY AND HANDLING PROCEDURES

The attached safety precautions and procedures for the storage, handling and care of lithium type batteries, must be distributed and required to be read by all personnel involved in the use or handling of this product.

Safety precautions must be exercised with lithium batteries at all times, especially while on board the vessels and during shipping/receiving operations.

These procedures along with the attached safety information must be posted in shipping/receiving, all battery storage areas and the vessels on board Bird and gun shacks.

Over the next few months, the Safety Department will be conducting on site safety training for lithium battery use, including emergency procedures and first aid.

Please contact me for any additional information or assistance concerning this or any product in your inventory.

cc: Steve Ludlow

MA-020592:10



DIGICON, INC. Safety Department

LITHIUM BATTERY SAFETY PRECAUTIONS AND PROCEDURES

Lithium oxyhalide primary batteries are a make up of the chemical formula $Li/BrCl$ in $SOCl_2$ or Lithium/Bromine Chloride in Thionylchloride.

They differ from other similar type batteries in that they provide a much longer battery cell life because the electrolyte is not alkaline base and is not as corrosive.

This longer battery life, when installed in the streamer birds, allows the cable to remain out for longer survey periods resulting in increased prospect shooting times and added profitability. This reduction in back deck activity also lowers the possibility of accidents and lessens the danger of MOB's.

Lithium batteries (Li) must be considered potentially more hazardous than alkaline batteries and do require special use and handling precautions which must be strictly observed and followed.

Six of the most important of these precautions are;

- * DO NOT ALLOW LITHIUM BATTERIES TO GET WET. STORE IN A COOL, DRY AND WELL VENTILATED LOCKER SPACE.
- * DO NOT ALLOW LITHIUM BATTERIES TO TOUCH EACH OTHER OR CONTACT METAL.
- * DO NOT CHARGE OR RE-CHARGE LITHIUM BATTERIES.
- * DO NOT OPEN, DAMAGE, SOLDER OR INCINERATE LITHIUM BATTERIES.
- * IN CASE OF FIRE, USE ONLY LITHIUM-X FIRE EXTINGUISHERS.
(DO NOT USE WATER, CO₂, DRY CHEMICAL OR HALON)
- * FOLLOW APPROPRIATE DIGICON, FEDERAL, STATE AND LOCAL REGULATIONS FOR SHIPPING AND DISPOSING OF LITHIUM BATTERIES.

SHIPPING AND HANDLING:

Lithium batteries are packaged and shipped from the manufacturer in special plastic bulk containers with separated compartments for each battery.

As long as each battery remains in its divided compartment and not allowed to touch another battery, no danger exist. Batteries stored or shipped in bulk and/or allowed to touch can short circuit the cells causing case seal loss, leakage of toxic gases and possible explosion from high temperature.

Transportation of lithium batteries is highly regulated by the United States Government and special requirements must be followed. (see attached)

Disposal of lithium batteries must also follow certain guidelines as set forth by the manufacture and the EPA (40-49 CFR) and must be shipped with the proper Waste Product Record forms. (see attached)

No special handling equipment or PPE (personnel protection equipment) is required for lithium batteries unless the cell is damaged or exposed. (See Emergency Procedure Section)

STORAGE:

Lithium batteries should be stored in the original manufacturers shipping containers. Other containers made from plastic, wood or non metallic products are acceptable but the individual cells must not be allowed to touch and should be separated by partition built or installed within the container.

Under some conditions, batteries may also be stored individually in heavy wall plastic bags, individual boxes or in plastic tubes with sealed end caps.

Containers and individually secured lithium batteries should be stored in a cool area (elevated temperatures can result in shortened battery life) within a locker or cabinet constructed of non-metallic material with ports or vents installed for ventilation. Cabinets may be purchased or built on site. (see attached)

The battery containment locker should be located internally on an unexposed deck, free from moisture, humidity and condensation. No other items should be stored in the locker and no objects should ever be placed on top of open battery containers.

All shipping containers should have the covers in place and all open edges should be sealed with water proof tape. If batteries are to be stored for long periods of time, periodic inspections of the sealed containers should be made to detect any leakage or heat build-up.

HANDLING AND USE PRECAUTIONS:

Mechanical Containment: Encapsulation (potting) of lithium batteries will not allow cell venting at low pressure. Such enclosure can result in high pressure explosion from inadvertent charging or high temperatures environments. (ie. in excess of 100 degree C)

Charging: Lithium batteries are primary cells and are not designed to be charged or re-charged. To do so may cause the cell to leak or explode.

Other: If soldering or welding to the battery terminals is required, exercise precautions to prevent damage to the cell which may result in loss of cell capacity, loss of the battery seal, leakage and/or explosion. In no incident should any soldering or welding be done on the battery case.

Incorporate the twenty standard battery handling precautions for alkaline and lead acid batteries as set forth in the Battery Section of the IAGC Marine Safety Manual.
(see attached)

SPECIAL SAFETY PRECAUTIONS:

- Installation:**
- a. Follow the manufactures recommendations for Lithium battery loading into banks and the sealing of the tubes.
 - b. Check all seal/o-ring connections for damage or deterioration before installation. replace as required.

- c. Check all battery bank tubes for corrosion or damage before installation. Replace as required.
- d. Testing of Lithium battery banks should be done in with a 20-30 ohm watt resistor across the battery terminals.
- c. When removing the battery banks from recovered bird units, place the unit in a vertical position with the battery pack pointing down before removing. This will keep any accumulated water around the nose of the bird from running into the body and battery tube.
- d. During all handling operations, a Lith-X fire extinguisher should be available as well as a Lithium PPE Handling kit.
(See SPECIAL EQUIPMENT Section)

EMERGENCY PROCEDURES:

In most normal operations, handling and use of Lithium type batteries will pose no problem. These EMERGENCY PROCEDURES are generated to assist all personnel in understanding how to handle any situation that may occur in the event of battery damage or case failure.

Stored Battery Emergency:

In case of battery cell rupture, explosion, high heat build-up or toxic gas release, all involved personnel are to put on personal protective equipment (Lithium PPE Handling Kit) before attempting any action.

- a. Have a Lith-X fire extinguisher manned and ready.
- b. Determine problem source.
- c. Remove all damaged and affected batteries from the problem source and place each individually in a heavy wall plastic bag, plastic box or other non metallic container.

- d. Remove all other unaffected batteries from the problem source and store clear of the area.
- e. Rectify the problem source. Clean any contamination with dry wipes and re-check the storage containment area for any additional hazards that may exist.
- f. Replace all unaffected batteries in the storage area after checking each individual shipping or containment box and the condition of each battery within.
- e. Dispose of all affected batteries in accordance with all Digicon, State and Federal regulations. (see attached)

Recovery of Lost Cable/Streamer:

- a. In the event of a cable/streamer loss, accurate depth readings must be obtained to determine what depth the cable may have sunk. Lithium battery cases are designed to withstand water depths of less than 1000 feet. In water depths greater than 1000 feet, the battery cells could experience external pressures in excess of 1,800 psi causing breakage of the glass to metal seal and flooding of the cell. This can cause the battery to short internally, releasing toxic gasses and high temperatures.
- b. If the cable/streamer has not sunk or has sunk in water depths of less than 1000 feet, the cable may be recovered as normal. All birds should be inspected for case deformation and/or water contamination.

Note: Use caution during this recovery and inspection operation. Be alert for any unusual conditions such as heat build-up on the battery tube, case burn through, toxic gasses etc..

During all recovery and launch operations, have a Lith-X fire extinguisher available along with a Lithium PPE Handling kit. (See SPECIAL EQUIPMENT SECTION)

- c. If the cable/streamer has sank below 1000 feet, recovery should be delayed by at least 24 hours. This delay will allow any crushed battery cases to exhaust themselves in the water and minimize top side dangers of fire, explosion and/or the release of toxic gases.

After the initial waiting period, recovery of the cable/streamer should be conducted with EXTREME CAUTION.

Fire fighting equipment should be at the ready and lith-X fire extinguishers manned.

Lithium personnel protective equipment (PPE) should be worn by all members of the recovery team.

- d. All bird assemblies and battery housings should be disassembled on an open deck with good cross ventilation. A vise should be used to hold each housing in place as the sealing mechanism is undone. Pressure build-up in the housings are a distinct possibility, therefore extreme care must be exercised when opening each battery compartment.
- e. If fire erupts in an assembled battery housing while the bird is still attached to the cable during the recovery operation, return the cable overboard and wait until extinguished.

If the bird and/or housing has been removed from the cable section and fire erupts, extinguish the fire with Lith-X fire extinguishers or throw all components overboard until extinguished. (Recover extinguished components if possible for proper disposal)

Note: Protection of the on board cable from any possible fire hazard is priority.

- f. All recovered batteries, damaged or undamaged, should be placed in heavy wall plastic bags, plastic boxes or other non-metallic containers and stored separately for disposal. (Do not store with new or depleted cells since electrolyte may react and corrosion set up)

- g. Proper disposal procedures should be followed upon reaching port.

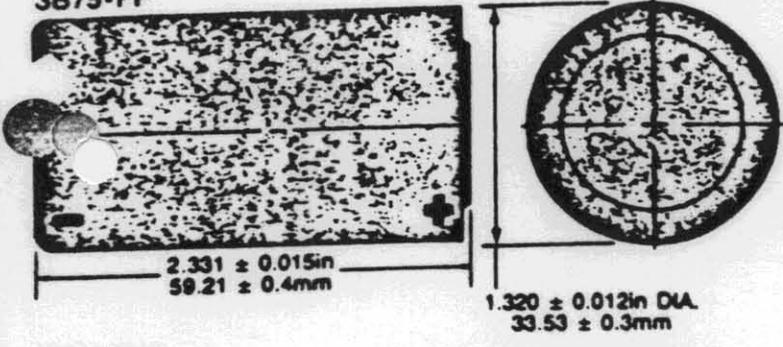
EMERGENCY EQUIPMENT

The following equipment should be provided and kept accessible during the storage, use and handling of lithium type batteries.

