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GLNPO Health, Safety and Environmental Compliance Manual

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ACRONYMS

ACGIH	American Conference of Governmental Industrial Hygienists
ANSI	American National Standards Institute
APR	Air Purifying Respirator
ARA	Area Regional Manager
ARCS	Assessment and Remediation of Contaminated Sediments
CAA	Clean Air Act: Prevent or control the emission of any substances into the air that may harm public health or natural resources; set standards to define acceptable tolerance levels for air pollutants. (40 CFR 50-80)
CBC	Complete blood count
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act: Original regulatory goal (1980) was focused on the cleanup of abandoned hazardous waste sites nationwide. A government trust fund (the "Superfund") pays for cleanups; EPA identifies potentially responsible parties (PRPs) and orders them to clean up the site or bills for cost of cleanup performed by the government. (40 CFR 300s)
CFR	Code of Federal Regulations
CGI	Combustible Gas Indicator
Class I	Materials with flash points below 100°F (see 29 CFR 1910.106)
Class II	Materials with flash points at or above 100°F, but below 140°F (see 29 CFR 1910.106)
CNS	Central nervous system
CPR	Cardiopulmonary Resuscitation
CRC	Contamination Reduction Corridor
CRZ	Contamination Reduction Zone
CWA	Clean Water Act: Federal Water Pollution Control Act FWPCA. Restore and maintain the integrity of surfaced waters in the United States by preventing or controlling pollution, with the ultimate goal of making all surface waters usable for fishing and swimming. (40 CFR 110-140, 40 CFR 400-470)
dBa	Decibels (decibel measured on the A-scale)

DOT	Department of Transportation
U. S. EPA	U.S. Environmental Protection Agency
EPCRA	Emergency Planning and Community Right-To-Know Act of 1986 (SARA Title III). Establish regulations for industry to report information regarding chemicals stored at facilities; establish a framework for emergency planning; establish reporting procedures for toxic chemical releases. (40 CFR 350, 355, 370, and 372)
EPIRB	Emergency Position Indicating Radio Beacon
FEF	Forced expiratory flow
FID	Flame ionization detector
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act. Establish safety standards for pesticides; restrict the use of, remove from the market, or refuse registration for products that do not need the safety standards. Note that FIFRA broadly defines "pesticides" to cover anything intended to kill, repel, or control any nonhuman form of life, from bacteria-killing disinfectants to herbicides for weed control. (40 CFR 150-186)
FRC	Functional residual capacity
GC	Gas chromatography
GLNPO	Great Lakes National Program Office
GLWQA	Great Lakes Water Quality Agreement
HMTA	Hazardous Materials Transportation Act. Centralize federal regulations for domestic packaging, labeling, and shipping of materials that pose a risk to health, safety, or property. (49 CFR 170s)
IAG	Inter Agency Agreements
IDLH	Immediately dangerous to life or health
kg	kilogram
IR	Infrared
LEL	Lower explosive limit
LFL	Lower flammable limit
ME	Medical Emergency
MEFR	Maximal expiratory flow rate

MSDS	Material Safety Data Sheet
MSHA	Mine Safety and Health Administration
MVV	Maximal voluntary ventilation
NFPA	National Fire Protection Association
NIOSH	National Institute for Occupational Safety and Health
OSC	On Scene Coordinator
OSH Act	Occupational Safety and Health Act. Assure the safety and health of workers; set standards to reduce or prevent illnesses and injuries among workers. (29 CFR 1910)
OSHA	Occupational Safety and Health Administration
OVA	Organic vapor analyzer
PAPR	Powered air-purifying respirator
PCB	Polychlorinated biphenyl
PDS	Personnel decontamination station
PEL	Permissible exposure limit
PID	Photoionization detector
PMS	Program Management Staff
PPE	Personal protective clothing and equipment
ppm	Parts per million
PSA	Pipeline Safety Acts. Under DOT, set minimum safety standards for the design, construction, and operation of pipelines carrying natural gas, liquefied gas, or hazardous liquids. Standards also cover repair requirements and accident and leak reporting requirements. (49 CFR 190-195)
psi	Pounds per square inch
PVC	Polyvinyl chloride
RBC	Red blood count

RCRA	Resource Conservation and Recovery Act. Regulate the generation, transport, and ultimate disposal of all forms of hazardous waste and industrial by-products, ranging from open garbage dumps to buried chemicals. Drafted as a solid waste disposal/recycling law, actual implementation focuses heavily on identification and tracking of hazardous wastes. Note that disposal under RCRA may trigger compliance duties under additional laws if land, air or water quality may be affected by the disposal method. (40 CFR 260-263 and 264-270)
REL	Recommended exposure limit
RPM	Remedial Programs Management
RPS	Remedial Programs Staff
RV	Residual volume
SAR	Supplied-air respirator
SCBA	Self-contained breathing apparatus
SDWA	Safe Drinking Water Act. Establish uniform federal standards for drinking water quality, and set up a system to control underground injection (or burial) of wastes and other substances that could contaminate such underground water sources as municipal water systems, public wells, and sole-source aquifers. (40 CFR 140-149)
SHEMD	Safety, Health, and Environmental Management Divisions
SOLAS	Safety Of Life At Sea
SOP	Standard Operating Procedure
SRS	Surveillance and Research Staff
TLC	Total lung capacity
TLV	Threshold limit value
TLV-C	Threshold limit value - ceiling
TLV-STEL	Threshold limit value - short-term exposure limit
TSCA	Toxic Substances Control Act of 1976. Evaluate the health and environmental risks of all chemicals before manufacture or use in the United States. EPA gathers data by screening new and existing chemicals through industry reporting and recordkeeping, including testing for possible risks. (40 CFR 700-750, 40 CFR 760s and 40 CFR 790-799)
TSD	Treatment, Storage, and Disposal Facility

TWA	Time-weighted average
UEL	Upper explosive limit
UFL	Upper flammable limit
USCG	U.S. Coast Guard
UV	Ultraviolet

Chapter 1 - POLICY AND RESPONSIBILITIES

1.1 POLICY

The Great Lakes National Program Office (GLNPO) is responsible for overall coordination of the U.S. EPA's efforts to protect and enhance Great Lakes Water Quality and restore and maintain the beneficial uses of the Great Lakes. GLNPO's role was established through the Great Lakes Water Quality Agreement (GLWQA) with Canada and through the Clean Water Act which charges the U.S. EPA through GLNPO for overseeing the implementation of the agreement. The direct authority and responsibility, however, for implementing the CWA and other federal laws necessary to carry out the GLWQA, is the primary responsibility of various headquarters program offices as well as Regions 2, 3, and 5, and the Great Lakes States.

GLNPO, a headquarters organization, is physically located within the Region 5 management structure. Therefore, the safety policies defined here are provided to augment the Region 5 Safety Plan. This plan is necessary in light of the unique multi-regional and multi-national programs of GLNPO which involve operation of various surveillance and research vessels as well as field demonstration programs. Any safety or compliance issue not covered here is subject to the Region 5 Safety Manual.

GLNPO HEALTH AND SAFETY POLICY STATEMENT

It is the policy of the US EPA, Great Lakes National Program Office, that all EPA employees working in offices, laboratories, field activities, and special programs are entitled to a comprehensive health and safety program. The goals of the program are to ensure that each employee is able to work in an environment free of recognized hazards and to reduce and mitigate occupational accidents as much as possible. These goals shall be accomplished through:

1. Training employees in the proper techniques for field investigations, proper use of and access to safety equipment, and proper protocol for inspections;

2. Development of standard operating procedures for routine and non-routine work environment

3. Enabling employees to identify those work situations where they believe a hazard exists without any adverse action taken against the employee;

4. Medical monitoring of employees in risk situations.

By implementing these procedures it is the desire of the U.S. EPA to see that it can mutually share the responsibility to reduce work place hazards and that the Agency can provide the environment for that to occur.

This policy shall be coordinated by the chair of the GLNPO Safety Committee in conjunction with the Regional Safety Manager. In addition to the outlined procedures, this policy shall meet the applicable requirements of the Occupational Safety and Health Administration, the provisions of Executive Order 12196 and other relevant statutes, laws, policies and guidance of the Federal Government regarding occupational health and safety.

1.1.1 Overview

The Great Lakes National Program Office (GLNPO) maintains a trained staff that is actively involved in laboratory, field, and special programs (e.g., *Terrestrial and Habitat*) operations. In addition, GLNPO maintains a fleet of surveillance vessels devoted to limnological research. The fleet consists of the *Lake Guardian*, *Hydra*, and *Mudpuppy*. The *Lake Guardian* is the primary research platform for GLNPO. Formerly an offshore oil-field supply vessel, the R/V *Lake Guardian* is the newest, largest, and most sophisticated vessel among the fleet. Historically, water used aboard research vessels for engine cooling, in showers, and in sinks was discharged overboard. The Lake Guardian, however, is a non-polluting vessel with no overboard discharges.

The *Hydra* is currently in lay-up status and was the principle vessel used during the 1970s and 1980s for sampling Lake Erie when the lake was in its most devastated condition. The *Mudpuppy*, a significantly smaller vessel, is capable of fresh-water sampling excursions in and around rivers, creeks, and streams which flow into the Great Lakes. Additionally, warehouse facilities are conveniently located for vessel maintenance and equipment storage.

In conjunction with the Central Regional Laboratory in Chicago, Illinois, the *Lake Guardian* provides analytical support to GLNPO.

1.1.2 Research Vessel Physical Characteristics

a. The R/V *Lake Guardian*

Length - 180'	Cruising Speed - 13 mph
Beam - 40'	Fuel Consumption - 75 GPH
Draft - 11'	Range - 9000 miles
Berthing Capacity - 42	Endurance - 15-30 days

b. The R/V *Hydra*

Length - 65.6'
Beam - 17.8'
Draft - 6.6'
Berthing Capacity - 8
Cruising Speed - 9 mph
Displacement (loaded) 95 tons
Range - 500 miles
Endurance - 2 days

c. The R/V *Mudpuppy*

Length - 33'
Beam -8'
Berthing Capacity - 0

1.2 PURPOSE

This manual establishes policies, responsibilities, procedures, rules, and guidelines for all GLNPO Occupational Safety & Health and Environmental Compliance Programs. A copy of this manual and the appropriate appendices must be readily available aboard our over-night research vessels. The manual and appendices must also be available in GLNPO offices.

For operations performed on the R/V Mudpuppy, a health and safety manual, specific to performing sampling activities where personnel exposures to contaminants are either unknown or only suspected, has been prepared. Therefore, in addition to the comprehensive GLNPO manual, a copy of the September 17, 1996 Health and Safety Manual, Appendix N, must also be available on board the R/V Mudpuppy.

1.3 POLICY AND PROGRAM GOALS

It is the goal of GLNPO to administer its programs in a manner that will assure that its employees are free from recognized hazards.

1.4 RESPONSIBILITIES

The responsibilities of relevant EPA personnel are detailed in the following paragraphs, separated by title.

1.4.1 Assistant Regional Administrator

The Assistant Regional Administrator (ARA) for the Resources Management Division is the Designated Regional Occupational Safety and Health Official. This ARA is responsible for establishing Regional Health and Safety and Environmental Compliance policies, programs, standards, goals, objectives, and priorities. The ARA is also responsible for establishing an organization including the designation of a Regional Health and Safety Manager with an adequate budget and staff to implement occupational health and safety and environmental compliance programs at all levels throughout Region 5 and GLNPO.

1.4.2 Regional Occupational Health and Safety Manager

The Regional Occupational Health and Safety Manager, under the direction of the ARA for the Resources Management Division, is responsible for developing Regional occupational health and safety and environmental compliance policies, programs, standards, goals, and objectives for evaluating the effectiveness of the Region's occupational health and safety and environmental compliance programs at all levels. He/she must also provide technical and management support, direction, and services to all Regional occupational health and safety and environmental compliance programs. Consideration for regulatory applicability will be ultimately determined by the Regional Occupational Health and Safety Manager.

1.4.3 Office Director

The Director of GLNPO is responsible for implementing the Great Lakes National Program Offices Occupational Health and Safety and Environmental Compliance Program and is accountable to the Regional Administrator.

1.4.4. GLNPO Occupational Health and Safety Manager

One Occupational Health and Safety Manager is appointed by the GLNPO Office Director. This manager serves as GLNPO's Health, Safety & Environmental Compliance Team Leader. The Team Leader, working with Team Members who represent a complete cross section of the Office staff, comprises a safety team that is responsible for assisting GLNPO management in directing health and safety activities within the Office and for coordinating such activities with the Regional Safety Manager. The team meets on a regular basis (i.e., preferably monthly but at minimum quarterly). Each month, the Team Leader reports to the Office management on significant issues. Each year in the first quarter, the safety team presents their proposed performance agreement to the Office management for approval. The Office Safety Manager will also serve on the Regional Health and Safety Committee. (Safety Representatives may also be appointed at the Branch or staff level.)

1.4.5 Supervisors and Managers

Supervisors and managers are responsible, to the extent of their authority, for providing employees with working conditions free from recognized hazards that are likely to cause death or serious harm (i.e., equipment, place of employment, etc.). Supervisors and managers shall comply with the Region's Occupational Health and Safety and Environmental Compliance Standards, along with all safety rules, regulations, and orders issued by the Region. Furthermore, they are responsible for enforcing these correct work practices.

1.4.6 Project Officers/Work Assignment Managers and Contract Officers

Project officers who manage support contracts and grants for sampling, analyses and boat operations are responsible for assuring that all GLNPO-funded activities adhere to the safety and compliance requirements defined in this manual. This includes medical monitoring and all required certification. It is recommended that this requirement is defined in the scope of work for any GLNPO-funded grants and contracts. Unresolved conflicts should be reported to the GLNPO Safety Manager for resolution.

1.4.7 Contractors and Grantees

All contractors and grantees that are involved in field activities on EPA vessels or equipment are required to have read the pertinent contents of this manual as well as adhere to the specific requirements. A system should be implemented that assures these policies are met as a prerequisite for boarding EPA vessels.

All contracts for contractors performing work for Region 5, or for any EPA activity or organization serviced by Regional Safety personnel, shall contain provisions, in writing, which require contractors and contract personnel to follow, at minimum, the same rules and requirements that U.S. EPA personnel follow while performing similar work. Wherever possible, contractual provisions should require that all safety equipment and services (e.g. personal protective equipment, medical monitoring, training, etc.) be equivalent to that required for EPA personnel in the Region.

1.4.8 Chief Scientist

All GLNPO vessels will have a designated "Chief Scientist" while undergoing EPA surveillance and research operations. The "Chief Scientist" role is defined in Attachment 1.2. The "Chief Scientist" should ensure that all survey activities are conducted safely and in compliance with the health and safety protocols of GLNPO.

1.4.9 Shift Supervisor

During 24-hour surveillance and research operations, GLNPO vessels will have a designated Shift Supervisor. The Shift Supervisor, acting as an assistant to the Chief Scientist, is required to follow many of the guidelines set forth for the Chief Scientists. The Shift Supervisor must inform the Chief Scientist of any situation which could compromise health and safety, sampling activities, or scheduling.

1.4.10 Employee Rights and Duties

EPA employees are expected to follow all health and safety rules and to perform duties in a manner which will protect their own well being and that of their fellow employees.

1.4.10.1 Employee Compliance

Employees are obliged to follow GLNPO's and the Region's Occupational Health and Safety and Environmental Compliance Standards, rules, regulations, and orders which are applicable to their own job duties, actions, and conduct. Employees are also required to use safety equipment, personal protective clothing and equipment (PPE), and other safety devices and, moreover, to follow safety procedures that the Region deems necessary for their protection.

1.4.10.2 Employee Rights and Responsibilities

The rights and responsibilities of EPA personnel with regard to occupational health and safety are detailed in the *Occupational Health and Safety for Environmental Protection Agency Employees* poster. (Attachment 1.1)

1.4.10.3 Employee Conduct and Discipline

It is EPA policy that primary emphasis be placed on preventing situations requiring disciplinary actions through effective employee-management relations and that when work performance and/or conduct are not maintained at acceptable levels, constructive corrective action be taken by responsible supervisors and management on a timely basis. It is critical that this policy is enforced due to the unique contractor/contractee relationships and the extenuating circumstances caused by extensive field work.

Disciplinary action taken must be consistent with the precept of like penalties for like offenses, with mitigating or aggravating circumstances taken into consideration. The action taken should be no more severe than sound judgement indicates is required to correct the situation and maintain discipline. Disciplinary action may include informal written and verbal warnings and formal actions including official written reprimand, suspension, reduction in grade, or removal from duty. EPA Order 3120.1B may be consulted in determining appropriateness of disciplinary actions.

1.5 SAFETY *TEAM* (COMMITTEE) POLICY

The GLNPO Occupational Health and Safety *Team* (Committee) is the medium for achieving the participation of employees in the GLNPO's Occupational Health and Safety Programs. A well-organized, balanced health and safety *Team* will have the diversified knowledge of all job operations and activities in GLNPO. The *Team* is an advisory body, not a policy making group. Committee (*Team*) members review data and render recommendations to aid management in making appropriate policy decisions in the area of health and safety matters affecting employees. The GLNPO Occupational Health and Safety *Team* shall:

1. Be effectively supported by management.

2. Be given specific tasks to accomplish, not general topics of consideration.

3. Include personnel from the program areas which committee decisions will affect.

4. Provide effective representation of all GLNPO employees.

5. Include a cross section of experts who have first-hand knowledge of pertinent work conditions and practices.

1.6 SAFETY *TEAM* (COMMITTEE) ORGANIZATION

Pursuant to the Safety Committee Bylaws and as specified in EPA Order 1440[1], the GLNPO Occupational Health and Safety *Team* is similar to the Regional Health and Safety Committee. It is a team that is operational in nature, consisting of representatives from branches and staffs whose recommendations it will affect.

The committee currently consists of the management advisor, who also serves as the Chief of the Monitoring Indicators Branch and Technical Assistance & Analysis Reporting Branch of GLNPO, and safety representatives who are appointed by their GLNPO staff or team leaders. The number of representatives is not strictly set, nor is the term for each member who serves on the committee. GLNPO consists of the following staffs and units:

Office of the Director
Data Integration Unit
Program Management Staff (PMS)
Environmental Planning Staff (EPS)
Remedial Programs Staff (RPS)
Environmental Information Branch (EIB)
Technical Assistance & Analysis Reporting Branch
Monitoring Indicators Branch
Policy Coordination & Communications Branch
Region and GLNPO Team Leaders

The GLNPO Safety Manager will provide organizational and technical guidelines for the committee including providing an agenda for each meeting and recording and distributing the meeting's minutes.

These Safety Team Members make up the overall operational GLNPO Safety Organization. The GLNPO Safety Organization is an operational group and is managed by the GLNPO Safety Manager. Specific duties of Safety Representatives include coordinating safety inspections and surveys, and scheduling required training, respirator fit testing, medical monitoring exams, and related matters for personnel in their organization. Safety Representatives may serve at the Office, Staff or Unit level and assist the Safety Manager in the overall management of the Health and Safety Program.

All Safety Representatives must report medical monitoring, required training, field certification, respirator fit testing, medical monitoring exams, and related matters to the GLNPO Safety Manager. These reports should be prepared using the designated forms and are to be reported to the GLNPO Safety Manager during the quarterly safety committee meeting. Additionally, Safety Representatives are expected to assist their Division Management in reporting abatement status of health and safety hazards or deficiencies found and cited during Annual and Semi-Annual Occupational Health and Safety and Environmental Compliance Surveys and Inspections.

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[1] See Appendix A. Note: This document applies to all federal employees and must be available at all federal facilities for review (e.g. *The R/V Lake Guardian*).

1.7 COMMITTEE OPERATIONS

The GLNPO Occupational Health and Safety *Team* meets every three months, usually on the first Tuesday of the second month of each quarter of the federal fiscal year (November, February, May, August). Issues and subjects discussed at committee meetings include: Vessel Operations, Annual Safety Inspection and Industrial Hygiene Survey results, the Medical Monitoring Program, the Annual Safety Budget, the Radiation Protection Program, the Lab Safety Program, Personal Protective Equipment (PPE), Safety Training Program, and other organizational and technical issues affecting GLNPO personnel.

The Regional Safety Committee Bylaws, adopted in June 1988, are currently in effect and govern all activities of the GLNPO Safety (*Team*).

1.8 GLNPO SAFETY PROGRAM GOALS

The GLNPO Safety Manager is responsible for preparing an annual work plan for submittal to the GLNPO Office Director and the Regional Safety Manager. The work plan should outline Regional Safety, Health, and Environmental Compliance Program goals for the coming fiscal year and their proposed method of implementation. Time frames for implementation should also be included. The goals and their implementation should be proactive and designed to build and improve the Regions' proactive Safety, Health, and Environmental Compliance Programs.

1.9 PROGRAM BUDGET AND RESOURCES

The GLNPO Safety Manager shall ensure that all Safety, Health, and Environmental Compliance submissions include proposed funding and resources for implementation. He/she, in conjunction with the Regional Safety Manager, will effectively administer the GLNPO Occupational Safety, Health, and Environmental Compliance Programs for all Offices, Staffs and Units in GLNPO.

Appropriate funds and other resources for administering the programs shall provide for, but not be limited to:

1. Sufficient personnel resources (including contract resources) to implement and administer the overall program at all levels:

2. Necessary administrative costs for such services as training, personal protective equipment, etc.;

3. Contracts and IAGs for medical monitoring, complete hygiene, and environmental compliance services including laboratory analysis and hazardous waste disposal services;

4. Safety and health sampling, testing, and diagnostic and analytical supplies and equipment;

5. Program training and promotion materials such as posters, slides, films, and video tapes, and;

6. Technical information, documents, books, standards, codes, and publications.

Most of these services will be provided through the Regional Health and Safety Manager to avoid duplication of effort. Appropriate contracts and grant funds will be provided to the Regional Health and Safety Manager for provision of these services.

1.10 DISSEMINATION OF OCCUPATIONAL HEALTH AND SAFETY PROGRAM INFORMATION

The GLNPO Safety Manager shall promote employee awareness of Occupational Safety, Health, and Environmental Compliance Programs by:

1. Providing, upon request, copies of Executive Order 12196, 29 CFR 1910, and the Region's Occupational Health and Safety Program to all employees. Also, copies of Agency and Regional standards and other applicable occupational health and safety standards shall be available to all employees for review upon request.

2. Posting a copy of the Agency's Policy poster in a conspicuous location in each Agency facility.

3. Bringing Occupational Health and Safety issues to the attention of employees through in-house publications, forums, and promotional materials.

1.11 WORKER'S CONCERNS

If an employee considers a situation or a work condition to be a safety hazard, it is his/her responsibility to report it directly to the Safety Manager or his/her staff/unit or office Safety Designee. It is an employee's responsibility to report potential safety hazards. (No one can take action against an individual who reports a safety problem.)

1.11.1 Reporting

Potential safety hazards and incidents should be reported in writing to the GLNPO Health and Safety Manager as soon as they are recognized. The GLNPO Health and Safety Manager, in conjunction with the Regional Health and Safety Manger, and his/her staff will investigate the situation and recommend corrective actions, if necessary. The Regional Health and Safety Office will either make these corrections or pass along their recommendations to a more appropriate party, i.e. the General Services Administration, building management, etc. The GLNPO reporting procedure, entitled *Incident Reporting Policy & Procedure,* is provided in Attachment 1.3.

1.11.2 Recordkeeping

Copies of all employee complaints, as well as documentation of corrective actions, are kept on file in the Regional Health and Safety Office.

1.12 INJURY & ILLNESS

When an EPA employee suffers an injury, whether traumatic or non-traumatic, or is stricken ill while on the job, there are necessary procedures to be followed in order to protect the employee's interests and well being. These procedures are defined in the following Sections 1.12.1 and 1.12.2.

1.12.1 Injury and Illness Definitions

Injuries are considered either "traumatic" or "non-traumatic." A "traumatic injury" is defined as a wound or other condition of the body caused by an external force, including stress or strain. A "non-traumatic injury," also referred to as an "occupational disease or illness," is a condition caused or aggravated by working in a job environment over an extended period. This includes injuries and illnesses caused by repeated stress or strain, systemic infection, and those caused by continuous or repeated exposure to toxins, poisons, fumes, etc.

1.12.2 Reporting Procedures

Employees must report all accidents or incidents, which may result in an injury, to their immediate supervisor and may do so without fear of reprisal. Moreover, it is in the employee's best interest to report all injuries sustained on the job, regardless of how minor they may appear, because a slight injury could develop into something more serious.

Specific forms are used for reporting an injury. When reporting a traumatic injury, complete Form CA-1, "Federal Employee's Notice of Traumatic Injury and Claim for Continuation of Pay/Compensation." When reporting a non-traumatic injury, complete Form CA-2, "Federal Employee's Notice of Occupational Disease and Claim for Compensation." (These forms are available through the Human Resources Department.) If an employee is incapacitated and unable to complete these forms, another person (co-worker, supervisor, etc.) may complete them. All forms should be signed by this other person and forwarded to the employee's supervisor.

The following steps should be taken consecutively by an employee in the event of a traumatic injury:

1. Report the injury or incident to your supervisor as soon as possible.

2. Obtain medical attention. Emergency treatment does not require prior authorization. In case of non-emergency treatment, your supervisor must first complete a CA-16 form (within four hours of an employee's request) in order to authorize medical treatment. (This form is valid for 60 days from date of issue unless canceled by the OWCP.) Choose a local federal medical officer/hospital, if available, or a local private physician/hospital, and schedule a consultation. Bring the CA-16 form and form HCFA 1500 (standard billing form) with you to your appointment.

3. File an official written notice of a traumatic injury within two working days, using form CA-1. (Continuation of Pay cannot be authorized if this form is filed more than 30 days after the date of injury.) Form CA-2 is filed instead of form CA-1 if disability results from an occupational disease or illness.

4. Retain a receipt of Notice of Injury from your supervisor for your personal records. It is attached to Forms CA-1 and CA-2.

5. If disabled as a result of a traumatic injury, the employee may choose to take leave or request Continuation of Pay (maximum of 45 calendar days.) If disability is a result of an occupational disease, an employee may use leave or request compensation using Form CA-7.

Supervisors shall investigate and report all job-related accidents on EPA Form 1440-9 "Supervisor's Report of Accident". This is a four-part form. The supervisor who completes the form must mail the top copy directly to the Environmental Protection Agency, Occupational Health abd Safety Office, Washington, D.C. 20460. If the accident involves an occupational injury or illness, the supervisor must attach a copy of Form CA-1 or CA-2. The fourth part of the completed Form 1440-9 must be retained by the supervisor. The supervisor must send the second part of the Form 1440-9 to the local personnel office and the third part of the form to the Regional Safety Manager.

Supervisors should perform the following when summarizing an injury or illness:

1. Complete and forward all forms to the appropriate OWCP District Office within 10 working days following the receipt from the employee if:

   - The disease or illness causes disability for work beyond the day or shift it was reported; or

   - It appears the condition will result in prolonged treatment, permanent disability, or serious disfigurement of the head, face, or neck; or

   - The condition has resulted (or will likely result) in a charge for medical or other related expenses.

2. Furnish a separate, narrative statement to be attached to the form, which should:

   - Describe in detail the work performed by the employee, identify fumes, chemical or other irritants or situations that the employee was exposed to which allegedly caused the condition. State the nature, extent and duration of exposure, including hours per day and days per week.

   - Attach copies of all physical examination reports (including X-ray reports and laboratory data) on file for the employees.

- Attach a record of the employees absence from work caused by any similar disease or illness (have employee state reason for each absence).

- Attach statements from each co-worker who has first-hand knowledge about the employee's condition and its cause (the co-worker should state how such knowledge was obtained.

- Review and comment on the accuracy of the employee's statement.

NOTE: For the employee's own protection, copies of all forms and documents should be made for his/her personal files.

1.12.3 Ship Board Reporting Requirements

Any accident or incident, whether involving EPA personnel, Contracting personnel, or Grantee, occurring during surveillance and research activities must be immediately reported to the Captain and the ship's Safety Officer. An Incident Report detailing the events of the incident must be provided in writing to the Regional Safety Manager and the GLNPO Director within 48-hours of the incident.

1.12.4 Investigation

Investigation of an accident or illness is necessary to prevent similar occurrences. It is not designed to establish guilt or innocence, but is an attempt to identify and abate potential hazards. Investigations should be conducted promptly by both the employee's supervisor and the Occupational Health and Safety Designee. Both parties should gather and document all facts and statements concerning an incident, make recommendations for resolution, and provide each other with copies of findings, as well as to the employee involved. Further details of investigative procedures are available in EPA Order 1440, Occupational Health and Safety Manual.

1.12.5 Recordkeeping

Under OSHA regulations, it is the responsibility of the Safety Office to maintain and keep current two OSHA Forms. "The Log of Federal Occupational Injuries and Illnesses" is used for compiling data and statistics on injuries and illnesses. "The Annual Summary of Federal Occupational Injuries and Illnesses" is a questionnaire completed by each Region for Headquarters in order to assist them in preparing the annual health and safety summary of the Agency for submission to the Department of Labor. This log and information will be kept at the Regional Safety Office.

1.13 ANNUAL AND PERIODIC INSPECTIONS AND SURVEYS

A summary of required inspections, frequency of inspections, and personnel responsible for specific inspections for all GLNPO operations is stated in Appendix V.

Occupational Safety and Health for Environmental Protection Agency Employees

Occupational Safety and Health Policy

The Environmental Protection Agency shall administer its programs in a manner that will assure its employees places and conditions of employment free from recognized hazards which are likely to cause death or serious harm.

Agency Responsibilities

Designate an Occupational Safety and Health Official to administer EPA's Safety and Health Programs. This Official is

Sallyanne Harper
Name

Acting Assistant Adm./OARM
Title

- Furnish employment and a place of employment free from recognized hazards.
- Comply with OSHA standards or develop more stringent alternate standards.
- Ensure that the performance evaluation of all managers and supervisors measures his/her performance in meeting requirements of EPA's Occupational Safety and Health Programs.
- Acquire, maintain, and require the use of approved personal protective equipment and approved safety equipment.
- Authorize Agency safety and health personnel to utilize expertise from other agencies, professional groups, consultants, universities, labor organizations, safety and health committees, and other appropriate sources.
- Ensure appropriate resources to effectively implement and administer the Agency's Occupational Safety and Health Programs.

Occupational Safety and Health Responsibilities

- Develop an Agency Occupational Safety and Health Program that includes policies, programs, standards, goals, and objectives
- Evaluate the effectiveness of the Agency's Occupational Safety and Health programs at all operating levels
- Provide technical support

Supervisor Responsibilities

To the extent of their authority, Supervisors shall:

- Provide his/her employees with employment and places of employment free from recognized hazards.
- Comply with all safety and health standards and with all rules, regulations and orders issued by the Agency.
- Enforce safe work practices.

Employee Responsibilities

- Comply with the Agency's Occupational Safety and Health standards, rules, regulations, and orders applicable to their own actions and conduct.
- Use the safety equipment, personal protective equipment and other safety and health devices provided by the Agency.
- Follow the procedures, provided or as directed, that the Agency deems necessary for their protection.
- Report all work-related property and personal accidents, and illnesses to their supervisor.

Employee and Employee Representative Rights

- Access to copies of the Agency's standards, injury and illness statistics, and procedures.
- Comment on standards proposed by the Agency
- Participate or assist in inspections and tell inspectors about unsafe or unhealthful working conditions.
- Authorized official time to participate in the Agency's Occupational Safety and Health Program activities
- May decline to perform assigned tasks because of a reasonable belief that under the circumstances the task poses an imminent risk of death or serious bodily harm and that there is not time to go through established reporting and abatement procedures.
- Report unsafe or unhealthful working conditions to appropriate officials. (See Chapter 4 of the Agency's Occupational Safety and Health Manual for detailed procedures.)
- Appeal if you disagree with the Agency's disposition of an unsafe or unhealthful working condition. Write appeal to:

  Office of Federal Agency Safety and Health Programs, OSHA
  U.S. Department of Labor
  Washington, DC 20210

Discrimination

If you exercise your rights under the Agency's Occupational Safety and Health Programs, you are protected from any discrimination, restraint, interference, coercion or reprisal.

Occupational Safety and Health Committee

EPA requires that an occupational Safety and Health Committee be established at each Agency Reporting Unit and Establishment. Membership of these committees must be determined to provide for effective representation of all employees. Your Occupational Safety and Health Committee Chairperson is: Regional Health and

A.James Finn, Safety Manager
Name and Title

WS #14052 (3-2075)
Location and Telephone Number

Further Information

Further information regarding EPA's Occupational Safety and Health Programs, its standards and procedures, the Federal law or any other information on health and safety is on file and can be reviewed in the Office of the Occupational Safety and Health Designee

Julius C. Simeno, Dir., SHEMD
Name and Title

Wash., DC (202)260-2640
Location and Telephone Number

EPA United States Environmental Protection Agency

Carol M. Browner FEB 09 1996

Attachment 1.2 – THE GLNPO CHIEF SCIENTIST

The duties and responsibilities statement establishes standards for performance as a Chief Scientist (CS) against which Chief Scientists can be evaluated. These are classified into two categories; scientific/technical and managerial.

Duties and Responsibilities

Chief Scientists will be expected to perform a variety of duties and fulfill specific obligations as technical leaders of the survey party.

Scientific/Technical Responsibilities: Scientific/technical responsibilities include oversight of sampling activities. In particular, Chief Scientists will be expected to:

- Coordinate activities with the vessel's captain regarding sampling schedules, and special needs or precautions for specific types of samples;
- Resolve conflicts as they arise; and
- Monitor sampling activities so that all samples are collected;
- Make final decisions regarding sampling priorities when time and adverse weather conditions become limiting.

Managerial Responsibilities: Managerial responsibilities include providing leadership, oversight of project activities, communication with crew, and compliance with safety requirements. In particular, Chief Scientists will be expected to:

- Assure all necessary equipment is acquired and is in good condition prior to survey departure;
- Maintain morale and encourage teamwork during surveys;
- Assign duties and monitor progress of work activities;
- Assure that a log of survey activities is maintained (as appropriate);
- Ensure that all survey activities are conducted safely and in compliance with health and safety protocols; and
- Support public outreach activities.

Requirements and Stages of Practicum Progress

The candidate will be required to complete a minimum of three surveys aboard an EPA vessel. The individual will assume increasing responsibility over time, with approval from the mentor.

Specifically, the stages of practicum progress are:

- Participating in a survey as a survey party member,
- Serving as Watch Captain on a survey, and
- Serving as Apprentice Chief Scientist during a survey under supervision by a certified Chief Scientist.

The Chief Scientist will be expected to demonstrate knowledge and understanding of surveys. The Chief Scientist should also be trained in CPR and First Aid and act as a first responder in emergency situations unless another designated person (e.g., Captain, Paramedic, EMT, etc.) is available.

Attachment 1.3 – INCIDENT REPORTING POLICY & PROCEDURE

An incident is defined as an event or an occurrence, minor or otherwise, that disrupts normal procedure or causes a crisis. In regards to health and safety, the term incident is defined to set a basic guideline for employees to consider when faced with situations which may be considered an unsafe and/or unhealthful condition. Often it is a combination of minor events/incidents which lead to a major and more serious event/incident. Therefore, it is imperative that thoughtful consideration and thorough investigation be used when faced with an incident.

POLICY

In accordance with EPA RS 1440, employees are responsible for detecting and promptly reporting work hazards, risks, or any unsafe conditions noted in their work environment. If an employee considers a situation or work condition to be a hazard, or has the potential to be a hazard, or is faced with an incident which may lead to an unsafe or unhealthful condition, it is his/her responsibility to report the potential safety hazards to their supervisor or directly to the Safety Manager or his/her Division Safety Designee. It is the responsibility of EPA management for promptly correcting these reported conditions.

REPORTING

Potential safety hazards or incidents should be reported in writing to the Regional Health & Safety Office as soon as they are recognized. The Health & Safety Manager or his/her designee will investigate the situation and recommend corrective action, if necessary. The Health & Safety Office will either make these correction or will pass the recommendations to a more appropriate party.

Chapter 2 - TRAINING, CERTIFICATION, AND MEDICAL MONITORING

REQUIRED TRAINING POLICY - OVERVIEW

It is the policy of the Great Lakes National Program Office that all EPA personnel and research vessel occupants, including ship contractors, laboratory contractors, and visiting scientists, have appropriate safety training specific to their job functions in accordance with EPA requirements. All required courses will be provided by the EPA Safety Manager, with the exception of Superfund training. (Superfund training will be provided by the Office of Superfund.) Training courses will be offered on an annual basis.

GLNPO training courses encompass a wide range of criteria including laboratory safety training, radiation safety training, field health and safety, first aid and CPR, respiratory protection training, emergency response, fire fighting, crane operation, industrial truck operation, occupational noise exposure, hazard communication, confined space entry, hot work and lockout/tagout procedures, as well as bloodborne pathogen training. In addition to training courses, GLNPO adheres to the regional medical monitoring selection policy followed by all EPA Region 5 employees.

2.1. REQUIRED TRAINING POLICY

All EPA and Contractor personnel who work in EPA owned or leased laboratory space (including laboratories on research vessels, and all field locations) must meet the safety training requirements specified in EPA Order 1440 and Regional Safety Manuals. These Regional Safety Manuals must be readily accessible at all locations. Supervisors must ensure that their employees are aware of these manuals and that the requirements within the manuals will be implemented. Chapter Eight of EPA Order 1440 specifically addresses working with toxic substances in laboratories. Regional and laboratory safety regulations are designed to comply with the OSHA regulations 29 CFR Part 1910 "Occupational Exposures to Hazardous Chemicals in Laboratories". All laboratories are required to have a site-specific safety manual. The manual should include general laboratory safety rules, fire escape plans, emergency plans, environmental compliance rules, and a chemical hygiene plan. All laboratory personnel must receive training based on the content of the manual and must know its location for reference purposes.

2.1.1 24-Hour Laboratory Safety Course

As specified in Order 1440, Chapter Eight, a 24-Hour Laboratory Safety Course must be completed by all EPA and contractor personnel prior to working in an EPA laboratory on a full-time or part-time basis. The 24-hour Laboratory Safety Course is designed to cover all aspects of laboratory safety. New employees must receive on-the-job training including fire evacuation procedures, waste disposal procedures, protective equipment requirements, the location of eyewash stations, fire alarms, spill control stations, and any site-specific safety rules. Topics such as potential sources of exposure, adverse health effects, work practices and engineering controls, environmental and medical monitoring procedures, and storage of incompatible materials should be covered, as well. Additionally, since all laboratories generate wastes, and some of theses wastes are hazardous under the RCRA regulations, the 24-hour training must include information regarding environmental compliance. This will ensure that laboratory personnel will understand compliance according to RCRA regulations and how it relates to their work practices. For

further information, please refer to EPA Headquarters Order 3500.1 entitled *"Training and Development for Compliance Inspectors/Field Investigators"*. In the event a new employee begins work in a laboratory prior to scheduled training, the employee should review the materials provided for the Laboratory Safety Class and refresher class. The employee should then be enrolled in the first available Laboratory Safety Class.

A training agenda for the 24-hour course can be found as **Attachment 2.1** of this chapter.

"General Laboratory Safety Rules" appear as **Attachment 2.2** of this chapter.

2.1.2 4-Hour Laboratory Safety Refresher Course

Following the completion of the 24-hour Laboratory Safety Course, an annual refresher course is required thereafter. The 4-Hour Laboratory Safety Annual Refresher Course is mandatory for all EPA and contractor personnel who work in EPA laboratories and is designed to review safety topics for personnel who already have a basic understanding of safety requirements. Recent advances in health and safety regulations should be included during this refresher training. The 4-Hour Laboratory Safety Annual Refresher Course agenda appears as **Attachment 2.3** of this chapter.

2.1.3 GLNPO Research Vessel Laboratory Training Requirements

In addition to the 24-hour Laboratory Safety Course and the annual 4-hour Refresher Course, all laboratory personnel are required to attend a "site-specific" training orientation course prior to engaging in laboratory activities. This course is intended to familiarize EPA personnel and contractors with the laboratories in which they will work. An Annual Refresher Course is required for this training and participants are required to document attendance. The general training agenda for the course appears as **Attachment 2.4** of this chapter.

2.1.4 Radiation Safety Training

The U.S. Nuclear Regulatory Commission's Material License issued to the U. S. EPA Central Regional Laboratory (CRL) allows the limited use of radioactive materials aboard GLNPO research vessel laboratories. This license also allows GLNPO laboratories to use Carbon 14 and Nickel for laboratory research and sample analysis. While these materials may be used on a limited basis, Radiological Health and Safety Plans, in accordance with the U.S. Nuclear Regulatory Commission (NRC) Regulatory Guide 8.8 and DOE publication PNL-6577, will be implemented to maintain the lowest minimum exposure to personnel. Use of these materials are subject to the guidelines specified in the CRL Radiation Safety Manual as described in **Appendix J** of this manual. GLNPO research vessels must also follow the guidelines presented in the Chemical Hygiene Plan described in **Appendix J** of this manual.

A site-specific Radiation Safety Training Course is required for GLNPO personnel and contractors prior to working in a GLNPO facility where radioactive materials are used. This training must provide information on work operations using radioactive materials, personnel monitoring, protective clothing, and bioassay. These training requirements appear as part of the Chemical Hygiene Plan described in **Appendix J** of this manual and radiation safety SOPs appear as an attachment to the plan.

2.1.5 40-Hour and 24-Hour Field Health and Safety Training

Health and Safety training is required for all EPA field personnel. The training consists of a 40-hour Superfund Hazardous Waste Site Training Course for all OSCs, RPMs, and related personnel. All other field personnel, including inspectors, are required to take the EPA 24-hour Field Safety Training Course. All training requirements will be in accordance with EPA Order 1440.2.

Since specific protection cannot be engineered into every field situation, it is essential that employees are trained to implement safe operational procedures and are familiar with the proper use of personal protective clothing and equipment. GLNPO employees and contractors, therefore, must successfully complete the 24-hour or 40-hour training required and hold certifications attesting that these requirements have been met. GLNPO employees and contractors are not permitted to engage in routine field activities until they have been trained and certified.

No persons, field EPA employees, or contractors will be permitted to participate in GLNPO-sponsored activities until they have received appropriate training .

2.1.6 8-Hour Field Health and Safety Annual Refresher Training

After certification in the 40-hour or 24-hour Field Health and Safety Training Courses, all GLNPO employees and contractor personnel are required to complete the 8-hour Refresher Training Course on an annual basis. The refresher instruction is designed as a review of subject areas necessary to maintain certification based on the initial 40-hour and 24-hour training.

For further details on this subject, refer to EPA Order 1440.2 Transmittal July 12, 1981.

2.1.7 Terrestrial Training

GLNPO personnel involved in Terrestrial operations are required to receive training in accordance with the EPA 24-hour Field Safety Training Course specifications noted above in **Section 2.1.5.**

2.1.8 First Aid and CPR

EPA employees classified as Chief Scientist and shift supervisors, and contractor personnel who work on board GLNPO vessels are required to be certified in basic First Aid/CPR.

CPR
Courses in Cardiopulmonary Resuscitation (CPR) will be offered throughout the year. Training may be given by fellow employees who are certified instructors or by instructors from an outside agency. Assuming that someone else will know CPR is a dangerous assumption. All EPA personnel aboard GLNPO vessels are required to attend an annual 4-hour course in CPR.

First Aid
First Aid, like CPR, will be taught throughout the year. This course is valuable to all, but especially important to personnel who are engaged in potentially hazardous activities. Like CPR, knowledge of First Aid is valuable outside the work place, as well. Chief Scientists and Shift Supervisors who are required to work on GLNPO research vessels must attend a 4-hour training session in First Aid, at minimum, once every three years.

2.1.9 Respiratory Protection

Employees performing tasks requiring the use of respiratory protective devices must receive training in the use and limitations of a respirator. Personnel must also be evaluated by a physician to ensure they are medically fit to wear a respirator. If respirators are issued, a written Respiratory Protection Program must be implemented. Training and program requirements can be found in OSHA 29 CFR 1910.134 and EPA Order 1440.3.

A written Respiratory Protection Program for GLNPO research vessels is described in **Appendix A** of this manual. All Emergency Response Personnel aboard the vessel must meet the requirements specified in the program.

2.1.10 Emergency Response Team Training

Prior to each GLNPO research vessel survey, it is necessary to have a designated emergency response team. The team must be trained in spill response, respiratory protection (including SCBA), and emergency response in accordance with OSHA 1910.120. The team members must also be trained in CPR and first aid and conduct practice drills on an annual basis.

In the event anyone aboard a ship at sea becomes ill or is injured beyond the clear capability of the ship to provide prompt and adequate care, a Medical Emergency (ME) exists and that person should be transferred to a facility providing emergency medical treatment. Details and procedures for injured or ill personnel or Medical Emergencies can be found in **Chapter 7, Section 4.**

2.2 SAFETY TRAINING FOR SHIP OPERATING PERSONNEL

Ship operating personnel must receive training specific to their job functions in accordance with all regulatory and policy requirements. Specific training areas such as fire fighting, heavy equipment operation, and powered industrial truck operation, are detailed in the following sections.

2.2.1 Fire Fighting

In the event of fire, a well-trained fire brigade must be available to respond immediately and be accompanied by a qualified chief in command. All members of the GLNPO research vessel fire brigade must be trained in accordance with the U.S. Coast Guard's fire brigade requirements. Training must include discussions of fire principles and fire classification, the use of portable fire extinguishers and proper extinguishing methods, in addition to overall fire safety awareness. Other qualifications of the brigade must include training and experience in fire protection and prevention in addition to well established firefighting organizational capabilities.

Response teams must be available 24 hours a day and regularly scheduled training for all members of the team must be conducted. Training sessions, at least one hour per week, are recommended. These sessions should include proper procedures on how to avoid fire, hands-on training for drills, including signals and individual responsibilities, as well as procedures for the prevention of bodily injury. A portion of this training must be devoted to the practice of emergency exit drills to make certain that all exits are clearly marked and easily passable and that all alarms are in maximum working order. Any deficiencies noted during drills or routine inspections must be corrected immediately.

Training documentation must be made available aboard the vessel and must include the date of training, name and social security number of the individual trained, and the name and qualifications of the trainer.

2.2.2 Cranes

Persons responsible for the operation of cranes, derricks, or hoists on all GLNPO research vessels are required to receive annual training in the proper use of Ship-Mounted Load Handling Equipment. Training documentation must be made available aboard the vessel and must include the date of training, name and social security number of the individual trained, and the name and qualifications of the trainer.

2.2.3 Powered Industrial Trucks (Fork Lifts)

The operator is one of the most important factors in the safe operation of industrial or fork-lift trucks. To ensure operator competence, and mental and physical fitness, training is required. Initial training must be performed in accordance with the National Safety Council Guidelines followed by refresher courses every two years. Training must include:

- Operator safety rules
- Basic material handling techniques
- Basic instruction on the operation of the truck
- A driver's performance test on an obstacle course which simulates actual driving conditions (e.g. maneuverability)

The operator should be trained to distinguish the differences between a fork-lift truck and a conventional car or truck. For example:

- A lift truck can be steered by either the front or rear wheels
- A lift truck steers more easily loaded than empty
- A lift truck is often driven as much in reverse as in forward gear

Employees who are assigned to operate powered industrial trucks and/or lift trucks should be given a certification card and should be required to carry it. "Rules of Operation" - Safety rules of operation will be given to all industrial truck and lift truck operators. These rules are described in **Attachment 2.6** of this chapter.

2.3 DOCUMENTATION

Documentation for all EPA required training courses and field certifications must be maintained by the branch or office safety representative, the GLNPO Safety Manager, the Branch or Division Safety Representative, the EPA Safety Manager, and the EPA Training Officer. In all cases, each attendant of an EPA required safety course must complete a Standard Form 182 prior to training and forward it to the Regional Training Officer. The information contained in this form will establish a permanent record and be maintained in the Human Resources Branch Training Data Management System.

The GLNPO Safety Manager will record and certify that annually required training courses have been attended by each field inspector or field personnel and issue proper documentation. The GLNPO Safety Manager will also be responsible for maintaining annual medical monitoring and respirator fit testing certification for appropriate field personnel.

2.4 MEDICAL MONITORING SELECTION POLICY

The Regional Medical Monitoring Selection Policy is detailed in Regional Order 3130 and is to be followed by all EPA Region 5 employees to whom it applies. The purpose of the Regional policy is to ensure consistency in EPA's approach to mandatory participation in the Medical Monitoring Program and to ensure that EPA provides the most comprehensive health protection possible for its employees. This program is specifically designed to monitor the health of employees whose work regularly or periodically poses the possibility of exposure to hazardous materials.

Medical monitoring may consist of a series of blood chemistry tests, urinalysis, pulmonary function tests, hearing testing, and chest x-rays. Other types of monitoring may be necessary based on the various hazards encountered by individual personnel. A physician is responsible for identifying and explaining the significance of all findings. No employee should leave the health unit with unanswered questions. Baseline or preplacement examinations are conducted prior to a job assignment where exposure to toxic substances or hazardous materials may be possible.

Three categories in which Medical Monitoring is mandatory are Hazardous Waste Site Workers, Laboratory Personnel, and Other Field Personnel or Inspectors who are exposed to toxic chemicals. Based on this policy, all GLNPO employees who work with potentially toxic chemicals must be monitored for exposure.

The written Medical Monitoring policy is described in **Appendix B** of this manual.

2.5 ADDITIONAL HEALTH AND SAFETY COURSES

As well as courses that are required for field and laboratory personnel, other courses will be offered that are intended for all employees, including Hazard Communication Training for office workers who do not routinely work in unsafe situations. Courses for non-field/lab personnel will be offered that address potentially serious health risks. Some courses will be offered consistently throughout the year while others will be specially scheduled.

2.5.1 Occupational Noise Exposure

In 1983 OSHA promulgated a hearing conservation amendment to the 1971 noise standard. This standard defines an effective program and requires that a hearing conservation program be implemented if workers are exposed to levels equal to or greater than 85 dB measured on the A scale (slow response). When employees are subjected to noise at or above this PEL, regulations state, "the employer shall administer an effective hearing conservation program". Note: EPA employees and contractors, including all GLNPO personnel, are required to wear hearing protection in all work spaces where noise levels reach or exceed 85 dBA.

The hearing conservation program for GLNPO research facilities is described in **Appendix C** of this manual.

2.5.2 Hazard Communication

GLNPO will ensure that a Hazard Communication Program is in place on all research vessels and that all non-laboratory personnel aboard the vessels are familiar with the program. The Hazard Communication Program will be based on the Occupational Safety and Health Administration's regulation stated in 29 CFR 1910.1200. The program will contain a chemical inventory list, material safety data sheets, proper labeling requirements, and employee training specifications. The Hazard Communication Program for GLNPO is described in **Appendix D** of this manual. Laboratory and Field personnel are required to receive training in accordance with the OSHA regulations 29 CFR 1910.1450 "Occupational Exposures to Hazardous Chemicals in Laboratories (refer to section 2.1.1 of this chapter for training requirements).

Note: All laboratory personnel aboard the vessels are protected under the OSHA health standard 29 CFR 1910.1450 "Occupational Exposure to Hazardous Chemicals in Laboratories".

2.5.3 Confined Space Entry

The Occupational Safety and Health Act of 1970 led to the development of the Safety Training and Education Standard (29 CFR 1926.21) for confined spaces. This standard defines a confined space and requires that employees who enter confined spaces are trained to recognize the hazards of a confined space and know the precautions to take when entering and working in such a space. Training is also required for the use of appropriate personal protective and emergency equipment when working in or around confined spaces.

After review of fatality and injury data, the Occupational Safety and Health Administration found the existing standards to be inadequate in protecting workers from the hazards of confined spaces. In June, 1989, OSHA proposed a new rule for the protection of workers in general industry who work in confined spaces. This rule would require the development of a permitting system for confined space entry, and would address training, monitoring, and equipment necessary for entry into confined spaces. As of April 15, 1993, the Permit-Required Confined Spaces regulation has become effective as stated in 29 CFR Part 1910.146, Occupational Safety and Health Administration (OSHA), U.S. Department of Labor. Further information concerning the Confined Space Entry Program and its requirements is described in **Appendix E** of this manual.

2.5.4 Hot Work Procedures

If proper safeguards are not implemented, activities such as cutting, welding, heating, grinding or other activities that produce a flame or spark have the potential for creating a fire or explosion. To minimize hazards associated with hot work, Standard Operating Procedures (SOP) should be developed and followed.

These procedures should include measures for protecting the worker, the establishment of a hot work permitting system, monitoring for chemical exposure, and monitoring for fire and explosion potential. When welding, cutting, or heating, all personnel and contractors must comply with OSHA 29 CFR 1926.353 for Ventilation and Protection in Welding, Cutting, and Heating During Construction Activities. OSHA 29 CFR 1910.252, General Requirements, must also be followed. Additional information outlining Hot Work Procedures is described in **Appendix F** of this manual.

2.5.5 Lockout/Tagout

The purpose of lockout/tagout is to control the release of potentially hazardous energy. The unexpected energization of machines or equipment, or release of stored energy, can cause injury or death. Based on this definition, GLNPO's Lockout/Tagout program is based on the Occupational Safety and Health Administration's (OSHA) Control of Hazardous Energy Sources Standard found in 29 CFR 1910.147. The program is designed to safeguard the health and well being of GLNPO and contractor personnel from a variety of energy sources when performing daily repairs, maintenance, and servicing of their operating equipment. To minimize hazards associated with these activities, personnel must be trained to follow proper lockout/tagout procedures specified in the written program. The GLNPO Lockout/Tagout Program includes energy source surveys, designations of authorized personnel, affected personnel, training, lockout/tagout methods and procedures, restoring equipment to use, and outside contractor information exchange. The GLNPO Lockout/Tagout Program is described in **Appendix G** of this manual.

2.5.6 Bloodborne Pathogens

If it is reasonably expected that an employee may be exposed to human blood or other potentially infectious materials, employers must protect their employees from the hazards of bloodborne pathogens and comply with the OSHA Bloodborne Pathogen Standard, 29 CFR 1910.1030. The standard requires procedures for the use of universal precautions, engineering controls, personal protec ive equipment, proper housekeeping, training, and handling of regulated waste. Due to the isolated nature of GLNPO research vessel shipboard operations, emergency First Aid response may be necessary and exposure to potential bloodborne pathogens may occur. Based on this assessment, a Bloodborne Pathogen Program has been developed for GLNPO research vessels and is described in **Appendix H** of this manual.

2.5.7 Personal Protective Equipment (PPE)

Employees performing tasks requiring the use of personal protective equipment must receive training in the use and limitations of the equipment. Training and program requirements can be found in OSHA 29 CFR 1910.132 and EPA Order 1440.2.

A written Personnel Protective Equipment Program for GLNPO is described in **Chapter 5** and **Appendix I** of this manual. All Emergency Response Personnel aboard the GLNPO Research Vessels must meet the requirements specified in the program.

Attachment 2.1

Training Date: _____
Time: _____
Conducted By: _____

24-HOUR LABORATORY SAFETY TRAINING AGENDA
GREAT LAKES NATIONAL PROGRAM OFFICE
RESEARCH VESSEL PERSONNEL

1. IDENTIFICATION OF HAZARDOUS MATERIAL
2. POTENTIAL SOURCES OF EXPOSURE
3. TOXICOLOGY
4. METHODS OF CONTROL
   - A. Flow Relationships in Hazardous Materials Laboratories
   - B. Ventilation
   - C. Work Practices (Chemical Handling Protocols, Handling and Labeling)
5. MONITORING
6. PERSONAL PROTECTIVE EQUIPMENT
   - A. Clothing
   - B. Emergency Eyewash & Showers
   - C. Respiratory Protection
7. SPILL CONTROL
8. WASTE AND STORAGE MANAGEMENT
9. CHEMICAL HYGIENE PLAN
10. CONTINGENCY PLAN

Attachment 2.2 – GENERAL LABORATORY SAFETY RULES

All laboratories and analytical procedures have certain dangers in common. Almost all analytical procedures use chemicals that are considered toxic or hazardous; examples include acids, bases, and organic solvents. The samples for analysis often contain unknown biological hazards or hazardous and toxic chemicals. For these reasons, certain safety precautions are necessary throughout all laboratories and whenever handling an unknown sample.

Each laboratory and analytical procedure will have safety rules specified in the Laboratory Safety Manual or Standard Operating Procedure. These manuals and procedures will be specific to each laboratory, however, the following laboratory safety rules listed below will apply to all U.S. EPA Region 5 laboratories:

1. All exits and passageways must be unobstructed and allow free exit.

2. Eating, drinking, smoking or applying cosmetics in the laboratory is prohibited.

3. Appropriate personal protective equipment must be worn for each procedure. This includes lab coats, gloves, safety glasses, goggles, and occasionally respirators. No bare legs, feet, sandals or perforated shoes are allowed.

4. Pipetting by mouth is prohibited.

5. All safety signs should be observed and obeyed.

6. All toxic waste must be properly disposed according to RCRA regulations.

7. Flammable, toxic or radioactive material must be stored in approved containers.

8. All containers of chemicals and samples shall be labeled clearly and correctly.

9. All gas cylinders must be firmly secured to prevent falling.

10. All electrical equipment should be properly grounded and electrical cords inspected periodically to ensure that they are in good working condition.

11. Floors and surface working areas are to be kept clean, dry and free from corrosive chemicals. Spills must be cleaned up immediately.

12. Initiation of a laboratory analysis or experiment, not fully described in Standard Methods, AQC Manual or other procedural source, must be preceded by a survey of existing literature. The toxicity and other hazards connected with the reactants and products should be investigated thoroughly before starting any laboratory reaction.

CONTINGENCY PLANS

Contingency plans must be developed and implemented in cases of accidents or emergencies. A spill contingency plan is necessary when toxic or hazardous substances are on site. Personnel must be trained in spill cleanup procedures. Depending on the size of the laboratory and the operations performed in the laboratory, a special team may be needed for emergencies. At smaller installations, the local fire department or emergency response team may be contacted for emergencies. Emergency response teams will require training in respiratory protection, first aid, and spill cleanup. The duties of the team must be clearly defined. Evacuation plans should be distributed, posted and updated yearly.

VENTILATION REQUIREMENTS

Proper ventilation must be provided for analytical procedures and especially those involving the use of toxic substances. Most laboratories will be equipped with fume hoods to provide proper ventilation. Fume hoods must be tested semi- annually to assure proper flow rates and containment. Maintenance must be conducted on a regular basis to insure proper functioning. Exhaust air from glove boxes must be treated by filtration, reaction, absorption, adsorption, electrostatic precipitation or incineration depending on the chemical compounds being used. All exhaust air from primary containment equipment must be discharged by roof- mounted blowers and dispersed clear of occupied buildings and air intakes.

Additionally, a mechanical exhaust ventilation system must be in place to control laboratory room air movement. The air supply must originate from areas where the potential for contamination is low, and exhaust into outside areas.

STORAGE REQUIREMENTS

Proper storage techniques must be followed and are detailed in the following sections.

STORAGE OF COMPRESSED GAS CYLINDERS

Only compressed gas cylinders required for immediate use are allowed to be stored in laboratory work areas. Separate areas should be provided for storage of all other gas cylinders. Empty and full cylinders should not be stored together. Oxygen cylinders must not be stored near flammable gas cylinders. Cylinders of compressed gases must be stored with the valve end up and securely fastened to a wall or immovable object to prevent the cylinder from falling. All cylinders must be securely fastened (strapped or chained) to prevent falls. All cylinders must be kept away from heat sources.

STORAGE OF CHEMICALS

All chemicals or waste materials in the laboratory, stockroom, or bulk storage must be stored according to their chemical compatibility. Storage control will minimize the potential for accidental mixing by spillage, breakage, or fire. Major storage areas are required for the following types of chemical compounds: flammable solvents, corrosive liquids, and strong oxidizers. Additional storage may include areas for radioactive materials, biological hazards, highly toxic materials and compressed gases.

When working in laboratory areas, only the minimum amount of chemical needed for analysis operations should be stored. Separate storage areas (stockrooms) should be provided for the main bulk of chemicals. Incompatible chemicals should either be stored in separate safety storage cabinets, divided by a wall, or enclosed by a tray to prevent accidental mixture. These storage areas and containers should always be properly labeled.

The main storage areas should be divided to accommodate incompatible chemicals. Depending on the amount of chemicals in storage, approved safety storage cabinets can be used. If necessary, storage rooms can also be used.

No more than five one-liter containers of Class I and II materials should be stored in open laboratory areas. Open laboratory areas include reagent shelves and bench tops. All glass containers must be protected by an outer sheath or made of unbreakable glass.

Storage areas for waste collection should be provided and properly designated. Provisions for containment and separation of incompatible waste materials are also required.

Attachment 2.3

Training Date:_____
Time:_____
Conducted By:_____

4-HOUR LABORATORY SAFETY TRAINING AGENDA
GREAT LAKES NATIONAL PROGRAM OFFICE
RESEARCH VESSEL PERSONNEL

1. CHEMICAL HEALTH AND SAFETY RESPONSIBILITIES

   A. Federal Safety and Health Regulations

   B. EPA Occupational Health and Safety Program

   C. OSHA 1910.1450 Occupational Exposures to Hazardous Chemicals in the Laboratories.

2. RIGHT TO KNOW

   A. Chemical Inventory

   B. Hazard Identification

   C. MSDS

   D. Labeling

   E. Training

3. CONTROLS

   A. Chemical Handling and Storage

      1. Flammable Materials
      2. Corrosives
      3. Highly Toxic Chemicals

   B. Ventilation

   C. Personal Protective Equipment

4. SOPs/SAFETY PLANS/EMERGENCY PROCEDURES

5. SPILL CONTROL/HAZARDOUS WASTE

Attachment 2.4

Training Date:_____
Time:_____
Conducted By:_____

TRAINING AGENDA
FOR
GREAT LAKES NATIONAL PROGRAM OFFICE
RESEARCH VESSEL PERSONNEL

I. SUBJECT

1. GLNPO Chemical Hygiene Plan

   - general overview
   - use of PPE
   - health and safety SOPs for analytical procedures
   - MSDS overview

2. Environmental and Health and Safety Procedures

   - hazmat/waste transportation
   - hazmat storage/spill prevention
   - hazardous/common waste
   - contingency plan (plan, SCBA, APR, spill cart, instruments, fire, identify team members)

3. General

   - MSDS review for specific materials
   - safety committee
   - lockout/tagout awareness
   - general comments

II. PARTICIPANTS

Name - Print	Name - Sign	Date

Attachment 2.5 POWERED INDUSTRIAL TRUCKS (FORK LIFTS)

RULES OF OPERATION

Safe rules of operation must be followed by all powered industrial truck drivers. The drivers should keep the following rules conveniently located, refer to them frequently, and use them as a checklist for safety. These rules have been developed in accordance with ANSI-B56.1-1993 (Revised).

1. At the beginning of each use, check brakes, steering controls, forks, hoists, warning devices and lights. Report any defects to the supervisor immediately. Also check to see that the fire extinguisher is in place and properly serviced.

2. Always face the direction of travel.

3. Before you start driving, look to see that no person or object is in your path. Always look before backing up.

4. Do not drive over objects lying on the floor such as trash, lumber and pipes. These could damage the truck, shift or topple the load, or flip out and strike another employee.

5. Use low gear when going down ramps or steep grades. On upgrades, keep the load in front. On downgrades, keep the load in back.

6. Under normal traffic conditions, keep to the right.

7. Avoid quick starts or turns, and jerky stops; always come to a complete stop before reversing the direction of travel.

8. Keep a safe distance between vehicles at all times (three truck lengths).

9. Make a complete stop at all doors, corners, exits and stop signs.

10. No horseplay at any time!

11. Keep alert—concentrate on the job at hand.

12. Remember that pedestrians have the right of way at all times.

13. Never drive with wet or greasy hands. If necessary, keep a towel or rag handy at all times.

14. Reduce speed on wet and slippery floors.

15. Whether loaded or empty, carry forks and platforms on lift trucks as low as possible. This lowers the center of gravity and reduces the possibility of overturning the truck or dumping the load.

16. Don't run trucks onto elevators unless authorized to do so. Be sure you have sufficient clearance before entering any elevator or going through a doorway. Once the truck is in the elevator, shut off the power, set the brakes and stay in the operator's seat in case of an emergency.

17. Check the clearance of any overhead crane or other object before raising forks or tiering.

18. Never use your truck as an elevator for other employees (for example, to service light fixtures or stock material).

19. When leaving the truck at any time, put the forks or platforms in the down position, shut off the power, set the brakes and remove the ignition key.

20. Never leave a truck in an aisle. Park the truck to one side, so traffic will not be blocked.

21. Before driving the truck into a freight car or trailer, always secure the bridging plate with bolts or pins so that it cannot move when the power wheels of the truck pass over it; and before moving the truck onto the bridge or into the carrier, walk into the freight car, truck or trailer and check the floor for holes or weak spots (the weight of your truck might break the floor).

22. Keep your feet and legs inside the guard, which is there to protect you.

23. Drive with extreme care, especially during shift changes.

Chapter 3 - COMPLIANCE REVIEW AND STANDARD OPERATING PROCEDURES

3.1 OVERALL POLICY

All construction, safety-related procurements, and safety-related contract activity must be initially reviewed by the Regional Safety Manager or other professionals working under the direction of the Regional Safety Manager. The initial review of activities is designed to assess any issues which may impact the safety, occupational health or environmental compliance of GLNPO employees, contractors, and the general public. Specifically, activities for initial review by the Regional Safety Manager include hazardous waste handling, transportation, and disposal. Supervisors, managers, property control personnel, and procurement personnel have a responsibility to assist the Regional Safety Manager in the maintenance and enforcement of Health and Safety Office review policies.

As such, visiting scientists (non-EPA or EPA contractors) must have health and safety standard operating procedures, spill programs, and training required to implement spill cleanup procedures if necessary.

3.2 SAFETY & HEALTH REVIEW OF NEW CONSTRUCTION/REPAIRS AND ALTERATIONS

All new facility construction activity and significant repairs or alterations to GLNPO facilities must be reviewed by the Regional Safety Manager or other professionals working under his/her direction. The review will be initiated at the planning and design phases and continue throughout construction. The Safety Manager will recommend design changes or design applications relative to safety, occupational health, fire prevention and protection, hazardous waste handling and disposal, and related program areas. As necessary, the Safety Manager may enlist and coordinate the services of specialized experts in such fields as fire protection, engineering, ventilation, hazardous waste, and other related fields. All facility activity impacting life and safety must have the approval of the Regional Safety Manager before it can be initiated.

3.3 SAFETY & HEALTH REVIEWS OF MARINE REPAIRS AND ALTERATIONS

All construction, repairs or alterations to GLNPO vessels, labs or other marine equipment in any way impacting safety, sanitation, occupational health, fire prevention and protection, environmental compliance or related issues must have the approval of the Regional Safety Manager before such activity is begun. The ship operations contractor should immediately report any potential hazards to the project officer, the GLNPO Safety Manager, and the Regional Safety Manager.

3.4 REVIEW OF HAZARDOUS MATERIALS AND HAZARDOUS WASTE DISPOSAL PROCUREMENT

Procurement requests for hazardous materials and hazardous waste disposal at GLNPO facilities must be approved and authorized in written form by the Safety Manager or an individual who has been designated by the Safety Manager. This procedure is necessary due to the complexity of hazardous materials and hazardous waste disposal regulations, as well as potential agency liability. Standard Operating Procedures for Hazardous Materials and Hazardous Waste Disposal may be found as an Attachment to the Chemical Hygiene Plan found in **Appendix J** of this manual.

3.5 HEALTH AND SAFETY REVIEW OF CONTRACTS

Any contract which involves field or laboratory work or otherwise appears to impact health and safety must be reviewed and approved by the Regional Safety Manager while in the initial planning stage. All EPA contracts must contain provisions which require the contract employee to follow all safety, health, and environmental compliance rules and regulations. If necessary, applicability of compliance rules and regulations will be determined by the Regional Health and Safety Manager.

3.6 REVIEW OF MISCELLANEOUS PROCUREMENT IMPACTING SAFETY, HEALTH OR ENVIRONMENTAL COMPLIANCE

Any procurement issue which has not been addressed in this manual, but appears to impact safety, health, hazardous material, or hazardous waste handling and disposal, should be brought to the attention of the Regional Safety Manager. The Regional Safety Manager will then determine what action, if any, needs to be taken.

3.7 STANDARD OPERATING PROCEDURE POLICY

Written Health and Safety Standard Operating Procedures (SOPs) must be developed for specific tasks (eg. pesticide inspections, PCB inspections, RCRA permit inspection, RCRA enforcement of TSDs, etc.) related to field or laboratory operations. Within these SOPs, all safety, occupational health and environmental compliance (hazardous waste transport and disposal) issues should be addressed. Division or Office management is responsible for the development of safety SOPs. The SOPs should be reviewed by the appropriate Division or Office Safety Representative. All SOPs should be readily available for examination by the Regional Safety Manager during regularly scheduled inspections or surveys.

Health and Safety SOPs may address issues such as Safety Procedures, personal protective equipment, training requirements (formal and on-the-job), medical monitoring and respirator fit testing requirements. Special requirements, such as specific types of respirators and confined space entry procedures, may also be addressed. If appropriate, Regional SOPs may be used to supplement laboratory or field SOPs.

3.8 FIELD SOPs

Standard operating procedures for GLNPO field operations, primarily sediment sampling, are described in **Chapter 10** of this manual.

3.9 LABORATORY CHEMICAL HYGIENE SOPs

Laboratory Chemical Hygiene SOP's on board GLNPO research vessels are described in **Appendix L** of this manual.

3.10 MARINE SOPs

All marine sampling, recovery, and operational activities are required to have SOPs for specific activities which impact safety, health, or environmental compliance.

3.11 EVACUATION PLAN

All GLNPO personnel must participate in facility evacuation training exercises and drills. They are also expected to be familiar with operational procedures identified in each Occupant Emergency Evacuation Plan for their place of work. GLNPO personnel are expected to cooperate fully with the instructions provided. An Occupant Evacuation Plan is described in **Appendix M** of this manual.

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Chapter 4 - RESEARCH VESSEL HEALTH AND SAFETY

GLNPO RESEARCH VESSEL HEALTH AND SAFETY - INTRODUCTION

Unique to GLNPO research vessels are their on-board laboratories. This feature, in addition to normal marine operations, requires adherence to rigorous health and safety procedures. Each vessel must develop and implement a Chemical Hygiene Plan designed to protect laboratory personnel from exposure to health hazards during work operations. Also, all GLNPO shipboard personnel must be familiar with marine safety practices associated with large and small boat operations. Although each vessel is staffed with an experienced professional crew, it is the policy of GLNPO to ensure that all personnel aboard each research vessel receive health and safety training relative to the specific hazards they may encounter while on board.

4.1 GLNPO CHEMICAL HYGIENE PLAN

Since laboratory work operations typically involve exposure to or use of toxic substances, specific health and safety programs are required. These programs are not merely limited to laboratory safety training. The Occupational Safety and Health Administration (OSHA) requires facilities engaged in the laboratory use of hazardous chemicals to develop and implement a "Chemical Hygiene Plan" as specified in 29 CFR 1910.1450. A Chemical Hygiene Plan contains procedures and work practices designed to protect laboratory personnel from exposure to health hazards during their work operations. As such, a Chemical Hygiene Plan must be developed for each GLNPO laboratory. The Chemical Hygiene Plan for GLNPO research vessels is attached as **Appendix J** of this manual.

4.2 SAFETY ORIENTATION VIDEO

New employees on board any GLNPO research vessel are required to receive site- specific safety training. Such training will include basic safety regulations, evacuation procedures, location of PPE, and specific hazards to which they may be exposed while on board the vessel. As part of this training, an instructional video will be presented and personnel will be required to document that they understand its contents. Additionally, all GLNPO personnel and contractors will be required to know the location of the Health & Safety Manual and the Material Safety Data Sheets. A GLNPO vessel orientation narrative appears as **Attachment 4.1** of this chapter.

4.3 BOAT HANDLING AND SEAMANSHIP

As described in Chapter 1 of this manual, the Great Lakes National Program Office maintains a fleet of research vessels specifically outfitted for limnological research. These vessels range in size from 33 feet to 180 feet with sampling missions lasting from 1 to 30 or more days. Those vessels outfitted for daily sampling missions are capable of maneuvering in the rivers, creeks and streams which empty into larger bodies of water. The large vessels, on the other hand, are equipped for lengthy sampling missions in the vast expanses of the Great Lakes.

While many health and safety practice procedures apply to both small and large vessels, there are specific differences. On board a small boat, crew movement, docking, and anchoring are significant safety issues. However, on large vessels, use of heavy equipment becomes a primary safety concern. To achieve maximum health and safety aboard all GLNPO vessels, it is the ultimate responsibility of each crew member to comport themselves in a safe and competent manner.

4.3.1 SAFE BOATING OPERATIONS - SMALL AND LARGE VESSELS

Safe boating is based on good sense, education and experience. Each GLNPO research vessel will be piloted by an accomplished boat operator and a chief scientist will monitor all activities. It is the responsibility of each crew member to report any unsafe condition and to work only within their ability. Should crew members encounter situations about which they are uncertain, they must report to the appropriate ship personnel before taking action. There is always an element of danger when working on the water.

4.3.2 PERSONAL FLOTATION DEVICES

Life jackets (personal flotation devices) must be worn any time the vessel is away from the dock and you are working on deck. A range of sizes are available. Eighty-five percent of the people who have died in boating accidents were not wearing PFDs.

Three types of PFDs frequently in use on EPA research vessels. Type 1 offers the greatest buoyancy and will automatically turn an unconscious person face up while in the water. However, these PFDs are bulky and difficult to work in. The second type of PFD, also called a keyhole vest or type 2 PFD, will keep an unconscious person face up but not as efficiently as a Type 1 PFD. The Type 2 life jacket is used more often when the boat is working close to shore where a quick, land-based rescue is possible. The third type of PFD is a flotation aid or work vest (Type 3 PFD). The Type 3 PFD permits the most freedom of movement but is not designed to hold an unconscious person upright in the water.

In addition to the above listed PFDs, there are two other types of PFDs which may be worn. The first type is what is commonly referred to as a Mustang Suit. Mustang Suits are classified as a type 5 PFD. Most Mustang suits will not right an unconscious person in the water. A Mustang Suit are made to help maintain body heat and may be worn during periods of cold weather conditions. The second type is a survival suit. A survival suit would be worn in the event of an abandon ship. During routine drills all persons are required to donned the suit and are instructed in proper water entry.

4.3.3 MAN OVERBOARD PROCEDURES

If witness to someone falling overboard, the following procedures are to be executed:

1. Scream "Man Overboard" to get the attention of others but **do not take your eyes off the person in the water**. If possible, throw anything that floats overboard to help mark the area in which the person went overboard. If the person is within range, throw them a life ring.

2. Point to the position of the person in the water.

3. At the first cry of "Man Overboard", the boat operator will freeze the Loran C display and place the engines in neutral until the location of the person is known. Once the location is known a rescue pattern can be executed.

4. Prepare to throw the life ring when the victim comes within range.

5. After the victim is pulled to the side of the vessel, the crew can assist the person to get back on board at the direction of the boat operator. **No one is permitted to go into the water to retrieve the victim unless directed by the boat operator.** Jumping into the water in order to "save" someone often results in two victims requiring rescue.

6. If the victim is not recovered immediately or is lost from sight, the Coast Guard should be notified immediately as well as other boats in the area that can assist in a search effort.

7. The boat operator will begin a search pattern using the position placed in the Loran C memory.

4.3.4 FIRE

The possibility of fire on board ship is always of great concern. If fire should occur, it may be fought without the assistance of fire fighting professionals. Consequently, it is important that research vessel personnel keep in mind fire safety when considering all shipboard activities.

When first aboard, vessel personnel will be apprised of the location of fire extinguishers and review the ship's fire fighting plans and procedures. Decisions regarding fire fighting assignments will be made at the beginning of each survey and the boat operator will be responsible for the plan and the assignment of fire fighting stations and duties.

4.3.5 WEATHER

Weather conditions can change rapidly on the water. Therefore, it is important to always be aware of these changes and to act accordingly.

4.3.6 DISTRESS SIGNALS

Despite being as well prepared as possible, there may be times when assistance is needed. In addition, the law requires that assistance be rendered to other boaters in distress.

Visual hand signals may be used to attract attention and indicate a need for help. Additionally, flares and dye markers may be used to signal for assistance. Channel 16 on the marine radio is the channel reserved for emergency transmissions. If a "MAYDAY" distress call is heard from another vessel, do not use Channel 16 and allow the Coast Guard to respond. If a GLNPO research vessel is in a position to render assistance, contact the Coast Guard as soon as there is a break in radio traffic.

4.3.7 FUELING

The greatest potential for fire occurs during the fueling of a vessel. Each year lives and boats are lost due to explosions and fires related to fueling operations.

Standard Operating Procedures have been developed for various GLNPO vessels and can be found as **Attachment 4.3** of this chapter.

4.3.8 RULES OF THE ROAD

The operator of a vessel must have a thorough understanding of the nautical rules of the road. The following rules should be followed by all boat operators:

1. If you encounter a vessel coming head on, make a clear turn to the right to indicate your intention to pass the other vessel on your left.

2. You are to give way if a vessel is approaching your line of direction from your right.

3. Always keep in mind that the people aboard the other vessel may not know what they are doing so be ready to take evasive action if necessary.

4. Sailboats under sail always have the right of way.

5. If you are passing a vessel, you must stay clear.

6. You are responsible for your wake and any damage that it may cause. You must obey all speed limits and No Wake Zones.

4.4 SMALL BOAT OPERATIONS

In addition to use of personal flotation devices, man overboard procedures, fire safety, weather awareness, distress signals, fueling procedures, and rules of the road, small boat operations include embarking, anchoring, and docking activities.

EMBARKING PROCEDURES

The following procedures are used when leaving the dock:

1. Don personal flotation devices (PFDs).

2. Start engines and allow them to warm up.

3. Follow the boat operator's directions for releasing dock lines making sure that no lines are in the water.

4. **NEVER CAST OFF FROM THE DOCK UNTIL ORDERED TO DO SO BY THE BOAT OPERATOR.**

DOCKING PROCEDURES

When docking the boat, the boat operator needs to concentrate on the docking procedure. Try to avoid conversation at this time, pay close attention to what is going on and be prepared to assist as directed by the boat operator. The following should be considered when docking:

1. The boat operator will assign duties. Learn the docking procedures and be prepared to implement them.

2. Secure the fenders to the side of the vessel as directed by the boat operator.

3. Prepare bow and stern dock lines. A crew member should standby each line.

4. As the vessel comes into the dock, watch for any obstructions in the water that the boat operator may not see and immediately bring them to his/her attention.

5. **Never jump from the vessel to the dock.** One could fall and be crushed between the dock and the vessel.

6. Never use arms or legs to slow the boat as it comes into dock. The boat operator will use the boat's engines to do this.