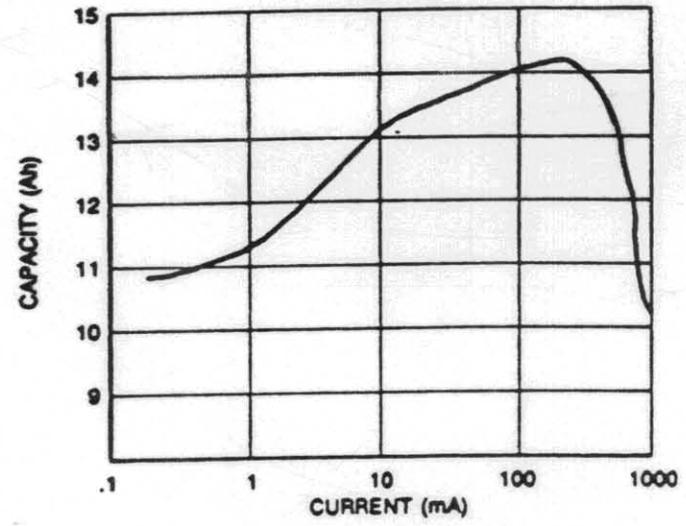
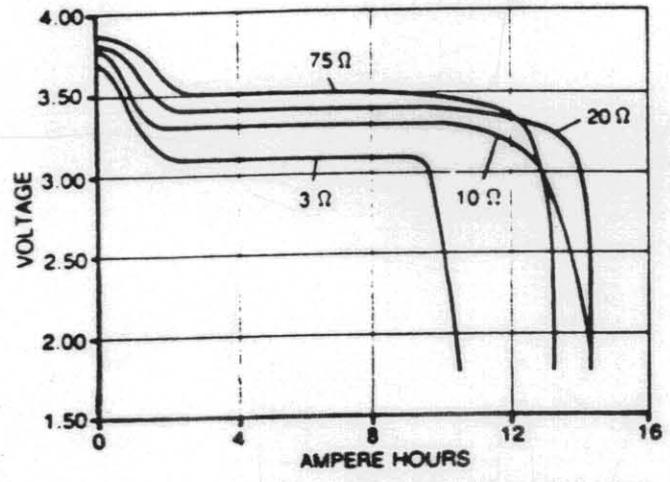
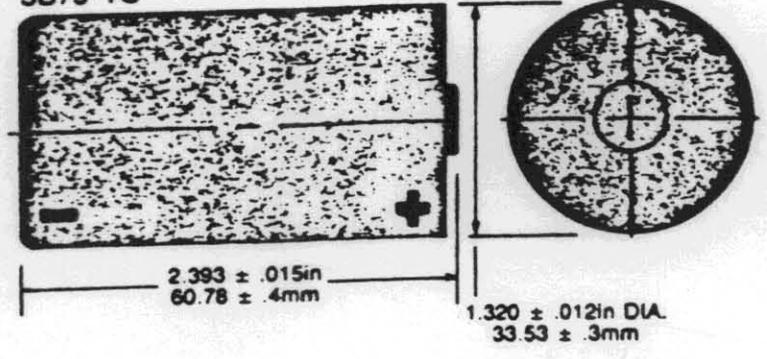
- a. Lithium-X (Lit-X) type fire extinguisher.
- b. Plastic or other non-metallic containers for individual placement of damaged cells. (Heavy wall plastic bags, plastic boxes, plastic tubes with end caps, wooden containers etc.)
- c. Large shipping containers constructed of heavy wall plastic with sealable lids for transporting and disposing of damaged batteries.
- d. Lithium PPE Handling Kit consisting of:
 - * Neoprene rubber gloves (thick wall) with wrist cuffs
 - * Face shield or goggles
 - * Mouth type respirator (SCBA gear may be required if toxic gases are excessive)
 - * Protective rubber lab apron

13. Battery cell vent plugs or caps should be tightly secured except when charging when they should be loose.
14. The ventilation tubes of battery boxes should be examined regularly to ensure that they are free from obstruction.
15. Lids of battery boxes should be fastened while open for servicing and properly secured again when the work is finished.
16. Batteries should be kept battened in position to prevent shifting in rough weather.
17. Alkaline and lead-acid batteries should be kept in separate compartments. Where both lead-acid and alkaline batteries are in use, great care should be exercised to separate the materials and tools used in servicing each type. Contamination of the electrolyte may cause deterioration of battery performance, and mixing of the two electrolytes produces a vigorous chemical reaction that could be dangerous.
18. Both acid and alkaline electrolytes are highly corrosive. Immediate remedial action should be taken to wash off any accidental splashes on the person or on equipment. Hands and clothes should always be washed as soon as the work is completed.
19. Batteries should always be transported in the upright position to avoid spillage of electrolyte. A sufficient number of men should be employed to transport the batteries since they are heavy, and painful strains or injury may result.
20. New technology in battery developments offers safer alternatives to electrolyte batteries and should be considered.

3B75-FF



3B75-TC



BCX

SERIES BCX72

3B75

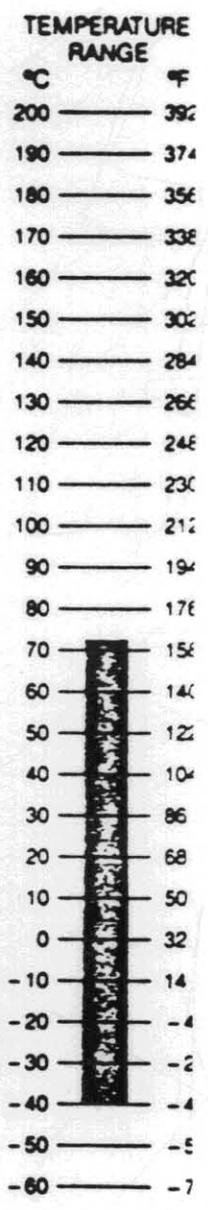
D SIZE

SPECIFICATIONS

Open Circuit Voltage (Nominal)	3.9V
At Room Temperature:	
Rated Average Load Voltage	3.4V
Rated Discharge Current	175mA
Rated Capacity	14 Ah
Maximum Continuous Discharge Current	1000mA
Operating Temperature Range (-40°C to 72°C)	
(Also available in Non-Magnetic cell configuration) P/N 3B1320	
Weight	115g
Safety Fuse	4 Amp
Energy Density	413 Wh/kg

Sample Discharge Table

Discharge Current (mA)	175	330	1000
Average Load Voltage (Volts)	3.4	3.3	3.1
Capacity (Ampere hours)	14	14	10



SAFETY AND HANDLING OF COMMERCIAL LITHIUM CELLS

Any person working directly with lithium cells must be trained in the specific precautions for safety and handling.

SCOPE

This procedure deals only with the removal of dead or partially used lithium cells or batteries from a piece of equipment. It is possible under severe abuse conditions that cells contained within a piece of equipment may be swollen or leaking. Leaking cells will contaminate sealed equipment with acid fumes.

WORK AREA

This work area should have good ventilation, preferably a mechanical exhaust hood. For safety precautions the area should have two exits; access to emergency alarm system or telephone; eye wash station and safety shower. The work surface must be non-conductive.

EQUIPMENT

Non-conductive tools

Lith-X fire extinguisher

Individual thick plastic bags with sealing mechanism

Glass jars with lids, containing calcium oride (lime) for leaking cells

PERSONAL PROTECTIVE EQUIPMENT (PPE)**1. Non-Vented Cells**

- a. Neoprene rubber gloves (thick wall) with wrist cuffs
- b. Goggles
- c. Respirator
- d. Protective rubber lab apron

2. Vented Cells in Non-Fire conditions

- a. Neoprene rubber gloves (thick wall)
- b. Goggles
- c. Respirator with acid gas vapor filter
- d. Protective rubber lab apron

PROCEDURE:

1. There should always be two (2) people present during removal of lithium cells from equipment. All unnecessary individuals should be removed from the area.
2. The work area must be free of clutter, flammable liquids and combustible materials.
3. Check the ventilation systems, exits, emergency alarm system, eye wash station, emergency shower, Lith-X fire extinguisher and materials for disposal of used cells.
4. Make sure that all PPE is in working order.
5. Employees working directly with cells and the observer must be wearing a minimum of safety glasses/goggles, gloves and a rubber lab coat. All additional PPE must be available

REMOVAL OF CELLS

1. Work in well ventilated area.
2. Equipment containing cells should be disassembled cautiously as it may contain acid gas from possible leaking cells.
3. If there is any sign of acid gas, indicated by a pungent odor or eye irritation, the unit should be placed in a ventilated hood. If a ventilated hood is unavailable, all employees in that work area should don respirator protection as outlined in PPE section.
4. Remove used cells from the housing. If cells are not leaking, they must be packaged individually in non-conductive bags for disposal.
5. If any cell are leaking they must never be handled without gloves. The leaking electrolyte is corrosive and an irritant.
6. Leaking cells should be placed in individually sealed non-conductive bags and placed in a container, preferably glass, containing lime. The lime will neutralize any escaping gasses. The material must then be packaged for proper disposal.
7. Equipment once containing leaking cells must be handled with rubber gloves until decontaminated.

FIRE CONDITIONS

1. Fire directly involving lithium cells must be fought as lithium fires.
2. Use Lith-X (graphite powder) extinguishers, specifically formulated for lithium fires.
3. Do not use carbon dioxide, dry chemical or Halon extinguishers. These extinguishers will be ineffective in a lithium fire.

HEALTH HAZARD INFORMATION FOR LEAKING CELLS

1. The electrolyte contained within the lithium cells can cause severe irritation to the respiratory tract, eyes and skin. All precautions should be taken to limit contact with any internal components of the cell.

FIRST AID

1. EYES:
Immediately flush eyes with a direct stream of water for at least fifteen (15) minutes while forcibly holding eyelids apart to ensure complete irritation of all eye and lid tissue. GET IMMEDIATE MEDICAL ATTENTION.
2. SKIN:
Flush with cool water or get under shower, remove contaminated garments. Continue to flush for at least fifteen (15) minutes. Get medical attention if needed.
3. INHALATION:
Remove to fresh air. If breathing is difficult, have trained person administer oxygen. If respiration stops, give mouth-to-mouth resuscitation. GET MEDICAL ATTENTION IMMEDIATELY.

DISPOSAL:

Environmental Protection Agency considers lithium cells and batteries hazardous waste upon disposal. Check and abide by all local, state and federal regulations regarding disposal of hazardous waste.

-Provisions for shipping "lithium batteries, solid cathode" IATA allows cells with solid cathode containing up to 3 grams of lithium to be transported on passenger aircraft. DOT allows only 1 gram of lithium for same.

Organizations shipping lithium batteries/cells should purchase and maintain updated regulation guides from these organizations for a thorough and current understanding of correct shipping methods.

CELLS/BATTERIES DEFINED

For purposes of terminology relating to the shipment of these commodities, "cell" refers to a single, self-contained power source and "battery" refers to two or more cells combined to serve as a single power source.

CHANGES TO REGULATIONS

Status Of DOT-E-7052 Exemption

This exemption which covers shipments of lithium batteries within the United States will expire September 30, 1993. Beyond this date the exemption will not exist as this regulation has been made part of title 49 thereby becoming mainstream regulation (reference Federal Register docket HM-181, published Dec. 21, 1990). Concerns who were party to DOT-E-7052 will no longer need to maintain party status, but will be in compliance through adherence to mainstream DOT and IATA regulations. This exemption may be used domestically until expiration date but it is recommended that new packaging requirements be adhered to as soon as possible (see following).

New Packaging Regulations

All international shipments of hazardous materials must comply with new packaging regulations which became effective January 1, 1991. These revised regulations are based on recommendations made by the United Nations (UN) and are enforced by the International Civil Aviation Organization (ICAO), the International Air Transport Association (IATA), the US Department of Transportation (DOT) and the International Maritime Organization's Dangerous Goods Code (IMDG).