7. As the boat enters the dock, make sure that you are not blocking the boat operator's view.

ANCHORING PROCEDURES

An anchor is a device used to hold a vessel in position while away from the dock. One, two or three anchors may be used to hold a vessel in position. The following is the general procedure for deploying and retrieving anchors:

Deployment

1. Make sure the anchor line is attached to the anchor and the boat.

2. Do not toss the anchor out away from the boat. Rather, lower it when signaled by the boat operator.

3. As the boat reverses, take a turn around the cleat and let the line out. Never allow the line to run freely through your hand. An attempt to stop a free-running line can deliver a burn or even a deep cut to your hand.

4. When you are letting line out, make sure you are not standing on the anchor line and that it is not tangled around your foot or any other object in the boat.

5. The length of rope needed to be played out, called the scope, is generally 6 to 8 times the depth of the water in which you are anchoring.

6. When securing the anchor line to the cleat, take at least two turns before cleating-off the anchor line.

RETRIEVAL

1. As the boat moves forward and the strain is removed from the anchor line, release the anchor line and begin taking it in. Always keep a turn on the cleat.

2. When the anchor line is running straight up and down, try to pull up the anchor. If the anchor is not free, turn the cleat a few times and signal the boat operator to run forward slowly while you keep the anchor line fast. When the boat operator stops the forward movement of the boat, try once more to lift the anchor. Replace the anchor on deck and secure it prior to getting underway.

KNOTS

There are a few basic knots that are useful when working on a vessel. They include the cleat hitch, figure eight knot, round turn and two half hitches, the bowline knot and the clove hitch.

4.5 LARGE BOAT OPERATIONS

Again, the use of personal flotation devices, man overboard procedures, fire safety, weather awareness, distress signals, fueling procedures, and rules of the road, apply to large vessels, as well as small vessels. The large vessels, however, are outfitted with heavy equipment such as "A" frames, knuckle/pivot cranes, rigging, and hoists. Standard Operating Procedures for deck safety practices during use of this type of heavy equipment must be addressed and enforced by the ship's operating contractor.

Attachment - 4.1 WELCOME ABOARD STATEMENT FOR THE R/V LAKE GUARDIAN

The United States Environmental Protection Agency, the ship's operations contractor, and the Master, officers and crew of the R/V Lake Guardian welcome you aboard. We hope your stay on board will be a pleasant one. Our goal will be to assist you to bring your research programs to a safe and successful conclusion.

We appreciate your cooperation in accomplishing this goal and we ask that you review the material in this handout. Should you have any questions or encounter problems regarding the items presented herein, please bring them to the attention of the ship's Master via the Chief Scientist.

This informational handout will provide some essential facts and useful information to insure you have a safe and comfortable voyage. Please do not hesitate to ask questions concerning any subject about the ship. We will be happy to provide explanations and/or demonstrations when possible. If you find you are having a problem, please bring it to the attention of the ship's Master (Captain), the Mate on watch or the Chief Scientist.

OPERATING AUTHORITY

The Lake Guardian is operated for and under the control of the U. S. EPA's Great Lakes National Program Office. An operating crew of professional seamen is furnished by the ship's contractor. Laboratory support is provided by personnel from EPA's on-site Central Regional Laboratory. Lab and ship safety overview is provided by an outside safety consulting firm. When the ship is at sea, a senior scientist from U. S. EPA/GLNPO is assigned responsibility for all movements and activities aboard the ship, in conjunction with the ship's Master. These two individuals have the final word on any issue which might arise while at sea.

MISSION

Lake Guardian's mission is to gather information about the chemical and biological conditions of the Lakes, and to monitor the pollutant concentrations in water, sediments, air, fish, and other biological matter. On occasion, the ship may be used for other scientific interests, including research activities of other federal, state and local agencies as well as academia.

GENERAL DESCRIPTION

Lake Guardian is U. S. EPA's newest, largest and cleanest surveillance and monitoring vessel. It was converted in 1990 from a former offshore oil field service vessel originally built in 1981. During the conversion period, all of the structures aft of the exhaust stacks were added.

In 1991, the four container labs and the HVAC (heating, ventilation and air conditioning) van were added to the ship, as well as the large stern U-Frame. The ship is 180 feet in overall length, with a beam (width) of 40 feet. Depending on loading conditions, it can have a draft (underwater portion of the hull) of up to 11 feet. Lake Guardian is powered by two 1125 HP Caterpillar diesel engines, each driving its own propeller shaft. Electrical power is provided by three 135 KW Caterpillar diesel engines. A bow thruster, powered by a 300 HP Caterpillar diesel engine, aids in the ship's ability to maneuver in close quarters. It is also used in station keeping. When operating at full power, the ship can make 13 miles per hour and will consume in excess of 100 gallons of fuel per hour.

LIFE ABOARD LAKE GUARDIAN

Knowledge of the ship's layout will assist you in accomplishing your daily activities, and is vital in determining the appropriate response for emergency situations, both real and simulated. Please study the deck plans, note the locations of fixed fire stations, portable fire extinguishers and abandon ship stations.

Because of Lake Guardian's unique mission, schedules and routines are inherently rigid. It is suggested that you keep abreast of vessel movements, scientific activities and the weather so that you are aware of emerging conditions which may affect you and/or your work aboard the ship.

Lake Guardian has berthing for up to 43 persons, including the crew. Most staterooms set aside for scientific personnel have two fixed bunks (upper and lower) as well as a fold-down pullman bunk for a third person. These pullman bunks are used only when a maximum complement of personnel is carried aboard; some crews may have to share accommodations. Stateroom assignments are made jointly by the ship's Master and the Chief Scientist.

Each stateroom and bunk contains a card which designates the emergency mustering location for the persons in that stateroom.

REPORTING ABOARD

Plan to report aboard at least one hour before sailing time. Upon arrival you should report to the Chief Mate, who will sign you aboard and provide an orientation of the vessel's physical arrangements including assigned berthing area. Berthing assignments for science personnel are made by the Chief Scientist.

Linens, towels, etc. will be provided when you arrive on board. Upon departure from the vessel, kindly strip your bunk and store the soiled linen in the laundry basket provided near the washing machine on the port side of the main deck, forward. Fresh linen will be issued once per week, the time of which will be announced in advance.

For your safety, you are required to accomplish the following immediately after receiving your berthing assignment:

- Insure that your life jacket is in place on your bunk.
- Insure that your survival suit is in place on your bunk.

Refer to the station bill posted in the mess deck and find your assigned life raft, fire and abandon ship stations.

Become familiar with the signals for fire and abandon ship; a drill will be conducted upon departure from the first port and at least once per week thereafter.

Safety Rule:

One hand for you and one hand for the ship. Always keep one hand free. Make two trips if necessary or get someone to help you. In addition, all persons working or observing on deck must wear a work vest. NO EXCEPTIONS.

PERSONAL POSSESSIONS

The ship's operating contractors cannot be responsible for the loss of personal possessions. Items of significant value should be left ashore, or given to the ship's Master for storage in the ship's safe.

SAILING TIME

Science personnel should plan to arrive on board at least one hour before sailing time. Allow sufficient time prior to departure to turn in rental cars, load equipment, etc.. Sailing time may be delayed at the Master's discretion if science/technical personnel report aboard in a condition which he considers unsafe. Further delays in sailing are announced should equipment malfunction occur, or when late deliveries of equipment and supplies are experienced.

WORK DECK

The Chief Scientist or his designated representative will advise the Master of any sampling, launching, streaming or retrieval activity required. The ship's cranes, winches, tools, rigging, etc. are to be operated by ship's crew only; however, during extended operations, scientific personnel may be asked to participate in these activities.

Scientific personnel should direct all inquiries to the Master, through the Chief Scientist, in matters concerning work on deck, navigation, safe working parameters, use of ship's equipment etc. Use of this procedure will avoid working at cross purposes.

When the ship is entering or leaving port, or during periods of poor visibility or high traffic activity, and at the Master's discretion, the pilothouse should not be visited. You may assemble on the 0-1 level (focsel) deck if you so desire.

While steaming during hours of darkness, no unauthorized lights should be displayed on deck. This is to comply with the Rules of the Road; lights shown forward of the deck house are detrimental to the night vision of the conning officer. While on station and engaged in sampling/test operations, adequate night lighting will be provided.

LABORATORIES AND SCIENTIFIC EQUIPMENT

There are four laboratories located aboard the Lake Guardian: chemistry lab (lower deck forward), microbiology lab (main deck midship-starboard side), wet lab (main deck-forepart of deckhouse) and container lab (boat deck-starboard side). The equipment and instruments contained in these labs are primarily for support of the basic monitoring function of the ship. Some or all of this equipment may be made available for use by guest scientists at the discretion of the U. S. EPA Project Officer or his designated representative.

MESSING

Our cook prepares and serves varied and nutritious meals for our crew and the embarked scientific party. The small refrigerator below the salad bar is designated for your use during other than meals hours. Feel free to partake of the cold cuts, leftovers, fruit and soft drinks provided. Normal meal hours are as follows:

Breakfast: 0730-0830
Lunch: 1130-1230
Dinner: 1700-1800

When large numbers of personnel are carried aboard, it is requested that meals be eaten comfortably but quickly. We have seating for 19 but must feed up to 43 personnel.

The stainless steel refrigerator in the galley and the walk-in refrigerator and freezer contain food for preparation of regular meals. We request that you do not open these units, but rather ask the cook for any item which you cannot find in the salad bar refrigerator. We further request that any mess gear used outside normal meal hours be scraped clean by the user and placed in the cart provided for dishes and utensils to be cleaned.

We request that the mess area be vacated by all personnel 30 minutes before and after each meal in order that the cook have ample space to prepare the area for meals and to square away after meals.

Certain other amenities are expected and required:

1. Appropriate clothing shall be worn to meals; this includes shirt and shoes.

2. Good breeding and shipboard protocol dictate that caps and other headgear be doffed when entering the mess area while the ship's company is at mess.

3. Late arrivals to meals due to watch standing is expected, however, general nonconformity with the meal schedule is considered poor form. On occasion, ship's crew reporting for watch may be served ahead of someone who has been waiting. Since the crew must report on time, your consideration will be appreciated.

4. When entering the mess area for meals, neither space nor sanitary considerations permit visits to the galley to look things over. A menu is posted on the whiteboard. Take your dinnerware from the dispensers provided and proceed to the salad bar and hot table and then to the seat of your choice.

5. The mess area is designated a no smoking area at all times.

6. During mealtimes, no food is permitted in the lounge.

SAFETY EVACUATION PROCEDURES

Ship evacuations will be conducted in accordance with the ship's station bill, as shown in **Attachment 7.1** of the Safety, Health, & Environmental Safety Manual.

ALCOHOLIC BEVERAGES AND ILLEGAL DRUGS

Alcoholic beverages and illegal drugs in any form will not be consumed or brought aboard by any persons. Any personnel found to be in violation of this regulation will have the substance confiscated and, upon arrival at the next port, will be discharged from the vessel.

FIREARMS

Firearms are prohibited on board the R/V Lake Guardian.

WASHING MACHINES AND DRYERS

Washing machines and dryers are provided and available for use by all personnel aboard.

The washing machines should only be used when you have a full load; use for partial loads will deplete the ship's fresh water supply. Use less than ½ cup of detergent for a full load; additional soap creates heavy sudsing which strains the machine and can leave residue in your clothing. The washing machines may be used while the ship is on station and collecting samples since the ship retains all waste water.

POTABLE WATER AND SEWAGE CAPACITY

The potable water and sewage holding capacity on board the Lake Guardian is severely limited. The showers, sinks, washing machine and toilets drain into a holding tank (for later transfer ashore).

The following guidelines are set forth to ensure conservation of resources:

- Flush toilets only when required for human waste; all other disposable materials should be placed in a waste container. Also, please remain till the water has stopped running in the toilet. Any toilet, shower, or faucet that leaks must be reported immediately to the Bridge so it can be repaired.

- When showering, please be brief; the water supply is limited. Each shower head is equipped with a mixing valve. In order to control the water temperature turn the handle counterclockwise to increase the temperature and clockwise to decrease the temperature.

- Showers and washing machines can be used when on or approaching a sampling station. Low phosphate detergent is provided for your use by the ship; do not use other types of soap in the washing machine.

CLEANLINESS

Cleanliness of the vessel is an "all hands" exercise. Our limited crew size demands that each person on board do his share to assist in maintaining clean, neat and orderly conditions. Personnel assigned to each space are responsible for the cleanliness of that space. Public areas of the vessel (heads, passageways, mess area, etc.) are assigned to members of the crew for cleaning. Your cooperation in this matter will be appreciated.

COMMUNICATIONS

Daily radio contact is made with the (ship's contractor's) office. The Master can handle routine or emergency traffic via the marine operator as may be required. Personal and business calls will be made by credit card or collect only, unless prior arrangements have been made to pay for this service.

Use of the cellular phone, when activated and in a coverage area, is for government and business use only. Permission to use same must be obtained from the Master or Chief Scientist and all calls must be logged.

SMOKING

In an effort to maintain the enclosed spaces of the ship as "sweet smelling" as possible, we request that smokers restrict this activity to outside areas.

FUELING

Whenever the vessel is taking on fuel, as evidenced by the red "bravo" flag flying by day or by a red light on the mast at night, the smoking lamp shall be extinguished throughout the vessel. Announcements shall be made to further warn personnel when fueling operations are being conducted. **There shall be no smoking throughout the vessel.**

STANDARD OPERATING PROCEDURES

A manual of Standard Operating Procedures (SOPs) is located in the main deck passageway. Included in this manual are procedures for performing certain functions aboard the vessel which could endanger the safety of personnel or equipment. At their earliest opportunity, all scientific personnel should read and become familiar with these procedures. Further, in the laboratory office is the U.S. EPA Region 5 Health and Safety Manual. Again, it is incumbent upon all scientific personnel to become familiar with this manual and to abide by the requirements contained therein.

RESPONSIBILITY OF THE MASTER

The ship's Master (Captain) assumes responsibility for the safe operation and navigation of the ship. He is responsible for the safety of all personnel on board and may curtail, delay or cease all operations if, in his judgment, the vessel, personnel or equipment are in jeopardy. The Master will confer and cooperate with the Chief Scientist/Trial Director in making decisions at these times, and will comply with the survey plan so far as possible to achieve the goals set forth therein.

TOURS OF THE VESSEL BY THE PUBLIC

The R/V Lake Guardian is funded by taxpayer dollars and an effort is made by U.S. EPA and (the ship's contractor) to insure that the vessel is available to the general public on a not-to-interfere basis with scientific operations, repair and maintenance work or crew privacy. With this in mind, scientific and crew personnel desirous of providing interested parties with a tour of the vessel must first check with the Master or the U. S. EPA Project Scientist before conducting such a tour. We request that tours be conducted only during the hours of 0900-2000, with the exception of mealtimes. Only public areas (lab passageways, pilothouse, open deck areas) of the vessel may be shown. Berthing areas are off limits for tours, except for unoccupied cabins which may have open doors for viewing purposes only. Visitors should not enter the cabins.

This concludes our indoctrination procedure for our planned cruise. If we work as a team, everyone does their job, and Mother Nature smiles upon us, we can expect another rewarding experience both personally and professionally.

Chapter 5 - PERSONAL PROTECTIVE EQUIPMENT

5.1 GLNPO PERSONAL PROTECTIVE EQUIPMENT POLICY

It is the policy of GLNPO to determine the levels of protection required for personnel assigned to specific field or laboratory operations and to provide appropriate protective clothing and equipment, as well as enforcing its correct use. Training requirements, use and control of personal protective clothing, and equipment are further discussed in **Appendix I** of this manual. A Personal Protective Clothing and Equipment Assignment Sheet is included as **Attachment 5.1.** Workplace hazard assessmements for all GLNPO operations, which include the types of personal protective equipment required for recognized hazards, are included in **Attachment 5.2**. The assessments are designed to comply with the requirements of 29 CFR 1910 Subpart I.

Each year all GLNPO field and laboratory personnel will be surveyed regarding existing health and safety equipment inventory as well as any additional requirements. All GLNPO safety purchases must be reviewed and approved by the Region 5 Safety Manager. Please also refer to Chapter 12 of the U.S. EPA Region 5 Health and Safety Manual.

5.2 LEVELS OF PROTECTION

I. INTRODUCTION

Response personnel must wear protective equipment when there is a probability of contact with hazardous substances that could affect their health. This includes vapors, gases, or particulates that may be generated by site activities, and direct contact with skin-affecting substances. Full face piece respirators protect lungs, gastrointestinal tract, and eyes against airborne toxicants. Chemical-resistant clothing protects the skin from contact with skin-destructive and absorbable chemicals. Good personal hygiene habits prevent ingestion of material.

Equipment to protect the body against contact with known or anticipated toxic chemicals has been divided into four categories according to the degree of protection afforded:

Level A: Should be worn when the highest level of respiratory, skin, and eye protection is needed.

Level B: Should be worn when the highest level of respiratory protection is needed, but a lesser degree of skin protection is needed.

Level C: Should be worn when a lesser level of respiratory protection is needed than Level B. Skin protection criteria are similar to Level B.

Level D: Should be worn only as a work uniform and not on any site with respiratory or skin hazards. It provides no protection against chemical hazards.

The Level of Protection selected should be based on the hazard and risk of exposure.

Hazard: Type and measured concentration of the chemical substance in the ambient atmosphere and its toxicity.

Risk: Potential for exposure to substances in air, splashes of liquids, or other direct contact with material due to work being done.

In situations where the type of chemical, concentration, and possibilities of contact are not known, the appropriate Level of Protection must be selected based on professional experience and judgment until the hazards can be better characterized.

Personal protective equipment reduces the potential for contact with toxic substances. Additionally, safe work practices, decontamination, site entry protocols, and other safety procedures further ensure the health and safety of responders. Together, these provide an integrated approach for reducing harm to response personnel.

II. LEVELS OF PROTECTION

A. Level A Protection

1. Personal Protective Equipment

- Pressure-demand, supplied-air respirator approved by the Mine Safety and Health Administration (MSHA) and National Institute for Occupational Safety and Health (NIOSH). Respirators may be:

  1. pressure-demand, self-contained breathing apparatus (SCBA), or

  2. pressure-demand, airline respirator (with an escape bottle for atmospheres with, or having the potential for, Immediately Dangerous to Life or Health (IDLH) contaminant concentrations).

- Fully encapsulating chemical-resistant suit
- Coveralls*, or
- Long cotton underwear*
- Gloves (inner), chemical-resistant
- Boots, chemical-resistant, steel toe and shank. (Depending on suit construction, worn over or under suit boot)

- Hard hat* (under suit)*
- Disposable gloves and boot covers* (Worn over fully encapsulating suit)
- Cooling unit*
- 2-Way radio communications (intrinsically safe)

* Optional

2. Criteria for Selection

Meeting any of these criteria warrants use of Level A Protection;

- The chemical substance has been identified and requires the highest level of protection for skin, eyes, and the respiratory system.
- Substances with a high degree of hazard to the skin are suspected to be present, and skin contact is possible. Skin contact includes: splash, immersion, or contamination from atmospheric vapors, gases, or particulates.
- Operations must be conducted in confined, poorly ventilated areas until the absence of substances requiring Level A protection is determined.
- Direct readings on field Flame Ionization Detectors (FID) or Photo ionization Detectors (PID) and similar instruments indicate high levels of unidentified vapors and gases in the air.

3. Guidance on Selection

a. Fully encapsulating suits are primarily designed to provide a gas or vapor tight barrier between the wearer and atmospheric contaminants.
Therefore, Level A is generally worn when high concentrations of airborne substances that could severely affect the skin are known or presumed to be present. Since Level A requires the use of a self-contained breathing apparatus, more protection is afforded to the eyes and respiratory system.

Until air surveillance data are available to assist in the selection of the appropriate Level of Protection, the use of Level A may have to be based on indirect evidence of the potential for atmospheric contamination or other means of skin contact with substances having severe skin-affecting properties.

Conditions that may require Level A protection include:

- Confined spaces: Enclosed, confined, or poorly ventilated areas are conducive to build up of toxic vapors, gases, or particulates.
  An entry into an enclosed space does not automatically warrant Level A protection, but should serve as a cue to carefully consider the justification for a lower Level of Protection.

- Suspected or known highly toxic substances: Various substances that are highly toxic, especially through skin absorption, require Level A Protection. Technical grade pesticides, concentrated phenolic compounds, Poison "A" compounds, fuming corrosives, and a wide variety of organic solvents are of this type. Carcinogens, and infectious substances known or suspected to be involved may require Level A protection. Field instruments may not be available to detect or quantify air concentrations of these materials. Until these substances are identified and their concentrations determined, maximum protection is necessary.

- Visible indicators: Visible air emissions from leaking containers or railroad or truck tank cars, as well as smoke from chemical fires and others, indicate high potential for concentrations of substances that could be extreme respiratory or skin hazards.

- Job functions: Initial site entries are generally walk-throughs in which instruments and visual observations are used to make a preliminary evaluation of the hazards.

In initial site entries, Level A should be worn when:

- There is a probability for exposure to high concentrations of vapors, gases, or particulates.

- Substances are known or suspected of being extremely toxic directly to the skin or by being absorbed.

Subsequent entries are to conduct the many activities needed to reduce the environmental impact of the incident. Levels of Protection for later operations are based not only on data obtained from the initial and subsequent environmental monitoring, but also on the protective properties of suit material as well. The probability of contamination and ease of decontamination must also be considered.

Examples of situations where Level A has been worn are:

- Excavating soil to sample buried drums suspected of containing high concentrations of dioxin.
- Entering a cloud of chlorine to repair a valve broken in a railroad accident.
- Handling and moving drums known to contain oleum.
- Responding to accidents involving cyanide, arsenic, and undiluted pesticides.

b. The fully encapsulating suit provides the highest degree of protection to skin, eyes, and the respiratory system given that the suit material resists chemicals during the time the suit is worn. While Level A provides maximum protection, all suit materials may be rapidly permeated and degraded by certain chemicals. These limitations should be recognized when specifying the type of fully encapsulating suit. Whenever possible, the suit material should be matched with the substance it is used to protect against.

B. Level B Protection

1. Personal Protective Equipment

- Pressure-demand, supplied-air respirator (MSHA/NIOSH approved). Respirators may be:

  1. pressure-demand, self-contained breathing apparatus, or
  2. pressure-demand, airline respirator (with escape bottle for IDLH or potential for IDLH atmosphere).

- Chemical-resistant clothing (includes: overalls and long-sleeved jacket or hooded, one or two-piece chemical-splash suit or disposable chemical-resistant, one-piece suits)
- Long cotton underwear*, or
- Coveralls*
- Gloves (outer), chemical-resistant
- Gloves (inner), chemical-resistant
- Boots (outer), chemical-resistant, steel toe and shank

- Boot covers (outer), chemical-resistant (disposable)*
- Hard hat (face shield*)
- 2-Way radio communications (intrinsically safe)

* Optional

2. Criteria for Selection

Meeting any one of these criteria warrants use of Level B protection:

The type and atmospheric concentration of toxic substances has been identified and requires a high level of respiratory protection, but less skin protection than Level A. These would be:

- Atmospheres with IDLH concentrations, but the substance or its concentration in air does not represent a severe skin hazard, or
- Chemicals or concentrations involved do not meet the selection criteria permitting the use of air-purifying respirators.

The atmosphere contains less than 19.5% oxygen.

It is highly unlikely that the work being done will generate high concentrations of vapors, gases or particulates, or splashes of material that will affect the skin.

Atmospheric concentrations of unidentified vapors or gases are indicated by direct readings on instruments such as the FID or PID or similar instruments, but vapors and gases are not suspected of containing concentrations of skin toxicants.

3. Guidance on Selection

a. Level B does not afford the maximum skin (and eye) protection as does a fully encapsulating suit since the chemical-resistant clothing is not considered gas, vapor, or particulate tight. However, a good quality, hooded, chemical-resistant, one-piece garment, with taped wrist, ankles, and hood does provide a reasonable degree of protection against splashes of liquids and lower concentrations of chemicals in the ambient air.

At most abandoned, outdoor hazardous waste sites, ambient atmospheric gas or vapor levels usually do approach concentrations sufficiently high to warrant Level A protection. In all but a few circumstances, Level B should provide the protection needed for initial reconnaissance.

Subsequent operations require a re-evaluation of Level B protection based on the probability of being splashed by chemicals, their effect on the skin, or the presence of hard-to-detect air contaminants. The generation of highly toxic gases, vapors, or particulates, due to the work being done, must also be considered.

b. The chemical-resistant clothing required in Level B is available in a wide variety of styles, materials, construction detail, and permeability. One or two-piece garments are available with or without hoods. Disposable suits with a variety of fabrics and design characteristics are also available. Taping joints between hood and respirator reduces the possibility for splash and vapor or gas penetration, but is not a gas tight barrier.

These factors and other selection criteria all affect the degree of protection afforded. Therefore, a specialist should select the most effective chemical-resistant clothing based on the known or anticipated hazards and job function.

Level B equipment does provide a high level of protection to the respiratory tract. Generally, if a self-contained breathing apparatus is required, selecting chemical-resistant clothing (Level B) rather than a fully encapsulating suit (Level A) is based on the need for less protection against known or anticipated substances affecting the skin. Level B skin protection is selected by:

- Comparing the concentrations of known or identified substances in air with skin toxicity data.
- Determining the presence of substances that are destructive to or re-absorbed through the skin by liquid splashes, unexpected high levels of gases, vapor, or particulates, or by other means of direct contact.
- Assessing the effect of the substance (at its measured air concentrations or potential for splashing) on the small areas left unprotected by chemical-resistant clothing. A hooded garment, taped to the mask with boots and gloves taped to the suit, further reduces the area for potential skin exposure.

C. Level C Protection

1. Personal Protective Equipment

- Air-purifying respirator, full-face, canister-equipped (MSHA/NIOSH approved)
- Chemical-resistant clothing (includes: coveralls or hooded, one-piece or two-piece chemical splash suit or chemical-resistant hood and apron; disposable chemical-resistant coveralls)
- Coveralls*, or
- Long cotton underwear*

- Gloves (outer), chemical-resistant
- Gloves (inner), chemical-resistant
- Boots (outer), chemical-resistant, steel toe and shank
- Boot covers (outer), chemical resistant (disposable)*
- Hard hat (face shield*)
- Escape mask*
- 2-Way radio communications (intrinsically safe)

*Optional

2. Criteria for Selection

Meeting all of these criteria permits use of Level C protection:

- Oxygen concentrations are not less than 19.5% by volume.
- Measured air concentrations of identified substances will be reduced by the respirator below the substance's threshold limit value (TLV) and the concentration is within the service limit of the canister.
- Atmospheric contaminants, liquid splashes, or other direct contact will not adversely affect any body left unprotected by chemical-resistant clothing.
- Job functions do not require self-contained breathing apparatus.
- Direct readings are a few ppms above background on instruments such as the FID or PID.

3. Guidance on Selection

a. Level C protection is distinguished from Level B by the equipment used to protect the respiratory system, assuming the same type of chemical-resistant clothing is used. The main selection criterion for Level C is that atmospheric concentrations and other selection criteria permit wearing air-purifying respirators.

The air-purifying device must be a full-face respirator (MSHA/NIOSH approved) equipped with a canister suspended from the chin or on a harness.

Canisters must be able to remove the substances encountered. Half-masks or cheek cartridge equipped, full-face masks should be used only with approval of a qualified health and safety professional, preferably a Certified Industrial Hygienist.

In addition, a full-face, air-purifying mask can be used only if:

- Substance has adequate warning properties.
- Individual passes a qualitative fit test for the mask.
- Appropriate cartridge/canister is used, and its service limit concentration is not exceeded.
- Site operations are not likely to generate unknown compounds or excessive concentrations of already identified substances.

b. An air surveillance program is part of all response operations when atmospheric contamination is known or suspected. It is particularly important that the air be thoroughly monitored when personnel are wearing air-purifying respirators. Periodic surveillance using direct-reading instruments and air sampling is needed to detect any changes in air quality necessitating a higher level of respiratory protection.

c. Level C protection with a full-face, air-purifying respirator should be worn routinely in an atmosphere only after the type of air contaminant is identified, concentrations measured and the criteria for wearing an air-purifying respirator met. A decision on continuous wearing of Level C protection must be made after assessing all safety considerations, including:

- The presence of (or potential for) organic or inorganic vapors or gases against which a canister is ineffective or has a short service life.
- The known (or suspected) presence in air of substances with low TLVs or IDLH levels.
- The presence of particulates in air.
- The errors associated with both the instruments and monitoring procedures used.
- The presence of (or potential for) substances in air which do not elicit a response on the instrument used.
- The potential for higher concentrations in the ambient atmosphere or in the air adjacent to specific site operations.

d. The continuous use of air-purifying respirators (Level C) must be based on the identification of the substances contributing to the total vapor or gas concentration and the application of published criteria for the routine use of air-purifying devices. Unidentified ambient concentrations of organic vapors or gases in air approaching or exceeding a few ppm above background require, at a minimum, Level B protection.

D. Level D Protection

1. Personal Protective Equipment:

- Coveralls
- Gloves*
- Boots/shoes, leather or chemical-resistant, steel toe and shank
- Safety glasses or chemical splash goggles*
- Hard hat (face shield*)
- Escape mask*

* Optional

2. Criteria for Selection

Meeting any of these criteria allows use of Level D protection:

- No contaminants are present.
- Work functions preclude splashes, immersion, or potential for unexpected inhalation of any chemicals.

Level D protection is primarily a work uniform. It can be worn only in areas where there is no possibility of contact with contamination.

NOTE: Levels C & D are the most common levels of protection used during GLNPO field operations.

III. PROTECTION IN UNKNOWN ENVIRONMENTS

In all incident response, selecting the appropriate personal protective equipment is one of the first steps in reducing health effects from toxic substances. Until the toxic hazards at an incident can be identified and personnel safety measures commensurate with the hazards instituted, preliminary safety requirements must be based on experience, judgment, and professional knowledge.

Of primary concern in evaluating unknown situations are atmospheric hazards. Toxic concentrations (or potential concentrations) of vapors, gases, and particulates, low oxygen content, explosive potential, and the possibility of radiation exposure all represent immediate atmospheric hazards. In addition to taking air measurements to determine these hazards, visual observation and review of existing data can help determine the potential risks from other materials.

Once immediate hazards, other than toxic substances, have been eliminated, the initial on-site survey and reconnaissance continues. Its purpose is to further characterize toxic hazards and, based on these findings, refine preliminary safety requirements. As data is obtained from the initial survey, the Level of Protection and other safety procedures are adjusted. Initial data also provide information upon which to base further monitoring and sampling requirements. No one method can determine a Level of Protection in all unknown environments. Each situation must be examined individually.

IV. ADDITIONAL CONSIDERATIONS FOR SELECTING LEVELS OF PROTECTION

Other factors which should be considered in selecting the appropriate Level of Protection are:

A. Heat and Physical Stress

The use of protective clothing and respirators increases physical stress, in particular, heat stress, on the wearer. Chemical protective clothing greatly reduces natural ventilation and diminishes the body's ability to regulate its temperature. Even in moderate ambient temperatures, the diminished capacity of the body to dissipate heat can result in one or more heat-related problems.

All chemical protective garments can be a contributing factor to heat stress. Greater susceptibility to heat stress occurs when protective clothing requires the use of a tightly fitted hood against the respirator facepiece, or when gloves or boots are taped to the suit. As more body area is covered, less cooling takes place, increasing the probability of heat stress. Whenever any chemical-protective clothing is worn, a heat stress recovery monitoring program must occur.

Wearing protective equipment also increases the risk of accidents. It is heavy, cumbersome, decreases dexterity, agility, interferes with vision, and is fatiguing to wear. These factors all

increase physical stress and the potential for accidents. In particular, the necessity of selecting Level A protection should be balanced against the increased probability of heat stress and accidents. Level B and C protection somewhat reduces accident probability because the equipment is lighter, less cumbersome, and vision problems are less serious.

B. Air Surveillance

A program must be established for routine, periodic air surveillance when Level A & B situations are expected. Without an air surveillance program, any atmospheric changes could go undetected and jeopardize response personnel. Surveillance can be accomplished with various types of air pumps and filtering devices followed by analysis of the filtering media, portable real-time monitoring instruments located strategically on site; personal dosimeters, and periodic walk-through by personnel carrying direct-reading instruments.

C. Decision Logic for Selecting Protective Clothing

No adequate criteria, similar to the respiratory protection decision-logic, are available for selecting protective clothing. A concentration of a known substance in the air approaching a TLV or permissible exposure limit for the skin does not automatically warrant a fully encapsulating suit. A hooded, high quality, chemical-resistant suit may provide adequate protection. The selection of Level A over Level B is a judgment that should be made by a qualified individual (Certified Industrial Hygienist) considering the hazards and risk.

Hazards: The physical form of the potential contaminant must be considered. Airborne substances are more likely to contact personnel wearing non-encapsulating suits, which are not considered gas or vapor tight. Liquids contacting the skin are generally considered more hazardous than contact with vapors, gases and particulates.

Effect of the contaminant on skin:

- Highly hazardous substances are those that are easily absorbed through the skin causing systemic effects, or that cause severe skin destruction.
- Less hazardous substances are those that are not easily absorbed through the skin causing systemic effects, or that do not cause severe skin destruction.

Risk: Concentration of the contaminant: The higher the concentration, the higher the probability of injury.

Work function: Site work activities dictate the probability of direct and indirect skin contact.

Instability of the situation: A higher Level of Protection should be considered when there is a probability of a release involving vapor or gases, splashes or immersion in liquids, or through the loss of container integrity.

D. Atmospheric Conditions

Atmospheric conditions such as stability, temperature, wind direction and wind velocity, as well as barometric pressure, determine the behavior of contaminants in air or the potential for volatile material being released into the air. These parameters should be considered when determining the need for and Level of Protection required.

E. Work in the Exclusion Zone

For operations in the Exclusion Zone (area of potential contamination), different Levels of Protection may be selected, and various types of chemical-resistant clothing worn. This selection would be based on measured air concentrations, the job function, the potential for skin contact or inhalation of the materials present, and ability to decontaminate the protective equipment used.

F. Escape Masks

Carrying an escape, self-contained breathing apparatus of at least fifteen-minute duration, is optional while wearing Level C or Level D protection. For initial site entry, a specialist should determine, on a case-by-case basis, whether they should be carried, or be strategically located in areas that have higher possibilities for harmful exposure.

V. Vapor or Gas Concentrations As Indicated by Direct-Reading Instruments

Instruments such as the FID and PID can be used to detect the presence of many organic vapors or gases either as single compounds or mixtures. Dial readings are frequently referred to, especially with unidentified substances, as total vapor and gas concentrations (in ppm). More correctly, they are deflections of the needle on the dial indicating an instrument response and do not directly relate to the total concentration in the air.

Attachment 5.1 – PERSONAL PROTECTIVE CLOTHING AND EQUIPMENT ASSIGNMENT FOR GREAT LAKES NATIONAL PROGRAM

Employee:_____ Social Security Number:_____

Work Operation:_____ Phone:_____

Yes	No	
❑	❑	Respiratory Protection (specify) _____
❑	❑	Protective Eye Wear, Normal
❑	❑	Protective Eye Wear, Prescription
❑	❑	Face Shield
❑	❑	Hard Hat
❑	❑	Laboratory Coat
❑	❑	Gloves, Chemical
❑	❑	Safety-toe Shoes
❑	❑	Rubber boots

Other_____

_____	_____	_____
Supervisor	Date	GLNPO Safety Manager/Regional Safety Manager

Attachment 5.2 – PERSONAL PROTECTIVE EQUIPMENT ASSESSMENTS

US EPA REGION 5
"WORKPLACE HAZARD ASSESSMENT AND CERTIFICATION"

WORKPLACE HAZARD ASSESSMENT

TYPE OF INSPECTION: MARINE LAB AND SAMPLING RV LAKE GUARDIAN and RV HYDRA
EMPLOYEES AFFECTED: Great Lakes National Programs Office Surveillance and Research Staff
WORKPLACE EVALUATED: Surveillance, Research and other Field Activities Aboard Research Vessels

HAZARD SOURCE	HAZARD POTENTIAL	RECOMMENDED PPE
IMPACT	Yes; flying and falling objects	Glasses w/side shields, goggles or faceshield; hardhat; steel-toed footwear.
PENETRATION	Yes; sharp objects	Puncture-resistant gloves.
COMPRESSION (Rollover)	No	
CHEMICAL	Yes; wide & varied range of potential chemical exposure	Latex gloves; lab coat or apron; and other equipment, as outlined in the Chemical Hygiene Plan.
HARMFUL DUST	Yes; nuisance and chemical dusts exposure potential	Latex gloves; lab coat or apron; and other equipment, as outlined in the Chemical Hygiene Plan.
LIGHT (Optical) RADIATION	No	
ELECTRICAL ENERGY	Yes; work in wet locations	Insulating mats and gloves.
IMMERSION IN WATER	Yes; during survey cruises	Fall protection, life preserver &/or survival suit, and boat.
OXYGEN DEFICIENCY	No	
THERMAL EFFECTS	No	
RADIATION	Yes; C_{14}	Glasses w/side shields; lab coat or apron.
NOISE	Yes; ship engines	Ear plugs
FALLS	Yes	Fall protection (full body harness, restraint belt), as needed.

NOTE: It is the responsibility of the supervisors and employees to reassess the workplace hazard situation, as necessary, by identifying and evaluating hazards, other than those identified above, and prescribe appropriate personal protective equipment.

CERTIFICATION OF HAZARDS ASSESSMENT

I certify that the workplace hazards, routinely and non-routinely encountered by US EPA Region 5, during MARINE LAB and SAMPLING aboard RV LAKE GUARDIAN and/or RV HYDRA, employees and for which Personal Protective Equipment has been provided, have been assessed for the determination of Personal Protective Equipment appropriateness, in compliance with 29 CFR 1910 Subpart I.

This assessment has been conducted by A. James Finn, US EPA Region 5 Safety, Health and Environmental Management Program Manager.

A. James Finn — Date 1/26/95

US EPA REGION 5
"WORKPLACE HAZARD ASSESSMENT AND CERTIFICATION"

WORKPLACE HAZARD ASSESSMENT

TYPE OF INSPECTION: MUD PUPPY SEDIMENT SAMPLING
EMPLOYEES AFFECTED: Great Lakes National Programs Office
Remedial Programs Staff

WORKPLACE EVALUATED: Surveillance, Research and other Field Activities
Aboard Research Vessels

HAZARD SOURCE	HAZARD POTENTIAL	RECOMMENDED PPE
IMPACT	Yes; flying and falling objects	Glasses w/side shields, goggles or faceshield; hardhat; steel-toed footwear.
PENETRATION	Yes; sharp objects	Puncture-resistant gloves.
COMPRESSION (Rollover)	No.	
CHEMICAL	Yes; wide & varied range of potential chemical exposure	Nitrile or neoprene gloves; MSA 1/2 or full-face respirator w/GMC-H canister.
HARMFUL DUST	Yes; nuisance and chemical dusts exposure potential	Nitrile or neoprene gloves: MSA 1/2 or full-face respirator w/GMC-H canister.
LIGHT (Optical) RADIATION	No.	
ELECTRICAL ENERGY	Yes; work in wet locations	Insulating mats and gloves.
IMMERSION IN WATER	Yes.	Fall protection, life preserver &/or survival suit, and boat.
OXYGEN DEFICIENCY	No.	
THERMAL EFFECTS	No.	
RADIATION	No.	
NOISE	No.	
FALLS	Yes	Fall protection (full body harness, restraint belt), as needed.

NOTE: It is the responsibility of the supervisors and employees to reassess the workplace hazard situation, as necessary, by identifying and evaluating hazards, other than those identified above, and prescribe appropriate personal protective equipment.

CERTIFICATION OF HAZARDS ASSESSMENT

I certify that the workplace hazards, routinely and non-routinely encountered by US EPA Region 5, **Great Lakes National Programs Office Remedial Programs Staff**, employees and for which Personal Protective Equipment has been provided, have been assessed for the determination of Personal Protective Equipment appropriateness, in compliance with 29 CFR 1910 Subpart I.

This assessment has been conducted by A. James Finn, US EPA Region 5 Safety, Health and Environmental Management Program Manager.

A. James Finn — 1/26/95

A. James Finn — Date

US EPA REGION 5
"WORKPLACE HAZARD ASSESSMENT AND CERTIFICATION"

WORKPLACE HAZARD ASSESSMENT

TYPE OF INSPECTION: Wetlands & all other Water-related (ie. small boat, wading, etc.) Activities
EMPLOYEES AFFECTED: Water Division and CDO, EDO & CRL (Env'l Sciences Div)
WORKPLACE EVALUATED: Enforcement, Research, Inspections and other Field Activities at Host Employer Sites

HAZARD SOURCE	HAZARD POTENTIAL	RECOMMENDED PPE
IMPACT	Yes; flying and falling objects	Glasses w/side shields, goggles or faceshield; hardhat; steel-toed boots.
PENETRATION	Yes; sharp objects	Puncture-resistant gloves.
COMPRESSION (Rollover)	No	
CHEMICAL	No	
HARMFUL DUST	No	
LIGHT (Optical) RADIATION	No	
ELECTRICAL ENERGY	Yes; work in damp locations	Rubber boots
IMMERSION IN WATER	Yes; immersion in water potential	Fall protection; life preserver, &/or waders.
OXYGEN DEFICIENCY	No	
THERMAL EFFECTS	No	
IATION	No	
NOISE	Yes; sources from equipment & operations	Ear plugs
FALLS	No	

NOTE: It is the responsibility of the supervisors and employees to reassess the workplace hazard situation, as necessary, by identifying and evaluating hazards, other than those identified above, and prescribe appropriate personal protective equipment.

CERTIFICATION OF HAZARDS ASSESSMENT

I certify that the workplace hazards, routinely and non-routinely encountered by US EPA Region 5 employees, conducting **WETLANDS INSPECTIONS**, and for which Personal Protective Equipment has been provided, have been assessed for the determination of Personal Protective Equipment appropriateness, in compliance with 29 CFR 1910 Subpart I.

This assessment has been conducted by A. James Finn, US EPA Region 5 Safety, Health and Environmental Management Program Manager.

A. James Finn

A. James Finn

1/26/95

Date

US EPA REGION 5
"WORKPLACE HAZARD ASSESSMENT AND CERTIFICATION"

WORKPLACE HAZARD ASSESSMENT

TYPE OF INSPECTION: GENERAL INDUSTRIAL INSPECTIONS
EMPLOYEES AFFECTED: Air & Radiation, Waste Management, and Water Divisions; CDO, EDO, PTSB & MQAB (Env'l Sciences Div) and all other Branches and Offices within Region 5, as needed
WORKPLACE EVALUATED: Enforcement Inspections and other Field Activities at Industrial Sites, including laboratories

HAZARD SOURCE	HAZARD POTENTIAL	RECOMMENDED PPE
IMPACT	Yes; flying and falling objects	Glasses w/side shields, goggles or faceshield; hardhat;steel-toed footwear.
PENETRATION	Yes; sharp objects	Puncture-resistant gloves.
COMPRESSION (Rollover)	No.	
CHEMICAL	Yes; wide & varied range of potential chemical exposure	Nitrile or neoprene gloves; MSA 1/2 mask or fullface respirator w/GMC-H canister.
HARMFUL DUST	Yes; nuisance, chemical & asbestos dusts exposure potential	Nitrile or neoprene gloves; MSA 1/2 mask or fullface respirator w/GMC-H canister.
LIGHT (Optical) RADIATION	No	
ELECTRICAL ENERGY	No	
IMMERSION IN WATER	No	
OXYGEN DEFICIENCY	No	
THERMAL EFFECTS	No	
RADIATION	No	
NOISE	Yes; in manufacturing & industrial settings	Ear plugs
FALLS	Yes	Fall protection (full body harness, restraint belt), as necessary.

NOTE: It is the responsibility of the supervisors and employees to reassess the workplace hazard situation, as necessary, by identifying and evaluating hazards, other than those identified above, and prescribe appropriate personal protective equipment.

CERTIFICATION OF HAZARDS ASSESSMENT

I certify that the workplace hazards, routinely and non-routinely encountered by US EPA Region 5 employees, conducting GENERAL INDUSTRIAL INSPECTIONS, and for which Personal Protective Equipment has been provided, have been assessed for the determination of Personal Protective Equipment appropriateness, in compliance with 29 CFR 1910 Subpart I.

This assessment has been conducted by A. James Finn, US EPA Region 5 Safety, Health and Environmental Management Program Manager.

A. James Finn — Date 1/26/95

A. James Finn

Chapter 6 - MARINE SAFETY

6.1 SHIP OPERATION SAFETY

GLNPO research vessels shall be regularly inspected to minimize potential marine safety hazards. A formal inspection must be conducted on a monthly basis by GLNPO personnel or designee who have a working knowledge of OSHA standards and regulations, as well as familiarity with marine safety operations. Research vessel operations shall be conducted in accordance with OSHA standards found in 29 CFR 1910 and 29 CFR 1926 as well as applicable standards found in 46 CFR and 33 CFR. A semi-annual inspection will be conducted by the Regional Health and Safety Manager. Inspection requirements appear in **Appendix V** of this manual.

Overall standards for research vessel operation safety must be developed by the ship's operations contractor and documented in a safety manual. At a minimum, the following minimum safety requirements should be addressed:

- Safety and Fire Protection During Welding & Burning Operations
- Inspections of Standing and Running Rigging, Cargo Handling Gear, and Scientific Equipment Overboarding Systems
- Lockout / Tagout of Equipment under Repair
- Pre and Post Sail Electrical Equipment Checkout
- Fueling Procedures
- Annual Vessel Inspections
- Fixed Electrical Space Heaters
- Maintenance of Emergency Equipment
- Small Boat Operational Safety
- Deck Safety Practices

6.2 SHIP PERSONNEL SAFETY

All personnel aboard GLNPO research vessels will be required to comply with the health, safety, and environmental regulations in accordance with the Environmental Health and Safety Compliance Manual for U.S. EPA GLNPO Vessels. Research vessel employees will be trained in the areas of health, safety, environmental compliance, and fire prevention. Training requirements appear in **Chapter 2** of this manual.

In addition to the requirements specified in the Environmental Health and Safety Compliance Manual for U.S. EPA GLNPO Research Vessels, health and safety protocols are also specified

in **Appendix O**, Policy, Memorandums, Standard Operating Procedures, and Regulatory Updates. The requirements specified in these two documents are designed to enhance the overall health, safety, and environmental compliance program for GLNPO research vessel operations.

6.3 NEW EMPLOYEE ORIENTATION

GLNPO research vessel laboratory personnel are required to receive laboratory safety orientation training. The safety orientation will contain rules for safe operations in laboratories, fire evacuation and alarm locations, waste disposal, spill control stations, personal protective equipment, and location of eyewashes.

GLNPO research vessel personnel not working in laboratory areas will also be required to receive safety orientation training. The safety orientation will include general safety rules, fire evacuation plans and emergency response procedures, and exposure to potential hazards. Training requirements are detailed in **Chapter 2** of this manual.

6.4 FIRE SAFETY

All occupants aboard GLNPO research vessels are required to participate in fire safety training exercises and drills. All personnel are expected to be familiar with the operational procedures identified in the Occupant Emergency Plan developed for the vessel. The Occupant Emergency Plan appears as **Appendix M** of this manual.

6.5 FIRST AID AND CPR

First Aid/CPR training and certification is required for specific personnel who work aboard all GLNPO research vessels. For specific training requirements in First Aid and CPR, refer to **Chapter 2.1.3.**

6.6 OCCUPANT EMERGENCY PLAN

The Federal Government is responsible for minimizing danger to life and property arising from the effects of bomb threats, bombs, enemy attack, fire, explosion, earthquake, serious weather disturbance, civil disturbance, and other disasters affecting federal property. In response to this, the General Services Administration requires the development of an Occupant Emergency Plan. The Occupant Emergency Plan for GLNPO research vessels appears as **Appendix M** of this manual.

6.7 CONFINED SPACE ENTRY

Confined Space Entry Policies and Procedures for GLNPO personnel are detailed in **Chapter 2 and Appendix E** of this manual.

6.8 VISITOR SAFETY

From time to time, GLNPO research vessels will conduct "open houses" where visitors may board and tour the vessels. During these times, research vessel personnel will be responsible for the health and safety of the visitors. For vessel- specific visitation policies, please refer to **Attachment 6.1** of this chapter. Visitor evacuation procedures and visitor security procedures can be found in **Chapter 7, Sections 7.5. and 7.6**, respectively.

Chapter 7 - EMERGENCY PREPAREDNESS AND RESPONSE

OVERVIEW

It is the policy of GLNPO to comply with all applicable federal, state and local regulations regarding emergency preparedness and response. This policy is not limited to hazardous material spills or the transportation of hazardous materials, but extends to firefighting operations, contractor support operations, as well as evacuation plans and security procedures for "open houses" aboard research vessels.

7.1 HAZARDOUS MATERIAL SPILLS -RCRA, OSHA

In the event of a hazardous material spill the Hazardous Waste Contingency Plan will be implemented immediately. The contingency plan contains specific procedures to be carried out in the event of a release. An example of a Hazardous Material Contingency Plan for GLNPO can be found as **Appendix R** of this manual.

7.2 HAZARDOUS MATERIAL TRANSPORTATION

It is the policy of U.S. EPA Region 5 to comply with all applicable regulations when transporting hazardous materials by government vehicle. **Appendix S** of this manual, entitled *Procedures for the Transportation of Hazardous Materials/Waste by Great Lakes National Program Office VIA Government Vehicle and Government Driver*, details necessary regulations and appropriate packaging for the transportation of hazardous materials. GLNPO will comply with the regulatory and policy requirements specified within this document.

7.3 FIRE FIGHTING OPERATIONS

Fire prevention programs must be established in all GLNPO facilities and aboard all research vessels to reduce the possibility of fire. If a fire does occur, well-developed fire fighting procedures will be implemented. Aboard research vessels, the captain is in charge of fire prevention and protection. He will establish inspection schedules, provide recordkeeping, and ensure that all fire fighting equipment is properly inspected and in working order. Fire equipment inspections will include such items as fire pump operation, fire hydrants, sprinkler systems, water supply, portable fire extinguishers, fire doors, exits, and detectors. A research vessel fire inspection program is described in **Appendix V** of this manual.

Response teams will be available 24-hours a day and regularly scheduled training for all members of the team will be conducted. At least one hour a week will be scheduled for a response training session. These sessions will include proper procedures on how to avoid fire, hands-on training for drills including signals and individual responsibilities, as well as procedures for the prevention of bodily injury. A portion of this training will be devoted to the practice of emergency exit drills to ensure that all exits are clearly marked, easily passable, and that all alarms are in working order. Any deficiencies noted during drills or regular inspections will be corrected immediately.

Emergency signal instructions and personnel assignments for research vessels are contained in the "Station Bill" which appears as **Attachment 7.1** of this chapter. An operational diagram for research vessels appears as **Attachment 7.2** of this Chapter.

7.4 INJURY, ILLNESS, OR MEDICAL EMERGENCY

GLNPO has retained medical consultation services of a maritime medical advice service. In the event of an injury or illness, the Captain or his designee will contact the service for interim medical advice for treatment of ship board injury or illness that is within the medical capabilities of on-board personnel. The contact information for these services can be found as **Attachment 7.4** of this chapter. Additionally, the medical contractor shall supply a document that contains complete contact and follow up information, as well as, supporting documentation.

In the event anyone aboard a ship at sea becomes ill or is injured beyond the clear capability of the ship to provide prompt and adequate care, a Medical Emergency (ME) exists and that person should be transferred to a facility providing emergency medical treatment.

If the Captain (or officer in charge) determines that a possible ME exists, the U.S. and/or Canadian Coast Guard should be contacted for advice and assistance. The Coast Guard may be hailed on radio Channel 16 throughout all the Great Lakes. The Coast Guard can provide medical consultation and evaluation of the situation and are equipped for evacuation by boat or helicopter, if needed.

Always contact the Coast Guard for advice. Not all ports have emergency medical facilities and not all may be suitable for a particular ME.

These procedures and numbers should be readily available for all employees aboard GLNPO research vessels.

Telephone numbers for Coast Guard areas and designated trauma centers appear as **Attachment 7.5** of this chapter.

7.5 CONTRACTOR SUPPORT OPERATIONS

All outside contractors will comply with health, safety, and environmental policies according to Federal, State, and Local regulations.

7.6 EVACUATION PLAN FOR VISITORS ABOARD RESEARCH VESSELS DURING AN OPEN HOUSE

In the event of a fire or other alarm incident during open house, the Personnel/Visitor watches must direct visitors to the nearest safe exit leading to the gangplank. The watch must then proceed with response activities.

7.7 SECURITY ABOARD RESEARCH VESSELS DURING AN OPEN HOUSE

Prior to an open house, a "Pre-open House Check List" will be completed to ensure that the ship is safe and secure for visitors to come aboard. The checklist appears as **Attachment 7.3** of this chapter. Also, during an open house, vessel personnel will be assigned to a personnel/visitor watch at designated locations throughout the ship. The personnel/visitor watch will prevent visitors from entering restricted areas as well as monitor and prevent unsafe activity. Uncooperative visitors will be reported to the Captain (1st or 2nd Mate) who will escort the visitor ashore.

Attachment 7.1 – STATION BILL

SIGNALS

FIRE AND EMERGENCY- Rapid ringing of the ship's bell and continuous ringing of general alarm bells for a period of at least 10 seconds.

ABANDON SHIP - More than 6 short blasts and 1 long blast on the whistle and the same signal on the general alarm bells.

MAN OVERBOARD - Hail, and pass the word "Man Overboard" to the bridge.

DISMISSAL - From FIRE AND EMERGENCY stations, 3 short blasts on the whistle and 3 short rings on the general alarm bells.

INSTRUCTIONS

1. Immediately upon reporting on board, the entire crew shall familiarize themselves with the location of their emergency stations and the specific duties required at that station.

2. Each crew member shall be provided with an individual supplementary station bill card which must show, in detail, the special duties to be performed.

3. The entire crew shall be instructed in the performance of their special duties and the crew on watch will remain prepared to receive the signal for an emergency drill.

4. Every person participating in the abandon ship drill will be required to wear a life preserver. The entire boat crew shall assist in removing the chain rails.

5. Immediately upon receiving the emergency signal, the Emergency Squad will assemble with the appropriate equipment at the scene of action.

6. The Steward's department will assemble and direct passengers to embarkation stations.

7. The first person to discover a fire shall immediately notify the bridge and fight the fire with available equipment provided that life and health are not immediately jeapordized.

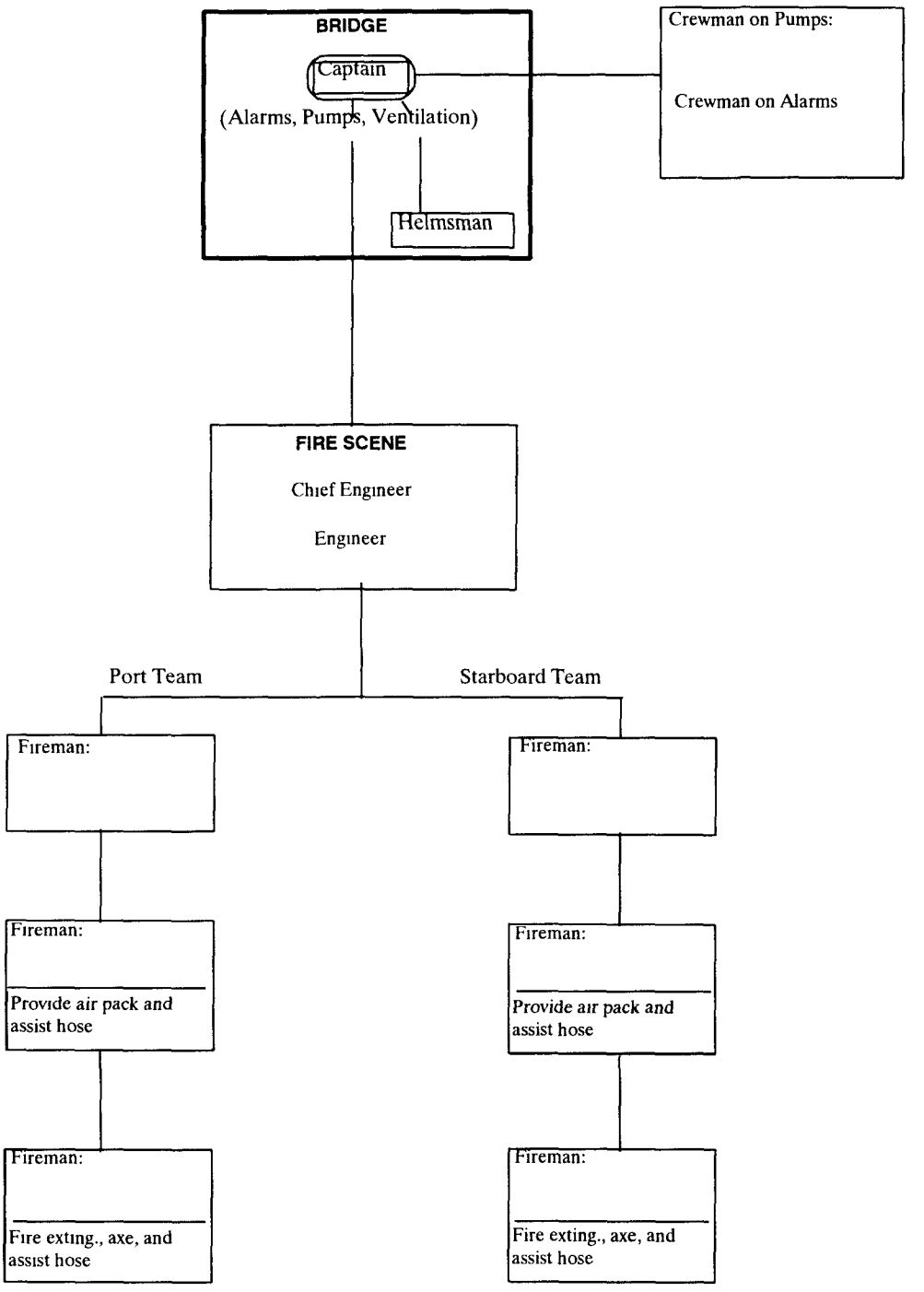
8. Immediately upon receiving the FIRE AND EMERGENCY signal, fire pumps will be started, all watertight doors, ports, and air shafts will be closed, and all fans and blowers stopped. The fire hose will be deployed in the affected area.

9. Upon hearing the signal, "MAN OVERBOARD", life ring buoys will be thrown overboard, the engines stopped, and a lookout sent aloft. The Emergency Boat Crew shall immediately clear the rescue boat for launching.

10. During periods of low visibility, all watertight doors and ports below the bulkhead deck shall be closed, subject to the Master's orders.

R/V LAKE GUARDIAN CREW ASSIGNMENTS DURING FIRE, EMERGENCY AND ABANDON SHIP INCIDENTS

NO.	RATING	FIRE & EMERGENCY STATIONS	ABANDON SHIP-LIFERAFT STATIONS
1	Master	On Bridge-In Overall Command Emergency	In Command-Provide Nav
2	Chief Mate	At Scene, in Charge-Assist Firemen	Launch Raft-Provide Compass
3	Second Mate	Provide Fog Applicator-Assist Firemen	Launch Raft-Provide Hand Held Radio
4	Chief Engineer	Engineroom - Start Fire Pump	Launch Raft
5	Asst. Engineer	Engineroom - Assist Chief as Directed	Assist Launching of Raft
6	Electrician	Make Ready Portable Fire Pump-Assist	Direct Personnel to Rafts 1 & 3
7	Able Seaman	At Scene-Provide Extinguisher & Axe	Assist Launch or Raft
8	Able Seaman	At Scene-Provide SCBA, Man Hose	Launch Raft
9	Ord Seaman	On Bridge-At Helm	Direct Personnel to Rafts 2 & 4
10	Cook	At Scene-Provide Air Pack, Man Hose	Provide First Aid Kit
11	Steward	At Scene-Provide Extinguisher, Assist	Provide Blankets
12	Elect Tech	Man Portable Fire/De-watering Pump	Assist Launch of Raft
13	Marine Tech	At Scene-Don Firesuit, Man Hose	Assist Launch of Raft
14	Chief Scientist	O-2 Deck Aft-Muster Scientists	O-2 Deck Aft-Muster Scientists
15	Scientist	O-2 Deck	O-2 Deck
16	Scientist	O-2 Deck	O-2 Deck
17	Scientist	O-2 Deck	O-2 Deck
18	Scientist	O-2 Deck	O-2 Deck
19	Scientist	O-2 Deck	O-2 Deck
20	Scientist	O-2 Deck	O-2 Deck
21	Scientist	O-2 Deck	O-2 Deck
22	Scientist	O-2 Deck	O-2 Deck
23	Scientist	O-2 Deck	O-2 Deck
24	Scientist	O-2 Deck	O-2 Deck


BRIDGE
Captain
(Alarms, Pumps, Ventilation)
Helmsman
Crewman on Pumps:
Crewman on Alarms
FIRE SCENE
Chief Engineer
Engineer
Port Team
Starboard Team
Fireman:
Fireman:
Provide air pack and assist hose
Fireman:
Fire exting., axe, and assist hose
Fireman:
Fireman:
Provide air pack and assist hose
Fireman:
Fire exting., axe, and assist hose

Attachment 7.3 - PRE-OPEN HOUSE CHECK LIST FOR R/V LAKE GUARDIAN

✔ Yes or No

Preliminary:

Y	N	
☐	☐	Visitor (school, press, VIP) schedule review by tour guide.
☐	☐	Sanitary holding tank low enough to preclude drain back-up in wet lab floor.
☐	☐	Pedestrian walkways and water-edge railings adequate.
☐	☐	Mooring lines not obstructing walkway.

Boarding Area:

Y	N	
☐	☐	Welcome sign, times and dates.
☐	☐	Welcome sign secure.
☐	☐	Trash can available ashore.
☐	☐	Gangplank - on-shore step.
☐	☐	Gangplank secured against lateral movement.
☐	☐	Gangplank - railings.
☐	☐	Gangplank - walk surface.

Main Deck Aft:

Y	N	
☐	☐	Gangplank access aboard unobstructed.
☐	☐	Removable gate railing secured against falling.
☐	☐	Fantail deck cleared of loose equipment and oil spills.

Y	N	
☐	☐	Knuckle crane secured and off.
☐	☐	Aft A-frame secured and off.
☐	☐	Starboard A-frame and winch secured and off.
☐	☐	Engine room hatch closed.
☐	☐	Main deck starboard side at rear of containers taped against entry.
☐	☐	Main deck port side clear of obstructions.
☐	☐	Boat hook available under aft container lab.
☐	☐	Life rings in place - fantail.
☐	☐	Counting device in place (may need a second one to count visitors disembarking).
☐	☐	Guide to R/V Lake Guardian tour brochures and stickers at hand on deck.

Container Labs:

Y	N	
☐	☐	Aft sea door open.
☐	☐	Hazardous Materials Container locked (lights on?).
☐	☐	Container labs cleared of hazardous materials, lights on, doors open but taped to prevent entry.

Wet Lab:

Y	N	
☐	☐	Port sea door open.
☐	☐	Wet lab lights on.
☐	☐	Video tape rewound, brochures, guest book and pen, press kits ready.

Y	N	
☐	☐	File drawers closed/locked.
☐	☐	All counters cleared of chemicals, samples, glass, except for display/demonstration items.
☐	☐	Floors clear of slip/trip hazards.
☐	☐	Refrigerator clear of hazardous materials and locked.
☐	☐	Hood cleared out and closed.
☐	☐	Non-potable water turned off.
☐	☐	Hazardous material drains closed.
☐	☐	Computer off or set to prevent tampering; all disks secure.
☐	☐	Pilferable items stowed.
☐	☐	Posters in place.
☐	☐	Double sea doors open.
☐	☐	Rosette sensors/controls off and secured
☐	☐	Rosette lowered to rack (winch controls off and secured).
☐	☐	A-frame secured and off.
☐	☐	Gunwale safety chain in place.
☐	☐	Sampling deck chained or taped against entry.
☐	☐	Equipment displays in place.

<u>Passageway:</u>

Y	N	
☐	☐	Both hallway aft sea doors open.
☐	☐	Walk-in refrigerator locked.

Y	N	
☐	☐	Exercise room locked.
☐	☐	Posters in place.
☐	☐	Chem. lab cleared of hazardous material, lights on, doors open, taped against entry.
☐	☐	Bio lab cleared of hazardous material, green lights on, doors open, taped against entry.
☐	☐	Hall fire door closed, sign saying "Entry Permitted".
☐	☐	Lab office door locked (due to hit/strike hazard of fire door opening into a person entering/leaving lab office).
☐	☐	Scientist cabin, clean, no valuables/pilferables, open without taping, (If occupied, should be locked).
☐	☐	Restrooms clean, lights on, toilet paper and paper towels available.
☐	☐	Starboard equipment/utility room locked.
☐	☐	Laundry room clean; no filled laundry baskets, lights on, door open.

Galley/Lounge:

Y	N	
☐	☐	Video tape rewound.
☐	☐	Water fountain clean.
☐	☐	Refrigerators locked.
☐	☐	All food stuffs put away.
☐	☐	Paper cups put away.
☐	☐	Soda dispenser turned off.
☐	☐	Storage cabinets locked.

Y	N	
☐	☐	Floors clean.
☐	☐	Engine room door closed, "No Entry" sign in place.

Focsle Deck:

Y	N	
☐	☐	Passageway lights on.
☐	☐	Forward two fire doors closed, "Entry Permitted" signs in place.
☐	☐	Mechanical room door locked.
☐	☐	Crew's quarters locked.
☐	☐	Office locked.
☐	☐	All occupied EPA and Scientist quarters locked.
☐	☐	Two vacant quarters open, lights on, pilferable articles stowed.
☐	☐	Water fountain clean.
☐	☐	Sheath on fire ax pick.
☐	☐	Aft door latched open, weather permitting.
☐	☐	Focsle aft deck clear of trip/slip hazards.
☐	☐	Winches secure and covered.
☐	☐	Access to container tops taped to prevent entry.
☐	☐	Both paint lockers closed and locked.
☐	☐	Bow deck taped to prevent access to anchor equipment.

Bridge Deck:

Y	N	
☐	☐	Dog house locked.
☐	☐	Battery racks secured against jettison.
☐	☐	Inflatable boat cover secure.
☐	☐	Trip hazards in area of boat davits marked with warning tape.
☐	☐	Safety chain at boat davit gunwale in place.
☐	☐	Ladders marked with warning tapes to prevent access to rigging.
☐	☐	Both emergency gear (SCBA, etc.) lockers closed, but not locked, and taped against access.
☐	☐	Radar turned off and secure.
☐	☐	Wing bridges off, secure and covered.

Bridge:

Y	N	
☐	☐	Bridge doors unlocked and open, weather permitting.
☐	☐	Pilferable bridge items stowed.
☐	☐	Rudder controls off and secure.
☐	☐	Cellular phone activated and/or shore telephone located.

Personnel:

Y	N	
☐	☐	EPA and Crew visitor duty station.
☐	☐	Gangplank Ashore: seaman (optional).
☐	☐	Fantail/gangplank: seaman.
☐	☐	Wet Lab: contractor or EPA Scientist and Public Affairs.

Y	N	
☐	☐	Lounge: seaman (optional).
☐	☐	Focsle aft deck: seaman.
☐	☐	Bridge Deck: seaman (optional).
☐	☐	Bridge: Ship's Officer.
☐	☐	School Tour Guide: Science Representative.
☐	☐	Press (et al) Host: Science Representative/Public Affairs.
☐	☐	EPA Science Representative.

After Tour:

Y	N	
☐	☐	Check all decks and unlocked spaces for stragglers/stowaways/damage.
☐	☐	Close gangway.
☐	☐	Change welcome sign, time, date.
☐	☐	Enter visitor count in log.
☐	☐	Rewind video tapes.

Attatchment 7.4 **Medical Advice Services Contractor**

The EPA has contracted Maritime Medical Access (MMA) of The George Washington University Medical Center to provide medical advice services. The service is available for four vessles; OSV Peter W. Anderson, Lake Explorer, R/V Lake Guardian and R/V Mudpuppy. This is a 24 hour per day service. Medical advice shall be provided by the emergency room attending physican at George Washington University Medical Center.

Communication Information:

Telephone (Maristat): (202)994-0473
(202)994-5644

Telex: GWU Med 496086888

PLAD: GWU MEDCEN WASHINGTON DC

Facsimile: GW Maritime Medical (202)994-0962

Single Sideband: Any available coast station

George Washington University Medical Center
2140 Pennsylvania Avenue, N.W.
Building VV
Washington, DC 20037
Phone: (202)994-3921
Fax: (202)994-3924

Attachment 7.5

MARINE MEDICAL

EMERGENCY OPERATIONS PLAN

U. S. C. G. Group: Great Lakes

In the event anyone aboard a ship at sea becomes ill or is injured beyond the clear capability of the ship to provide prompt and adequate care, a Medical Emergency (ME) exists and that person should be transferred to a facility providing emergency medical treatment.

If the Captain (or officer in charge) determines that a possible ME exists, the U.S. and/or Canadian Coast Guards should be contacted for advice and assistance. The Coast Guards may be hailed on radio Channel 16 throughout all the Great Lakes. The Coast Guards can provide medical consultation and evaluation of the situation and are equipped for evacuation by boat or helicopter, if needed. Always contact the Coast Guard for advice. Not all ports have emergency medical facilities and not all may be suitable for a particular ME.

Additionally, GLNPO has procured the emergency consultation services of George Washington Hospital. In the event of an emergency, the Captain or his designee will contact the service for interim medical advice for the treatment of ship board injury or illness. For complete communication information see **Attachment 7.4.**

These procedures and telephone numbers should be readily available to all employees aboard our research vessels.

2.5.1 Coast Guard Areas

Coast Guard Command Center (Cleveland)
Anywhere in the Great Lakes
(800)321-4400
(216)522-3984
Note: The (800) number will only work within the area of the Great Lakes, outside of this area use the (216) number. The Command Center can contact the any Coast Guard station within the Great Lakes.

Buffalo
Lake Ontario & East ½ of Lake Erie
Coast Guard: (716)843-9500
Health Services: (716) 846-4167
Trauma Centers: Mercy Hospital, Buffalo, NY
(716) 828-2790

Sisters of Charity, Buffalo, NY
(716)862-1810

Sault St. Marie
Lake Superior and Upper 1/3 of Lake Huron
and Upper 1/3 of Lake Michigan
Coast Guard: (906)635-3233
Health Services: (906)635-3225
Trauma Centers: Marquette Gen., Marquette, MI (800)562-9753 or (906)228-9440
Northern Michigan Regional, Petosky, MI
(616)348-4000

Detroit
West ½ of Lake Erie and Lower 2/3 of Lake Huron
Coast Guard: (313) 568-9524
Health Services: (313) 568-9526
Trauma Centers: Detroit Receiving, Detroit, MI
(313) 745-3356
Henry Ford, Detroit, MI
(313) 641-4029

Grand Haven
Eastern ½ of Lake Michigan
Coast Guard: (616)847-4501
Health Services: (616)847-4542
Trauma Centers: Ottawa County Hospital
(616)847-5310

Milwaukee
Western ½ of Lake Michigan
Coast Guard: (414)747-7181
Health Services: (414)747-7111
Trauma Centers: Froederct General Hospital
(414)259-3000

2.5.2 Great Lakes Regional Hospitals

ILLINOIS

Chicago

Northwestern Memorial Hospital
Superior St. & Fairbanks Court
Chicago, IL 60611
(312)908-2000
Ask for Emergency Rm.; 5-10 min. from harbor.

Columbus Hospital
2520 N. Lakeview Avenue
Chicago, IL 60614
(312)883-7300
5-10 minutes from Lake; unsure of distance from harbor.

Zion

Midwestern Regional Medical
Emmaus & Shiloh Boulevard
Zion, IL 60099
(847)872-4561
Unknown distance from harbor There is more than one in area.

INDIANA

Gary

Methodist Hospitals Northwest Indiana
600 Grant Street
Gary, IN 46402
(219)886-4000
20 miles from harbor; 15 minutes.

Hammond

St. Margaret Hospital
5454 Hohman Avenue
Hammond, IN 46320
(219)933-2077

MICHIGAN

Arcadia (See Frankfort)

Charlevoix

Charlevoix Area Hospital
Lakeshore Drive
Charlevoix, MI 49720
(616)547-0027
1 mile from harbor.

Escanaba

St. Francis Hospital
3401 Ludington Street
Escanaba, MI 49829
(906)786-3311
2 miles from harbor.

Frankfort

Paul Oliver Memorial Hospital
224 Park Avenue
Frankfort, MI 49635
(616)352-9621
Half mile from harbor.

Grand Haven

N. Ottawa Community Hospital
1309 Sheldon Road
Grand Haven, MI 49417
(616)847-5310
2 blocks from harbor.

Holland

Holland Community Hospital
602 Michigan Avenue
Holland, MI 49423
(616)394-3202
10-15 minutes from harbor.

Harbor Springs (See Petoskey)

Leland (See Frankfort or Traverse City)

Ludington
Memorial Medical Center
One Atkinson Drive
Ludington, MI 49431
(616)845-2390
1 mile from harbor.

Manistee

West Shore Hospital
1465 E. Parkdale
Manistee, MI 49660
(616)723-3501 Ext. 150
5 miles from harbor.

Manistique

Schoolcraft Memorial Hospital
500 Main Street
Manistique, MI 49854
(906)341-2163
3 blocks from harbor.

Montague/Whitehall/Muskegon

Hackley Hospital
1700 Clinton Street
Muskegon, MI 49443
(616)726-3511
3 miles from harbor.

Mercy Hospital
1700 Oak Avenue
Muskegon, MI 49442
(616)739-9341
10 miles from harbor.

Pentwater (See Ludington)

Petosky
Northern Michigan Hospital
416 Connable Street
Petosky, MI 49770
(616)348-4520
10 miles from harbor.

Portage Lake (See Manistee)

MICHIGAN (CONTINUED)

South Haven
South Haven Community Hospital
955 S. Bailey Avenue
South Haven, MI 49090
(616)637-5271 Ext. 0

Traverse City

Munson Medical Center
1105 Sixth Street
Traverse City, MI 49684
(616)922-9000
5 minutes from bay.

MINNESOTA

Duluth
St. Mary's Emergency Care Trauma Center
407 E. Third Street
Duluth, MN 55805
(218)726-4357

WISCONSIN

Gill's Rock (see Strugeon Bay)

Green Bay

St. Mary's Medical Center
1726 Shawano Avenue
Green Bay, WI 54303
(414)498-4560
1 hour from bay.

Kenosha

Kenosha Hospital
6308 Eighth Avenue
Kenosha, WI 53140
(414)656-2201
5-8 blocks from harbor.

Kewaunee

St. Mary's Memorial
First & Lincoln
Kewaunee, WI 54216
(414)388-2210
5 minutes or less from harbor; about 2 miles.

Manitowoc

Holy Family Medical Center
2300 Western Avenue
Manitowoc, WI 54221
(414)684-2011
21 blocks from Lake.

Milwaukee

St. Luke's Medical Center
2900 W. Oklahoma Avenue
Milwaukee, WI 53215
(414)649-6000

Port Washington

St. Mary's Ozaukee
743 N. Montgomery Street
Port Washington, WI 53074
(414)243-7373

Racine

St. Mary's Medical Center
3801 Spring Street
Racine, WI 53405
(414)636-4201
5-10 minutes from harbor.

St. Luke's Memorial
1320 Wisconsin Avenue
Racine, WI 53403
(414)636-2201
5-10 minutes from harbor.

Sheboygan

Sheboygan Memorial Medical
2629 N. 7th Street
Sheboygan, WI 53083
(414)451-5000

St. Nicholas Hospital
1601 N. Taylor Drive
Sheboygan, WI 53081
(414)459-8300
3-4 min. from harbor.

Sturgeon Bay

Door County Memorial
330 S. 16th Place
Sturgeon Bay, WI 54235
(414)743-5566
5-10 miles from harbor.

Two Rivers

Two Rivers community Hospital & Hamilton Memorial Home
2500 Garfield Street
Two Rivers, WI 54241
(414)793-1178
6 blocks from Coast Guard Station.

CANADA

ONTARIO

Thunder Bay

Port Arthur General Hospital
460 N. Court St.
Thunder Bay, Ontario P7A4X6
(807)343-6621
5-10 minutes from Marina.

Welland Canal

Welland Co. General Hospital
Third Street
Welland, Ontario L3B4W6
(905)732-6111 Ext. 3250
30 minutes from Lake Ontario.

*NOTE: All hospitals listed provide 24-hour Emergency Room Service with a physician on duty.

Chapter 8 - ENVIRONMENTAL COMPLIANCE

Executive Order 12088, signed by President Jimmy Carter in 1978, requires Federal Agencies to comply with all requirements of federal, state, and local environmental regulations. As such, EPA Regions must comply with these regulations concerning air, water, hazardous and nonhazardous waste, toxic substance control, emergency planning, and community right-to-know. Additionally, all U.S. EPA employees, including U.S. EPA contractors, as well as their representatives, are required to act in an environmentally responsible manner to protect themselves, the public, and the environment.

Acting in accordance with Executive Order 12088, each department and division of the U.S. EPA is required to establish practices and procedures which comply with these regulatory requirements as they relate to individual U.S. EPA work operations. As a division of U.S. EPA Region 5, GLNPO and GLNPO research vessels must have well established programs for ensuring compliance with federal, state, and local regulations regarding releases of hazardous and non-hazardous substances into the environment. GLNPO personnel, therefore, must comply with the regulations detailed in the Toxic Substance Control Act and the Resource Conservation and Recovery Act and understand how these regulations affect their work operations.

8.1 TSCA - PCBs

The Toxic Substance Control Act (TSCA) primarily applies to manufacturers, distributors, processors, and importers of chemicals. This law specifically bans the manufacture of polychlorinated biphenyls (PCBs). All federal facilities, however, who use or dispose of any PCB items are subject to TSCA regulations specified in Section 6 of the TSCA regulations as they appear in 40 CFR Part 761. Since GLNPO research laboratories and vessels use and dispose of samples, standards, and stock solutions containing PCBs, they are required to comply with TSCA through proper PCB labeling, storage, dilution, spill cleanup, and disposal.

8.2 RCRA

The Resource Conservation and Recovery Act (RCRA) of 1976 was enacted to ensure proper identification, reporting, transporting, storage, and disposal of hazardous and non-hazardous solid waste. Section 6001 of RCRA requires that all Federal Agencies be in compliance with this act. In the case of non-hazardous solid waste, Federal facilities are required to comply with the regulations specified in 40 CFR Parts 240-249. For hazardous solid waste, Federal agencies are required to comply with the regulations specified in 40 CFR Parts 260-272.

8.2.1 SOLID NON-HAZARDOUS WASTE HANDLING, STORAGE, AND DISPOSAL

GLNPO facilities and research vessels generate three profiles of non-hazardous solid waste. These waste profiles are considered as 1) trash designated for a land disposal facility, 2) broken glassware, and 3) recyclable cans and paper. GLNPO facilities and research vessels must, therefore, dispose of their non-hazardous solid waste in compliance with 40 CFR Parts 240-249. These regulations specifically relate to regulatory compliance by the waste disposal facility and to recycling.

Trash Designated for a Land Disposal Facility

Trash that cannot be recycled must be placed in garbage cans conveniently located throughout GLNPO office facilities and on board GLNPO research vessels, including laboratory areas. Examples of such trash include laboratory towels, labware (excluding glass) that is not contaminated, and solid samples that are not designated as hazardous waste.

Recyclable Waste

GLNPO personnel, as well as GLNPO contractors, are required to participate in a recycling program for newspapers, white paper, uncontaminated glassware and aluminum cans. Broken, uncontaminated glassware is also considered recyclable. Recycling containers, such as trash cans, must be conveniently located throughout GLNPO offices and research vessels.

Hazardous Waste

As amended, RCRA regulates the generation, treatment, storage, and disposal of hazardous waste from "cradle to grave" and all Federal agencies are required to comply with these regulations as they appear in 40 CFR Parts 260-272. Individual states, however, are authorized to operate hazardous waste disposal programs in lieu of the federal program. Based on this authorization, GLNPO facilities and GLNPO research vessels are required to comply with State regulations when disposing of hazardous waste.

Waste Minimization

GLNPO facilities and research vessels are specifically encouraged to minimize hazardous waste generation where possible. Minimizing the generation of hazardous waste reduces potential hazards to employees, the public, and the environment.

Training

Federal and State regulations require annual training for personnel who will be generating, handling, and disposing of hazardous waste. GLNPO is required to provide this initial training to personnel whose work operations involve hazardous waste. The training must be designed to familiarize personnel with hazardous waste handling procedures and emergency response actions. Annual refresher training must be provided thereafter.

8.3 DRINKING WATER

The U.S. EPA requires that EPA facilities monitor drinking water for lead and copper levels. If these levels reach or exceed the action level, then appropriate action must be taken. GLNPO complies with this policy through the monitoring of drinking fountains and sink faucets, and bottled water used as sources of drinking water in GLNPO facilities and aboard GLNPO research vessels.

8.4 GLNPO ENVIRONMENTAL COMPLIANCE MANUAL

GLNPO facilities and GLNPO research vessels are committed to complying with all applicable rules and regulations in an effort to serve as a model to other U.S. EPA programs in the areas of environmental health and safety. GLNPO has developed an environmental compliance manual which outlines environmental compliance strategies and procedures to ensure that health and safety is a constant and consistent priority in the work operations at GLNPO facilities and aboard GLNPO research vessels. This environmental compliance manual appears as **Appendix T** of this manual.

8.5 AIR EMISSIONS AND TOXICS

Rules and regulations pertaining to air emissions and toxics are specified in **Appendix T, Chapter 2**, Air.

8.6 INDOOR AIR QUALITY

Indoor air quality measurements and surveys are conducted as part of the annual industrial hygiene survey for GLNPO research vessel laboratories and work areas. Reports of findings are provided to the U.S. EPA Region 5 Safety and Health Manager, and any deficiencies are corrected under his direction.

8.7 ASBESTOS PRECAUTIONS

The U.S. EPA National Policy Statement for Asbestos-Containing Materials (No. SHEMD-92-001) specifies the requirements for the identification and management survey of asbestos-containing materials in U.S. EPA facilities. Depending on asbestos survey results for GLNPO facilities and research vessels, an Operations and Maintenance Plan may be developed to address management of asbestos-containing materials in accordance with SHEMD policy.

The policy and Standard Operating Practices used in the SHEMD plan were developed through the Safety, Health, and Environmental Management Divisions National Technical Services Center, using the *"Policy and Standard Operating Practices Manual for the Management of Asbestos-Containing Building Materials at EPA Facilities"* (Third Draft, March 1992).

Asbestos surveys will be performed for all GLNPO facilities and research vessels in accordance with SHEMD-92-001. Results of inspections for specific facilities and vessels are located in **Appendix U** of this manual.

Chapter 9 HEALTH AND SAFETY PROCEDURES DURING GLNPO SEDIMENT SAMPLING OPERATIONS

9.1 BACKGROUND

The Sediment Assessment Program is designed to sample and evaluate areas of sediment where the possibility of contamination exists. During sampling, field specialists and laboratory analysts may be exposed to sediment which represents a chemical or biological hazard. Therefore, the potential for exposure should always be of foremost concern when handling sediments of unknown contamination.

GLNPO sediment sampling activities are grouped into the following five categories:

1. Sediment sampling at Great Lakes Harbor
2. Tributary sediment monitoring
3. Open lake sediment monitoring
4. Support for EPA regions for Superfund and enforcement activities
5. Miscellaneous activities

Sediment assessment and tributary monitoring may entail collecting long core and grab samples with low to high amounts of contamination. Typical sediment assessments span six to twenty days. Operation of all R/V *Mudpuppy* equipment is usually necessary. Open lake sediment monitoring is generally conducted aboard the R/V Lake Guardian and involves the use of heavier equipment where the captain is responsible for navigation and positioning of the vessel.

Sediment sampling to support EPA regional offices or other governmental agencies provides the largest degree of diversity in sampling activities. Sampling operations range from use of all or part of the R/V *Mudpuppy* equipment to field-flexible sampling plans based on observations of samples and/or their environments. Most of GLNPO's sediment sampling activities, however, will be performed on board the R/V *Mudpuppy* either on an outdoor work bench or in a mobile laboratory. Refer to **Appendix N and Appendix O** of this manual for safety protocols for the R/V *Mudpuppy*.

Sampling aboard the R/V *Mudpuppy* will include one U.S. EPA/GLNPO technical individual and two contractors. Personnel will have experience in the operation of small craft vessels, as well as in the use of sampling equipment. Additional staff may participate in sediment sampling activities provided they meet the training requirements described in the GLNPO safety manual.

9.2 SAFETY

Prior to commencing field operations, the field team should gather all site data available and assess the anticipated hazard level of sediments to be sampled. When assessing the sediments' hazard potential for a site, the depth sampled below the surface must always be considered. For example,

if all historical data available for a site comes from Ponar dredged samples, all samples collected below the sampling depth of the Ponar should be treated as unknown and potentially hazardous. Refer to **Appendix A** and **Appendix I** of this manual for additional information regarding Respiratory Protection and Personal Protective Equipment.

A. Personal Protection for Contaminated Sediment

This section examines the procedures that will be implemented by all personnel working with contaminated sediment. It should be noted that research conducted with sediment varies considerably depending on the scope and objective of the research. Therefore, the guidelines set forth in this SOP may not be applicable to all situations dealing with potentially contaminated sediments.

1. Medical Surveillance. Health monitoring will be provided for personnel working with sediments. Health monitoring establishes a baseline to which all subsequent medical monitoring can be compared. All field and laboratory personnel must be monitored prior to working with any sediments.

2. Personal Precautions. Workers must always be aware of possible points of contamination as described by the supervisor. Hands should always be kept away from the eyes and mouth. After completion of a manipulation involving sediment or the removal of potentially contaminated clothing (gloves, protective clothing, etc.), the hands, forearms, and other areas of possible contact should be washed with soap and water. Do not use organic solvents to clean the skin. These solvents may increase penetration of the contaminant into the skin.

3. Clothing. When working with sediments, it is of the utmost importance to avoid skin contact. A fully fastened, knee-length lab coat must be worn in the laboratory work area at all times. Disposable Tyvek® lab clothing must be worn for sediment manipulation. During field operations, disposable Tyvek® or Saranex suits must be worn by all personnel who may have possible contact with the sediment.

4. No shorts or skirts are to be worn when working with hazardous materials.

5. Hand Protection. Hands will be the most frequent point of potential contact with contaminants. Gloves must be worn to avoid skin contamination. Disposable gloves must be discarded after each use in appropriate containers designated for this use. Double gloves will be used with the outer glove being stripped off after any potential exposure. Torn or punctured gloves must be discarded and replaced immediately. Rubber, latex or vinyl gloves do not provide full protection. Contaminants may diffuse into the gloves. When sediment is handled, gloves should be changed frequently. Cuffs must be tight fitting or taped to the sleeve to prevent inward migration of contaminants.

6. Eye Protection. Safety glasses must be worn at all times. In addition, face shields will be made available in the work area. On deck, face shields will be required when hauling coring equipment and sediment cores until the sediment is extruded from the core tube and deemed, when possible, non-hazardous.

7. Further Precautions. Protective disposable footwear is recommended during sediment manipulation. Long hair should be tied back and loose clothing should be covered. Eating, drinking, smoking, chewing gum, and smokeless tobacco are prohibited in the work area. In addition, respirators may be required when sediment is manipulated. Respirators will be stored in an appropriate manner when not in use

B. Facility Engineered Protection

The following guidelines are for the laboratory work area where sediments will be tested.

1. Area identification and access control.

   a. The laboratory work area where sediments are used or stored will be properly identified. Access to the designated laboratory work area will be limited. Laboratory doors will be kept closed.
   b. Animals and plants not related to the analytical procedure shall not be permitted in the laboratory.

2. Eyewash stations and hand washing facilities are available in the laboratory work area.

3. Contaminant Devices. Work with sediment will be performed in an appropriate containment device. Procedures involving sediment will not be conducted on an open bench due to the potential hazard for generating contaminated dusts, aerosols, or fumes. Hoods and ventilated work areas are used to minimize the worker exposure to contaminants associated with sediment. All containment devices will be constructed out of smooth, unbreakable material, such as Teflon®, stainless steel, polyethylene, fiberglass, or plexiglass. Exhaust air from hoods or a ventilated work area does not have to be filtered but it must be discharged out of the building, as far from the air intake supply as possible.

4. Equipment. Use of instruments such as pH, dissolved oxygen or conductivity meters will be used in a ventilated work area or hood. This equipment will be enclosed in plastic to reduce the potential for contamination or kept outside the hood on a lab cart. Instruments will be serviced or calibrated in the work area. All calibration and maintenance log books should be kept with the equipment. All equipment that has come in contact with potentially

contaminated sediment must be kept either under negative pressure (e.g., a hood) or sealed in an air-tight container (e.g., a Tupperware container) before it is cleaned.

5. Work Surfaces. All laboratory work surfaces potentially exposed to hazardous sediments must be covered with Teflon® sheets, plastic trays, dry absorbent plastic-backed paper, foil, or other impervious or disposable material. If a surface becomes contaminated or a spill occurs, the work surface should be decontaminated or disposed of immediately.

6. Housekeeping. The laboratory work area shall be kept clean and orderly. Clean up shall follow every operation or, at a minimum, at the end of each day. Containers for disposal of contaminated materials will be placed in the work area.

7. Spill Control. A hazardous sediment spill will be treated as a "Chemical Spill": Organic Solvent". The sediment spill will be contained with the appropriate absorbent material.
If a spill occurs, the worker should:

   (a) pour absorbent material on the spill quickly, using enough material to absorb all fluid and cover the mass with excess dry absorbent to control vapors;

   (b) sound the air horn to signal for help if necessary;

   (c) if problems are encountered in containing the spill, consideration should be given to evacuating the building, routing personnel away from the problem area;

   (d) clean up absorbents and dispose of them properly as hazardous waste;

   (e) when safe, allow personnel to return to the laboratory work area.

9.3 STORAGE OF SEDIMENT

Solid-phase sediment and sediment extracts will be stored at 4°C in air-tight containers in the dark. Proper identification and sample tracking information must accompany all samples. Sediment extracts can be temporarily stored at 4°C in designated lab refrigerators. On board, sediment samples are stored inside coolers in either capped core tubes or in sample containers. All samples are to be transported from the refrigerator to work area on a lab cart in sealed containers. Sediment will always be transferred using double containment. Transfer of sediment from the storage container is a procedure which involves a potential hazard for personal contamination. During this procedure, the number of investigators in the laboratory work area should be kept to a minimum.

9.4 HOMOGENIZATION AND PREPARATION OF ELUTRIATE SAMPLES

Mixing and sampling of solid-phase sediment or sediment extracts will be done in the original storage container under a hood. If the containers holding sediment are removed from the hood, an intermediate non-breakable container must be used. The worker must use a respirator with organic vapor-acid gas filters and appropriate clothing as described in **Chapter 6** of this manual when solid-phase sediment or sediment extracts are not under a hood or in a ventilated work area.

9.5 CLEAN UP OF EQUIPMENT AFTER SEDIMENT PROCESSING

Glassware and equipment coming in contact with sediment will be cleaned as soon as possible. Cleaning glassware poses an increased exposure hazard. Therefore, all glassware must be cleaned under the vented sinks or hoods located in the laboratory work area.

9.6 SEDIMENT ASSESSMENT FIELD OPERATIONS SAFETY STANDARD OPERATING PROCEDURES

The following rules must be followed by sediment assessment field personnel:

SMOKING IS NOT ALLOWED.

1. When away from the dock, a personal flotation device must be worn any time you are out of the cabin.

2. No one is to go up onto the cabin roof without the captain's permission.

3. No one is to climb up onto, stand up on, or move around on the cabin roof while the ship is underway.

4. While underway, no one is to move to the aft deck by way of the outboard edge and handrail.

5. While underway, try to keep movement to a minimum.

6. When lifting equipment with the boom and winch, hard hats with face shields must be worn by anyone on the forward deck.

7. When collecting sediments, only the designated collection crew are to be on the forward deck.

8. When collecting sediments, personal protective equipment must be worn, including splash suit, safety glasses, disposable gloves, outer green gloves taped to the suit, rubber boots or boot covers, and hard hats with face shields.

9. Full face shields are to be worn any time there is a strong possibility that sediment may be splashed upon you. In particular, face shields should be worn when removing sediment cores from the aluminum tube and when washing sediment off equipment or the deck.

10. No contaminated splash suits or boots are to be worn or carried into the cabin until decontaminated.

11. When sediment is present on the forward deck, no one is to step out onto the forward deck unless, at a minimum, a Tyvek® suit, disposable gloves, boots and safety glasses are worn. Once contaminated, this clothing is not to be worn back into the cabin until decontaminated.

12. Heat-related emergencies are one of our primary concerns during the summer. Many times heat-related risks are a greater threat to our safety than the possibility of chemical contamination. Good judgment is essential. Pace yourself by knowing your limits. Field work is not a race and above all not a competition. During extreme heat, the Captain/Safety Officer will be monitoring your condition and recommending you drink plenty of water. You may also be requested to remove your safety clothing and take a break in the air conditioned cabin. If you feel the effects of heat stress, inform the Captain/Safety Officer.

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APPENDIX A: RESPIRATORY PROTECTION PROGRAM

Purpose

The purpose of this program is to provide written standard operating procedures governing the selection and use of respirators as required by EPA Order 1440.3, Respiratory Protection and by the Occupational Safety and Health Administration (OSHA) Regulations 29 CFR 1910.134; see Safety Office for copies.

Background

OSHA has set permissible exposure limits for many workplace airborne toxic materials. If employee exposure to the toxic materials exceeds these limits, the regulations require that feasible engineering controls and/or administrative controls be installed/instituted. If engineering/administrative controls cannot be implemented, the Agency is required to provide appropriate, approved respiratory protection for its employees. Respirators are the least acceptable means for reducing personnel exposures; they provide good protection only if properly selected and fitted, worn by employees when needed, and replaced when their service life is over. Despite these difficulties, respiratory protective devices are the only means of protection available to employees when engineering and work practice controls are not feasible or inadequate.

EPA Order 1440.3, Respiratory Protection, defines the Agency policy, responsibilities, and basic requirements for a respiratory protection program. The purpose of the program is to ensure the safety of employees whose jobs require the use of respiratory protective devices. EPA Management is required to establish and implement a respiratory protection program for the Region and its employees, who engage in activities in which atmospheres contain or are suspected of containing unhealthy quantities of airborne contaminants, atmospheres that have insufficient oxygen content, or where there is the threat of imminent release of toxic agents. Respiratory protection may also be necessary for routine but infrequent operations and for non-routine operations in which the employee is exposed briefly to high concentrations of a hazardous substance.

Selection of Respiratory Protection Devices

The proper selection of respiratory protective devices basically involves three steps:

1. Identification of the hazard.
2. Evaluation of the hazard.
3. Selection of the appropriate approved respiratory protective device based on the first two considerations.

Identification of the Hazard

To identify respiratory hazards, it is important to have working knowledge of the kinds of hazardous atmospheres which require the use of respirators. Contaminated atmospheres and oxygen-deficient atmospheres are the two types of atmospheres which present respiratory hazards.

Contaminated Atmospheres

Toxic materials can enter the body primarily in three ways: (1) by ingestion, through the gastrointestinal tract, (2) by absorption through the skin or through cuts and punctures, and (3) by inhalation through the respiratory system. The respiratory system not only presents the quickest and most direct avenue of entry into the body, but for many agents the lungs are also the critical target. Airborne contaminants include solid and liquid particulate matter and gaseous material, whether a true gas or vapor, or a combination of these.

Gaseous Contaminants: These contaminants are of two types:

A. Gases are fluids which exist in a gaseous state at ordinary temperature and pressure, such as carbon dioxide. Such substances are solids or liquids only at much lower temperature or much higher pressures than are commonly found in the work environment. Carbon dioxide, is a gas at room temperature, but it occurs as solid "dry ice" at low temperature, or as a liquid in a pressurized tank.

B. Vapors are a gaseous state of a substance that is solid or liquid at ordinary temperature and pressure. Vapors are formed by the evaporation of substances, for example, acetone or trichloroethylene, which ordinarily occur as liquid.

Particulate Contaminants: Particulate contaminants are suspended particles or droplets of a substance. Many of these particles can remain suspended in air indefinitely and are easily inhaled:

There are three types of particulates:

A. Dusts are solid particles produced by such processes as grinding, crushing, and mixing of powder compounds.

B. Mists are tiny liquid droplets suspended whenever liquid is sprayed, vigorously mixed, or otherwise agitated.

C. Fumes are solid condensation particles of small particle size.

Combination Contaminants: The two basic forms of contaminated atmospheres, gaseous and particulate, frequently occur together.

Oxygen Deficient Atmospheres

In an oxygen deficient atmosphere, the problem is not the presence of something harmful, but the absence of something essential. These atmospheres are most commonly found in confined and poorly ventilated spaces. Oxygen deficient atmospheres are classified as either immediately dangerous to life or health (IDLH) or not immediately dangerous to life or health depending on the oxygen concentration in the atmosphere. (An oxygen deficient atmosphere that contains less than 16 volume percent of oxygen in the atmosphere at sea level is IDLH. An oxygen deficient atmosphere not immediately dangerous to life and health is an atmosphere having an oxygen concentration between 16 and 19.5 volume percent of oxygen in the atmosphere at sea level. Normal oxygen content is 20.9 volume percent in the atmosphere.)

Oxygen deficient atmospheres occur in two different ways: (1) Oxygen may be "used up" by a chemical reaction, and (2) Oxygen is displaced by another gas. There is no definition of oxygen deficient atmosphere that has been universally accepted. OSHA has adopted and EPA accepts an oxygen deficient atmosphere as one that contains less than 19.5 volume percent of oxygen in the atmosphere at sea level.

Effects of Oxygen Deficiency

O_2 Vol % at Sea Level	Physiological Effect
16-12	Increased breathing volume. Accelerated heartbeat.
O_2 Vol % at Sea Level	Physiological Effect
14-12	Impaired attention and thinking. Impaired coordination.
O_2 Vol %at Sea Level	Physiological Effect
14-10	Very faulty judgment. Very poor muscular coordination. Muscular exertion causes rapid fatigue that may result in permanent heart damage. Intermittent respiration.
10-6	Nausea. Vomiting. Inability to perform rigorous movement, or loss of all movement. Unconsciousness, followed by death.
Less than 6	Spasmatic breathing. Convulsive movements. Death in minutes.

Evaluation of the Hazard

Respiratory protective devices, according to Agency policy and OSHA regulations shall be required in the following types of situations:

1. When there is a high potential for sudden release of toxic airborne substances or there has been such a release.
2. When making entries into environments or locations where there is reasonable belief that a hazardous environment is present; for example, entering hazardous waste or spill sites and manholes.
3. During infrequent, but routine operations, where engineering controls are not feasible or adequate for the toxicity of the material involved.

It is important to assess the potential hazards and the degree of control that can be exercised over each situation. Responsibility resides with the project leader/inspector. The respiratory protective device selected in each situation will depend on the information from the qualitative and quantitative determination of the hazard.

The person who evaluates the respiratory hazard must have the cooperation of others in obtaining information on the work area, work activities and other materials to properly evaluate and determine the appropriate respiratory protective device that will provide the best protection. Consideration of these questions will help in the selection of the correct equipment:

1. Does the atmosphere oxygen level meet with standards? Is the atmosphere oxygen level expected to remain constant or decrease?
2. What is the contaminant? Is it a gas, vapor, mist, dust, or fume?
3. What is the estimated concentration of the contaminant? Have measurements been taken?
4. Could the contaminant be considered immediately dangerous to life or health?
5. Is the contaminant flammable? Does the concentration approach the lower explosive limit? Do dust concentrations create a potential explosion problem?
6. Does the contaminant have adequate warning properties, e.g., smell, irritation?
7. Will the contaminant irritate the eyes at estimated concentration? Is eye protection also needed?
8. What type(s) of respirators will provide the required degree of employee protection?9.Is the recognized contaminant the only contaminant present?
10. If the contaminant is a gas or vapor, is there an effective sorbet for the respirator canister?
11. Can the contaminant be absorbed through the skin? If it can, will it result in a serious injury?
12. Does the facility require use of respiratory protection? Is there a facility/site specific safety plan available? Does it specify respiratory protection requirements?
13. Is there any onsite screening or test data available?
14. Are OSHA respiratory protection requirements applicable to the facility, site or activity?

Selection of Approved Respiratory Protective Devices

The selection of approved respiratory protective devices shall be based on these considerations:

1. The nature of the hazardous operation or process.
2. The type of respiratory hazard.
3. The location of the hazardous area in relation to the nearest area having respirable air.
4. The period of time the respiratory protection will be needed.
5. The employee's activities in the hazardous area.
6. The physical characteristics, functional capabilities, protection factors and limitations of the respiratory protection devices.

The NIOSH approval on a respirator has the following information:

- An assigned identification number placed on each unit.
- A label identifying the type of hazard for which the respirator is approved.
- Additional information on the label which give limitations and identifies the component parts for use with the basic unit.

Attachment A to EPA Order 1440.3 (See safety office for copy) provides a "Decision Logic Table for Respiratory Protective Device Selection." These are general guidelines. Written standard operating procedures governing the selection and use of respiratory protective devices shall be established for specific situations, where necessary. These may be in the form of facility/site specific plans or program-specific safety plans, such as for NESHAP-Asbestos inspections (Appendix C of EPA Order 1440.3). Types of respiratory protective devices are summarized in Appendix D of EPA Order 1440.3.

SELECTION

In general ANSI Z88.2-1980 states that the selection of the proper approved respirator depends upon:

- The nature of the hazard.
- The characteristics of the hazardous operation or process.
- The location of the hazardous area with respect to a safe area having respirable air.
- The period of time for which respiratory protection may be needed.
- The activity of workers in the hazardous area.
- The physical characteristics, functional capabilities, and limitations of respirators of various types.
- The respirator/protection factors and respirator fit.

All these criteria must be considered in the selection of a respirator. The Joint NIOSH/OSHA Standards

Completion Respirator committee devised a "Respirator Decision Logic" based on the above criteria.

ANSI Z88.2-1980 also describes the suitability of a particular respiratory protective device for oxygen deficient or Immediately Dangerous to Life or Health (IDLH) atmosphere. OSHA regulations require the use of approved respirators. Respirators are tested at the NIOSH Testing Laboratory in Morgantown, West Virginia in accordance with the requirements of 30 CFR Part 11 and are jointly approved by the Mine Safety and Health Administration (MSHA).

AIR-PURIFYING RESPIRATORS

I. Introduction

Respiratory protection must be used when the concentration of a substance in the ambient atmosphere exceeds a personal exposure limit. Several exposure limits used to determine the need for respiratory protection. In order of precedence, these are the OSHA Permissible Exposure Limits (PELs), NIOSH Recommended Exposure Limits (RELs), and the ACGIH Threshold Limit Values (TLVs). If none of these are available, other published data may be used.

Air-purifying respirators may be used only if all of the following requirements are met:

- The identity and concentration of the contaminant are known.
- The ambient concentration of a contaminant is below the Immediately Dangerous to Life or Health (IDLH) concentration.
- The oxygen content in the atmosphere is greater than 19.5%.
- The respirator assembly is approved for protection against the specific concentration of a contaminant.
- There is periodic monitoring of the work area.
- The respirator assembly has been successfully fit tested on the user.

II. Respirator Construction

An air-purifying respirator (APR) consists of a facepiece and a purifying element. In some APR designs there are combined in a single unit, more often they are separate components. There are several basic designs of air-purifying respirators.

- Disposable Dust Respirators

  These are generally constructed using cloth or paper as the filter element. A satisfactory face to respirator seal is difficult to achieve with this type of respirator. Most respirators of this design are not approved. Those which are approved are used for protection against dusts and mists. Some may be approved for asbestos use.

- Emergency Escape Mouthbit Respirators
  Mouthbit respirators are approved for escape use only. The mouthpiece containing the cartridge element is held in place by the teeth and a clamp is used to seal the nostrils.

- Quarter-Mask Respirators (Type B Half-Mask)
  The quarter-mask respirator is used for dusts (airborne exposure limits not less than 0.05 mg/m^3). The facepiece fits from the top of the nose to the top of the chin.

- Half-Mask Respirators (Type A Half-Mask)
  The half-mask respirator has approved cartridges for pesticides, organic vapors, dusts, mists, fumes, and several other combinations. A half-mask respirator fits from above the nose to under the chin.

- Full-Face Respirators
  A full-face respirator provides full face protection, including the eyes. It has a much higher Assigned Protection Factor than either a quarter or half-mask respirator. The full-face mask may be used with a wide variety of filtration media. This type of respirator may be used with cheek-mounted cartridges, chin-mounted cartridges, chin-mounted canisters, or chest/back-mounted canisters.

- Powered Air-Purifying Respirators
  Powered air-purifying respirators utilize pumps or fans to force air through the purifying elements. This eliminates breathing resistance and may help to maintain positive pressure in the facepiece. Powered air-purifying respirators are available in quarter, half, and full-face designs as well as with specialized helmet assemblies.

III. Facepiece

The facepiece is the means of sealing the respirator assembly to the user's face. The facepiece consists of the lens (full face only), mask suspension, and a means of attaching the filtration elements. Inhalation check valves are used to prevent moist exhaled air from being passed through the filter element. Exhalation check valves are used to allow exhalation through the diaphragm. Each respirator manufacturer utilized different means for attaching components to the facepiece. This prevents mixing parts from different manufacturers (hybridization) which would void a respirator's approval.

Although many configurations exist, only four types of facepiece-element assemblies are permissible for use with hazardous materials:

- Half-mask with twin cartridges or filters.
- Full-face mask with twin cartridges or filters
- Full-face mask with chin-mounted canister
- Full-face mask with harness-mounted canister (gas mask)

The full-facepiece is the recommended facepiece for use. It provides eye protection, is easier to fit, and has an Assigned Protection Factor greater than the half-mask.

IV. Air-Purifying Elements

Respiratory hazards can be broken down into two classes: particulates and vapors/gases. Particulates are filtered by mechanical means, while vapors and gases are removed by sorbents that react chemically with them. Respirators with the appropriate cartridge can filter or remove both classes of hazards.

A. Particulate-Removing Filters

Particulates can occur as dusts, fumes, or mists. The particle size can range from macroscopic to microscopic, and their toxicological effects can be severe or innocuous. The hazard posed by a particulate can be determined by its exposure limit (EL). A nuisance particulate will have an EL of 10 mg/m^3, while a toxic particulate may have an EL well below 0.05 mg/m^3.

Mechanical filters are classified according to the protection for which they are approved under schedule 21C of 30 CFR Part 11. Most particulate filters are approved only for dusts and/or mists with Els equal to or greater than 0.05 mg/m^3. These dusts are usually considered to produce pneumoconiosis and fibrosis. Such filters have an efficiency of 80-90% for 0.6 micrometer particles.

Respirators approved for fumes are more efficient, removing 90-99% for 0.6 micrometer particles. This type of respirator is approved for dusts, fumes and mists with ELs equal to or greater than 0.05 mg/m^3.

Finally there is a high efficiency filter which is 99.97% effective against particles 0.3 microns in diameter. It is approved for dusts, mists, and fumes with an EL less than 0.05 mg/m^3.

Mechanical filters load with particulates as they are used. As they do, they become more efficient, but also become more difficult to breathe through. When a mechanical filter becomes difficult to breathe through it should be replaced.

B. Gas and Vapor-Removing Cartridges and Canisters

When selecting a gas or vapor-removing element, it must be chosen for protection against a specific type of contaminant. Some of the commonly employed types of chemical cartridges and canisters and their OSHA-required color coding are listed in Table 2-1. This table has been excerpted from the OSHA respirator regulations for general industry (29 CFR 1910.134).

1. Style and Size

Gas and vapor-elements are available in different styles. The physical differences are: (1) size and (2) means of attachment to the facepiece. The smallest elements are cartridges which contain 50-200 cm^3 of sorbet and attach directly to the facepiece, usually in pairs. Chin canisters have a volume of 250-500 cm^3 and are attached to a full-facepiece. Gas mask, or industrial-size canisters contain 100-2000 cm^3 and are attached by a harness to the wearer's front or back and connected to the full-facepiece by a breathing hose.

The difference in applications is the Maximum Use Concentration (MUC) for which the cartridge or canister can be used in accordance with its NIOSH/MSHS approval. For example, organic vapors can be removed by the appropriate cartridges, chin canister, or gas-mask canister. Cartridges are approved for use in atmospheres up to 1000 ppm (0.1%) organic vapors, chin style canisters up to 5000 ppm (0.5%), and gas mask canisters up to 20,000 ppm (2.0%). However, no air-purifying respirator is permitted in an IDLH atmosphere.

2. Service Life

Each sorbet has a finite capacity for removing contaminants and when this limit is reached the cartridge or canister is said to be saturated. At this point the element will allow the contaminant to pass through and enter the facepiece. The length of time a cartridge or canister will effectively sorb the contaminant is known as the service life of the element. Service life of a type of cartridge or canister is dependent on several factors: the breathing rate of the wearer; contaminant concentration; and sorption efficiency.

a. Breathing Rate

If the breathing rate of the user is rapid, the flow rate of the contaminated air drawn through the cartridge is greater than it is at a moderate or slow respiration rate. A higher flow rate brings a larger amount of contaminant in contact with the sorbet in a given period of time which, in turn, increases the rate of sorbet saturation and shortens service life.

b. Contaminant Concentration

The expected service life of an organic vapor cartridge decreases as ambient contaminant concentration increases. As concentration goes up, the mass flow rate increases, bringing more contaminant in contact with the sorbet in a given period of time. For example, at any constant breathing rate, ten times as much contaminant contacts the element when the concentration is 500 ppm compared to 50 ppm.

c. Cartridge Efficiency

Chemical sorbents vary in their ability to remove contaminants from air. Table 2-2 compares the efficiency of organic vapor cartridges for a number of solvents by recording the amount of time until a 1% breakthrough concentration was measured in the cartridge-filtered air. The initial test concentration is 1000 ppm of solvent vapor; the breakthrough concentration is 10 ppm. From the table it can be seen that it takes 107 minutes for chlorobenzene to reach a 1% breakthrough, while it only takes 3.8 minutes for vinyl chloride. The sorbet (activated carbon) in the organic vapor cartridge is much better for removing chlorobenzene than vinyl chloride under the test conditions. Cartridge efficiencies need to be considered when selecting and using APRs.

3. Warning Properties

A warning property is used as a sign that a cartridge or canister in use is beginning to lose its effectiveness. A warning property can be detected as an odor, taste, or irritation. At the first such signal, the old cartridge or canister must be exchanged for a fresh one. Without a warning property, respirator efficiency may drop without the knowledge of the wearer, ultimately causing a health hazard.

Most substances have warning properties at some concentration. A warning property detected only at dangerous levels, that is, greater than the EL, is not considered adequate. An odor, taste, or irritation detected at extremely low concentrations is also not adequate because the warning is being given all the time or long before the filter begins to lose its effectiveness. In this case, the wearer would never realize when the filter actually becomes ineffective.

The best concentration for a warning property is to be first detected is around the EL. For example, toluene has an odor threshold of 40 ppm and an EL of 100 ppm. This is usually considered an adequate warning property. Conversely, dimethylformamide has an EL of 10 ppm and an odor threshold of 100 ppm. An odor threshold ten times the EL is not an adequate warning property.

If a substance causes rapid olfactory fatigue (that is, the sense of smell is no longer effective), its odor is not an adequate warning property. For example, upon entering an atmosphere containing hydrogen sulfide, the odor is quite noticeable. After a short period of time, it is no longer detectable.

Use of Respiratory Protective Devices

Selecting the respirator appropriate for a given hazard is important, but equally important is using the selected device properly. Proper use can be ensured by training users in selection, use, and maintenance of respiratory devices.

TRAINING AND FIT TESTING

Training

EPA Order 1440.3 requires that employees receive a minimum of six hours training initially, and two to four hours annually, thereafter, in respiratory protection. Training will be provided initially as part of Region V's "24 Hour Health and Safety Training for Field Personnel" course, and subsequent training will be provided as part of Region V's required annual "8 Hour Refresher Training" course, and recorded via Region V's normal safety record keeping and tracking system.

Fit Testing

The proper fitting of respiratory protective devices requires the use of some type of fit test. The fit test is needed to determine the proper match between the facepiece of
the respirator and the face of the user. Two types of tests are necessary, qualitative tests and quantitative tests.

1. Qualitative Tests: Fast, requiring no complicated expensive equipment, and are easily performed. Qualitative fit tests may be used, but are not substitute for annual quantitative fit tests which are required for all respirator users. There are five types of qualitative tests:

   A. Isoamyl acetate, a low toxicity substance with a banana oil like odor, is used widely in testing the facepiece fit of organic vapor cartridge/canister respirators. The substance is applied to a cotton wad inside an enclosure. The enclosure can be put together by the use of a plastic bag, several hangers, and some cotton. The user should put on the respiratory protective device in some area away from the test enclosure so that there is no prior contamination of the cartridge or "pre-exposure" to the isoamyl acetate.

      The user should perform the following steps in order:

      - Normal breathing.
      - Deep breathing, as during heavy exertion. This should not be done long enough to cause hyperventilation.
      - Side-to-side and up-and-down head movements. These movements should not be exaggerated, but should approximate those that take place on the job.

- Talking. This is most easily accomplished by reading a prepared text loudly enough to be understood by someone standing nearby.

- Other exercises may be added depending upon the need.

The major drawback of the isoamyl test is that the odor threshold varies widely among individuals. Also, the sense of smell is easily dulled and may deteriorate during the test so that the user can detect only high vapor concentrations. Another disadvantage is that isoamyl acetate smells pleasant, even in high concentrations; therefore, a user may say that the respirator fits although it has a leak. A user may say that a respirator fits because he/she likes the fit of a particular respirator or is following the respirator selection of another employee. Conversely, a user may claim that a particular respirator leaks if it is uncomfortable, etc. Therefore, unless the employee is highly motivated toward wearing respirators, the results of the test must sometimes be suspect.

B. Irritant Smoke Test - The irritant smoke test, similar to the isoamyl acetate test in concept, is used widely in testing the facepiece fit of high efficiency particulate filter respirators. This test can be used for both air-purifying and atmosphere supplying respirators, but an air purifying respirator must have a high-efficiency filter. The test substance is an irritant (stannic chloride or titanium tetrachloride) which is available commercially in sealed glass tubes. When the tube ends are broken and air passes through them, a dense irritating smoke is emitted. If the user detects any of the irritant smoke, it means a defective fit, and adjustment or replacement of the respirator is required. The irritant smoke test must be performed with caution because the aerosol is highly irritating to the eyes, skin, and mucous membrane. As a qualitative means of determining respirator fit, this test has a distinct advantage in that the wearer usually reacts involuntarily to leakage by coughing or sneezing. The likelihood of giving a false indication of proper fit is reduced. Irritant smoke tests are ineffective for positive pressure respirators operating in the demand and continuous mode.

C. Taste Test - Utilizing sodium saccharin and placing a hood over the wearers head is an acceptable method for Atmosphere Supplying Respirators. (Normally for single use respirators.)

D. Negative Pressure Test - This test (and the positive pressure test) should be used only as a very gross determination of fit. The wearer should use this test just before entering the hazardous atmosphere. In this test, the user closes off the inlet of the canister, cartridge(s) or filter(s) by covering with the palm(s) or squeezing the breathing tube so that it does not pass air; inhales gently so that the facepiece collapses slightly; and holds his/her breath for about ten seconds. If the facepiece remains slightly collapsed and no inward leakage is detected, the respirator has been properly donned and the exhalation valve and facepiece are not leaking. This test, of course, can only be used on respirators with tight-fitting facepieces. Although this test is simple, it has severe drawbacks; primarily that the wearer must handle the respirator after it has supposedly been positioned on his/her face. This handling can modify the facepiece seal. A second drawback is that with a negative pressure in a facepiece, a leaking facepiece may be drawn tightly to the face to form a good seal, giving a false reading of a good seal.

E. Positive Pressure Test - This test, similar to the negative pressure test, is conducted by closing if the exhalation valve or breathing tube and exhaling gently into the facepiece. The fit is considered satisfactory if slight positive pressure can be built up inside the facepiece without any evidence of outward leakage. For some respirators, this method requires that the wearer remove the exhalation valve cover; this often disturbs the fit of the respirator to the wearer. Therefore, this test should be used sparingly if it requires removing and replacing a valve cover. The test is easy for respirators whose valve cover has a single small port that can be closed by the palm or a finger.

2. Quantitative Tests - Quantitative respirator performance tests involve placing the user wearing the device in an atmosphere containing an easily detectable, relatively non-toxic gas, vapor or aerosol. The atmosphere inside the respirator is sampled continuously through a probe in the respiratory inlet covering. The leakage is expressed as a percentage of the test atmosphere outside the respirator, called "percentage of penetration," or simply "penetration." The greatest advantage of a quantitative test is that it indicates respirator fit numerically, and does not rely on a subjective response.

   EPA Employees are required to receive an annual quantitative fit test as arranged by the Regional Safety Officer. The irritant smoke qualitative test will be used as an interim measure. (This method is less subjective than the isoamyl acetate method.) Both the negative or positive pressure test will be used by the employee when donning a respirator to check the seal. Blue certification cards must be signed by the individual performing the fit test.

MEDICAL MONITORING

As part of the annual medical monitoring examination, employees performing tasks requiring the use of respiratory protective devices must be certified physically capable of performing the work while wearing the devices. A blue certification card will be issued to employees by a physician certifying that the employee is physically able to wear a respirator. The certification card must be available at the time of the respirator fit test and signed by the fit test operator.

INVENTORY AND PERSONAL ISSUANCE

Inventory

The Regional Safety Manager shall maintain a general inventory of respiratory equipment and supplies in his/her custody, and administer the regional budget for equipment purchases, for non-CERCLA activities. Part of the Regional Safety Manager's budget is administering funds for all personal protective equipment including purchase for all respiratory equipment and respiratory equipment supplies.

When additional respirators or respiratory equipment are needed, those needs should be transmitted to the Regional Safety Manager as soon as possible and the procurement should be coordinated with him/her.

Additionally, in each Branch where employees use respiratory protection devices, a general inventory of

respiratory equipment and supplies may be kept by the Branch Safety Officer or other appropriate individuals, but if kept shall be the responsibility of the Branch Supervisor. This inventory shall be available to the Regional Safety Manager for his/her annual inspection.

Personal Issuance

Field and laboratory personnel subject to contaminated atmospheres (as previously defined) will be issued an appropriate respirator with an initial supply of filters. Other equipment may be personally issued as needed. The immediate supervisor or his/her designee, is responsible for issuing equipment and maintaining records of the issuances. Respirators should be the full face type whenever possible.

SPECIAL CONSIDERATIONS IN RESPIRATOR USE

1. Respiratory protective devices shall not be worn when any condition prevents a good seal. Specific conditions not permitted are as follows:

   A. Any facial hair lying between the sealing surface of a respirator facepiece and the wearer's skin that will prevent a good seal shall not be allowed. This includes stubble, a moustache, sideburns or a beard that extends outward between the face and the sealing surface of the respirator.

   B. Spectacle temple bars or straps that pass between the sealing surface of a facepiece and the wearer's face prevent a good seal and, therefore, shall not be permitted with a full-face respiratory protective device. Individualized eye glasses mounted to the facepiece will be furnished.

2. Employees with perforated eardrums shall not wear respirators.

3. Contact lenses shall not be permitted while wearing a respirator.

4. Eating, drinking, smoking, chewing gum and applying cosmetics shall not be permitted while wearing a respirator.

Inspection, Maintenance, Repair, and Storage of Respiratory Protective Devices

Proper inspection, maintenance, storage, and repair of respiratory devices are mandatory to insure that these devices protect the health and safety of the employees when in use.

Inspection

An important part of respirator maintenance program is the inspection of the devices. If performed properly, inspections will identify damage or malfunctioning respirators and help to maintain their state of readiness. All respiratory protective devices must be inspected monthly or before each use. A record

must be kept of inspection dates and findings. Responsibility for inspection and record keeping resides with the supervisor (who may delegate the responsibility to the Branch Safety Officer), for equipment in general inventory and the employee for personally issued equipment. Inspection guidelines for various respiratory protection devices are provided in Appendix E of EPA Order 1440.3.

Maintenance

All respiratory protective devices shall be cleaned and disinfected after each use by the user or by another designated person.

The actual cleaning may be accomplished in a variety of ways:

1. The respiratory protective device should be washed with detergent in warm water using a brush , thoroughly rinsed in clean water, and then air dried in a clean place. Care should be taken to prevent damage from rough handling. This method is an accepted procedure for a small group or unit of employees where each employee cleans his/her own respirator.

2. A standard domestic type dish or clothes washer may be used if a rack is installed to hold the facepieces in a fixed position. (If the facepieces are placed loose in the washer, they may be damaged.) This method is especially useful in a large unit or group where respirator usage is extensive. *Handy-wipe disinfectants may be used as a substitute for the above methods.

Detergents and disinfectants: If possible, detergents containing a bactericide should be used. Organic solvents should not be used, as they can deteriorate the rubber facepiece. If the above combination is not available, a detergent may be used, followed by a disinfecting rinse. Reliable disinfectants may be made from some available household solutions.

1. Hypochlorite solution [50 parts per million (ppm) of chlorine] made by adding approximately two tablespoons of chlorine bleach per gallon of water. A two-minute immersion is sufficient to disinfect the respirator.

2. Aqueous solution of iodine (0.8ml tincture of iodine in one liter. The iodine 7% ammonium and potassium iodine, 45% alcohol and 48% water.) Again, a two-minute immersion is sufficient and will not damage the rubber and plastic in the respirator facepieces. Check with the manufacturer to find out the proper temperature for the solutions.

If the respirators are washed by hand, a separate disinfecting rinse may be provided. If a dish or clothes washing machine is used, the disinfectant must be added to the rinse cycle, and the amount of water in the machine at the time will have to be
measured to determine the correct amount of disinfectant to be added.

Rinsing: The cleaned and disinfected respirators should be rinsed thoroughly in clean water (120° F maximum) to remove all traces of detergent, cleaner and sanitizer, and disinfectant. This is very important to prevent dermatitis.

Drying: The respirators may be allowed to dry by themselves on a clean surface. They may also be hung from a horizontal wire, like drying clothes, but care must be taken not to damage the facepieces.

Repair

Continued use of respiratory protective devices may require periodic repair or replacement of component parts of the equipment. Such repairs and parts replacement must be done by a qualified individual(s). Equipment in need of repair will be given to the Supervisor or Safety Officer designee, who will either arrange for the repair of the equipment or its disposal if it is not repairable.

Replacement of parts and repair of air-purifying respirators, in most cases, present little problem. Most equipment manufacturers supply literature which details the component parts of their respirator and include servicing information. The manufacturer will also provide replacement parts. Replacement parts for respiratory protective devices must be those of the manufacturer of the equipment. Substitution of parts from a different brand or type of respirator will invalidate the approval of the respirator.

(All respirators and parts shall be NIOSH or MSHA approved with the appropriate TC number.)

Defective air-supplying respiratory equipment, with the exception of the SCBA, can be repaired and worn if broken parts are replaced by a qualified individual, again with the aid of the manufacturer's literature and parts. Maintenance of SCBA equipment is more difficult, primarily because of the valve and regulator assembly. Because of this, regulations require that SCBA equipment be returned to the manufacturer or certified repair person for adjustment or repair.

Storage

Care that has been taken to repair and maintain respirators can be negated by improper storage. Respiratory protective equipment must be stored to protect it from dust, sunlight, heat, extreme cold, excessive moisture, and damaging chemicals. Leaving a respirator unprotected can lead to damage of the working parts or permanent distortion of the facepiece, thus making it ineffective.

After cleaning and disinfecting the respirators, they should be placed individually in plastic bags capable of being sealed until reissue. They should be stored in a single layer with the facepiece and exhalation valve in a normal position to prevent the rubber or plastic from assuming a permanently distorted shape.

Equipment in general inventory will be stored in designated lockers or chests provided with the equipment. Personally issued equipment when not in use will be stored in a personally issued equipment locker. In the field, the equipment will be transported in the chests provided with the equipment or in a special carrying bag.

ATTACHMENTS

ADMINISTRATIVE RESPIRATORY PROTECTION PROGRAM
(To be Distributed to Employees When Issued Respirators)

General

The OSHA General Industry standard for respiratory protection, 29 CFR 1910.134, requires that a written respiratory protection program be established by an employer. The following procedures are based on the requirements for a minimum respirator program as established by the Occupational Health and Safety Administration.

OSHA's Requirements for a Minimal Respirator Program:

1. "Written standard operating procedures (S.O.P.) governing the selection and use of respirators shall be established."

2. "Respirators shall be selected on the basis of hazards to which the worker is exposed."

3. "The user shall be instructed and trained in the proper use of respirators and their limitations."

4. "Where practicable, the respirators should be assigned to individual workers for their exclusive use."

5. "Respirators shall be regularly cleaned and disinfected. Those used by more than one worker shall be thoroughly cleaned and disinfected after each use."

6. "Respirators shall be stored in convenient, clean, and sanitary location."

7. "Respirators used routinely shall be inspected during cleaning. Worn or deteriorated parts shall be replaced. Respirators for emergency use, such as self-contained breathing devices, shall be thoroughly inspected at least once a month and after each use."

8. "Persons should not be assigned to tasks requiring use of respirators unless it has been determined that they are physically able to perform the work and use the equipment. The local physician shall determine what health and physical conditions are pertinent. The respirator user's medical status should be reviewed annually."

9. "Approved or accepted respirators shall always be used."

Guidelines

1. The guidelines in this program are designed to help reduce employee exposures to occupational dust, fumes, mists, radionuclides, gases, and vapors.

2. The primary objective is to prevent excessive exposure to these contaminants.

3. Where feasible, exposure to contaminants will be eliminated by engineering controls (example, general and local ventilation, enclosure or isolation, and substitution of a less hazardous process or material.)

4. When effective engineering controls are not feasible, use of personal respiratory protective equipment may be required to achieve the goal.

Responsibilities

1. Management

   It is management's responsibility to determine what specific situations require use of respiratory equipment. Management must also provide proper respiratory equipment to meet the needs of each specific situation. Employees must be provided with adequate training and instruction on all equipment.

2. Management/Supervisory

   Superintendents, supervisors, foremen, or group leaders of each area are responsible for ensuring that all personnel under their control are completely knowledgeable of the respiratory protection requirements for the areas in which they work. They are also responsible for insuring that their subordinates comply with all facets of this respiratory program, including respirator inspection and maintenance.

3. Employees

   It is the responsibility of the employee to have an awareness of the respiratory protection requirements for their work areas (as explained by management.) Employees are also responsible for wearing the appropriate respiratory equipment according to proper instructions and for maintaining the equipment in a clean and operable condition.

ADMINISTRATION

1. **Name:**_____ **Signature:**_____
Regional Health & Safety Manager
is responsible for overall program administration.

2. **Name:**_____ **Signature:**_____
Physician, Occupational Health Nurse
is responsible for monitoring the health of company employees via a comprehensive medical and health program, including physical examinations.

3. **Name:**_____ **Signature:**_____
Either Regional Health & Safety Manager or Supervisor
is responsible for selection, issuance, training, and fit testing of all respirators used in this Agency including recordkeeping of the "Respirator Issuance and Training" card and "Job Description - Respirator Specification" form.

RECOMMENDED RESPIRATORY PROTECTION PROGRAM

Work Area Monitoring

Although it is not specifically discussed in the OSHA Requirements for a Minimal Respirator Program, to assure the adequacy of a respiratory protection program, monitoring should be conducted on a periodic basis to provide a continuing healthful environment for employees. Personal sampling equipment may be used in accordance with accepted industrial hygiene standards to sample each work area. Results of these samples will pinpoint areas where respiratory protection is required. A "Job Description - Respirator Specification" Form will also document what type of equipment should be worn for specific hazards present.

EMPLOYEE MEDICAL MONITORING

1. Pre-employment physical examinations are conducted on all employees to assure that they are physically able to perform their work and can use respiratory equipment as required.

2. Yearly physical examinations will be given to regular employees in order to assist them in maintaining their health. (At option of employer/physician or where such exams are required by Local, State, and/or Federal Regulations).

3. Biological monitoring in the form of blood and/or urinary analysis will be conducted on a yearly basis for all employees if appropriate (Employer/Physician determination).

4. Records must be kept on file for the duration of employment and for 30 years following.

RESPIRATOR INSPECTION AND MAINTENANCE

The following points should be considered for respirator inspection and maintenance:

1. The wearer of the respirator should inspect it daily whenever it is in use.

2. Respirators not discarded after one shift use, will be cleaned on a daily basis, according to the manufacturer's instructions, by the assigned employee or other person designated by the respirator program coordinator.

3. Respirators not discarded after one shift use, will be stored in a suitable container away from areas of contamination.

4. Whenever feasible, respirators not discarded after one shift use, will be marked or stored in such a manner to assure that they are worn only by the assigned employee. If use by more than one employee is required, the respirator must be cleaned between uses.

EMERGENCY RESPIRATORY EQUIPMENT

Self contained breathing apparatus may be required in specific areas for emergency use. This equipment will be used only by trained personnel when it is necessary to enter hazardous atmospheres. The following points should be considered:

1. All potential users will be fully trained in the use of this equipment.

2. When the equipment is used, it will be tested in an uncontaminated atmosphere prior to entering the hazardous area if possible.

3. An employee will not work with this apparatus in a hazardous atmosphere on an individual basis. At least one additional employee suitably equipped with a similar breathing apparatus must be in contact with the first employee and must be available to render assistance if necessary.

4. This equipment will be inspected monthly by trained department or group personnel. Inspection and maintenance information will be maintained by the Branch Supervisor Safety Officer.

JOB DESCRIPTION - RESPIRATOR SPECIFICATION FORM

JOB
DESCRIPTION _____
Contaminant Concentration X. ppm mg/m^3

_____
Recommended Respiratory Protection

First Choice Second Choice _____
NIOSH Approval Numbers

_____
OSHA Standard for Contaminant

_____

This form and the card that states that the employee is able to wear a respirator should be presented by the employee at the time of the fit testing. The form should also be filled out by the Public Health Service and by the person conducting the fit test and forwarded to the Regional Health and Safety Manager.

RESPIRATOR ISSUANCE AND TRAINING

Employee | Employee # | Title | Date

Respirator:
__Self-Contained __Supplied Air
__Powered Air __HEPA Filter
__Dust/Mist Filter __Chemical Cartridge
__Dust/Fume/Mist Filter __Chemical Cartridge w/pre-filter

Model | Application | NIOSH Approval #

Limitations: __Beard __Denture __Glasses __None

Explain:

Fitting:
___ Satisfactory Positive Pressure Test
___ Satisfactory Isoamyl Acetate Test
___ Satisfactory Negative Pressure Test
___ Satisfactory Sweetener Test

Maintenance: Cleaning: __Daily __Weekly __Other
Disposal: __Daily __Weekly __Other
__Individual __Plant __Other

Indicator

Employee Signature | Date

Approved | Date

APPENDIX B: MEDICAL MONITORING PROGRAMS

MEDICAL MONITORING SELECTION POLICY

The Regional Medical Monitoring Selection Policy is detailed in Regional Order 3130, see Safety Office, and is to be followed by all EPA Region 5 employees to which it applies.

PURPOSE

The purpose of the Regional policy is to insure consistency in our approach to mandatory participation in Medical Monitoring and to ensure that we provide the most comprehensive health protection possible for our employees. Baseline and subsequent yearly periodic medical monitoring exams are required for three categories of Regional employees.

POLICY

The three categories for which Medical Monitoring is mandatory are Hazardous Waste Site Workers, Laboratory Personnel, and Other Field Personnel or Inspectors who are exposed to toxic materials. These categories are detailed within the Procedure section below.

PROCEDURE

The first category of employees, Hazardous Waste Site Workers, are those who are engaged or involved in clean-up operations, investigations, inspections, corrective actions or similar activities at hazardous waste sites, treatment, storage, and disposal (TSDs) facilities or emergency response operations involving hazardous substances. Regulations relative to Medical Monitoring requirements which apply to Hazardous Waste Site Workers can be found in both 29 CFR 1910.120, Hazardous Waste Operations and Emergency Response, Final Rule, dated March 6, 1989, and EPA Order 1440.2.

The second category of employees required to participate in the Regional Medical Monitoring Program is Laboratory Personnel who regularly work with or around toxic substances which have a risk of impairing the health of the employee. The regulations covering Medical Monitoring for Laboratory Personnel are set out in the
EPA Order 1440, Chapter 8.

The third group of employees covered by mandatory Medical Monitoring consists of Field Personnel who are routinely engaged in field activities (other than Hazardous Waste Site activities) that might expose them to toxic substances or involve significant physical exertion. These employees are field inspectors and other personnel who work with toxic substances, or in the area of toxic substances to the degree that there is a risk of health impairment, or who frequently engage in arduous or physically taxing activity, or who use respiratory protective equipment.

All other personnel who may be exposed to some or all of the hazards and conditions described in this Order, but to a lesser degree than the three categories of employees described herein, are encouraged to enroll in the Regional Medical Monitoring Program. Final determination, if a question arises relative to individual participation or application of other related requirements relative to Medical Monitoring, will be made by the Regional Safety Manager who will consult with U.S. PHS Personnel, as appropriate. The determinations made in this regard are important. A determination that an employee is in the mandatory category of Medical Monitoring is also a determination that Medical Monitoring is a condition of employment in that position. Refusal to comply with this requirement could represent grounds for disciplinary action up to removal.

FURTHER REFERENCES

The regulations relative to Medical Monitoring for the personnel mentioned in this Order are to be found in EPA Order 1440.2, see Safety Office.

MEDICAL MONITORING PROGRAM PROCEDURES

U.S. EPA, Region 5, has established an agency-wide medical surveillance program to reduce insofar as possible the health risks of its employees who may be exposed to toxic substances or hazardous materials. This program is designed to monitor the health of employees whose work regularly or periodically poses the possibility of exposure to hazardous materials. Representative job categories that have health monitoring made available to them include laboratory workers. Generally, administrative, fiscal, secretarial, and other support personnel who have only indirect, infrequent, or inconsequential incidental exposures are not included.

All personnel who work (regularly or periodically) at Superfund or RCRA waste sites are required, by law, to participate in the medical surveillance program as a condition of employment. (29 CFR 1910.120) Other employees whose jobs justify inclusion in the program are free to participate if they choose, although EPA recommends participation by all employees who are referred for an examination.

Health monitoring is an employer responsibility and EPA bears the entire cost. When a preexisting or non-job related condition is detected in the course of a health monitoring examination, the employee is referred to his/her private physician for further evaluation, treatment, and follow-up. The employee must bear these costs. If the condition is later determined to have resulted from employment, the employee may seek compensation and recovery of medical expenses from the Department of Labor, Office of Workers' Compensation Programs.

The health provider source for EPA employees is the U.S. Public Health Service (PHS), Division of Federal Employee Occupational Health (DFEOH) by contractual arrangements. The PHS/DFEOH health units are located in the Metcalf Federal Building at 77 W. Jackson and the Federal Office Building at 536 S. Clark Street (Chicago); in the McNamara Building (Detroit); and the Federal Office Building (Akron). Consultation is available with the Regional Occupational Medicine Officer when a job-related illness is detected or suspected.

CONTENT OF MEDICAL SURVEILLANCE EXAMINATIONS

Medical surveillance consists of a series of blood chemistry tests, urine tests, and electrocardiogram, pulmonary function testing, vision tests, hearing testing when there has been or might be exposure to noise, cervical cytology (Pap smear test) and pelvic examination (females), medical and work history, and a complete examination by a physician. Chest X-rays and other special tests may also be included as necessary. The physician is responsible for explaining the significance of all findings - no employee should leave the health unit with unanswered questions or concerns.

FREQUENCY OF MEDICAL SURVEILLANCE EXAMINATIONS

Baseline or pre-placement examinations are conducted prior to a job assignment where exposure to toxic substances or similar hazardous materials may be possible.

Annual examinations are conducted for all persons in the job categories previously described.

Termination examinations are conducted at the termination of employment or before reassignment to an area where medical examinations are not required, if an employee has not had an examination within the last six months.

Crisis monitoring will be provided to EPA employees who have experienced acute exposures or other work related health hazards, or who report aggravated pre-existing medical conditions as a result of adverse work activities, on an emergency basis. Under these conditions, the employee may report directly to the PHS health unit for special tests as necessary. For life threatening emergencies and for non emergencies occurring outside of normal working hours, the nearest hospital-based emergency center is the most appropriate provider of the required services. Prior EPA approval for medical testing is not required under emergency circumstances; however, an application for EPA approval must be submitted promptly to the EPA.

ACCESS TO MEDICAL SURVEILLANCE EXAMINATIONS

The EPA Regional Health and Safety Officer develops a list of employees who are to be examined and provides these names to the PHS health units. The decision as to whom is recommended for the program often rests with the Branch Chief or supervisor most familiar with the possible hazards involved for employees under their supervision. If an employee has not been included in the medical surveillance program and believes they may have been exposed to toxic substances or hazardous materials, the supervisor should be contacted.

Upon enrollment in the medical surveillance program, the employee will be contacted by the PHS health unit nurse to schedule an appointment. Various forms shall be obtained from the Health and Safety Office and must be completed before the actual examination - a medical and work history (Baseline or Interim), Privacy Act Statement, Authorization for Disclosure of Information (to EPA Regional Health and Safety

Officer for occupationally related findings only), and a medical questionnaire for respirator users. It is requested that the supervisor complete two forms: a "Request for Medical Clearance for Respirator Use" (top portion) and a "Report of Employee Exposure to Hazardous Substance or Conditions". All forms will be provided to the employee by an EPA liaison person or the PHS health unit nurse.

The medical surveillance examination is normally accomplished in two visits to the health unit. During the first visit, basic tests are administered and samples of blood and urine are submitted to the laboratory. (NOTE: NO DRUG TESTING OR AIDS TESTING IS PERFORMED.) A return visit is scheduled with the physician when all test results have been received.

EMPLOYEE HEALTH MAINTENANCE EXAMINATION PROGRAM (EHMEs)

EPA's policies on employee health maintenance are described in a Regional Order titled "Employees Health Maintenance Policy and Procedures." The order describes the available services under the Employee Health Maintenance Program. The program provides periodic examinations to evaluate the health of employees who are not clinically ill. It is designed to discover previously undiagnosed diseases and to assist employees and organizations in maintaining optimum on-the-job health for their employees. EPA, Region 5 participates in this program through the Department of Health and Human Services, Division of Federal Employee Occupational Health. The order also describes the process for selecting candidates for inclusion in the program and the criteria used in determining eligibility. The examination consists of blood tests, hearing tests, vision screening and glaucoma tests, spirometry (a test for evaluating the condition of the lungs), an EKG (a test to evaluate the condition of the heart), a pap smear (for women), a proctoscopy of the colon (optional), and a full body physical examination. An employee may not receive an EHME exam more often than once within a two-year period.

OTHER HEALTH SERVICES PROVIDED TO EPA EMPLOYEES

Occasionally, there is confusion between the medical surveillance examination and the EHME-Employee Health Maintenance Examination. EHMEs are routine general medical exams, not related specific work exposures. As a participating agency in the PHS/DFEOH program, EPA is allotted a certain number of EHMEs per year. EPA, in turn, provides names of employees who are to receive EHMEs to PHS based on a set of criteria developed by EPA. The EHME and the medical surveillance examinations are performed for different reasons and should be viewed as two separate programs.

ATTACHMENT

Descriptions of the types of medical evaluations, as well as the appropriate medical surveillance forms, are found in the **Attachment.**

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

NOV 6 1995

OFFICE OF
ADMINISTRATION
AND RESOURCES
MANAGEMENT

MEMORANDUM

SUBJECT: Occupational Medical Surveillance Forms

FROM: Leah J. Henry HQOB
Safety, Health & Environmental Management Division

TO: ALL SHEMP Managers

Attached please find both a camera-ready copy of the new Occupational Medical Surveillance (OMSP) form as well as a disk containing the form. This form will be used for all EPA OMSP exams beginning January 1, 1996. Please note that the use of this form is mandatory.

Those of you who have existing agreements with the Division of Federal Occupational Health (DFOH), U.S. Public Health Service, should note that DFOH personnel have been advised that EPA will require the new form for all OMSP exams. However, your particular physician may not have been made aware of the change. In any case, you will need to modify your agreement with DFOH to specify the use of this form. Those of you who use private providers will need to initiate a modification to your contract. I suggest that you begin this process immediately in order to meet the deadline. Keep in mind that the provider will be required to send completed forms to our Medical Review Officer (at present, Dr. Christopher Holland) for final review.

The transition to a standardized form is the second step (the first being the development of a national policy) in our overall effort to collect meaningful OMSP data that will prove useful to the Agency in recognizing and remediating real and potential exposures. Additionally, the forms represent a major step towards limiting OMSP exams to those employees who need them and eliminating employees who do not require medical surveillance.

We ask for the cooperation of everyone in the implementation of this change. Please call me at 202-260-6340 if you have any questions regarding this memorandum. Thank you for your assistance.

Recycled/Recyclable

National Medical Surveillance Program

BCA9(

mployee is to complete the shaded medical history column of this form prior to appointment.

alth Unit - Attach hard copy of screening, diagnostic, and laboratory tests to this form prior to formal Medical review

Location of Health Center Performing Examination:

Client SS# _____

Client Name: _____

Provider Name(s): _____

_____

DEMOGRAPHIC DATA

Name:	Position:	SS#
Date of Testing:	Date of Birth:	Sex:

PROVIDERS PLEASE NOTE - CORE EXAM MUST ALWAYS BE COMPLETED

PREPLACEMENT/BASELINE CORE EXAM OCCUPATIONAL HEALTH EVALUATION

Required Services: (Check when test performed)

- ☐ DFOH Profile, Blood and Urine
- ☐ Audiometry (initials _____)
- ☐ EKG
- ☐ Spirometry (initials _____)
- ☐ Vision Screening
- ☐ Chest X-Ray - PA
- ☐ General Physical Examination
- ☐ General Medical History

If indicated services (Check when test performed)

- ☐ Stress EKG (per MRO only)
- ☐ Tetanus Immunization

PERIODIC CORE EXAM OCCUPATIONAL HEALTH EVALUATION

Required Services: (Check when test performed)

- ☐ DFOH Profile, Blood and Urine
- ☐ Vision Screening
- ☐ Audiometry (initials _____)
- ☐ General Physical Examination
- ☐ General Medical History

If indicated services: (Check when test performed)

- ☐ EKG
- ☐ Stress EKG (per MRO only)
- ☐ Tetanus Immunization
- ☐ Chest X-Ray - PA
- ☐ Spirometry (initials _____)
- ☐ Tonometry (initials _____)

MEDICAL SURVEILLANCE - SPECIAL PROFILES -

Please check all specialty exams that apply and complete the testing as indicated on page 2

- ☐ Pesticide Laboratory Workers
- ☐ Solid Waste/Emergency Response Team
- ☐ Field Sampling Personnel
- ☐ Clean Air Inspector/Enforcement Officers
- ☐ FIFRA Enforcement Officers
- ☐ Lab Employees
- ☐ NESHAPS/AHERA (Asbestos Enforcement Officers)
- ☐ NPDES Inspectors
- ☐ Radiation Staff
- ☐ Remedial Project Officers
- ☐ TSCA Enforcement Officers
- ☐ U.S.T. Inspectors
- ☐ Wetlands Staff

This examination does not substitute for a periodic health examination conducted by your private provider. It is being conducted for occupational purposes.

☐ **Pesticide Laboratory Workers**
- ☐ Baseline/Exit Exam
  - ☐ Serum Lead — Results _____
  - ☐ Urine Heavy Metals — Results _____
- ☐ Periodic Exam
  - ☐ Respirator Clearance

☐ **Solid Waste/Emergency Response Team**
- ☐ Baseline/Exit Exam
  - ☐ RBC Cholinesterase — Results _____
  - ☐ Respirator Clearance
  - ☐ Urine Heavy Metals — Results _____
- ☐ Periodic Exam
  - ☐ Serum Lead — Results _____
  - ☐ Respirator Clearance

☐ **Field Sampling Personnel**
- ☐ Baseline/Exit Exam
  - ☐ Serum Lead — Results _____
  - ☐ RBC Cholinesterase — Results _____
  - ☐ Respirator Clearance
- ☐ Periodic Exam
  - ☐ Serum Lead — Results _____
  - ☐ Respirator Clearance

☐ **Clean Air Inspector/Enforcement Officers**
- ☐ Baseline/Exit Exam
  - ☐ Serum Lead — Results _____
- ☐ Periodic Exam
  - ☐ Serum Lead — Results _____

☐ **FIFRA Enforcement Officers**
- ☐ Baseline/Exit Exam
  - ☐ RBC Cholinesterase — Results _____
- ☐ Periodic Exam
  - ☐ RBC Cholinesterase — Results _____

☐ **Lab Employees**
- ☐ Baseline/Exit Exam
  - ☐ RBC Cholinesterase — Results _____
  - ☐ Serum Lead — Results _____
  - ☐ Serum PBC — Results _____
  - ☐ Respirator Clearance(if on emergency team)
  - ☐ Urine Heavy Metals — Results _____
- ☐ Periodic Exam
  - ☐ Serum Lead — Results _____
  - ☐ Respirator Clearance(if on emergency team)

☐ **NESHAPS/AHERA**(Asbestos Enforcement Officers)
- ☐ Baseline/Exit Exam
  - ☐ B-Reading — Results _____
  - ☐ Respirator Clearance
- ☐ Periodic Exam
  - ☐ Chest X-Ray in accordance with OSHA guidelines
  - ☐ Respirator Clearance

☐ **NPDES Inspectors**
- ☐ Baseline/Exit Exam
  - ☐ Core Component Only
- ☐ Periodic Exam
  - ☐ Core Component Only

☐ **Radiation Staff**
- ☐ Baseline/Exit Exam
  - ☐ RBC Cholinesterase — Results _____
  - ☐ Serum Lead — Results _____
  - ☐ Respirator Clearance(if on emergency team)
  - ☐ Exercise Tolerance (Stress Test if>40yrsold)
- ☐ Periodic Exam
  - ☐ RBC Cholinesterase — Results _____
  - ☐ Respirator Clearance(if on emergency team)
  - ☐ Exercise Tolerance(Stress)Test Triennial Basis

☐ **Remedial Project Officers**
- ☐ Baseline/Exit Exam
  - ☐ RBC Cholinesterase — Results _____
  - ☐ Serum Lead — Results _____
  - ☐ Respirator Clearance
- ☐ Periodic Exam
  - ☐ Serum Lead — Results _____
  - ☐ Respirator Clearance

☐ **TSCA Enforcement Officers**
- ☐ Baseline/Exit Exam
  - ☐ RBC Cholinesterase — Results _____
  - ☐ Serum Lead — Results _____
  - ☐ Serum PBC — Results _____
  - ☐ Respirator Clearance
- ☐ Periodic Exam
  - ☐ Core Component Only

☐ **U.S.T.Inspectors**
- ☐ Baseline/Exit Exam
  - ☐ Core Component Only
- ☐ Periodic Exam
  - ☐ Core Component Only

☐ **Wetlands Staff**
- ☐ Baseline/Exit Exam
  - ☐ Lyme Titer — Results _____
- ☐ Periodic Exam
  - ☐ Core Component Only

Client Name: _____ Date: _____

MEDICAL HISTORY

Have you ever experienced any of the following:

VASCULAR

	Yes	No
Enlarged superficial veins	☐	☐
Hardening of the arteries	☐	☐
High Blood Pressure	☐	☐
Stroke	☐	☐
Transient Ischemic Attack (TIA)	☐	☐
Aneurysms (Dilated arteries)	☐	☐
Poor circulation to hands and feet	☐	☐
White fingers with cold/vibration	☐	☐

RESPIRATORY

	Yes	No
Asthma(incl.exercise induced asthma)	☐	☐
Bronchitis	☐	☐
Emphysema	☐	☐
Acute or chronic lung infections	☐	☐
Wind pipe or lung surgery	☐	☐
Collapsed lung	☐	☐
Scoliosis (curved spine) with breathing limitations	☐	☐
History of Tuberculosis	☐	☐

HEART

	Yes	No
Heart pain (Angina)	☐	☐
Heart rythmn disturbance	☐	☐
History of Heart Attack	☐	☐
Organic heart disease (including: prosthetic heart valves, mitral stenosis, heart block, pacemakers, Wolf Parkinson White (WPW) Syndrome)	☐	☐
Heart surgery	☐	☐
Mitral Valve Prolapse	☐	☐
Palpitations (Irregular heart beat)	☐	☐
Sudden loss of consciousness	☐	☐

Physical Activity or Exercise Program(check one)

Intensity: Low ____ Moderate ____ High ____

Activity _____ Frequency ____Days per weeks

Duration _____ Minutes

DIAGNOSTIC AND PHYSICAL FINDINGS

Cardio/Pulmonary

Normal	Abnormal	
☐	☐	EKG - Attach with interpretation
☐	☐	Lungs/Chest (includes breast)
☐	☐	Heart (thrill, murmur)
☐	☐	Vascular

Pulmonary Function Testing: (Attach Copy)

Calibration Date _____
(same day as test)
Machine Brand _____

%Predicted FVC	%Predicted FEV1	%Predicted FEV1/FVC	%Predicted FEF 25-75

Comments: Findings

Cardiac Risk Profile

Chol ____ HDL ____ LDL ____ Trig ____ Gluc ____

Hospitalizations and Surgeries

Year	Reason

CHEST X-RAY

Last PA Chest X-ray: Date _____

Result: ☐Normal ☐Abnormal
Comments: _____

TB Mantoux (PPD) Date: _____

mm Induration: _____

VITAL SIGNS

Height _____ Weight _____

Blood Pressure _____ mm/hg Pulse _____ /MIN

Respirations _____ /MIN Temp(if indicated) _____

IMMUNIZATIONS

Tetanus DPT (Td) Date: _____

Has client received HBV Vaccine:

☐Yes ☐No ☐Declined ☐Not Applicable

CORONARY RISK FACTORS

	Yes	No
Blood Pressure ≥ 145/90	☐	☐
Fasting Glucose ≥ 120 mg/dl	☐	☐
Total Cholesterol ≥ 200 mg/dl	☐	☐
Family history of CVD in members ≤ 55	☐	☐
Obesity	☐	☐
No regular exercise program	☐	☐
Currently smoking or ≥ pack/yr history	☐	☐

Client Name: _____ Date: _____

MEDICAL HISTORY

WELLNESS/HEALTH PROFILE

Smoking History
This information is needed since smoking increases your risk for lung cancer and several other types of cancer, chronic bronchitis, emphysema, asbestos related lung diseases, coronary heart disease, high blood pressure, and stroke. Please check your smoking status and complete that section:

☐ Current Smoker
Number of cigarettes per day _____
Number of cigars per day _____
Number of pipe bowls per day _____
Total years you have smoked _____

☐ Former Smoker
Number of cigarettes per day _____
Number of cigars per day _____
Number of pipe bowls per day _____
Total years you smoked _____

Alcohol/Drug Use
What is your average alcohol consumption in a week?

_____ drinks
(1 drink = 12 oz beer, 1 glass wine or 1.5 oz liquor)
How often do you drink alcohol?
☐ Weekdays ☐ Weekends ☐ Both

Do you use recreational drugs?
☐ Currently ☐ Previously ☐ Never

RESPIRATOR CLEARANCE QUESTIONS

What type of respirator do/will you use:
☐ Cartridge ☐ Air Supply ☐ SCBA

How often do you use a respirator?
☐ Daily ☐ Weekly ☐ Monthly ☐ < two times a year

Effort while using respirator?
☐ Light ☐ Moderate ☐ Heavy

Hazards present during use?
☐ High altitude ☐ Temp extremes ☐ Confined spaces

Have you ever had, or do you now have any of the following? Please check all that apply and use the space below to comment on positive responses.

Yes	No	
☐	☐	Persistent Cough
☐	☐	Heart Trouble
☐	☐	Shortness of breath
☐	☐	History of fainting or seizures
☐	☐	Fear of tight or enclosed spaces
☐	☐	Sensation of smothering
☐	☐	Heat exhaustion or heat stroke
☐	☐	Contact lenses or eyeglasses
☐	☐	Other conditions that might interfere with respirator use or result in limited work activity

Client comments regarding positive responses to Respirator Clearance Questions:
_____

DIAGNOSTIC AND PHYSICAL FINDINGS

Comments/Findings

ENDOCRINE

	Yes	No
Diabetes (insulin requiring)	☐	☐
Diabetes (non-insulin requiring)	☐	☐
Childhood Onset Diabetes	☐	☐
Thyroid Disease	☐	☐
Obesity	☐	☐
Unexplained weight loss or gain	☐	☐

OBSTETRIC

	Yes	No
Are you currently pregnant?	☐	☐

Comments/Findings

MENTAL HEALTH

	Yes	No
History of psychosis	☐	☐
Poor adaptation to stress	☐	☐
Anxiety or phobia disorder	☐	☐
Panic attacks, hyperventilation	☐	☐
Uncontrollable rage	☐	☐
Claustrophobia	☐	☐
Diagnosed personality disorder or neuroses	☐	☐

DERMATOLOGY

	Yes	No
Sun sensitivity	☐	☐
Allergic dermatitis to rubber	☐	☐
History of chronic dermatitis	☐	☐
Active skin disease	☐	☐
Moles that change in size or color	☐	☐

Medications: List all medications (prescription and over-the-counter) you are currently taking.
_____
_____

MEDICAL HISTORY

MUSCULOSKELETAL

	Yes	No
Moderate to severe arthritis, tendonitis	☐	☐
Amputations	☐	☐
Loss of use of arm or leg	☐	☐
Aseptic bone necrosis	☐	☐
Chronic back pain (back pain associated with neurological deficit or leg pain)	☐	☐

NEUROLOGICAL

	Yes	No
Any neurological disease	☐	☐
Seizures	☐	☐
Spinal Cord Injury	☐	☐
Numbness or tingling	☐	☐
Head/spine surgery	☐	☐
History of head trauma with persistent deficits	☐	☐
Chronic recurring headaches (migraine)	☐	☐
Brain tumor	☐	☐
Loss of memory	☐	☐
Insomnia (difficulty sleeping)	☐	☐

GASTROINTESTINAL

	Yes	No
Esophageal diverticula	☐	☐
Severe reflux	☐	☐
Hiatal hernia	☐	☐
Gas bloat syndrome	☐	☐
Gastric outlet obstruction	☐	☐
Ileostomy obstruction	☐	☐
Diverticulitis	☐	☐
Hernias	☐	☐
Fistulas	☐	☐
Colostomy	☐	☐
Hepatitis	☐	☐
Active ulcer disease	☐	☐
Irritable bowel syndrome	☐	☐
Rectal bleeding	☐	☐
Vomiting blood	☐	☐

GENITOURINARY

	Yes	No
Blood in urine	☐	☐
Difficult or painful urination	☐	☐
Infertility (difficulty having children)	☐	☐

DIAGNOSTIC AND PHYSICAL FINDINGS

Normal	Abnormal		Comments/Findings
☐	☐	Upper extremities (strength)	
☐	☐	Upper extremities (range of motion)	
☐	☐	Lower extremities (strength)	
☐	☐	Lower extremities (range of motion)	

Normal	Abnormal		Comments/Findings
☐	☐	Cranial Nerves	
☐	☐	Cerebellum	
☐	☐	Motor/Sensory	
☐	☐	Deep Tendon reflexes	
☐	☐	Mental Status Exam	

Normal	Abnormal		Comments/Findings
☐	☐	Auscultation	
☐	☐	Palpation	
☐	☐	Organo-megaly	
☐	☐	Tenderness	
☐	☐	Inguinal hernia	

Normal	Abnormal		Comments/Findings
☐	☐	Urogenital exam	

Client Name: _____ Date: _____

MEDICAL HISTORY

VISION

	Yes	No
Frequent headaches	☐	☐
Blurred vision	☐	☐
Difficulty reading	☐	☐
Eye disease	☐	☐
Eyeglasses	☐	☐
Contact lenses	☐	☐
Radial Keratotomy	☐	☐
Cataracts	☐	☐
Color blindness	☐	☐

HEARING

	Yes	No
Loud, constant noise or music in the last 14 hours	☐	☐
Loud, impact noise in past 14 hours	☐	☐
Ringing in the ears	☐	☐
Difficulty hearing	☐	☐
Ear infections or cold in the last 2 weeks	☐	☐
Dizziness or balance problems	☐	☐
Are you in a Hearing Conservation Program	☐	☐
Do you use protective hearing equipment	☐	☐

If yes, type: ☐ foam ☐ pre-mold/plugs ☐ ear muffs

	Yes	No
Have you had prior Military Service	☐	☐
Have you had prior ear surgery	☐	☐
Have you had an ear drum rupture	☐	☐
Have you had recurrent ear infections	☐	☐
Do you wear a hearing aid	☐	☐

DIAGNOSTIC AND PHYSICAL FINDINGS

Head and Neck

Normal	Abnormal
☐	☐ Head, Face, Neck (thyroid), Scalp
☐	☐ Nose/Sinuses
☐	☐ Mouth/Throat
☐	☐ Pupils equal/reactive
☐	☐ Ocular Motility
☐	☐ Ophthalmoscopic Findings

Comments/Findings

Vision

Normal	Abnormal
☐	☐ Color vision

Type of test

- ☐ Ishihara plate
- ☐ Function test (Yarn, colors in room)
- ☐ Other (specify _____)

Uncorrected vision (Snellen Units)

Both Nr 20/____ Right Nr 20/____ Left Nr 20/____

Both Fr 20/____ Right Fr 20/____ Left Fr 20/____

Corrected vision (Snellen Units)

Both Nr 20/____ Right Nr 20/____ Left Nr 20/____

Both Fr 20/____ Right Fr 20/____ Left Fr 20/____

Ears

Left Normal	Left Abnormal	Right Normal	Right Abnormal
☐	☐ Canal/External ear	☐	☐ Canal/External ear
☐	☐ Tympanic Membrane	☐	☐ Tympanic Membrane

Comments/Findings:

Hearing

Audiogram: ☐ Baseline ☐ Annual ☐ Termination (Attach current and baseline audiogram)

Calibration Method: ☐ Oscar ☐ Biological Date _____

Frequency	500Hz	1000Hz	2000Hz	3000Hz	4000Hz	6000Hz	8000Hz
Right ear							
Left ear							

Review/compare with baseline: Change ☐ No change ☐

☐ Normal ☐ Abnormal Explain:

Client Name: _____ Date: _____

TOXIC EXPOSURE HISTORY

Have You Ever Worked With, Or Had Significant Exposure To, Any Of The Following?
Check All Which Apply In Past Year (Periodic/Exit Exam) Or Prior Years (Pre-placement Exam)

	YES	NO		YES	NO		YES	NO		YES	NO
Chemicals	☐	☐	Plastic Manufacture	☐	☐	Grinding	☐	☐	Foundry/Smelter	☐	☐
Insulation	☐	☐	Refinishing	☐	☐	Welding/Torch Cutting	☐	☐	Laboratory	☐	☐
Painting	☐	☐	Plumbing/Pipe fitting	☐	☐	Petroleum	☐	☐	Sawmill	☐	☐
Machinery	☐	☐	Jewelry	☐	☐	Refineries	☐	☐	Farming	☐	☐
Dry Cleaning	☐	☐	Shipyards	☐	☐	Sandblasting	☐	☐	Plating	☐	☐
Electronics	☐	☐	Mining	☐	☐	Assembly Line	☐	☐	Grain Elevator/Silo	☐	☐
Heavy Equipment Operation	☐	☐	Printing	☐	☐	Medical Facilities	☐	☐			

SINCE WORKING AT THE EPA HAVE YOU EVER WORKED WITH:

(a) **Aerosols**

If yes, which type?	YES	NO
Spray Paint	☐	☐
Other Sprays	☐	☐
Lubricants	☐	☐
Cleaners	☐	☐

(b) **Asbestos Dust**

If yes, where?		
Insulation/Removal	☐	☐
Brake Shoes/Gaskets	☐	☐
Building Assessment	☐	☐

(c) **Asphalt, pitch or tar**

If yes, where?		
Roofing	☐	☐
Road Work	☐	☐

(d) **Beryllium Dust** ☐ ☐

(e) **Cotton Dust**

If yes, where?		
Milling/Picking	☐	☐
Processing	☐	☐

(f) **Pesticides**

If yes, where?		
Applications/Waxing	☐	☐
Farmwork/Manufacture	☐	☐

(g) **Fuel**

If yes, which type?		
Gasoline/Diesel	☐	☐
Jet/Rocket Fuel	☐	☐
Natural Gas	☐	☐
Underground Tank Removal	☐	☐

(h) **Oils**

If yes, where?		
Machining/Maintenance	☐	☐
Distribution/Sales	☐	☐

(i) **Aerosols**

If yes, where?	YES	NO
Battery Manufacture	☐	☐
Foundry/Smelter	☐	☐
Welding/Soldering/Brazing	☐	☐
Paint/Ceramics	☐	☐

(j) **Nickel/Chrome**

If yes, where?		
Plating	☐	☐
Smelter/Mining	☐	☐

(k) **Paint**

If yes, which type?		
Epoxy/Acrylic	☐	☐
Oil/Enamel	☐	☐
Waterbase/Latex	☐	☐
Polyurethane/Lead Base	☐	☐

(l) **Microwave/Radio Frequency**

If yes, where?		
Radar/Communications	☐	☐
Ovens/Sealers	☐	☐

(m) **Nuclear Radiation/X-Ray**

If yes, where?		
Industrial Testing	☐	☐
Laboratory/Isotopes	☐	☐
Power Plant	☐	☐

(n) **Fiberglass**

If yes, where?		
Insulation	☐	☐
Construction/Repair	☐	☐
Grinding/Sanding	☐	☐

(o) **Plastics**

If yes, where?		
Formulation/Production	☐	☐
Molding/Extrusion	☐	☐

(p) **Solvents/Cleaners**

If yes, which type?	YES	NO
Degreasers	☐	☐
Acid/Alkali Strippers	☐	☐
Dry Cleaning	☐	☐
Underground Tanks Removal	☐	☐

(q) **Compressed Gases**

If yes, which type?		
Argon/Ammonia	☐	☐
Arsine/Anesthetic	☐	☐
Chlorine/Hydrogen	☐	☐
Helium/Carbon Monoxide	☐	☐
Phosphine/Sulfur Dioxide	☐	☐
Other	☐	☐

(r) Have you ever worked in an excessively hot or cold environment? ☐ ☐
Where? _____

_____

(s) Have you ever worked around excessive noise? ☐ ☐
Where? _____

_____

(t) Have you ever worked around vibration or with vibrating tools? ☐ ☐
Where? _____

_____

(u) Have you ever performed a site assessment on any of the above industry groups or materials? ☐ ☐
Where? _____

_____

Client Name: _____ Date _____

TOXIC EXPOSURE HISTORY

P... AN "X" IN THE BOX WHICH INDICATES WHEN YOU HAVE E... IN YOUR LIFE HAD DIRECT CONTACT WITH THAT SUBSTA...