The new regulations require "performance oriented" packaging. This means that packages must pass certain tests designed to demonstrate package integrity. Such testing is usually performed by recognized independent testing organizations authorized by domestic authority to certify packaging. Once certified, the package is assigned a UN code identifying it as such.

Please be informed that certified packaging is not currently available as "in stock" items from vendors and are not likely to be available in the near future. Reasons being:

1. The tests are somewhat specific to the product contained.
2. The certification is not just for outer packaging. Rather, an entire packaging "configuration" or combination of inner packaging, buffer materials, and outer packaging is certified.

Thus, it is not likely that this packaging will be available as an off-the-shelf item from vendors in the near future.

Emergency Response Communication

As of January 1, 1991 the US Department of Transportation requires shippers of hazardous materials, such as manufacturers and distributors, to be in compliance with the Emergency Response Communication Standard as per Title 49 Part 171 et al. This regulation, published in Federal Register Vol. 55, #246 on 12/21/90 requires the shipper of hazardous materials to use the proper shipping name, have a 24-hour emergency response information system, and provide emergency response mitigation information with each shipment. Refer to the code of Federal regulations or call Electrochem Industries for more information.

DETERMINING IF BATTERIES/CELLS ARE RESTRICTED OR NOT

Lithium batteries/cells are considered non-dangerous if they meet the following requirements:

- A) Each cell with a liquid cathode must contain 0.5 gram or less of lithium or lithium alloy, and each cell with a solid cathode must contain 1 gram or less of lithium or lithium alloy.
 B) Each battery with a solid cathode must contain an aggregate quantity of 2 grams or less of lithium or lithium alloy, and each battery with a liquid cathode must contain an aggregate quantity of 1 gram or less of lithium or lithium alloy.
 C) Each cell must be hermetically sealed.
 D) Cells must be separated to prevent short circuits.
 E) Batteries must be separated to prevent short circuits and must be packed in strong packaging except when installed in electronic devices.
 F) If a liquid cathode battery contains more than 0.5 gram of lithium or lithium alloy, or if a solid cathode battery contains more than one gram of lithium or lithium alloy, it must not contain a liquid or gas which is considered dangerous unless the liquid or gas, if free, would be completely absorbed or neutralized by other materials in the battery.

In interpreting this definition, refer to the following chart to determine parts A and B. (As of this writing Electrochem produces only one "solid cathode" cell, this being the 3B1750.) Parts B and E refer to battery packs (series and parallel arrangements containing two or more cells). Part C has been met by virtue of Electrochem product design. Parts D and E must be met by you (the secondary shipper). Part F does not apply to any products currently manufactured by Electrochem. All other cells and cell packs are restricted in some manner.

	Cell Chart
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Size	Model	Net wt. of lithium per cell in grams	Size	Model	Net wt. of Lithium per cell in grams
<u>CSC Series</u>			<u>BCX Series</u>		
AA	3B24	.7	1/2AA	3B26	.3
1/2C	3B29	1.3	AA	3B27	.5
C	3B30	2.4	PC	3B50	.4
1/2AA	3B33	.3	AA	3B64	.7
D	3B35	5.7	C	3B70	2.4
DD	3B36	11.0	D	3B75	5.7
2/5C	3B665	.9	DD	3B76	11.0
<u>QTC Series</u>			C-N	3B1600	2.4
PC	3B880	.4	D-N	32B1320	5.7
AA	3B940	.5	DD-N	3B1415	11.0
2/3AA	3B950	.4	2/3AA	3B793	.5
1/2AA (25.5MM)	3B955	.2	<u>HRT Series</u>		
1/2 AA	3B960	.2	1/2C	3B748	1.2
Memorymaxx	3PD1000	.5	.45C	3B752	1.2
Memorymaxx	3PD2000	1.0	D	3B835	5.0
<u>PWR Series</u>			<u>PMX Series</u>		
.45C	3B682	1.2	AA	3B1065	.5
1/2C	3B683	1.2	C	3B90	1.8
D	3B766	5.0	D	3B95	3.5
			DD	3B2000	8.0
			HT-C	3B1750	2.0

continues

If Electrochem cells or batteries you are shipping contain equivalent or less lithium than gram limitations outlined in parts A and B there are no other restrictions and you need not read further. These cells may be transported on passenger aircraft.

If cells you are shipping are not listed call Electrochem Industries for more information.

Cells or batteries you are shipping exceed lithium content limitations as outlined in parts A and B you will need special documentation, packaging and labeling as per the following:

PROPER SHIPPING NAMES, UN NUMBERS AND GENERAL REQUIREMENTS

There are three classifications for lithium batteries, those being:

Lithium batteries, liquid cathode - UN3090

Lithium batteries, solid cathode - UN3090

Lithium batteries contained in equipment - UN3091

(The category "Lithium batteries contained in equipment" may be used outside the U.S. only or within the U.S. with pre-approval from the Associate Administrator for Hazardous Materials Safety.

General limitations and requirements, as per DOT and IATA are as follows:

Lithium batteries, liquid cathode - UN3090

(applies to most Electrochem products)

- Cells must not contain more than 12 grams of lithium and are permissible on cargo aircraft only.
- Cells or batteries must be packed in UN packaging with not more than 500g of lithium per inner box.
- Maximum allowable gross weight per package is not to exceed 35 kg.
- They must be packed in such a manner as to prevent movement or short circuiting.
- Labels required: "Miscellaneous" and "cargo aircraft only"
- packaging required: UN approved.
- Shipper's Declaration of Dangerous Goods completed as per example (see documentation section).
- This regulation does not apply to depleted cells with open circuit voltage of less than 2 volts or 2/3 voltage of the undischarged cell.
- Markings "lithium batteries, liquid cathode - UN3090" must appear on box.

Lithium batteries, solid cathode - UN3090

(currently applies only to Electrochem's PMX-HT Series 3B1750 "C" cell)

- Cells must not contain more than 12 grams of lithium and are permissible on cargo aircraft only. IATA allows cells containing up to 3 grams of lithium to be shipped on passenger aircraft, but this pertains only to shipments moving outside U.S. boundaries.
- Cells or batteries must be packed in UN packaging with not more than 500g of lithium per packaging for cargo aircraft and 125g of lithium for passenger aircraft. - Maximum allowable gross weight per package is not to exceed 35 kg for cargo aircraft or 5 kg for passenger aircraft.
- They must be packed in such a manner as to prevent movement or short circuiting.
- Labels required: "miscellaneous" and "cargo aircraft only" ("cargo aircraft only" label used only when applicable).
- Packaging required: UN approved.
- Shipper's Declaration of Dangerous Goods completed as per example (see documentation section).
- This regulation does not apply to depleted cells with open circuit voltage of less than 2 volts or 2/3 voltage of the undischarged cell.
- Markings "lithium batteries, solid cathode - UN3090" must appear on box.
- Cells or batteries must be packed in strong inner fiberboard packaging with not more than 125g of lithium in each packaging for passenger aircraft or 500g of lithium for cargo aircraft.
- "Shipper's Declaration of Dangerous Goods" completed as per example. "X" out "Passenger Aircraft Only" or "Cargo Aircraft Only" depending on mode selected.

continues

Lithium batteries contained in equipment UN3091

Shippers inside the U.S. must have pre-approval from DOT to ship this commodity.

-The quantity of lithium metal contained in any piece of equipment must not exceed 3g per cell and 125g per battery for passenger aircraft or 12g per cell and 500g per battery for cargo aircraft.

-Not more than 5 kg of lithium batteries may be contained in any piece of equipment.

Labels required: "miscellaneous" and "cargo aircraft only" ("cargo aircraft only" label required when cells contain over 3 grams of lithium).

-Equipment containing lithium batteries must be contained in strong outer packaging which is waterproof.

-Requirements of 5.0 in the IATA book must be met.

-Requirements in IATA packaging note 903 must be met other than packaging requirements.

-Cells must not be capable of being discharged during transport to the extent that the open circuit voltage is less than the lower of 2 volts or 2/3 of the voltage of the undischarged cell.

-Markings "Lithium Batteries contained in equipment UN3091" must appear on box.

SELECTING A CARRIER

The following is a list of carriers currently used by Electrochem. This should not be considered an endorsement or all inclusive of carriers qualified to handle lithium cells.

For Domestic Air Shipments

Federal Express is recommended for domestic air shipments because they are a direct carrier, not a forwarding agent. This allows them to offer the best domestic air service available for lithium batteries, as control of goods is maintained from shipping point to destination. Federal also will provide pre-printed hazardous forms with company name and address.

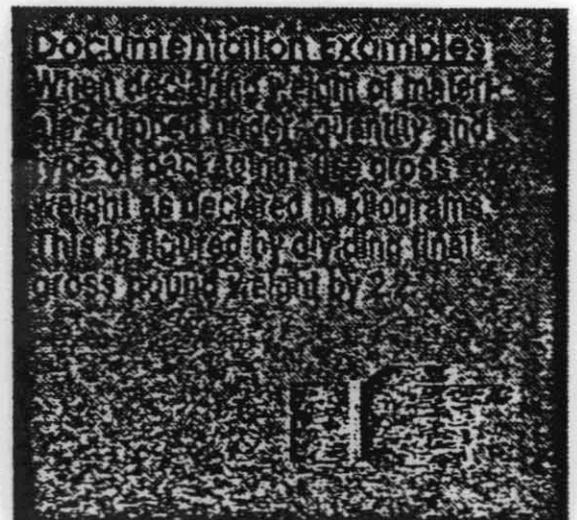
For International Air Shipments

E.I currently uses Airborne Express and Federal Express but there are several carriers or forwarders able to handle lithium batteries. The degree of success you have with a carrier will depend on liaison established with carrier staff and carrier familiarity with lithium batteries.

For Domestic Overland Shipments:**United Parcel Service**

UPS will require completion of their UPS hazardous form (available from UPS - example in documents section) and completion of UPS hazardous tag (example in labels section).

Note : UPS will not airship (UPS Blue or Red) restricted lithium batteries.