PLEASE INDICATE "NOW" OR "PAST" AND NUMBER OF YEARS

FOR INTERIM AND YEARLY OR EXIT EXAMS LIST CONTACT ONLY SINCE LAST EXAM.

	NEVER	NOW	PAST
Acetone	☐	☐___	☐___
Antimony	☐	☐___	☐___
Acrylamide	☐	☐___	☐___
Arsenic	☐	☐___	☐___
Acrylonitrile	☐	☐___	☐___
Asbestos	☐	☐___	☐___
Ammonia	☐	☐___	☐___
Asphalt	☐	☐___	☐___
BCME	☐	☐___	☐___
Benzene/Benzol	☐	☐___	☐___
Benzidine	☐	☐___	☐___
Beryllium	☐	☐___	☐___
Beta Napthylamine	☐	☐___	☐___
Bromine	☐	☐___	☐___
Butyl Alcohol/Acetate	☐	☐___	☐___
Cadmium	☐	☐___	☐___
Carbon Black	☐	☐___	☐___
Carbon Disulfide	☐	☐___	☐___
Carbon Monoxide	☐	☐___	☐___
Cellosolve	☐	☐___	☐___
Chlorine	☐	☐___	☐___
Chloroform	☐	☐___	☐___
Chromium Compounds	☐	☐___	☐___
Coal Tar Pitch	☐	☐___	☐___

	NEVER	NOW	PAST
Coal Dust	☐	☐___	☐___
Cobalt	☐	☐___	☐___
Cotton Dust	☐	☐___	☐___
Cresol	☐	☐___	☐___
Cyanide	☐	☐___	☐___
D-4 D	☐	☐___	☐___
DDT	☐	☐___	☐___
Dichlorobenzene	☐	☐___	☐___
Dinitrobenzene	☐	☐___	☐___
Dioxin	☐	☐___	☐___
Endrin	☐	☐___	☐___
Epichlorhydrin	☐	☐___	☐___
Ethanolamine	☐	☐___	☐___
Ethylene Glycol Dinitrate (EGDN)	☐	☐___	☐___
Ethylene Oxide	☐	☐___	☐___
Formaldehyde	☐	☐___	☐___
Gasoline/Fuels	☐	☐___	☐___
Hexane	☐	☐___	☐___
Hydrazine	☐	☐___	☐___
Hydrogen Sulfide	☐	☐___	☐___
Lead	☐	☐___	☐___
Mercury	☐	☐___	☐___
Manganese	☐	☐___	☐___

	NEVER	NOW	PAST
MEK (Methyl Ethyl Ketone)	☐	☐___	☐___
Methylene Chloride	☐	☐___	☐___
Naptha	☐	☐___	☐___
Nickel	☐	☐___	☐___
Nitrobenzene	☐	☐___	☐___
Oil Mist	☐	☐___	☐___
Perchloroethylene (PCE)	☐	☐___	☐___
Phenol	☐	☐___	☐___
PCB/PBB	☐	☐___	☐___
Silica/Sand	☐	☐___	☐___
Styrene	☐	☐___	☐___
Sulfur Dioxide	☐	☐___	☐___
2-4, 5-T	☐	☐___	☐___
TDI/Urethane/Isocyanate	☐	☐___	☐___
Toluene	☐	☐___	☐___
Trichloroethylene (TCE)	☐	☐___	☐___
1,1,1,Trichloroethane (Methyl Chloroform) (TCA)	☐	☐___	☐___
Vinyl Chloride Monomer	☐	☐___	☐___
Welding Fumes	☐	☐___	☐___
Wood Dust	☐	☐___	☐___
Xylene	☐	☐___	☐___
Zinc Compounds	☐	☐___	☐___

List all chemical contact that resulted in symptoms: _____

TOXIC EXPOSURE HISTORY (OMIT FOR PERIODIC AND EXIT EXAMS)

	YES	NO
1. Have you ever developed illness or symptoms which you think were related to your work?	☐	☐
2. Have you ever worked with a substance which made your nose, chest, or sinuses congested?	☐	☐
3 Have you ever worked with a substance that irritated your skin or caused a rash?	☐	☐
4. Did you ever work in an area that was subsequently closed down?	☐	☐
5. Were you ever advised to use personal protection during work?	☐	☐
If yes, what kind?	☐	☐
Respirator	☐	☐
Face Shield	☐	☐
Glasses	☐	☐
Ear Muffs or Plugs	☐	☐
Gloves	☐	☐
Special Clothing	☐	☐
Other: _____	☐	☐
6 Have you ever pursued a compensation claim or received disability payments for occupational injury disease?	☐	☐
7. Have you ever been turned down for life insurance?	☐	☐

	YES	NO
8. Have you ever worked for an employer who required periodic physical examinations or blood/urine tests?	☐	☐
9. How many days of work did you miss in the last 12 months due to your health? _____	☐	☐
10. Have you ever received hazardous duty or environmental pay?	☐	☐
11. Have you ever had an illness, condition or symptoms which:	☐	☐
Occurred only during work?	☐	☐
Occurred only after work, in evening?	☐	☐
Occurred when you begin work after a weekend or holiday?	☐	☐
Disappeared during vacations or weekends?	☐	☐
12. Have you ever lived near large industrial plants or areas of air pollution?	☐	☐
13. Do you have another job?	☐	☐
14. Do you have any hobbies?	☐	☐
15. Are you exposed to any toxic substances or hazards at your other jobs, at home, or away from work?	☐	☐
List _____		
_____		

Client Name: _____ Date _____

PROFESSIONAL STAFF

Please [redacted] the topics you discussed during the diagnostic work-up or physical examination

- ☐ Diet
  - ☐ Low-calorie
  - ☐ Low-fat
  - ☐ Low-salt
- ☐ Cholesterol
- ☐ Hypertension
- ☐ Exercise
- ☐ Obesity
- ☐ Smoking Cessation
- ☐ Avoid Sun Exposure/Sun Screen
- ☐ Alcohol Use
- ☐ Cancer Screening
- ☐ Immunizations
- ☐ Hearing Protection
- ☐ Vision Referral
- ☐ Other Personal Protective Equipment
- ☐ Job Stressors
- ☐ Referral(s)

Others _____

_____

WORKPLACE EXPOSURE MONITORING

EXAMININ[redacted]SICIAN

Is workplace monitoring data or other exposure data for this employee or this position available for review?

☐ Yes ☐ No

If yes, what type of data is available?

- ☐ Acute Exposure Data
- ☐ Workplace Monitoring Data
- ☐ Individual Dosimetry Data
- ☐ MSDS

- ☐ Periodic Exposure Data
- ☐ Workplace Monitoring Data
- ☐ Individual Dosimetry Data
- ☐ MSDS

How was data made available?

- ☐ Electronic Database
- ☐ Hard Copy Report
- ☐ Employee Self-Report

If yes, please explain what changes, if any were made in the examination due to this data:

_____

_____

Based upon your knowledge of the physical demands of the position and/or the potential exposure to occupational hazards, please answer the following:

Does the employee need to continue in a medical surveillance program?

- ☐ Yes
- ☐ No
- ☐ Cannot determine based on information available
- ☐ Other _____

EXAMINING PHYSICIAN

Summary of Abnormal Findings with Plan of Action [redacted]

_____

_____

_____

ENVIRONMENTAL PROTECTION AGENCY

PHYSICAL EVALUATION FORM EPA NATIONAL PROGRAM

BCA9 0013

Name of client _____ Health Center Address: _____

SSN#. _____ _____

Agency Name: _____ Health Center Phone: _____

Qualification Statement

☐ No Significant Findings - Employee should be able to meet the medical requirements of the job based on these examination findings.

(1) ☐ Respirator use without restrictions.

☐ Additional testing required - Final determination cannot be made until the following tests are conducted.

_____

_____

(2) ☐ Respirator use with restrictions.

☐ Significant Medical Findings - The examining physician has determined that this individual cannot perform the requirements effectively and without hazard to himself/herself or others.

(3) ☐ NO RESPIRATOR USE PERMITTED.

☐ Findings of a Temporary Nature - Individual is currently unable to perform the essential functional requirements effectively and without hazard to himself/herself or others because of a medical condition of a temporary nature (not to exceed six months).

_____ Date

Examining Physician's Signature

_____

Examining Physician's Name (print/type)

☐ Concur ☐ Do not concur Comments: _____

_____

Reviewing Physician's Signature: _____ Date

Reviewing Physician's Name: (print/type) _____

TYPES OF EVALUATIONS - DEFINITIONS

BASELINES EVALUATION - The purpose of this evaluation is to characterize the state of the individual prior to commencing work in a new assignment. It may also be conducted in order to assess the individual's health status in relation to the special demands of the proposed job assignment.

PERIODIC EVALUATION - The purpose is to identify and measure any adverse effects from occupational activities, and to control risks from occupational exposures. These are conducted either annually or biennially. The frequency is based on specific criteria.

EXIT EVALUATION - This evaluation is conducted when someone terminates employment in a given position that requires medical surveillance. The purpose of the examination is to document the health status of the individual at the end of employment in that position.

SPECIAL EVALUATION - This evaluation is used to assess the health status of the employee following an unusual exposure to a hazardous substance (biological, physical, chemical, radiologic) or to evaluate medical issues relating to the performance of specific job duties. It may also include follow-up testing. Please note that an employee who is acutely symptomatic from an exposure to a hazardous substance will be treated initially by their own physician or at an emergency department.

CONTENT OF INDIVIDUAL MEDICAL EVALUATIONS

The content of any individual medical surveillance examination will include a "core" component of data as well as data investigations unique to specific job duties and exposures.

CONTENT OF "CORE" COMPONENTS:

1. *Medical and occupational history*
2. *Physical examination*
3. *Audiogram*
4. *Vision testing*
5. *Pulmonary function testing (periodicity established by age, smoking, type and frequency of respirator use, known medical considerations and exposure profile)*
6. *Chest x-ray (initially, when medically indicated and exit)*
7. *Routine blood and urine analysis (includes complete blood count - CBC, blood chemistries - SMAC 20, urine analysis)*
8. *Electrocardiogram (baseline at 40, and every five years thereafter)*
9. *Tetanus vaccination (administered if employee has not had vaccination in 10 years)*
10. *Cardiac stress test (only at the recommendation of the occupational medicine physician). Generally this test should be obtained when the employee has multiple risk factors for cardiovascular disease, has known but poorly characterized cardiac disease, AND is involved in one of the following activities:*

    a. *Heavy lifting*

    b. *Extensively employs personal protective equipment that places increased strain on the heart and lungs (IE. Impervious chemical protective clothing)*

    c. *Involved in emergency response or criminal investigation*

FREQUENCY OF MEDICAL EVALUATIONS

The frequency of the medical evaluations shall be determined by the nature, type, frequency and intensity of the potential exposures. Using the following guidelines, the frequency will be established by the EPA Safety, Health, and Environmental Management Program (SHEMP) Manager in consultation with the employee's supervisor and the designated occupational physician.

1. *Annual evaluations are recommended for laboratory or field employees who meet the criteria for participant selection and who fit into any one of the four categories described below:*

   a. *A field or laboratory employee who: is over age 40; or has significant medical problems or findings on prior medical surveillance examinations (e.g. insulin requiring diabetes, cardiovascular disease, elevated live enzyme test, etc.)*

   b. *An emergency response team member.*

   c. *An employee whose position requires engaging in field or laboratory activities more than 30 days per year.*

   d. *An employee with routine exposure to a substance regulated by OSHA and requiring annual medical examinations.*

2. *Evaluations every other year for those employees not fitting the criteria for annual examinations (e.g. a healthy employee not exposed to a substance that OSHA requires annual surveillance examination and/or who visits various field sites an average of 30 or fewer days per year).*

JOB CATEGORIES FOR SPECIALTY EXAMINATIONS

A. Office Workers
BASELINE/EXIT - "Core Elements" ONLY
PERIODIC - "Core Elements" ONLY

B. Pesticide Laboratory Workers
BASELINE/EXIT - "Core Elements, Serum Lead, Urine Heavy Metal Screen (Arsenic, Mercury, Bismuth, and Antimony), Serum Polychlorinated Biphenyl (PCB), Red Blood Cell Cholinesterase, and Respirator Clearance
PERIODIC - "Core Elements", Serum Lead, and Respirator Clearance

C. Solid Waste/Emergency Response Team
BASELINE/EXIT - "Core Elements", Red Blood Cell Cholinesterase, Urine Heavy Metal Screen (Arsenic, Mercury, Bismuth, and Antimony), and Respirator Clearance.
PERIODIC - "Core Elements", Serum Lead, and Respirator Clearance.

D. Field Sampling Personnel
BASELINE/EXIT - "Core Elements", Serum Lead, Red Blood Cell Cholinesterase, Urine Heavy Metal Screen (Arsenic, Mercury, Bismuth, and Antimony), and Respirator Clearance.
PERIODIC - "Core Elements", Serum Lead, and Respirator Clearance.

E. Clean Air Inspector/Enforcement Officers
BASELINE/EXIT - "Core Elements" and Serum Lead
PERIODIC - "Core Elements" and Serum Lead

F. FIFRA Enforcement Officers
BASELINE/EXIT - "Core Elements" and Red Blood Cell Cholinesterase
PERIODIC - "Core Elements" and Red Blood Cell Cholinesterase

G. Lab Employees
BASELINE/EXIT - "Core Elements", Red Blood Cell Cholinesterase, Serum Lead, Serum Polychlorinated Biphenyl (PCB), Urine Heavy Metal Screen (Arsenic, Mercury, Bismuth, and Antimony), and Respirator Clearance (if on an emergency team).
PERIODIC - "Core Elements", Serum Lead, and Respirator Clearance (if on an emergency team).

H. NESHAPS/AHERA (Asbestos Enforcement Officers)
BASELINE/EXIT - "Core Elements", B-reading, and Respirator Clearance
PERIODIC - "Core Elements", Chest x-ray (Follow instructions in the Occupational Safety Health Evaluation for Periodic Examinations) and Respirator Clearance.

I. NPDES Inspectors
BASELINE/EXIT - "Core Elements" ONLY
PERIODIC - "Core Elements" ONLY

J. Radiation Staff
BASELINE/EXIT - "Core Elements", Red Blood Cell Cholinesterase. Serum Lead, Stress EKG (if >40 years old), and Respirator Clearance.
PERIODIC - "Core Elements", Red Blood Cell Cholinesterase, Stress EKG (Triennial Basis), and Respirator Clearance.

K. Remedial Project Officers
BASELINE/EXIT - "Core Elements", Red Blood Cell Cholinesterase, Serum Lead, and Respirator Clearance.
PERIODIC - "Core Elements", Serum Lead, and Respirator Clearance.

L. TSCA Enforcement Officers
BASELINE/EXIT - "Core Elements", Red Blood Cell Cholinesterase, Serum Lead, Serum Polychlorinated Biphenyl (PCB), and Respirator Clearance.
PERIODIC - "Core Elements" ONLY

M. U.S.T. Inspectors
BASELINE/EXIT - "Core Elements" ONLY
PERIODIC - "Core Elements" ONLY

N. Wetlands Staff
BASELINE/EXIT - "Core Elements" and Lyme Titer IGG
PERIODIC - "Core Elements" ONLY

O. Divers
Follow previously established protocol

Employees are required to notify the health center 48 hours in advance for preliminary and physical examination appointment cancellations. The agency will be billed $34.00 for preliminary and $65.00 for physical examination appointments that are not cancelled.

APPENDIX C: HEARING CONSERVATION PROGRAM

Under the OSHA regulation for Occupational Noise Exposure (29 CFR 1910.95), a program must include:

- Assessment of noise exposure
- Audiometric tests of exposed workers
- Noise abatement and/or administrative controls
- Availability of hearing protection
- Employee training and education
- Maintenance of records on noise and hearing data

Assessment of Noise Exposure

GLNPO research vessels are required to follow the regulatory specifications as outlined in the OSHA standard for Occupational Noise Exposure (29 CFR 1910.95).

When information indicates that a worker's exposure may equal or exceed an 8-hour Time-Weighted Average (TWA) of 85 dBA, GLNPO must implement a monitoring program. Monitoring of the worker's noise exposure should be performed in accordance with the regulatory standard and must be computed in accordance with Appendix A of the standard (29 CFR 1910.95). Monitoring shall be repeated whenever a change in production, process, equipment or controls change or increase noise exposures. GLNPO will provide affected employees the opportunity to observe results of noise measurements.

To determine if personnel are being over exposed to noise, sound level meters should be used to identify areas where hazardous noise levels exist. The sound level meter will measure noise at different times during the day and indicate a daily average exposure. Alternately, a noise dosimeter may be attached directly to a worker to measure the amount of noise to which they are exposed during a period of time. If noise levels are at 85 dBA, or higher, based on an 8-hour work day, GLNPO will notify the worker.

Audiometric Tests of Exposed Workers

29 CFR 1910.95 states that "The employer shall establish and maintain an audiometric testing program" by "making audiometric testing available to all employees whose exposures equal or exceed an 8-hour Time-Weighted Average (TWA) of 85 dBA." This testing shall be provided at no cost to the employee. Testing must be performed by a licensed or certified professional in accordance with 29 CFR 1910.95(g)(3). All audiograms shall meet the requirements of Appendix C of the regulation.

Within six (6) months of the worker's first exposure at or above 85 dBA, GLNPO will provide the employee with a baseline audiogram to which subsequent audiograms can be compared. Audiograms shall be repeated at least annually thereafter. Evaluation of the audiograms shall be performed in accordance with 29 CFR 1910.95(g) (7-10).

Noise Abatement and/or Administrative Controls

When workers are subjected to sound exceeding 85 dBA, administrative or engineering controls will be implemented. If such controls fail to reduce levels to acceptable limits, personal hearing protection should be provided. Hearing protection can include the following:

- Ear plugs: These seal the ear canal and prevent noise from reaching delicate parts of the ear. Ear plugs are inexpensive and portable, but they can be hard to fit and can introduce dirt into the ear canal if not kept clean.

- Canal caps: These are soft pads on a headband that seal the entrance to the ear without entering the ear. If used incorrectly, they might not seal the ear properly.

- Ear muffs: These have a head band, ear cups, and ear cushions. This type of ear protection usually provides the greatest amount of protection.

Availability of Hearing Protectors

GLNPO will make hearing protection available to all workers exposed to an 8-hour Time-Weighted Average (TWA) of 85 dBA or greater. This is provided at no cost to the worker and should be replaced as necessary.

GLNPO will ensure that hearing protection is worn in compliance with the regulation. In addition, GLNPO will ensure proper selection of hearing protection

Based on the evaluation methods described in Appendix B of the regulation (29 CFR 1910.95).

Employee Training and Education

GLNPO will institute a training program for all workers who are exposed to noise levels at or above the 85 dBA Time-Weighted Average (TWA). Training will be updated and repeated annually. Training will include the following:

- the effects of noise on hearing
- the purpose of hearing protection
- the advantages and disadvantages of various types of protectors
- instruction on the selection, fitting, use and care of various types of protectors
- the purpose of audiometric testing
- description of audiometric testing procedures

In addition, GLNPO will make available in the workplace and on board all research vessels a copy of the standard (29 CFR 1910.95).

Maintenance of Records on Noise and Hearing Data

GLNPO will maintain records of all worker exposure records in accordance with 29 CFR 1910.95 (M) of the regulation. Noise exposure measurement records will be retained for two (2) years. Audiometric test records will be retained for the duration of the worker's association with GLNPO.

APPENDIX D: HAZARD COMMUNICATION PROGRAM

Commitment

The U.S. EPA is firmly committed to providing a safe and healthy work environment for all EPA personnel and contractors. In order to meet this commitment, all GLNPO facilities and Research Vessels are required to comply with OSHA's Hazard Communication standard, 29 CFR 1910.1200. A Hazard Communication program shall be implemented as outlined herein.

A Hazard Communication Coordinator will be assigned and will have the overall responsibility for ensuring compliance by coordinating the following functions:

- Maintenance of the hazardous chemical inventory.
- Maintenance of a complete Material Safety Data Sheet (MSDS) file and current employee MSDS notebooks.
- Training of all employees regarding chemical safety.
- Updating of training as new chemicals are added or processes are changed.
- Labeling of all transfer and waste containers.
- Dissemination of hazard information to outside contractors

A successful Hazard Communication Program requires the cooperation of EPA and contracting personnel. It is the duty of GLNPO to assure that hazard communication is given proper priority. All personnel are encouraged to ask questions and keep informed so that GLNPO can maintain a safe and healthy workplace.

Access To The Written Program

All, or any part, of this written Hazard Communication Program is available to all EPA personnel, contractors, and/or their designated representative. Interested persons can contact the Hazard Communication Coordinator for review and copying.

Labeling

In accordance with the OSHA Hazard Communication Standard (29 CFR 1910.1200), all containers shall be labeled as specified in this section.

A. No hazardous chemicals will be accepted for use on board GLNPO research vessels or shipped to any outside location, unless labeled with at least the following information:

- Identity of the hazardous chemical(s)
- Appropriate hazard warnings for the chemicals(s)
- Name and address of the chemical manufacturer, importer, or other responsible party

B. All spray bottles or other transfer containers will be labeled with at least the following information:

- Identity of the hazardous chemical(s)
- Appropriate hazard warnings for the chemical(s)

C. The Hazard Communication Coordinator is responsible for reviewing labels and assuring that the label information is kept current.

D. No label is to be defaced or removed when material is received or in use. Any containers with missing labels will be removed from service until proper labels are installed.

Material Safety Data Sheets

A material safety data sheet (MSDS) containing the information required by 29 CFR 1910.1200 shall be maintained for each hazardous substance. The MSDS shall be the most current one supplied by the chemical manufacturer, importer, or distributor. MSDSs will be available for review by all personnel.

The Hazard Communication Coordinator shall be responsible for maintaining an inventory of chemicals currently in use. In addition, a separate inventory file must be maintained of previously used chemicals. Inventory records of previously used chemicals must be maintained for thirty-years as part of employee exposure records.

An office file containing the current chemical inventory and appropriate MSDSs is located in the laboratory office on board ship. A copy of the inventory and MSDSs for use by occupants of GLNPO facilities can be found in wall-mounted notebooks located near the point of use in the hallway between the Chemistry and Biology laboratories.

Personnel Information and Training Policy

A. All EPA personnel and contractors, including temporary contractors who may possibly be exposed to chemical hazards shall be appropriately informed and/or trained concerning the potential hazards of the chemicals in GLNPO facilities.

B. . All EPA personnel and contractors, including temporary contractors, shall be informed of the details contained in this program, including an explanation of the labeling system, the material safety data sheets, and how to interpret and use this information.

C. All EPA personnel and contractors, including temporary contractors shall be provided with additional training when new chemical hazards are introduced or prior to performing non-routine tasks that could involve exposure to hazardous chemicals.

D. When appropriate, reinforcement of training will be conducted through topics at safety meetings.

E. The extent of information transmitted to EPA personnel and contractors during training sessions will be dictated by the degree of chemical hazard present. The following sources of information will be used during training sessions:

- The text of the Hazard Communication Standard (29 CFR 1910.1200)
- An inventory list of hazardous chemicals
- Applicable MSDSs
- The written Hazard Communication Program

Contractor Policy

Outside contractors shall be provided with all necessary information concerning the potential hazards of the substances to which they may be exposed and appropriate protective measures required to minimize their exposure.

Whenever possible, the contractor or agency management should be provided with a list of the hazardous chemicals and the material safety data sheets for the materials their employees may be exposed to by virtue of their work in GLNPO facilities. In addition, contractors must have MSDSs on site for all potentially hazardous chemicals they use or produce in GLNPO facilities.

PERMIT-REQUIRED CONFINED SPACE ENTRY PROGRAM

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I. PURPOSE

The purpose of this program is to ensure that no one enters or works in a hazardous atmosphere contained in a compartment or space aboard GLNPO vessels. In general, no routine hazard is as dangerous as the presence of potentially lethal atmospheres in vessel spaces. By design, some vessels have contained spaces (especially tanks and voids) in which a multitude of both toxic and non-toxic gas or vapor creating substances are used in the normal operation of the vessel. Although in many instances harmful gases or vapors are present in such low concentrations that no adverse conditions are created, hazardous atmospheres that have the potential to be created can explode or cause asphyxiation. Compounding the problem is that many gases or vapors are not detected by smell, and personnel attempting to save a fallen shipmate may themselves be overcome and killed by undetected vapors. It is for these reasons that every confined space must be tested for oxygen-deficient or otherwise hazardous atmospheres.

II. IDENTIFICATION OF PERMIT-REQUIRED CONFINED SPACES

A documented evaluation must be performed on all areas of GLNPO vessels that are or may be considered to be *Permit-Required Confined Spaces*. The following criteria should be used to evaluate the vessel.

A ***confined space*** is any enclosure or compartment that:

1. Has a limited means of exit or entry (for example, a hatch on a tank),
2. Is large enough to enter and perform work, and
3. Is not designed for continuous employee occupancy.

A ***permit-required space*** is a ***confined space*** that exhibits one or more of the following hazards:

1. Contains or has the potential to contain a hazardous atmosphere,
2. Contains a material that has the potential for engulfment (i.e., sand, grain, etc.),
3. Has the internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section, or
4. Contains any other recognized serious safety or health hazard.

Those places identified as ***permit-required confined spaces*** (permit spaces) must be identified with a sign that states:

"DANGER PERMIT-REQUIRED
CONFINED SPACE, DO NOT ENTER"

III. POLICY

Permit-required confined spaces shall not be entered by any U.S. EPA employee or contractor that is not specifically authorized to do so. Written authorization to enter a permit space must be obtained from the GLNPO Occupational Health and Safety Manager and the Regional Occupational Health and Safety Manager concurrently. No individual shall enter a permit space without following all predetermined and precautions and procedures. Only personnel trained and competent in permit-required confined space entry shall be allowed to enter and/or perform work in a permit-required confined space. Contact will be made with all emergency services prior to space entry. Any violation of this policy may result in a serious accident or injury. Therefore, any individual found not complying with established procedures will be subject to severe disciplinary action.

IV. PROGRAM RESPONSIBILITIES

A. If the vessel design is such that there are confined spaces where toxic and non-toxic gases may accumulate, the vessel's Master is responsible for a comprehensive confined-space entry program.

The vessel's Master must:

- Ensure that there is at least one trained, qualified and certified gas-free engineer on board. The Chief Engineer shall be designated as the ship's gas-free engineer (GFE).
- Ensure that confined-space entry practices are established.
- Ensure that this program is evaluated annually for compliance and effectiveness. The Confined-Space Program Entry Checklist (Attachment I) may be used for this purpose.

B. The Chief Engineer shall ensure that:

- All personnel that will perform permit-required confined space entries as either entry supervisor, authorized entrant, or authorized attendant are trained concerning confined-space entry hazards, procedures and precautions. Additional support may be obtained from qualified marine chemists or industrial hygiene officers, certified as Gas-Free Engineers.
- All equipment required for proper evaluation of confined spaces is aboard the ship, inventoried annually, and properly maintained.
- Gas-free certificates are posted in necessary areas.
- Records of gas-free space testing are kept.
- Assigned personnel receive training on the confined-space entry program upon reporting aboard and annually thereafter.

C. All hands are responsible to ensure that:

- The Chief Engineer is notified prior to entering any unventilated, non-occupied space that has been designated to store hazardous or toxic materials or any sealed space.
- The Chief Engineer is notified prior to conducting hot work on a bulkhead, deck, or overhead, adjacent to a space containing flammable or potentially explosive atmospheres (such as fuel oil or contaminated holding tank).
- Gas-free engineering certificates posted on spaces are complied with at all times.
- Gas-free engineering retesting of spaces is accomplished prior to the end of the period for which a gas free certificate is valid. If a change is made to a space, the space shall be retested and recertified prior to any additional work in the space.
- Notify the Chief Engineer prior to entering any unventilated, non-occupied space designated to store hazardous or toxic materials or any sealed space. Verify that such a space was checked by a gas-free engineer prior to entry, and comply with the gas-free engineering certificates posted outside the space.
- Notify the Chief Engineer before any new space is used to store hazardous or toxic material or of any spill of hazardous or toxic material.

V. PROGRAM ELEMENTS

The confined-space entry program consists of the following elements, selected on the basis of typical shipboard operations:

1. ***Identification and Testing***. Any sealed or unventilated, unoccupied space designated for hazardous or toxic materials storage must be tested for oxygen deficiency prior to entry. Hot work on a bulkhead, deck, or overhead adjacent to a space containing flammable or potentially explosive atmospheres (e.g., fuel oil vapors) also required testing.

2. ***Ventilation and Personnel Protection Requirements***. Any sealed or unventilated, unoccupied space designated for hazardous or toxic materials storage must be ventilated prior to entry. During activities which require entry into confined spaces, one individual must always stand watch at the entrance to monitor the worker(s) and notify appropriate rescue personnel in case of emergency.

3. ***Training***. The Chief Engineer is responsible for ensuring that assigned personnel receive training on the gas-free engineering program upon reporting aboard and annually thereafter. Records of such training shall be maintained.

Additional training will be conducted when:

a. The job duties change,
b. There is a change in the permit space program or the permit space operation presents a new hazard, or
c. When an employee's job performance shows deficiencies.

Training will consist of the following topics:

a. The locations and hazards of the confined spaces aboard the vessel
b. Procedures for requesting gas-free testing
c. Proper permit completion
d. Duties of entrants, attendants, and the Chief Engineer
e. Pre-entry procedures
f. Personal Protective Equipment (PPE)
g. Procedures for helping shipmates in an emergency. Training must stress to all personnel that if a person is seen unconscious in any space, **no one** is to enter that space without appropriate respiratory protective equipment and a backup assistant. All gas-free engineering personnel shall be trained in CPR and emergency and rescue procedures.
h. Recordkeeping

Retraining on all aspects shall be accomplished annually.

4. ***Recordkeeping***. All gas-free engineering tests must be recorded in the confined-space entry log which contains the following data:

- Date and time of inspections/tests.
- Location of confined space(s).
- Tests conducted and results.
- Prescribed instructions.
- Type of entry or work performed.
- Name of person(s) conducting inspection/test.

VI. ENTRY PERMITS

A. No permit-required confined space shall be entered without a valid permit and written authorization from the GLNPO Health and Safety Manager and the Regional Health and Safety Manager.

B. The permit shall be issued and signed by the Chief Engineer, who shall act as the entry supervisor.

C. The permit will be completed in its entirety; there shall be no blanks.

D. The permit will be posted at the entrance of the confined space.

E. The Confined Space Entry Permit will be valid for a single work shift only. On projects requiring more than a single work shift, a new permit shall be completed at the start of each shift.

F. The Confined Space Entry Permit is in Attachment II.

G. Canceled permits will be reviewed annually to determine the adequacy of the Program and procedures used. Canceled permits must be retained for at least one year.

VII. PERSONAL PROTECTIVE EQUIPMENT (PPE) AND DEVICES

Personal protective equipment, such as impervious gloves, boots and goggles, appropriate for the hazards of the space, must be used as specified on the entry permit.

Each worker entering a permit space must wear a body harness with a lifeline attached, unless such equipment creates an additional hazard or does not contribute to the emergency rescue of a worker. A fall arrester and winch retrieval system is required for vertical confined space entry work deeper than five feet. Training in proper use of the retrieval device may be provided by the equipment vendor.

Respiratory protection may be required under special circumstances. Only those employees specifically trained in respiratory protection may wear respirators.

Entry into some confined spaces, such as compartments in the lower areas of vessels, may require that entrants wear respirators attached to supplied breathing air lines, or, at a minimum, have in their immediate possession, ready for use, a respirator attached to a five-minute emergency escape breathing air canister. Emergency canisters, if supplied, are not to be used while working in the confined space, but only for escape, should it become necessary. Such an entry is prohibited without written authorization from the GLNPO Occupational Health and Safety Manager and the Regional Occupational Health and Safety Manager.

VIII. PRE-ENTRY PROCEDURE

Before any employee is allowed to enter a confined space, supervisory authorization shall be obtained and a Confined Spaces Entry Permit (see Attachment II) shall be initiated.

- Appropriate gas-free testing must be performed by qualified personnel from outside of the confined space to determine if a hazardous atmosphere exists.

- If tests indicate the atmosphere is initially safe but the work may produce a hazardous atmosphere from activities such as welding or the use of solvents, entry without respiratory protection will only be permitted if continuous atmospheric testing during entry is conducted by trained personnel.

- If tests indicate that the atmosphere is unsafe, the confined space shall first be ventilated until the hazardous condition has been removed and confirmed by testing. The confined space shall be thoroughly ventilated. Special care should be taken to assure that circulated air will reach isolated pockets and recirculating contaminated air is prevented. Provisions shall be made for adequate make-up air during the entire entry, using an external blower with a flexible hose. Be aware that exhausted air may contain hazardous vapors or gases.

- The confined space shall be ventilated using an external blower with flexible hose to prevent:

  - oxygen excess or deficient atmospheres.
  - flammable vapors in the atmosphere above 10% of the LEL,
  - toxic vapors, other contaminants, gases, or particulate accumulation, or

- The employee entering the space must wear protective clothing appropriate for the anticipated hazards. Refer to the Special PPE section of the permit and to the Material Safety Data Sheet (MSDS) for the contaminant, if necessary.

  Unless otherwise specified authorized entrants who enter a permit space must wear a chest or full body harness with a retrieval line attached to the center of their backs near shoulder level or above their heads. The other end of the retrieval line must be attached to a mechanical device or to a fixed point outside the permit space.

  A mechanical device must be available to retrieve entrant from vertical type permit spaces more than five feet deep.

- The space shall be isolated. All incoming piping and lines will be blinded, bled, and locked. The use of an in-line shut-off valve as the sole means of isolating the confined space from any line is prohibited. All electrical, hydraulic, and pneumatic powered machines and equipment shall be de-energized and locked out. All stored or accumulated energy shall be dissipated.

- Every effort shall be made to make the confined space as safe to enter as possible. This may require purging, ventilation, pumping, flushing, etc. from a remote position outside the confined space. Lighting shall be adequate for the work being performed.

- The Confined Space Entry Permit will not be issued unless the following provisions have been instituted:

  A. An attendant must maintain constant vigilance and maintain verbal communications with the worker inside. When using the single observer method the attendant must be equipped with a means of obtaining help without leaving the area (radio, airhorn, etc.). Surrounding personnel must be aware of this procedure and be trained to respond.

  B. Adequate rescue procedures must have been developed and practiced (see section XIII, Rescue Techniques).

C. The attendants shall be trained in their duties (see Section XI, C, Attendant's duties).

D. Employees must be aware that they should **NEVER** attempt to enter a confined space to rescue an individual who needs help, unless trained and equipped to do so.

E. All nearby and entry personnel shall understand the hazards of the confined space and be instructed about precautions necessary.

- Access openings, hinged doors or hatch covers shall be secured open and guarded from hazards outside the space.

- The completed permit shall be posted in a conspicuous place near the point of entry.

IX. PERMIT CLOSURE AND CANCELLATION

The permit shall be closed and/or canceled by the following situations:

- At the completion of the specified work or operation specified on the permit.
- At the end of each work shift.
- Any condition that is not allowed under the entry permit arises in or near the permit space.

The closure of the permit will include closing notes detailing any additional practices and procedures that were used to eliminate or mitigate new hazards or problems encountered during the entry.

X. RECLASSIFICATION PROCEDURES

A confined space that has been designated a Permit-required confined space may be reclassified as a non-permit space if the following provisions are met:

- Written authorization for reclassification must be obtained from the GLNPO Health and Safety Manager and the Regional Health and Safety Manager.

- The space must pose no actual or potential atmospheric hazards. Hazardous work or work that may create a hazardous atmosphere, e.g. painting, welding , etc., may not be performed. Controlling a hazardous atmosphere with ventilation does not constitute the elimination of atmospheric hazards.

- All other hazards associated with the space must be eliminated. An example of this may include locking out the power source to an unguarded fan that is in the space.

- If it is necessary to enter a permit space in order to elimninate the hazards of the space, a Permit must be issued and standard permit space entry procedures must be followed.

- Only the Chief Engineer shall be allowed to reclassify a permit space as a non-permit space. The basis for determination that all hazards have been eliminated shall be documented by the Chief Engineer. This certification shall be signed, dated, and posted at the space entrance.

- If any hazard arises inside the space during the course of work then all entrants must immediately evacuate the space. The space shall not be reoccupied until the hazard has been eliminated and the space has been re-evaluated.

XI. SPECIAL EQUIPMENT

A. Portable Tools

All portable power tools and extension cords are to be grounded, in good repair and protected by a ground-fault circuit interrupter (GFCI).

B. Ladders

A ladder may be used as a means of entering and exiting, provided it does not obstruct the opening. A ladder is required in all confined spaces deeper than four feet. The ladder shall be secured and not removed until all employees have exited the space.

C. Lighting

Low voltage lighting is suggested, such as a 12 volt florescent lantern.

D. Non-sparking Tools and Equipment

Anytime that there is a reasonable potential of an explosive or flammable atmosphere only non-sparking tools and explosion proof equipment shall be used.

XII. RESPONSIBILITIES

A. Authorized Entrant's Duties

- Know the hazards of the confined space, including information on the mode of exposure (e.g., inhalation or skin absorption), signs or symptoms, and consequences of the exposure;

- use appropriate personal protective equipment properly (e.g., face and eye protection, and other forms of barrier protection such as gloves, aprons, and coveralls);

- maintain communication (i.e., telephone, radio, visual observation) with attendants to enable the attendant to monitor the entrant's status as well as to alert the entrant to evacuate;

- exit from the permit space as soon as possible when ordered by an authorized person (supervisor and/or attendant), when the entrant recognizes the warning signs or symptoms of exposure, when a prohibited condition exists, or when an automatic alarm is activated; and

- alert the attendant when a prohibited condition exists or when warning signs or symptoms of exposure exist.

B. Chief Engineer's Duties

1. Routine Duties

- Know the confined space hazards, including information on the mode of exposure, signs, or symptoms and consequences of exposure;

- verify emergency plans and specified entry conditions such as permits, tests, procedures, and equipment before allowing entry;

- take appropriate measures to keep unauthorized personnel away from the site;

- ensure that entry operations remain consistent with the entry permit and that acceptable entry conditions are maintained; and

- terminate entry and cancel permits when entry operations are completed or if a non-permitted condition develops.

- Establish the rotation time cycle (duration) for hot locations that can result in excessive heat stress on the entrant and enter this time on the permit.

2. Emergency Duties

- In the event of an emergency, the attendant shall summon aid immediately and instruct the person who responds to call the listed rescue service on the nearest phone. The supervisor shall ensure that rescue personnel are met at the site and led to the appropriate place.

- In the event that the rescue is to be made by an outside emergency response organization, the supervisor must notify the vessel's Master of the event and details. If any injuries occur, the supervisor must also activate the accident reporting procedure.

C. Attendant's Duties

1. Routine Duties

- assure that the appropriate equipment is operable and available at the work site;
- know the location of the nearest emergency alarm or phone, the emergency number to be used and the exact location of the work site;
- understand the present and potential hazards of the confined space;
- remain outside permit space during entry operations unless relieved by another authorized attendant;
- perform non-entry rescues when specified by employer's rescue procedure;
- know existing and potential hazards, including information on the mode of exposure, signs or symptoms, consequences of the exposure, and their physiological effects (for example, drowsiness, heat stress, twitching, or unconsciousness), and know that entrants must leave the confined space when they exhibit symptoms of overexposure;
- maintain communication with and keep an accurate account of those entrants entering the permit-required space;
- order evacuation of the permit space when a prohibited condition exists, when an entrant shows signs of physiological effects of hazard exposure, when an emergency outside the confined space exists, or when the attendant cannot effectively and safely perform required duties;
- summon rescue and other services during an emergency;
- ensure that unauthorized persons stay away from permit spaces or exit immediately if they have entered the permit space;
- inform authorized entrants and Chief Engineer of entry by unauthorized persons; and
- perform no other duties that interfere with the attendant's primary duties.

4. Emergency Duties

- In the event of an emergency, the attendant shall summon aid immediately and instruct the person who responds to call the listed rescue service on the nearest phone.

- In the event that the rescue is to be made by an outside emergency response organization, the attendant is to take the following action:

  1. monitor the situation in order to give a detailed report to the emergency response personnel,
  2. assist the emergency response personnel, if necessary, and
  3. when the situation is under control, notify the vessel's Master of the incident.

XIII. RESCUE TECHNIQUES

Rescue

- All entrants are required to wear a full body harness and life line when entering a permit space. In all spaces with a greater depth than five feet, a mechanical retrieval unit must be used.

- Permit space entries should be reported to the designated rescue team to allow for preparation and reduce response time.

- The attendant shall sound an alarm and request that the responder call the site emergency number for additional assistance.

- The attendant shall attempt to remove the entrant while remaining outside of the confined space. If the rescue is not successful within 30 seconds, the attendant must call for additional help.

- Once the entrant has been removed from the confined space, the entrant must be moved to fresh air and any necessary first aid must be applied by rescue personnel only.

- If an injury occurs within a confined space and the injured party is conscious but immobile, attendant should summon trained rescue personnel to remove the entrant and maintain safety watch.

- If an injured entrant is exposed to a substance for which a Material Safety Data Sheet (MSDS) or other similar written information is required to be kept on board, that MSDS or other written information must be made available to the emergency personnel treating the exposed entrant.

- The attendant must understand that he/she is NEVER to go into a confined space to rescue an entrant.

Training and Practices Rescue

Rescue technique practice using the equipment described is vital. These rescue techniques must be learned and reviewed by employees so they are skilled and comfortable in performing staged emergencies. Annual training should include mock emergencies using actual permit spaces and equipment. Drills should be coordinated with rescue teams.

XIV. CONTRACTOR REQUIREMENTS

When outside contractor services are required to enter a permit space, GLNPO shall:

- Inform the contractor of the presence of permit-required confined spaces at the site and that entry is allowed only through adherence to this program.

- Apprise the contractor of the hazards and precautions associated with the spaces they are to enter. This may be accomplished by reviewing the requirements of the entry permit with the contractor, and assisting the contractor in the completion of the permit. The contractor should use this information as a minimum guideline only and should take all the precautions over and above the guideline to ensure safe space entry.

- Debrief the contractor at the conclusion of the entry operation. All information relating to the space entry including atmospheric conditions, additional hazards encountered, and the precautions taken to address the hazards must be noted on the canceled permit used by the contractor.

- Coordinate entry operations when entrants from both parties are entering and working in permit spaces concurrently. The following requirements are recommended:

  A. Information should be exchanged including specific work being performed, hazards created by the work, and all precautions used.

  B. Separate permits may be used and completed separately.

  C. Both parties shall ensure that isolation procedures are completed and separate locks and tags must be used.

  D. Separate attendants may be used and must remain in constant communication with each other.

  E. Contractors are responsible for providing their own equipment. GLNPO will not provide any equipment for any contractor.

All contractors shall:

- Obtain information from GLNPO about the presence of permit-required confined spaces on board and that entry is allowed only through adherence to this program.

- Coordinate entry operations when entrants from both parties are entering and working in permit spaces concurrently.

- The contractor shall inform GLNPO at the conclusion of the entry operation of all information relating to the space entry including atmospheric conditions, additional hazards encountered, and the precautions taken to address the hazards.

ATTACHMENT I

Confined Space Entry Program Checklist

CONFINED-SPACE ENTRY PROGRAM CHECKLIST

This checklist should be used to evaluate the effectiveness of the confined-space entry program.

1. Is there at least one trained, qualified, and certified gas-free engineer aboard?

2. Is gas-free engineering equipment properly maintained?

3. Is gas-free engineering equipment inventoried annually?

4. Are gas-free certificates posted in necessary areas?

5. Are records kept of space gas-free testing and are these records audited annually?

6. Is the Chief Engineer notified before anyone enters any unoccupied space that is not designed to be ventilated during routine operations, that has been designated to store hazardous or toxic materials, or that is normally sealed under routine operating conditions?

7. Is the Chief Engineer notified before hot work is conducted on a bulkhead, deck or overhead adjacent to a space containing flammable or potentially explosive atmospheres (such as fuel oil or contaminated holding tank)?

8. Is the Chief Engineer notified of the stowage in a new location or spill of any hazardous or toxic material?

9. Are gas-free engineering certificates posted on spaces complied with at all times?

10. Is gas-free engineering conducted whenever anchorage is made to a space under a gas-free engineering certificate prior to additional work occurring in the space?

11. Are periods for which gas-free certificates are valid posted on each certificate?

12. Are spaces retested prior to the end of the period for which a gas-free certificate is valid?

13. Does the gas-free engineering test log document all gas-free engineering tests and contain the following data:

    - Date and time of inspections/tests?
    - Location of space?
    - Tests conducted and results?
    - Prescribed instructions?
    - Type of entry or work to be performed?
    - Name of person conducting test/inspection?

14. Are gas-free engineering tests conducted in the order of oxygen, combustible gases, toxic gases?

15. If gas-free engineering tests indicated the presence of a flammable vapor, was the space ventilated until vapor was no longer detectable?

16. Do all hands receive training on the Confined Space Entry Program upon reporting aboard and annually thereafter?

17. Does training cover the following:

    - How to identify confined/enclosed spaces?
    - Hazards encountered when entering confined/enclosed spaces?
    - Procedures for requesting gas-free testing/
    - Procedures for helping shipmates in an emergency?

18. Are all personnel trained in CPR and emergency rescue procedures annually?

ATTACHMENT II

Confined Space Entry Permit

CONFINED SPACE ENTRY PERMIT

(CHECK OR FILL IN ALL BLANKS THAT APPLY)

TODAY'S DATE: _____

TIME of ENTRY: Date: _____ Time: _____ Safety Permit No.: _____

PURPOSE OF ENTRY: Inspection: _____ Other: _____

BRIEF DESCRIPTION OF PURPOSE. _____

LOCATION of ENTRY (Be Specific): _____

The U.S. EPA Personnel			or	**Subcontractors Entering**		
Name	*Time In*	*Time Out*		*Name*	*Time In*	*Time Out*

HAVE ALL PERSONNEL GONE THROUGH A PRE-ENTRY BRIEFING? Yes _____ No _____

SPACE TESTED BY (Name/Title) _____ Date: _____ Time: _____

TYPE & SERIAL NUMBER of SAMPLING EQUIPMENT: Make: _____ S/N _____ Calib. Date: _____

TYPE & SERIAL NUMBER of SAMPLING EQUIPMENT: Make: _____ S/N _____ Calib. Date: _____

PRE-ENTRY READING TAKEN? Yes____ No____ DOCUMENT LATER READINGS ON BACK

% Oxygen:	Opening____	Middle____	Bottom____	Other____	All 19.5% _____
% LEL:	Opening____	Middle____	Bottom____	Other____	All 10% LEL_____
Toxic Reading:	CO_____	H2S_____	Other_____	All PEL____	

ARE ALL POWER SOURCES INTRINSICALLY SAFE? Yes _____ No_____

HAVE ALL PERSONNEL BEEN GIVEN THE PROPER PPE? Yes _____ No _____

HAVE ALL PERSONNEL BEEN TRAINED TO WORK SAFELY AND TO USE EQUIPMENT? Yes_____ No_____

IS RESCUE PLAN IN PLACE? Yes _____ No _____ Why Not? _____

HAS THE AREA BEEN SECURED AND ALL ENERGY SOURCES LOCKED AND TAGGED? Yes_____ No_____

IS THERE ANY POSSIBILITY OF ENTRAPMENT OR ENGULFMENT BY PARTICULATE MATTER? Yes_____ No_____

IF YES, HAS PROVISION BEEN MADE TO WORK SAFELY IN SUCH AN AREA? Yes_____ No_____

ARE O2, LEL AND TOXIC SUBSTANCES WITHIN SAFE LIMITS? Yes_____ No_____

I certify that the above conditions are accurate and validate the entry only for the stated purpose, time and identified employees, not to exceed work for one shift. If any question was answered "NO" and a satisfactory answer was not given ***DO NO ISSUE PERMIT.***

Date: _____

Signature: _____

Title:

ATTACHMENT III

References

REFERENCES

Safety Requirements for Working in Tanks and Other Confined Spaces, American National Standards Institute, Z117.1.1977

Safety Requirements for Confined Spaces, American National Standards Institute, Z117.1.1989

Criteria for a Recommended Standard. Working in Confined Space, National Institute for Occupational Safety and Health, December, 1979

Permit Required Confined Spaces, Federal Register, 29 CFR 1910.146, Vol 54, No. 10

Safe Vessel Specification Manual, U.S. EPA, 1977

APPENDIX F: HOT WORK PROCEDURES

Hot Work Permitting System

Hot work is defined as the cutting, shaping or joining of metals by use of heat produced by flame or electric arc. This includes welding, brazing, soldering and the use of cutting torches, blow torches and similar activities. In addition, the loosening of frozen nuts or bolts or even paint removal can also be classified as hot work.

Hot work activities conducted by EPA or contractor personnel will be done through a permit system. The permit is an authorization, in writing, for the worker to proceed with the hot work activities. The hot work permit will list the time, place, type of work, and certify that hazards have been evaluated and proper protective equipment has been authorized. See **Attachment 1 of this Appendix** for a sample of a Hot Work Permit. The following is a minimum list of items that should be provided on the permit:

1) Date, shift, and location of work being performed.

2) Description of work being performed.

3) Potential hazards that the worker may encounter (e.g., surrounding areas such as adjoining tanks/vessels)

4) Isolate mechanical and electrical systems.

Authorized personnel will evaluate hot work operations based on the Hazard Communication Program stated in CFR 1910.1200. Chemical inventory lists and Material Safety Data Sheets will be referenced prior to hot work to identify the location and reactive characteristics of any dangerous or potentially dangerous materials where the hot work will occur. This will allow personnel to monitor for chemical and physical agents before and during hot work activities. It will ensure that the proper engineering controls have been implemented and that appropriate personal protective equipment is being used as well.

Implementation of Engineering Controls: In some situations it may be necessary to ventilate, isolate or implement some other control to reduce the hazard of the task performed.

Wearing of Proper Personal Protection Equipment: After the initial air monitoring and evaluation of the hot work site is performed, proper protective equipment will be selected. Personal protective equipment may include gloves, coveralls, boots, aprons, head cover, ear protection, eye protection, face protection, and/or respiratory protection.

WORK PRACTICES

Fire Watch

Suitable fire extinguishing equipment will be maintained and stationed at the work site. Any welding or cutting activity will require a fire watch person to observe the individual performing the hot work. Cutting or welding on a partition (wall, deck, etc.) may require a second fire watch in order to observe the other side of the wall, deck, etc. The person will be trained in use of the fire extinguishing devices and trained in alerting the proper authorities in case of an accident. After completion of hot work, a fire watch will be kept for half an hour.

Posting the Permit and Any Necessary Warning Signs

Depending on the work activity and the hazards involved, signs will be posted to offer an important reminder to the individual conducting the work and also warn others outside the work area of the hazards associated with the task being performed.

Keeping the Work Area Free of Hazards

The work area will be inspected for flammable debris and other hazards that may contribute to injury or death. Flammable items will be removed or isolated from the work area. If it is not possible to remove the hazard it may be necessary to move the work area to a new location. If there is no safe way of conducting the hot work activity it will be necessary to pursue alternative methods.

Additionally, all gas cylinder regulators must be closed at the end of use. Acetylene and oxygen hoses must be rolled-up at the end of each use and stored in such a way that they will not rupture, present a fire hazard or a confined space hazard.

Hot Work Permits

The permit should only be posted at the work area and allowed for one shift. If work is to continue during another shift or day, a new permit must be issued before hot work activities resume.

Attachment 1 – FIRE PROTECTION – HOT WORK PERMIT

In an effort to establish control over operations using open flames or producing sparks (e.g. welding, cutting, burning), authorization must be secured before equipment capable of igniting combustible materials is used outside areas normally specified.

Fill out form prior to conducting any hot work. After conducting hot work, the Hot Work Permit should be returned to the maintenance department which will collect and forward it to the Safety Department for filing and record purposes.

1. Area where work is to be done (including surrounding area) has been inspected and is free of any unnecessary combustible or flammable materials:
   Yes _____ No _____

2. The designated fire watch is: _____.
   (Name of Person)

3. Fire extinguishing equipment is available in the hot work area:
   Yes _____ No _____

4. All departments and/or personnel concerned have been notified of the Hot Work activities:
   Yes _____ No _____

5. Combustible materials have been isolated from sources of ignition in the hot work area:
   Yes _____ No _____

6. Only trained and authorized personnel are allowed to conduct hot work in the work area:
   Yes _____ No _____

7. Date of issue: _____

8. Time permit is valid: _____

9. Name of person completing form: _____

10. Name of Supervisor authorizing hot work to be performed:

_____

Comments: _____

_____

APPENDIX G: LOCKOUT/TAGOUT PROGRAM

INTRODUCTION

This Lockout/Tagout Program has been developed to comply with the Occupational Safety and Health Administration's (OSHA) Control of Hazardous Energy Sources Standard in 29 CFR 1910.147. This program will safeguard the health and well-being of GLNPO personnel exposed to the hazards presented by energized machines or equipment. Rigorous compliance with this program will ensure that machines and equipment are isolated from all potentially hazardous energy sources, locked out and tagged out, before any employees perform any servicing or maintenance activities where the unexpected energization, start-up or release of stored energy could cause serious injury or death. Energy sources present in the facility includes electrical, mechanical, hydraulic, and pneumatic sources.

The Captain has been appointed to administer the Lockout/Tagout Program, and has full support to effectively manage this program, assisted by the electrical engineers and marine technicians. The administrator has been authorized to carry out this program without delay.

PROGRAM OF COMPLIANCE

The Lockout/Tagout Program will include the following components:

- Energy Source Surveys
- Authorized Employees
- Affected Employees
- Training
- Lockout/Tagout Methods
- Lockout/Tagout Procedures
- Restoring Equipment to Use
- Outside Contractor Information Exchange

ENERGY SOURCE SURVEYS

It is the intent of GLNPO to conduct a detailed energy source survey of all equipment and machines in the facility. The initial survey will include the identification of all energy sources for each piece of equipment or machinery and location of energy shutoffs for each piece of equipment. This survey will result in the production of a written lockout/tagout control procedure for each piece of equipment. New equipment or machinery will be inspected during installation and a written lockout/tagout procedure will be developed for each piece of new equipment before it is energized.

Follow-up surveys will be made yearly and at such a time as engineering or production procedures result in a changes to energy sources or controls.

AUTHORIZED EMPLOYEES

Lockout/tagout authorized associates are persons who have been trained in the procedures necessary to lockout and tagout equipment or machinery prior to servicing or performing maintenance on it. Only authorized associates may install or remove locks and tags installed as part of this program.

AFFECTED EMPLOYEES

Affected employees include any associate who operates or uses machinery or equipment on which servicing or maintenance is being performed under lockout/tagout procedures, or who has to work in an area in which servicing or maintenance work is being performed. All associates in the mechanical areas of GLNPO operational areas are considered to be affected employees and will be trained to recognize locks and tags used for lockout/tagout and the need for lockout/tagout procedures.

Any associate who attempts to remove, alter, bypass, or override a lockout/tagout will be subject to disciplinary action.

TRAINING

Training will be provided to all authorized associates in the procedures for lockout/tagout. Only trained associates will be authorized to initiate or remove lockout/tagouts.

All affected associates will receive lockout/tagout awareness training.

LOCKOUT/TAGOUT METHODS

Lockout/tagout will be accomplished using a padlock or combination of padlock and multiple lock hasp in combination with a warning tag. The padlock will ensure that the hazardous energy source cannot be re-energized. Chains and special hardware may also be used to isolate energy sources. Padlocks with keys will be available at Lockout/Tagout stations, with a master key retained in the key safe.

The warning tag will communicate the reasons why the energy source should not be re-energized. The warning tag will be attached at the lockout and at the equipment control panel, and will be of non-reusable, all-weather construction, fastened with a nylon tie. The name of the authorized associate, date and time of the lockout/tagout, and a brief description of the work to be performed will be included on warning tag.

LOCKOUT/TAGOUT PROCEDURES

Prior to initiating any repairs, modifications and/or adjustments to operating equipment or machines, the following steps will be followed:

1. The immediate manager for the affected equipment or machines will be notified that the energy sources will be deactivated using the Lockout/Tagout procedures.

2. All sources of energy to the affected equipment will be identified by the authorized associate. Energy sources include mechanical, electrical, hydraulic and pneumatic.

3. All controls will be turned off, and all energy to the affected equipment will be turned off or blanked and locked out. Stored energy will be released. If more than one authorized employee is assigned to work on the equipment, a multiple lock hasp will be used.

4. A warning tag will be filled out and affixed to the controls and to the lockout device(s).

5. Prior to starting any work on the locked out equipment, the authorized employee will attempt to start the equipment to ensure that the lockout device provides adequate protection. Operating controls must be reset to the "off" position after this test.

6. Work on the locked out/tagged out equipment may now be performed, with caution and continuous observations for hidden energy sources.

RESTORING EQUIPMENT TO USE

After the completion of all repairs, maintenance and/or adjustments to the locked out/tagged out equipment, it will be restored to use by following these steps:

1. The authorized associate and the line manager will verify that the area around the equipment is safe to reenergize. No associates or tools will be permitted in unsafe areas around the equipment, and all guards and covers will be properly reconnected.

2. Lockout/tagouts will be removed by the authorized associate. If work will be carried out over several shifts, the outgoing authorized associate will return the key to the Administrator or Assistant Administrator for safekeeping in a secure location. All locked out equipment will be tested to ensure that it remains in a de-energized state.

3. If the work is completed, the lock shall not be removed from the equipment until the authorized employee removes it, or until the lockout/tagout administrator investigates the equipment, verifies the safety of the equipment, and verifies that the authorized employee is unavailable to remove his lock and attempts to contact him. The authorized associate will be notified of the removal of his lock when he returns to the building.

4. The equipment is restarted.

OUTSIDE CONTRACTOR INFORMATION EXCHANGE

Whenever outside contractor personnel are engaged to perform work on equipment or machines, the Lockout/Tagout administrator will provide a copy of the GLNPO Lockout/Tagout Program and receive a copy of the contractor's written program. All authorized and affected associates will be informed of significant differences between the two programs and will observe the locks and tags of both programs.

LOCKOUT PROCEDURE CHECKLIST

1. Train authorized lockout/tagout associates and affected associates.
2. Assign work and define work area.
3. Identify all energy sources to equipment.
4. Notify affected associates.
5. Turn off energy sources at controls, if possible.
6. Turn off energy sources at breakers or valves, releasing stored energy.
7. **Attempt to restart equipment**.
8. Check for operation.
9. Return controls to "off" position.
10. Install warning tags at all locks and controls.
11. Perform repair, maintenance, servicing or adjustment.
12. Check equipment and notify affected associates.
13. Remove warning tags and lockouts.
14. Restore equipment to operating conditions.

APPENDIX H: BLOODBORNE PATHOGENS PROGRAM - R/V LAKE GUARDIAN

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SECTION I

PURPOSE OF THE PLAN

One of the major goals of the Occupational Safety and Health Administration (OSHA) is to regulate facilities where work is carried out to promote safe work practices in an effort to minimize the incidence of illness and injury experienced by employees. Relative to this goal, OSHA has enacted the Bloodborne Pathogens Standard, codified as 29 CFR 1910.1030. The purpose of the Bloodborne Pathogens Standard is to "reduce occupational exposure to Hepatitis B Virus (HBV), Human Immunodeficiency Virus (HIV) and other bloodborne pathogens that employees may encounter in their workplace.

The US EPA Great Lakes National Program Office (GLNPO) believes that there are a number of "good general principles that should be followed when working with bloodborne pathogens." These include:

- It is prudent to minimize all exposure to bloodborne pathogens.
- Risk of exposure to bloodborne pathogens should never be underestimated.
- Our facility should institute as many work practices and engineering controls a possible to eliminate or minimize employee exposure to bloodborne pathogens.

We have implemented this Exposure Control Plan to meet the letter and intent of the OSHA Bloodborne Pathogens Standard. The objective of this plan is two fold:

- To protect our employees from the health hazards associated with bloodborne pathogens.
- To provide appropriate treatment and counseling should an employee be exposed to bloodborne pathogens.

SECTION II

GENERAL PROGRAM MANAGEMENT

A. RESPONSIBLE PERSONS

There are four major "Categories of Responsibility" that are central to the effective implementation of our Exposure Control Plan. These are:

- The "Exposure Control Officer"
- Department Managers and Supervisors
- Education/Training Instructors
- Our Employees

The following sections define the roles played by each of these groups in carrying out the plan. (Throughout this written plan, employees with specific responsibilities are identified. If, because of promotion or other reasons a new employee is assigned any of these responsibilities, the GLNPO Safety Manager and/or the Ship Operations Project Officer is to be notified of the change, so that they can update their records.)

EXPOSURE CONTROL OFFICER

The "Exposure Control Officer" will be responsible for overall management and support of our facility's Bloodborne Pathogens Compliance Program. Activities which are delegated to the Exposure Control Officer typically include but are not limited to:

- Overall responsibility for implementing the Exposure Control Plan for the entire facility.
- Working with management and other employees to develop and administer any additional bloodborne pathogens-related policies and practices needed to support the effective implementation of this plan.
- Looking for ways to improve an Exposure Control Plan, as well as to revise and update the plan when necessary.
- Collecting and maintaining a suitable reference library on the Bloodborne Pathogens Standard and bloodborne pathogens safety and health information.

- Knowing current legal requirements concerning bloodborne pathogens.
- Acting as the facility liaison during OSHA inspections.
- Conducting periodic facility audits to maintain an up-to-date Exposure Control Plan.

A designated EPA employee or contractor has been appointed the facility's Exposure Control Officer.

We have determined that the Exposure Control Officer will require assistance in fulfilling his/her duties. To assist them in carrying out their duties, we have created an Exposure Control Committee composed of the following people. (If no committee is to be established, write "No committee established").

Exposure Control Committee

- Chemical Hygiene Officer - Co-Chair
- US EPA's Chief Scientist - Co-Chair
- Analytical Contract Project Representative
- Ship Operating Contract Representative
- Additional Representatives from Ship Safety Committee (as needed)
- _____
- _____
- _____

DEPARTMENT MANAGER AND SUPERVISORS

Department Managers and Supervisors are responsible for exposure control in their respective areas. They work directly with the Exposure Control Officer and our employees to ensure that proper exposure control procedures are followed.

EDUCATION/TRAINING COORDINATOR

Our Education/Training Coordinator will responsible for providing information and training to all employees who have the potential for exposure to bloodborne pathogens. Activities falling under the direction of the Coordinator include:

- Maintaining an up-to-date list of facility personnel requiring training (in conjunction with facility management).
- Developing suitable education/training programs.
- Scheduling periodic training seminars for employees.
- Maintaining appropriate training documentation such as Sign-In Sheets, Quizzes, Training Agenda, etc.
- Periodically reviewing the training programs with the Exposure Control Officer, Department Managers and Supervisors to include appropriate new information.

GLNPO's Safety Manager has been selected to be the facility's Education/Training Coordinator.

EMPLOYEES

As with all of our facility's activities, our employees have the most important role in our Bloodborne Pathogens Compliance Program, for the ultimate execution of much of our Exposure Control Plan rests in their hands. In this role, they must do such things as:

- Know what tasks they perform that have the potential for occupational exposure.
- Attend the bloodborne pathogens training sessions.
- Plan and conduct all operations in accordance with our work practice controls.
- Develop good personal hygiene habits.

B. AVAILABILITY OF THE EXPOSURE CONTROL PLAN TO EMPLOYEES

To help them with their efforts, our facility's Exposure Control Plan is available to our employees at any time. Employees are advised of this availability during their education/training sessions. Copies of the Exposure Control Plan are kept at the following locations:

- Chemical Hygiene Officer's Office
- GLNPO Headquarters
- Designated First Aid Area
- Contained within GLNPO's Safety Health and Environmental Compliance Manual

C. REVIEW AND UPDATE OF THE PLAN

We recognize that it is important to keep our Exposure Control Plan up to date. To ensure this, the plan will be reviewed and updated under the following circumstances:

- Annually, on or before May 5 of each year.
- Whenever new or modified tasks and procedures are implemented which affect occupational exposure of our employees.
- Whenever our employees' jobs are revised in such ways that new occupational exposure may occur.
- Whenever we establish new functional positions within our facility that may involve exposure to bloodborne pathogens.

SECTION III

EXPOSURE DETERMINATION

One of the keys to implementing a successful Exposure Control Plan is to identify exposure situations employees may encounter. To facilitate this in our facility, we have prepared the following lists:

- Job classifications in which all employees have occupational exposure to bloodborne pathogens.
- Job classifications in which some employees have occupational exposure to bloodborne pathogens.
- Tasks and procedures in which occupational exposure to bloodborne pathogens occurs (these tasks and procedures are performed by employees in the job classifications shown on the two previous lists).

GLNPO Safety Manager and the Ship Operations Project Officer will work with department managers and supervisors to revise and update these lists as our tasks, procedures, and classifications change.

JOB CLASSIFICATIONS IN WHICH ALL EMPLOYEES HAVE EXPOSURE TO BLOODBORNE PATHOGENS

Below are listed the job classifications in our facility where all employees may come into contact with human blood or other potentially infectious materials, which may result in possible exposure to bloodborne pathogens:

JOB TITLE	DEPARTMENT/LOCATION
Ship's Chemical Hygiene Officer	R/V Lake Guardian
Chief Scientist	R/V Lake Guardian
Ship's Operations Contractor Designee	R/V Lake Guardian

JOB CLASSIFICATIONS IN WHICH SOME EMPLOYEES HAVE EXPOSURE TO BLOODBORNE PATHOGENS

Below are listed the job classifications in our facility where some employees may come into contact with human blood or other potentially infectious materials, which may result in possible exposure to bloodborne pathogens:

JOB TITLE	DEPARTMENT/LOCATION

WORK ACTIVITIES INVOLVING POTENTIAL EXPOSURE TO BLOODBORNE PATHOGENS

Below are listed the tasks and procedures in our facility where employees may come into contact with human blood or other potentially infectious materials which may result in exposure to bloodborne pathogens.

TASK	JOB CLASSIFICATION	DEPARTMENT LOCATION
First Aid/CPR Responder	Chief Scientist Ship's Chemical Hygiene Officer Ship's Operations Contractor Designee Ship's Analytical Contractor or Designee	

SECTION IV
METHODS OF COMPLIANCE

We understand that there are a number of areas that must be addressed in order to effectively eliminate or minimize exposure to bloodborne pathogens in our facility. The first five areas we deal with in our plan are:

- The use of Universal Precautions.
- Establishing appropriate engineering controls.
- Implementing appropriate Work Practice Controls.
- Using necessary Personal Protective Equipment.
- Implementing appropriate housekeeping procedures.

Each of these areas are reviewed with our employees during their bloodborne pathogens training (see the "Information and Training" section of this plan for additional information). By rigorously following the requirements of OSHA's Bloodborne Pathogens Standard in these five areas, we feel that we will eliminate or minimize our employees' occupational exposure to bloodborne pathogens as much as possible.

A. UNIVERSAL PRECAUTIONS

We began the use of Universal Precautions on September 1, 1993. As a result, we treat all human blood and potentially infectious body fluids (excluding saliva not containing visible blood) as if they are known to be infected with HBV, HIV and other bloodborne pathogens.

In circumstances where it is difficult or impossible to differentiate between body fluid types, we assume all body fluids to be potentially infectious.

The Designated Exposure Control Officer is responsible for overseeing our Universal Precautions Program.

B. ENGINEERING CONTROLS

One of the key aspects to our Exposure Control Plan is the use of Engineering Controls to eliminate or minimize employee exposure to bloodborne pathogens. As a result, employees use cleaning, maintenance and other equipment that is designated to prevent contact with blood or other potentially infectious materials.

The Designated Exposure Control Officer periodically works with department managers and supervisors to review tasks and procedures performed in our facility where engineering controls can be implemented or updated. As a part of this effort, a facility survey was completed in October 1992 identifying three things:

- Operations where engineering controls are currently employed.
- Operations where engineering controls can be updated.
- Operations currently not employing engineering controls, but where engineering controls could be beneficial.

The results of this survey can be found on the following pages.

Each of these lists is reexamined during our annual Exposure Control Plan review and opportunities for new or improved engineering controls are identified. Any existing engineering control equipment is also reviewed for proper function and needed repair or replacement each month, in conjunction with the department manager or supervisor where the equipment is located.

ENGINEERING CONTROL EQUIPMENT

The following operations have, or should have, Engineering Control Equipment to eliminate or minimize our employees' exposure to bloodborne pathogens. If equipment is needed but not yet available "None" is indicated in the "Control Equipment" column.

DEPARTMENT/ OPERATION	CONTROL EQUIPMENT	NEEDS UPDATING	DATE OF LAST REVIEW
Analytical Laboratory	Safety Shower Eye Wash	Monthly	Monthly
Throughout	Sinks, spigots	Routine Maintenance	Routine Maintenance
Designated First Aid Station	Waste Receptacles	Monthly	Monthly

In addition to the engineering controls identified on these lists, the following engineering controls are used throughout the facility:

- Handwashing facilities (or antiseptic hand cleaners and towels or antiseptic towelettes), are readily accessible to all employees who have the potential for exposure.

- Self-sheathing needles. (MEDICAL).

- Containers for contaminated reusable sharps having the following characteristics:
  - Puncture resistant.
  - Color-coded or labeled with a biohazard warning label.
  - Leak-proof on the sides and bottom.

  (MEDICAL)

- Specimen containers which are:
  - Leak proof.
  - Color-coded or labeled with a biohazard warning label.
  - Puncture-resistant if necessary.

  (MEDICAL)

- Secondary containers which are:
  - Leak-proof.
  - Color-coded or labeled with a biohazard warning label.
  - Puncture-resistant, if necessary.

  (MEDICAL)

C. WORK PRACTICE CONTROLS

In addition to engineering controls, our facility uses a number of Work Practice Controls to help eliminate or minimize employee exposure to bloodborne pathogens. Many of these Work Practiced Controls have been in effect for some time.

The person in our facility who is responsible for overseeing the implementation of these Work Practice Controls is the Designated Exposure Control Officer. He/she works in conjunction with department mangers, supervisors and our facility's training coordinators to effect this implementation.

Our facility has adopted the following Work Practice Controls as part of our Bloodborne Pathogens Compliance Program:

- Employees wash their hands immediately, or as soon as feasible, after removal of potentially contaminated gloves or other personal protective equipment.

- Following any contact of body areas with blood or any other potentially infectious materials, employees wash their hands and any other exposed skin with soap and water as soon a possible. They also flush exposed mucous membranes with water.

- Contaminated needles and other contaminated sharps are not bent, recapped or removed unless:
  - It can be demonstrated that there is no feasible alternative.
  - The action required is by specific medical procedure.
  - In the above situations the recapping or needle removal is accomplished through the use of a medical device or a one-handed technique.

  (MEDICAL)

- Contaminated reusable sharps are placed in appropriate containers immediately, or as soon as possible after use.
  (MEDICAL)

- Eating, drinking, smoking, chewing gun, applying cosmetics or lip balm, and handling contact lenses is prohibited in work areas where there is potential for exposure to bloodborne pathogens.

- Food and drink is not kept in refrigerators, freezers, on countertops or in other storage areas where blood or other potentially infectious materials are present.

- Mouth pipetting/suctioning of blood or other infectious materials is prohibited.
  (MEDICAL)

- All procedures involving blood or other infectious materials minimize splashing, spraying or other actions generating droplets of these materials.

- Contaminated or potentially contaminated materials are placed in designated leak-proof containers, appropriately labeled, for handling and storage.

- If outside contamination of a primary container of infectious material occurs, that container is placed within a second leak-proof container, appropriately labeled, for handling and storage. (If infectious material can puncture the primary container, the secondary container must be puncture resistant.)

Equipment which becomes contaminated is examined prior to servicing or shipping, and decontaminated as necessary unless it can be demonstrated that decontamination is not feasible.

- An appropriate biohazard warning label is attached to any contaminated equipment, identifying the contaminated portions.

- Information regarding the remaining contamination is conveyed to all affected employees, the equipment manufacturer and the equipment service representative prior to handling, servicing or shipping.

When a new employee comes to our facility, or an employee changes jobs within the facility, the following process occurs to ensure that they are trained in the appropriate work practice controls:

- The employee's job classification and the tasks and procedures they will perform are checked against the Job Classifications and Tasks List which we have identified in our Exposure Control Plan as those in which the potential for occupational exposure exits.

- If the employee is transferring from one job to another within our facility, the job classification and tasks/procedures pertaining to their previous position are also checked against these lists.

- Based on this "cross checking", the new job classifications and/or tasks and procedures which will bring the employee into occupational exposure situations are identified.

- The employee is then trained by the facility Training Coordinator or another instructor regarding any work practice controls that the employee is not experienced with.

D. PERSONAL PROTECTIVE EQUIPMENT

Personal Protective Equipment is our employees' last line of defense against bloodborne pathogen exposure. Because of this, our facility provides for our employees, at no cost to them, the Personal Protective Equipment that they need to protect themselves against such exposure. This equipment includes but is not limited to:

- Gloves
- Safety glasses
- Goggles
- Face shields/masks
- Respirators
- Protective Clothing

Hypoallergenic gloves, glove liners and similar alternatives are readily available to those employees who are allergic to the gloves our facility normally uses.

The Designated Exposure Control Officer, working with department managers and supervisors, is responsible for ensuring that all departments and work areas have appropriate personal protective equipment available to all employees.