482282

U.S. AIR MAIL PERMIT NO. 10000 (Priority of mail fees applies to the addressee)

3101435831

129-00 3101435831

11/1/91

WILSON GREATBATCH LTD/ELECTROCHEM LTD. BATTERY WORLD
10000 WEHRIE DR. 20 EAST AVE.
CLARENCE NY 14031 NY 14031

NET WEIGHT: 11.10 LBS

NET QUANTITY OF DANGEROUS GOODS: 9

UN3090

1 fiberboard box
2 8.4 Kg

90311

SHIPPER'S CERTIFICATION FOR RESTRICTED INFRASTRUCTURE MODES

SHIPPER'S NAME AND ADDRESS: WILSON GREATBATCH LTD, 10000 WEHRIE DRIVE, CLARENCE, NY 14031

SHIPPER'S PHONE NUMBER: 1-800-424-9300

SHIPPER'S SIGNATURE: John Irvine/Traffic Sup. Date: 11/1/91

DECLARATION: I HEREBY DECLARE THAT THE CONTENTS OF THIS CONSIGNMENT ARE FULLY AND ACCURATELY DESCRIBED ABOVE BY PROPER SHIPPING NAME AND ARE CLASSIFIED, MARKED AND LABELED, AND ARE IN ALL RESPECTS IN PROPER CONDITION FOR TRANSPORT BY AIR ACCORDING TO THE APPLICABLE INTERNATIONAL AND NATIONAL REGULATIONS.

U.S. AIR MAIL PERMIT NO. 10000 (Priority of mail fees applies to the addressee)

3101435831

129-00 3101435831

11/1/91

WILSON GREATBATCH LTD/ELECTROCHEM LTD. BATTERY WORLD
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ups United Parcel Service

6988698

SHIPPER'S CERTIFICATION FOR HAZARDOUS MATERIALS

SHIPPER'S NAME AND ADDRESS: WILSON GREATBATCH LTD, 10000 Wehrie Drive, Clarence, N.Y. U.S.A. 14031

EMERGENCY CONTACT NUMBER: NY 1-13-517

SHIPPER'S SIGNATURE: John Irvine/Traffic Sup. Date: 11/1/91

SHIPPER'S NAME AND ADDRESS	SHIPPER'S PHONE NUMBER	SHIPPER'S SIGNATURE	DATE
WILSON GREATBATCH LTD 10000 WEHRIE DR CLARENCE NY 14031	1-800-424-9300	John Irvine/Traffic Sup.	11/1/91

DECLARATION: This is to certify that the above named materials are properly classified, described, packaged, marked and labeled, and are in proper condition for transportation, according to the applicable regulations of the Department of Transportation, and Requirements of United Parcel Service.

8172.101 Hazardous Materials Table

8172.101

(1) A/W	(2) Hazardous materials descriptions and proper shipping names	(3) Hazard class	(4A) Identification number	(4) Labeling required (if not excepted)	(5) Packaging		(6) Maximum net quantity in one package		(7) Water shipment		
					(a) Excepted	(b) Special requirements	(a) Passenger carrying aircraft or railcar	(b) Cargo only aircraft	(a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
A	Lime-nitrogen. See Calcium cyanamide, not hydrated	ORM A	NA2701	None	175 505	175 510	No limit	No limit	1.3	1.3	
	Lime, unslaked. See Calcium oxide										
	Lime, hydrated. See Calcium oxide										
	Liquid other than one listed as flammable, corrosive, poison or irritant, charged with nitrogen, carbon dioxide, or air. See Compressed gas 2.2										
	Liquefied hydrocarbon gas. See Hydrocarbon gas, liquefied	Nonflammable gas	NA1050	Nonflammable gas	175 506	175 504	500 pounds	500 pounds	1.3	1.3	
	Liquefied nonflammable gas (charged with nitrogen, carbon dioxide, or air)	Flammable gas	UN1075	Flammable gas	175 506	175 504 175 514 175 515	Forbidden	500 pounds	1.3	1	
	Liquefied petroleum gas										
	Liquid other than one listed as flammable, corrosive, poison or irritant, charged with nitrogen, carbon dioxide, or air. See Compressed gas 2.2	Flammable solid	NA2013	Flammable solid and flammable when wet	None	175 508	Forbidden	25 pounds	1.3	0	Segregation code as for flammable solid labeled Dangerous When Wet
	Lithium acrylate-ethylene diacrylate copolymer	Flammable solid	UN1410	Flammable solid and flammable when wet	None	175 508	Forbidden	25 pounds	1.3	0	Segregation code as for flammable solid labeled Dangerous When Wet
	Lithium aluminum hydride	Flammable solid	UN1411	Flammable liquid	None	175 137	Forbidden	1 quart	1	0	Segregation code as for flammable solids labeled Dangerous When Wet
	Lithium aluminum hydride, ethereal	Flammable liquid	UN1412	Flammable solid	175 143	175 140	25 pounds	100 pounds	1.3	4	Segregation code as for flammable solids labeled Dangerous When Wet
	Lithium amide, powdered	Flammable solid									
	Lithium batteries, for disposal	ORM C		None	None	175 1015	Forbidden	Forbidden			
	Lithium battery. See 175 200(7)										
	Lithium borohydride	Flammable solid	UN1413	Flammable solid and flammable when wet	None	175 508	Forbidden	25 pounds	1.3	0	Segregation code as for flammable solids labeled Dangerous When Wet
	Lithium borosulfone	Flammable solid	UN2000	Flammable solid and flammable when wet	None	175 508	Forbidden	25 pounds	1.3	0	Segregation code as for flammable solids labeled Dangerous When Wet
	Lithium hydride	Flammable solid	UN1414	Flammable solid and flammable when wet	None	175 508	Forbidden	25 pounds	1.3	0	Segregation code as for flammable solids labeled Dangerous When Wet

164

Title 49—Transportation

482583

Research and Special Programs Administration, DOT

§ 173.1025

§ 173.965 Cotton and other fibers.

Cotton and the fibers jute, hemp, flax, sisal, coir, kapok, or similar vegetable fibers, when offered for transportation by water, must be packaged in bales, securely and tightly bound with rope, wire, or other similar means.

[Amdt. 173-201, 52 FR 13043, Apr. 20, 1987]

§ 173.985 Exothermic ferrochrome, ferromanganese, and silicon-chrome.

Exothermic ferrochrome, ferromanganese, and silicon-chrome, when offered for transportation by water, must be prepared for shipment in compliance with § 173.510 and must be packaged in a steel barrel or drum, not over 750 pounds gross weight.

§ 173.995 Fish scrap and fish meal.

(a) Except as provided in paragraph (b) of this section, fish scrap and fish meal, containing at least 6 percent but not more than 12 percent water, when offered for transportation by water, must be prepared for shipment in compliance with § 173.510 and must be packaged as follows:

- (1) Burlap (jute) bag;
- (2) Multi-wall paper bag;
- (3) Polyethylene-lined burlap or paper bag;
- (4) Rail car; or
- (5) Freight container.

(b) Fish scrap and fish meal may not be offered for transportation if the temperature of the material exceeds 120° F. (49° C.)

(c) When fish scrap or fish meal is offered for transportation by vessel in bulk in freight containers the following additional requirements must be met:

(1) The fish meal must contain at least 100 PPM antioxidant (ethoxyquin) at the time of shipment.

(2) Each shipment must be accompanied by a statement in which the shipper certifies:

(i) The moisture content of the fish meal;

(ii) The concentration of antioxidant (ethoxyquin) in the material in PPM at the time of loading into the freight container;

(iii) The fat content of the fish meal;

(iv) Date and place of production of the fish meal; and

(v) The physical state of the material (ground, pelletized, or mixture).

[Amdt. 173-94, 41 FR 16089, Apr. 18, 1976, as amended by Amdt. 173-116, 43 FR 17945, Apr. 27, 1978]

§ 173.1010 Lead dross or scrap containing 3 percent or more free acid.

Lead dross or scrap containing 3 percent or more free acid, when offered for transportation by water, must be prepared for shipment in compliance with § 173.510 and must be packaged in steel barrels or drums or wooden barrels, boxes, or kegs.

(49 U.S.C. 1803, 1804, 1808, 49 CFR 1.53, App. A to Part 1)

[Amdt. 173-130, 44 FR 23228, Apr. 19, 1979]

§ 173.1015 Lithium batteries, for disposal.

(a) Lithium batteries, for disposal, comprised of one or more cells, may be offered for transportation to a permitted storage facility and disposal site by motor vehicle only, if the battery:

(1) When new, contained not more than 12 grams of lithium per cell;

(2) Is equipped with an effective means of preventing external short circuits;

(3) Is classified and offered for transportation as an ORM-C, and

(4) Is overpacked in a strong fiberboard box, or metal or fiber drum which complies with § 173.24.

(b) Paragraph (a) does not apply to lithium batteries which, when new, were excepted from regulation under § 173.206(f).

[Amdt. 173-160, 47 FR 54827, Dec. 8, 1982, 48 FR 655, Jan. 6, 1983]

§ 173.1025 Ferrous metal borings, shavings, turnings, or cuttings (excluding stainless steel).

Ferrous metal borings, shavings, turnings, or cuttings, other than stainless steel, when offered for transportation by water, must be prepared for shipment in compliance with § 173.510 and must be packaged in a metal barrel or drum.

(49 U.S.C. 1803, 1804, 1808, 49 CFR 1.53, App. A to Part 1)

[Amdt. 173-130, 44 FR 23228, Apr. 19, 1979]

**EXTINGUISHING
AGENT
DATA SHEET****NA-X.
MET-L-X.
LITH-X.**

482286

NA-X**Application**

Ansul Na-X may be used on sodium, potassium, and sodium-potassium alloy fires. It is a special low chloride content agent, developed in support of the Atomic Energy Commission Breeder Reactor program for the protection of liquid metal component test facilities. Na-X can be discharged through hand hoses and is available in 30 pound hand portable and 150 pound and 350 pound wheeled and stationary extinguishers.

Not suitable for use on magnesium fires

Description

Na-X is a low chloride (0.3% by weight) sodium carbonate based agent. It contains a polymer crusting agent and other additives to make it free-flowing and to cause heat caking or crusting.

Approvals and Listings

is listed by Underwriters Laboratories on sodium, potassium, and sodium-potassium alloy fires to 1400 °F (760 °C). The listing includes scoop application, 30 pound hand portable, 150 pound and 350 pound wheeled and stationary extinguishers.

Na-X meets the requirements of R. D. T., Standard M-17-1T.

Ordering Information

Na-X may be purchased in steel containers (50 pounds (22.7 kg) of agent, shipping weight 54 pounds (24.5 kg)) by ordering Part No. 25886.

MET-L-X**Application**

Ansul Met-L-X may be used on sodium, potassium, sodium-potassium alloy, and magnesium fires. In addition, it will control and sometimes extinguish small fires on zirconium and titanium.

Met-L-X can be discharged through hose lines and is available in hand portable, wheeled, stationary, and piped system extinguishers ranging from 30 to 2000 pounds.

Description

Met-L-X is a dry powder composed of a salt base plus a polymer for sealing, and other additives to render it free-flowing and cause heat caking, or crusting.

Approvals and Listings

Met-L-X is listed by Underwriters Laboratories for use on sodium, potassium, sodium-potassium, and magnesium alloys. The listing includes scoop application, 30 pound hand portable, 150 pound and 350 pound wheeled and stationary extinguishers.

Ordering Information

Met-L-X may be purchased in steel containers (50 pounds (22.7 kg) of agent, shipping weight 54 pounds (24.5 kg)) by ordering Part No. 9328.

LITH-X**Application**

Ansul Lith-X was developed for use on lithium fires, and will also extinguish magnesium, sodium, and potassium fires. Lith-X will contain, and in some cases completely extinguish, fires of zirconium, titanium, and sodium-potassium alloy.

Description

Lith-X is a compound of a special graphite base with additives to render it free-flowing so that it may be used in extinguishers. It does not cake or crust, but excludes air and conducts heat away from the burning mass to extinguish the fire.

Ordering Information

Lith-X may be purchased in steel containers (45 pounds (20.4 kg) of agent, shipping weight 49 pounds (24.5 kg)) by ordering Part No. 9334.

*Plastic containers may be substituted at Ansul's option.

Ansul Na-X, Lith-X and Met-L-X are registered trademarks.

EOPRENE

Neoprene-Coated Glove

482287

Chemical/Oil-Resistant Gloves



Neoprene
6780R fully coated heavyweight 12" gauntlet smooth finished

This glove is multi-dipped for superior quality, durability and protection against acids, caustics, oils, greases and solvents and has many general chemical handling and refinery applications. Heavyweight styles have a five-piece flannel liner. Industrial-weight styles have a two-piece flannel liner and a lighter coating for increased flexibility. Three styles are available with a reinforced thumb crotch for extra protection and wear. An insulated style is also available (see page 13).

Compare over our heavy unsupported nitrile style 737 or 747 (see page 22), or some other suitable unsupported chemical-resistant glove. Our longer gauntlet styles will give you the good cut and abrasion resistance as well as the initial chemical protection needed in many hazardous material clean-up applications.

Other styles include:

- 5122 fully coated industrial-weight knit wrist /smooth finished
- 6122 R fully coated industrial-weight knit wrist/ rough finished
- 6000 fully coated heavyweight knit wrist/ smooth finished
- 6782R fully coated heavyweight 10" gauntlet/ rough finished
- 6784 fully coated heavyweight 14" gauntlet/ smooth finished
- 6784R fully coated heavyweight 14" gauntlet/ rough finished
- 6785 fully coated industrial-weight 12" gauntlet/ smooth finished
- 6797 fully coated heavyweight elbow-length gauntlet/ smooth finished
- 6797R fully coated heavyweight elbow-length gauntlet/ rough finished



Neoprene
6780R fully coated heavyweight 12" gauntlet rough finished

- 9910R ... fully coated heavyweight 10" gauntlet/reinforced thumb crotch/rough finished
- 9912R .. fully coated heavyweight 12" gauntlet/reinforced thumb crotch/rough finished
- 9914 fully coated heavyweight 14" gauntlet/reinforced thumb crotch/smooth finished
- 9914R .. fully coated heavyweight 14" gauntlet/reinforced thumb crotch/rough finished

Sanitized®

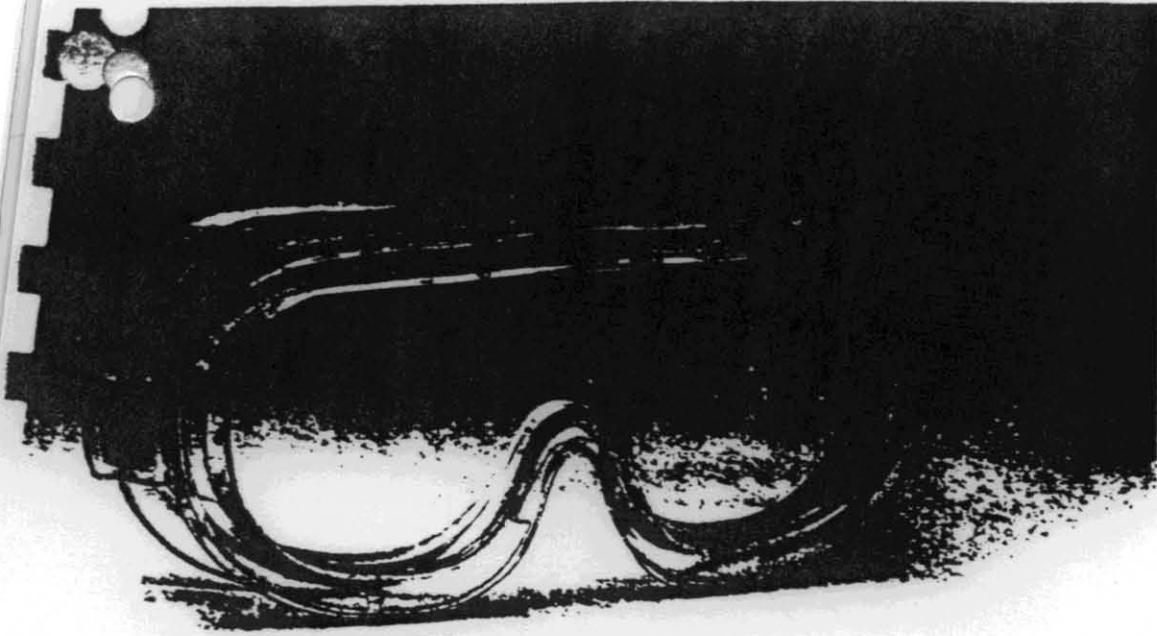


Defensive Guard™
6780-20 12" neoprene gauntlet with a sewn 20" nitrile-impregnated shoulder-length sleeve

This rugged glove is suitable for many pelletblasting and sandblasting applications. It's recyclable, and its five-piece flannel liner helps keep you cool and comfortable. A rough-finished style (6780R-20) is also available.

Sanitized®

482288



75
Hard
cover goggle

is the only goggle on the market that offers two chemical drainage systems that protect against seepage. Its indirect venting provides maximum ventilation while protecting against chemical splash, flying particles and dust.

- soft, extra-wide frame fits snugly and comfortably around the face
- wide, neoprene strap holds goggles securely in place while the frontal attachment eliminates pressure points
- fits easily over prescription glasses



9305 cover goggles are also available in green bodies. Both models are available with indirect or closed venting. Meets ANSI Z87.1-1979 Standards.



Also available with a hood providing increased splash protection.

The Pro-Tech 1490 half-mask respirator is molded of a non-allergenic PVC compound. This soft, pliable material has been approved by the U.S. Food and Drug Administration for use in garments worn by newborn babies. Upon contact with the skin, it actually softens and assumes the contours of the wearer's face. Moreover, it relaxes providing a good comfortable fit for hours.

Three sizes are available, each molded with Pro-Tech's deep chin cup and wide face-sealing flange. They're lightweight and designed with the cartridges and filters positioned carefully for good balance and minimum impairment of vision. The medium size will fit the vast majority of your workforce. Small or large sizes will properly protect the rest of the workers. Protection factors will well exceed industry standards. However, facial hair will prevent a tight seal and employees with beards should not be assigned tasks requiring any air-purifying respirators.

Laboratory tests demonstrate that Pro-Tech respirators offer an excellent combination of low breathing resistance and long service life compared to nine commonly used brands.

The 1490 series features a choice of headbands. The anchors on the braided elastic headband are molded directly onto the mask so they won't be lost during routine cleaning. A semi-rigid, plastic cradle head harness provides added comfort and a more secure, slip-free fit.

Replacement Parts and Accessories

Description	Part No.
Filter Retainer	B205
Suspension Assy. (Straight)	B325
Suspension Assy. (Cradle)	B324
Exhale Valve Seat	B213
Exhale Valve Cover	B210
Exhale Flap	B215
Inhale Flap	B216
PVC Facepiece (Small)	B150
PVC Facepiece (Medium)	B250
PVC Facepiece (Large)	B350
Respirator Storage Bag	ARS-10

Model 1490 Ordering Information

Type	To Protect Against	Respirator Catalog No.	Filter and/or Cartridge	Approval No.
A	Dusts & Mists	1490-F100	F100	TC-21C-154
B	Organic Vapor	1490-G100	G100	TC-23C-107
BA	Organic Vapor, Dusts, Mists	1490-G100-F100	G100 & F100	TC-23C-276
BN	Organic Vapor, Dusts, Mists, Fume, Radon Daughters	1490-G100-F100	G100 & F100	TC-23C-275
C	Acid Gas & Organic Vapor	1490-G104	G104	TC-23C-163
CB	Acid Gas, Organic Vapor, Dusts, Mists	1490-G104-F100	G104 & F100	TC-23C-163
	Ammonia & Methyl Amine	1490-G106	G106	TC-23C-279
	Ammonia, Methyl Amine, Dusts, Mists	1490-G106-F100	G106 & F100	TC-23C-280
E	Paint Spray & Organic Vapor	1490-G100-F102	G100 & F102	TC-23C-124
B	Pesticides, Organic Vapor, Paint Spray, Dusts, Mists	1490-G100-F104	G100 & F104	TC-23C-202
H	Metal Fume (Welding), Dusts, Mists	1490-F100	F100	TC-21C-196
	Radionuclides, Highly Toxic Dusts, Mists & Fume, Including Asbestos	1490-G100	G100	TC-21C-231
	Acid Gas, Organic Vapor, Radionuclides, Highly Toxic Dusts, Mists & Fume	1490-G104-G200	G104-G200	TC-23C-421
K	Acid Gas and Formaldehyde	1490-G102	G102	TC-23C-359
	Organic Vapor, Radionuclides, Highly Toxic Dusts, Mists & Fume	1490-G100-G200	G100-G200	TC-23C-450
	Acid Gas, Radionuclides, Highly Toxic Dusts, Mists & Fume	1490-G102-G200	G102-G200	TC-23C-450
	Ammonia, Methyl Amine, Radionuclides, Highly Toxic Dusts, Mists & Fume	1490-G106-G200	G106-G200	TC-23C-457

Use suffix S or L to indicate facepiece size.

Example: To purchase a small dust respirator, order 1490S-F100

1. Warning - Be sure the atmosphere contains adequate oxygen (19.5%) and contains no substance immediately dangerous to life or health, such as carbon monoxide.
2. Warning - Make certain your contaminant does not appear on the "Do Not Use" chart at the top of pages 8-9.
3. Determine the respirator needed by consulting the chart on pages 8-9.
4. Carefully note the information on the TLV/TWA of the contaminant present in your workplace. The appropriate 1490 respirator is recommended whenever the actual contaminant concentration is below 10 times the TLV/TWA.

Utility Information

and filter combination for your application. Use the Pro-Tech Selection Guide to make your choice. Usage limitations are stated on the approval label.