Our employees are trained regarding the use of appropriate personal protective equipment for their job classifications and task/procedures they perform. Training is provided when necessary if an employee takes a new position or news job functions are added to their current position.

To determine the need for additional training, the employee's previous job classification and tasks are compared to those for any new job or function. Any needed training is provided by their department manager or supervisor working with our facility's Training Coordinator.

To ensure that all personal protective equipment is not contaminated and is in the appropriate condition to protect employees from potential exposure, our facility adheres to the following practices:

- All personal protective equipment is inspected periodically and repaired or replaced as needed to maintain its effectiveness.

- Reusable personal protective equipment is cleaned, laundered and decontaminated as needed.

- Single-use personal protective equipment, or equipment that cannot, for whatever reason, be decontaminated, is disposed of by forwarding that equipment to the Designated Exposure Control Officer.

To make sure that this equipment is used as effectively as possible, our employees are to adhere to the following practices when using their personal protective equipment:

- Any garments penetrated by blood or other potentially infectious materials are removed immediately or as soon as feasible.

- All potentially contaminated personal protective equipment is removed prior to leaving a work area.

- Gloves are worn in the following circumstances:
  - Whenever the employees anticipate hand contact with blood or other potentially infectious materials.
  - When handling or touching contaminated items or surfaces.

- Disposable gloves are replaced as soon as practical after contamination or if they are torn, punctured or otherwise lose their ability to function as an exposure barrier.

- Utility gloves are decontaminated for reuse unless they are cracked, peeling, torn or exhibit other signs of deterioration at which time they are disposed of.

- Masks and eye protection (such as goggles, face shields, etc.) are used whenever splashes or sprays may generate droplets of infectious materials.

- Protective clothing (such as coats) are worn whenever potential exposure to the body is anticipated.

E. HOUSEKEEPING

Maintaining our facility in a clean and sanitary condition is an important part of our Bloodborne Pathogens Compliance Program. To facilitate this, we have set up a written schedule for cleaning and decontamination of the appropriate areas of the facility. The schedule provides the following information:

- The area to be cleaned/decontaminated.

- Day and time of scheduled work.

- Cleansers and disinfectants to be used.

- Any special instructions that are appropriate.

Using this schedule, our janitorial/cleaning staff employs the following practices:

- All equipment and surfaces are cleaned and decontaminated after contact with blood or other potentially infectious materials:

  - After the completion of medical procedures. (MEDICAL)
  - Immediately (or as soon as feasible) when surfaces are overtly contaminated.
  - After any spill of blood or infectious materials.
  - At the end of the work shift if the surface may have been contaminated during that shift.

- Protective coverings (such as plastic trash bags or wrap, aluminum foil or absorbent paper) are removed and replaced:

  - As soon as it is feasible when overtly contaminated.
  - At the end of the work shift if they may have been contaminated during the shift.

- All trash containers, pails, bins and other receptacles intended for use routinely are inspected, cleaned and decontaminated as soon as possible if visibly contaminated.

- Potentially contaminated broken glassware is picked up using mechanical means (such as a dustpan and brush, tongs, forceps, etc.).

- Contaminated reusable sharps are stored in containers that do not require "hand processing". (MEDICAL)

The Designated Exposure Control Officer is responsible for setting up our cleaning and decontamination schedule making sure it is carried out within our facility.

We are also very careful in our facility in handling regulated waste (including bandages, feminine hygiene products and other potential infectious materials).

- They are discarded or "bagged" in containers that are:

  - Able to be closed.
  - Puncture-resistant if the discarded materials have the potential to penetrate the container.
  - Leak-proof if the potential for fluid spill or leakage exists.
  - Red in color or labeled with the appropriate biohazard warning label.

- Containers for this regulated waste are placed in appropriate locations in our facility within easy access of our employees and as close as possible to the sources of the waste.

- Waste containers are maintained upright, routinely replaced and not allowed to overfill.

- Contaminated laundry is handled as little as possible and is not sorted or rinsed where it is used.

- Whenever our employees move containers of regulated waste from one area to another, the containers are immediately closed and placed inside an appropriate secondary container if leakage is possible from the first container.

The Designated Exposure Control Officer is responsible for the collection and handling of our facility's contaminated waste.

CLEANING SCHEDULE

SCHEDULED EQUIPMENT/ AREA	CLEANERS/ CLEANING	DISINFECTANTS (DAY/TIME)	SPECIAL USED	INSTRUCTIONS
First Aid Station		After Use	Solutions with bleach or NaCl O4	

SECTION V

HEPATITIS B VACCINATION, POST-EXPOSURE EVALUATION AND FOLLOW-UP

Everyone in our facility recognizes that even with proper adherence to all our exposure prevention practices, exposure incidents can occur. As a result, we have implemented a Hepatitis B Vaccination Program as well as set up procedures for post-exposure evaluation and follow-up should exposure to bloodborne pathogens occur.

NOTE: Contract personnel are responsible for implementing their own post-exposure evaluation and follow-up plan that at least meets the requirements of this section.

A. VACCINATION PROGRAM

To protect our employees as much as possible from the possibility of Hepatitis B infection, our facility has implemented a vaccination program This program is available, at no cost, to all employees who have occupational exposure to bloodborne pathogens.

The vaccination program consists of a series of three inoculations over a six-month period. As part of their bloodborne pathogens training, our employees have received information regarding the Hepatitis B vaccination, including its safety and effectiveness.

The GLNPO Safety Manager is responsible for setting up and operating our vaccination program which has been in effect since September 1, 1993.

Vaccinations are performed under the supervision of a licensed physician or other health care professional. Employees taking part in the vaccination program are listed on the following pages. Employees who have declined to take part in the program are listed as well, and have signed the "Vaccination Declination Form".

To ensure that all employees are aware of our vaccination program, it is thoroughly discussed during our bloodborne pathogens training. We also post "Vaccination Program Notices" in prominent places throughout our facility.

EMPLOYEES ELIGIBLE FOR HEPATITIS B VACCINATION

NAME	DEPT/ TITLE	ACCEPTED/ DECLINED	DATES SCHEDULED	INOCULATION RECEIVED #1/	#2/	#3/

VACCINATION DECLINATION FORM

DATE _____

EMPLOYEE NAME _____

EMPLOYEE ID# _____

I understand that due to my occupational exposure to blood or other potentially infectious materials I may be at risk of acquiring Hepatitis B virus (HBV) infection. I have been given the opportunity to be vaccinated with Hepatitis B vaccine at no charge. However, I decline to receive the Hepatitis B vaccination at this time. I understand that by declining this vaccine, I continue to be at risk of acquiring Hepatitis B, a serious disease. If, in future, I continue to have occupational exposure to blood or other potentially infectious materials and I wish to be vaccinated with Hepatitis B vaccine at that time, I can receive the vaccination series at no charge.

_____ _____
EMPLOYEE SIGNATURE DATE

_____ _____
FACILITY REPRESENTATIVE SIGNATURE DATE

MAKE SURE YOU HAVE RECEIVED YOUR

HEPATITIS B VACCINATION

The vaccination is given at the following times:

_____

_____

_____

Location:

_____

_____

_____

TO SIGN UP CALL _____ **OR TALK TO YOUR SUPERVISOR.**

THIS VACCINATION IS FREE OF CHARGE TO ALL EMPLOYEES

B. POST-EXPOSURE EVALUATION AND FOLLOW-UP

If one of our employees is involved in an incident where exposure to bloodborne pathogens may have occurred, there are two things that we immediately focus our attention and efforts upon:

- Investigating the circumstances surrounding the exposure incident.

- Making sure that our employees receive medical consultation and treatment if needed and as expeditiously as possible.

The Designated Exposure Control Officer investigates every exposure incident that occurs in our facility. This investigation is initiated within 24 hours after the incident occurs and involves gathering the following information:

- When the incident occurred
  - Date and time

- Where the incident occurred
  - Location within the facility

- What potentially infectious materials were involved in the incident
  - Type of material (blood, etc.)

- Source of the material

- Under what circumstances the incident occurred
  - Type of work being performed

- How the incident was caused
  - Accident
  - Unusual circumstances (equipment malfunction, power failure, etc.)

- Personal protective equipment being used at the time of the incident

- Actions taken as a result of the incident
  - Employee decontamination
  - Clean up
  - Notifications made

After this information is collected it is evaluated, a written summary of the incident and its cause is prepared, and recommendations are made for avoiding similar incidents in the future (to assist with this gathering of information, we use the "incident Investigation Form").

In order to ensure that our employees receive the best and most timely treatment should an exposure to bloodborne pathogens occur, our facility has set up a comprehensive post-exposure evaluation and follow-up process. We use the checklist at the end of this section to verify that all the steps in the process have been correctly followed. This process is overseen by the following people:

- Designated Exposure Control Officer
- Ship Operations Project Officer
- GLNPO Health & Safety Manager

We recognize that much of the information involved in this process must remain confidential, and will do everything possible to protect the privacy of those involved.

As the first step in this process we provide an exposed employee with this confidential information:

- Documentation regarding the routes of exposure and circumstances under which the exposure incident occurred.
- Identification of the source individual (unless infeasible or prohibited by law).

Next, if possible, we test the source individual's blood to determine the HBV and HIV infectivity. This information will also be made available to the exposed employee, if it is obtained. At that timed, the employee will be made aware of any applicable laws and regulations concerning disclosure of the identity and infected status of the source individual.

Finally, we collect and test the blood of the exposed employee for HBV and HIV status.

Once these procedures have been completed, an appointment is arranged for the exposed employee with a qualified health care professional to discuss the employee's medical status. This includes an evaluation of any reported illness as well as any recommended treatment.

C. INFORMATION PROVIDED TO THE HEALTH CARE PROFESSIONAL

To assist the health care professional we forward a number of documents to him/her, including the following:

- A copy of the Bloodborne Pathogens Standard
- A description of the exposure incident
- The exposed employee's relevant medical records
- Other pertinent information

D. HEALTH CARE PROFESSIONAL WRITTEN OPINION

After the consultation, the health care professional provides our facility with a written opinion evaluating the exposed employee's situation. We, in turn, furnish a copy of this medical opinion to the employee in question.

In keeping with the emphasis on confidentiality, the written opinion will contain only the following information:

- Whether a Hepatitis B Vaccination is indicated for the employee.
- Whether the employee has received the Hepatitis B Vaccination.
- Confirmation that the employee has been told about any medical condition resulting from the exposure incident which may require further evaluation or treatment.

All other findings or diagnoses will remain confidential and will not be included in the written report.

E. MEDICAL RECORDKEEPING

To make sure that we have as much medical information available to the participating health care professional as possible, our facility maintains comprehensive medical records on our employees.

GLNPO Health and Safety Manager is responsible for setting up and maintaining these records which include the following information:

- Name of the employee

- Social security number of the employee

- A copy of the employee's Hepatitis B Vaccination status
  - Dates of any vaccinations
  - Medical records relative to the employee's ability to receive the vaccination

- Copies of the results of the examinations, medical testing, and follow-up procedures which took place as a result of an employee's exposure to bloodborne pathogens.

- A copy of the information provided to the consulting health care professional as a result of any exposure to bloodborne pathogens.

As with all information concerning these areas, we recognize that it is important to keep the information in these medical records confidential. We will not disclose or report this information to anyone without the employee's written consent except as required by law.

EXPOSURE INCIDENT INVESTIGATION FORM

DATE OF INCIDENT _____ TIME OF INCIDENT: _____

LOCATION _____

POTENTIALLY INFECTIOUS MATERIALS INVOLVED.

TYPE: _____ SOURCE _____

_____ _____

CIRCUMSTANCES (WORK BEING PERFORMED, ETC.): _____

_____

_____

HOW INCIDENT WAS CAUSED (Accident, equipment malfunction, etc.) _____

_____

_____

_____

_____

_____

_____

PERSONAL PROTECTIVE EQUIPMENT BEING USED _____

_____

_____

ACTIONS TAKEN (Decontamination, clean up, reporting, etc.) _____

_____

_____

RECOMMENDATIONS FOR AVOIDING REPETITION OF INCIDENT _____

_____

POST-EXPOSURE EVALUATION AND FOLLOW-UP CHECKLIST

The following steps must be taken, and information transmitted, in case of an employee's exposure to bloodborne pathogens:

ACTIVITY	COMPLETION DATE
Employee furnished with documentation regarding exposure incident.	_____
Source individual identified.	_____
(_____) Source Individual	
Source individual's blood tested and results given to exposed employee.	_____
_____Unable to obtain consent.	
Exposed employee's blood collected and	_____
Appointment arranged for employee with health care professional.	_____
(_____) Professional's Name	
Documentation forwarded to health care professional.	_____

_____Bloodborne Pathogens Standard
_____Description of exposed employee's duties
_____Description of exposure incident, including routes of exposure
_____Result of source individual's blood testing
_____Employee's medical records

SECTION VI

LABELS AND SIGNS

For our employees one of the most obvious warnings of possible exposure to bloodborne pathogens are biohazard labels. Because of this, we have implemented a comprehensive biohazard warning labeling program in our facility using labels of the type shown on the following page or, when appropriate, using red "color-coded" containers. The Designated Control Officer is responsible for setting up and maintaining this program in our facility

The following items in our facility are labeled:

- Containers of regulated waste
- Refrigerators/freezers containing blood or other potentially infectious materials. (MEDICAL)
- Sharps disposal containers. (MEDICAL)
- Other containers used to store, transport or ship blood and other infectious materials.
- Laundry bags and containers
- Contaminated equipment

On labels affixed to contaminated equipment we have also indicated which portions of the equipment are contaminated.

We recognize that biohazard signs must be posted at entrances to HIV and HBV research laboratories and production facilities. However, we do not have these types of operations in our facility so we are not affected by these special requirements

(If the facility has HIV and HBV research laboratory and production operations, please see the copy of the Bloodborne Pathogens Standard, section (g) (1) (ii) for warning sign requirements.)

BIOHAZARD LABELS

SECTION VII

INFORMATION AND TRAINING INFORMATION AND TRAINING

Having well informed and educated employees is extremely important when attempting to eliminate or minimize their exposure to bloodborne pathogens. Because of this, all employees who have the potential for exposure to bloodborne pathogens must participate in a comprehensive training program and are furnished with as much information as possible regarding this issue

This program was set up so that employees would receive the required training on or before June 4, 1992. Employees will be retrained at least annually to keep their knowledge up to date. Additionally, all new employees, as well as those changing jobs or job functions, will be given any additional training that their new position may require at that time.

The GLNPO Health and Safety Officer is responsible for seeing that all employees who have the potential for exposure to bloodborne pathogens receive this training. He/she will be assisted by the following instructors:

_____

_____

_____

A. TRAINING TOPICS

The topics covered in our training program include, but are not limited to, the following:

- The Bloodborne Pathogens Standard.
- The epidemiology and symptoms of bloodborne diseases.
- Our facility's Exposure Control Plan (and where employees can obtain a copy).
- Appropriate methods for recognizing tasks and other activities that may involve exposure to blood and other potentially infectious materials

- A review of the use and limitations of methods that will prevent or reduce exposure, including:

  - Engineering controls
  - Work practice controls
  - Personal protective equipment

- Selection and use of personal protective equipment including:
  - Types available
  - Proper use
  - Location within facility
  - Removal
  - Handling
  - Decontamination
  - Disposal

- Visual warnings of biohazards within our facility including labels, signs, and "color-coded" containers.

- Information on the Hepatitis B vaccine, including:
  - Efficacy
  - Safety
  - Method f administration
  - Benefits of vaccination
  - Our facility's free vaccination program

- Actions to take and persons to contact in an emergency involving blood or other potentially infectious materials.

- The procedures to follow if an exposure incident occurs, including incident reporting.

- Information on the post-exposure evaluation and follow-up, including medical consultation, that our facility will provide.

B. TRAINING METHODS

Our facility's training presentations make use of several training techniques including, but not limited to:

- Classroom type atmosphere with personal instruction.
- Video programs.
- Training manuals/employee handouts
- Employee review sessions.

We have used the forms found on the following page and/or our computer systems to facilitate this recordkeeping.

These training records are available for examination and copying to our employees and their representatives as well as to OSHA and its' representatives.

BLOODBORNE PATHOGENS TRAINING SESSIONS

DATE OF SESSION _____ SESSION SUMMARY (ATTACHED)_____

INSTRUCTOR(S) QUALIFICATIONS

_____

_____

_____

ATTENDEE NAME	JOB TITLE	SSN	SIGNATURE

SECTION VIII

HIV AND HBV RESEARCH LABORATORIES AND PRODUCTION FACILITIES

We recognize that there are several special requirements for HIV and HBV research and production facilities in the areas of construction, engineering controls, work practices, the use of containment equipment as well as employee education and training. However, since we do not have these types of operations in our facility, these special requirements do not apply. Therefore, our exposure control plan does not address these requirements.

(If your facility includes HIV or HBV research laboratories or production facilities, you can find a listing of special requirements that the Standard imposes upon such facilities by consulting the Bloodborne Pathogen Standard 29 CFR 1910.1030. In this case, to complete your Exposure Control Plan you will need to document the methods you will use to comply with these special requirements as well as your implementation schedule.)

APPENDIX I: PERSONAL PROTECTIVE CLOTHING & EQUIPMENT

Purpose

This section establishes policy, responsibilities, and practices for the procurement, issue, control, and use of protective clothing and equipment by GLNPO employees engaged in laboratory and field activities.

Policy

It is the policy of the Environmental Protection Agency to administer its programs in a manner that will assure the protection of the health and safety of all personnel in routine field and laboratory work, especially those persons engaged in work of a hazardous or toxic nature, by providing and requiring the use of specified protective clothing and equipment.

References

1. Occupational Safety and Health Act, P.L. 91-596.
2. 29 CFR 1910, Subpart I. Sections 132, 133, 134, 135, 136, 137, and 138.
3. EPA Order 1440.2 Health and Safety Requirements for Employees engaged in Field Activities, EPA Order 1440.3 Respiratory Protection.
4. Executive Order 12196, Occupational Safety and Health for Federal Employees, 1980.

Definitions

The applicable terms used in this chapter are defined in the following paragraphs.

Field Activities

The term field activities, as used in this chapter, means EPA program activities that are conducted by EPA employees outside of EPA administered facilities. These activities include, but are not limited to, environmental and pesticides sampling, field analysis, inspection of water and wastewater treatment plants, hazardous material spills and waste site investigations, inspections, and sampling.

Routine Laboratory Activities

The term routine laboratory activities denotes EPA program activities that are conducted by EPA employees in an EPA-administered laboratory facility.

Applicability

The provisions of this chapter are applicable to all GLNPO employees at all operational levels. They are also applicable to EPA contractors.

Responsibilities

The duties assigned Regional personnel with regard to Personal Protective Equipment (PPE), are detailed in the following paragraphs.

Regional Administrator

The Regional Administrator is responsible for implementing the regional safety program of which the requirements of this chapter are a part. It is the responsibility of the Regional Administrator to require Division and Office Directors to budget the funds necessary to procure personal protective clothing and equipment.

Division and Office Directors

The Division and Office Directors are responsible for assigning staff to field and laboratory work which may require the use of personal protective clothing and safety equipment.

Supervisors

In accordance with the procedures of this manual, the supervisor is responsible for determining the level of protection required (in consultation with the Health and Safety Officer). He/she is responsible for controlling, issuing, and inspecting the protective clothing/equipment in their section. He/she is responsible for identifying employees who require protective prescription lenses and for having these employees provide current prescriptions. He/she is responsible for keeping an accurate inventory and for maintaining the protective clothing/equipment in a functional condition. He/she is responsible for identifying employees who require training and certification; for ensuring that those employees receive training and certification in compliance with the provisions of EPA Orders 1440.2, 1440.3, and OSHA 29 CFR 1910.120 and 1910.132 through 139; and for ensuring these requirements are contained in their position description. He/she is responsible for recommending appropriate correction and/or disciplinary action of employees who choose to violate or neglect safety requirements.

Regional Health and Safety Manager

The Regional Health and Safety Manager (RHSM) is responsible for assisting supervisors in the selection, procurement, issuance, and maintenance of protective clothing and equipment. He/she reviews every procurement request related to safety, health or personal security, to assure that the request is justified and appropriate. He/she will determine if the item, or an acceptable alternative, is available in the Region, based on the Regional inventory of all protective clothing/equipment that he/she maintains. He/she will annually perform a review and audit of the condition, inventory, and use of protective clothing/equipment for each Division and Office. A report of this annual review/audit will be distributed to all Division/Office Directors. He/she is responsible for identifying program areas that require training and certification. As a member of the Region 5 training committee, he/she advises the Office of Personnel regarding the Health and Safety training requirements of EPA 1440.2, 1440.3, and OSHA 29 CFR 1910.120, and recommends the required funding. The Regional Health and Safety manager shall be responsible for administering the Respiratory Protection Program in Region 5.

Employee

Employees are responsible for the protective clothing and/or equipment issued to them and are required to wear and use the clothing and equipment as prescribed in this chapter and for reporting any damage and/or malfunction of the clothing/equipment issued to them. Employees may provide a current prescription, at their own expense, if the supervisor has determined that the government will provide protective prescription eye wear.

Employees assigned protective clothing and/or equipment are required to sign a receipt for such items, verifying that:

1. They have received proper training in the use and maintenance of these items.

2. They have read the safety procedures and agree to accept the responsibilities provided therein.

3. They accept responsibility for the maintenance and use of the assigned protective clothing and equipment. Cleaning, sanitizing and maintaining the respirators is included in this responsibility. Any damage, excessive wear, or malfunction of the equipment must be reported immediately to the individual's supervisor. Individuals are also responsible for the cost of replacing items of protective clothing or equipment lost, damaged, or stolen through their own negligence.

4. Items provided from a general supply will be maintained by the organizational unit responsible for its supply and issuance.

Facilities Engaged in Hazardous Field Work

Each facility regularly engaged in hazardous, or potentially hazardous, field work will be responsible for:

1. Maintaining adequate supplies of disposable coveralls, gloves, respirators and their replacement cartridges, and overboots.

2. Providing lockable cabinets for storage of PPE in the field.

Personal Protective Equipment Requirements

It is the policy of GLNPO to determine the level of protection required for employees assigned specific duties, to provide adequate and appropriate PPE, and to enforce its proper use. Additionally, specific information on related PPE considerations may be obtained through the use of the EPA's "Guidelines for the Selection of Chemical Protective Clothing" and through consultation with Regional Safety and Health Manager.

GLNPO requires the use of PPE whenever there are hazard exposures that can be eliminated or protected against through the use of PPE. No unprotected person shall knowingly be subjected to hazardous environmental conditions. All laboratory and field operations should be evaluated, and their respective hazards assessed, to assure that adequate and appropriate PPE is selected, and its use is enforced.

Eye and Face Protection

Descriptions of the protective equipment available specifically for the eyes and face are included in the following paragraphs.

Protective Eye Wear

Protective eye wear, including plain and prescription lenses, shall be provided to all field and laboratory employees. They must be worn when the danger of eye injury exists. No one may enter a controlled location where eye protection is mandatory without such equipment. Areas in a laboratory, or on-site locations may be designated as controlled areas by the person in charge. It is his/her responsibility to determine the level of protection required and to enforce its use.

Safety Glasses

Protective eye and face devices purchased after July 5, 1994 shall comply with American National Standards Institute (ANSI) Standard Z87.1-1989, "American National Standard Practice for Occupational and Educational Eye and Face Protection"; eye and face protective devices purchased before July 5, 1994 shall comply with the ANSI Standard Z87.1-1968, "USA Standard for Occupational Eye and Face Protection".

Safety Goggles

A variety of goggles are available to protect the eyes from flying particles, liquids, gases and vapors, however, those types of goggles are hazards-specific making proper selections critical to employee protection.

Use of the appropriate type of goggle for eye protection is required when safety glasses do not provide adequate protection against the hazards encountered in the work area.

Face Shields

Safety glasses or goggles offer little protection to the face and neck. Full face shields that protect the face and neck shall be worn when the maximum protection from flying particles and splashes from harmful liquids is needed. Face shields are not a primary eye protection device and are designed for use over the protective eyewear required for the operation.

Contact Lenses

Contact lenses are not protective eyewear. In situations where protective eyewear is required, the manager or supervisor in consultation with the GLNPO Safety Manager will determine if contact lenses may be worn with additional appropriate eye protection as determined by 29 CFR 1910.134. Contact lenses may not be worn where there is risk of exposure to: intense heat; molten metals; high particulate containing atmospheres; chemical fumes, vapors or splashes; or while wearing a respirator.

Head Protection

All head protection purchased after July 5, 1994, shall comply with ANSI Standard Z89.1 1986, "American National Standard for Personnel Protection -- Protective Headwear for Industrial Worker -- Requirements"; protective headwear purchased before July 5, 1994 shall comply with the Requirements for Industrial Head Protection. Head protection will be worn by all GLNPO employees where there is danger of injury from limited electric shock or from falling or flying objects. Head protection is required at waste-clean up sites where injury may result from equipment operation. Employees are required to wear head protection during all inspections of industrial and chemical plants, waste disposal operations, and sites where any of the above hazards exist.

Protective Apparel

Protective apparel is required for most field and laboratory work performed in the Region. It should be strong, resistant to chemical and thermal penetration, flexible and easy to clean. The performance requirements are to be determined by the substances being handled. It is the responsibility of the supervisor to determine the choice of garment to be worn (laboratory coat, coveralls, rubber or plastic aprons, splash suits, fully encapsulating disposable coveralls, Personal Floatation Devices (PFD's), etc.)

Aprons, Coveralls, Splash Suits

Plastic or rubber aprons, coveralls or splash suits provide protection from corrosive or irritating liquids. However, they can accumulate a charge of static electricity and in the case of fire can cause additional injuries. Therefore, they should not be worn in areas where flammable solvents or other materials could be ignited by a static charge.

Flame Resistant Garments

Properly-designed pants, jackets and hard hat liners with appropriate chemical treatment provide protection from fire hazards such as unexpected furnace flames and from the hazard of splashed molten metal. Jackets with pockets on the inside only help to prevent injury in the presence of high-temperature, airborne particles. Similarly, properly fitted jackets and pants, which are not rolled up, can also prevent injury. Employees are required to wear chemically treated jackets and pants during all coke oven battery and blast furnace casthouse inspections. At a minimum, chemically-treated jackets must be worn during inspections at basic oxygen furnace shops, electric arc furnace shops and facilities with electric arc furnaces and cupolas. It is important that this type of protective clothing be chemically-treated after each washing.

Disposable Outer Garments

Disposable outer garments (e.g. Polyethylene, Saran Coated or Tyvek) may, in some cases, be preferable to reusable ones. Examples include the handling of quantities of highly toxic or carcinogenic materials. Disposable full length suits are recommended for high risk situations; however, many disposable garments offer limited protection from vapor penetration and their use should be determined by the supervisor.

Disposal of Contaminated Garments

Garments should be disposed of in accordance with disposal and decontamination procedures provided by the provisions of the Specific Site Safety Plan or SOP or similar rule.

Gloves

Gloves will be worn when it is necessary to handle corrosive materials, sharp or rough objects, hot or cold materials, or when there is a possibility of exposure to chemicals. Gloves will not be worn near machinery if they may cause bodily injury as a result of being caught in the machine.

The following additional requirements will be met:

1. Gloves will be selected based on their intended use, the hazard involved and their suitability for the job.

2. Before use, gloves will be inspected for punctures, tears or discoloration.

3. Gloves will be appropriately cleaned before removal.

4. Leather gloves will be used for handling broken glassware, for inserting rubber stoppers into glass tubes, for protection against rough or sharp-edged objects, hot or cold materials and for similar operations where protection from chemicals is not needed.

5. Specialized gloves are manufactured for specialized activities. These activities include:

   A. Electrical operations or fish shocking activities where the use of rubber insulated gloves meet OSHA regulations.

   B. Working at temperature extremes where the use of gloves made with such materials as Nomex or Kevlar or in combination with other materials is required.

Foot Protection

All safety footwear purchased after July 5, 1994, shall comply with ANSI Standard Z41-1991, American National Standard for Personnel Protection - Protective Footwear"; protective footwear purchased before July 5, 1994, shall comply with the ANSI Standard Z41.1-1967, "USA Standard for Men's Safety-Toe Footwear". Shoes must be worn at all times in areas where chemicals are stored or used. Perforated shoes or sandals must not be worn in laboratories or during any field work. Safety-toe shoes must be worn by all GLNPO employees who regularly engage in moving, lifting, handling or carrying supplies, materials, equipment, furniture, or other objects of such weight that accidental injury to the toes from falling or shifting of such objects may result. Foot protection, other than ordinary shoes, may be required in special cases. Safety-toe shoes or safety-toe boots are required for most field activities. Rubber boots or plastic shoe covers are to be worn over safety-toe shoes to avoid possible exposure to corrosive chemicals or to large quantities of solvents or water that may penetrate normal foot gear (e.g., during clean-up operations.)

Respiratory Protection

Approved respirator protection will be worn by GLNPO employees when they are working in, or when they encounter, hazardous atmospheres exceeding the Permissible Exposure Limits, in suspected oxygen deficient atmospheres, or where there is imminent danger of release of airborne toxic substances. See Appendix A, Respiratory Protection Program, of this manual.

Non-Personal Protective/Safety Equipment in Laboratories

Emergency alarm systems, safety showers, eye wash fountains, fire extinguishers, and other such equipment will be provided as part of the laboratory work place. The requirements and technical standards are set forth in 29 CFR 1910.1450, EPA 1440 "Occupational Health and Safety in EPA Regions: Program Guidance", EPA Safety Manual, and GSA Safety and Environmental Management Program (PBS- 1L-92-4).

All laboratory safety and emergency equipment should be inspected no less than once every 6 months; the SCBAs should be inspected after every use or not less than once every month.

Emergency Equipment

The following equipment is required for laboratory emergencies. This equipment should be stored together in a central location closest to the laboratory operation having the highest risk of an emergency situation.

Quantity	Description
2	Positive pressure (pressure demand) self-contained breathing apparatus (SCBA) (MSHA, NIOSH approved)
2	Fully encapsulated suits*
2	Hooded, chemical splash suits
2	Chemical resistant disposable coveralls
1	Spill control cart with spill control equipment
1	Thin-window Geiger counter (0-5mr/hr.) minimum*
	*Optional

Several pairs of gloves are also required. The gloves should be selected to protect against a variety of corrosive or toxic materials. Leather and insulated gloves should also be included in the selection.

All of the above equipment should be inspected periodically (at least every six months.) The SCBAs should be inspected after each use or at least once a month.

Additional Protective Requirements

To prevent injury and protect the skin, laboratory personnel may not wear loose, ragged or torn clothing and laboratory coats, or meager or insufficient clothing (e.g., shorts and/or halter tops).

Issuance and Training in the Use of Protective Clothing and Safety Equipment

All of the protective clothing and equipment listed in this manual, as specified for use in laboratory work or field operations must be issued to the employee or made available. If PPE is required for the task, it must be transported to the point of operation and be worn and/or utilized as necessary in performing the activity. For laboratory work, clothing and equipment made available on site satisfies the intent of this manual.

Standard Level of Protection Provided

The Agency will provide each employee regularly engaged in field work with the following: safety toe shoes; or toe caps, safety glasses/goggles and face shield (prescription safety glasses will be provided when safety goggles do not fit over regular prescription glasses), and an approved hard hat.

Field Work of a Hazardous Nature

In addition to the above, the Agency will provide each employee assigned to field work of a hazardous or potentially hazardous nature the following items: disposable coveralls, disposable gloves, pull on safety toe rubber boots (knee high), and a respirator (as appropriate.)

Specialized Field Work

The Agency will provide personnel assigned to specialized field work (e.g., GLNPO and CERCLA personnel) work clothing/equipment as necessary. This may include: life preserver; exposure suit; waders, or fully encapsulated protective suit. Employees assigned to field work, when there is the potential of fire, will be issued fire resistant coveralls and jackets (e.g., Nomex.) Those employees who require respiratory protection and prescription lenses will be provided prescription lenses mounted in a special frame to accommodate the respiratory equipment.

Training

All employees engaged in field work will receive training and certification in compliance with the provisions of EPA Order 1440.2 and 1440.3. Employees shall not be permitted to engage in routine field activities unless they have been trained and certified to a level commensurate with the degree of anticipated hazards. All employees shall be provided with a minimum of 24 hours of health and safety training prior to their becoming involved in normal routine field activities. In addition, employees engaged in field activity requiring the use of respiratory protective devices must be properly trained in the selection and use of such devices and certified that he/she is physically capable of wearing such equipment.

APPENDIX J: CHEMICAL HYGIENE PLAN AND SAFETY MANUAL

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ATTACHMENTS

Attachment 1 - 29 CFR 1910.1450, Revised July 1, 1992

Attachment 2 - Storage For Chemical Compatibility

Attachment 3 - SOP for Hazardous Material Storage and Spill Prevention

Attachment 4 - Weekly Inspection Checklist

Attachment 5 - SOP for Hazardous and Common Wastes

Attachment 6 - Radiation Safety For R/V Lake Guardian Laboratories

Attachment 7 - CRL Radiation Safety Manual

R/V LAKE GUARDIAN CHEMICAL HYGIENE PLAN AND SAFETY MANUAL

U.S. EPA, Region 5, Great Lakes National Program Office
Surveillance & Research Staff (SRS)
77 West Jackson Blvd.
Chicago, Illinois 60604

1.1 INTRODUCTION

The Environmental Protection Agency (EPA) has approximately 33 laboratories in different areas of the country. At these laboratories EPA employees analyze samples and conduct tests in support of the investigative, enforcement, and research responsibilities of Superfund and other Agency Programs. Analysts are typically involved with samples or tests containing hazardous substances or constituents.

The Occupational Safety and Health Administration's (OSHA) regulation for "Occupational Exposures to Hazardous Chemicals in Laboratories", 29 CFR 1910.1450 (the standard) requires that each facility engaged in the laboratory use of hazardous chemicals develop and implement a written program known as a "Chemical Hygiene Plan" which sets forth procedures, equipment, personal protective equipment and work practices that are capable of:

- protecting employees from the health hazards presented by hazardous chemicals used in that particular workplace; and
- keeping employee exposures to the hazardous chemicals, to which they may be occupationally exposed in their laboratories, below the permissible exposure limits specified in the standard.

Purpose

This Chemical Hygiene Plan (CHP) sets forth policies, procedures, equipment, personal protective equipment, and work practices that when properly implemented, are capable of protecting employees from the health hazards presented by hazardous chemicals used in the Lake Guardian laboratories. It is the basis for a chemical hygiene program to ensure the proper implementation of controls to protect the safety and health of personnel working in Great Lakes National Program Office (GLNPO) laboratories.

This Plan is intended to meet the requirements of 29 CFR 1910.1450, the OSHA's standard for occupational exposures to hazardous chemicals in laboratories, a copy of which is found in **Attachment 1**.

Scope

All individuals employed in this laboratory workplace who may be exposed to hazardous chemicals in the course of their assignments are required to follow the provisions of this Chemical Hygiene Plan.

The Chemical Hygiene Plan will be reviewed and updated annually by the Chemical Hygiene Officer and the Region V Safety Officer.

1.2 GENERAL PRINCIPLES

The following General Principles will be adhered to in the implementation of this Chemical Hygiene Plan.

1. Minimize all chemical exposures
   - Laboratory activities can expose employees to a number of different chemicals at relatively small exposure levels. It is our intent to minimize these exposures to the lowest possible levels.

2. Minimize risk
   - Avoid underestimation of risk
   - General safety procedures are developed to account for health risks in performing various procedures.

3. Provide adequate ventilation
   - General and local ventilation (through use of fume hoods) will be used as recommended in 29 CFR 1910.1450 a copy of which can be found in **Attachment 1**.

4. Institute a Chemical Hygiene Program
   - A Chemical Hygiene Program has been incorporated with existing Laboratory Standard Operating Procedures and Safety Manuals.

5. Observe established Action Levels and/or Permissible Exposure Limits (PELs) and Threshold Limit Values (TLVs). Monitoring will be done as necessary to assure safe levels of chemical

6. Properly dispose of hazardous chemicals
   - Chemical waste will be properly disposed of according to applicable federal, state, and local regulations.

1.3 RESPONSIBILITIES

General laboratory responsibilities are addressed in the GLNPO Quality Assurance Project Plan (QAPP). This section will outline responsibilities of the Chemical Hygiene Officer and implementation of the Chemical Hygiene Plan. Documents mentioned below can be found in the safety office.

1. Organizational Structure
   - See Quality Assurance Project Plan (QAPP), Section 2.0, Project Organization and Responsibility, available in the safety office.

2. Roles and Responsibilities

   a. EPA - See EPA 1440.5A, Section 7.a.

   b. Project Director - See QAPP, Section 2.0.

   c. Safety and Health Manager - See EPA 1440.5A, section 8a.

   d. Chemical Hygiene Officer (CHO)

      - Provide technical assistance/guidance to administrators, laboratory directors and supervisors in developing and implementing chemical hygiene procedures and practices.

      - Monitor procurement, use and disposal of chemicals in the laboratories.

      - Maintain an up-to-date file of material safety data sheets or appropriate alternative. Maintain an inventory of all hazardous chemicals in an up-to-date manner.

      - Assist laboratory managers or project directors to develop and implement the use of adequate procedures and use of protective equipment to ensure employee health.

      - Know the current legal requirements with respect to the Chemical Hygiene Plan (CHP), regulated substances, and disposal methods.

      - Coordinate emergency procedures and fire department activities related to hazardous chemicals.

      - Conduct annual audits to determine the implementation and effectiveness of the CHP and compliance with company policy.

- Ensure up-to-date records are maintained on training of all employees required to handle hazardous chemicals.
- Periodically inspect engineering controls and personal protective equipment.
- Make routine surveys of the work area to ensure safe practices are being followed.
- Ensure manufacturers'/suppliers' labels have not been defaced or removed.
- Ensure that a copy of the Chemical Hygiene Plan and the Material Safety Data Sheet (MSDS) manual are readily accessible to the laboratory employee.
- Enforce applicable safety and health rules.

e. Employees - Lab worker/staff.

- Obey established safety rules.
- Follow established Standard Operating Procedures when performing any work with hazardous chemicals.
- Know where the CHP and the MSDS's are kept in the laboratory.
- Use engineering controls and personal protective equipment as required by laboratory standard operating procedure and Chemical Hygiene Standard Operating Procedures.
- Inform your supervisor of:
  - Any symptoms of overexposure that may possibly be related to hazardous chemicals;
  - Missing labels on containers;
  - Malfunctioning safety equipment.
- Do not remove or deface labels on the containers.
- Know the location of, and how to use, emergency equipment, first aid supplies, emergency eyewash, engineering control devices, etc.

- Know your role in emergency procedures, including your assignment on the ship's station bill.

- Know the emergency evacuation route from the laboratory.

f. Master, Research Vessel, Lake Guardian

- Ensure that all ship's operations are conducted in accordance with all applicable safety and health rules and procedures.

g. EPA Supervisors

- Be sure that all laboratory employees have been properly trained regarding use of hazardous chemicals, engineering control equipment, personal protective equipment, and waste and storage management.

- Ensure that employees and contractors are following the CHP.

- Provide assistance to the CHO in maintaining the chemical inventory and MSDS manual.

- Plan laboratory procedures in a manner which will minimize employee hazard and waste generation.

1.4 THE LABORATORY FACILITY

Design

1. Design of the laboratory facilities shall provide, at a minimum, the following components:

   a General ventilation shall be installed to supply 4 to 12 air exchanges per hour. Positive pressure shall be maintained when necessary to reduce analytical error caused by contamination from engine exhaust fumes. Air vents shall be altered as necessary to minimize turbulence at the face of fume hoods.

   b. Each laboratory shall be equipped with at least one chemical fume hood having a face velocity of 100 fpm with a minimum sash opening of 17 inches.

   c. Each laboratory shall be equipped with an eyewash fountain capable of providing 15 minutes of flow. Emergency drench showers shall be installed in numbers sufficient to be accessible within 10 feet of at least one exit from each laboratory.

   d. Space for waste disposal containers should be designed into every lab along with drains and openings in work surfaces to allow easy access to containers.

2. Designated areas.

- Fume hoods #4 in the Biology Lab, #6 in the Primary Productivity Lab, and #9 and #10 in the Extraction Lab are the only designated areas for use of carcinogens and highly toxic materials. These materials are listed on page J-13 of the Chemical Hygiene Plan. These materials can only be used in these designated areas.

3. Maintenance.

- Chemical-hygiene-related equipment shall be inspected according to the schedule given in Section 1.15. The EPA Region V Health and Safety Officer shall be notified of any deficiencies that cannot be easily remedied.

4. Usage.

- Only those procedures designated by EPA GLNPO as appropriate to the facilities shall be carried out in the laboratories.

5. Ventilation

- General ventilation shall not be used to for protection from toxic substances. If fume hoods or other local ventilation is inadequate, EPA GLNPO shall be notified so that appropriate equipment is obtained. Any alteration of the ventilation system should be made only if thorough testing indicates that worker protection from airborne toxic substances will continue to be adequate.

6. Electrical

- In the Biology, Multi-Purpose (Wet), and Chemistry Labs, the outlets near any water source shall be equipped with a Ground Fault Circuit Interrupter (GFCI). The GFCI outlets shall be inspected by the ship's electrician before and after each survey.

1.5 BASIC RULES AND PROCEDURES FOR WORKING WITH CHEMICALS

The following shall be used for guidelines in the general use of chemicals:

1. Avoidance of Routine Exposure

   - Develop and encourage safe habits; avoid unnecessary exposure to chemicals by any route of entry.
   - Do not smell or taste chemicals.
   - Apparatus which may produce toxic chemicals should be vented to prevent entry into the local ventilation system.
   - Inspect gloves and other personal protective equipment before use.
   - Do not allow release of toxic substances in cold rooms (walk-in coolers) which may be inadequately ventilated.

2. Use of Chemicals

   - Use only those chemicals for which the ventilation system is appropriate.
   - Keep chemical containers tightly sealed when not in use.

3. Eating, Smoking, Etc.

   - Eating, drinking, smoking, gum chewing, or application of cosmetics is prohibited in all laboratories. Wash hands thoroughly before partaking in these activities.
   - Storage, handling, or consumption of food or beverages in storage areas, refrigerators, glassware, or utensils which are also used for laboratory operations is prohibited.

5. Equipment and glassware

   - Handle and store laboratory glassware with care to avoid damage; do not use damaged glassware. Use equipment only for its designed purpose.

6. Exiting

- Wash areas of exposed skin well before leaving the laboratory.

7. Horseplay

- Avoid practical jokes or other behavior which might confuse, startle, or distract another worker.

8. Mouth suction

- Do not use mouth suction for pipetting or siphoning.

9. Personal Apparel

- Confine long hair and loose clothing. Wear shoes at all times but do not wear sandals or other open shoes.

10. Personal Housekeeping

- Keep the work area clean and uncluttered, with chemicals and equipment properly labeled and stored. Keep chemicals away from incompatible materials, sunlight, and unnecessary heat or open flames. Clean up the work area on completion of an operation or at the end of each day. Return chemicals back to their proper storage place.

11. Personal Protection

- Safety glasses or other appropriate eye protection shall be worn in the laboratories by all persons including visitors.

- Wear appropriate gloves when the potential for contact with toxic materials exists. Ensure that gloves are free from contamination before moving from one procedure to the next. Decontaminate gloves as necessary. Inspect gloves before each use and wash them before removal. Replace periodically or as needed.

- Use other protective and emergency apparel and equipment as needed.

- Avoid use of contact lenses in the laboratory. If they are used, the laboratory supervisor must be informed so that special precautions are taken.

- Remove laboratory coats immediately upon significant contamination. Do not store lab coats or other contaminated personal protective equipment near food, books, desks, clean clothes, etc.

12. Planning

- Review the MSDS and Chemical Hygiene SOP prior to performing any laboratory procedure. Plan appropriate protective procedures and positioning of equipment before beginning any new operation.

13. Unattended Operations

- Leave lights on, place a suitable sign on the door, and provide for containment of toxic substances in the event of utility failure to the operation.

14. Use of Fume Hoods

- Use a hood for operations which might result in release of toxic vapors or dust or as required by the procedure's SOP. It is good practice to do a procedure in a fume hood, if practical, even when not required.

- As a general rule, use a fume hood when working with volatile substances having a Threshold Limit Value of less than 50 ppm.

- Keep materials stored in the hood to a minimum and do not allow them to block vents or air flow.

- Carcinogens and highly toxic chemicals must only be handled in designated hoods.

- Never perform any chemical mixing or vaporization in a heat hood or heat canopy.

- Leave the hood "on" when it is not in active use if toxic substances are stored in it or if it is needed to maintain general ventilation (i.e. the Hazardous Materials Storage Locker).

15. Working Alone

- Avoid working alone whenever possible. Do not work alone if the procedures being conducted are hazardous.

- When working alone, have a laboratory staff or crew member occasionally check the work area.

1.6 CHEMICAL HYGIENE STANDARD OPERATING PROCEDURES (SOP)

All laboratory procedures for analysis done on the Lake Guardian can be found in the Quality Assurance Project Plan. Chemical Hygiene SOP's for each procedure are bound separately under the title Chemical Hygiene SOP's for U.S. EPA's Great Lakes Program Office and are part of the Chemical Hygiene Plan. Further recommendations can be found in a National Research Council publication, 1981, entitled Prudent Practices for Handling Hazardous Chemicals in Laboratories.

SOP's for chemical storage can be found in **Attachment 2**. SOP's for Chemical Disposal can be found in **Attachment 5**. As lab procedures vary, these Chemical Hygiene SOP's must be updated.

Depending on research operations, radioactive materials Ni-63 and C-14 may be present in the Analytical and Primary Productivity Laboratories respectively. These materials are subject to restriction by the Nuclear Regulatory Commission as set forth in 10 CFR Part 20. Guidelines for safe use of these materials on board the Lake Guardian are set forth in the GLNPO Standard Operating Procedures for Radiation Safety, located in **Attachment 6** of this Appendix, and are administered by the ship's Radiation Safety/Chemical Hygiene Officer.

Designated Areas

Work with select carcinogens, allergens, reproductive and embryotoxins and substances that have a high degree of acute and/or chronic toxicity may require additional protection for employees. For the GLNPO, the following compounds are used which are select carcinogens under 29 CFR 1910.1450 (b).

- Beryllium
- Formaldehyde

In addition, the following chemicals are considered "extremely poisonous" although not on the OSHA select carcinogen list. These chemicals should also be used exclusively in the Designated Area. These chemicals are:

- Carbon 14
- Chloroform
- Hydrazine Sulfate
- Sodium Nitroprusside

The Designated Area(s) on the Lake Guardian are:

- Fume Hood #4, Bio Lab
- Fume Hood #6, Primary Prod. Lab
- Fume Hood #9, Extraction Lab
- Fume Hood #10, Extraction Lab

These fume hoods shall be labeled as Designated Areas. SOP's for these areas are dependent on the material and procedure being done. Different Personal Protective Equipment (PPE) may be required for different chemicals (See the Chemical Hygiene SOP for each lab procedure). General SOP's in using these fume hoods as a Designated Area are as follows:

- Periodically check the air flow of the fume hood.
- Wear appropriate PPE.
- Avoid inhalation or skin contact with these chemicals.
- Decontaminate or dispose of gloves after use.
- Review MSDS's prior to laboratory procedures.
- Excess hazardous material must be treated as hazardous waste.
- Thorough decontamination of the working area, working surfaces, gloves and equipment must be done prior to doing another procedural step.

Required Prior Approvals

Unique circumstances may require special approval as outlined in the Quality Assurance manual. Any unusual procedures or circumstances not covered by the Laboratory Analytical Procedures or the Chemical Hygiene Standard Operating Procedures, must be approved by the Limnology Group Leader.

1.7 CHEMICAL PROCUREMENT, DISTRIBUTION AND HANDLING

Laboratory employees shall follow the procedures set forth in the document entitled Standard Operating Procedures for Hazardous Material Storage and Spill Prevention contained in **Attachment 3**. This Attachment provides information concerning procurement, bulk storage, distribution, and laboratory storage. **Attachment 2** contains the chemical inventory for the routine surveys conducted on the ship as well as information necessary to ensure compatible storage.

1.8 SIGNS AND LABELS

Prominent signs and labels for the following shall be posted in the laboratory:

- Emergency Telephone Numbers - Emergency telephone numbers and radio contact with the U.S. Coast Guard shall be maintained by the ship's Captain.

- Container Labeling - All containers of chemicals, cleaning material, maintenance supplies, etc. throughout the facility shall have labels identifying the contents. Damaged labels on such materials shall be replaced. In addition, any transfer containers of such chemicals and materials shall be appropriately labeled. This is in accordance with 29 CFR 1910.1200, the OSHA Hazard Communication Standard.

- Safety and First Aid Equipment - All safety showers, eyewash stations, first aid kits, fire blankets, and fire extinguishers in the facility shall have proper identification markings.

- Exit Signs - All exits shall be marked and the signs properly maintained.

- High Risk Areas - All chemical storage cabinets shall be labeled to indicate general category and chemical compatibility.

- Fume hoods #4, #6, #9 and #10 must be labeled with "Designated Area" signs indicating the use of carcinogenic, highly toxic and/or radioactive materials in those areas.

1.9 HAZARD IDENTIFICATION

Purpose

This procedure outlines a method for determining the health hazards of a particular chemical which will be used by the laboratory. For any chemical which is purchased from an outside supplier, the manufacturer's or supplier's Material Safety Data Sheet (MSDS) and label will be the principal source of hazard information. For any chemical produced in the laboratory, or produced as a by-product, it will be assumed to be hazardous unless, or until, its identity can be determined and a specific hazard analysis is performed.

Scope

This procedure will cover all hazardous chemicals used in the laboratory, whether brought into the laboratory from an outside manufacturer or supplier, or produced in the laboratory as a product, intermediate or by-product. This procedure also details the acquisition and maintenance of MSDS and container labeling.

Procedures

The Chemical Hygiene Officer (CHO) will review each new or revised MSDS when it is received from a manufacturer or supplier. The review will be conducted to assure that it is complete and that it provides information concerning the health hazards, special procedures or practices for handling and storage, emergency procedures and disposal methods. In conjunction with the appropriate laboratory supervisor, the CHO will determine if special procedures or practices need to be implemented to assure safe handling.

If available, supplier's samples must include a Material Safety Data Sheet for the use of operating personnel in evaluating the product. The inventory can be found in **Attachment 2** of this CHP.

If a Material Safety Data Sheet is missing, the CHO will secure it through appropriate channels. Suppliers who fail to cooperate in providing MSDSs will be identified to the appropriate management personnel for disposition.

All labels affixed to incoming chemical containers must be maintained. Contact the CHO if any container labels are missing or defaced. The container with a missing or defaced label will be removed by the CHO from stock and not returned until the condition has been rectified.

If any laboratory procedure will result in the production of a by-product which is unknown, it will be considered hazardous and handled according to the SOP for work with particularly hazardous substances.

If any laboratory procedure results in an intermediate or final product whose composition is known, a literature search will be conducted to determine the hazardous nature of the chemical. Following this hazard evaluation, the CHO, in conjunction with other members of the

management staff as needed will develop appropriate practices and procedures to assure safe handling, use, storage and disposal of the chemical. These procedures will be included with the SOPs for the work with hazardous chemicals to ensure employee protection.

In addition to the MSDS's, other information concerning hazards, safe handling, storage, and disposal can be found in the CHO office and in the central Great Lakes National Program Office, 77 W. Jackson Blvd., Chicago, IL 60604-3590.

Material Safety Data Sheets (MSDS)

Since such a wide variety of substances are utilized in our facilities, one central recordkeeping area will be used for storage of MSDSs for the entire facility. In this way, everyone will know the location of MSDS information. The following procedures cover recordkeeping and filing of MSDSs for chemicals used in the laboratories. Additional copies of MSDSs should be made available at each Laboratory to facilitate easy access.

- Before any chemical is received at the facility, each supplier of hazardous materials will be contacted and an MSDS for their products will be obtained. This initial request will be formalized as part of the purchasing procedure, i.e. an MSDS will be requested during the verbal ordering and again on the written purchase order.

- A master file and cross reference list of MSDSs by trade name, chemical names, supplier and user will be developed and maintained by the CHO and located in the CHO office.

- A file of MSDSs for chemicals used in each laboratory will be located in the central hallway.

- The laboratory file of MSDSs should be used for employee training purposes and must be available for employee access.

- The CHO will make MSDSs available to any outside medical provider or public service agency that needs the information.

- MSDSs for products that are not currently used or that have been changed will be maintained in an inactive file for a minimum of 30 years in the lab office on board the Lake Guardian, then in a central GLNPO Office.

We will rely exclusively on the information supplied by the product vendor or distributor of the Material Safety Data Sheet to properly determine the hazards of any particular chemical used in the laboratories. MSDS's that are incomplete or appear to be in error will be referred back to the vendor or distributor by the CHO for information or change. If you notice any missing information or information which appears to be inaccurate, please contact the CHO.

Note: MSDSs should be maintained in accordance with 1910.20 subpart C - General Safety and Health Provisions - "Access to Employee Exposure and Medical Records." Paragraph (d) Preservation of Records; (1) (11) (A) & (B), Material Safety Data Sheets; and paragraph (c) (5) (iv). Records concerning the identity of a substance or agent need not be retained for any specific period, as long as some record of the identity (chemical name if known) of the substance or agent, where it is used, and when it was used are retained for at least thirty (30) years.

Labels

Labels are designed to provide information to employees concerning the hazards of various chemicals. Therefore, it is important that hazardous chemicals remain in properly labeled containers. The following procedures apply to all manufacturers' labels.

- All manufacturers' labels will remain on the containers. If any container labels are missing or defaced, please contact your supervisor.
- As a minimum, each label should contain the following:
  1. Identification of the material in the container;
  2. Appropriate hazard warnings, such as health, fire, and reactivity;
  3. Name and address of chemical manufacturer, importer, or the responsible party (applies only to manufacturers' labels).
- If you are unfamiliar with the contents on the label, please see the lab supervisor for further explanation.

In laboratory storage, reaction or processing containers should be labeled with:

- Identification of material in the container, such as, product or chemical name
- Whenever possible, appropriate hazard warnings as to health, fire, or reactivity taken from the Material Safety Data Sheets, or other hazard identification reference.
- Containers of chemicals produced in-house will be labeled with appropriate hazard information by the CHO.

1.10 INDUSTRIAL HYGIENE

Purpose

Industrial Hygiene is the science of recognition, evaluation, and control of environmental health hazards arising in the work place. This procedure describes how chemical hazards in the laboratory will be evaluated. Material Safety Data Sheets specify the health hazards associated with a hazardous material. A professional Industrial Hygienist is needed to interpret this information, especially Permissible Exposure Limits (PEL's) and Threshold Limit Values (TLV's), in relationship to how hazardous materials are used in the laboratory environment.

Scope

Certain hazardous chemicals require an industrial hygiene study to determine the level of the hazardous chemical and extent of control needed to protect the employee. These efforts will be coordinated by the Chemical Hygiene Officer (CHO). Where a question exists concerning employee exposure to hazardous materials, engineering controls, or personal protection equipment requirements, the CHO should be contacted immediately.

Laboratory Procedures

Employee Exposure Determination In many of the laboratory procedures, multiple hazardous chemicals are used, however, the quantities are small and the duration of use is short. For these reasons, monitoring of the potential employee exposure due to airborne chemicals will be conducted if there is sufficient reason to believe that an exposure is possible. The following criteria will be used to determine if monitoring will be conducted:

- The toxicity and volatility of the hazardous chemical in use. If a highly toxic or highly volatile material is handled during a procedure, these operations will be placed on a priority evaluation list to determine if sampling is needed.
- The manner in which the laboratory procedure is conducted. Procedures which

must be conducted outside a lab hood or unventilated area, if toxic chemicals must be heated, procedures must be conducted in open vessels vs. closed containers.

- Quantity of, and frequency at which a hazardous chemical is used in the lab.

- Report of an employee experiencing signs or symptoms of exposure, such as, skin or eye irritation, shortness of breath, headache, etc.

As required by the OSHA Lab standard, 29 CFR 1910.1450 (See **Attachment 1** of this Appendix), monitoring will be conducted if the above conditions could result in an employee over exposure during use of the following chemicals regulated by OSHA.

- OSHA Regulated Substances, according to 29 CFR 1910 Subpart Z, dated July 1, 1992, are the following:
  Asbestos
  Coal Tar Pitch Volatiles
  4-Nitrobiphenyl
  alpha-Naphthylamine
  Methyl-chloromethyl ether
  3, 3 -Dichlorobenzidine and its salts
  bis-Chloromethyl ether
  beta-Naphthylamine
  Benzidine
  4-Aminodiphenyl
  Ethyleneimine
  beta-Propiolactone
  2-Acetylaminofluorene
  4-Dimethylaminoazobenzene
  N-Nitrosodimethylamine
  Vinyl chloride
  Inorganic Arsenic
  Lead
  Benzene
  Coke Oven Emissions
  Bloodborne Pathogens
  Cotton Dust
  1, 2-dibromo-3-chloropropane
  Acrylonitrile
  Ethylene oxide
  Formaldehyde
  Methylenedianiline

Monitoring of employee exposure may also be conducted for any other chemicals used in the laboratory if the conditions stated under paragraph 1 are experienced.

The CHO will coordinate employee monitoring. The CHO should be contacted if the above conditions are observed or if plans for a new procedure or use of a new chemical could be expected to create any of the conditions described above.

Personal Protective Equipment (PPE)

Selection, use, maintenance and storage of all respiratory protective equipment will be in accordance with the Respiratory Protection Program, as stated in **Appendix A** of this manual.

Safety glasses will be worn at all times when working in any laboratory where hazardous chemicals are used. Additional requirements for eye protection, such as chemical splash guard, goggles, full face respirators, etc., will be determined by the laboratory SOP for use of that chemical.

Protective clothing requirements, such as, lab coats, protective gloves, coveralls, etc., will be determined by the laboratory SOP for use of that chemical. Determinations are based on MSDS Recommendations and "Guidelines for the Selection of Chemical Protective Clothing", available from the American Conference of Governmental Industrial Hygienists, 6500 Glenway Drive, Cincinnati, OH, 45211, (513)661-7881.

Preventive Maintenance Programs

Exhaust Ventilation: The local exhaust ventilation system will be maintained on a quarterly basis by the Maintenance Department/Engineering Department, with the assistance of the Chemical Hygiene Officer. The evaluation will include:

- Hood performance
  - Use smoke tubes to visualize the air flow patterns within the hood. Excessive turbulence, uneven exhaust air flow patterns, effects of make-up air will be evident from the smoke tube evaluation.
  - Measure the air velocity with a calibrated velometer. Make a series of measurement to assure the even distribution of the exhausted air stream. Air velocities should not vary more than 20% - 25% over the face of the hood.
  - Always perform this evaluation with the hood sash in the full open position. If adequate velocities are not attainable at the full open position, remove the hood from service until it can be maintained.
- Exhaust fan.
  - Maintain the exhaust fan, e.g. drive belts, lubrication, etc.
  - Observe proper direction of the fan rotation.
  - Determine the condition of the fan blades.
  - Check the performance of multi-speed fans, solenoids, etc., which can affect the performance of the hood under different operating conditions.
- Additions to the Local Exhaust Ventilation (LEV) system.

Whenever an additional hood, or other ventilated equipment is added to the system, the entire system should be re-evaluated. Following the evaluation, necessary repairs or additions should be made to the system.

Eyewashes and Safety Showers: Eyewashes and Safety Showers will be checked on a weekly basis by the CHO in the laboratory.

1.11 EMPLOYEE INFORMATION AND TRAINING

Purpose

This procedure outlines the laboratory's policy for training employees who are required to handle hazardous chemicals.

Scope

The Information and Training Program will teach employees about the hazards of the chemicals used in their areas and the protective measures by which they can protect themselves from exposure to these chemicals. At a minimum, the following areas will be covered either in training sessions or provided as reference materials to which each employee has ready access:

- The contents of the Federal Standard, "Occupational Exposure to Hazardous Chemicals in Laboratories".
- The laboratory's Chemical Hygiene Program and its location.
- Permissible Exposure Limits for chemicals regulated by OSHA and other established exposure limits which will be used during employee exposure determinations.
- Symptoms associated with overexposure to hazardous materials.
- Hazards of chemicals used in the laboratories. This will be accomplished by teaching the employee to read MSDS's and manufacturers' labels.
- For additional information on the hazards of chemicals, the employees will have access to appropriate reference material.
- Use of personal protective equipment.
- Standard operating procedures to be implemented when hazardous chemicals are used.
- Special procedures that workers involved in use of particularly hazardous substances must follow.
- Emergency procedures.
- Storage practices.
- Waste disposal.

Procedures

Training Program: The training program will be presented in three parts.

1. Part I will present an explanation of the OSHA regulation, the company's Chemical Hygiene Plan and where this and other reference materials containing additional information on the hazards, safe handling, storage and disposal of hazardous chemicals are located.

2. Part II will include training in basic concepts associated with chemical hazards. Areas covered are:

   a. Chemical Hazards - The basic concepts related to chemical hazards: Definition of a hazard, types of hazards, exposure or dose, routes of entry, acute versus chronic effects, Threshold Limit Values, and types of control measures.

   b. Material Safety Data Sheets - This explains what a Material Safety Data Sheet is, how it can be used, and what information it contains.

   c. Labeling, Storage, and Handling - This introduces types of labels and their purposes, emphasizing the importance of reading and heeding labels. General storage considerations are covered and safe handling procedures and personal protective equipment are discussed. The intent is to lay the groundwork for a discussion of the specific handling procedures to be used in the laboratory. This section stresses the importance of following the standard operating procedures.

3. Part III of the training will include the specific chemical hazards, protective practices and equipment, applicable parts of the laboratory's Chemical Hygiene Plan and standard operating procedures for work with hazardous chemicals in the laboratory to which the employee is assigned. Areas covered are:

   a. Chemicals You Use - This will teach employees about the chemical hazards and control procedures for the specific chemical hazards identified for each procedure in the laboratory that involves hazardous chemicals.

   b. Chemical Hygiene Plan - A detailed explanation of the CHP will be provided to the employee including all applicable parts of the CHP.

   c. Standard Operating Procedures - Review in detail the SOP's specific to the laboratory where the employee works.

4. Training will be provided as follows:

   a. Newly hired personnel will be trained by the CHO before that employee works with hazardous chemicals.

b. Employees transferred to new positions will be trained by the CHO before working with hazardous chemicals.

c. Supplemental training, (i.e., when new chemical hazards or procedures are introduced into the laboratory) will be presented to the employee affected by the CHO.

d. Refresher training will be provided as deemed necessary by the CHO. An annual refresher in selected aspects of chemical hazards is desirable.

5. All training will be documented:

a. The CHO will maintain a list of employees who have received training.

b. The CHO will obtain signatures from employees receiving training, including transferred employees.

1.12 MEDICAL EVALUATION PROGRAM

Medical evaluation and surveillance for EPA personnel working in the Lake Guardian laboratories shall be provided by their local office. All medical services for contractor laboratory employees shall be provided by their employer.

1.13 PERSONAL PROTECTIVE EQUIPMENT (PPE)

Personal Protective Equipment (PPE) shall be made available to all laboratory employees. Appropriate PPE is dependent on the lab procedure being performed and the chemicals used. Proper PPE is discussed in the Chemical Hygiene SOPs and Material Safety Data Sheets (MSDSs). Recommendations regarding PPE shall be based on the "Guidelines for the Selection of Chemical Protective Clothing".

Safety showers and eyewash stations shall be conveniently located to laboratories. These stations shall be checked weekly. Records of these inspections shall be kept in the CHO's office.

Respiratory protection shall be provided as needed for Lake Guardian laboratory personnel.

Eye Protection

Appropriate eye protection must be worn in the laboratory or when doing laboratory or mechanical work. Protective eyewear should never be shared between employees. Primary types of eye protection are as follows:

Safety Glasses

All lab employees who do not wear prescription eyewear shall have sturdy safety glasses fitted with side shields. These glasses must be worn in the laboratory at all times, even when the

employee is not performing analytical work. This requirement protects the employee from hazards generated by other analysts' work. Persons needing prescription eyewear shall have safety-rated lenses with side shields, as specified by ANSI Z.87.

Safety Goggles

Safety glasses are not always sufficient to protect employees from all chemical hazards during analytical procedures. Safety goggles are designed to protect the eyes from splash hazards. All employees shall wear goggles when performing analytical procedures involving liquids which may present such a hazard.

Face Shields

Face shields shall be provided when working with corrosive materials or chemicals that are potentially explosive. Face shields are designed to be worn comfortably over safety glasses or goggles and should not be used in place of these items. The employee should never use a face shield in lieu of a protective barrier designed for working with explosive procedures, but in conjunction with the barrier.

Gloves

The skin is a potential route of exposure to hazardous materials on the Lake Guardian. It is very important that gloves are worn when working with chemicals or performing operations that involve heat hazards.

The analyst should not assume that a pair of gloves will provide adequate protection, even when they are new. Gloves should be examined for discoloration and punctures before each use. The employee should verify that the gloves are appropriate for the hazard. Sometimes, when working with mixtures, double or even triple gloving may be necessary. Following is a brief description of the type of glove that should be worn for some laboratory operations or when working with specific chemicals. In addition, the OHSD also provides a manual on the proper selection of personal protective equipment that may be consulted if the hazard is not listed here.

Hot Objects	Fiberglass or treated leather gloves; never wear asbestos gloves
Acids (HCl, Nitric)	Natural Rubber
Acids (H_2SO_4)	Neoprene
Bases	Natural Rubber
PCBs	Neoprene or poly vinyl alcohol
Amines	Butyl Rubber

Ethers	Polyvinyl Alcohol
Xylene	Polyvinyl alcohol
Methylene Chloride	Vitron/Neoprene
Pentachlorophenol	Nitrile
Mercury	Poly vinyl alcohol
Carbon Disulfide	Poly vinyl alcohol
Phenol	Butyl rubber
2-Nitro Fluorine*	Butyl Rubber/Nitrile
t-Butyl Alcohol*	Butyl Rubber/Nitrile

*Data currently does not exist relating to appropriate glove type. The gloves were recommended by a manufacturer.

1.14 RECORDKEEPING

This section should meet the requirements of 1910.1450 (j) and be consistent with EPA Order 1440 "Occupational Health and Safety Manual," CHAPTER 3 ("Accident and Illness Investigation, Reporting and Recordkeeping Requirements"), 29 CFR 1960 Subpart I, 29 CFR 1910.20 and relevant sections of other OSHA standards.

The following records shall be kept on board the Lake Guardian and will be managed by the Chemical Hygiene Officer:

1. Accident / Illness records;

2. CHP records - compatible with current knowledge and regulations, employee training, MSDSs, current chemical inventory;

3. Inventory and use records for hazardous and high-risk substances;

4. Respiratory fit testing records.

1.15 HOUSEKEEPING, INSPECTION AND MAINTENANCE

Housekeeping - Floors shall be cleaned before and after each survey. Floors shall be cleaned during a survey, as needed, to maintain dry conditions free of chemical contamination.

Storage of laboratory equipment must not block hallways or exits or obstruct access to safety showers, eyewashes, spill kits, first aid supplies, and fire equipment.

Laboratory equipment and supplies must be used and stored in a secure manner always bearing in mind the ship's movement during rough weather.

Inspection - The CHO shall conduct weekly inspections of the laboratories, general ship safety, and the hazardous materials storage area. Copies of the current checksheets used for inspection shall be maintained in **Attachment 4**.

The safety showers and the GFCI outlets shall be inspected before the beginning of each survey. Safety showers will be inspected weekly thereafter.

Maintenance - After inspections, arrangements shall be made with the Chief Engineer or Electrician for any needed repairs. Those repairs which cannot be made immediately should be reported to the EPA Region V Health and Safety Officer for inclusion in the next work list for the ship.

Laboratory personnel should report any problems or shortages associated with safety and health equipment to the CHO.

1.16 WASTE DISPOSAL

Waste disposal for the Lake Guardian laboratories shall be conducted according to the Standard Operating Procedures for Hazardous and Common Waste Disposal contained in **Attachment 5**.

1.17 SPILLS AND ACCIDENTS

The best remedy for spills and accidents is to prevent their occurrence. Guidelines for the prevention of chemical spills can be found in **Attachment 3**, the Standard Operating Procedures for Hazardous Material Storage and Spill Prevention. Strict adherence to all standard operating procedures and the guidelines set forth in this Chemical Hygiene Plan will greatly reduce the chance for spills and accidents in the Lake Guardian laboratories.

Spills that do occur shall be remediated following the guidelines set forth in the R/V Lake Guardian Hazardous Materials / Hazardous Waste Contingency Plan, as stated in **Appendix R** of this manual.

The following guidelines shall be used in responding to accidents which may occur:

General Emergency Procedures - General Emergency Procedures for the operation of the boat can be found in Research Vessel Safety Procedures & Seaward Services, Inc. Occupational Safety & Health Manual, found in **Appendix N** of this manual.

Chemical Emergency Procedures

- Be aware of antidote or dilution procedures for all chemicals being used in the procedure.
- Get victim to deluge shower or eyewash if needed.
- Contact the bridge and/or the CHO. Contact Captain for emergency phone numbers.
- The Captain shall notify the proper authorities and summon help as needed.

General First Aid - First aid supplies are maintained in portable kits throughout the ship. Additionally, there is a major supply station in the Captain's office.

Eye Contact: Promptly flush eyes with water for a period of at least 15 minutes and seek medical attention.

Ingestion: Follow the directives in the chemical's MSDS and take appropriate action. Seek medical attention.

Skin Contact: Remove all contaminated clothing and wash the affected area thoroughly at the sink or in the emergency deluge shower. Seek medical attention as needed.

1.18 SAFETY PROCEDURES

To ensure the health and safety of those working in the Lake Guardian laboratories, the following safety procedures shall be observed in addition to those procedures directly involved with chemical hygiene:

1. Compressed Gas Cylinders - All compressed gas cylinders must be secured to permanent cylinder storage fixtures at all times. Appropriate fixtures are located in the Analytical Laboratory and on the 01 deck. Small capacity cylinders which cannot be secured to the fixtures shall be secured by some other means in such a way as to prevent rolling, falling, or bumping of the cylinders. Cylinders containing oxygen shall be stored separately from cylinders and other materials having highly flammable constituents by a distance of 20 feet or a half hour fire wall. This does not apply to oxygen cylinders in use or connected for use. As a general rule, no more than six compressed gas cylinders are allowed in a sprinklered area, and no more than three are allowed in a non-sprinklered area. Also, *gang chaining* of compressed gas cylinders is strictly forbidden.

2. Fire Safety and Emergency Response Procedures - Dry chemical (ABC) fire extinguishers shall be located in each of the permanent laboratories as well as the hallway. Container laboratories shall have their own automatic dry chemical system. All laboratory personnel shall be familiarized with the use of immersion suits, life jackets, and the ship's station bill. When the fire alarm is sounded all laboratory personnel shall get an immersion suit and/or life jacket and report to the location assigned to them on the station bill. Other than for first response with a fire extinguisher, no non-crew laboratory personnel shall be involved in fire fighting. Fire doors shall be kept closed at all times.

3. On Deck Safety Procedures - Work vests shall be worn at all times during sampling and testing conducted on the rosette deck and fantail. No one is permitted on the fantail during sea operations unless directly involved with sampling, testing, checking of equipment, or other work. No one is permitted to work alone on the fantail. A crew member with a radio should be present during work at a sampling station. During weather conditions causing freezing of water on deck surfaces, hoses shall be used to thaw surfaces with warm water as needed to prevent a slipping hazard for those working outside.

ATTACHMENT 1 – 29 CFR 1910.1450, Revised July 1, 1992

code of federal regulations

Labor

29

PART 1910 (§ 1910.1000 TO END)

Revised as of July 1, 1992

made with the aid of the secret may be inappropriate.

[52 FR 31877, Aug. 24, 1987, as amended at 52 FR 46080, Dec. 4, 1987; 53 FR 15035, Apr. 27, 1988; 54 FR 24334, June 7, 1989; 54 FR 6888, Feb. 15, 1989]

§ 1910.1450 Occupational exposure to hazardous chemicals in laboratories.

(a) *Scope and application.* (1) This section shall apply to all employers engaged in the laboratory use of hazardous chemicals as defined below.

(2) Where this section applies, it shall supersede, for laboratories, the requirements of all other OSHA health standards in 29 CFR part 1910, subpart Z, except as follows:

(i) For any OSHA health standard, only the requirement to limit employee exposure to the specific permissible exposure limit shall apply for laboratories, unless that particular standard states otherwise or unless the conditions of paragraph (a)(2)(iii) of this section apply.

(ii) Prohibition of eye and skin contact where specified by any OSHA health standard shall be observed.

(iii) Where the action level (or in the absence of an action level, the permissible exposure limit) is routinely exceeded for an OSHA regulated substance with exposure monitoring and medical surveillance requirements, paragraphs (d) and (g)(1)(ii) of this section shall apply.

(3) This section shall not apply to:

(i) Uses of hazardous chemicals which do not meet the definition of laboratory use, and in such cases, the employer shall comply with the relevant standard in 29 CFR part 1910, subpart Z, even if such use occurs in a laboratory.

(ii) Laboratory uses of hazardous chemicals which provide no potential for employee exposure. Examples of such conditions might include:

(A) Procedures using chemically-impregnated test media such as Dip-and-Read tests where a reagent strip is dipped into the specimen to be tested and the results are interpreted by comparing the color reaction to a color chart supplied by the manufacturer of the test strip; and

(B) Commercially prepared kits such as those used in performing pregnancy tests in which all of the reagents needed to conduct the test are contained in the kit.

(b) *Definitions—*

Action level means a concentration designated in 29 CFR part 1910 for a specific substance, calculated as an eight (8)-hour time-weighted average, which initiates certain required activities such as exposure monitoring and medical surveillance.

Assistant Secretary means the Assistant Secretary of Labor for Occupational Safety and Health, U.S. Department of Labor, or designee.

Carcinogen (see *select carcinogen*).

Chemical Hygiene Officer means an employee who is designated by the employer, and who is qualified by training or experience, to provide technical guidance in the development and implementation of the provisions of the Chemical Hygiene Plan. This definition is not intended to place limitations on the position description or job classification that the designated individual shall hold within the employer's organizational structure.

Chemical Hygiene Plan means a written program developed and implemented by the employer which sets forth procedures, equipment, personal protective equipment and work practices that (i) are capable of protecting employees from the health hazards presented by hazardous chemicals used in that particular workplace and (ii) meets the requirements of paragraph (e) of this section.

Combustible liquid means any liquid having a flashpoint at or above 100 °F (37.8 °C), but below 200 °F (93.3 °C), except any mixture having components with flashpoints of 200 °F (93.3 °C), or higher, the total volume of which make up 99 percent or more of the total volume of the mixture.

Compressed gas means:

(i) A gas or mixture of gases having, in a container, an absolute pressure exceeding 40 psi at 70 °F (21.1 °C); or

(ii) A gas or mixture of gases having, in a container, an absolute pressure exceeding 104 psi at 130 °F (54.4 °C) regardless of the pressure at 70 °F (21.1 °C); or

(iii) A liquid having a vapor pressure exceeding 40 psi at 100 °F (37.8 °C) as determined by ASTM D-323-72.

Designated area means an area which may be used for work with "select carcinogens," reproductive toxins or substances which have a high degree of acute toxicity. A designated area may be the entire laboratory, an area of a laboratory or a device such as a laboratory hood.

Emergency means any occurrence such as, but not limited to, equipment failure, rupture of containers or failure of control equipment which results in an uncontrolled release of a hazardous chemical into the workplace.

Employee means an individual employed in a laboratory workplace who may be exposed to hazardous chemicals in the course of his or her assignments.

Explosive means a chemical that causes a sudden, almost instantaneous release of pressure, gas, and heat when subjected to sudden shock, pressure, or high temperature.

Flammable means a chemical that falls into one of the following categories:

(i) *Aerosol, flammable* means an aerosol that, when tested by the method described in 16 CFR 1500.45, yields a flame protection exceeding 18 inches at full valve opening, or a flashback (a flame extending back to the valve) at any degree of valve opening;

(ii) *Gas, flammable* means:

(A) A gas that, at ambient temperature and pressure, forms a flammable mixture with air at a concentration of 13 percent by volume or less; or

(B) A gas that, at ambient temperature and pressure, forms a range of flammable mixtures with air wider than 12 percent by volume, regardless of the lower limit.

(iii) *Liquid, flammable* means any liquid having a flashpoint below 100 °F (37.8 °C), except any mixture having components with flashpoints of 100 °F (37.8 °C) or higher, the total of which make up 99 percent or more of the total volume of the mixture.

(iv) *Solid, flammable* means a solid, other than a blasting agent or explosive as defined in § 1910.109(a), that is liable to cause fire through friction, absorption of moisture, spontaneous chemical change, or retained heat from manufacturing or processing, or which can be ignited readily and when ignited burns so vigorously and persistently as to create a serious hazard. A chemical shall be considered to be a flammable solid if, when tested by the method described in 16 CFR 1500.44, it ignites and burns with a self-sustained flame at a rate greater than one-tenth of an inch per second along its major axis.

Flashpoint means the minimum temperature at which a liquid gives off a vapor in sufficient concentration to ignite when tested as follows:

(i) Tagliabue Closed Tester (See American National Standard Method of Test for Flash Point by Tag Closed Tester, Z11.24-1979 (ASTM D 56-79))-for liquids with a viscosity of less than 45 Saybolt Universal Seconds (SUS) at 100 °F (37.8 °C), that do not contain suspended solids and do not have a tendency to form a surface film under test; or

(ii) Pensky-Martens Closed Tester (see American National Standard Method of Test for Flash Point by Pensky-Martens Closed Tester, Z11.7-1979 (ASTM D 93-79))-for liquids with a viscosity equal to or greater than 45 SUS at 100 °F (37.8 °C), or that contain suspended solids, or that have a tendency to form a surface film under test; or

(iii) Setaflash Closed Tester (see American National Standard Method of Test for Flash Point by Setaflash Closed Tester (ASTM D 3278-78)).

Organic peroxides, which undergo autoaccelerating thermal decomposition, are excluded from any of the flashpoint determination methods specified above.

Hazardous chemical means a chemical for which there is statistically significant evidence based on at least one study conducted in accordance with established scientific principles that acute or chronic health effects may occur in exposed employees. The term "health hazard" includes chemicals which are carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, corrosives, sensitizers, hepatotoxins, nephrotoxins, neurotoxins, agents which act on the hematopoietic systems, and agents which damage the lungs, skin, eyes, or mucous membranes.

Appendices A and B of the Hazard Communication Standard (29 CFR 1910.1200) provide further guidance in defining the scope of health hazards and determining whether or not a chemical is to be considered hazardous for purposes of this standard.

Laboratory means a facility where the "laboratory use of hazardous chemicals" occurs. It is a workplace where relatively small quantities of hazardous chemicals are used on a non-production basis.