482290

Type	To Protect Against	PVC Half-Mask *	Silicone Half-Mask	Full Face	Replacement Cartridge & Filter
B	Dusts, all types	1482-F100 TC-21C-154	1585-F100 TC-21C-154	1694-F100 TC-21C-344	F100
	Organic vapor, solvents, hydrocarbons	1482-G100 TC-23C-107	1585-G100 TC-23C-107	1694-G100 TC-23C-661	G100
BA	Organic vapor, dust, mist	1482-G100/F100 TC-23C-276	1585-G100/F100 TC-23C-276	1694-G100/F100 TC-23C-662	G100/F100
BH	Organic vapor, dust, mist, fume, radon daughters	1482-G100/F108 TC-23C-275	1585-G100/F108 TC-23C-275	1694-G100/F108 TC-23C-663	G100/F108
C	Acid gas and organic vapor	1482-G104 TC-23C-163	1585-G104 TC-23C-163	1694-G104 TC-23C-664	G104
CA	Acid gas and organic vapor, dust and mist	1482-G104/F100 TC-23C-163	1585-G104/F100 TC-23C-163	1694-G104/F100 TC-23C-665	G104/F100
D	Ammonia and methyl amine	1482-G106 TC-23C-279	1585-G106 TC-23C-279	1694-G106 TC-23C-666	G106
DA	Ammonia and methyl amine, dust and mist	1482-G106/F100 TC-23C-280	1585-G106/F100 TC-23C-280	1694-G106/F100 TC-23C-667	G106/F100
E	Paint spray and organic vapor	1482-G100/F102 TC-23C-124	1585-G100/F102 TC-23C-124	1694-G100/F102 TC-23C-668	G100/F102
G	Pesticides, organic vapor, dust and mist	1482-G100/F104 TC-23C-202	1585-G100/F104 TC-23C-202	1694-G100/F104 TC-23C-669	G100/F104
H	Metal fume (welding), dust and mist, radon daughters	1482-F108 TC-21C-196	1585-F108 TC-21C-196	1694-F108 TC-21C-345	F108
	Radionuclides, highly toxic dust, mists & fume including asbestos	1482-G108 TC-21C-231	1585-G108 TC-21C-231	1694-G108 TC-21C-346	G108
	Acid gas and organic vapor, radionuclides, highly toxic dusts, mists & fume	1482-G104/G208 TC-23C-421	1585-G104/G208 TC-23C-421	1694-G104/G208 TC-23C-670	G104/G208
K	Acid gases *	1482-G102 TC-23C-359	1585-G102 TC-23C-359	1694-G102 TC-23C-671	G102
L	Organic vapor, radionuclides, highly toxic dusts, mists & fumes	1482-G100/G208 TC-23C-458	1585-G100/G208 TC-23C-458	1694-G100/G208 TC-23C-672	G100/G208
M	Acid gas and radionuclides, highly toxic dusts, mists & fume	1482-G102/G208 TC-23C-459	1585-G102/G208 TC-23C-459	1694-G102/G208 TC-23C-673	G102/G208
N	Ammonia & methyl amine, radionuclides, highly toxic dusts, mists & fume	1482-G106/G208 TC-23C-457	1585-G106/G208 TC-23C-457	1694-G106/G208 TC-23C-674	G106/G208

Replacement Parts

Model 1482 & 1585

DESCRIPTION	PART NO.
Filter Retainer	B205
Straight Headband Set	B214
Cradle Headband Set	B314
Exhale Valve Seat	B213
Exhale Valve Cover	B210
Exhale Flap	B215
Inhale Flap	B216
PVC Facepiece Assem. (Small)	B122
PVC Facepiece Assem. (Medium)	B222
PVC Facepiece Assem. (Large)	B322
Silicone Facepiece Assem. (Small)	B142
Silicone Facepiece Assem. (Medium)	B242
Silicone Facepiece Assem. (Large)	B342

Model 1694

DESCRIPTION	PART NO.
Facepiece Assembly	B501
Filter Retainers	B205
Inhale Valve Flap (Nose Cup)	B215
Inhale Valve Flap (Receptacle)	B216
Exhale Valve Flap	B215
Exhale Valve Cover	B210
Headband Harness	B514
Headband Harness, Heavy Duty Neoprene	B515
Spectacle Mount	S276
Lens Protector (pack of 25)	M25

Neoprene Aprons

CPP's Neoprene Aprons are economy priced and made to last. They are available in three weights: medium, heavy and extra heavy, in yellow and black. The construction is identical to the hycar apron illustrated at left; the only difference being the material itself. Our Neoprene Aprons have four metal grommets, reinforced bib and all edges are turned and hemmed. They are all 35 inches wide and are available in lengths of 45 and 48 inches. Specify length and weight desired (see price list).

Neoprene Sleeves

These sleeves are made with medium weight, 14 ounce Neoprene for comfort and protection. They are available in yellow only and are 18 inches in length. CPP offers Neoprene Sleeves in three different styles: cuffs at both ends as illustrated (YNS-18C-2), cuff at wrist with elastic at top (YNS-18C), and elastic at both ends (YNS-18E). Specify style desired.

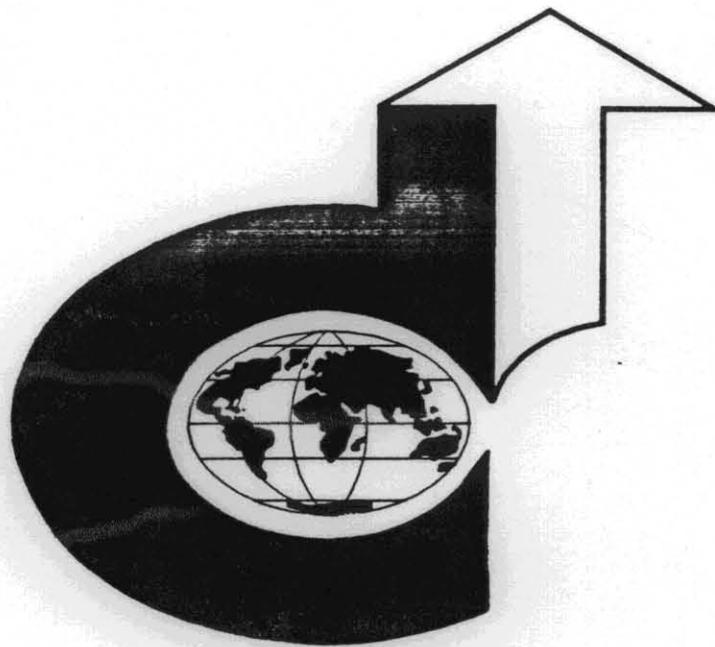
Hycar Aprons

These are the perfect aprons to use when in contact with animal fats and greases under cold conditions. They are available in three weights: medium, heavy and extra heavy. Four colors are offered: black, white, yellow and maroon. CPP's Hycar Aprons are constructed with four metal grommets, reinforced bib and all edges are turned and hemmed. Available in lengths of 45 and 48 inches, both 35 inches wide. Also available in a 36 inch length that is 24 inches wide (BH-36, black). Specify length, weight and color desired.

Sleeve
YNS-18C-2

Apron BH-45

DIGICON CRISIS MANAGEMENT PLAN



WORLDWIDE OPERATIONS

CRISIS MANAGEMENT PLAN

Table of Contents

- **Purpose Statement**
- **Initial Disaster Response Guidelines**
- **Crisis Management Teams**
- **Crisis Management by Function**
- **Classifying the Crisis for Proper Response**
- **Response Plans for Specific Disasters**
- **Notification Tree**

PURPOSE STATEMENT

482294

This crisis management plan (the "Plan") has been developed to enable Digicon (the "Company") to establish and maintain the capability to quickly and effectively respond to all aspects of any serious incident involving any Company employee, contractor, subcontractor, client, or other person on Company owned or operated facilities, or involving the production, distribution, or use of Digicon's products or services.

The Plan has been distributed to all Digicon personnel who act in a supervisory position. These personnel will, at least annually, review the Plan with all employees under their supervision and will post a copy in each facility under their control. In addition, a copy of the Plan is to be provided to each client and subcontractor of the Company at the beginning of any contract for seismic data acquisition or other field activity.

INITIAL DISASTER RESPONSE GUIDELINES

482295

Our First Priorities are to People:

1. Directly affected employees, contractors, subcontractors, clients, or other persons on site and their families
2. Neighbors to site
3. Other Company employees and client and subcontractor employees
4. Broader community

Initial Phase (during the first two hours):

- **Get relevant information on what happened.** The most senior management representative at the scene should gather the facts of the incident, if there were injuries/fatalities, and who was present at the site.
- **Use the notification tree.** (See last page of the Plan.)
- **Deploy the crisis management officer to the scene.** The most senior management representative is responsible for crisis response activity until the CMO arrives. Upon arrival, the CMO will assume full responsibility as outlined in Section 2, Crisis Management Teams.
- **Coordinate all efforts and take direction from any emergency personnel** (police, fire, government officials) already on site.
- **Organize, prioritize and determine responsibility for specific tasks** on-site and in Houston. Get needed employees enroute as soon as possible.
- **Take care of traumatized employees who were on the scene.**
- **Find out who is in which hospital and treatment/care needed.** (Are there specialists, doctors, or extraordinary needs, transportation, etc. required?) This information should be maintained at the site and be available to HR and management. Make sure victims are identified and no names are released to external parties before notification of next of kin.
- **Determine if drug test(s) are necessary** in light of the incident, per Company policy.

Second Phase (2 to 24 Hours After):

482296

- Establish communication channels with affected personnel's family and identify contact for requests/needs.
- Reevaluate the need for other resources and/or personnel on-site. Outside contacts may include foreign embassies, funeral homes, SOS evacuation personnel, insurance agents, etc.
- Ensure that before management talks to media, all emergency contacts of affected personnel have been notified. Do not release names of affected people until their families have been notified.
- Assist with family accommodations - travel to hospitals, motel arrangements, meals, cash/expense needs.
- Make arrangements for housing, food, and other requirements on-site for those who need to stay.
- Set up accommodations/lodging near site for arriving Company personnel.
- The insurance department should prepare details of benefit/medical coverage (if appropriate). Check beneficiary designations and be sensitive about confirming and communicating with beneficiaries.
- Coordinate with line management to determine which operations employees are needed on-site, and what they should be doing.
- Operations recovery should begin as soon as possible in order to restore normalcy.

Third Phase (24 to 96 Hours After):

- If there has been a death, find out what the funeral arrangements are and communicate these. It is not the Company's intent to be involved in actual funeral arrangements as this is to be the family's decision.
- Contact the payroll department to obtain funding for ATO, vacation, and other immediately available benefits.
- Coordinate with Human Resources to keep the rest of the Company informed.
- Make visits to hospitals - select people who have good relationships.
- Collect/secure affected individual's personal effects (need witness) on-site. Itemize all belongings and keep a copy of the list. As appropriate, turn personal effects over to family.
- Document crisis events as completely as possible. Documentation should be ongoing until a final resolution report is made.

Fourth Phase (4 to 7 Days and Thereafter as Needed):

482297

- Assess what's being done and what additional action is required. Follow-up on items previously identified.
- Initiate face-to-face meetings with employees who have questions/concerns.
- Coordinate with insurance again to ensure smooth payment of employee benefits and Company claims.
- Follow-up and participate in already-mentioned activities. Communicate with key contacts. Hold periodic meetings with employees at site and communicate within the Company.