Laboratory scale means work with substances in which the containers used for reactions, transfers, and other handling of substances are designed to be easily and safely manipulated by one person. "Laboratory scale" excludes those workplaces whose function is to produce commercial quantities of materials.

Laboratory-type hood means a device located in a laboratory, enclosure on five sides with a moveable sash or fixed partial enclosed on the remaining side; constructed and maintained to draw air from the laboratory and to prevent or minimize the escape of air contaminants into the laboratory; and allows chemical manipulations to be conducted in the enclosure without insertion of any portion of the employee's body other than hands and arms.

Walk-in hoods with adjustable sashes meet the above definition provided that the sashes are adjusted during use so that the airflow and the exhaust of air contaminants are not compromised and employees do not work inside the enclosure during the release of airborne hazardous chemicals.

Laboratory use of hazardous chemicals means handling or use of such chemicals in which all of the following conditions are met:

(i) Chemical manipulations are carried out on a "laboratory scale;"

(ii) Multiple chemical procedures or chemicals are used;

(iii) The procedures involved are not part of a production process, nor in any way simulate a production process; and

(iv) "Protective laboratory practices and equipment" are available and in common use to minimize the potential for employee exposure to hazardous chemicals.

Medical consultation means a consultation which takes place between an employee and a licensed physician for the purpose of determining what medical examinations or procedures, if any, are appropriate in cases where a significant exposure to a hazardous chemical may have taken place.

Organic peroxide means an organic compound that contains the bivalent —O—O— structure and which may be considered to be a structural derivative of hydrogen peroxide where one or both of the hydrogen atoms has been replaced by an organic radical.

Oxidizer means a chemical other than a blasting agent or explosive as defined in § 1910.109(a), that initiates or promotes combustion in other materials, thereby causing fire either of itself or through the release of oxygen or other gases.

Physical hazard means a chemical for which there is scientifically valid evidence that it is a combustible liquid, a compressed gas, explosive, flammable, an organic peroxide, an oxidizer, pyrophoric, unstable (reactive) or water-reactive.

Protective laboratory practices and equipment means those laboratory procedures, practices and equipment accepted by laboratory health and safety experts as effective, or that the employer can show to be effective, in minimizing the potential for employee exposure to hazardous chemicals.

Reproductive toxins means chemicals which affect the reproductive capabilities including chromosomal damage (mutations) and effects on fetuses (teratogenesis)

Select carcinogen means any substance which meets one of the following criteria:

(i) It is regulated by OSHA as a carcinogen; or

(ii) It is listed under the category, "known to be carcinogens," in the Annual Report on Carcinogens published by the National Toxicology Program (NTP) (latest edition); or

(iii) It is listed under Group 1 ("carcinogenic to humans") by the International Agency for Research on Cancer Monographs (IARC) (latest editions); or

(iv) It is listed in either Group 2A or 2B by IARC or under the category, "reasonably anticipated to be carcinogens" by NTP, and causes statistically significant tumor incidence in experimental animals in accordance with any of the following criteria:

(A) After inhalation exposure of 6–7 hours per day, 5 days per week, for a significant portion of a lifetime to dosages of less than 10 mg/m^3;

(B) After repeated skin application of less than 300 (mg/kg of body weight) per week; or

(C) After oral dosages of less than 50 mg/kg of body weight per day.

Unstable (reactive) means a chemical which is the pure state, or as produced or transported, will vigorously polymerize, decompose, condense, or will become self-reactive under conditions of shocks, pressure or temperature.

Water-reactive means a chemical that reacts with water to release a gas that is either flammable or presents a health hazard.

(c) *Permissible exposure limits.* For laboratory uses of OSHA regulated substances, the employer shall assure that laboratory employees' exposures to such substances do not exceed the permissible exposure limits specified in 29 CFR part 1910, subpart Z.

(d) *Employee exposure determination*—(1) *Initial monitoring.* The employer shall measure the employee's exposure to any substance regulated by a standard which requires monitoring if there is reason to believe that exposure levels for that substance routinely exceed the action level (or in the absence of an action level, the PEL).

(2) *Periodic monitoring.* If the initial monitoring prescribed by paragraph (d)(1) of this section discloses employee exposure over the action level (or in the absence of an action level, the PEL), the employer shall immediately comply with the exposure monitoring provisions of the relevant standard.

(3) *Termination of monitoring.* Monitoring may be terminated in accordance with the relevant standard.

(4) *Employee notification of monitoring results.* The employer shall, within 15 working days after the receipt of any monitoring results, notify the employee of these results in writing either individually or by posting results in an appropriate location that is accessible to employees.

(e) *Chemical hygiene plan—General.* (Appendix A of this section is nonmandatory but provides guidance to assist employers in the development of the Chemical Hygiene Plan.) (1) Where hazardous chemicals as defined by this standard are used in the workplace, the employer shall develop and carry out the provisions of a written Chemical Hygiene Plan which is:

(i) Capable of protecting employees from health hazards associated with hazardous chemicals in that laboratory and

(ii) Capable of keeping exposures below the limits specified in paragraph (c) of this section.

(2) The Chemical Hygiene Plan shall be readily available to employees, employee representatives and, upon request, to the Assistant Secretary.

(3) The Chemical Hygiene Plan shall include each of the following elements and shall indicate specific measures that the employer will take to ensure laboratory employee protection:

(i) Standard operating procedures relevant to safety and health considerations to be followed when laboratory work involves the use of hazardous chemicals;

(ii) Criteria that the employer will use to determine and implement control measures to reduce employee exposure to hazardous chemicals including engineering controls, the use of personal protective equipment and hygiene practices; particular attention shall be given to the selection of control measures for chemicals that are known to be extremely hazardous;

(iii) A requirement that fume hoods and other protective equipment are functioning properly and specific measures that shall be taken to ensure proper and adequate performance of such equipment;

(iv) Provisions for employee information and training as prescribed in paragraph (f) of this section;

(v) The circumstances under which a particular laboratory operation, procedure or activity shall require prior approval from the employer or the em-

ployer's designee before implementation;

(vi) Provisions for medical consultation and medical examinations in accordance with paragraph (g) of this section;

(vii) Designation of personnel responsible for implementation of the Chemical Hygiene Plan including the assignment of a Chemical Hygiene Officer and, if appropriate, establishment of a Chemical Hygiene Committee; and

(viii) Provisions for additional employee protection for work with particularly hazardous substances. These include "select carcinogens," reproductive toxins and substances which have a high degree of acute toxicity. Specific consideration shall be given to the following provisions which shall be included where appropriate:

(A) Establishment of a designated area;

(B) Use of containment devices such as fume hoods or glove boxes;

(C) Procedures for safe removal of contaminated waste; and

(D) Decontamination procedures.

(4) The employer shall review and evaluate the effectiveness of the Chemical Hygiene Plan at least annually and update it as necessary.

(f) *Employee information and training.* (1) The employer shall provide employees with information and training to ensure that they are apprised of the hazards of chemicals present in their work area.

(2) Such information shall be provided at the time of an employee's initial assignment to a work area where hazardous chemicals are present and prior to assignments involving new exposure situations. The frequency of refresher information and training shall be determined by the employer.

(3) *Information.* Employees shall be informed of:

(i) The contents of this standard and its appendices which shall be made available to employees;

(ii) The location and availability of the employer's Chemical Hygiene Plan;

(iii) The permissible exposure limits for OSHA regulated substances or recommended exposure limits for other hazardous chemicals where there is no applicable OSHA standard;

(iv) Signs and symptoms associated with exposures to hazardous chemicals used in the laboratory; and

(v) The location and availability of known reference material on the hazards, safe handling, storage and disposal of hazardous chemicals found in the laboratory including, but not limited to, Material Safety Data Sheets received from the chemical supplier.

(4) *Training.* (i) Employee training shall include:

(A) Methods and observations that may be used to detect the presence or release of a hazardous chemical (such as monitoring conducted by the employer, continuous monitoring devices, visual appearance or odor of hazardous chemicals when being released, etc.);

(B) The physical and health hazards of chemicals in the work area; and

(C) The measures employees can take to protect themselves from these hazards, including specific procedures the employer has implemented to protect employees from exposure to hazardous chemicals, such as appropriate work practices, emergency procedures, and personal protective equipment to be used.

(ii) The employee shall be trained on the applicable details of the employer's written Chemical Hygiene Plan.

(g) *Medical consultation and medical examinations.* (1) The employer shall provide all employees who work with hazardous chemicals an opportunity to receive medical attention, including any follow-up examinations which the examining physician determines to be necessary, under the following circumstances:

(i) Whenever an employee develops signs or symptoms associated with a hazardous chemical to which the employee may have been exposed in the laboratory, the employee shall be provided an opportunity to receive an appropriate medical examination.

(ii) Where exposure monitoring reveals an exposure level routinely above the action level (or in the absence of an action level, the PEL) for an OSHA regulated substance for which there are exposure monitoring and medical surveillance requirements,

medical surveillance shall be established for the affected employee as prescribed by the particular standard.

(iii) Whenever an event takes place in the work area such as a spill, leak, explosion or other occurrence resulting in the likelihood of a hazardous exposure, the affected employee shall be provided an opportunity for a medical consultation. Such consultation shall be for the purpose of determining the need for a medical examination.

(2) All medical examinations and consultations shall be performed by or under the direct supervision of a licensed physician and shall be provided without cost to the employee, without loss of pay and at a reasonable time and place.

(3) *Information provided to the physician.* The employer shall provide the following information to the physician:

(i) The identity of the hazardous chemical(s) to which the employee may have been exposed;

(ii) A description of the conditions under which the exposure occurred including quantitative exposure data, if available; and

(iii) A description of the signs and symptoms of exposure that the employee is experiencing, if any.

(4) *Physician's written opinion.* (i) For examination or consultation required under this standard, the employer shall obtain a written opinion from the examining physician which shall include the following:

(A) Any recommendation for further medical follow-up;

(B) The results of the medical examination and any associated tests;

(C) Any medical condition which may be revealed in the course of the examination which may place the employee at increased risk as a result of exposure to a hazardous chemical found in the workplace; and

(D) A statement that the employee has been informed by the physician of the results of the consultation or medical examination and any medical condition that may require further examination or treatment.

(ii) The written opinion shall not reveal specific findings of diagnoses unrelated to occupational exposure.

(h) *Hazard identification.* (1) With respect to labels and material safety data sheets:

(i) Employers shall ensure that labels on incoming containers of hazardous chemicals are not removed or defaced.

(ii) Employers shall maintain any material safety data sheets that are received with incoming shipments of hazardous chemicals, and ensure that they are readily accessible to laboratory employees.

(2) The following provisions shall apply to chemical substances developed in the laboratory:

(i) If the composition of the chemical substance which is produced exclusively for the laboratory's use is known, the employer shall determine if it is a hazardous chemical as defined in paragraph (b) of this section. If the chemical is determined to be hazardous, the employer shall provide appropriate training as required under paragraph (f) of this section.

(ii) If the chemical produced is a by-product whose composition is not known, the employer shall assume that the substance is hazardous and shall implement paragraph (e) of this section.

(iii) If the chemical substance is produced for another user outside of the laboratory, the employer shall comply with the Hazard Communication Standard (29 CFR 1910.1200) including the requirements for preparation of material safety data sheets and labeling.

(i) *Use of respirators.* Where the use of respirators is necessary to maintain exposure below permissible exposure limits, the employer shall provide, at no cost to the employee, the proper respiratory equipment. Respirators shall be selected and used in accordance with the requirements of 29 CFR 1910.134.

(j) *Recordkeeping.* (1) The employer shall establish and maintain for each employee an accurate record of any measurements taken to monitor employee exposures and any medical consultation and examinations including tests or written opinions required by this standard.

(2) The employer shall assure that such records are kept, transferred, and

made available in accordance with 29 CFR 1910.20.

(k) *Dates*—(1) *Effective date.* This section shall become effective May 1, 1990.

(2) *Start-up dates.* (i) Employers shall have developed and implemented a written Chemical Hygiene Plan no later than January 31, 1991.

(ii) Paragraph (a)(2) of this section shall not take effect until the employer has developed and implemented a written Chemical Hygiene Plan.

(l) *Appendices.* The information contained in the appendices is not intended, by itself, to create any additional obligations not otherwise imposed or to detract from any existing obligation.

[55 FR 3327, Jan. 31, 1990, 55 FR 7967, Mar. 6, 1990, 55 FR 12111, Mar. 30, 1990]

APPENDIX A TO § 1910.1450—NATIONAL RESEARCH COUNCIL RECOMMENDATIONS CONCERNING CHEMICAL HYGIENE IN LABORATORIES (NON-MANDATORY)

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Foreword

As guidance for each employer's development of an appropriate laboratory Chemical Hygiene Plan, the following non-mandatory recommendations are provided. They were extracted from "Prudent Practices for Handling Hazardous Chemicals in Laboratories" (referred to below as "Prudent Practices"), which was published in 1981 by the National Research Council and is available from the National Academy Press, 2101 Constitution Ave., NW., Washington DC 20418.

"Prudent Practices" is cited because of its wide distribution and acceptance and because of its preparation by members of the laboratory community through the sponsorship of the National Research Council. However, none of the recommendations given here will modify any requirements of the laboratory standard. This Appendix merely presents pertinent recommendations from "Prudent Practices", organized into a form convenient for quick reference during operation of a laboratory facility and during development and application of a Chemical Hygiene Plan. Users of this appendix should consult "Prudent Practices" for a more extended presentation and justification for each recommendation.

"Prudent Practices" deals with both safety and chemical hazards while the laboratory standard is concerned primarily with chemical hazards. Therefore, only those recommendations directed primarily toward control of toxic exposures are cited in this appendix, with the term "chemical hygiene" being substituted for the word "safety". However, since conditions producing or threatening physical injury often pose toxic risks as well, page references concerning major categories of safety hazards in the laboratory are given in section F.

The recommendations from "Prudent Practices" have been paraphrased, combined, or otherwise reorganized, and headings have been added. However, their sense has not been changed.

Corresponding Sections of the Standard and this Appendix

The following table is given for the convenience of those who are developing a Chemical Hygiene Plan which will satisfy the requirements of paragraph (e) of the standard. It indicates those sections of this appendix which are most pertinent to each of the sections of paragraph (e) and related paragraphs.

Paragraph and topic in laboratory standard	Relevant appendix section
(e)(3)(i) Standard operating procedures for handling toxic chemicals.	C, D, E
(e)(3)(ii) Criteria to be used for implementation of measures to reduce exposures.	D
(e)(3)(iii) Fume hood performance	C4b
(e)(3)(iv) Employee information and training (including emergency procedures).	D10, D9
(e)(3)(v) Requirements for prior approval of laboratory activities.	E2b, E4b
(e)(3)(vi) Medical consultation and medical examinations.	D5, E4f
(e)(3)(vii) Chemical hygiene responsibilities	B
(e)(3)(viii) Special precautions for work with particularly hazardous substances.	E2, E3, E4

In this appendix, those recommendations directed primarily at administrators and supervisors are given in sections A-D. Those recommendations of primary concern to employees who are actually handling laboratory chemicals are given in section E. (Reference to page numbers in "Prudent Practices" are given in parentheses.)

A. General Principles for Work with Laboratory Chemicals

In addition to the more detailed recommendations listed below in sections B-E, "Prudent Practices" expresses certain general principles, including the following:

1. *It is prudent to minimize all chemical exposures.* Because few laboratory chemicals are without hazards, general precautions for handling all laboratory chemicals should be adopted, rather than specific guidelines for particular chemicals (2, 10). Skin contact with chemicals should be avoided as a cardinal rule (198).

2. *Avoid underestimation of risk.* Even for substances of no known significant hazard, exposure should be minimized; for work with substances which present special hazards, special precautions should be taken (10, 37, 38). One should assume that any mixture will be more toxic than its most toxic component (30, 103) and that all substances of unknown toxicity are toxic (3, 34).

3. *Provide adequate ventilation.* The best way to prevent exposure to airborne substances is to prevent their escape into the working atmosphere by use of hoods and other ventilation devices (32, 198).

4. *Institute a chemical hygiene program.* A mandatory chemical hygiene program designed to minimize exposures is needed; it should be a regular, continuing effort, not merely a standby or short-term activity (6, 11). Its recommendations should be followed in academic teaching laboratories as well as by full-time laboratory workers (13).

5. *Observe the PELs, TLVs.* The Permissible Exposure Limits of OSHA and the Threshold Limit Values of the American Conference of Governmental Industrial Hygienists should not be exceeded (13).

B. Chemical Hygiene Responsibilities

Responsibility for chemical hygiene rests at all levels (6, 11, 21) including the:

1. *Chief executive officer,* who has ultimate responsibility for chemical hygiene within the institution and must, with other administrators, provide continuing support for institutional chemical hygiene (7, 11).

2. *Supervisor of the department or other administrative unit,* who is responsible for chemical hygiene in that unit (7).

3. *Chemical hygiene officer(s),* whose appointment is essential (7) and who must:

(a) Work with administrators and other employees to develop and implement appropriate chemical hygiene policies and practices (7);

(b) Monitor procurement, use, and disposal of chemicals used in the lab (8);

(c) See that appropriate audits are maintained (8);

(d) Help project directors develop precautions and adequate facilities (10);

(e) Know the current legal requirements concerning regulated substances (50); and

(f) Seek ways to improve the chemical hygiene program (8, 11).

4. *Laboratory supervisor,* who has overall responsibility for chemical hygiene in the laboratory (21) including responsibility to:

(a) Ensure that workers know and follow the chemical hygiene rules, that protective equipment is available and in working order, and that appropriate training has been provided (21, 22);

(b) Provide regular, formal chemical hygiene and housekeeping inspections including routine inspections of emergency equipment (21, 171);

(c) Know the current legal requirements concerning regulated substances (50, 231);

(d) Determine the required levels of protective apparel and equipment (156, 160, 162); and

(e) Ensure that facilities and training for use of any material being ordered are adequate (215).

5. *Project director or director of other specific operation,* who has primary responsibility for chemical hygiene procedures for that operation (7).

6. *Laboratory worker,* who is responsible for:

(a) Planning and conducting each operation in accordance with the institutional chemical hygiene procedures (7, 21, 22, 230); and

(b) Developing good personal chemical hygiene habits (22).

C. The Laboratory Facility

1. *Design.* The laboratory facility should have:

(a) An appropriate general ventilation system (see C4 below) with air intakes and exhausts located so as to avoid intake of contaminated air (194);

(b) Adequate, well-ventilated stockrooms/storerooms (218, 219);

(c) Laboratory hoods and sinks (12, 162);

(d) Other safety equipment including eyewash fountains and drench showers (162, 169); and

(e) Arrangements for waste disposal (12, 240).

2. *Maintenance.* Chemical-hygiene-related equipment (hoods, incinerator, etc.) should undergo continuing appraisal and be modified if inadequate (11, 12).

3. *Usage.* The work conducted (10) and its scale (12) must be appropriate to the physical facilities available and, especially, to the quality of ventilation (13).

4. *Ventilation*—(a) *General laboratory ventilation.* This system should: Provide a source of air for breathing and for input to local ventilation devices (199); it should not be relied on for protection from toxic substances released into the laboratory (198); ensure that laboratory air is continually replaced, preventing increase of air concentrations of toxic substances during the working day (194); direct air flow into the laboratory from non-laboratory areas and out to the exterior of the building (194).

(b) *Hoods.* A laboratory hood with 2.5 linear feet of hood space per person should be provided for every 2 workers if they spend most of their time working with chemicals (199); each hood should have a continuous monitoring device to allow convenient confirmation of adequate hood performance before use (200, 209). If this is not possible, work with substances of unknown toxicity should be avoided (13) or other types of local ventilation devices should be provided (199). See pp. 201-206 for a discussion of hood design, construction, and evaluation.

(c) *Other local ventilation devices.* Ventilated storage cabinets, canopy hoods, snorkels, etc. should be provided as needed (199). Each canopy hood and snorkel should have a separate exhaust duct (207).

(d) *Special ventilation areas.* Exhaust air from glove boxes and isolation rooms should be passed through scrubbers or other treatment before release into the regular exhaust system (208). Cold rooms and warm rooms should have provisions for rapid escape and for escape in the event of electrical failure (209).

(e) *Modifications.* Any alteration of the ventilation system should be made only if thorough testing indicates that worker protection from airborne toxic substances will continue to be adequate (12, 193, 204).

(f) *Performance.* Rate: 4-12 room air changes/hour is normally adequate general ventilation if local exhaust systems such as hoods are used as the primary method of control (194).

(g) *Quality.* General air flow should not be turbulent and should be relatively uniform throughout the laboratory, with no high velocity or static areas (194, 195); airflow into and within the hood should not be excessively turbulent (200); hood face velocity should be adequate (typically 60-100 lfm) (200, 204).

(h) *Evaluation.* Quality and quantity of ventilation should be evaluated on installation (202), regularly monitored (at least every 3 months) (6, 12, 14, 195), and reevaluated whenever a change in local ventilation devices is made (12, 195, 207). See pp. 195-198 for methods of evaluation and for calculation of estimated airborne contaminant concentrations.

D. Components of the Chemical Hygiene Plan

1. Basic Rules and Procedures (Recommendations for these are given in section E, below)

2. Chemical Procurement, Distribution, and Storage

(a) *Procurement.* Before a substance is received, information on proper handling, storage, and disposal should be known to those who will be involved (215, 216). No container should be accepted without an adequate identifying label (216). Preferably, all substances should be received in a central location (216).

(b) *Stockrooms/storerooms.* Toxic substances should be segregated in a well-identified area with local exhaust ventilation (221). Chemicals which are highly toxic (227) or other chemicals whose containers have been opened should be in unbreakable

secondary containers (219). Stored chemicals should be examined periodically (at least annually) for replacement, deterioration, and container integrity (218-19).

Stockrooms/storerooms should not be used as preparation or repackaging areas, should be open during normal working hours, and should be controlled by one person (219).

(c) *Distribution.* When chemicals are hand carried, the container should be placed in an outside container or bucket. Freight-only elevators should be used if possible (223).

(d) *Laboratory storage.* Amounts permitted should be as small as practical. Storage on bench tops and in hoods is inadvisable. Exposure to heat or direct sunlight should be avoided. Periodic inventories should be conducted, with unneeded items being discarded or returned to the storeroom/stockroom (225-6, 229).

3. Environmental Monitoring

Regular instrumental monitoring of airborne concentrations is not usually justified or practical in laboratories but may be appropriate when testing or redesigning hoods or other ventilation devices (12) or when a highly toxic substance is stored or used regularly (e.g., 3 times/week) (13).

4. Housekeeping, Maintenance, and Inspections

(a) Cleaning. Floors should be cleaned regularly (24).

(b) Inspections. Formal housekeeping and chemical hygiene inspections should be held at least quarterly (6, 21) for units which have frequent pesonnel changes and semiannually for others; informal inspections should be continual (21).

(c) *Maintenance.* Eye wash fountains should be inspected at intervals of not less than 3 months (6). Respirators for routine use should be inspected periodically by the laboratory supervisor (169). Safety showers should be tested routinely (169). Other safety equipment should be inspected regularly. (*e.g.*, every 3-6 months) (6, 24, 171). Procedures to prevent restarting of out-of-service equipment should be established (25).

(d) *Passageways.* Stairways and hallways should not be used as storage areas (24). Access to exits, emergency equipment, and utility controls should never be blocked (24).

5. Medical Program

(a) *Compliance with regulations.* Regular medical surveillance should be established to the extent required by regulations (12).

(b) *Routine surveillance.* Anyone whose work involves regular and frequent handling of toxicologically significant quantities of a chemical should consult a qualified physician to determine on an individual basis whether a regular schedule of medical surveillance is desirable (11, 50).

(c) *First aid.* Personnel trained in first aid should be available during working hours and an emergency room with medical personnel should be nearby (173). See pp. 176-178 for description of some emergency first aid procedures.

6. Protective Apparel and Equipment

These should include for each laboratory:

(a) Protective apparel compatible with the required degree of protection for substances being handled (158-161);

(b) An easily accessible drench-type safety shower (162, 169);

(c) An eyewash fountain (162);

(d) A fire extinguisher (162-164);

(e) Respiratory protection (164-9), fire alarm and telephone for emergency use (162) should be available nearby; and

(f) Other items designated by the laboratory supervisor (156, 160).

7. Records

(a) Accident records should be written and retained (174).

(b) Chemical Hygiene Plan records should document that the facilities and precautions were compatible with current knowledge and regulations (7).

(c) Inventory and usage records for high-risk substances should be kept as specified in sections E3e below.

(d) Medical records should be retained by the institution in accordance with the requirements of state and federal regulations (12).

8. Signs and Labels

Prominent signs and labels of the following types should be posted:

(a) Emergency telephone numbers of emergency personnel/facilities, supervisors, and laboratory workers (28);

(b) Identity labels, showing contents of containers (including waste receptacles) and associated hazards (27, 48);

(c) Location signs for safety showers, eyewash stations, other safety and first aid equipment, exits (27) and areas where food and beverage consumption and storage are permitted (24); and

(d) Warnings at areas or equipment where special or unusual hazards exist (27).

9. Spills and Accidents

(a) A written emergency plan should be established and communicated to all personnel; it should include procedures for ventilation failure (200), evacuation, medical care, reporting, and drills (172).

(b) There should be an alarm system to alert people in all parts of the facility including isolation areas such as cold rooms (172).

(c) A spill control policy should be developed and should include consideration of prevention, containment, cleanup, and reporting (175).

(d) All accidents or near accidents should be carefully analyzed with the results distributed to all who might benefit (8, 28).

10. Information and Training Program

(a) Aim: To assure that all individuals at risk are adequately informed about the work in the laboratory, its risks, and what to do if an accident occurs (5, 15).

(b) Emergency and Personal Protection Training: Every laboratory worker should know the location and proper use of available protective apparel and equipment (154, 169).

Some of the full-time personnel of the laboratory should be trained in the proper use of emergency equipment and procedures (6).

Such training as well as first aid instruction should be available to (154) and encouraged for (176) everyone who might need it.

(c) Receiving and stockroom/storeroom personnel should know about hazards, handling equipment, protective apparel, and relevant regulations (217).

(d) Frequency of Training: The training and education program should be a regular, continuing activity—not simply an annual presentation (15).

(e) Literature/Consultation: Literature and consulting advice concerning chemical hygiene should be readily available to laboratory personnel, who should be encouraged to use these information resources (14).

11. *Waste Disposal Program.*

(a) Aim: To assure that minimal harm to people, other organisms, and the environment will result from the disposal of waste laboratory chemicals (5).

(b) Content (14, 232, 233, 240): The waste disposal program should specify how waste is to be collected, segregated, stored, and transported and include consideration of what materials can be incinerated. Transport from the institution must be in accordance with DOT regulations (244).

(c) Discarding Chemical Stocks: Unlabeled containers of chemicals and solutions should undergo prompt disposal; if partially used, they should not be opened (24, 27).

Before a worker's employment in the laboratory ends, chemicals for which that person was responsible should be discarded or returned to storage (226).

(d) Frequency of Disposal: Waste should be removed from laboratories to a central waste storage area at least once per week and from the central waste storage area at regular intervals (14).

(e) Method of Disposal: Incineration in an environmentally acceptable manner is the most practical disposal method for combustible laboratory waste (14, 238, 241).

Indiscriminate disposal by pouring waste chemicals down the drain (14, 231, 242) or adding them to mixed refuse for landfill burial is unacceptable (14).

Hoods should not be used as a means of disposal for volatile chemicals (40, 200).

Disposal by recycling (233, 243) or chemical decontamination (40, 230) should be used when possible.

E. Basic Rules and Procedures for Working with Chemicals

The Chemical Hygiene Plan should require that laboratory workers know and follow its rules and procedures. In addition to the procedures of the sub programs mentioned above, these should include the rules listed below.

1. General Rules

The following should be used for essentially all laboratory work with chemicals:

(a) *Accidents and spills—Eye Contact:* Promptly flush eyes with water for a prolonged period (15 minutes) and seek medical attention (33, 172).

Ingestion: Encourage the victim to drink large amounts of water (178).

Skin Contact: Promptly flush the affected area with water (33, 172, 178) and remove any contaminated clothing (172, 178). If symptoms persist after washing, seek medical attention (33).

Clean-up. Promptly clean up spills, using appropriate protective apparel and equipment and proper disposal (24 33). See pp. 233-237 for specific clean-up recommendations.

(b) *Avoidance of "routine" exposure:* Develop and encourage safe habits (23); avoid unnecessary exposure to chemicals by any route (23);

Do not smell or taste chemicals (32). Vent apparatus which may discharge toxic chemicals (vacuum pumps, distillation columns, etc.) into local exhaust devices (199).

Inspect gloves (157) and test glove boxes (208) before use.

Do not allow release of toxic substances in cold rooms and warm rooms, since these have contained recirculated atmospheres (209).

(c) *Choice of chemicals:* Use only those chemicals for which the quality of the available ventilation system is appropriate (13).

(d) *Eating, smoking, etc.:* Avoid eating, drinking, smoking, gum chewing, or application of cosmetics in areas where laboratory chemicals are present (22, 24, 32, 40); wash

hands before conducting these activities (23, 24).

Avoid storage, handling or consumption of food or beverages in storage areas, refrigerators, glassware or utensils which are also used for laboratory operations (23, 24, 226).

(e) *Equipment and glassware:* Handle and store laboratory glassware with care to avoid damage; do not use damaged glassware (25). Use extra care with Dewar flasks and other evacuated glass apparatus; shield or wrap them to contain chemicals and fragments should implosion occur (25). Use equipment only for its designed purpose (23, 26).

(f) *Exiting:* Wash areas of exposed skin well before leaving the laboratory (23).

(g) *Horseplay:* Avoid practical jokes or other behavior which might confuse, startle or distract another worker (23).

(h) *Mouth suction:* Do not use mouth suction for pipeting or starting a siphon (23, 32).

(i) *Personal apparel:* Confine long hair and loose clothing (23, 158). Wear shoes at all times in the laboratory but do not wear sandals, perforated shoes, or sneakers (158).

(j) *Personal housekeeping:* Keep the work area clean and uncluttered, with chemicals and equipment being properly labeled and stored; clean up the work area on completion of an operation or at the end of each day (24).

(k) *Personal protection:* Assure that appropriate eye protection (154-156) is worn by all persons, including visitors, where chemicals are stored or handled (22, 23, 33, 154).

Wear appropriate gloves when the potential for contact with toxic materials exists (157); inspect the gloves before each use, wash them before removal, and replace them periodically (157). (A table of resistance to chemicals of common glove materials is given p. 159).

Use appropriate (164-168) respiratory equipment when air contaminant concentrations are not sufficiently restricted by engineering controls (164-5), inspecting the respirator before use (169).

Use any other protective and emergency apparel and equipment as appropriate (22, 157-162).

Avoid use of contact lenses in the laboratory unless necessary; if they are used, inform supervisor so special precautions can be taken (155).

Remove laboratory coats immediately on significant contamination (161).

(l) *Planning:* Seek information and advice about hazards (7), plan appropriate protective procedures, and plan positioning of equipment before beginning any new operation (22, 23).

(m) *Unattended operations:* Leave lights on, place an appropriate sign on the door, and provide for containment of toxic substances in the event of failure of a utility service (such as cooling water) to an unattended operation (27, 128).

(n) *Use of hood:* Use the hood for operations which might result in release of toxic chemical vapors or dust (198-9).

As a rule of thumb, use a hood or other local ventilation device when working with any appreciably volatile substance with a TLV of less than 50 ppm (13).

Confirm adequate hood performance before use; keep hood closed at all times except when adjustments within the hood are being made (200); keep materials stored in hoods to a minimum and do not allow them to block vents or air flow (200).

Leave the hood "on" when it is not in active use if toxic substances are stored in it or if it is uncertain whether adequate general laboratory ventilation will be maintained when it is "off" (200).

(o) *Vigilance:* Be alert to unsafe conditions and see that they are corrected when detected (22).

(p) *Waste disposal:* Assure that the plan for each laboratory operation includes plans and training for waste disposal (230).

Deposit chemical waste in appropriately labeled receptacles and follow all other waste disposal procedures of the Chemical Hygiene Plan (22, 24).

Do not discharge to the sewer concentrated acids or bases (231); highly toxic, malodorous, or lachrymatory substances (231); or any substances which might interfere with the biological activity of waste water treatment plants, create fire or explosion hazards, cause structural damage or obstruct flow (242).

(q) *Working alone:* Avoid working alone in a building; do not work alone in a laboratory if the procedures being conducted are hazardous (28).

2. Working with Allergens and Embryotoxins

(a) *Allergens* (examples: diazomethane, isocyanates, bichromates): Wear suitable gloves to prevent hand contact with allergens or substances of unknown allergenic activity (35).

(b) *Embryotoxins* (34-5) (examples: organomercurials, lead compounds, formamide): If you are a woman of childbearing age, handle these substances only in a hood whose satisfactory performance has been confirmed, using appropriate protective apparel (especially gloves) to prevent skin contact.

Review each use of these materials with the research supervisor and review continuing uses annually or whenever a procedure change is made.

Store these substances, properly labeled, in an adequately ventilated area in an unbreakable secondary container.

Notify supervisors of all incidents of exposure or spills; consult a qualified physician when appropriate.

3. Work with Chemicals of Moderate Chronic or High Acute Toxicity

EXAMPLES: diisopropylflurophosphate (41), hydrofluoric acid (43), hydrogen cyanide (45).

Supplemental rules to be followed in addition to those mentioned above (Procedure B of "Prudent Practices", pp. 39-41):

(a) *Aim:* To minimize exposure to these toxic substances by any route using all reasonable precautions (39).

(b) *Applicability:* These precautions are appropriate for substances with moderate chronic or high acute toxicity used in significant quantities (39).

(c) *Location:* Use and store these substances only in areas of restricted access with special warning signs (40, 229).

Always use a hood (previously evaluated to confirm adequate performance with a face velocity of at least 60 linear feet per minute) (40) or other containment device for procedures which may result in the generation of aerosols or vapors containing the substance (39); trap released vapors to prevent their discharge with the hood exhaust (40).

(d) *Personal protection:* Always avoid skin contact by use of gloves and long sleeves (and other protective apparel as appropriate) (39). Always wash hands and arms immediately after working with these materials (40).

(e) *Records:* Maintain records of the amounts of these materials on hand, amounts used, and the names of the workers involved (40, 229).

(f) *Prevention of spills and accidents:* Be prepared for accidents and spills (41).

Assure that at least 2 people are present at all times if a compound in use is highly toxic or of unknown toxicity (39).

Store breakable containers of these substances in chemically resistant trays; also work and mount apparatus above such trays or cover work and storage surfaces with removable, absorbent, plastic backed paper (40).

If a major spill occurs outside the hood, evacuate the area; assure that cleanup personnel wear suitable protective apparel and equipment (41).

(g) *Waste:* Thoroughly decontaminate or incinerate contaminated clothing or shoes (41). If possible, chemically decontaminate by chemical conversion (40).

Store contaminated waste in closed, suitably labeled, impervious containers (for liquids, in glass or plastic bottles half-filled with vermiculite) (40).

4. Work with Chemicals of High Chronic Toxicity

(Examples: dimethylmercury and nickel carbonyl (48), benzo-a-pyrene (51), N-nitrosodiethylamine (54), other human carcinogens or substances with high carcinogenic potency in animals (38).)

Further supplemental rules to be followed, in addition to all these mentioned above, for work with substances of known high chronic toxicity (in quantities above a few milligrams to a few grams, depending on the substance) (47). (Procedure A of "Prudent Practices" pp. 47-50).

(a) *Access:* Conduct all transfers and work with these substances in a "controlled area": a restricted access hood, glove box, or portion of a lab, designated for use of highly toxic substances, for which all people with access are aware of the substances being used and necessary precautions (48).

(b) *Approvals:* Prepare a plan for use and disposal of these materials and obtain the approval of the laboratory supervisor (48).

(c) *Non-contamination/Decontamination:* Protect vacuum pumps against contamination by scrubbers or HEPA filters and vent them into the hood (49). Decontaminate vacuum pumps or other contaminated equipment, including glassware, in the hood before removing them from the controlled area (49, 50).

Decontaminate the controlled area before normal work is resumed there (50).

(d) *Exiting:* On leaving a controlled area, remove any protective apparel (placing it in an appropriate, labeled container) and thoroughly wash hands, forearms, face, and neck (49).

(e) *Housekeeping:* Use a wet mop or a vacuum cleaner equipped with a HEPA filter instead of dry sweeping if the toxic substance was a dry powder (50).

(f) *Medical surveillance:* If using toxicologically significant quantities of such a substance on a regular basis (*e.g.*, 3 times per week), consult a qualified physician concerning desirability of regular medical surveillance (50).

(g) *Records:* Keep accurate records of the amounts of these substances stored (229) and used, the dates of use, and names of users (48).

(h) *Signs and labels:* Assure that the controlled area is conspicuously marked with warning and restricted access signs (49) and that all containers of these substances are appropriately labeled with identity and warning labels (48).

(i) *Spills:* Assure that contingency plans, equipment, and materials to minimize exposures of people and property in case of accident are available (233-4).

(j) *Storage:* Store containers of these chemicals only in a ventilated, limited

access (48, 227, 229) area in appropriately labeled, unbreakable, chemically resistant, secondary containers (48, 229).

(k) *Glove boxes:* For a negative pressure glove box, ventilation rate must be at least 2 volume changes/hour and pressure at least 0.5 inches of water (48). For a positive pressure glove box, thoroughly check for leaks before each use (49). In either case, trap the exit gases or filter them through a HEPA filter and then release them into the hood (49).

(l) *Waste:* Use chemical decontamination whenever possible; ensure that containers of contaminated waste (including washings from contaminated flasks) are transferred from the controlled area in a secondary container under the supervision of authorized personnel (49, 50, 233).

5. Animal Work with Chemicals of High Chronic Toxicity

(a) *Access:* For large scale studies, special facilities with restricted access are preferable (56).

(b) *Administration of the toxic substance:* When possible, administer the substance by injection or gavage instead of in the diet. If administration is in the diet, use a caging system under negative pressure or under laminar air flow directed toward HEPA filters (56).

(c) *Aerosol suppression:* Devise procedures which minimize formation and dispersal of contaminated aerosols, including those from food, urine, and feces (e.g., use HEPA filtered vacuum equipment for cleaning, moisten contaminated bedding before removal from the cage, mix diets in closed containers in a hood) (55, 56).

(d) *Personal protection:* When working in the animal room, wear plastic or rubber gloves, fully buttoned laboratory coat or jumpsuit and, if needed because of incomplete suppression of aerosols, other apparel and equipment (shoe and head coverings, respirator) (56).

(e) *Waste disposal:* Dispose of contaminated animal tissues and excreta by incineration if the available incinerator can convert the contaminant to non-toxic products (238); otherwise, package the waste appropriately for burial in an EPA-approved site (239).

F. Safety Recommendations

The above recommendations from "Prudent Practices" do not include those which are directed primarily toward prevention of physical injury rather than toxic exposure. However, failure of precautions against injury will often have the secondary effect of causing toxic exposures. Therefore, we list below page references for recommendations concerning some of the major categories of safety hazards which also have implications for chemical hygiene:

1. Corrosive agents: (35-6)
2. Electrically powered laboratory apparatus: (179-92)
3. Fires, explosions: (26, 57-74, 162-4, 174-5, 219-20, 226-7)
4. Low temperature procedures: (26, 88)
5. Pressurized and vacuum operations (including use of compressed gas cylinders): (27, 75-101)

G. Material Safety Data Sheets

Material safety data sheets are presented in "Prudent Practices" for the chemicals listed below. (Asterisks denote that comprehensive material safety data sheets are provided).

*Acetyl peroxide (105)
*Acrolein (106)
*Acrylonilrile (107)
Ammonia (anhydrous) (91)
*Aniline (109)
*Benzene (110)
*Benzo[a]pyrene (112)
*Bis(chloromethyl) ether (113)
Boron trichloride (91)
Boron trifluoride (92)
Bromine (114)
*Tert-butyl hydroperoxide (148)
*Carbon disulfide (116)
Carbon monoxide (92)
*Carbon tetrachloride (118)
*Chlorine (119)
Chlorine trifluoride (94)
*Chloroform (121)
Chloromethane (93)
*Diethyl ether (122)
Diisopropyl fluorophosphate (41)
*Dimethylformamide (123)
*Dimethyl sulfate (125)
*Dioxane (126)
*Ethylene dibromide (128)
*Fluorine (95)
*Formaldehyde (130)
*Hydrazine and salts (132)
Hydrofluoric acid (43)
Hydrogen bromide (98)
Hydrogen chloride (98)
*Hydrogen cyanide (133)
*Hydrogen sulfide (135)
Mercury and compounds (52)
*Methanol (137)
*Morpholine (138)
*Nickel carbonyl (99)
*Nitrobenzene (139)
Nitrogen dioxide (100)
N-nitrosodiethylamine (54)
*Peracetic acid (141)
*Phenol (142)
*Phosgene (143)
*Pyridine (144)
*Sodium azide (145)
*Sodium cyanide (147)
Sulfur dioxide (101)

*Trichloroethylene (149)
*Vinyl chloride (150)

APPENDIX B TO § 1910.1450—REFERENCES (NON-MANDATORY)

The following references are provided to assist the employer in the development of a Chemical Hygiene Plan. The materials listed below are offered as non-mandatory guidance. References listed here do not imply specific endorsement of a book, opinion, technique, policy or a specific solution for a safety or health problem. Other references not listed here may better meet the needs of a specific laboratory. (a) Materials for the development of the Chemical Hygiene Plan:

1. American Chemical Society, Safety in Academic Chemistry Laboratories, 4th edition, 1985.

2. Fawcett, H.H. and W. S. Wood, Safety and Accident Prevention in Chemical Operations, 2nd edition, Wiley-Interscience, New York, 1982.

3. Flury, Patricia A., Environmental Health and Safety in the Hospital Laboratory, Charles C. Thomas Publisher, Springfield IL, 1978.

4. Green, Michael E. and Turk, Amos, Safety in Working with Chemicals, Macmillan Publishing Co., NY, 1978.

5. Kaufman, James A., Laboratory Safety Guidelines, Dow Chemical Co., Box 1713, Midland, MI 48640, 1977.

6. National Institutes of Health, NIH Guidelines for the Laboratory use of Chemical Carcinogens, NIH Pub. No. 81-2385, GPO, Washington, DC 20402, 1981.

7. National Research Council, Prudent Practices for Disposal of Chemicals from Laboratories, National Academy Press, Washington, DC, 1983.

8. National Research Council, Prudent Practices for Handling Hazardous Chemicals in Laboratories, National Academy Press, Washington, DC, 1981.

9. Renfrew, Malcolm, Ed., Safety in the Chemical Laboratory, Vol. IV, *J. Chem. Ed.*, American Chemical Society, Easlon, PA, 1981.

10. Steere, Norman V., Ed., Safety in the Chemical Laboratory, *J. Chem. Ed.* American Chemical Society, Easlon, PA, 18042, Vol. I, 1967, Vol. II, 1971, Vol. III 1974.

11. Steere, Norman V., Handbook of Laboratory Safety, the Chemical Rubber Company Cleveland, OH, 1971.

12. Young, Jay A., Ed., Improving Safety in the Chemical Laboratory, John Wiley & Sons, Inc. New York, 1987.

(b) Hazardous Substances Information:

1. American Conference of Governmental Industrial Hygienists, Threshold Limit Values for Chemical Substances and Physical Agents in the Workroom Environment with Intended Changes, 6500 Glenway Avenue, Bldg. D-7 Cincinnati, OH 45211-4438 (latest edition).

2. Annual Report on Carcinogens, National Toxicology Program U.S. Department of Health and Human Services, Public Health Service, U.S. Government Printing Office, Washington, DC, (latest edition).

3. Best Company, Best Safety Directory, Vols. I and II, Oldwick, N.J., 1981.

4. Bretherick, L., Handbook of Reactive Chemical Hazards, 2nd edition, Butterworths, London, 1979.

5. Bretherick, L., Hazards in the Chemical Laboratory, 3rd edition, Royal Society of Chemistry, London, 1986.

6. Code of Federal Regulations, 29 CFR part 1910 subpart Z, U.S. Govt. Printing Office, Washington, DC 20402 (latest edition).

7. IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man, World Health Organization Publications Center, 49 Sheridan Avenue, Albany, New York 12210 (latest editions).

8. NIOSH/OSHA Pocket Guide to Chemical Hazards, NIOSH Pub. No. 85-114, U.S. Government Printing Office, Washington, DC, 1985 (or latest edition).

9. Occupational Health Guidelines, NIOSH/OSHA NIOSH Pub. No. 81-123 U.S. Government Printing Office, Washington, DC, 1981.

10. Patty, F.A., Industrial Hygiene and Toxicology, John Wiley & Sons, Inc., New York, NY (Five Volumes).

11. Registry of Toxic Effects of Chemical Substances, U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control, National Institute for Occupational Safety and Health, Revised Annually, for sale from Superintendent of Documents U.S. Govt. Printing Office, Washington, DC 20402.

12. The Merck Index: An Encyclopedia of Chemicals and Drugs, Merck and Company Inc. Rahway, N.J., 1976 (or latest edition).

13. Sax, N.I. Dangerous Properties of Industrial Materials, 5th edition, Van Nostrand Reinhold, NY., 1979.

14. Sittig, Marshall, Handbook of Toxic and Hazardous Chemicals, Noyes Publications, Park Ridge, NJ, 1981.

(c) Information on Ventilation:

1. American Conference of Governmental Industrial Hygienists Industrial Ventilation (latest edition), 6500 Glenway Avenue, Bldg. D-7, Cincinnati, Ohio 45211-4438.

2. American National Standards Institute, Inc. American National Standards Fundamentals Governing the Design and Operation of Local Exhaust Systems ANSI Z 9.2-1979 American National Standards Institute, N.Y. 1979.

3. Imad, A.P. and Watson, C.L. Ventilation Index: An Easy Way to Decide about Haz-

ardous Liquids, Professional Safety pp 15-18, April 1980.

4. National Fire Protection Association, Fire Protection for Laboratories Using Chemicals NFPA-45, 1982.

Safety Standard for Laboratories in Health Related Institutions, NFPA, 56c, 1980.

Fire Protection Guide on Hazardous Materials, 7th edition, 1978.

National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

5. Scientific Apparatus Makers Association (SAMA), Standard for Laboratory Fume Hoods, SAMA LF7-1980, 1101 16th Street, NW., Washington, DC 20036.

(d) Information on Availability of Referenced Material:

1. American National Standards Institute (ANSI), 1430 Broadway, New York, NY 10018.

2. American Society for Testing and Materials (ASTM), 1916 Race Street, Philadelphia, PA 19103.

(Approved by the Office of Management and Budget under control number 1218-0131)

[55 FR 3327, Jan. 31, 1990; 55 FR 7967, Mar. 6, 1990; 57 FR 29204, July 1, 1992]

§ 1910.1499 Source of standards.

Section 1910.1000	41 CFR 50-204.50, except for Table Z-2, the source of which is American National Standards Institute, Z37 series

[40 FR 23073, May 28, 1975]

§ 1910.1500 Standards organizations.

Specific standards of the following organizations have been referred to in this subpart. Copies of the standards may be obtained from the issuing organization.

American Conference of Governmental Industrial Hygienists
6500 Glenway Avenue, Bldg. D—7
Cincinnati, Ohio 45211—4438

American National Standards Institute
1430 Broadway
New York, New York 10018

[40 FR 23073, May 28, 1975, as amended at 43 FR 57603, Dec. 8, 1978; 57 FR 29204, July 1, 1992]

Attachment 2 - STORAGE FOR CHEMICAL COMPATIBILITY

Chemicals in the R/V Lake Guardian Laboratories have been color labeled and should be stored by hazard group according to the following chart:

Group Number	Hazard Classification	Color
I	Acids	Red
II	Flammable	Orange
III	Refrigerated Materials	Green
IV	Oxidizers	Yellow
V	Alkalis	Blue
VI	Extremely Poisonous	Brown
VII	Generally Safe	White
VIII	Special Storage	Black

CHEMICAL STORAGE INVENTORY

All chemicals must be stored in segregated areas by compatible chemicals. Incompatible chemicals may react violently with each other or form highly toxic gases. These reactions can occur by mixing incompatible vapors or spilling incompatible contents onto each other. Therefore, extreme care must be taken to keep compatibles segregated physically from incompatibles, e.g., storage of incompatibles on a bottom shelf of a cabinet is not an acceptable segregating procedure. Storage areas must be kept in a cool, adequately ventilated area. All flammable or combustible materials and high heat sources must be kept clear of storage areas. Storage areas should not be in a "heavy traffic" area and should be protected from physical damage. Storage cabinets must be clearly labeled as to what materials can be stored in them. An inventory of chemicals in each storage area must be kept updated. New chemicals purchased must be checked to see what compatible materials they may be stored with by reviewing MSDS's, e.g., not all acids can be stored together.

Chemicals should not be stored in cabinets under fume or heat hoods where chemicals procedures take place. Chemicals should not be stored in direct sunlight. Chemicals listed within a group may be stored together. Groups of chemicals must be physically separated.

Chemical Storage Group I, Most Acids

In general, keep most acids separate from oxidizers and bases.

Chemical	Comments
Glacial Acetic Acid	Keep from hydroxyls, ethyleneglycol, peroxides, permanganates, chromic acid, nitric acid, per-chloric acid
1-Amino-2-Naphthal -4-Sulfonic Acid	
Ammonium Phosphate	
Ascorbic Acid	
Disodium Ethylenediamine Tetracetate	
EDTA Tetrasodium Salt	
L-(+)-Glutamic Acid	
Glutaraldehyde	

Chemical	Comment
B-Glycerophosphoric Acid	
Disodium Salt	
Hydrochloric Acid	
Lugol's Solution	
Oxalic Acid	Keep from sulfuric acid
Phosphoric Acid	
Plantinum Cobalt Color Standard	
Sulfuric Acid	
Kodak Farmer's Reducer (Thio-sulfuric Acid Disodium Salt)	

Chemical Storage Group II, Flammables

All flammables must be stored in a flammable liquid storage cabinet. There shall be no storage of oxidizers, combustibles or ignitables in this area.

Chemicals	Comments
Acetone	
Ethyl Alcohol	
Hexane	
Isopentyl Alcohol	
Isoamyl Alcohol	
Methyl Alcohol	
Nitromethane	
Sodium Borohydride	

Chemical Storage Group III, Refrigerated Materials

These materials must be stored refrigerated and no oxidizers, acids or other incompatibles shall be contained in the refrigerated area.

Chemical	Comments
^{14}C, Radioactive Material	

Chemical Storage Group IV, Oxidizers (in general)

These chemicals must be kept separate from acids, combustibles, flammables, ignitables, and other incompatibles.

Chemical	Comments
Ammonium Molybdate	
Ammonium Persulfate	Keep from organics, sodium peroxide, reducing agents.
Ascarite	Material is not an oxidizer. Keep from acids.
Ferric Nitrate	
Iodine	
Manganese Dioxide	
Potassium Dichromate	
Potassium Nitrate	
Potassium Persulfate	
Potassium Nitrite	
Soda Lime	
Sodium Bichromate	
Sodium Hypochlorite	
Stannous Chloride	
Sodium Nitrate	
Sodium Nitrite	

Chemical Storage Group V, Alkalis

These chemicals contain alkali salts which react with some acids and other chemicals. Keep from oxidizers.

Chemical	Comments
Aluminum Standard	
Barium Standard	
Beryllium Standard	
Boron Standard	
Calcium Standard	
Cobalt Standard	
Copper Standard	
Iron Standard	
Lithium Standard	
Magnesium Standard	
Magnesium Carbonate	
Manganese Standard	
Potassium Hydroxide	
Potassium Standard	
Soda Lime	
Sodium Carbonate	
Sodium Hydroxide	
Sodium Standard	

Chemical	Comments
Strontium Standard	
Titanium Standard	
Vanadium Standard	
Zinc Standard	

Chemical Storage Group VI, Extremely Poisonous Chemicals

In general, these must be kept from acids and oxidizers.

There are no cyanides used in any procedures.

Chemicals	Comments
Carbon Tetrachloride	
Chloroform	Keep from alkalis
Dricote	
Formaldehyde	
Hydrazine Sulfate	Keep from acids, metals, oxidizers
Mercuric Oxide Red	
Mercuric Thiocyanate	
Methylene Chloride	
Methylmercuric Bromide	
Methylmercury (II) Hydroxide	
Phenol	
Platinum Chloride (Platinizing Solution)	
Polychlorinated Biphenyl Standards	
Sodium Nitroprusside (Sodium Nitroferricyanide)	

Chemical Storage Group VII, Chemicals that can be stored relatively safely.

These chemicals are relatively safe to store. In general, keep acids and oxidizers from these chemicals.

Chemicals	Comments
Ammonium Chloride	Keep from acids and alkalis
Ammonium Sulfate	Keep from oxidizers
Antimony Potassium Tartrate (Potassium Antimonyl Tartrate)	
Brij-35	
Bio-Rex 70	
Buffer Solutions	
Cadmium	
Calcium Sulfate	
Cupric Bromide	
Cupric Oxide	
Cupric Sulfate, 5-Hydrate (Copper Sulfate)	
Disodium Phosphate 4', 6-Diamidino-2-Phenylindole Dihydrochloride	
Ecoscint	
Ferrous Sulfate	
Magnesium Nitrate Hexahydrate	
Magnesium Sulfate	

Chemical	Comments
Manganese Sulfate (Manganous Sulfate)	
Mercury Indicator	
Methenamine (Hexamethylenetetramine)	Keep from acids and oxidizers
Methylthymol Blue	
Monopotassium Phosphate	
N-1-Naphthylethylenediamine Dihydrochloride	
Phenolphthalein	
Phenylethylamine	
Potassium Chloride	
Kodak Bleach (Potassium Bichromate)	
Potassium Iodide	
Potassium Phosphate	
Potassium Sodium Tartrate	
Potassium Biiodate	
Potassium Biphthalate	
Potassium Sulfate	
Primary Calibration Standards	
RadiacWash	
Silicon Atomic Absorption Standard	

Chemical	Comments
Sodium Bisulfite	
Sodium Bicarbonate	
Sodium Borate	
Sodium Bromide	
Sodium Chloride	
Sodium Citrate	
Sodium Iodide	
Sodium Lauryl Sulfate (Sodium Dodecyl Sulfate)	
Sodium Metaphosphate	
Sodium Phosphate	
Sodium Potassium Tartrate	
Sodium Salicylate	
Sodium Silicate	
Sodium Sulfate	
Sodium Sulfite	
Sodium Thiosulfate	
Starch	
Sulfanilamide	

Chemical Storage Group VIII, Special Storage

These chemicals present unique hazards and cannot be stored with any group of chemicals in this laboratory. These chemicals must be stored separately from all other chemicals at this laboratory. See MSDS's for special precautions.

Chemicals	Comments
Nitric Acid	Incompatible with some acids, is an oxidizer
Sodium Azide	

Attachment 3 – STANDARD OPERATING PROCEDURES FOR HAZARDOUS MATERIAL STORAGE AND SPILL PREVENTION

I. Introduction

The use of proper handling procedures for hazardous materials helps to ensure a safe working environment for persons working in a laboratory. The special hazards present, because the Lake Guardian laboratories are on board a ship, make proper handling of chemicals especially important. The purpose of this document is to present standard operating procedures which will provide safe storage of hazardous materials in all laboratory areas and will result in the reduction of spills.

II. Ordering and Procurement of Chemicals

In order to ensure that adequate storage will be provided for hazardous materials needed during a survey, the Chemical Hygiene Officer (CHO) must be informed of the chemical name, amount, and approximate arrival date of all deliveries to the ship. If the chemical has not been on board previously, an MSDS must be requested by the person placing the order. All MSDSs must be given to the CHO to use in planning for safe handling and hazard communication.

No chemicals will be accepted for storage without adequate labeling. Labels shall include at the minimum: identification of the contents, description of hazards, precautionary information, first aid instructions, and spill cleanup procedures.

Compressed gas cylinders shall not be kept on board unless there is sufficient equipment to adequately secure them during sailing. There will be no storage at the warehouse of gas cylinders intended for use on the ship.

III. Bulk Storage of Hazardous Materials

Storage of any one hazardous material in quantities greater than one gallon (4 liters) is considered bulk storage and is not permitted in the laboratories. The only exception to this rule is the extraction laboratory which contains a flammables cabinet. All other bulk storage will take place in the hazardous materials locker (HML).

The HML consists of two separately diked storage areas, each containing appropriately labeled cabinets. One storage area is designated for flammable materials. The other is designated for corrosives, poisonous and *generally safe* materials. If cabinet space is insufficient, do not store corrosives in the flammables cabinets or vice versa. Notify the CHO.

IV. Transfer to the Laboratory

All bottled hazardous materials leaving the HML must be in protective bottle carriers or transferred to a non-breakable container. Transfer of chemicals to non-breakable containers must take place in the HML hood. Materials shall be taken from the HML only in quantities sufficient for one work shift or one gallon (4 liters), whichever is less.

V. Storage in the Laboratory

Hazardous materials in the laboratories must be kept in containment pans sufficient to hold the entire quantity of the largest container. This applies to both cabinet and countertop storage. Countertop storage shall be minimized whenever possible to reduce the danger of spills during rough seas.

Materials in the fume hoods shall also be kept in containment pans. Hood storage shall be limited to those chemicals frequently used during the present shift and quantities should not be great enough to impede proper function of the hood.

Hazardous materials shall be stored according to chemical compatibility to reduce the danger of reaction following a spill. The CHO will be inspecting laboratory storage and will determine when changes are necessary.

Attachment 4: WEEKLY INSPECTION CHECKSHEET

Date _____

A check mark indicates inspection met with standard. If conditions are unacceptable, indicate date corrected or make comment below.

	Bio. Lab	Chem. Lab	Wet Lab	Ext. Lab	Anal. Lab	Prod. Lab
1)						
2)						
3)						
4)						
5)						
6)						
7)						
8)						
9)						
10)						
11)						
12)						
13)						

WEEKLY LABORATORY INSPECTIONS

1) The eyewash is working properly.

2) Hoods are free of unnecessary clutter.

3) Transfer containers are properly labeled.

4) Hoods are being used at or below the permitted sash height.

5) Waste containers are properly labeled and dated.

6) All chemicals are kept in proper containment.

7) Chemicals are stored according to compatibility.

8) Combustibles are stored away from heaters.

9) GFCI outlets are functioning correctly.

10) Access to spill and first aid kits is unobstructed.

11) All power cords are in good working condition.

12) Compressed gas cylinders are properly secured.

13) All exits are unobstructed.

WEEKLY GENERAL SAFETY INSPECTIONS FOR R/V LAKE GUARDIAN

Date _____

____ Emergency showers are unobstructed.

____ Emergency lights are functioning.

____ No combustibles are stored near room heaters.

____ All fire doors are closed.

____ All exits are clearly marked and unobstructed.

____ Tool room equipment is clean of accumulated debris and shavings.

____ Machine guards are in place on tool room equipment.

____ The floor mat is properly placed in front of the main electrical control panel in the engine room.

____ Circuit boxes are in safe condition and doors are closed.

____ Compressed gas cylinders are properly secured.

____ All GFCIs are in working condition.

____ All extension cords are grounded and not in permanent use.

____ Electrical cords are in good condition.

____ No combustibles are stored in the exhaust vent room.

____ Gasoline Can *self-closing* devices working properly.

____ Panic Bars on walk-in freezers and refrigerators are functional.

Attachment 5: SOP FOR HAZARDOUS AND COMMON WASTES

I. INTRODUCTION

II. HAZARDOUS CHEMICAL WASTE

- A. Hazardous Waste Storage
  - 1. Satellite Storage
  - 2. Primary Storage
  - 3. Interim and Secondary Storage
- B. Hazardous Waste Transport
- C. Disposal Procedures
  - 1. Transporters
  - 2. Disposal Facilities

III. NONHAZARDOUS CHEMICAL WASTE

- A. Laboratory Non-Hazardous Chemical Waste
  - 1. Acid Waste
  - 2. Basic Waste
  - 3. Neutral Waste
- B. Ship Non-Hazardous Chemical Waste

IV. COMMON WASTE

- A. Hazardous Common Waste
- B. Non-Hazardous Common Waste
- C. Recyclables

R/V LAKE GUARDIAN
STANDARD OPERATING PROCEDURES FOR HAZARDOUS AND COMMON WASTES

I. Introduction

These standard operating procedures were developed to ensure that waste handling operations by Lake Guardian personnel comply with local, state, and federal regulations. In addition, proper handling of waste enhances the safety of personnel on board the ship and minimizes hazards to the environment. Following the correct procedures will help to ensure that the Lake Guardian continues to serve the Great Lakes and the communities along its shores in the best possible manner.

In its role as a research vessel, the Lake Guardian generates two kinds of waste. As a functioning research laboratory, chemical wastes are produced which can be of either a hazardous or nonhazardous nature. The ship's additional function as a vessel on which its personnel travel, results in the accumulation of the common wastes of daily living and of ship operations. This document serves as a standard for disposal of both these types of waste.

II. Hazardous Chemical Waste

Hazardous chemical wastes are those listed or defined by the Resource Conservation and Recovery Act in 40 CFR Part 261. Some wastes are listed by name in the regulation and others are included by definition as having ignitable, corrosive, reactive, or toxic characteristics. All disposal of hazardous chemical wastes shall be carried out under the supervision of the Chemical Hygiene Officer (CHO).

A. Hazardous Waste Storage

Hazardous chemical wastes are stored in three areas, the satellite area, the primary storage area, and the interim or secondary storage area. The following discusses storage and labeling methods for each type of area.

1. Satellite Storage

Hazardous waste generated during preparation and analytical procedures is initially stored within the laboratory at the site of generation. Acidic, basic, and organic solvent wastes are stored in polyethylene containers. Containers for PCB disposal greater than 50 ppm are to be made of steel. Containment pans must be used and must have a capacity large enough to hold the contents of the largest container within its confines.

All temporary waste containers must have a hand written label stating the chemical name(s) of its contents. Five gallon containers used for final disposal will have

color coded waste labels. These labels will be distributed by the Chemical Hygiene Officer. Laboratory personnel are responsible only for marking the label with the accumulation start date. The accumulation start date is the first day in which waste was put into the container.

In laboratory areas where five gallon final disposal containers are unsuitable, smaller temporary containers may be used. These containers must be of the specified type (polyethylene, steel, etc.) and must be hand labeled as to chemical content. No glass containers may be used.

Five waste streams have been identified for possible generation by GLNPO laboratories. To minimize disposal costs, it is important that none of these waste streams are mixed. To assist in identification of waste stream containers, a color code system will be used. All containers regardless of size will be marked with appropriate colored labels. When transferring waste from a temporary container to a five gallon disposal carboy, the color codes must match. The following is a list of the waste streams and their designated labels:

a. Yellow - Acid waste from the dissolved oxygen carbon (DOC) system containing sulfuric acid, chromic acid, metals including mercury, and water;

b. Blue - Basic and neutral waste, containing sodium hydroxide, mercuric sulfate, phenol, and water;

d. Green - Organic solvent waste (e.g., methylene chloride) containing PCBs in concentrations less than 50 ppm PCBs;

e. Red - Waste solvents including hexane, acetone and methanol;

f. Radioactive Symbol - Low level radioactive waste containing Carbon 14.

There is also a methylene chloride waste containing approximately 1-2% methylene chloride with water. This waste is non-hazardous (i.e., handled as a special non-regulated waste) and is discussed in section III.

2. Primary Storage

The primary storage area for all hazardous wastes is the Hazardous Materials Locker (HML). This room is also a primary storage area for hazardous materials before use. The locker is divided into two storage areas, one containing the storage cabinets for corrosive and toxic materials and the other containing the cabinets for flammables. The two areas are separately diked and a dry chemical fire suppression system has been installed.

Hazardous wastes leaving satellite storage shall be taken to the HML for continued storage. If the hazardous waste is in containers other than the five gallon carboys, the waste shall be transferred into an appropriately labeled carboy stored in the HML. All waste chemical transfers shall take place in the hood in the HML.

All flammable wastes shall be stored in the flammables cabinets. Corrosive wastes shall be stored in the corrosives cabinets, taking care to separate acidic and basic materials. If cabinets are at their storage capacity, other carboys for neutral and non-flammable wastes may be stored on the floor in containment pans with a five gallon capacity at the discretion of the Chemical Hygiene Officer. Care must be taken to see that containers are secured from movement during sailing.

3. Interim or Secondary Storage

Secondary storage at a land facility has been proposed. Until that storage area is completed, interim storage will take place at the warehouse in Bay City. Transport of hazardous waste to interim storage may be performed only by EPA personnel following the established transport guidelines.

Storage shall take place at the warehouse only when transport for disposal cannot be scheduled to coincide with time in port. Storage at the warehouse should not extend beyond five working days. All storage and transportation of hazardous waste must be coordinated by the Chemical Hygiene Officer.

B. Hazardous Waste Transport

Hazardous waste must be transported to secondary storage by persons employed directly by the EPA in an EPA owned vehicle. Contractors and their employees may not transport hazardous waste at any time and vehicles owned by a contractor or his employees are not acceptable for transport.

Transportation of hazardous waste to storage must follow the guidelines printed in Procedures for the Transportation of Hazardous Materials by Great Lakes National Program Office via Government Vehicle, as stated in **Appendix S** of this manual.

C. Disposal Procedures

Disposal of all Hazardous waste must be made through an EPA contracted transport, storage, and disposal (TSD) facility. The CHO or his/her designated representative shall be present for the pickup of all wastes.

1. Transporters

The CHO or representative shall be responsible for the accuracy of the information on the waste manifest by assuring that the labeling, amounts, and waste codes are correct for each waste stream. Placarding of the transport vehicle may be provided by the transporter, however, the CHO or representative must assure that it is correct. Manifests shall be signed by the CHO or representative and one copy should be sent to the appropriate state agency. The remaining generator copy should be filed in the manifest file in the laboratory office and retained for five years. The hazardous waste tracking form must be completed, which documents the date of pickup, manifest number, waste stream identification number, and date the return manifest is received.

2. Disposal Facilities

After any TSD has been contracted and before each waste pickup, the CHO must assure that any disposal facilities used by the contractor are in compliance with EPA off-site policy.

The disposal facility shall return a signed copy of the manifest to the ship within 35 days after receiving the waste. If this copy is not returned within 35 days, the CHO shall attempt to contact the disposal facility. If not received within 45 days, the CHO shall contact the appropriate agency as directed in 40 CFR 262.42, or contact the appropriate state agency. After receipt, the generator's manifest copy from the disposal facility shall be filed with the original copy from the transporter in the laboratory office.

III. Non-hazardous Chemical Waste

While many of the chemical wastes from the laboratories can be assumed to be hazardous, a few are non-hazardous. Some hazardous wastes can be pretreated and then disposed of as non-hazardous waste. In addition, the ship generates several types of non-hazardous waste. This section will identify specific waste streams which may be disposed of as non-hazardous and provide guidelines for pretreatment where necessary.

A. Laboratory Non-Hazardous Chemical Waste

Laboratory chemical wastes that can disposed of as non-hazardous materials are grouped by pH as acidic, basic, or neutral.

1. Acidic and Basic Waste

   Acids (pH less than 2) and bases (pH greater than 12.5) without other chemical contamination may be neutralized and disposed of in the laboratory sink. All neutralizations must take place in a fume hood and pH should be brought as close to 7 as feasible.

2. Non-regulated Waste

   The aqueous faction of the methylene chloride extraction procedure is a non-regulated waste. It must, however, be treated, using carbon filters, to remove any detectable methylene chloride before it can be disposed of into a sewer system. The procedure used in the ship's laboratory generates a large quantity of this waste which is stored in one of the ship's holding tanks. Drains leading to the holding tank are found in the multi-purpose, extraction, and analytical laboratories. At no time is any other waste, including concentrated methylene chloride, to be added to the tank. The waste shall be treated by a contractor assigned by the EPA.

B. Ship Non-Hazardous Chemical Waste

Waste from systems operations of the ship consists of engine oil, oily waste (oil mixed with water), antifreeze, graywater (sewage), and untreated surface water. All may be disposed of as non-hazardous waste with the following considerations:

1. Disposal of ship waste shall be the responsibility of the ship's engineer and project manager. The CHO shall be notified of the type and quantity of waste before disposal and give approval of the transport and disposal method. All completed manifests must be forwarded to the CHO immediately.

2. Oil and oily waste may be handled by any local contractor provided it is recycled. If tested and found contaminated or otherwise unrecycleable, it must be disposed of following the guidelines in part II.C.

3. Antifreeze may be disposed of as non-hazardous provided testing does not show any evidence of contamination. If contaminated, it must be disposed of following the guidelines in part II.C.

IV. Common Waste

Common waste shall be defined as any waste other than chemical whether generated in the laboratory or in other sections of the ship.

A. Hazardous Common Waste

Hazardous common waste is generated exclusively in the laboratories.

Gloves, paper towels, or other disposables that come into contact with hazardous waste must be collected separately, stored in appropriately labeled bags, and disposed of as hazardous waste.

B. Non-Hazardous Common Waste

In order to maintain the respect and goodwill of the public in the towns and cities where the ship takes port, the Lake Guardian must ensure proper disposal of its garbage, trash, and other non-hazardous common waste. Personnel on board are expected to follow the guidelines in this section at all times.

1. At no time is anything to be thrown overboard, either at port or at sea.

2. All garbage and trash generated throughout the ship other than in the laboratories shall be placed in the trash compactor in the laundry room. Compacted trash will be stored in bags and tied securely to the main deck until a proper place of disposal is reached.

3. Final disposal of trash shall take place at a Coast Guard dumpster or shall be picked up directly by a paid trash hauler. No trash may be disposed of at public parks or other public dumping places.

4. No trash disposal shall take place without approval by the captain or the CHO who will ensure that arrangements have been made with the Coast Guard or trash hauler.

5. No excess bags will be left beside a full dumpster unless permission is granted from the captain or CHO.

6. Aerosol cans, paints, or commercial solvents intended for disposal shall be given to the duty engineer or CHO for storage until proper disposal can be arranged by the CHO.

C. Recycling

A formal plan for recycling is in place as described in Attachment 5.1. Recycling and conservative use of disposable materials is encouraged whenever possible. Persons working on the ship are encouraged to bring a mug for their personal use while on board.

Seaward Services, Inc.

APPENDIX J
Attachment 5.1

R/V LAKE GUARDIAN STANDARD OPERATING PROCEDURE

Title: Recycling Program

Background: In keeping with USEPA mandates, protection of earth resources and good earth citizenship, it is desirable to institute and maintain a recycling program aboard the R/V Lake Guardian. It is understood that while there may not always be adequate resources ashore to accept recycled materials, the intent of this SOP is to create a program whereby ALL personnel aboard the ship can participate in a recycling program to the maximum extent possible without causing undue burden on any one person, crewmember, scientist or guest.

Scope: This SOP shall apply to all material aboard the ship which is disposed of on a regular and continuous basis with the exception of waste from the engine room and waste from the laboratories, which are dealt with under a separate SOP.

Infrastructure provided: An area of the mess deck shall be set aside for placement of waste containers. Separate containers shall be provided for plastics, clear glass, metal and "wet" garbage. The latter is defined as table and plate scraps and galley food materials in an otherwise moist state. Waste containers will be fitted with colored plastic bags of different colors, of the drawstring type. Another area of the ship, presently the O-1 level aft (on top of the container labs) will be set aside for storage of the plastic bags removed from the mess deck .

Procedure: Each and every person sailing aboard the R/V Lake Guardian is encouraged to participate in the ship's recycling program. Each person is responsible for properly disposing of the waste from his or her stateroom into the proper waste paper container. Upon completion of each meal eaten aboard, each person shall dispose of his or her own waste into the proper container. Dirty dishes (which have been scraped clean by the user) shall then be placed into the cart provided. At the end of each meal, the steward will survey the waste containers. Any bag which is full will be removed and replaced by a clean one. Bags which are not full shall have their drawstrings pulled tight but not secured. At the beginning of the next meal these bags shall be reopened for further filling. Full bags (color coded as to contents) will be removed by the steward to the outside storage area. Ship's operating crew will not be responsible for segregation and disposal of trash generated by others beyond the mess deck repository.

Twenty four hours prior to arrival in each port the ship's Master will contact the Technical Project Coordinator to advise ETA and duration of stay. The TPC will make an attempt to identify and locate a facility which will come to the ship to offload segregated waste. If such a facility does not exist, or is not available during the ship's port call, only the "wet" garbage will be discharged from the ship, with all other (recyclable) waste remaining aboard. This procedure will be maintained for subsequent port calls until such time as the designated recyclable storage space is full and it is not reasonably expected that another waste removal source will be found. At this point, all waste then stored on the O-1 level will be discharged from the ship into a common shore side container.

Whenever the ship is in port and garbage is to be discharged from the ship, either to a common container or to a recycling facility, ALL members of the ship's complement shall be called upon at that time to assist in removal of the waste ashore. If a "human chain" is established, the time taken to perform this effort will be minimal.

To achieve USEPA's goal of recycling reusable materials, the sum total of the ship's complement is encouraged to participate in this program, not only that each might have an opportunity to demonstrate his or her own good earth citizenship, but also to minimize the time and effort required to make this program a success.

Attachment 6: RADIATION SAFETY SOP FOR R/V LAKE GUARDIAN LABORATORIES

Limited use of radioactive materials in the R/V Lake Guardian laboratories is covered under the U.S. Nuclear Regulatory Commission's Material License (Attachment A) issued to the U.S. EPA Central Regional Laboratory (CRL). By amendment to this license, Carbon 14 and Nickel 63 may be used for laboratory research and sample analysis on board the ship. Use of these materials is subject to the guidelines enumerated in the CRL Radiation Safety Manual (Attachment B) and, in addition, to the specific Lake Guardian guidelines presented here.

Procurement

All radionuclides must be procured by the CRL Radiation Safety Officer (RSO) as specified in the CRL Radiation Safety Manual (hereafter referred to as the Manual). Radionuclides transported to the ship must be carried by an EPA owned vehicle driven by an EPA employee. Shipments must be accompanied by a bill of lading and arrive just prior to use.

Use Aboard the Ship

Use of radionuclides on board the ship shall be overseen by an Interim RSO who shall be named on the license and shall carry out the responsibilities assigned to the Interim RSO in the Manual.

Training

The Interim RSO and all other employees involved with use of radioactive materials on the ship shall be trained according to Radiation Safety Training guidelines in the Manual.

Records

All records of training, disposal, equipment, and inventory shall be kept at CRL. Copies of results of wipe tests for sealed source devices shall be maintained in the ship's lab office.

Laboratory Use

The Primary Productivity Lab or any other lab designated for use of radioactive materials shall not be used at any time, even during port time, for other types of lab work, storage of supplies, or storage of personal items.

Storage and Disposal

Storage of radionuclides shall follow storage guidelines in the Manual. No unsealed radionuclides shall be left on board when the Interim RSO departs at the end of a Survey. Solid and liquid wastes generated on the ship are to be packaged and labeled as radioactive waste and shall be taken to CRL for disposal according to the Manual.

Spill Procedures

Should a spill or other release of radioactive materials occur, procedures outlined in the R/V Lake Guardian Contingency Plan part IV B 8, stated in **Appendix R** of this manual, shall be followed.

Non-GLNPO Groups

Groups outside of GLNPO using the ship's laboratory facilities and wishing to use radioactive materials must observe the following guidelines:

1) All use of radioactive materials must be approved by the CRL Radiation Safety Officer.

2) The ship's Chemical Hygiene Officer and Interim RSO, if expected on board, shall be notified prior to arrival.

3) Proof of amendment of NRC license to use the material on board the ship must be provided.

4) A copy of the R/V Lake Guardian Radiation Safety SOP shall be provided to the group supervisor with the expectation that these guidelines shall be observed by persons using radionuclides on the ship.

5) All radioactive materials and wastes, both liquid and solid, must be removed by the group at departure.

Attachment 7 – CRL RADIATION SAFETY MANUAL

Attachment 7: **RADIATION SAFETY MANUAL FOR CENTRAL REGIONAL LABORATORY**

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RADIATION SAFETY MANUAL
CENTRAL REGIONAL LABORATORY
REGION 5

Central Regional Laboratory (CRL) has established, as part of its overall safety program, this manual to provide guidelines for the safety and well-being of personnel involved in radiation work. Although the facility uses and stores very small quantities of radioactive materials, proper training of workers, laboratory techniques, and general housekeeping practices are established and maintained in order to prevent unnecessary radiation exposure and/or contamination.

Organization of the Radiation Safety Program

Each person working with radioisotopes is responsible for adhering to the safety and operational procedures discussed in this document. The following sections review the management of the program and key personnel for administering the radiation safety program.

Management of the Radiation Safety Program

Assurance of an adequate radiation safety program at CRL is the ultimate responsibility of the CRL Director. However, the actual program implementation is delegated to the Radiation Safety Officer (RSO). The CRL Health and Safety Committee provides additional oversight and management assistance in carrying out the program.

Radiation Safety Officer's Duties:

The RSO is an individual appointed by the CRL Director. The RSO is qualified by training and experience in radiation safety to advise and assist the Director and CRL staff in the safe use of radioactive material and radiation producing devices. The RSO is named on the Nuclear Regulatory Commission (NRC) license and cannot be changed without prior approval of the NRC. The RSO's duties include the following:

1. General overseeing all activities involving radioactive material, including conducting routine monitoring.

2. Determining compliance with rules and regulations and license conditions.

3. Maintaining an inventory of all radionuclides at CRL and limiting the quantities of radionuclides to the amounts authorized by the licensee.

4. Supervising and coordinating the radioactive waste disposal program, including keeping waste storage and disposal records.

5. Overseeing distribution of personal monitoring devices and reviewing exposure data.

6. Performing leak tests on sealed sources.

7. Supervising decontamination in case of contaminating accidents.

8. Serving as a member of the CRL Health and Safety Committee.

9. Processing procurement requests for radionuclides.

10. Maintaining contamination survey records.

11. Ensuring that appropriate protective clothing and equipment are available to personnel.

12. Recommending to the laboratory director the termination of hazardous or potentially hazardous radiological operations.

In addition to the CRL RSO, an interim radiation safety officer is appointed aboard each research vessel during each limnology cruise that is scheduled to use radioactive materials. The interim RSO oversees ship activities involving the use of radioisotopes and ensures that storage and handling practices are in compliance with the guidelines established by this manual. The interim RSO's responsibilities include those listed in items 1, 2, 5, 6, 7, 8, 10, 11, and 12.

Safety Committee:

The CRL Safety Committee covers radiation safety and disposal issues on an as-needed basis during its monthly meetings. Committee members present topics for discussion and resolution. If action outside the meeting is required, the committee chairman designates members to investigate and resolve issues. Issues that are beyond the scope of the committee are referred to CRL upper management or EPA divisions as required; for example, the Air and Radiation Division is available for radiation safety support.

Laboratory Personnel:

Each person who is designated as a user or who has contact with any radioactive material and/or is an operator of an instrument containing a sealed source device is responsible for the following:

1. Keeping his/her external exposure to radiation as low as reasonably achievable.

2. Wearing the prescribed monitoring equipment, such as a dosimeter, in radiation areas.

3. Wearing protective clothing, including gloves, whenever contamination is possible and not wearing the protective clothing when outside the laboratory area.