Final Phase (Within 30 Days):

- Complete documentation/reports as necessary. A final report is to be prepared by the CMO and must be in written form, addressed to the Chairman and the President of the Company. Be prepared to review this report personally with senior management.
- Assist the Crisis Management Team in reviewing the Plan and suggest modifications.

1. Crisis Management Officer (CMO)

482298

A Crisis Management Officer from each Company location is responsible for establishing and maintaining operating group crisis management capabilities, and acting as the interface with the corporate crisis management functions. Under the direction of the CMO, each group will maintain procedures and systems for notifying the CMO of any serious or potentially serious incident. The CMO will assess the incident and activate the group crisis management and/or corporate crisis plans as appropriate.

Crisis Management Officers (CMO)
(Effective 7-1-93)

Location	CMO	Work	Home	Mobile/Beeper
Houston - Kirby	Carlos Sepeda	(713) 630-3016	(713) 491-9134	M: (713) 826-4472 B: (713) 765-2469
Houston - Sowden	Stuart Oshinsky	(713) 939-1400	(713) 265-1080	M: (713) 819-7458 B: (713) 765-2453
Jackson	Jock Allen	(601) 939-5142	(601) 825-4435	
Oklahoma City	Bill Patterson	(405) 942-8887	(405) 359-9308	M: (405) 642-5301
Brisbane	Peter Spooner	61 7 852 2791 61 7 252 5212	61 7 376 8759	M: 61 18 150 537
Perth	Dave Pratt	61 9 322 1944	61 9 368 2546	M: 61 18 905 737
Bogota	John Donaldson	57 1 256 8667 57 1 256 1819	57 1 616 0468	
Grinstead	Bob Marsh	0342 328-1111	0342 216482	M: 0831 342452
Jakarta	Winston Ong	6221-5200362	6221-321307 Sat. & Sun. 65 457 1185	
Kuala Lumpur	K. T. Tong	60 3 793 0373	60 3 733 9235 60 3 735 2035	
Singapore	Michael Chu	65 359 3213 65 258 1221 ext. 210	65 733 1924	
Land Crews *	James Eckert	(601) 939-5142	(601) 673-9001	M: (601) 331-0743 M: (713) 899-1853
Vessels *	Jim Thompson	(713) 630-4088	(713) 789-8266	M: (713) 865-4167
Assen	Doug Penrose	31 5920 62221	31 50 124831	
Bangkok	Vinay Vaidye	662 249 0483	662 391 8808	B: 662 152 21 33 88

* Each land crew and vessel will have two CMO's - one permanent and one rotating. The permanent CMO is shown in the table. The rotating CMO is to be the crew/vessel party manager. An updated listing of the rotating CMO will be distributed monthly.

The Plan places primary responsibility for crisis management at the local operating level. Even in the event of a crisis requiring the attention of the Corporate and/or Executive Crisis Team, the local group will remain fully involved, although elements of crisis management may shift. The Group Crisis Management Organization will be responsible for ensuring that strong communication links exist between the site and corporate headquarters during a crisis. When this cannot be quickly accomplished, perhaps because of site personnel's involvement in emergency response efforts, it will be the group's responsibility to assign either group or corporate managers to fill the void.

Membership is determined by each group/location but should include, at a minimum, the following personnel:

Crisis Management Officer

Operations/Manufacturing Representative

*Safety and Environmental Representative

*Insurance Representative

*Human Resources Representative

* If any member is not immediately available, members should be drawn from corporate resources.

Corporate Crisis Team

A Corporate Crisis Team consisting of key functional managers will be available around-the-clock to supplement the group's crisis activities. Its role will be to supplement the group's crisis management activities, and to execute corporate crisis functions, including broad-based communication activities with various internal and external corporate audiences.

Functional Area	Individual as of 7/93	Office	Home	Mobile
Corporate Safety & Env.	Mike Arnold	(713) 630-4054	(713) 358-3448	(713) 854-5127
		Beeper: 1-800-999-6710 Satellite Code: 999-0492		
Human Resources	Lisa Seeker	(713)630-4277	(713)550-5159	(713)819-7402
Insurance	John Conerly	(713)630-4290	(713)353-2360	(713)819-7404
Operations	Kevin Callaghan	(713)630-4224	(713)558-6644	(713)819-7405

4. Executive Crisis Team

482300

Composed of senior executives, the Executive Crisis Team will guide the policy and strategy specific to the crisis, for execution by the Group Crisis Management Organization. The ECT must be called immediately in the event of:

1. The death of or life threatening injury to any individual, or less severe injuries to several individuals in any single incident
2. Any vessel sinking, vessel fire, or collision
3. Any hostage or kidnapping
4. Potential for or actual media attention
5. Any other incident deemed critical by the Corporate Crisis Team

Executive Crisis Team
(Effective 7-1-93)

		Office/Home/Mobile
CEO/Chairman	E. R. Prince	713-630-4400/713-465-7956/713-824-2167
COO/President	L. E. Lenig	713-630-4300/713-973-2594/713-824-8059
CFO/Finance	A. C. Pogach	713-630-4280/713-461-8496/713-819-7403
Exec. V.P./W.W. Operations	S. J. Ludlow	713-630-4050/713-835-0073/713-253-8467

CRISIS MANAGEMENT BY FUNCTION

482301

A crisis will place considerable demands on the emergency response teams and other operations in the divisions or groups. It will also require the timely and prepared response of many corporate functions, as identified below.

Corporate Functions

Prime Responsibilities

Safety

- . Protect human health and the environment
- . Secure as quickly as possible operations and equipment to assure health and safety of anyone associated with the incident
- . Assess extent of harm to persons, providing support (including medical and toxicity information) to medical care providers
- . Evaluate industrial hygiene, environmental contamination and decontamination issues
- . Ensure that all appropriate safety regulatory agencies have been notified
- . Coordinate compliance with all regulatory agencies with jurisdiction, including the Company's response to investigations, enforcement actions, or citations
- . Provide direct liaison with state and local officials, identifying concerns and responding to information requirements
- . Meet government requirements; anticipate and mitigate risks and liabilities
- . Assess liability and advise post-accident investigation team

Human Resources

- . Support management, employees and family members
- . Assist management with communications
- . Advise personnel on legal obligations, extent of regulatory or law enforcement authority, etc.
- . Provide timely, accurate and complete information to general employee population
- . Coordinate response to civil and criminal investigations, litigation, etc.

- . Develop, coordinate and provide for the implementation of event specific strategy
- . Identify needs of impacted community members/clients
- . Keep clients, community leaders and community at-large informed
- . Provide telecommunications and audio/visual support and equipment for crisis management activities at site and corporate headquarters
- . Deliver timely and accurate information to media
- . Coordinate media relations with other crisis communication activities

Operations Staff

- . Maintain transportation, administrative, and general support for all crisis management activities

Insurance

- . Preserve the company's right to insurance coverage by meeting policy requirements
- . Provide timely and appropriate insurance coverage to claimants

Investor Relations

- . Provide proactive communication to investment community

CLASSIFYING THE CRISIS FOR PROPER RESPONSE

482303

The following classification system is intended to provide the Crisis Management Team with a guide to activating the corporate crisis organization.

Facility Event

Incident occurs within Company or customers' facility with little or no external involvement or interest.

- Handled by facility (and/or group) according to their emergency response and crisis management procedures
- Notification within 24 hours to corporate functions as determined by group management

Local Event

Incident involves elements of the community and a visible response by local emergency response officials. The resulting news media and community interest is at the local level.

- Handled by facility (and/or group) according to their emergency response and crisis management procedures
- Immediate notification to corporate functions

Regional Event

Substantial external emergency response is involved. Community and news media interest goes beyond local level to state/regional level.

- Crisis Management Officer assembles Group Crisis Management Organization to manage crisis
- Managers from Corporate Crisis Team join the Group Crisis Management Organization

Any incident with the potential for national or international media attention.

- Crisis Management Officer assembles Group Crisis Management Organization and Corporate Crisis Team
- Group Crisis Management Organization continues to manage all activities
- Corporate Crisis Team supplements group's activities and executes corporate crisis management responsibilities
- The Group Crisis Management Organization and Corporate Crisis Team notify and involve the Executive Crisis Team

RESPONSE PLANS FOR SPECIFIC DISASTERS

482305

The section on "Initial Disaster Response Guidelines" gives general instructions on responding to any crisis.

Use the following response plans for instructions specific to these crises:

- Damage/Loss of Assets
- Death of Individual
- Environmental Damage
- Illness/Injury to Individual
- Kidnapping/Hostage/Terrorist Acts
- Natural Disaster Response
- Political Instability/Civil Disorder/International Conflicts
- Seizure of Equipment

MAJOR DAMAGE/LOSS OF COMPANY ASSETS

482306

Once major damage to Company assets has occurred, the paramount task is to reduce or eliminate any further damage to the assets.

1. Secure the asset.
2. Take necessary action to reduce further loss.
3. Notify the Corporate Crisis Team immediately. Give the following information:
 - . Date of occurrence
 - . Description of the asset
 - . Cause of damage
 - . Location of occurrence
 - . Asset's present location
 - . Local contact person and phone number
 - . Witnesses' names and addresses
 - . Estimate of damage
 - . List of any third parties and addresses involved.
4. Until an insurance appointed adjuster or surveyor arrives, maintain the asset integrity for their appraisal and evaluation.
5. Document cost to replace or repair the asset.

DEATH OF OR LIFE THREATENING INJURY TO AN INDIVIDUAL; INJURY TO SEVERAL INDIVIDUALS IN A SINGLE INCIDENT

482307

Death

1. Verify details of death and obtain positive identification of fatality through witnesses, Company personnel, hospital/coroner personnel, etc.
2. Use notification tree for contacts and report immediately. Notify Executive Crisis Team.
3. Coordinate the notification of next of kin. (Notify in person if at all possible.)
4. One individual will be designated by the Corporate Crisis Team to coordinate (if necessary) the repatriation of mortal remains. That individual will work with "International SOS Assistance" services, local management and corporate personnel to handle all Company details as sensitively and quickly as possible.
5. Collect/secure the individual's personal effects with a witness present if possible. Itemize and keep a copy of the list.
6. Find out what funeral arrangements have been made by the family and communicate to appropriate locations.
7. Make sure the appropriate Human Resources, insurance, and payroll departments have been notified.
8. Transfer the individual's personal effects to their family members.

Threatening Injury, or Injuries to Several Individuals in a Single Incident

1. Verify details of injury(s).
2. Use notification tree for contacts and report immediately. Notify Executive Crisis Team.
3. The CMO and/or most senior management representative at the scene should determine if circumstances best warrant use of "International SOS Assistance" or immediate action of Company personnel to obtain necessary medical attention. **See section on Serious Illness/Injury for further instructions.**
4. Collect/secure the individual's personal effects with a witness present if possible. Itemize and keep a copy of the list.
5. Coordinate the notification of affected personnel's family.
6. Make sure the appropriate Human Resources and insurance departments have been notified.
7. Communicate regularly to the Executive Crisis Team the status and any change in condition of affected personnel.
8. Transfer the individual's personal effects to their family members.

ENVIRONMENTAL DAMAGE

482308

If any suspected environmental damage has occurred at a Digicon job site or location, call Houston Safety Department hours a day to report the incident whether or not the Company is at fault. Examples include but are not limited oil spills, fuel leaks, explosions, fires, loss of explosives, etc.

The Safety Department will advise you on what immediate action to take depending on the nature and severity of the incident. Use the notification tree and immediately inform the appropriate personnel about the incident, the severity, and the initial instructions received from the Safety Department.

Due to intricate governmental regulations and client requirements, Safety personnel will direct the Company's response from initial notification to final recovery phase.

SERIOUS ILLNESS/INJURY

482309

Emergency medical or legal assistance services are available for all employees traveling on assignment worldwide through "International SOS Assistance", 24 hours a day, 365 days of the year. Services range from telephone advice and referrals to full-scale international medical evacuations. SOS operates via a network of multi-lingual medical care and aeromedical specialists at SOS Control Centers around the world. A member can call any Control Center at any time of day to access the following services:

Medical Assistance

- Pre-Trip Medical Referral Information
- 24 Hour Worldwide Medical Information and Assistance
- Emergency Medication
- Hospital Deposit Guarantee
- Medical Monitoring
- Dispatch of a Doctor or Specialist
- Emergency Evacuation
- Medically Supervised Repatriation
- Repatriation of Mortal Remains

Personal Assistance

- Embassy & Consular Information
- Lost Document Assistance
- Emergency Message Transmission
- Emergency Personal Cash
- Legal Access
- Translations & Interpreters
- Claims Assistance

Travel Assistance

- Emergency Family Travel Arrangements
- Transportation to Join Disabled Member
- Return of Minor Children
- Return of Vehicle
- Return of Traveling Companion
- Transportation for Replacement Employee
- Return of Member to Original Work Site

1. When normal emergency medical care is unavailable due to local conditions or extraordinary circumstances, contact the CMO immediately. Jointly decide if circumstances best warrant use of "SOS" or immediate action of Digicon personnel. If "SOS" is needed, contact the closest control center for specific instructions.

SOS Worldwide Control Centers (24 Hour Emergency Numbers)

Philadelphia, PA, USA
Call Collect:
1 (215) 245-4707
Within U.S.A. Call:
1 (800) 523-6586
1 (215) 244-9617
ex. 271349 ISOS UR
from Mexico: 95-800-010-6254

Beijing, China
86 (1) 500 3388 ext. 438
Fax: 86 (1) 500 3419
Attn: Suite 438
Telex: 210 327 bjkl

Brisbane, Australia
61 (7) 371 32 55
Fax: 61 (7) 371 47 32
Telex: 140330-aa-med

Buenos Aires, Argentina
54 (1) 325-4771
Fax: 54 (1) 394-4358
Telex: 28181 LENRO AR

Cairo, Egypt*
20 (2) 71 7480
Fax: 20 (2) 360 41 27
Telex: 22707 SOSCA UN
*Monitored Sun-Thur 9:00-4:00

Geneva, Switzerland
Call Collect: 41 (22) 347 61 61
Fax: 41 (22) 346 29 32
Telex: 427172 SOSSA

Heidelberg, Germany
49 (62) 212-8686
Fax: 49 (62) 212-0376

Hong Kong
(852) 5450-868
Fax: (852) 5598492*
Telex: 68948 SOS HKHX*
*Fax & Telex monitored
Mon - Fri during
business hours

Istanbul, Turkey
90 (1) 130-9638
Fax: 90 (1) 147-9709*
*Fax monitored
Mon-Fri during
business hours

Jakarta, Indonesia
62-21-520-2556
Fax: 62-21-520-0387

Johannesburg, South Africa
27 (11) 403 4490
Fax: 27 (11) 339-6897
Telex: 421 883 SA

London, England
44 (81) 876-2929
Fax: 44 (81) 392-1641*
Telex: 941331 SOSWHQG*
*Fax & Telex monitored
Mon-Fri during
business hours

Madrid, Spain
34 (1) 359 9575
Within Spain: 91 359 9575
Fax: 34 (1) 345 1908
Telex: 44192 SOSME

Singapore
(65) 226-3936
Fax: (65) 226-3937
Telex: RS 24422 SOSAFE

2. Collect the individual's personal effects with a witness present if possible. Either forward them with the individual to the treatment site, or secure and wait for further instructions on disposition.

3. Notify individual's family.

4. Notify the appropriate Human Resources and insurance departments. If "SOS" services were used, notify the Corporate Safety Department.

5. Determine if further crisis response notification is needed.

Monitor the individual's status and notify the Executive Crisis Team if the situation becomes life-threatening.

KIDNAPPING/HOSTAGE/TERRORIST ACTS

482310

The first hours following a kidnapping are critical to its successful resolution. In the event of a kidnapping, hostage or terrorist incident, the following procedures must be carried out immediately.

I. Communication

Inform one of the members of the Executive Crisis Team by the fastest, most secure means possible, giving the details below:

- i. Casualties, if any
- ii. Identity of victim(s)
- iii. Date and time of kidnap
- iv. Location and method of kidnap
- v. Kidnapper's demand, if any
- vi. Method used by kidnappers to transmit their demands
- vii. Name of recommended negotiator, if any suggested by local authorities
- viii. Company action to date
- ix. Police involvement
- x. Kidnap group's identity, if known
- xi. Press involvement

(Upon receipt of this information, the executive will take specific actions which are not suitable for publication in this document.)

II. Negotiation

Negotiations are to be handled by specialists experienced in these types of incidents. The Executive Crisis Team will designate such a specialist who will be immediately sent to the site. In the event that you must speak to any kidnapper, do the following:

- (a) Tell them you are not authorized to make any decisions in this matter but indicate willingness to cooperate.
- (b) Ask kidnappers a proof question to establish that the victim is alive. This question must be one that only the victim can answer. Refuse to discuss anything until the proof question is correctly answered.
- (c) Demand a codeword which will enable you to identify the real kidnappers from hoax calls or extortion attempts by other criminals.
- (d) Record all calls on tape. If this is not possible, write down the following details:
 - i. Male/Female
 - ii. Young/Old
 - iii. Type of accent
 - iv. Local or long distance call

- v. Tone of voice (mental state)
- vi. Background noises
- vii. Duration of call
- viii. Type of telephone used (call box, automatic operator, mobile)
- ix. Anything else that seems noteworthy about the call or caller

482311

(e) Maintain a detailed diary of events including:

- i. Date, time and type of all communications with kidnappers/extortionists
- ii. Date and time of all significant events
- iii. Details of all meetings (participants and nature of discussions)

(f) Give no interviews to the press. All inquiries by the press should be handled by one nominated representative who should politely offer "no comment" in response to all inquiries.

(g) Look after victim's family and arrange protection if necessary.

III. Support

When the designated specialist arrives, release all information gathered to date. Follow specific instructions given by the specialist. He/she will direct all subsequent activity in conjunction with the Executive Crisis Team.

SEIZURE OF EQUIPMENT

482312

In the case of seizure of equipment by a government or a government agency, the following action is to be taken:

1. Contact the Corporate Crisis Team for insurance notification and certification.
2. Notify local law enforcement officials. Obtain copy of reports filed.
3. Verify that Digicon complied in all respects with the laws of any country within whose jurisdiction the property may be situated.
4. Verify that all permits necessary for legal operation were obtained prior to the commencement of the operation.
5. Digicon and its agents should make every reasonable and repeated effort to recover the property prior to and during the insurance claim waiting period.

POLITICAL INSTABILITY/DISORDER/CONFLICTS

482313

At the first sign of civil disorder immediately contact the Houston Safety Department to obtain up-to-date international safety warnings. Use notification tree and relay the following information ASAP:

1. Activity or rumors
2. List and exact location of personnel that could be affected and method of contact
3. List or summary of Company assets that could be affected
4. Information/warnings issued by local government, embassy/consulate, or Safety Department's bulletins

Follow directives of local government, embassy/consulate, or the Executive Crisis Team, whichever directive is the most current. Communicate status reports as frequently as possible to members of the Executive Crisis Team.

NOTIFICATION TREE

482314

Notification of the next level should be made immediately, until highest level necessary for that incident has been informed. If unable to reach the named employee within 1 hour, continue up the tree until a contact is made.

Board

CEO

Rudy Prince
Office: 713-630-4400
Home: 713-465-7956
Mobile: 713-824-2167

President

Larry Lenig
Office: 713-630-4300
Home: 713-973-2594
Mobile: 713-824-8059

WW Operations VP

Steve Ludlow
Office: 713-630-4050
Home: 713-835-0073
Mobile: 713-253-8467

Corporate Safety

Mike Arnold
Office: 713-630-4054
Home: 713-358-3448
Beeper: 1-800-999-6710 - Satellite Code: 999-0492
Mobile: 713-854-5127

Corporate Insurance

John Conerly
Office: 713-630-4290
Home: 713-353-2360
Mobile: 713-819-7404

Corporate H.R.

Lisa Seeker
Office: 713-630-4277
Home: 713-550-5159
Mobile: 713-819-7402

M.D./Operations V.P.

Name: _____
Office: _____
Home: _____
Beeper: _____
Mobile: _____

Operations Manager

Name: _____
Office: _____
Home: _____
Beeper: _____
Mobile: _____

Operations Supervisor

Name: _____
Office: _____
Home: _____
Beeper: _____
Mobile: _____

Party Manager

Name: _____
Office: _____
Home: _____
Beeper: _____
Mobile: _____

Operations Employee

CFO/M.D/Financial VP

Name: _____
Office: _____
Home: _____
Beeper: _____
Mobile: _____

Div. Manager/Controller

Name: _____
Office: _____
Home: _____
Beeper: _____
Mobile: _____

Support Staff Manager

Name: _____
Office: _____
Home: _____
Beeper: _____
Mobile: _____

Support Staff Supervisor

Name: _____
Office: _____
Home: _____
Beeper: _____
Mobile: _____

Support Staff Employee

NOTE: Each manual holder should complete the names and phone numbers specific to their location.

NATURAL DISASTER RESPONSE

482315

Priorities

1. Evacuate employees by the quickest, safest method.
2. Secure or remove Company assets if safely possible.
3. Use notification tree for contacts; report situation and current status.

Post-Notification

1. Determine equipment, personnel and actions necessary to begin recovery of operations.
2. Again, use notification tree to report damage assessment.
3. Re-establishing communication (phone, fax, etc.) is the top priority for recovery phase.
4. Begin recovery operations.