4. Wearing respiratory protection devices where needed

5. Using pipette filling devices and never pipetting radioactive liquids by mouth.

6. Performing radioactive work within the confines of an exhaust hood unless previous examination has indicated the safety of working in the open.

7. Avoid eating, drinking or smoking where radioactive materials are present. Refrigerators must not be used jointly for foods and radioactive materials.

8. After work with radionuclides, checking immediate areas of hoods, benches, or any work area where radioactive materials are being used (through use of low level meters or wipe tests) for possible contamination and removing contamination immediately. If removal is not possible, the area shall be clearly identified and the radiation safety officer notified.

9. Keeping the work area neat and clean. Work areas shall be free of equipment and materials not required for the immediate procedure. Transport and keep radioactive materials in double containers to prevent breakage or spillage and to ensure adequate shielding. Keep work surfaces covered with absorbent material, preferably paper lined.

10. Labeling and isolating radioactive waste and equipment used in the laboratory. Equipment used for radioactive substances should not be used for other work unless the equipment is completely decontaminated prior to being used.

11. Immediately reporting accidental release, inhalation, ingestion or injury involving radioactive materials to the supervisor, the emergency response team, and the RSO. The individual shall cooperate in all attempts to evaluate his/her exposure.

12. Carrying out decontamination procedures when necessary and taking adequate steps to prevent additional spread of contamination.

13. When performing new analyses or working with new radioisotopes, working with the RSO and lab safety personnel to develop a safety plan for the analytical procedure.

14. Notifying the Hazardous Waste Disposal Officer (HWDO) of any radioactive waste slated for disposal and working with the HWDO to dispose of the material in accordance with local, State and Federal regulations.

Postings:

CRL posts its NRC license in accordance with NRC regulations on the safety bulletin board and in each work area where radioactive materials are used. In addition, the following items are conspicuously posted in appropriate areas at CRL:

- The regulations of 10 CFR 19 and 20
- This radiation safety manual
- Any notice of violation involving radiological working conditions, proposed imposition of civil penalty, or order issued pursuant to 10 CFR 20, Subpart B, and any response submitted to such notices.
- Form NRC-3 (revision 6/82 or later) "Notice to Employees"

Radiation Safety Training

All employees involved in the use of radioactive materials at CRL are required to complete an annual radiation safety training course. The course is also required for new employees or employees who are transferred to work in areas requiring the use of radioactive materials. Copies of the radiation safety manual and the NRC license are provided to each employee participating in the training. In addition, on-the-job training is conducted before an employee is allowed to independently perform analyses involving radioisotopes. The following topics are presented and discussed during the training course:

- Radioactivity and radioactive decay
- Characteristics of ionizing radiation
- Man-made radiation sources
- Acute effects of exposure to radiation

- Health risks associated with occupational radiation exposures
- Special considerations in the exposure of women of reproductive age
- Occupational exposure limits
- Modes of exposure; internal and external
- Basic protective measures; time, distance, shielding
- Procedures for maintaining exposure as low as is reasonably achievable
- Radiation survey instrumentation; calibration and limitations
- Radiation monitoring programs and procedures
- Contamination control, including protective clothing and equipment and workplace design
- Personnel decontamination
- Responsibilities of employees and management
- Interaction with radiation protection staff
- Operational procedures associated with specific job assignments.

An annual meeting is also held with ancillary personnel (security, housekeeping, and clerical) whose duties may require them to work in the vicinity of radioactive material. The ancillary personnel are informed where radionuclides are stored and/or used at CRL and taught to recognize the radioactive warning signs posted in the laboratory. These personnel are cautioned to use care in labs where the radioisotopes may be present, for example, they are told not to touch or remove equipment on bench tops. In addition, a written handout is provided to the supervisors of these personnel; the handout has a statement to be signed by the supervisor which indicates that the supervisor has read and understands the information provided in the handout, and will provide such information to new employees.

General Rules for Working With Radioactive Materials

The following consists of rules general to all activities involving the use of radioisotopes at CRL. Employees should be aware of these rules and use them.

1. Individuals under the age of 18 are not permitted to enter areas where open radioisotopes are used, nor are they allowed to work with radioactive materials or devices.

2. High standards of cleanliness and good housekeeping should be maintained in all radioisotope use/storage areas.

3. Personal belongings should not be brought into the laboratory where they may be contaminated.

4. Eating, drinking, smoking, and the application of cosmetics is forbidden in any area where unsealed radioisotopes are used.

5. Rubber or plastic gloves and laboratory coats should be worn whenever working with radioactive material. Gloves should be presumed to be contaminated and either cleaned or discarded as radioactive waste.

6. Faucets, notebooks, calculators, drawer handles, and so on, should not be handled while wearing gloves.

7. Whenever possible, work with all equipment on easily cleaned trays. All work surfaces must be covered with absorbent paper.

8. Radioactive material should be kept covered, and must be used and stored behind shielding of a type and amount appropriate to the radionuclide(s) present.

9. Work involving potential for airborne radioactivity must be performed in an approved hood.

10. Before leaving the laboratory, wash hands and remove protective equipment, including lab coat.

Radionuclides and Sealed Source Devices

Under the current NRC license, CRL is authorized to have the following radionuclides on site:

Element and Number	Chemical and/or Physical Form	Maximum Amount
Any byproduct material with Atomic Numbers between 3-83, inclusive	Any	Not to exceed 2.0 millicuries, total
Carbon-14	Any	Not to exceed 30.0 millicuries, total
Nickel-63	Foils in Perkin-Elmer Model 6006204 detector cells	Not to exceed 15.0 millicuries per foil
Nickel-63	Plated sources in Hewlett-Packard Model 19235 detector cells	Not to exceed 15.0 millicuries, per source

Appendix A contains a copy of the most recent inventory of radionuclides currently held by CRL. This appendix is updated biannually.

Procurement

In order to ensure that the amounts on hand do not exceed those allowed by the license, the following procurement process must be followed when ordering radioactive materials or sealed source devices:

1. The analyst must discuss the request for radionuclides with the Radiation Safety Officer to determine the method of handling, storing, monitoring for, and disposing of the substance. This must be performed before the procurement request form is completed.

2. The procurement requisition is approved and logged by the Radiation Safety Officer.

3. All incoming radionuclides are delivered to the Radiation Safety Officer, who, in turn, notifies the analyst.

4. The Radiation Safety Officer logs the shipment on the inventory and turns it over to the analyst.

Receiving Shipments

Every package containing radioactive material is opened and inspected by the Radiation Safety Officer as soon as possible after receipt. The following procedures for opening and inspecting packages are completed before the radionuclides are transferred to the analyst:

1. Disposable plastic gloves and a lab coat are worn while inspecting shipment containing unsealed radioactive material.

2. Contamination surveys of packages are performed to determine whether there is leakage. Before opening the package, the RSO monitors the package with a meter capable of low-level readings and performs a wipe test. If a reading is higher than background, the Regional Health Physicist is called for guidance in handling and opening the package. If both readings are less than or equal to background, the package is opened. After the package is opened, it is surveyed again with a low-level meter. If the reading is higher than background, the Regional Health Physicist is called for guidance.

3. All received shipments are logged in a book which identifies:

    - The type of radionuclide received
    - Serial number of source and activity at the time of calibration (if sealed)
    - Serial number of survey meter used and survey results
    - Wipe test results
    - Surveyor's initials

Inventory

Physical inventories are conducted for all radioactive materials, including source devices, biannually. The RSO is responsible for maintaining the inventory and ensuring that all radioactive materials are accounted for.

The RSO also maintains a running inventory, indicating quantities of materials on hand, materials on order, source devices present or being repaired off site, and radioactive materials for disposal. The RSO uses the running inventory to ensure that NRC license limits are not exceeded.

Storage and Use

Radioactive materials must be stored so that the measured ionizing radiation level in areas occupied by personnel is less than 2.0 millirems/hour (mR/hr) and as low as reasonably achievable. If additional storage space or shielding is needed for materials that exceed the limits, the analyst should consult with the RSO.

All unsealed radioactive materials must be labeled clearly and marked in such a way that personnel passing through the laboratory will note any materials on a bench top that present a radiation hazard. This requirement is especially critical for emergency response personnel entering the laboratory during an emergency situation. Radioactive materials should never be left unattended or unsecured. Analysts are responsible for securing materials in a locked cabinet or other appropriate storage place when not using the materials. If the analyst leaves the work area for lunches or breaks, a sign should be placed on the door banning access to other personnel. Locking the door would also be helpful to ensure that unauthorized personnel do not have access to the materials.

All laboratories and storage areas that contain radioisotopes must be clearly labeled on all entrances. The yellow and magenta radiation hazard warning label is appropriate for this purpose.

Labeling and Marking

Walkways and doors leading to open radionuclide work areas are conspicuously and properly identified by the use of warning signs stating "Caution, Radiation Area". All equipment and apparatus used for liquid scintillation is used exclusively for the purpose of counting and must be labeled with approved warning tape. All containers of licensed material must bear durable, clearly visible labels identifying the radioactive contents, and these must be stored and locked in an appropriate cabinet.

Safety Plans

Safety plans must be written for all methods or procedures involving the use of radioactive materials that are not sealed source devices. Sealed source device safety procedures are already included in safety plans for other methods. Refer to the CRL Safety Manual for guidance in developing a safety plan.

Protective Measures

In addition to the work rules discussed previously, all employees should attempt to keep the dose of external radiation as low as reasonably achievable (ALARA) through good work practices. Keeping the dose from external radiation at ALARA levels requires the wise use of time, distance, and shielding. In every situation, these three factors must be considered jointly. While shielding is desirable in reducing exposure, it must not be overlooked that doing the job in one-half the time is just as effective as halving the dose rate with shielding. Working twice as far from a point source is as effective as doing a job in one-fourth the time.

Time

Plan ahead; be familiar with the procedures involved for the analysis so that handling time is reduced and, therefore, the potential exposure to the radioisotope
is minimized.

Distance

The intensity of a radiation field decreases with the distance from the source. For a point source the intensity is inversely proportional to the square of the distance, the same as the light from a flashlight.

Shielding

The intensity of the radiation field is reduced by the proper placement of suitable shielding material. The sealed source devices are shielded by the manufacturer and wipe tests are conducted semiannually to ensure that leakage is not occurring. Following are some general guidelines on shielding methods for radioisotopes:

1. Alpha particles are easily shielded by even a piece of paper.

2. Beta particles can be a problem. Using lead may produce Bremsstrahlung (an x-ray) which in turn must be shielded. Therefore, analysts should use aluminum or plastic to shield Beta particles.

3. Gamma and x-rays are shielded best by dense materials such as lead.

4. Neutrons are best shielded by hydrogenous materials such as water and plastics.

Radiation Monitoring Devices

A number of radiation monitoring devices are available for use. Radiation dosimeters are worn by personnel who work with sealed source and open radioisotopes. Meters and other equipment are available for monitoring contamination of work areas and lab equipment.

Dosimeters

The Region V safety office operates a dosimetry program to monitor external radiation exposures of personnel who work with radionuclides. The dosimeter must be worn on the person in the vicinity of the upper torso at all times when engaged in work involving radioisotopes. The dosimeter must be worn outside protective clothing in order not to impair the measurement of beta dose. Dosimetry results are treated as medical monitoring records, and therefore, are subject to privacy restrictions.

In the event that an exposure to radionuclides is suspected, bioassay screening is available through the Public Health Service. If a person suspects exposure, he/she must report this immediately to the supervisor, the RSO, and the Regional Safety Office.

The NRC's present limit of radiation dose that can be received on the job is 5 rem/year. The EPA, however, has set an administrative dose limit in order to control external exposure to be less than 0.5 rem/year. Every effort should be made to ensure that the dose to any employee is ALARA.

Female employees who are considering pregnancy or are currently pregnant should be especially cautious when working with or near radioactive materials. Pregnant females should limit exposure to levels less than 0.5 rem/year and notify their supervisors and the RSO as soon as they know they are pregnant.

Monitoring Instruments

Survey meters are available for use for monitoring contamination of equipment and work areas. The meters are calibrated by a qualified company, such as the manufacturer, on an annual basis. Any employee requiring the use of a meter should see the RSO. The following survey meters are available at or to CRL:

- Ludlum Model 14C Geiger Counter with Model 44-9 Probe
- Eberline E520 with HP260 Handprobe
- Ludlum Micro-R Survey Meter

The following radiation detection instruments are available for use at CRL:

- Ludlum Model 140-5 Alpha Scintillation Counter
- Beckman Model LS-333 Beta Liquid Scintillation Counter
- Nucor Model 30 Beta and Gamma Counter
- Nuclear Chicago Model 26501 Beta and Gamma Counter

Laboratory Monitoring

The radioisotope work areas are monitored periodically. The radiation labs are monitored after each work session is completed. Work areas aboard research vessels should be monitored after each limnology cruise. Wipe tests of sealed sources are conducted every six months.

If monitoring reveals that removable contamination is present in the amount of 200 dpm per 100 square centimeters or greater, decontamination procedures will be implemented immediately.

The RSO will direct any changes in work procedures or decontamination necessary, and the personnel involved will be responsible for the required action. If not complied with, action will be taken by the CRL director. The RSO will coordinate with the Air and Radiation Division for special monitoring procedures, such as air sampling.

Spills and Decontamination

It is unlikely that a radioactive material spill will occur at CRL. Most radioactive material is contained in sealed source devices in laboratory equipment. In the event of a spill or leakage from a sealed source, the hazardous materials contingency plan will be implemented immediately. This plan provides for emergencies involving radioactive materials.

Disposal

Most radioactive wastes generated at CRL are low level in nature. The wastes consist primarily of sample, biodegradable scintillation fluids, and lab wastes such as towels. The RSO should be consulted when disposing of radioactive materials.

The disposal of waste contaminated with low levels of radioactivity is closely monitored at CRL. An analyst wishing to dispose of radioisotopes must inform the RSO of materials to be disposed. The RSO then meets with the analyst to determine the hazards (e.g., RCRA regulated waste as well as being low level radioactive) and the appropriate disposal method given the hazard characteristics. The following discusses the disposal procedures used at CRL.

Liquid Wastes

Carbon-14 liquid wastes generated by GLNPO activities may be disposed via the sanitary sewage system if the scintillation liquid used is biodegradable (not regulated under RCRA) and water-miscible. Ecoscint is such a scintillation fluid. According to 10 CFR Part 20.303, up to one Curie of Carbon-14 may be disposed per year in this manner. In addition, up to one Curie combined of other product isotopes (provided none of the prescribed daily limits or concentration limits for each isotope is exceeded) may also be disposed in this manner in a year. Chicago Metropolitan Sewer District regulations incorporate the NRC regulations by reference.

The disposal of radioisotopes via the sewer system is closely monitored at CRL. The following steps are performed during sewer disposal:

1. The disposer must have the authorization of the RSO to pour the wastes down the drain.

2. A specific sink must be used exclusively for the disposal process. A sign should be placed near the sink restricting use by other personnel during the period in which it has been set aside for disposal.

3. Sink disposals are logged in a book maintained by the RSO. The log includes the following: identity of disposer, radioisotope, total activity and volume disposed, date and time of disposal, and sink location.

4. The container holding the low level liquid must be triple rinsed and reserved for holding low level liquid wastes only.

5. The sink must be decontaminated. This is accomplished through triple washing/rinsing the sink with a commercial cleaner such as Det-O-Jet, or Liquinox. After the sink has been thoroughly cleaned and dried, a dry wipe test should be taken to ensure that the removable contamination is less than 200 dpm per 100 square centimeters. If the removable contamination is higher than this number, the sink must be washed/rinsed until the level is below that specified.

Solid Wastes

CRL holds a permit for disposal of solid low level waste at the Washington State disposal site. All solid wastes which cannot be decontaminated are shipped to this site; for example, gloves and paper towels cannot be easily decontaminated. Wastes that can be decontaminated are cleaned then disposed of in regular trash. Examples of solid wastes that can be decontaminated are sample vials and liquid waste containers. The following procedures are used for decontamination of solid waste:

1. If sample vials are to be decontaminated, run a test on about ten containers to determine whether the decontamination procedure is appropriate for the vials.

2. Rinse the container three times with water, pouring the wastewater down a predetermined sink. If the rinsing action does not decontaminate the container satisfactorily, wash/rinse the container three times with a solution of water and a commercial detergent such as Det-O-Jet.

3. Wipe the container to ensure that removable contamination is less than 200 dpm per 100 square centimeters or for the entire surface of the container if less than 100 square centimeters. If the removable contamination is less than this number, the container may be thrown away as regular trash. If the removable contamination is greater than allowed, repeat the decontamination process. If the procedure continues to be unsuccessful, dispose of the container as low level radioactive waste.

Solid wastes to be disposed at a low level site are stored in a drum in Room 1045. Once a drum has been filled, arrangements will be made for shipment off site.

Records

The RSO is responsible for keeping all records required under NRC regulations and as required by the license. Records to be maintained, as stated within the regulation, include personnel training records, waste disposal records, wipe test and equipment service records, and inventory records.

APPENDIX K: HEAVY EQUIPMENT PRACTICES FOR SEDIMENT SAMPLING

- Knuckle/Pivot Crane
- Operational Safety Practices During Use of HIAB Crane
- Deck Safety Practices During Use of Overboard Science Equipment, A-Frames, HIAB Crane and Hoists

1.0 Scope

To provide standard operating procedures for use before, during and after operation of the HIAB crane. These procedures shall be followed by all personnel aboard the R/V Lake Guardian involved with the handling, maintenance, and operation of the HIAB crane.

2.0 Reference

Crane Inspection & Certification Bureau (CICB) Training Manual: Mobile Cranes & Rigging Considerations, Chapter 1-2.

3.0 Responsibility

There are several CICB certified mobile crane operators aboard the R/V Lake Guardian who will assume primary responsibility for handling, maintenance, and operation of the HIAB crane.

4.0 Inspection

The following items shall be inspected on a weekly basis. Any deficiencies such as those listed shall be carefully examined and a determination made as to whether they constitute a safety hazard.

A. Prior to initial use, all new and/or altered cranes shall be inspected to insure compliance with provisions contained in the Crane Inspection and Certification Manual.

B. All control mechanisms shall be inspected for maladjustments interfering with proper operation.

C. All control mechanisms shall be inspected for excessive wear of components and for contamination of lubricants or other foreign matter.

D. All safety devices shall be inspected for malfunction.

E. Inspections for deterioration or leakage in air or hydraulic systems.

F. Crane hooks shall be inspected for deformations, cracks, or having more than 15% in excess of normal throat opening or more than a 10 degree twist from the plane of the unbent hook.

G. Inspections are required for rope reeving for noncompliance with crane manufacturer's recommendations.

H. Electrical apparatus shall be inspected weekly for malfunctioning, signs of excessive deterioration, dirt and moisture accumulation.

A complete inspection of the crane shall be performed on a yearly basis by qualified personnel (e.g., outside contractor). This inspection shall include all of the requirements above as well as the following items. Any deficiencies such as those listed shall be carefully examined and a determination made as to whether they constitute a safety hazard.

I. Deformed, cracked or corroded members in the crane structure and boom.

J. Loose bolts or rivets.

K. Cracked or worn sheaves and drums.

L. Worn, cracked or distorted parts such as pins, bearings, shafts, gears, rollers, and locking devices.

M. Excessive wear on brake and clutch system parts, linings, pawls and ratchets.

N. Load, boom angle and other indicator over their full range, for any significant inaccuracies.

O. Gasoline, diesel, electric or other power plants for improper performance or noncompliance with safety requirements.

P. Crane hooks. Magnetic particle or other suitable crack detecting inspection should be performed at least once each year.

Q. Travel steering, braking and locking devices for malfunctions.

R. Excessively worn or damaged tires.

A crane which has been idle for a period of one month or more, but less than six months, shall be given an inspection conforming with requirements of the weekly inspection above, before placing in service.

A crane which has been idle for a period of over six months shall be given a complete inspection conforming with requirements of the weekly and yearly inspections, before placing in service.

5.0 Testing

A. Prior to initial use, all extensively repaired or altered cranes should be tested by or under the direction of an appointed or authorized person.

B. Written reports shall be furnished by such persons showing test procedures and confirming the adequacy of repairs or alterations.

C. Test loads shall not exceed 110% of the rated load at any selected working radius.

D. Re-rating test report shall be readily available.

E. No cranes shall be re-rated in excess of the original load ratings unless such rating changes are approved by the crane manufacturer or final assembler.

6.0 Maintenance

A. A preventative maintenance program based on the crane manufacturer's recommendations shall be established. Dated and detailed records shall be readily available.

B. It is recommended that replacement parts be obtained from the original equipment manufacturer.

C. Before adjustments and repairs are started on a crane, the following precautions shall be taken as applicable.

1. Crane placed where it will cause the least interference with other equipment or operations in the area.

2. All controls in the "OFF" position (Activate the Lockout/Tagout Procedure)

3. Starting means rendered inoperative.

4. Warning or "out of order" signs placed on the crane.

5. Power plant stopped or disconnected at take-off.

6. Boom lowered to the ground if possible or otherwise secured against dropping.

7. Lower load block lowered to ground or otherwise secured against dropping.

D. After adjustments and repairs have been made, the crane shall not be operated until all guards have been reinstalled, safety devices reactivated and maintenance equipment removed.

7.0 Adjustments and Repairs

A. Any unsafe conditions disclosed by the inspection shall be corrected before operation of the crane is resumed. Adjustments and repairs shall be done only by designated personnel.

B. Adjustments shall be maintained to assure correct functioning of components. (All functional operating mechanisms, safety devices, control systems and power plants).

C. Repairs or replacement shall be provided promptly as needed for safe operation.

D. All replacement parts or repairs shall have at least the original safety factor.

E. All moving parts of the crane for which lubrication is specified, including rope and chain, shall be regularly lubricated. Lubricating systems shall be checked for proper delivery of lubricant. Particular care should be taken to follow manufacturer's recommendations as to points and frequency of lubrication, maintenance of lubricant levels and types of lubricant to be used.

F. Machinery shall be stationary while lubricants are being applied and protection provided as called for in the above section "Maintenance", unless equipped for automatic lubrication.

8.0 Rope Inspection

A. All running ropes in continuous service should be visually inspected once every working day. A thorough inspection of all rope in use shall be made at least once a month and a full written, dated and signed report of rope conditions must be kept on file in the safety office. All inspections shall be performed by an appointed, authorized person. Any deteriorations, resulting in appreciable loss of original strength, such as described below, shall be carefully noted and determinations made as to whether further use of the rope would constitute a safety hazard.

1. Reduction of rope diameter below nominal diameter due to loss of core support, internal or external corrosion or wear of outside wires.

2. A number of broken outside wires and the degree of distribution of concentration of such broken wires.

3. Worn outside wires.

4. Corroded or broken wires at end connections.

5. Corroded, cracked, bent, worn or improperly applied end connections.

6. Severe kinking, crushing, cutting or outstanding.

B. Heavy wear and/or broken wires may occur in sections in contact with equalizer sheaves or other sheaves where rope travel is limited, or with saddles. Particular care shall be taken to inspect ropes at these locations.

C. All rope which has been idle for a period of a month or more due to shut down or storage of a crane on which it is installed shall be given a thorough inspection before it is placed in service. This inspection shall be for all types of deterioration and shall be performed by an appointed, authorized person whose approval shall be required for further use of the rope. A written and dated report of the rope condition shall be filed.

D. Particular care shall be taken in the inspection of non-rotating rope.

9.0 Rope Replacement

A. No precise rules can be given for determination of the exact time for replacement of rope, since many variable factors are involved. Safety in this respect depends largely upon the use of good judgement by an appointed, authorized person in evaluating remaining strength in a used rope after allowance for deterioration disclosed by inspection. Safety of rope operation depends upon this remaining strength.

B. Conditions such as the following should be sufficient reason for questioning rope safety and for consideration of replacement.

1. In running ropes, six randomly distributed broken wires in one lay or three broken wires in one strand in one lay.

2. Wear of one-third the original diameter of outside individual wires.

3. Kinking, crushing, bird caging or any other damage resulting in distortion of the rope structure.

4. Evidence of any heat damage from any cause.

5. Reductions from nominal diameter of more than:
3/64" for diameters to and including 3/4"
1/16" for diameters 7/8 to 1 1/8" inclusive
3/32" for diameters 1 1/4" to 1 1/2" inclusive

6. In standing ropes, more than two broken wires in one lay in sections beyond and connections or more than one broken wire at an end connection.

C. In order to establish data as a basis of judging the proper time for replacement, a continuing inspection record shall be maintained. This record shall cover points on deterioration listed in "Inspection" of this section.

10.0 Rope Maintenance

A. Rope shall be stored to prevent damage or deterioration.

B. Unreeling or uncoiling of rope shall be done as recommended by the rope manufacturer and with extreme care to avoid kinking or inducing a twist.

C. Before cutting a rope, seizing shall be placed on each side of the place where the rope is to be cut to prevent unlaying of the strands. On preformed rope, one seizing on each side of the cut is required. On non-preformed ropes of 7/8" diameter or smaller, two seizing on each side of the cut are required, and for non-preformed rope of one inch diameter or larger, three seizing on each side of the cut are required.

D. During installation, care shall be observed to avoid dragging of the rope in dirt or around objects which will scrape, nick, crush or induce sharp bends in it.

E. Rope should be maintained in a well lubricated condition. It is important that lubricant applied as part of a maintenance program shall be compatible with the original lubricant and to this end the rope manufacturer should be consulted. Those sections of rope which are located over sheaves or otherwise hidden during inspection and maintenance procedures require special attention when lubricating rope. The object of rope lubrication is to reduce internal friction and to prevent corrosion. Periodic field lubrication is particularly important for non-rotating rope.

F. When an operating rope shows greater wear at well defined localized areas than on the remainder of the rope, rope life can be extended in cases where a reduced rope length is adequate by cutting off a section at one end, and thus shifting the wear to different areas of the rope.

11.0 Operation

A. Cranes shall only be operated by designated operators, learners under the direct supervision of a designated operator, maintenance and test personnel when it is necessary in the performance of their duties, and inspectors.

B. No one, other than personnel specified in the above paragraph shall enter a crane control station, with the exceptions of persons such as oilers and supervisors, whose duties require them to do so, and then only in the performance of their duties and with the knowledge of the operator or other person.

C. Operators shall be required to pass a practical operating examination. Examinations shall be limited to the specific type equipment which he will operate.

D. Operators shall meet the following physical qualifications:

1. Have vision of at least 20/30 Snellen in one eye, and 20/50 in the other, with or without corrective lenses.

2. Be able to distinguish red, green, and yellow regardless of position of colors, if color differentiation is required for operation.

3. Hearing, with or without hearing aid, must be adequate for the specific operation.

4. A history of epilepsy or of a disabling heart condition shall be sufficient reason for his/her disqualification.

E. The operator shall not engage in any practice which will divert his attention while actually engaged in operating the crane.

F. When he is physically or mentally unfit, an operator shall not engage in the operation of this equipment.

G. The operator shall respond to signals only from the appointed signal man, but shall obey a stop signal at any time, no matter who gives it.

H. If a warning signal is furnished, it shall be sounded each time before traveling, and intermittently during travel, particularly when approaching workmen.

I. Before leaving a crane unattended, the operator shall:

1. Land any attached load, bucket, lifting magnet or other device.
2. Disengage clutch.
3. Set travel, swing, boom brakes and other locking devices.
4. Put controls in the "OFF" position.
5. Stop the engine.
6. Secure crane against accidental travel.
7. Crane booms shall be lowered to ground level or otherwise fastened securely against displacement by wind loads or other outside forces.

J. If there is a warning sign on the switch or engine starting controls, the operator shall not close the switch or start the engine until the warning sign has been removed by the person placing it there.

K. Before closing the switch or starting the engine, the operator shall see that all controls are in the "OFF" position and all personnel are in the clear.

L. If power fails during operation, the operator shall set all brakes and locking devices, move all clutch or other power controls to the "OFF" position and, if practical, the suspended load should be landed under brake control.

M. The operator shall familiarize himself with the equipment and its proper care. If adjustments or repairs are necessary, or any defects are known, he shall report the same promptly to the appointed person and shall also notify the next operator of the defects upon changing shifts.

N. All controls shall be tested by the operator at the start of a new shift. If any controls do not operate properly, they shall be adjusted or repaired before operations are begun.

O. Booms which are being assembled or disassembled on the ground with or without support of the boom harness should be securely blocked to prevent dropping of the boom and boom sections.

12.0 Handling and Moving the Load

A. No crane shall be loaded beyond the rated load, except for test purposes.

B. When loads which are limited by structural competence rather than by stability are to be handled, the person responsible for the job shall ascertain that the weight of the load has been determined within plus or minus 10% before it is lifted.

C. The hoist rope shall not be wrapped around the load.

D. The load shall be attached to the hook by means of slings or other approved devices.

E. The individual directing the lift shall see that the crane is level and where necessary blocked properly and that the load is well secured and properly balanced in the sling or lifting device before it is lifted more than a few inches.

F. Before starting the hoist, note the following conditions:

1. Hoist rope shall not be kinked.

2. Multiple part lines shall not be twisted around each other.

3. The hook shall be brought over the load in such a manner as to prevent swinging.

4. If there is a slack rope condition, it should be determined that the rope is properly seated on the drum and in the sheaves.

G. During hoisting, care shall be taken that there is no sudden acceleration or deceleration of the moving load and that the load does not contact any obstructions.

H. Side loading of booms shall be limited to freely suspended loads. Cranes shall not be used for dragging loads sideways.

I. The operator shall not hoist, lower, swing or travel while anyone is on the load or hook.

J. The operator should avoid carrying loads over people.

K. The operator shall test the brakes each time a load approaching the rated load is handled by raising it a few inches and applying the brakes.

L. Outriggers shall be used when the load to be handled at that particular radius exceeds the rated load without outriggers as given by the manufacturer for that crane. Where floats are used, they shall be securely attached to the outriggers. Wood blocks used to support outriggers shall:

1. Be strong enough to prevent crushing.

2. Be free from defects.

3. Be of sufficient width and length to prevent shifting or toppling under load.

M. Neither the load nor the booms shall be lowered below the point where less than two full wraps of rope remain in their respective drums.

N. When two or more cranes are used to lift one load, one designated person shall be responsible for the operation. He/she shall analyze the operation and instruct all personnel involved in the proper positioning, rigging of the load and the movement to be made.

O. In transit, the following additional precautions shall be exercised:

1. The boom shall be carried in line with the direction of motion.

2. The superstructure shall be secured against rotation, except when negotiating turns when there is an operator in the cab or the boom is supported on a dolly.

3. The empty hook shall be lashed or otherwise restrained so that it cannot swing freely.

P. Before traveling a crane with a load, a designated person shall be responsible for determining and controlling safety. Decisions such as position of load, boom location, ground support, travel route and speed of movement shall be in accordance with his/her determinations.

Q. A crane with or without load shall not be traveled with the boom so high that it may bounce back over the cab.

R. When rotating the crane, sudden starts and stops shall be avoided. Rotational speed shall be such that the load does not swing out beyond the radii at which it can be controlled. A tag or restrain line shall be used when rotation of the load is hazardous.

S. When a crane is to be operated at a fixed radius, the boom-hoist pawl or other positive locking device shall be engaged.

T. Ropes shall not be handled on a winch head without the knowledge of the operator.

U. While a winch head is being used, the operator shall be within convenient reach of the power unit control level.

13.0 Holding A Load

A. The operator shall not leave his position at the controls while the load is suspended.

B. No person should be permitted to stand or pass under a load on the hook.

C. If the load must remain suspended for any considerable length of time, the operator shall hold the drum from rotating in the lowering direction by activating the positive controllable means at the operators station.

14.0 Signals

A. Standard signals to the operator shall be in accordance with the standards prescribed in the next paragraph, unless voice communication equipment (telephone, radio or equivalent) is utilized. Signals shall be discernible or audible at all times. No response shall be made unless signals are clearly understood.

B. Hand signals shall be in accordance with attached diagram.

C. For operations not covered by the hand signals, or for special conditions that occur from time to time, additions to or modification of the standard signals shall be required. In such cases, these special signals shall be agreed on in advance by the operator and the signalman and should not be in conflict with standard signals.

D. If it is desired to give instructions to the operator, other than provided by the established signal system, the crane motions shall be stopped.

15.0 Miscellaneous

A. Cranes shall not be operated without the full amount of any ballast or counterweight in place as specified by the maker, but truck cranes that have dropped the ballast or counterweight may be operated temporarily with special care and only for light loads without full ballast of counterweight in place. The ballast or counterweight in place specified by the manufacturer shall not be exceeded.

B. Except where the electrical distribution and transmission lines have been de-energized and visibly grounded at point of work or where insulating barriers not a part of or an attachment to the crane have been erected to prevent physical contact with the lines, cranes shall be operated proximate to, under, over, by or near power lines only in accordance with the following:

1. For lines rated 50kV or below, minimum clearance between the lines and any part of the crane or load shall be 10 feet.

2. For lines rated over 50 kV minimum, clearance between the lines and any part of the crane or load shall be 10 feet plus 0.4 inches for each 1kV over 50kV, or use twice the length of the line insulator but never less than 10 feet.

3. In transit with no load and boom lowered, the clearance shall be a minimum of four feet.

4. It is recommended that a person be designated to observe the clearance and give timely warning for all operations where it is difficult for the operator to maintain the desired clearance by visual means.

C. Cage-type boom guards, insulating lines, or proximately warning devices may be used on cranes, but the use of such devices shall not operate to alter the requirements of paragraph (A) above, even if such devices are required by law or regulation.

D. Before the commencement of operations near electrical lines, the person responsible for the job shall notify the owners of the lines or their authorized representative providing them with all pertinent information and requesting their cooperation.

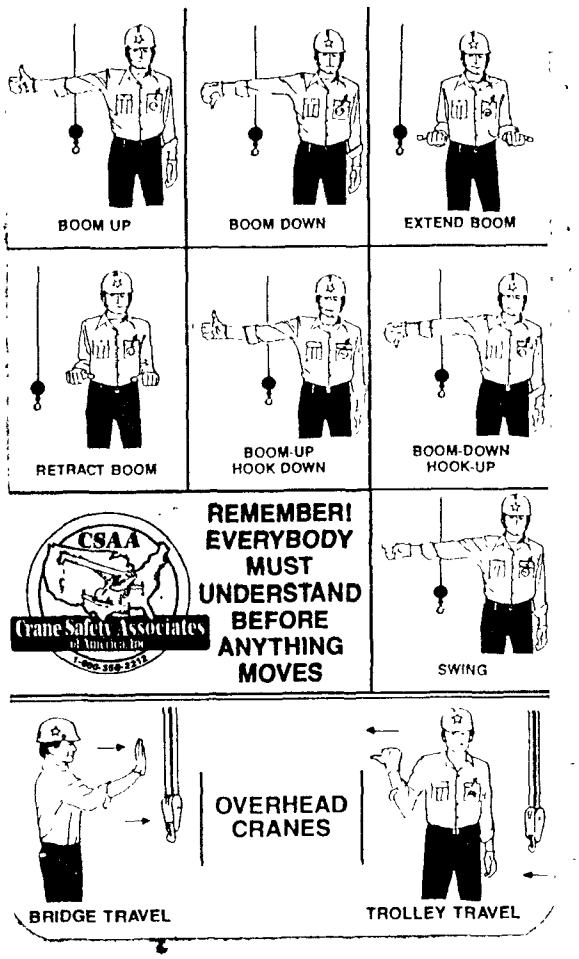
E. Any overhead wire shall be considered to be an energized line unless and until the person owning such line or the electrical utility authorities indicate that it is not an energized line.

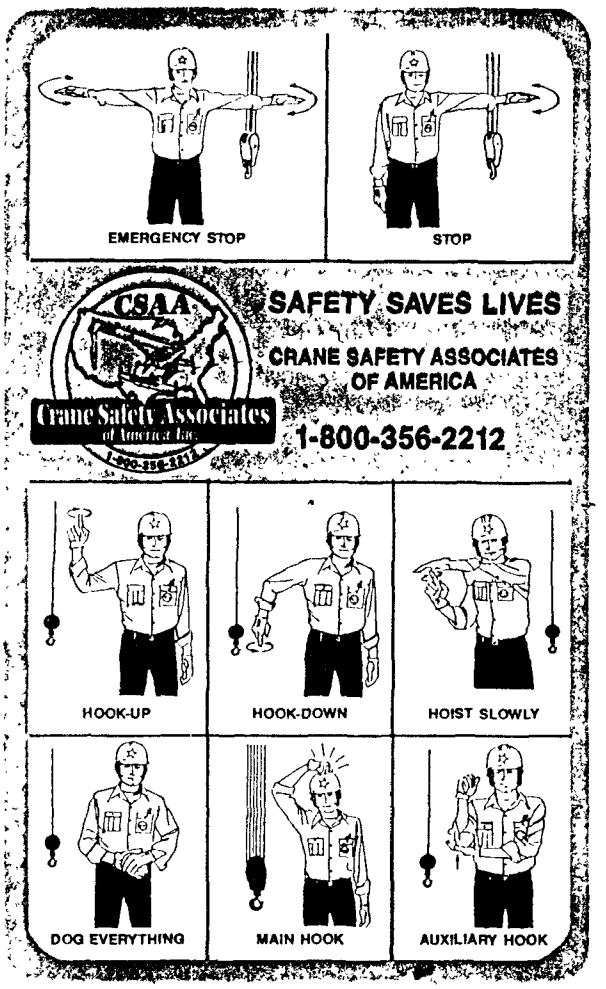
F. Exceptions to this procedure, if approved by the owner of the electrical lines, may be granted by the administrative or regulatory authority if the alternate procedure provides sufficient protection and is set forth in writing.

G. Firm footing, uniformly level within one percent should be provided. Where such a footing is not otherwise supplied, it should be provided by substantial timbers, cribbing, or other structural members sufficient to distribute the load so as not to exceed safe bearing capacity of the underlying material.

H. A carbon dioxide, dry chemical or equivalent fire extinguisher shall be kept in the vicinity of the crane. Operating and maintenance personnel shall be familiar with the use and care of the fire extinguishers provided.

Hand signals for use in directing winch or crane operators:





Hand Signals: Where verbal communications are impossible or are likely to be interfered with by other noises, the crew should utilize a standard set of hand signals. Where the winch operator doesn't have a clear view of the load, one competent crewman should give signals, not the whole crew.

- DECK SAFETY PRACTICES DURING USE OF OVERBOARD SCIENCE EQUIPMENT, A-FRAMES, HIAB CRANE AND HOISTS

1.0 Scope

To provide standard operating procedures and general deck safety practices during the use of overboard science equipment, A-Frames, HIAB Crane, Hoists or any other systems that lift, lower, secure or otherwise handle objects on board the R/V Lake Guardian.

2.0 References

Environmental Protection Agency: GLNPO Chemical Hygiene Plan and Safety Manual, Page 34.

Environmental Protection Agency, Region 5: Health and Safety Manual, Section 18-1.

North Pacific Fishing Vessel Owner's Association: Vessel Safety Manual, Chapter 4, "Working Conditions".

Seaward Services, Inc.: Occupational Safety & Health Program for Employees Working Aboard the R/V Roger R. Simons and R/V Lake Guardian, Section 2-1.

3.0 Responsibility

The ship's Master is responsible for implementation and accomplishment of the procedures contained herein.

4.0 Frequency of Inspection

Prior to the use of any piece of lifting gear, crane, A-Frame, davit or other handling device, either the ship's Science Officer, Marine Science Technician, the mate on watch or appointed designee, shall visually inspect the equipment involved with the operation and attest to its ability to perform the intended operation. This inspection shall include slings, hoists, blocks, ropes and associated hardware. On an annual basis, preferably several weeks prior to commencement of a new operating season, all of the aforementioned gear will be inspected by a qualified and independent third party for material condition and safe working load. Straps, chains, shackles, turnbuckles, etc., shall be condemned and removed from the vessel if found to be unserviceable. Cranes, winches, A-Frames and davits found to be unserviceable shall be "tagged out of order" and repaired prior to further use.

5.0 Deck Skills and Safety Procedures

A. Work vests shall be worn at all times during sampling and testing conducted on the weather decks.

B. Hard hats must be worn by crane operators and any persons assisting with the load.

C. All individuals involved in sampling procedures on deck shall wear appropriate safety gear. (Life vests, work suits, hard hats, eye, face, hand and foot protection, safety lines, etc.). Employees will be provided with personal protective equipment and trained in the use and care of this equipment. In compliance with OSHA 1910 standards, vessel employees are required to adhere to any and all policies regarding personal protective equipment for their own well being.

D. No one is permitted on the weather decks during sea operations unless directly involved with sampling, testing, checking of equipment or other work.

E. During weather conditions causing freezing of water on deck surfaces, hoses shall be used to thaw surfaces with warm water as needed to prevent a slipping hazard for those working outside. Special precautions are necessary in wet, slippery conditions.

F. Never stand in a bight (a loop of line, rope or chain) or put any part of your body into a bight without first making sure that the gear cannot be worked.

G. Never stand in the direct line of pull when a rope or wire is under tension, in case it breaks and snaps back. Generally, rope or wire snaps back with a corkscrew motion, so the danger zone extends to either side of the direct line of pull.

H. Lines under tension may be subjected to sudden shocks or strains that cause them to bounce violently up and down. Never straddle or step over a line or wire under tension. Be especially cautious when the gear has become snagged or fouled.

I. Stay out from underneath loads suspended in the air, and keep in mind that suspended loads become battering rams in rolling seas. A tag line must be attached to any load being hoisted to control turning and swinging.

J. Do not stand between a load in the air and a rail, stanchion, hatch coaming or any solid object against which you could be crushed. If you are the man at the controls, never pass a load over another crewman.

K. Be sure to use adequate lighting when working in poorly lit areas or during the night.

L. Only lower one device overboard at a time unless prior approval has been obtained from the Captain or Officer in Charge.

M. Do not work alone on the weather decks. A crew member with a radio should be present during work at a sampling station.

N. Report any equipment failure or accident to the Bridge immediately.

6.0 Communication

A. Clear communication between the pilot house and deck should be maintained by means of properly located, functioning intercoms or radios.

B. Position the ship's internal video system in such a way that the pilot house can view overboard activities.

C. Inform pilot house of readiness to sample or the presence of overboard gear or lines in the water.

D. Inform curious onlookers of unsafe conditions.

E. Inform pilot house and clear decks after sampling is complete. Secure science and deck gear. Turn off all electrical and mechanical equipment.

F. When verbal communication is impossible or likely to be interfered with by other noises, the crew should utilize a standard set of hand signals. Where the winch operator does not have a clear view of the load, only one designated person will be responsible for giving the hand signals.

7.0 Deck Machinery

A. Gear systems, including wrapping heads, winches, tackle, nets, etc., should provide safe and convenient operation.

B. Wires and wraps should be of adequate strength for the anticipated loads.

C. Moving parts of winches and of wrap and chain leads which may present a hazard should have adequate guards.

D. Repairs to winches, tackle and lifting gear should be to original standards of construction. Repairs should be tested using dead loads before the gear is placed back in service.

E. Protection should be provided around winch foundations to prevent a person from being caught or dragged under.

F. Sheaves should be guarded where possible. Blocks and sheaves should be properly lubricated at regular intervals.

G. All shackles used aloft should be safety wired or "moused" so they cannot come loose accidentally.

H. Winches should be provided with a means to prevent over hoisting and to prevent the accidental release of a load if the power supply fails.

8.0 General Lifting Precautions

A. Components must be of sufficient size to accomplish the task, and should be inspected regularly.

B. Fiber lines should be checked for signs of excessive wear, fraying, rot and dryness.

C. Wire rope should be examined for fish hooks, badly worn areas and kinks. Badly worn wire ropes should be replaced.

D. Wooden blocks should be inspected for cracked or rotten cheeks, worn pins or cracked or badly worn metal parts.

E. Shackles, swivels, metal blocks and hooks should be inspected for cracks, distortion, excessive wear or metal fatigue.

F. If one part of a lifting appliance gives way, the force may weaken or destroy other parts.

G. Heavy weights should never be permitted to drop regardless of the distance. They should be lowered to rest and secured to prevent rolling or sliding. Never keep a load in the air any longer than necessary.

H. All motions with heavy weights should be slow to avoid creating momentum. Attaching a tag line will help avoid many problems and ensure safe handling of the load.

I. Avoid sudden shocks or strain, and beware of side pulls. Side play puts great stress on a boom or crane.

J. Only certified crane operators are permitted to operate the ship's cranes and hoists.

K. Any person directing the crane operator must be trained in the use of standard operating hand signals. (See Attachment A)

L. Report any equipment failure or accident to the Bridge immediately.

STANDARD OPERATING PROCEDURE

Operational Safety Practices During Use of HIAB Crane Aboard the R/V Lake Guardian

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Prepared by _____ Date _____

Approved by _____ Date _____

Rev _____

Operational Safety Practices During Use of HIAB Crane

1 0 Scope

To provide standard operating procedures for use before, during and after operation of the HIAB crane. These procedures shall be followed by all personnel aboard the R/V Lake Guardian involved with the handling, maintenance and operation of the HIAB crane

2.0 References

Crane Inspection & Certification Bureau (CICB) Training Manual: Mobile Cranes & Rigging Considerations, Chapter 1-2.

The contents of this document are based on recognized Safety Standards, which are published by the following Organizations or Agencies:

AMERICAN NATIONAL STANDARDS INSTITUTE
OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION
SOCIETY OF AUTOMOTIVE ENGINEERS
POWER CRANE AND SHOVEL ASSOCIATION
AMERICAN WELDING SOCIETY
WIRE ROPE INSTITUTE OF AMERICA
CONSTRUCTION SAFETY ASSOCIATION OF ONTARIO

3 0 Responsibility

There are several CICB certified mobile crane operators aboard the R/V Lake Guardian who will assume primary responsibility for handling, maintenance and operation of the HIAB crane.

4.0 Inspection

Items such as the following shall be for defects at monthly intervals, or as specifically indicated, including observation during operation for any defects which might appear between regular inspections. Any deficiencies such as listed shall be carefully examined and determinations made as to whether they constitute a safety hazard:

A Prior to initial use all new and/or altered cranes shall be inspected to insure compliance with provisions contained in Crane Inspection and Certification Manual.

B. All control mechanisms shall be inspected for maladjustments interfering with proper operation. Daily

C. All control mechanisms shall be inspected for excessive wear of components and contamination by lubricants or other foreign matter.

D. All safety devices shall be inspected for malfunction.

E Inspections for deterioration or leakage in air or hydraulic systems. Daily

F Crane hooks shall be inspected for deformations, cracks or having more than 15% in excess of normal throat opening or more than 10 degree twist from the plane of the unbent hook

G Inspections are required for rope reeving for noncompliance with crane manufacturer's recommendations

H. Electrical apparatus shall be inspected weekly for malfunctioning, signs of excessive deterioration, dirt and moisture accumulation

A complete inspection of the crane shall be performed on a yearly basis. This inspection shall include all of the requirements above as well as the following items Any deficiencies such as listed shall be carefully examined and a determination made as to whether they constitute a safety hazard.

I. Deformed, cracked or corroded members in the crane structure and boom

J. Loose bolts or rivets.

K. Cracked or worn sheaves and drums.

L. Load, boom angle and other indicators over their full range, for any significant inaccuracies.

M. Gasoline, diesel, electric or other power plants for improper performance or noncompliance with safety requirements.

N. Crane hooks. Magnetic particle or other suitable crack detecting inspection should be performed at least once each year.

A crane which has been idle for a period of one month or more, but less than six months, shall be given an inspection conforming with requirements of the weekly inspection above, before placing in service

A crane which has been idle for a period of over six months shall be given a complete inspection conforming with requirements of the weekly and yearly inspections, before placing in service.

5 0 Testing

A. Prior to initial use all extensively repaired or altered cranes should be tested by or under the direction of an appointed or authorized person.

B. Written reports shall be furnished by such persons showing test procedures and confirming the adequacy of repairs or alterations.

C Test loads shall not exceed 110% of the rated load at any selected working radius.

D Re-rating test report shall be readily available

E. No cranes shall be re-rated in excess of the original load ratings unless such rating changes are approved by the crane manufacturer or final assembler.

6.0 Maintenance

A. A preventative maintenance program based on the crane manufacturer's recommendations shall be established. Dated and detailed records shall be readily available.

B. It is recommended that replacement parts be obtained from the original equipment manufacturer.

C. Before adjustments and repairs are started on a crane the following precautions shall be taken as applicable.

(1) Crane placed where it will cause the least interference with other equipment or operations in the area.

(2) All controls in the "OFF" position.

(3) Starting means rendered inoperative.

(4) Warning or "out of order" signs placed on the crane.

(5) Power plant stopped or disconnected at take-off.

(6) Boom lowered to the ground if possible or otherwise secured against dropping.

(7) Lower load block lowered to ground or otherwise secured against dropping.

D. After adjustments and repairs have been made the crane shall not be operated until all guards have been reinstalled, safety devices reactivated and maintenance equipment removed.

7 0 Adjustments and Repairs

A. Any unsafe conditions disclosed by the inspection shall be corrected before operation of the crane is resumed. Adjustments and repairs shall be done only by designated personnel.

B. Adjustments shall be maintained to assure correct functioning of components. (All functional operating mechanisms, safety devices, control systems and power plants).

C. Repairs or replacement shall be provided promptly as needed for safe operation

D. All replacement parts or repairs shall have at least the original safety factor

E. All moving parts of the crane for which lubrication is specified, including rope and chain, shall be regularly lubricated Lubricating systems shall be checked for proper delivery of lubricant

Particular care should be taken to follow manufacturer's recommendations as to points and frequency of lubrication, maintenance of lubricant levels and types of lubricant to be used.

F. Machinery shall be stationary while lubricants are being applied and protection provided as called for in the above section "Maintenance" C-1 through C-7, unless equipped for automatic lubrication

8.0 Rope Inspection

A. All running ropes in continuous service should be visually inspected once every working day. A thorough inspection of all rope in use shall be made at least once a month and a full written, dated and signed report of rope conditions kept on file where readily available. All inspections shall be performed by an appointed or authorized person. Any deteriorations, resulting in appreciable loss of original strength, such as described below, shall be carefully noted and determinations made as to whether further use of the rope would constitute a safety hazard

(1) Reduction of rope diameter below nominal diameter due to loss of core support, internal or external corrosion or wear of outside wires.

(2) A number of broken outside wires and the degree of distribution of concentration of such broken wires.

(3) Worn outside wires

(4) Corroded or broken wires at end connections.

(5) Corroded, cracked, bent, worn or improperly applied end connections.

(6) Severe kinking, crushing, cutting or outstanding.

B Heavy wear and/or broken wires may occur in sections in contact with equalizer sheaves or other sheaves where rope travel is limited, or with saddles. Particular care shall be taken to inspect ropes at these locations.

C All rope which has been idle for a period of a month or more due to shut down or storage of a crane on which it is installed shall be given a thorough inspection before it is placed in service This inspection shall be for all types of deterioration and shall be performed by an appointed or authorized person whose approval shall be required for further use of the rope A written and dated report of the rope condition shall be filed

D. Particular care shall be taken in the inspection of non-rotating rope

9 0 Rope Replacement

A. No precise rules can be given for determination of the exact time for replacement of rope, since many variable factors are involved. Safety in this respect depends largely upon the use of good judgement by an appointed or authorization person in evaluating remaining strength in a used rope after allowance for deterioration disclosed by inspection Safety of rope operation depends upon this remaining strength.

B. Conditions such as the following should be sufficient reason for questioning rope safety and for consideration of replacement.

(1) In running ropes, six randomly distributed broken wires in one lay or three broken wires in one strand in one lay.

(2) Wear of one-third the original diameter of outside individual wires.

(3) Kinking, crushing, bird caging or any other damage resulting in distortion of the rope structure.

(4) Evidence of any heat damage from any cause.

(5) Reductions from nominal diameter of more than:
3/64" for diameters to and including 3/4"
1/16" for diameter 7/8" to 1-1/8" inclusive
3/32" for diameters 1-1/4" to 1-1/2" inclusive

(6) In standing ropes, more than two broken wires in one lay in sections beyond end connections or more than one broken wire at an end connection.

C. In order to establish data as a basis of judging the proper time for replacement, a continuing inspection record shall be maintained This record shall cover points of deterioration listed in "inspection" of this section

10 0 Rope Maintenance

A Rope shall be stored to prevent damage or deterioration

B. Unreeling or uncoiling of rope shall be done as recommended by the rope manufacturer and with extreme care to avoid kinking or inducing a twist

C Before cutting a rope, seizing shall be placed on each side of the place where the rope is to be cut to prevent unlaying of the strands On preformed rope, one seizing on each side of the cut is required On non-preformed ropes of 7/8" diameter or smaller, two seizings on each side of the cut are required, and for non-preformed rope of one inch diameter or larger, three seizings on each side of the cut are required.

D. During installation care shall be observed to avoid dragging of the rope in dirt or around objects which will scrape, nick, crush or induce sharp bends in it.

E. Rope should be maintained in a well lubricated condition It is important that lubricant applied as part of a maintenance program shall be compatible with the original lubricant and to this end the rope manufacturer should be consulted. Those sections of rope which are located over sheaves or otherwise hidden during inspection and maintenance procedures require special attention when lubricating rope The object of rope lubrication is to reduce internal friction and to prevent corrosion. Periodic field lubrication is particularly important for non-rotating rope

F. When an operating rope shows greater wear at well defined localized areas than on the remainder of the rope, rope life can be extended in cases where a reduced rope length is adequate by cutting off a section at one end, and thus shifting the wear to different areas of the rope.

11.0 Operation

A Cranes shall only be operated by designated operators, learners under the direct supervision of a designated operator, maintenance and test personnel when it is necessary in the performance of their duties, and inspectors.

B. No one, other than personnel specified in the above paragraph shall enter a crane cab, with the exceptions of persons such as oilers and supervisors, whose duties require them to do so, and then only in the performance of their duties and with the knowledge of the operator or other person.

C. Operators shall be required to pass a practical operating examination. Examinations shall be limited to the specific type equipment which he will operate.

D. Operators shall meet the following physical qualifications.

(1) Have vision of at least 20/30 Snellen in one eye, and 20/50 in the other, with or without glasses

(2) Be able to distinguish red, green, and yellow regardless of position of colors, if color differentiation is required for operation

(3) Hearing, with or without hearing aid, must be adequate for the specific operation

(4) A history of epilepsy or of a disabling heart condition shall be sufficient reason for his disqualification.

E. The operator shall not engage in any practice which will divert his attention while actually engaged in operating the crane.

F. When he is physically or mentally unfit, an operator shall not engage in the operation of this equipment.

G. The operator shall respond to signals only from the appointed signal man, but shall obey a stop signal at any time, no matter who gives it.

H. If a warning signal is furnished, it shall be sounded each time before traveling, and intermittently during travel, particularly when approaching workmen.

I. Before leaving his crane unattended, the operator shall:
(1) Land any attached load, bucket, lifting magnet or other device.
(2) Crane booms shall be lowered to ground level or otherwise fastened securely against displacement by wind loads or other outside forces.
(3) Set travel, swing, boom brakes and other locking devices.
(4) Put controls in the "OFF" position.
(5) Stop the motor.

J. If there is a warning sign on the switch or motor starting controls, the operator shall not close the switch or start the motor until the warning sign has been removed by the person placing it there.

K. Before closing the switch or starting the motor, the operator shall see that all controls are in the "OFF" position and all personnel are in the clear.

L If power fails during operation, the operator shall set all brakes and locking devices, move all power controls to the "OFF" position and if practical, the suspended load should be landed under brake control.

M The operator shall familiarize himself with the equipment and its proper care If adjustments or repairs are necessary, or any defects are known, he shall report the same promptly to the appointed person and shall also notify the next operator of the defects upon changing shifts

N Booms which are being assembled or disassembled on the ground with or without support of the boom harness should be securely blocked to prevent dropping of the boom and boom sections

12 0 Handling & Moving the Load

A No crane shall be loaded beyond the rated load, except for test purposes

B. When loads which are limited by their own structural integrity rather than by stability are to be handled, the person responsible for the job shall ascertain that the weight of the load has been determined within plus or minus 10% before it is lifted.

C The hoist rope shall not be wrapped around the load.

D. The load shall be attached to the hook by means of slings or other approved devices.

E. The individual directing the lift shall see that the crane is level and that the load is well secured and properly balanced in the sling or lifting device before it is lifted more than a few inches

F. Before starting the hoist, note the following conditions:

(1) Hoist rope shall not be kinked.
(2) Multiple part lines shall not be twisted around each other.
(3) The hook shall be brought over the load in such a manner as to prevent swinging.
(4) If there is a slack rope condition, it should be determined that the rope is properly seated on the drum and in the sheaves.

G During hoisting care shall be taken that there is no sudden acceleration of deceleration of the moving load and that the load does not contact any obstructions.

H. Side loading of booms shall be limited to freely suspended loads. Cranes shall not be used for dragging loads sideways.

I. The operator shall not hoist, lower, swing or travel while anyone is on the load or hook.

J. The operator should avoid carrying loads over people.

K. The operator shall test the preset hydraulic lifting limit each time a load approaching the rated load is handled by raising it a few inches and observing it's ability to hold the load in position without lowering.

L Neither the load nor the booms shall be lowered below the point where less that two full wraps or rope remain in their respective drums.

M. In transit the following additional precautions shall be exercised:
(1) The boom shall be carried in line with the direction of motion.
(2) The empty hook shall be lashed or otherwise restrained so that it cannot swing freely

N When rotating the crane, sudden starts and stops shall be avoided. Rotational speed shall be such that the load does not swing out beyond the radii at which it can be controlled. A tag or restrain line shall be used when rotation of the load is hazardous.

O. Ropes shall not be handled on a winch head without the knowledge of the operator.

P. While a winch head is being used, the operator shall be within convenient reach of the power unit control level.

13.0 Holding a Load

A. The operator shall not leave his position at the controls while the load is suspended.

B. No person should be permitted to stand or pass under a load on the hook.

C. If the load must remain suspended for any considerable length of time, the operator shall hold the drum from rotating in the lowering direction by activating the positive controllable means at the operators station.

14 0 Signals

A. Standard signals to the operator shall be in accordance with the standards prescribed in the next paragraph, unless voice communication equipment (telephone, radio or equivalent) is utilized. Signals shall be discernible or audible at all times. No response shall be made unless signals are clearly understood.

B. Hand signals shall be in accordance with Attachment A.

C. For operations not covered by the hand signals, or for special conditions that occur from time to time, additions to or modification of the standard signals may be required. In such cases these special signals shall be agreed on in advance by the operator and the signalman and should not be in conflict with standard signals.

D. If it is desired to give instructions to the operator, other than provided by the established signal system, the crane motions shall be stopped

15.0 Miscellaneous

A. Except where the electrical distribution and transmission lines have been de-energized and visibly grounded at point of work or where insulating barriers not a part of or an attachment to the crane have been erected to prevent physical contact with the lines, cranes shall be operated proximate to, under, over, by or near power lines only in accordance with the following:

(1) For lines rated 50Kv or below, minimum clearance between the lines and any part of the crane or load shall be 10 feet.

(2) For lines rated over 50kV minimum, clearance between the lines and any part of the crane or load shall be 10 feet plus 0 4 inch for each 1kV over 50kV, or use twice the length of the line insulator but never less than 10 feet.

(3) It is recommended that a person be designated to observe the clearance and give timely warning for all operations where it is difficult for the operator to maintain the desired clearance by visual means.

B. Cage-type boom guards, insulating lines, or proximately warning devices may be used on cranes, but the use of such devices shall not operate to alter the requirements of paragraph (A) above, even if such devices are required by law or regulation

C. Before the commencement of operations near electrical lines, the person responsible for the job shall notify the owners of the lines or their authorized representative providing them with all pertinent information and requesting their cooperation

D. Any overhead wire shall be considered to be an energized line unless and until the person owning such line or the electrical utility authorities indicate that it is not an energized line.

E. Exceptions to this procedure, if approved by the owner of the electrical lines, may be granted by the administrative or regulatory authority if the alternate procedure provides sufficient protection and is set forth in writing

F. A carbon-dioxide, dry chemical or equivalent fire extinguisher shall be kept in the vicinity of the crane. Operating and maintenance personnel shall be familiar with the use and care of the fire extinguishers provided

STANDARD OPERATING PROCEDURE

Deck Safety Practices During Use of Scientific Equipment, A-Frames and Hoists

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Prepared by _____ Date _____

Approved by _____ Date _____

Rev. _____

Deck Safety Practices During Use of
Overboard Science Equipment, A-Frames, HIAB Crane and Hoists

1.0 Scope

To provide standard operating procedures and general deck safety practices during the use of overboard science equipment, A-Frames, HIAB Crane, Hoists or any other systems that lift, lower, secure or otherwise handle objects on board the R/V Lake Guardian.

2.0 References

Environmental Protection Agency: GLNPO Chemical Hygiene Plan and Safety Manual, Page 34.

Environmental Protection Agency, Region 5: Health and Safety Manual, Section 18-1.

North Pacific Fishing Vessel Owner's Association: Vessel Safety Manual, Chapter 4, "Working Conditions".

Seaward Services, Inc.: Occupational Safety & Health Program for Employees Working Aboard the R/V Roger R. Simons and R/V Lake Guardian, Section 2-1.

3.0 Responsibility

The ship's Master is responsible for implementation and accomplishment of the procedures contained herein.

4.0 Frequency of Inspection

Prior to the use of any piece of lifting gear, crane, A-frame, davit or other handling device, either the ship's Science Officer, Marine Science Technician, the mate on watch or appointed designee, shall visually inspect the equipment involved with the operation and attest to its ability to perform the intended operation. This inspection shall include slings, hoists, blocks, ropes and associated hardware. On an annual basis, preferably several weeks prior to commencement of a new operating season, all of the aforementioned gear will be inspected by a qualified and independent third party for material condition and safe working load. Straps, chains, shackles, turnbuckles, etc., shall be condemned and removed from the vessel if found to be unserviceable. Cranes, winches, A-frames and davits found to be unserviceable shall be tagged "Out of Order" and repaired prior to further use.

5.0 Deck Skills and Safety Procedures

A. Work vests shall be worn at all times during sampling and testing conducted on the weather decks.

B. Hard hats must be worn by crane operators and any persons assisting with the load.

C. All individuals involved in sampling procedures on deck shall wear appropriate safety gear. (Life vests, work suits, hard hats, eye, face, hand and foot protection, safety lines etc..). Employees will be provided with personal protective equipment and trained on the use and care of this equipment. In compliance with OSHA 1910 standards, vessel employees are required to adhere to any and all policies regarding personal protective equipment for their own well being.

D. No one is permitted on the weather decks during sea operations unless directly involved with sampling, testing, checking of equipment or other work.

E. During weather conditions causing freezing of water on deck surfaces, hoses shall be used to thaw surfaces with warm water as needed to prevent a slipping hazard for those working outside. Special precautions are necessary in wet, slippery conditions.

F. Never stand in a bight (a loop of line, rope or chain) or put any part of your body into a bight without first making sure that the gear cannot be worked.

G. Never stand in the direct line of pull when a rope or wire is under tension, in case it breaks and snaps back. Generally, rope or wire snaps back with a corkscrew motion, so the danger zone extends to either side of the direct line of pull.

H. Lines under tension may be subjected to sudden shocks or strains that cause them to bounce violently up and down. Never straddle or step over a line or wire under tension. Be especially cautious when the gear has become snagged or fouled.

I. Stay out from underneath loads suspended in the air, and keep in mind that suspended loads become battering rams in rolling seas. A tag line must be attached to any load being hoisted to control turning and swinging.

J. Don't stand between a load in the air and a rail, stanchion, hatch coaming or any solid object against which you could be crushed. If you're the man at the controls, never pass a load over another crewman.

K. Be sure to use adequate lighting when working in poorly lit areas or during the night.

L. Only lower one device overboard at a time unless prior approval has been obtained from the Science Officer.

M. Do not work alone on the weather decks. A crew member with a radio should be present during work at a sampling station.

N. Report any equipment failure or accident to the Bridge immediately.

6.0 Communication

A. Clear communications between the pilot house and deck should be maintained by means of properly located, functioning intercoms or radios.

B. Position the ship's internal video system such that the pilot house can view overboard activities.

C. Inform pilot house of readiness to sample or the presence of overboard gear or lines in the water.

D. Inform curious onlookers of unsafe conditions.

E. Inform pilot house and clear decks after sampling is complete.Secure science and deck gear. Turn off all electrical and mechanical equipment.

F. When verbal communications are impossible or are likely to be interfered with by other noises, the crew should utilize a standard set of hand signals. Where the winch operator doesn't have a clear view of the load, one designated person will be responsible for giving the hand signals, not the whole crew.

7.0 Deck Machinery

A. Gear systems, including wrapping heads, winches, tackle, nets, etc., should provide safe and convenient operation.

B. Wires and wraps should be of adequate strength for the anticipated loads.

C. Moving parts of winches and of wrap and chain leads which may present a hazard should have adequate guards.

D. Repairs to winches, tackle and lifting gear should be to original standards of construction. Repairs should be tested using dead loads before the gear is placed back in service.

E. Protection should be provided around winch foundations toprevent a person from being caught or dragged under.

F. Sheaves should be guarded where possible. Blocks and sheaves should be properly lubricated at regular intervals.

G. All shackles used aloft should be safety wired or "moused" so they cannot come loose accidentally.

H. Winches should be provided with a means to prevent over hoisting and to prevent the accidental release of a load if the power supply fails.

8.0 General Lifting Precautions

A. Components must be of sufficient size to accomplish the task, and should be inspected regularly.

B. Fiber lines should be checked for signs of excessive wear, fraying, rot and dryness.

C. Wire rope should be examined for fish hooks, badly worn areas and kinks. Badly worn wire ropes should be replaced.

D. Wooden blocks should be inspected for cracked or rotten cheeks, worn pins or cracked or badly worn metal parts.

E. Shackles, swivels, metal blocks and hooks should be inspected for cracks, distortion, excessive wear or metal fatigue.

F. If one part of a lifting appliance gives way, the force may weaken or destroy other parts.

G. Heavy weights should never be allowed to drop regardless of the distance. They should be lowered to rest and secured to prevent rolling or sliding. Never keep a load in the air any longer than necessary.

H. All motions with heavy weights should be slow to avoid creating momentum. Attaching a tag line will help avoid many problems and insure safe handling of the load.

I. Avoid sudden shocks or strains, and beware of side pulls. Side play puts great stress on a boom or crane.

J. Only certified crane operators are permitted to operate the ship's cranes and hoists.

K. Any person directing the crane operator must use and be trained in the use of standard operating hand signals. (See attachment A).

L. Report any equipment failure or accident to the Bridge immediately.

APPENDIX L: CHEMICAL HYGIENE STANDARD OPERATING PROCEDURES FOR U.S. EPA GLNPO RESEARCH VESSELS

Chemical Hygiene SOP No.:	Overall Glove Recommendation	Laboratory Procedure
1	Optional	Dissolved Nutrients Filtration
2	CPE*	Total Alkalinity
3	CPE	Ammonia Nitrogen
4	CPE	Chloride
5	CPE	Dissolved Organic Carbon
6	CPE	Chlorophyll-a & Chlorophyll-b
7	CPE	Chlorophyll-a & Pheophytin-a
8	Vinyl	Specific Conductance
9	CPE	Nitrate & Nitrite Nitrogen
10	CPE	Dissolved Oxygen
11	Vinyl	Dissolved Oxygen
12	CPE	Electrometric pH
13	CPE	Soluble Reactive Phosphorous
14	CPE	Total Phosphorous, Total Dissolved Phosphorous
15	CPE	Silicates
16	CPE	Standards & Spikes Preparation
17	CPE	Sulfate
18	Insulated	Suspended Solids
19	N/A	Technicon Autoanalyzer & Associated Recording Equip.
20	Vinyl	Turbidity
21	CPE	Aerobic Heterotrophs, Total Coliforms, Fecal Coliforms, Fecal Streptococci
22	Neoprene	Determining Primary Production Parameters

Chemical Hygiene SOP No.:	Overall Glove Recommendation	Laboratory Procedure
23	N/A	Quality Control Schedule
24	N/A	Reagent Water System
25	Neoprene	Sampling Surface Waters for Hydrophobic Contaminants Including Filtration, Liquid/ Liquid Extraction
26	CPE	Determination of Metals in Acid Rain
27	CPE	Determination of Cadmium, Chromium, & Nickel in Acid Rain
28	CPE	Determination of Total Arsenic in Water
29	CPE	Determination of Total Potassium & Sodium in Acid Rain
30	CPE	Determination of Nickel in Acid Rain
31	CPE	Analysis of Total Kjeldahl Nitrogen & Total Phosphorous in Water
32	CPE	Analysis of Particulate Organic Carbon in Lake Water
33	CPE	Direct Observation of Bacteria by DAPI
34	CPE	Analysis of Phytoplankton
35	CPE	Analysis of Zooplankton
36	CPE	Analysis of Total Phosphorous
37	CPE	Determination of Calcium, Magnesium, Potassium, & Sodium

Chemical Hygiene SOP No.:	Overall Glove Recommendation	Laboratory Procedure
38	CPE	Determination of Total Calcium Magnesium, Potassium, & Sodium
39	See Pg. 39-1	Liquid/Liquid Water Extraction Capture

***CPE = CHLORINATED POLYETHYLENE**

CHEMICAL HYGIENE SOP

No. 1

Laboratory Procedure: Dissolved Nutrients Filtration

Method: --------

Description: An unaltered sample is vacuum filtered through a pre-washed selected .45 um membrane filter.

Chemicals Used: None

Overall Glove Recommendation: Gloves optional, any protective glove

SAFETY CONTROLS

Procedure	Potential Exposure	PPE and/or Engineering Controls
Pouring sample into separatory funnel, draining, shaking, filtering, etc.	None	General ventilation is adequate. PPE- General lab requirements, safety glasses, lab coat, gloves not required, rubber gloves optional

WASTE GENERATION AND HANDLING

Follow all guidelines in the U.S. EPA's Characterization of Waste From Standard Analytical Methods.

SPECIAL PRECAUTIONS

None

CHEMICAL HYGIENE SOP

No. 2

Laboratory Procedure:	Total Alkalinity
Method:	Titration
Description:	A measured amount of sample is titrated with acid to a pH of 4.5.
Chemicals Used:	Sulfuric acid, pH buffers, sodium carbonate.

Overall Glove Recommendation: Chlorinated polyethylene (CPE)

SAFETY CONTROLS

Procedure	Potential Exposure	PPE and/or Engineering Controls
1. Sulfuric acid dilutions, if necessary	Spills, splashing, inhalation	General ventilation is adequate. If practical, do procedure in a fume hood. PPE-splash proof safety goggles, lab coat, viton, chlorinated polyethylene, polyethylene gloves
2. Stock alkalinity standard preparation, (sodium carbonate)	None, except with excessive skin contact	General ventilation is adequate. If practical, do procedure in a fume hood. PPE-splash proof safety goggles, lab coat, any protective glove or CPE
3. Stock alkalinity dilutions, handling	None	General ventilation adequate. PPE-safety glasses, lab coat, gloves optional. If used, any protective glove is adequate. CPE

Procedure	Potential Exposure	PPE and/or Engineering Controls
4. Handling of pH buffers	Spills, splashing	General ventilation is adequate. PPE-splash proof safety goggles, lab coat, gloves not required, butyl gloves optional. CPE
5. Titration of sample of check standard with sulfuric acid	Spills, splashing, inhalation	General ventilation is adequate. If practical, do procedure in a fume hood. Sulfuric acid concentrations are low. PPE-splash proof safety goggles, lab coat, viton, chlorinated polyethylene, polyethylene gloves optional, not required

WASTE GENERATION AND HANDLING

Follow all guidelines in the U.S. EPA's Characterization of Waste From Standard Analytical Methods.

SPECIAL PRECAUTIONS

Thoroughly wash hands after procedure completion.

CHEMICAL HYGIENE SOP

No. 3

Laboratory Procedure:	Ammonia Nitrogen
Method:	Automated phenolate/nitroprusside spectrophotometric determination
Description:	Ammo concentration of a sample determined spectrophotometrically.
Chemicals Used:	Sodium hydroxide phenol, 5.25% chlorine bleach, potassium sodium tartrate, sodium citrate, sulfuric acid, Brij-35, sodium nitroprusside, ammonia standard

Overall Glove Recommendation: Chlorinated Polyethylene (CPE)

SAFETY CONTROLS

Procedure	Potential Exposure	PPE and/or Engineering Controls
1. Sodium phenolate solution preparation, phenol and sodium hydroxide	Spills, splashing, inhalation	Do procedure in a fume hood. When in contact with water, sodium hydroxide may generate sufficient heat to ignite combustible materials. Allow to cool. PPE- splash proof safety goggles, lab coat, butyl gloves (choice), viton gloves (adequate) for phenol, nitrile, neoprene or rubber gloves (choice), butyl gloves (adequate) for sodium hydroxide. CPE adequate for procedure

Procedure	Potential Exposure	PPE and/or Engineering Controls
2. Sodium hypochlorite solution, 5.25% chlorine bleach	Spills, inhalation	General ventilation is adequate. Do procedure in a fume hood if practical. PPE-splash proof safety goggles, lab coat, rubber gloves or CPE
3. Complexing reagent, potassium sodium tartrate, sodium citrate, sulfuric acid, Brij-35	Inhalation	General ventilation is adequate. If practical, do procedure in a fume hood. PPE-splash proof safety goggles, lab coat, viton, chlorinated polyethylene, polyethylene gloves
4. Sodium nitroprusside		Sodium nitroprusside is a poison. Perform procedure in fume hood. PPE-splash proof safety goggles, lab coat, & rubber gloves or CPE
5. Sodium hydroxide	Spills, splashing, inhalation	When in contact with water, sodium hydroxide may generate sufficient heat to ignite combustible materials. Allow to cool. Do procedure in a fume hood. PPE-splash proof safety goggles, lab coat, nitrile, neoprene or rubber gloves (choice), butyl gloves or CPE adequate

Procedure	Potential Exposure	PPE and/or Engineering Controls
6. Standards handling	As listed in SOP No. 16	As listed in SOP No. 16. Gloves - CPE

WASTE GENERATION AND HANDLING

Follow all guidelines in the U.S. EPA's Characterization of Waste From Standard Analytical Method

SPECIAL PRECAUTIONS

Use care handling sodium hydroxide which may generate high heat when in contact with water.

Wash hand thoroughly after procedure completion.

CHEMICAL HYGIENE SOP

No. 4

Laboratory Procedure: Chloride

Method: Automated Ferricyanide Spectrophotometric Determination

Description: Liberated thiocyanate ion, in the presence of ferric ion, forms highly colored ferric thiocyanate. The ferric thiocyanate is determined spectrophotometrically.

Chemicals Used: Chloride reagent, chloride standards

Overall Glove Recommendation: Chlorinated Polyethylene (CPE)

SAFETY CONTROLS

Procedure	Potential Exposure	PPE and/or Engineering Controls
1. Chloride reagent preparation, mercuric thiocyanate, methanol, ferric nitrate, nitric acid, Brij-35	Spills, splashing, inhalation, flammable	This material is flammable and hazardous. Do procedure in a fume hood. PPE-splash proof safety goggles, lab coat, no choice gloves based on data for all these materials. Recommend viton or butyl gloves and double gloving. CPE adequate. All reagents should be covered and sealed with parafilm when complete
2. Chloride reagent handling	Slight inhalation	Concentrations are low, general ventilation adequate. PPE-splash proof safety glasses, lab coat, gloving not required, viton, butyl or CPE gloves optional

Procedure	Potential Exposure	PPE and/or Engineering Controls
3. Standards handling	As outlined in SOP No. 16	As outlined in SOP No. 16. Gloves - CPE

WASTE GENERATION AND HANDLING

Follow all guidelines in the U.S. EPA's Characterization of Waste From Standard Analytical Methods.

SPECIAL PRECAUTIONS

Keep ignition sources away from flammables. Keep containers closed when not in use.

Wash hands thoroughly after procedure completion.

CHEMICAL HYGIENE SOP

No. 5

Laboratory Procedure: Dissolved Organic Carbon

Method: ---------

Description: The determination of organic carbon requires the removal of inorganic carbon. Measurements are made with a non-dispersive infrared analyzon.

Chemicals Used: Sulfuric acid, potassium persulfate, organic carbon standard.

Overall Glove Recommendation: Chlorinated Polyethylene (CPE)

SAFETY CONTROLS

Procedure	Potential Exposure	PPE and/or Engineering Controls
1. Sulfuric acid solution preparation, handling	Spills, splashing, inhalation	Do procedure in a fume hood. Add acid slowly. PPE-splash proof safety goggles, lab coat, viton, chlorinated polyethylene, polyethylene gloves
2. Persulfate reagents, potassium persulfate		Local exhaust is adequate. PPE-splash proof safety goggles, lab coat, rubber or neoprene gloves. CPE adequate. Potassium persulfate is a strong oxidizer. Keep from flammables.
3. Standards handling	As outlined in SOP No. 19	As outlined in SOP #19. Gloves - CPE

Procedure	Potential Exposure	PPE and/or Engineering Controls
4. CO_2 analyzer operation	Compressed gas cylinder explosions	Keep compressed gas cylinders secure and upright. Follow safety procedures in Compressed Gas Association Pamphlet P-1
5. Analytical system	Dependent on reagent or standard used	Follow PPE and Engineering Controls as outlined for each reagent or standard used. Gloves - CPE

WASTE GENERATION AND HANDLING

Follow all guidelines of the U.S. EPA's Characterization of Waste from Standard Analytical Methods.

SPECIAL PRECAUTIONS

Compressed gas cylinders.

Thoroughly wash hands after procedure completion.

CHEMICAL HYGIENE SOP

No. 6

Laboratory Procedure:	Chlorophyll-a and chlorophyll-b
Method:	Spectroflourometric Determination
Description:	Algae samples are steeped in ethanol. The decrease in fluorescence at particular wave lengths resulting from the acidification of the sample is proportional to chlorophyll-a and chlorophyll-b
Chemicals Used:	Acetone, sodium bicarbonate, chlorophyll-a standard, chlorophyll-b standard, magnesium carbonate, hydrochloric acid, acetone.

Overall Glove *Recommendation:* Chlorinated Polyethylene (CPE)

SAFETY CONTROLS

Procedure	Potential Exposure	PPE and/or Engineering Controls
1. Acetone solution preparation, acetone and sodium bicarbonate	Spills, splashing, inhalation, flammable	Acetone is flammable. Do procedure in a fume hood. Keep from ignition sources. PPE-splash proof safety goggles, lab coat, butyl, or CPE gloves
2. Chlorophyll-a, chlorophyll-b standards	Spills, splashing, inhalation	Perform procedure in fume hood. PPE-splash proof safety goggles, lab coat CPE or neoprene gloves
3. Magnesium carbonate suspension	None	General ventilation is adequate. PPE-splash proof safety glasses, lab coat

Procedure	Potential Exposure	PPE and/or Engineering Controls
4. Hydrochloric acid solution preparation	Spills, splashing, inhalation	Do procedure in a fume hood. PPE-splash proof safety goggles, lab coat, rubber gloves (choice), viton or CPE gloves (adequate)
5. Calibration, dilution of chlorophyll standards with acetone	Flammable	Acetone and ethanol is extremely flammable. Do procedure in a fume hood. Keep from ignition sources. PPE-splash proof safety goggles, lab coat, gloves not required, CPE gloves optional
6. Analytical procedure, filtration	Flammable	PPE- safety glasses and lab coat
7. Spectro-fluorometer preparation and procedure	Spills, inhalation, flammable	PPE-safety glasses and lab coat

WASTE GENERATION AND HANDLING

Follow all guidelines in the U.S. EPA's Characterization of Waste From Standard Analytical Methods.

SPECIAL PRECAUTIONS

Use care in handling flammables. Keep containers closed when not in use.

Wash hands thoroughly after procedure completion.

CHEMICAL HYGIENE SOP

No. 7

Laboratory Procedure:	Chlorophyll-a and Pheophytin-a
Method:	Spectrofluorometric Determination
Description:	Algae samples are steeped in acetone. Fluorescence at prescribed wavelengths is measured before and after acidification.
Chemicals Used:	Acetone, magnesium carbonate, chlorophyll-a standard, hydrochloric acid.

Overall Glove Recommendation: Chlorinated Polyethylene (CPE)

SAFETY CONTROLS

Procedure	Potential Exposure	PPE and/or Engineering Controls
1. Acetone solution preparation	Spills, splashing, inhalation	Acetone is flammable. Do procedure in a fume hood. Keep from ignition sources. PPE-splash proof safety goggles, lab coat, butyl or CPE gloves
2. Chlorophyll standards	Spills, splashing, inhalation	Perform procedure in fume hood. PPE-splash proof safety goggles, & neoprene or CPE gloves
3. Magnesium carbonate suspension	None	General ventilation is adequate. PPE-splash proof safety glasses, lab coat, gloves not required, any protective glove optional. CPE gloves suggested

Procedure	Potential Exposure	PPE and/or Engineering Controls
4. Hydrochloric acid solution	Spills, splashing, inhalation	Do procedure in a fume hood. PPE-splash proof safety goggles, lab coat, rubber gloves (choice), viton or CPE gloves (adequate)
5. Calibrations, dilutions of chlorophyll with acetone	Flammable	Acetone is flammable. Keep from ignition sources. Do procedure in a fume hood. PPE-splash proof safety goggles, lab coat, CPE gloves
6. Analytical procedure, filtration	Flammable	Acetone is flammable. Keep from ignition sources. Do procedure in a fume hood. PPE-splash proof safety goggles, lab coat, butyl or CPE gloves optional
7. Spectrophotometer and spectrofluorometer procedures	Spills, inhalation, flammable	Use PPE as outlined for handling reagents, CPE gloves suggested

WASTE GENERATION AND HANDLING

Follow all guidelines in the U.S. EPA's Characterization of Waste From Standard Analytical Methods.

SPECIAL PRECAUTIONS

Use care in handling flammables. Keep containers closed when not in use.

Wash hands thoroughly after procedure completion.

CHEMICAL HYGIENE SOP

No. 8

Laboratory Procedure: Specific Conductance

Method: Conductivity Bridge

Description: Specific conductance of water samples are measured by a self-contained conductivity meter.

Chemicals Used: Sodium chloride, potassium chloride.

Overall Glove Recommendation: Polyvinyl Chloride (Vinyl)

SAFETY CONTROLS

Procedure	Potential Exposure	PPE and/or Engineering Controls
1. Stock chloride set standard solution, working calibration standard preparation, sodium chloride	None	General ventilation is adequate. PPE-safety glasses, lab coat, any protective gloves. Vinyl suggested
2. Stock control standard, control standard, potassium chloride	None	General ventilation is adequate. PPE-safety glasses, lab coat, any protective glove. Vinyl suggested
3. Calibration, heating of standard	Heat (burns)	Use local exhaust.

WASTE GENERATION AND HANDLING

Follow all guidelines in the U.S. EPA's Characterization of Waste From Standard Analytical Methods.

SPECIAL PRECAUTIONS

Wash hands thoroughly after procedure completion.

CHEMICAL HYGIENE SOP

No. 9

Laboratory Procedure:	Nitrate and Nitrite Nitrogen
Method:	Cadmium reduction, automated, spectrophotometric
Description:	Buffered samples are passed through a reduction column to reduce nitrate to nitrite. The nitrite undergoes a diazotization reaction to form an azo dye which is determined spectrophotometrically.
Chemicals Used:	Granulated cadmium, phosphoric acid, sulfanilamide, N-(1-naphtyl)-ethylenediame dihydrochloride, Brij-35, hydrochloric acid, copper sulfate, ammonium chloride.

Overall Glove Recommendation: Chlorinated Polyethylene (CPE)

SAFETY CONTROLS

Procedure	Potential Exposure	PPE and/or Engineering Controls
1. Granulated cadmium	Inhalation	Do procedure in a fume hood. PPE-splash proof safety goggles, lab coat, rubber gloves (no data on gloves). CPE adequate
2. Color reagent preparation, phosphoric acid, sulfanilamide, N-(1-naphtyl)-ethylenediamine dihydrochloride, Brij-35	Spills, splashing, inhalation	Do procedure in a fume hood. Avoid any high heating of this material. Phosphoric acid reacts with water and sulfanilamide. Mix carefully. PPE-splash proof safety goggles, lab coat, viton, or butyl, or CPE gloves

Procedure	Potential Exposure	PPE and/or Engineering Controls
3. Hydrochloric acid, reagent water solution	Spills, splashing, inhalation	May cause skin or respiratory burns. Do procedure in a fume hood. PPE-splash proof safety goggles, lab coat, neoprene, rubber gloves or CPE gloves
4. Copper sulfate solution	Spills, splashing, inhalation	Avoid heating this material. Do procedure in a fume hood. PPE-splash proof safety goggles, lab coat, neoprene, nitrile or CPE gloves
5. Buffer solution preparation, ammonium chloride, Brij-35	Spills, splashing, inhalation	Do not burn this material. Do procedure in a fume hood. PPE-splash proof safety goggles, lab coat, neoprene, nitrile, butyl, viton, or CPE gloves
6. Standards handling	As listed in SOP No. 19	As listed in SOP No. 19. Gloves - CPE
7. Procedure:		
7a. Preparation of reduction column, cadmium, hydrochloric acid	Spills, splashing, inhalation	Do procedure in a fume hood. PPE-splash proof safety goggles, lab coat, neoprene, rubber or CPE gloves
7b. Preparation of reduction column, cadmium, copper sulfate	Spills, splashing, inhalation	Avoid heating. Do procedure in a fume hood. PPE-splash proof safety goggles, lab coat, neoprene, nitrile or CPE gloves

Procedure	Potential Exposure	PPE and/or Engineering Controls
7c.Preparation of reduction column, cadmium handling	Inhalation	Do procedure in a fume hood. PPE-splash proof safety goggles, lab coat, rubber or neoprene gloves (no data on gloves). CPE adequate
8. Analytical system handling standards	As listed in SOP No. 19	As listed in SOP No. 19. Gloves - CPE
9. Conditioning the pump, ammonium chloride	Spills, splashing, inhalation	Allow local exhaust or venting operating equipment. PPE-splash proof safety goggles, lab coat, neoprene, nitrile, butyl, viton, or CPE gloves
10. Preliminary calibration, dilute standards	As listed in SOP No. 19	As listed in SOP No. 19. Gloves - CPE

WASTE GENERATION AND HANDLING

Follow all guidelines in the U.S. EPA's Characterization of Waste From Standard Analytical Methods.

SPECIAL PRECAUTIONS

Follow Trouble Shooting / Corrective Action Section

Wash hands thoroughly after procedure completion.

CHEMICAL HYGIENE SOP

No. 10

Laboratory Procedure: Dissolved Oxygen

Method: Micro Method, Winkler Titration

Description: The sample is treated with several chemicals. Manganous hydroxide combines with dissolved oxygen in the sample to form a brown precipitate. Free iodine is released which is stoichiometrically equivalent to the dissolved oxygen in the sample. The sample is then titrated with sodium thiosulfate.

Chemicals Used: Manganese sulfate, sodium hydroxide, sodium iodide, sodium azide, sulfuric acid, soluble starch, sodium thiosulfate, potassium biiodate, potassium iodide, chloroform.

Overall Glove Recommendation: Chlorinated Polyethylene (CPE) except for chloroform, see procedure #4

SAFETY CONTROLS

Procedure	Potential Exposure	PPE and/or Engineering Controls
1. Manganese sulfate solution preparation	Inhalation	General ventilation is adequate. Do procedure in a fume hood if practical. PPE-splash proof safety goggles, lab coat, no data on gloves, recommend rubber or CPE gloves

Procedure	Potential Exposure	PPE and/or Engineering Controls
2. Alkaline azide reagent, sodium hydroxide, sodium iodide, sodium azide	Spills, splashing, inhalation	Sodium azide is extremely poisonous and may be explosive at very high heat. Sodium hydroxide is highly toxic. Both materials react violently with water. Mix slowly, allow to cool. Do procedure in a fume hood. PPE-splash proof safety goggles, face shield, lab coat, nitrile, neoprene or rubber gloves (choice), butyl or CPE gloves (adequate). Apron optional
3. Starch indicator solution	None	General ventilation adequate. PPE-safety glasses or splash proof, lab coat, any type of protective glove optional. CPE suggested
4. Sodium thiosulfate stock solution, chloroform	Spills, splashing, inhalation	Chloroform is a suspect carcinogen. Do procedure in Designated Area fume hood. PPE-splash proof safety goggles, lab coat, viton gloves only

Procedure	Potential Exposure	PPE and/or Engineering Controls
5. Sodium thiosulfate standard titrant	None	General ventilation is adequate. If practical, do procedure in fume hood. PPE-safety glasses or splash proof, lab coat, nitrile, neoprene, viton, butyl or CPE gloves
6. Potassium biiodate stock solution, working standard	Drying (burns)	Use local heat exhaust for heating. General ventilation adequate for preparation. PPE-safety glasses, lab coat, gloves not required, vinyl or CPE gloves optional
7. Potassium iodide solution preparation	None	General ventilation adequate. If practical, do procedure in a fume hood. PPE-safety glasses or splash proof, lab coat, any protective glove optional. CPE suggested
8. Sulfuric acid solution	Spills, splashing, inhalation	General ventilation is adequate. If practical, do procedure in a fume hood. PPE-splash proof safety goggles, lab coat, viton, chlorinated polyethylene, polyethylene gloves

Procedure	Potential Exposure	PPE and/or Engineering Controls
9. Standardization of sodium thiosulfate	Spills, splashing, inhalation	Low concentrations, general ventilation adequate. PPE- splash proof safety goggles, lab coat, viton or CPE gloves
10. Procedure	Spills, splashing, inhalation	If practical, do procedures in a fume hood. Use PPE as listed for each reagent handled

WASTE GENERATION AND HANDLING

Follow all guidelines in the U.S. EPA's Characterization of Waste From Standard Analytical Methods.

SPECIAL PRECAUTIONS

Mix alkaline azide solution carefully to avoid violent reaction. Recommend double gloving with carcinogens in the event of a spill.

Wash hands thoroughly after procedure completion.

CHEMICAL HYGIENE SOP

No. 11

Laboratory Procedure: Dissolved Oxygen

Method: Micro, dissolved oxygen meter measurement

Description: Samples are analyzed with a Dissolved Oxygen meter immediately after collection.

Chemicals Used: Potassium chloride

Overall Glove Recommendation: Vinyl

SAFETY CONTROLS

Procedure	Potential Exposure	PPE and/or Engineering Controls
Addition potassium chloride solution to probe	None	General ventilation adequate. PPE- safety glasses, lab coat, any protective gloves. Vinyl suggested

WASTE GENERATION AND HANDLING

Follow all guidelines in the U.S. EPA's Characterization of Waste From Standard Analytical Methods.

SPECIAL PRECAUTIONS

Wash hands thoroughly after procedure completion.

CHEMICAL HYGIENE SOP

No. 12

Laboratory Procedure: Electometric pH

Method: ----------

Description: The pH of a sample is determined electrometrically using a glass electrode in combination with a reference electrode or with a combination pH electrode.

Chemicals Used: Calibration standard buffers, control standard buffers, sodium hydroxide for cleaning.

Overall Glove Recommendation: Chlorinated Polyethylene (CPE)

SAFETY CONTROLS

Procedure	Potential Exposure	PPE and/or Engineering Controls
1. Calibration using pH buffers (potassium biphthalate-sodium hydroxide buffer)	Spills, splashing, inhalation	General ventilation may be adequate. PPE-splash proof safety goggles, lab coat, gloves not required, neoprene, butyl, rubber or CPE gloves optional
2. Washing with sodium hydroxide	Spills, splashing, inhalation	When in contact with water, sodium hydroxide may generate sufficient heat to ignite combustibles. Do procedure in a fume hood, collect rinse-off. PPE-splash proof safety goggles, lab coat, nitrile, neoprene, rubber gloves (choice), butyl or CPE gloves (adequate)

WASTE GENERATION AND HANDLING

Follow all guidelines in the U.S. EPA's Characterization of Waste From Standard Analytical Methods.

SPECIAL PRECAUTIONS

Wash hands thoroughly after procedure completion.

CHEMICAL HYGIENE SOP

No. 13

Laboratory Procedure: Soluble Reactive Phosphorous

Method: ----------

Description: Phosphate ions react with ammonium molybdate and potassium antimonyl tartrate. It is reduced with ascorbic acid to form a blue complex which is determined spectrophotometrically.

Chemicals Used: Sodium lauryl sulfate, sulfuric acid, ammonium molybdate, ascorbic acid, potassium antimonyl tartrate, hydrochloric acid, sodium hydroxide.

Overall Glove Recommendation: Chlorinated Polyethylene (CPE)

SAFETY CONTROLS

Procedure	Potential Exposure	PPE and/or Engineering Controls
1. Sodium lauryl sulfate solution preparation	Splashing	General ventilation adequate. Do procedure in fume hood if practical. PPE-splash proof safety goggles, lab coat, rubber gloves (choice), any protective glove (adequate). CPE suggested
2. Sulfuric acid solution preparation	Spills, splashing, inhalation	Do procedure in a fume hood. May cause skin and respiratory burns. PPE-splash proof safety goggles, lab coat, viton, chlorinated polyethylene, polyethylene gloves

Procedure	Potential Exposure	PPE and/or Engineering Controls
3. Ammonium molybdate stock solution	Spills, splashing, inhalation	General ventilation is adequate. PPE-splash proof safety goggles, lab coat, no data on gloves, recommend rubber or CPE gloves
4. Ascorbic acid solution	Slight irritations	General ventilation is adequate. If practical, do procedure in fume hood. PPE-splash proof safety goggles, lab coat, any protective glove. CPE suggested
5. Potassium antimonyl tartrate solution	Spills, splashing, inhalation	General ventilation is adequate. PPE-splash proof safety goggles, lab coat, no data on gloves-recommend rubber or CPE
6. Combined color reagent mixture	Spills, splashing, inhalation	General ventilation is adequate. Follow analytical procedure steps when adding chemicals. Add slowly, mix carefully, allow mixture to cool. PPE-splash proof safety goggles, lab coat, use appropriate gloves for handling sulfuric acid, remaining solutions and handling of mix - CPE adequate
7. Standards preparation and handling	Follow SOP No. 16	Follow SOP No. 16. Gloves - CPE

Procedure	Potential Exposure	PPE and/or Engineering Controls
8. Procedure	Follow SOP No. 19	Follow SOP No. 19. Gloves - CPE
9. Hydrochloric acid preparation	Spills, splashing, inhalation	May cause severe skin or respiratory burns. Do procedure in a fume hood. PPE-splash proof safety goggles, lab coat, neoprene, rubber or CPE gloves
10. Trouble Shooting sequencing hydrochloric acid	Inhalation	Acid is dilute, general ventilation adequate. PPE-splash proof safety goggles, lab coat, neoprene, rubber or CPE gloves. Seal container with parafilm
11. Sodium hydroxide preparation	Spills, splashing, inhalation	When in contact with water, sodium hydroxide may generate sufficient heat to ignite combustibles. Do procedure in a fume hood. PPE-splash proof safety goggles, lab coat, nitrile, neoprene, rubber gloves (choice), butyl or CPE gloves (adequate)

Procedure	Potential Exposure	PPE and/or Engineering Controls
12. Trouble Shooting sequencing with sodium hydroxide	Splashing	Sodium hydroxide soln. is quite dilute. General ventilation is adequate. PPE- splash proof safety goggles, lab coat, nitrile, neoprene rubber gloves (choice), butyl or CPE gloves (adequate)

WASTE GENERATION AND HANDLING

Follow all guidelines in the U.S. EPA's Characterization of Waste From Standard Analytical Methods.

SPECIAL PRECAUTIONS

Mix combined color reagent very carefully.

Wash hands thoroughly after procedure completion.

CHEMICAL HYGIENE SOP

No. 14

Laboratory Procedure:	Total phosphorous, total dissolved phosphorous
Method:	Low level, micro-persulfate digestion, automated spectrophotometric determination.
Description:	Water samples are digested - blue complex is determined spectrophotometrically.
Chemicals Used:	Sulfuric acid, hydrochloric acid, ammonium persulfate, ammonium molybdate, ascorbic acid, potassium antimonyl tartrate, sodium lauryl sulfate

Overall Glove Recommendation: Chlorinated Polyethylene (CPE)

SAFETY CONTROLS

Procedure	Potential Exposure	PPE and/or Engineering Controls
1. Sample preservation with sulfuric acid	Spills, splashing, inhalation	May cause skin or respiratory burns. General ventilation adequate for this procedure but use caution. PPE-splash proof safety goggles, lab coat, viton, chlorinated polyethylene, polyethylene gloves
2. Preparation of hydrochloric acid	Spills, splashing, inhalation	May cause severe skin or respiratory burns. Do procedure in a fume hood. PPE-splash proof safety goggles, lab coat, neoprene, rubber or CPE gloves

Procedure	Potential Exposure	PPE and/or Engineering Controls
3. Digestion solution preparation, sulfuric acid	Spills, splashing, inhalation	May cause skin or respiratory burns. Do procedure in a fume hood. PPE- splash proof safety goggles, lab coat, viton, chlorinated polyethylene, polyethylene gloves
4. Digestion solution preparation, ammonium persulfate	Spills, splashing, inhalation	This material is a strong oxidizer when heated. Keep from combustibles. do procedure in a fume hood. PPE- splash proof safety goggles, lab coat, neoprene, viton or butyl or CPE gloves
5. Working digestion solution, sulfuric acid, ammonium persulfate	Spills, splashing, inhalation, potential violent reactions	Sulfuric acid is not compatible with strong oxidizers. Mix solution carefully, avoid heating and heat sources. General ventilation adequate at 10 ml volumes of each reagent. PPE- splash proof safety goggles and face shield, lab coat, viton or CPE gloves only, viton apron recommended
6. Sampler wash, sulfuric acid	Spills, splashing, inhalation	Very dilute acid. General ventilation is adequate. PPE- splash proof safety goggles, lab coat, viton, chlorinated polyethylene, polyethylene gloves

Procedure	Potential Exposure	PPE and/or Engineering Controls
7. Color development reagent, sulfuric acid	Spills, splashing, inhalation	May cause skin or respiratory burns. Do procedure in a fume hood. PPE-splash proof safety goggles, lab coat, viton, chlorinated polyethylene, polyethylene gloves
8. Ammonium molybdate stock solution preparation	Spills, splashing, inhalation	General ventilation adequate. PPE-splash proof safety goggles, lab coat, no data on gloves - recommend rubber or CPE
9. Ascorbic acid stock solution preparation	Slight irritations	General ventilation adequate. If practical, do procedure in a fume hood. PPE-splash proof safety goggles, lab coat, any protective glove. CPE suggested
10. Potassium antimonyl tartrate solution	Spills, splashing, inhalation	General ventilation adequate. PPE-splash proof safety goggles, lab coat, no data on gloves - recommend rubber or CPE

Procedure	Potential Exposure	PPE and/or Engineering Controls
11. Combined color reagent mixture	Spills, splashing, inhalation	General ventilation and good lab practice is adequate. Follow analytical procedure steps when adding chemicals. Add slowly, mix carefully, allow mixture to cool. PPE-splash proof safety goggles, lab coat, use appropriate gloves for handling sulfuric acid, remaining solutions and handling of mix-CPE gloves
12. Sodium lauryl sulfate solution preparation	Splashing	General ventilation is adequate. If practical, do procedure in a fume hood. PPE-splash proof safety goggles, lab coat, rubber gloves (choice), any protective glove (adequate)
13. Standard preparation	Follow SOP No. 16	Follow SOP No. 16. Gloves - CPE
14. Digestion sample, calibration and controls preparation	Spills, splashing, inhalation	General ventilation is adequate. Wear appropriate PPE as outlined for reagents and controls

Procedure	Potential Exposure	PPE and/or Engineering Controls
15. Digestion, heating tubes	Burns, inhalation	Use exhaust hood while digesting. Allow a clean air purge before opening. Use insulated gloves when handling hot items
16. Analytical procedures	Inhalation	Follow procedures and PPE in SOP No. 19. Gloves - CPE

WASTE GENERATION AND HANDLING

Follow all guidelines in the U.S. EPA's Characterization of Waste From Standard Analytical Methods.

SPECIAL PRECAUTIONS

Combined color reagent mix should be done carefully, as well as working digestion solutions. Avoid breathing digestion vapors off of heating apparatus.

Wash hands thoroughly after procedure completion.

CHEMICAL HYGIENE SOP

No. 15

Laboratory Procedure:	Silicates
Method:	Automated spectrophotometric, molybdate blue
Description:	In acidic solution, silicamolybdate is reduced to molybdenum blue which is determined spectrophotometrically
Chemicals Used:	Ammonium molybdate, sulfuric acid, oxalic acid, ascorbic acid, acetone

Overall Glove Recommendation: Chlorinated Polyethylene (CPE)

SAFETY CONTROLS

Procedure	Potential Exposure	PPE and/or Engineering Controls
1. Ammonium molybdate reagent, ammonium molybdate, sulfuric acid	Spills, splashing, inhalation	Do procedure in a fume hood. PPE-splash proof safety goggles, lab coat, viton or CPE gloves
2. Oxalic acid reagent	Spills, splashing, inhalation	Incompatible with oxidizers and sulfuric acid. Avoid this contact. Avoid heating. General ventilation is adequate. PPE-splash proof safety goggles, lab coat, rubber, butyl, chlorinated polyethylene gloves (choice), nitrile, CPE or neoprene gloves (adequate)

Procedure	Potential Exposure	PPE and/or Engineering Controls
3. Ascorbic acid reagent, ascorbic acid, acetone	Splashing, inhalation, flammable	Acetone is flammable. Keep from ignition sources. Do procedure in a fume hood. Remaining procedures can be done in general ventilation. PPE- splash proof safety goggles, lab coat, butyl or CPE gloves only. Seal reagent top with parafilm
4. Standards solution	Follow SOP No. 16	Follow SOP No. 16
5. Analytical Procedures	Follow SOP No. 19	Follow SOP No. 19

WASTE GENERATION AND HANDLING

Follow all guidelines in the U.S. EPA's Characterization of Waste From Standard Analytical Methods.

SPECIAL PRECAUTIONS

Use caution working with flammables.

Wash hands thoroughly after procedure completion.

CHEMICAL HYGIENE SOP

No. 16

Laboratory Procedure: Standards and Spikes Preparation

Method: Many

Description: Preparation of individual standards used for the analytical procedures.

Chemicals Used: Sulfuric acid, chloroform, anhydrous ammonium sulfate, potassium biphthalate, sodium chloride, potassium nitrate, potassium nitrite, sodium nitrite, potassium phosphate (monobasic), silica, sodium sulfate, ammonium chloride, methenamine, potassium chloride, potassium sulfate, sodium nitrate, sodium phosphate (dibasic), sodium glycerophosphate, sodium silicate

Overall Glove Recommendation: Chlorinated Polyethylene (CPE)

SAFETY CONTROLS

Procedure	Potential Exposure	PPE and/or Engineering Controls
Calibration (set) standards, preparation:		
1. Ammonia stock standard, anhydrous ammonium sulfate, sulfuric acid	Splash, possible explosion	Avoid extreme heat w/ ammonium sulfate or sulfuric acid-explosive. Do not mix ammonium sulfate with oxidizers-produces toxic gases. When adding sulfuric acid, do procedure in fume hood. All other dilutions of the stock standard can be done in general ventilation. Do in fume hood if practical

Procedure	Potential Exposure	PPE and/or Engineering Controls
		PPE-splash proof safety goggles, lab coat, viton, chlorinated polyethylene, polyethylene gloves
2. Dissolved organic carbon, potassium biphthalate and sulfuric acid	Spills, splashing, inhalation	Low conc. of acid general ventilation is adequate. PPE-splash proof safety goggles, lab coat, viton, chlorinated polyethylene, polyethylene gloves
3. Chloride stock standard, sodium chloride	None	General ventilation adequate. General lab PPE required: Safety glasses, lab coat, any protective glove optional. CPE suggested
4. Nitrate stock standard, potassium nitrate, sulfuric acid	Spills, splashing, inhalation	Do procedure in a fume hood. PPE-splash proof safety goggles, lab coat, viton, chlorinated polyethylene, polyethylene gloves
5. Nitrite stock standard, potassium nitrite, sodium nitrite, chloroform	Spills, splashing, inhalation	Chloroform is a suspect carcinogen. Do procedure in the Designated Area fume hood. PPE-splash proof safety goggles, lab coat, viton or CPE gloves
6. Phosphorous stock standard, potassium phosphate (monobasic), sulfuric acid	Spills, splashing, inhalation	Do procedure in a fume hood. PPE-splash proof safety goggles, lab coat, viton, chlorinated polyethylene, polyethylene gloves

Procedure	Potential Exposure	PPE and/or Engineering Controls
7. Silica stock standard	Inhalation	Do procedure in a fume hood. PPE-safety glasses, lab coat, any protective glove optional. CPE suggested
8. Sulfate stock standard, sodium sulfate	Slight inhalation	General ventilation is adequate. PPE-splash proof safety goggles, lab coat, any protective glove. CPE suggested
Intermediate control standards, working control standards (dilutions of intermediate), spike preparations		
9. Ammonia / orthorphosphate, sulfuric acid	Spills, splashing, inhalation	General ventilation may be adequate. If practical, do procedure in a fume hood. PPE-splash proof safety goggles, lab coat, viton, chlorinated polyethylene, polyethylene gloves
10. Nitrate/silica intermediate	Spills, splashing, inhalation	General ventilation is adequate. PPE-splash proof safety goggles, lab coat, viton or CPE gloves
11. Digested phosphorous, sulfuric acid	Spills, splashing, inhalation	Do procedure in a fume hood. PPE-splash proof safety goggles, lab coat, viton, chlorinated polyethylene, polyethylene gloves

Procedure	Potential Exposure	PPE and/or Engineering Controls
12. Chloride / sulfate	None	General ventilation is adequate. General lab PPE-safety glasses, lab coat, any protective glove. CPE suggested
Control standard concentrate for autoanalyzers, preparation:		
13. Ammonium chloride	Inhalation	General ventilation is adequate, low conc. PPE-splash proof safety goggles, lab coat, chlorinated polyethylene gloves. Seal ammonium chloride buffer with parafilm
14. Dissolved organic carbon, methenamine	Spills, splashing, inhalation, flammable	General ventilation is adequate, low conc. Keep from ignition sources. PPE-splash proof safety goggles, lab coat, (no data on gloves), recommend rubber gloves or CPE and double gloving
15. Chloride and sulfate stock and high & low control concentrate, potassium chloride, potassium sulfate	None	General ventilation adequate. If practical, do procedure in fume hood. PPE-safety glasses, lab coat, any protective glove. Suggest CPE

Procedure	Potential Exposure	PPE and/or Engineering Controls
16. Nitrate stock control, sodium nitrate	Spills, inhalation	Avoid any shock or heating to this material. General ventilation is adequate. This material is a solid and may disperse in the fume hood. PPE-splash proof safety goggles, lab coat, butyl, CPE or viton gloves
17. Orthophosphate stock control, sodium phosphate (dibasic)	Slight spills, inhalation	General ventilation is adequate. PPE-safety glasses, lab coat, any protective glove. CPE suggested
18. Digested phosphorous, sodium glycerophosphate		General ventilation is adequate. PPE-safety glasses, lab coat, any protective glove. CPE suggested
19. Silica stock control, $Na_2 Si F_6$	Inhalation, spills	Local ventilation adequate. PPE-safety glasses, lab coat, any protective glove. CPE suggested
Intermediate control standards, working control standards, preparation:		
20. Ammonia / orthophosphate, sulfuric acid (high & low standard)	Spills, splashing, inhalation	General ventilation is adequate. Quantity of acid used is low. PPE-splash proof safety goggles, lab coat, viton, chlorinated polyethylene, polyethylene gloves

CHEMICAL HYGIENE SOP

No. 17

Laboratory Procedure: Sulfate

Method: Automated, methylthymol blue, spectrophotometric determination

Description: Water samples are passed through various chemical reactions to determine the amount of sulfate present

Chemicals Used: Barium chloride, methylthymol blue, hydrochloric acid, ethanol, ammonium chloride, ammonium hydroxide, tetrasodium EDTA, sodium hydroxide, Brij-35, sodium sulfate, calcium oxide

Overall Glove Recommendation: Chlorinated Polyethylene (CPE)

SAFETY CONTROLS

Procedure	Potential Exposure	PPE and/or Engineering Controls
1. Barium chloride solution preparation		Perform procedure in fume hood. PPE-splash proof safety goggles, lab coat, any protective glove. CPE suggested
2. Methylthymol blue solution preparation	Spills, splashing, inhalation	Do procedure in fume hood. Ethanol vapors may flash back. Keep from open flame. PPE-splash proof safety goggles, lab coat, polyethylene gloves only for ethanol, rubber (choice) or viton or CPE (adequate) gloves

Procedure	Potential Exposure	PPE and/or Engineering Controls
3. Buffer solution preparation	Spills, splashing, inhalation	General ventilation is adequate. PPE-splash proof safety goggles, lab coat, neoprene, CPE or rubber gloves. Seal reagent and waste container with parafilm
4. Buffered EDTA solution preparation	Spills, splashing, inhalation	General ventilation is adequate. PPE-splash proof safety goggles, lab coat, neoprene, CPE or butyl gloves
5. Sodium hydroxide solution preparation	Spills, splashing, inhalation	When in contact with water, sodium hydroxide may generate sufficient heat to ignite combustible materials. Keep these materials away. Prepare solution in a fume hood. PPE-splash proof safety goggles, lab coat, nitrile, neoprene, rubber gloves (choice), butyl or CPE gloves (adequate)
6. Dilution water preparation	Spills, splashing, inhalation	General ventilation is adequate. If practical, do procedure in fume hood. PPE-splash proof safety goggles, lab coat, rubber gloves (choice), any protective glove (adequate). CPE suggested

Procedure	Potential Exposure	PPE and/or Engineering Controls
7. Sulfate stock solution preparation, working solution dilutions	Follow SOP No. 16	Follow SOP No. 16. Gloves - CPE
8. Analytical procedure	Follow SOP No. 19	Follow SOP No. 19. Gloves - CPE
9. Pump all reagents through system, run pattern for calibration standards, handling samples, analysis	Spills, splashing, inhalation	Use appropriate PPE as indicated
10. Wash out procedure	Spills, splashing, inhalation	Use appropriate PPE as indicated

WASTE GENERATION AND HANDLING

Follow all guidelines in the U.S. EPA's Characterization of Waste From Standard Analytical Methods.

SPECIAL PRECAUTIONS

Use care in handling ammonium hydroxide. Review Safety and Waste Handling and Troubleshooting / Corrective Action sections in the Laboratory Procedure Manual for this procedure.

Wash hands thoroughly after procedure completion.

CHEMICAL HYGIENE SOP

No. 18

Laboratory Procedure: Suspended Solids

Method: Glass fiber filters

Description: Water samples are filtered through a glass fiber filter. This is washed, dried, and weighed

Chemicals Used: None

SAFETY CONTROLS

Procedure	Potential Exposure	PPE and/or Engineering Controls
Drying in oven or muffle furnace	Heat (burns)	Exhaust heat from furnace. Use insulated gloves handling hot items

WASTE GENERATION AND HANDLING

None.

SPECIAL PRECAUTIONS

None

CHEMICAL HYGIENE SOP

No. 19

Laboratory Procedure:	Technicon autoanalyzer and associated recording equipment
Method:	---------
Description:	This is a general description of operation of autoanalyzers, recorders, and the computer connections.
Chemicals Used:	As listed in each SOP which requires this equipment.

SAFETY CONTROLS

Procedure	Potential Exposure	PPE and/or Engineering Controls
Electrical connections, wet conditions	Electrical shock, hazards	Use Ground Fault Interrupter

WASTE GENERATION AND HANDLING

None.

SPECIAL PRECAUTIONS

None

CHEMICAL HYGIENE SOP

No. 20

Laboratory Procedure: Turbidity

Method: Nephelometric

Description: A comparison of light scattered by the sample under defined conditions with the intensity of light scattered by a standard reference suspension. Readings are made in a nephelometer.

Chemicals Used: Hydrazine sulfate, hexamethylenetetramine

Overall Glove Recommendation: Polyvinyl chloride (Vinyl)

SAFETY CONTROLS

Procedure	Potential Exposure	PPE and/or Engineering Controls
1. Stock formazin solution preparation, hydrazine sulfate, hexamethylenetetramine	Spills, splashing, inhalation	Respiratory and skin burns. Do procedure in a fume hood. PPE-splash proof safety goggles, lab coat, and polyvinyl chloride gloves
2. General procedure	Inhalation, spills	General ventilation is adequate. PPE-safety glasses & lab coat. Rubber or vinyl gloves optional

WASTE GENERATION AND HANDLING

Follow all guidelines in the U.S. EPA's Characterization of Waste From Standard Analytical Methods.

SPECIAL PRECAUTIONS

Wash hands thoroughly after procedure completion.

CHEMICAL HYGIENE SOP

No. 21

Laboratory Procedure: Aerobic Heterotrophs. (Total Coliforms Fecal Coliforms, Fecal Streptococci, not presently done).

Method: ----------

Description: Microbiological analysis of water samples

SOP for Aerobic Heterotrophs

Chemicals Used: Sodium thiosulfate, ethyl alcohol, phosphate buffer solution

Overall Glove Recommendation: Chlorinated Polyethylene except for hot items (CPE).

SAFETY CONTROLS

Procedure	Potential Exposure	PPE and/or Engineering Controls
1. Addition of sodium thiosulfate to each sample bottle	None	General ventilation is adequate. If practical, do procedure in a fume hood. Suggested PPE-splash proof safety goggles, lab coat, nitrile, neoprene, viton, CPE or butyl gloves
2. Heating agar, autoclaving	Heat (burns)	Exhaust heat. Use insulated gloves handling hot items
3. Flaming of flask lip	Flammable	Keep combustible chemicals and materials away from area. If practical, remove these from lab
4. Forceps sterilized in ethyl alcohol	Flammable	Keep container of ethyl alcohol 2 ft. from flame. Vapors can potentially flash back

Procedure	Potential Exposure	PPE and/or Engineering Controls
5. Analytical procedures, handling	Biological	General bio-safety rules should apply for all procedures. PPE-safety glasses, lab coat, gloves not required, any protective glove optional. CPE suggested
6. Sterilization of equipment	Heat, inhalation	Use exhausting vent or hood over autoclave. Use insulated gloves when handling hot items
7. Calibration, pH buffers	Splashing, inhalation	General ventilation is adequate. If practical, do procedure in a fume hood. PPE-splash proof safety goggles, lab coat, neoprene, butyl, CPE or rubber gloves

WASTE GENERATION AND HANDLING

Follow all guidelines in the U.S. EPA's Characterization of Waste From Standard Analytical Methods.

SPECIAL PRECAUTIONS

Follow Biosafety Rules as outlined in the Chemical Hygiene Safety Manual. Recommend double gloving in the event of spill.

Wash hands thoroughly after procedure completion.

SOP for Fecal Coliform Bacteria

Chemicals Used: Rosalic acid, sodium hydroxide, potassium dihydrogen phosphate, magnesium chloride

Overall Glove Recommendation: Chlorinated Polyethylene except for hot items (CPE).

SAFETY CONTROLS

Procedure	Potential Exposure	PPE and/or Engineering Controls
1. Difco M-FC Broth preparation	Spills, splashing	General ventilation adequate. PPE-splash proof safety goggles, lab coat, any protective glove. CPE suggested
2. Rosalic acid solution preparation	Spills, splashing, inhalation	Perform procedure in fume hood. PPE-splash proof safety goggles, lab coat, rubber or CPE gloves
3. Lauryl Tryptos Broth preparation	Spills, splashing, inhalation, heat (burns)	General ventilation is adequate. PPE-splash proof safety goggles, lab coat, neoprene, CPE or rubber gloves. Use care during autoclaving to prevent burns. Use exhaust hood while autoclaving and during removal of products. Use insulated gloves for hot items

Procedure	Potential Exposure	PPE and/or Engineering Controls
4. EC medium preparation	Spills, splashing, inhalation, heat (burns)	General ventilation is adequate. PPE-splash proof safety goggles, lab coat, neoprene, CPE or rubber gloves. Use care during autoclaving to prevent burns. Use exhaust hood while autoclaving and during removal of products. Use insulated gloves for hot items
5. Stock phosphate buffer solution preparation, pH adjustment	Spills, splashing, inhalation, heat (burns)	General ventilation is adequate. PPE-splash proof safety goggles, lab coat, neoprene, CPE or rubber gloves. Use care during autoclaving to prevent burns. Use exhaust hood while autoclaving to prevent burns. Use exhaust hood while autoclaving and during removal of products. Use insulated gloves for hot items
6. Working solution of phosphate buffer	Spills, splashing, inhalation, heat (burns)	General ventilation is adequate. PPE-splash proof safety goggles, lab coat, neoprene, CPE or rubber gloves. Use care during autoclaving. Use exhaust hood while autoclaving and during removal of products. Use insulated gloves for hot items

Procedure	Potential Exposure	PPE and/or Engineering Controls
7. Sample preparation and serial dilutions	Spills, splashing, inhalation, biological	Biosafety rules need to be followed. Procedure must be done in the Biological Safety Cabinet. PPE- splash proof safety goggles, lab coat, CPE or rubber gloves (double gloving is recommended)
8. Filtration procedure	Spills, splashing, inhalation, biological	Biosafety rules need to be followed. Procedure must be done in the Biological Safety Cabinet. PPE- splash proof safety goggles, lab coat, CPE or rubber gloves (double gloving is recommended). Use care while operating incubator to prevent burns. Use exhaust hood for incubator operation and removing samples. Allow a clean air purge before opening incubator. Use insulated gloves for hot items

Procedure	Potential Exposure	PPE and/or Engineering Controls
9. Verification procedures counting and recording	Spills, splashing, inhalation, biological	Biosafety rules need to be followed. Procedure must be done in the Biological Safety Cabinet. PPE-splash proof safety goggles, lab coat, CPE or rubber gloves (double gloving is recommended). Use care while operating incubator to prevent burns. Use exhaust hood or vent while incubator is in operation and while removing samples. Allow a clean air purge before opening incubator. General lab rules and PPE. Use insulated gloves for hot items

WASTE GENERATION AND HANDLING

Follow all guidelines in the U.S. EPA's Characterization of Waste From Standard Analytical Methods.

SPECIAL PRECAUTIONS

Biological Safety procedures need to be followed during these procedures. Thorough decontamination of work areas and equipment needs to be followed closely. All biological work must be done in a Biological Safety Cabinet. Double gloving is recommended for protection in the event of a spill of inoculant.

Review all Biosafety procedures in the Chemical Hygiene Safety Manual prior to any work.

SOP for Total Coliform Bacteria

Chemicals Used: Ethanol, dipotassium hydrogen phosphate, potassium dihydrogen phosphate, sodium chloride, sodium lauryl sulfate, magnesium chloride, methylene blue, sodium hydroxide

Overall Glove Recommendation: Chlorinated Polyethylene (CPE)

SAFETY CONTROLS

Procedure	Potential Exposure	PPE and/or Engineering Controls
1. M-Endo Broth MF preparation	Spills, splashing, inhalation, heat (burns)	General ventilation is adequate. PPE-splash proof safety goggles, lab coat, neoprene, CPE or rubber gloves. Use exhaust hood during autoclaving. Use insulated gloves for heated material
2. To rehydrate M-Endo Broth MF	Spills, splashing, inhalation, flammables. Ethanol is very flammable	Ethanol is very flammable. Do procedures in a fume hood. Keep from open flames. Keep container closed. PPE-splash proof safety goggles, lab coat, polyethylene gloves only for handling ethanol, rubber or neoprene for remaining procedure. Boil in a fume hood. Do not use open flame heat source. CPE gloves adequate for procedure

Procedure	Potential Exposure	PPE and/or Engineering Controls
3. Lauryl Tryptose Broth preparation	Spills, splashing, inhalation, heat (burns)	General ventilation is adequate. PPE-splash proof safety goggles, lab coat, neoprene, CPE or rubber gloves. Use care during autoclaving to prevent burns. Use exhaust hood while autoclaving and during removal of products. Use insulated gloves for hot items
4. Rehydration of Lauryl Tryptose Broth preparation	Spills, splashing, inhalation, heat (burns)	General ventilation is adequate. PPE-splash proof safety goggles, lab coat, neoprene, CPE or rubber gloves. Use care during autoclaving to prevent burns. Use exhaust hood while autoclaving and during removal of products. Use insulated gloves for hot items
5. Stock phosphate buffer solution preparation, pH adjustment	Spills, splashing, inhalation, heat (burns)	General ventilation is adequate. PPE-splash proof safety goggles, lab coat, CPE, neoprene or rubber gloves. Use care during autoclaving to prevent burns. Use exhaust hood while autoclaving and during removal of products. use insulated gloves for hot items

Procedure	Potential Exposure	PPE and/or Engineering Controls
6. Working solution of phosphate buffer	Spills, splashing, inhalation, heat (burns)	General ventilation is adequate. PPE- splash proof safety goggles, lab coat, neoprene, CPE or rubber gloves. Use care during autoclaving to prevent burns. Use exhaust hood while autoclaving and during removal of products. Use insulated gloves for hot items
7. Brilliat Green Bile 2% preparation	Spills, splashing, inhalation, heat (burns)	General ventilation is adequate. PPE- splash proof safety goggles, lab coat, neoprene, CPE or rubber gloves. Use care during autoclaving to prevent burns. Use exhaust hood while autoclaving to prevent burns. Use exhaust hood while autoclaving and during removal of products. Use insulated gloves for hot items

Procedure	Potential Exposure	PPE and/or Engineering Controls
8. Serial dilutions	Spills, splashing, inhalation, biological	Biosafety procedures must be followed. Procedure must be done in the Biological Safety Cabinet. PPE- splash proof safety goggles, lab coat, CPE or rubber gloves. Double gloving is recommended. Biosafety procedures must be followed
9. Single step procedure	Spills, splashing, inhalation, heat (burns), biological	Procedure must be done in the Biological Safety Cabinet. PPE- splash proof safety goggles, lab coat, CPE or rubber gloves. Double gloving is recommended. Biosafety procedures must be followed

Procedure	Potential Exposure	PPE and/or Engineering Controls
10. Single step procedure	Spills, splashing, inhalation, heat (burns), biological	Procedure must be done in the Biological Safety Cabinet. PPE- splash proof safety goggles, lab coat, CPE or rubber gloves, double gloving is recommended. Use care while operating incubator to prevent burns. Use exhaust hood while incubator is in operation and while removing samples. Allow a clean air purge before opening incubator. Use insulated gloves for hot items
11. Two-step enrichment procedure	Spills, splashing, inhalation, heat (burns), biological	Procedure must be done in the Biological Safety Cabinet. PPE- splash proof safety goggles, lab coat, CPE or rubber gloves, double gloving is recommended. Use care while operating incubator to prevent burns. Use exhaust hood while incubator is in operation and while removing samples. Allow a clean air purge before opening incubator. Use insulated gloves for hot items

Procedures	Potential Exposure	PPE and/or Engineering Controls
12. Counting and recording	None	General lab rules and PPE

WASTE GENERATION AND HANDLING

Thoroughly dilute and neutralize all materials and pour down drain. Follow all guidelines in the U.S. EPA's Characterization of Waste From Standard Analytical Methods.

SPECIAL PRECAUTIONS

Biological safety practices need to be followed during sample procedures. Thorough decontamination of work areas and equipment needs to be followed closely. All biological work must be done in a Biological Safety Cabinet. Double gloving is recommended for protection in the event of a spill of inoculant.

Review all Biosafety Procedures in the Chemical Hygiene Safety Manual prior to any work.

SOP for Fecal Streptococci

Chemicals Used: Hydrogen peroxide, 2, 3, 5-Triphenyl tetrazolium chloride, sodium carbonate, bile salts

Overall Glove Recommendation: Chlorinated Polyethylene (CPE)

SAFETY CONTROLS

Procedure	Potential Exposure	PPE and/or Engineering Controls
1. BHI agar preparation KF streptococcus agar	Heat, inhalation	Exhaust heat while boiling. Use insulated gloves when handling hot items
2. Addition of 2, 3, 5-triphenyl tetrazolium chloride to agar		Missing MSDS
3. Analytical procedures, handling	Biological	General biosafety rules should apply for all procedures. PPE-safety glasses, lab coat, latex gloves (or any protective glove). CPE suggested
4. Addition of 3% hydrogen peroxide	None	General ventilation is adequate. PPE-splash proof safety goggles, lab coat, CPE or rubber gloves

WASTE GENERATION AND HANDLING

Follow all guidelines in the U.S. EPA's Characterization of Waste From Standard Analytical Methods.

SPECIAL PRECAUTIONS

Follow Biosafety Procedures as outlined in the Chemical Hygiene Safety Manual.

CHEMICAL HYGIENE SOP

No. 22

Laboratory Procedure:	Determining primary production parameters.
Method:	^{14}C Radiotracer
Description:	Samples are inoculated with radiotracer ^{14}C. The radioactivity of the filter containing the algal cells is determined by liquid scintillation counting.
Chemicals Used:	Radiotracer $NaH^{14}CO_3$, phenolethylamine, hydrochloric acid, "scintillation cocktail"

Overall Glove Recommendation: Neoprene

SAFETY CONTROLS

Procedure	Potential Exposure	PPE and/or Engineering Controls
1. Analytical procedures handling radioactive material	Ingestion, skin if not protected (slight hazard)	All radioactive materials used in the procedure must be done in the Designated Area fume hood. Follow PPE guidelines in CRL Radiation Safety Manual
2. Addition of hydrochloric acid to sample	Spills, splashing, inhalation	General ventilation is adequate. If practical, do procedure in a fume hood. PPE-splash proof safety goggles, lab coat, neoprene or rubber gloves

Procedure	Potential Exposure	PPE and/or Engineering Controls
3. Addition of liquid scintillation cocktail	Spills	General ventilation is adequate. PPE-safety glasses, lab coat, data on gloves inconclusive, recommend viton or a viton/neoprene blended glove material. Recommend testing this material prior to use
4. Addition of phenolethylamine		Missing MSDS
5. Clean up procedure	Splashing	General ventilation is adequate. PPE-safety glasses, lab coat, any protective glove. Apron optional. Neoprene gloves suggested

WASTE GENERATION AND HANDLING

Follow all guidelines in the U.S. EPA's Characterization of Waste From Standard Analytical Methods.

SPECIAL PRECAUTIONS

Hazards from alpha particle radiation occur from ingesting. Any material will block alpha particles from exposed skin.

Follow all Safety Procedures and Guidelines for radioactive material as outlined in the CRL Radiation Safety Manual.

CHEMICAL HYGIENE SOP

No. 23

Laboratory Procedure: Quality Control Schedule

Method: ----------

Description: This procedure is not applicable.

CHEMICAL HYGIENE SOP

No. 24

Laboratory Procedure: Reagent Water System

Method: ----------

Description: This procedure is not applicable.

CHEMICAL HYGIENE SOP

No. 25

Laboratory Procedure: Sampling surface waters for hydrophobic contaminants including filtration and liquid/liquid extraction

Method: ----------

Description: Surface waters are collected with an electrically powered pump. Filtered water is passed through XAD-2 Resin which extracts and concentrates hydrophobic contaminants for analysis.

Chemicals Used: Acetone

Overall Glove Recommendation: Neoprene

SAFETY CONTROLS

Procedure	Potential Exposure	PPE and/or Engineering Controls
1. Filtration rinsing carboys penta plate parts with acetone Note: Since gloves may introduce contaminants, it is of great importance to decontaminate gloves	Spills, splashing, inhalation, flammable	Acetone is extremely flammable and irritating to skin. Inhalation of large quantities can be hazardous. Procedure must be done in a fume hood. If a particular procedure does not make this feasible, use a local exhaust vent. Vapors can travel a great distance and flashback to source. Under no circumstances should ignition sources, sparking, heat generation, be in the vicinity of these vapors. PPE- splash proof safety goggles, lab coat. Neoprene, CPE or butyl gloves

Procedure	Potential Exposure	PPE and/or Engineering Controls
2. Extraction Methylene Chloride		Methylene Chloride is a known animal carcinogen. Procedure should be performed in Designated Area fume hood. PPE- splash proof safety goggles, lab coat, & neoprene or polyvinyl alcohol or viton gloves. Set up extraction equipment in hood.

WASTE GENERATION AND HANDLING

Follow all guidelines in the U.S. EPA's Characterization of Waste From Standard Analytical Methods.

SPECIAL PRECAUTIONS

Butyl gloves should offer excellent protection and not break down. All fire hazards must be removed. Use fume hoods or local exhaust vents that have explosion proof motors only. Do not do any heating procedures near this activity.

CHEMICAL HYGIENE SOP

No. 26

Laboratory Procedure: Determination of metals in acid raid.

Method: Inductively coupled argon plasma atomic emission spectroscopy (ICP-AES).

Description: Acid rain samples are analyzed for 15 different metals.

Chemicals Used: Nitric acid, plasma grade standards: aluminum, boron, barium, beryllium, calcium, cobalt, copper, iron, lithium, magnesium, manganese, strontium, titanium, vanadium, zinc

Overall Glove Recommendation: Chlorinated Polyethylene (CPE)

SAFETY CONTROLS

Procedure	Potential Exposure	PPE and/or Engineering Controls
1. Nitric acid handling, dilutions, sample preservation	Spills, splashing, inhalation, heating	Nitric acid is incompatible with heat and most common metals and powdered metals. Extreme care must be used when heating. Do procedure in a fume hood. PPE-splash proof safety goggles, lab coat, CPE or viton gloves, face shield
2. Standard (Standards purchased commercially, not prepared here) Standard as follows:		

Procedure	Potential Exposure	PPE and/or Engineering Controls
2a. Aluminum	Inhalation	General ventilation adequate. PPE- splash proof safety goggles, lab coat, rubber gloves (data inconclusive on gloves). CPE adequate
2b. Barium	Inhalation	General ventilatin adequate. PPE- splash proof safety goggles, lab coat, rubber gloves (data inconclusive on gloves). CPE adequate
2c. Beryllium	Inhalation, spills	This material is a carcinogen. Procedure must be done in the Designated Area fume hood. PPE- splash proof safety goggles, lab coat, rubber gloves (double gloving recommended). CPE adequate
2d. Boron	Inhalation	General ventilation adequate. PPE- splash proof safety goggles, lab coat, rubber gloves (data inconclusive on gloves). CPE adequate
2e. Calcium	None	General ventilatin adequate. PPE- splash proof safety goggles, lab coat, rubber gloves (data inconclusive on gloves). CPE adequate

Procedure	Potential Exposure	PPE and/or Engineering Controls
2f. Silver	Inhalation, spills	General ventilation adequate. PPE- splash proof safety goggles, lab coat, rubber gloves (data inconclusive on gloves). CPE adequate
2g. Cobalt	Inhalation	General ventilation adequate. PPE- splash proof safety goggles, lab coat, rubber gloves (data inconclusive on gloves). CPE adequate
2h. Copper	Inhalation	General ventilation adequate. PPE- splash proof safety goggles, lab coat, rubber gloves (data inconclusive on gloves). CPE adequate
2i. Iron	Inhalation	General ventilation adequate. PPE- splash proof safety goggles, lab coat, rubber gloves (data inconclusive on gloves). CPE adequate
2j. Lithium	Inhalation	General ventilation adequate. PPE- splash proof safety goggles, lab coat, rubber gloves (data inconclusive on gloves). CPE adequate

Procedure	Potential Exposure	PPE and/or Engineering Controls
2k. Magnesium	Inhalation	General ventilation adequate. PPE-splash proof safety goggles, lab coat, rubber gloves (data inconclusive on gloves). CPE adequate
2l. Manganese	Inhalation	General ventilation adequate. PPE-splash proof safety goggles, lab coat, rubber gloves (data inconclusive on gloves). CPE adequate
2m. Strontium	Inhalation, spills	General ventilation adequate. PPE-splash proof safety goggles, lab coat, rubber gloves (data inconclusive on gloves). CPE adequate
2n. Titanium	Inhalation, spills	General ventilation adequate. PPE-splash proof safety goggles, lab coat, rubber gloves (data inconclusive on gloves). CPE adequate
2o. Vanadium	Inhalation, spills	General ventilation adequate. PPE-splash proof safety goggles, lab coat, rubber gloves (data inconclusive on gloves). CPE adequate

Procedure	Potential Exposure	PPE and/or Engineering Controls
2p. Zinc	Inhalation, spills	General ventilation adequate. PPE-splash proof safety goggles, lab coat, rubber gloves (data inconclusive on gloves). CPE adequate
3. AR00 standard preparation in nitric acid	Spills, splashing, inhalation, heating	Nitric acid is incompatible with heat and most common metals and powdered metals. Extreme care must be used when heating. Do procedure in a fume hood. PPE-splash proof safety goggles, lab coat, CPE or rubber gloves (acid is diluted)
4. AR01 Standard preparation, calcium magnesium in nitric acid	Spills, splashing, inhalation, heating	Nitric acid is incompatible with heat and most common metals and powdered metals. Extreme care must be used when heating. Do procedure in a fume hood. PPE-splash proof safety goggles, lab coat, CPE or rubber gloves (acid is diluted)

Procedure	Potential Exposure	PPE and/or Engineering Controls
5. AR02 standard preparation, aluminum, boron, barium, beryllium, cobalt, copper, iron, lithium, manganese, strontium, titanium, vanadium, and zinc in nitric acid	Inhalation, splashing	Beryllium is a carcinogen, therefore, procedure must be done in the Designated Area fume hood. Nitric acid is incompatible with heat and most common metals. Extreme care must be used when heating. Do procedure in a fume hood. PPE-splash proof safety goggles, lab coat, CPE or rubber gloves, (acid is diluted)
6. Interelemental correction solution, iron in nitric acid	Spills, splashing, inhalation, heating	Nitric acid is incompatible with heat and most common metals and powdered metals. Extreme care must be used when heating. Do procedure in a fume hood. PPE-splash proof safety goggles, lab coat, CPE or rubber gloves, (acid is diluted)

Procedure	Potential Exposure	PPE and/or Engineering Controls
7. Lab control standards, high and low, aluminum, boron, barium, beryllium, cobalt, copper, iron, lithium, manganese, strontium, titanium, vanadium, and zinc in nitric acid	Inhalation, splashing	Beryllium is a carcinogen, therefore, procedure must be done in the Designated Area fume hood. Nitric acid is incompatible with heat and most common metals and powdered metals. Extreme care must be used when heating. Do procedure in a fume hood. PPE-splash proof safety goggles, lab coat, CPE or rubber gloves, (acid is diluted)
8. Intermediate solution and dilution, aluminum, iron, magnesium, boron, copper, titanium, vanadium, zinc, barium, lithium, manganese, strontium, beryllium, calcium, cobalt in nitric acid	Inhalation, splashing	Beryllium is a carcinogen, therefore, procedure must be done in the Designated Area fume hood. Nitric acid is incompatible with heat and most common metals. Extreme care must be used when heating. Do procedure in a fume hood. PPE-splash proof safety goggles, lab coat, CPE or rubber gloves (acid is diluted)

Procedures	Potential Exposure	PPE and/or Engineering Controls
9. Analytical procedures, calibrations,	Inhalation	Do as much as practical under a fume hood or a local exhaust vent. Avoid breathing fumes. PPE-safety glasses or splash proof goggles, lab coat, rubber or CPE gloves

WASTE GENERATION AND HANDLING

Follow all guidelines in the U.S. EPA's Characterization of Waste From Standard Analytical Methods.

SPECIAL PRECAUTIONS

Many standards used are carcinogenic or very poisonous. Extreme care must be taken when handling these materials. Follow all procedures carefully in the analytical procedure manual. Double gloving is recommended.

Nitric acid used in these procedures is dilute enough to most likely not react with metals and heat. However, care must still be used.

Wash hands thoroughly after procedure completion.

CHEMICAL HYGIENE SOP

No. 27

Laboratory Procedure: Determination of cadmium, chromium, and nickel in acid rain samples.

Method: Flameless atomic absorption spectroscopy

Description: Acid rain samples are analyzed by flameless atomic absorption

Chemicals Used: Nitric acid, ammonium phosphate, magnesium nitrate, stock standards: cadmium, chromium, nickel, argon

Overall Glove Recommendation: Chlorinated Polyethylene (CPE)

SAFETY CONTROLS

Procedure	Potential Exposure	PPE and/or Engineering Controls
1. Sample preservation with nitric acid	Spills, splashing, inhalation	Nitric acid is incompatible with heat and common metals and powdered metals. Extreme care must be taken. Do procedure in a fume hood. PPE-splash proof safety goggles, lab coat, viton, rubber gloves, or face shield optional. CPE adequate
2. Matrix modifier: ammonium hydrogen phosphate, magnesium nitrate hexahydrate solution preparation	None	General ventilation is adequate. If practical, do procedure in a fume hood. PPE-splash proof safety goggles, lab coat, any protective glove recommended (data inconclusive on gloves). CPE adequate

Procedure	Potential Exposure	PPE and/or Engineering Controls
3. Flasks stored with nitric acid	Spills, splashing, inhalation	Nitric acid is incompatible with heat and common metals and powdered metals. Extreme care must be taken. Do procedure in a fume hood. PPE-splash proof safety goggles, lab coat, viton gloves, CPE or rubber gloves, face shield optional
4. Stock standard, stock calibration standards handling: cadmium	Spills, inhalation, contact	Do procedure in a fume hood. PPE-splash proof safety goggles, lab coat, (no data on glove types) recommend rubber or CPE gloves
4a. Chromium	Spills, inhalation, contact	This material is a carcinogen. Do procedure in the Designated Area fume hood. PPE-splash proof safety goggles, lab coat, (no data on gloves) recommended rubber or CPE gloves and double gloving
4b. Nickel	Inhalation	This material is a carcinogen. Procedure must be done in the Designated Area fume hood. PPE-splash proof safety goggles, lab coat, CPE or rubber gloves plus double gloving recommended

Procedure	Potential Exposure	PPE and/or Engineering Controls
5. Dilution of standards with nitric acid	Spills, splashing, inhalation	Do procedure in a fume hood. PPE-splash proof safety goggles, lab coat, viton gloves, CPE or rubber gloves, face shield optional
6. Working calibration standards preparation-dilution with nitric acid	Spills, splashing, inhalation	Do procedure in a fume hood. PPE-splash proof safety goggles, lab coat, viton gloves, CPE or rubber gloves, face shield optional
7. Instrument calibration	Spills, inhalation, eyes	Do as much of procedure as possible in a fume hood. Local exhaust over instrument may be more practical. PPE-safety glasses or splash proof safety goggles, lab coat, rubber or CPE gloves, proper eye protection for lighting electrodeless discharge lamp
8. Analytical procedures	Spills, inhalation	Do as much of procedure as possible in a fume hood. Local exhaust over instrument may be more practical. PPE-safety glasses or splash proof safety goggles, lab coat, rubber or CPE gloves

WASTE GENERATION AND HANDLING

Follow all guidelines in the U.S. EPA's Characterization of Waste From Standard Analytical Methods.

SPECIAL PRECAUTIONS

Nitric acid is diluted enough to reduce potential for heat and metal reactions. However, care must still be used. Metal standards are toxic. Use extreme care with carcinogens. Double gloving recommended for spills.

CHEMICAL HYGIENE SOP

No. 28

Laboratory Procedure:	Determination of total arsenic in water.
Method:	Hydride generation atomic absorption spectroscopy.
Description:	Samples are digested and oxidized. Arsenic is determined spectrophotometrically.
Chemicals Used:	Potassium persulfate, nitric acid, sodium borohydride, hydrochloric acid, sodium hydroxide, arsenic standard, arsenic pentoxide standard, dimethyl arsenic acid (cacodylic acid), arsenic trioxide standard

Overall Glove Recommendation: Chlorinated Polyethylene (CPE)

SAFETY CONTROLS

Procedure	Potential Exposure	PPE and/or *Engineering Controls*
1. Nitric acid additions to sample bottles	Spills, splashing, inhalation	Nitric acid is incompatible with heat and common metals and powdered metals. Extreme care must be taken. Do procedure in a fume hood. PPE- splash proof safety goggles, lab coat, viton gloves, CPE or rubber gloves, face shield optional

Procedure	Potential Exposure	PPE and/or Engineering Controls
2. Sodium borohydride solution, mixed with sodium hydroxide	Spills, splashing, inhalation	Sodium borohydride will liberate hydrogen gas on contact with water. Sodium hydroxide may generate sufficient heat to ignite combustibles when in contact with water. Procedure must be done in a fume hood. PPE-splash proof safety goggles, face shield recommended, lab coat, rubber apron recommended, rubber gloves are only common glove for both materials. CPE gloves adequate
3. Potassium persulfate solution		Local exhaust is adequate. PPE-splash proof safety goggles, lab coat, CPE, rubber or neoprene gloves. Potassium persulfate is an oxidizer, keep from flammables
4. Arsenic standards preparation:		
4a. Arsenic trioxide, nitric acid	Spills, splashing, inhalation	Arsenic is a carcinogen. This material reacts with acids. Do procedure with extreme caution. Procedure must be done in the Designated Area fume hood. PPE-

Procedure	Potential Exposure	PPE and/or Engineering Controls
		splash proof safety goggles, face shield, lab coat, rubber apron, rubber gloves. CPE adequate
4b. Arsenic spiking solution, nitric acid	Spills, splashing, inhalation	Arsenic is a carcinogen. This material reacts with acids. Do procedure with extreme caution. Procedure must be done in the Designated Area fume hood. PPE- splash proof safety goggles, face shield, lab coat, rubber apron, rubber or CPE gloves
4c. Arsenic pentoxide, sodium hydroxide	Spills, splashing, inhalation	Sodium hydroxide may cause sufficient heat to ignite combustibles when in contact with water. Arsenic is a carcinogen. This material reacts with acids. Do procedure with extreme caution. Procedure must be done in the Designated Area fume hood. PPE- splash proof safety goggles, face shield, lab coat, rubber apron, rubber or CPE gloves

Procedure	Potential Exposure	PPE and/or Engineering Controls
4d. Arsenic (V) intermediate and standard, nitric acid	Spills, splashing, inhalation	Arsenic is a carcinogen. This material reacts with acids. Do procedure with extreme caution. Procedure must be done in the Designated Area fume hood. PPE- splash proof safety goggles, face shield, lab coat, rubber apron, rubber or CPE gloves
4e. Dimethyl arsenic acid, sodium hydroxide, stock and spiking	Spills, splashing, inhalation	This material is a carcinogen. Sodium hydroxide reacts with water and may generate sufficient heat to ignite combustibles. Do procedure in the Designated Area fume hood. PPE- splash proof safety goggles,, face shield, lab coat, rubber apron, rubber gloves or CPE adequate
5. Instrument operation and calibration	Spills, inhalation	Do as much of procedure as possible in a fume hood. Or use local exhausting over operation. PPE- splash proof safety goggles, lab coat, CPE or rubber gloves. Wear eye protection for UV light when igniting electrodeless discharge lamp

Procedure	Potential Exposure	PPE and/or Engineering Controls
6. Digestion procedure	Spills, inhalation, heat (burns)	Use local exhaust over autoclave. Avoid breathing vapors. PPE-as outlined for each solution and standard. Use insulated gloves handling hot items. Allow a clean air purge before opening autoclave
7. Analytical procedure	Spills, inhalation	Do as much of procedure as possible in a fume hood. Or use local exhaust over operation. PPE-as outlined for each standard
8. Rinsing and adding hydrochloric acid	Spills, splashing, inhalation	May cause severe skin or respiratory burns. Do procedure in a fume hood. PPE-splash proof safety goggles, lab coat, CPE, neoprene or rubber gloves

WASTE GENERATION AND HANDLING

Follow all guidelines in the U.S. EPA's Characterization of Waste From Standard Analytical Methods.

SPECIAL PRECAUTIONS

Use proper procedures handling carcinogens and toxic materials. Allow for thorough decontamination.

CHEMICAL HYGIENE SOP

No. 29

Laboratory Procedure:	Determination of total potassium and sodium in acid rain.
Method:	Flame atomic absorption
Description:	Acid rain samples are analyzed by atomic absorption.
Chemicals Used:	Nitric acid, potassium standards, sodium standards, hydrochloric acid

Overall Glove Recommendation: Chlorinated Polyethylene (CPE)

SAFETY CONTROLS

Procedure	Potential Exposure	PPE and/or Engineering Controls
1. Sample preservation with nitric acid	Spills, splashing, inhalation	Nitric acid is incompatible with heat, common metals and powdered metals. Extreme care must be taken. Do procedure in a fume hood. PPE- splash proof safety goggles, lab coat, CPE, viton or rubber gloves, face shield optional
2. Potassium standards, intermediate standards, working standards in nitric acid	Spills, splashing, inhalation	Nitric acid is incompatible with heat, common metals and powdered metals. Extreme care must be taken. Do procedure in a fume hood. PPE- splash proof safety goggles, lab coat, CPE, viton or rubber gloves, face shield optional

Procedure	Potential Exposure	PPE and/or Engineering Controls
3. Sodium standards, intermediate standards, working standards, in nitric acid	Spills, splashing, inhalation	Nitric acid is incompatible with heat, common metals and powdered metals. Extreme care must be taken. Do procedure in a fume hood. PPE-splash proof safety goggles, lab coat, CPE, viton or rubber gloves, face shield optional
4. Instrument calibration, burner operation	Heat (burns), compressed gas cylinder explosions	Keep combustibles away from operating area. Acetylene tank must be secure and upright. Follow all safety procedures in Compressed Gas Association Pamphlet P-1
5. Instrument calibration	Inhalation, spills	Do as many procedures as possible in a fume hood. Or use local exhausting during operation. PPE-splash proof safety goggles, lab coat, CPE, rubber gloves
6. Analytical procedure washing with hydrochloric acid	Spills, splashing, inhalation	May cause severe skin or respiratory burns. Do procedure in a fume hood. PPE-splash proof safety goggles, lab coat, CPE, neoprene or rubber gloves

WASTE GENERATION AND HANDLING

Follow all guidelines in the U.S. EPA's Characterization of Waste From Standard Analytical Methods.

SPECIAL PRECAUTIONS

None

CHEMICAL HYGIENE SOP

No. 30

Laboratory Procedure: Determination of nickel in acid rain.

Method: Flameless atomic absorption

Description: Acid rain samples are analyzed by atomic absorption.

Chemicals Used: Nitric acid, nickel standards

Overall Glove Recommendation: Chlorinated Polyethylene (CPE)

SAFETY CONTROLS

Procedure	Potential Exposure	PPE and/or Engineering Controls
1. Sample preservation with nitric acid, rinsing, immersions	Spills, splashing, inhalation	Nitric acid is incompatible with heat, common metals and powdered metals. Extreme care must be taken. Do procedure in a fume hood. PPE-splash proof safety goggles, lab coat, CPE, viton or rubber gloves, face shield optional
2. Nickel standard, stock calibration standard, working calibration standard preparation with nitric acid	Spills, splashing, inhalation	Nitric acid is incompatible with heat, common metals, and powdered metals. Nickel is a carcinogen. This procedure must be done in the Designated Area fume hood. PPE-splash proof safety goggles, lab coat, CPE, rubber gloves, double gloving recommended

Procedure	Potential Exposure	PPE and/or Engineering Controls
3. Instrument calibration	Spills, inhalation, eyes	Do as much of procedure as possible in a fume hood or local exhaust over operation. PPE-safety glasses or splash proof safety goggles, lab coat, CPE or rubber gloves, proper eye protection for lighting electrodeless discharge lamp
4. Analytical procedures	Spills, inhalation	Do as much of procedure as possible in a fume hood or local exhaust over operation. PPE-safety glasses or splash proof safety goggles, lab coat, CPE or rubber gloves

WASTE GENERATION AND HANDLING

Follow all guidelines in the U.S. EPA's Characterization of Waste From Standard Analytical Methods.

SPECIAL PRECAUTIONS

Double gloving recommended for carcinogens in the event of a spill. Use care in handling carcinogens.

CHEMICAL HYGIENE SOP

No. 31

Laboratory Procedure: Analysis of total Kjeldahl nitrogen and total phosphorous in water.

Method: ----------

Description: Samples are evaporated and digested. They are then analyzed for total phosphorous and total Kjeldahl nitrogen using a technicon auto analyzer.

Chemicals Used: Sulfuric acid, potassium sulfate, mercuric oxide, sodium hydroxide, potassium sodium tartrate, sodium citrate, phenol, bleach (household), sodium nitroprusside, sodium chloride, ascorbic acid, potassium antimonyl tartrate, adenosine-5' monophosphoric acid, sodium salt, potassium sulfate, ammonium molybdate, sodium hypochlorite, ascorbic acid, glutamic acid, potassium dihydrogen phosphate

Overall Glove Recommendation: Chlorinated Polyethylene (CPE)

SAFETY CONTROLS

Procedure	Potential Exposure	PPE and/or Engineering Controls
1. Digesting solution preparation	Spills, splashing, inhalation	Do procedure in a fume hood. Mercuric oxide is extremely toxic, sulfuric acid reacts violently with water. Pour acid slowly. PPE-splash proof safety goggles, lab coat, viton, chlorinated polyethylene or polyethylene gloves and apron. When handling potassium sulfate only, any protective glove can be used. CPE suggested

Procedure	Potential Exposure	PPE and/or Engineering Controls
2. Digesting solution, glassware cleaning	Spills, splashing, inhalation	Do procedure in a fume hood. PPE-splash proof safety goggles, lab coat, CPE, neoprene or rubber gloves
3. Sampler wash solution preparation	Spills, splashing, inhalation	Do procedure in a fume hood. PPE-splash proof safety goggles, lab coat, viton, chlorinated polyethylene, or polyethylene gloves
4. Dilution loop solution preparation	Spills, splashing, inhalation	Do procedure in fume hood. PPE-splash proof safety goggles, lab coat, nitrile, neoprene, CPE, rubber or polyethylene gloves
5. Complexing reagents solution preparation	None documented	General ventilation is adequate. PPE-splash proof safety goggles, lab coat, any protective glove. CPE suggested
6. Alkaline phenol solution preparation	Spills, splashing, inhalation	Do procedure in a fume hood. Phenol and sodium hydroxide are extremely poisonous. PPE-splash proof safety goggles, lab coat, CPE or butyl gloves
7. Sodium hypochlorite solution preparation	Spills, splashing, inhalation	General ventilation adequate. If practical, do in fume hood. PPE-splash proof safety goggles, lab coat, CPE, viton, or rubber gloves

Procedure	Potential Exposure	PPE and/or Engineering Controls
8. Sodium nitroprusside reagent preparation	Spills, splashing, inhalation	Sodium nitroprusside is a poison. Perform procedure in fume hood. PPE-splash proof safety goggles, lab coat, CPE, rubber gloves
9. Sodium chloride solution preparation	None	General ventilation is adequate. No PPE required. Splash proof safety goggles, lab coat, any protective glove. CPE suggested
10. Sulfuric acid solution preparation	Spills, splashing, inhalation	Do procedure in fume hood. Add acid carefully to avoid violent reaction with water. PPE-splash proof safety goggles, lab coat, viton, chlorinated polyethylene gloves and apron. Apron optional
11. Ammonium molybdate solution preparation	Spills, splashing, inhalation	General ventilation is adequate. If practical, do procedure in a fume hood. PPE-splash proof safety goggles, lab coat, CPE or rubber gloves
12. Ascorbic acid solution preparation	None	General ventilation is adequate. PPE-splash proof safety goggles, lab coat, any protective glove. CPE suggested

Procedure	Potential Exposure	PPE and/or Engineering Controls
13. Potassium antimonyl tartrate solution preparation	Spills, splashing, inhalation	General ventilation is adequate. PPE-splash proof safety goggles, lab coat, CPE or rubber gloves
14. Combined color reagent preparation	Spills, splashing, inhalation	General ventilation is adequate. If practical, do procedure in fume hood. Combine reagents in order given in Laboratory Procedures. PPE-splash proof safety goggles, lab coat, viton, chlorinated polyethylene, polyethylene gloves
15. Nitrogen stock standard preparation	Spills, splashing, inhalation	Do procedure in a fume hood. PPE-splash proof safety goggles, lab coat, viton, chlorinated polyethylene, polyethylene gloves
16. Phosphorous stock standard preparation, working range dilutions	Spills, splashing, inhalation	General ventilation is adequate. PPE-splash proof safety goggles, lab coat, viton, chlorinated polyethylene, polyethylene gloves. Use same PPE to preserve samples with sulfuric acid
17. Stock AQC standard, working standard dilutions	Spills, splashing, inhalation	General ventilation is adequate. Do procedure in fume hood if practical. PPE-splash proof safety goggles, lab coat, viton,

Procedure	Potential Exposures	PPE and/or Engineering Controls
		chlorinated polyethylene, polyethylene gloves
18. Digestion, glassware rinse with hydrochloric acid	Spills, splashing, inhalation	If practical, do procedure in fume hood. General ventilation is adequate. PPE- splash proof safety goggles, lab coat, rubber (choice) gloves and apron, CPE or viton, gloves (adequate)
19. Sample preparation, calibration, pumping reagents, handling samples during tests	Spills, splashing, inhalation	Use appropriate PPE when handling calibration standards samples
20. Evaporating sample tubes	Inhalation, heat (burns)	Use care in operating heating equipment. Use exhaust hood or vent while operating. Handle carefully while removing

WASTE GENERATION AND HANDLING

Follow all guidelines in the U.S. EPA's Characterization of Waste From Standard Analytical Methods.

SPECIAL PRECAUTIONS

Use extreme care in handling phenol and mercuric oxide. These are extremely toxic. Use care in handling the many, different acids.

CHEMICAL HYGIENE SOP

No. 32

Laboratory Procedure:	Analysis of particulate organic carbon in lake water.
Method:	Infrared defection of carbon dioxide.
Description:	Non-dissolved carbon in water is caught on a fiberglass filter which is burned to carbon dioxide. Carbon dioxide is sparged and quantified by an IR detector.
Chemicals Used:	Potassium hydrogen phthalate standard, sulfuric acid, EDTA standard

Overall Glove Recommendation: Chlorinated Polyethylene (CPE)

SAFETY CONTROLS

Procedure	Potential Exposure	PPE and/or Engineering Controls
1. Stock potassium hydrogen phthalate standard, mix in sulfuric acid	Spills, splashing, inhalation	General ventilation is adequate for small volume of acid. If practical, do procedure in fume hood. PPE-splash proof safety goggles, lab coat, viton, chlorinated polyethylene, polyethylene gloves
2. Working calibration standards	Spills, splashing, inhalation	General ventilation is adequate for small volume of acid. If practical, do procedure in fume hood. PPE-splash proof safety goggles, lab coat, viton, chlorinated polyethylene, polyethylene gloves

Procedure	Potential Exposure	PPE and/or Engineering Controls
3. EDTA standard preparation, mix in sulfuric acid	Spills, splashing, inhalation	General ventilation is adequate for small volume of acid. If practical, do procedure in fume hood. PPE-splash proof safety goggles, lab coat, viton, chlorinated polyethylene, polyethylene gloves
4. EDTA control standard high and low	Moderate splash	General ventilation is adequate for small volume of acid. If practical, do procedure in fume hood. PPE-splash proof safety goggles, lab coat, neoprene, rubber or CPE gloves
5. Instrument start up, oxygen adjustment	Compressed gas cylinder explosion	Keep cylinder upright and secure. Keep all flammables away from area. Follow safety rules in Compressed Gas Association Pamphlet P-1
6. Instrument start up, furnace start up	Flammable	Keep combustibles and oxygen tanks safely away
7. Instrument start up, addition of sulfuric acid	Spills, splashing, inhalation	General ventilation is adequate for small volume of acid. If practical, do procedure in fume hood. PPE-splash proof safety goggles, lab coat, viton, chlorinated polyethylene, polyethylene gloves

Procedure	Potential Exposure	PPE and/or Engineering Controls
8. Preparation of nickel shells in furnace	Heat (burns)	Use insulated gloves and forceps handling hot items. Use local exhaust during operation
9. Sample analysis	Inhalation	Use local exhaust during operation. PPE-as outlined for each standard

WASTE GENERATIONS AND HANDLING

Follow all guidelines in the U.S. EPA's Characterization of Waste From Standard Analytical Methods.

SPECIAL PRECAUTIONS

Use proper procedures handling compressed gas cylinders.

CHEMICAL HYGIENE SOP

No. 33

Laboratory Procedure: Direct observation of bacteria by DAPI.

Method: ----------

Description: A sample is prepared on a microscope slide and bacteria counted under a compound microscope.

Chemicals Used: Gluteraldehyde, nitric acid, irgalan black (stain), 4', 6-diamidine-2 phenylindol, acetic acid, paraffin oil, ethyl alcohol

Overall Glove Recommendation: Chlorinated Polyethylene (CPE)

SAFETY CONTROLS

Procedure	Potential Exposure	PPE and/or Engineering Controls
1. Sample preservation with gluteraldehyde	Spills, splashing, inhalation	Glutaraldehyde readily penetrates skin. Do procedure in a fume hood if at all practical. General ventilation may only be adequate if low concentrations are used. PPE-splash proof safety goggles, lab coat, neoprene or butyl gloves. CPE adequate
2. Wash all glassware with nitric acid	Spills, splashing, inhalation	Nitric acid is incompatible with heat, common metals, powdered metals. Extreme care must be taken. Do procedure in a fume hood. PPE-splash proof safety goggles, lab coat,

Procedure	Potential Exposure	PPE and/or Engineering Controls
		CPE, viton or rubber gloves, face shield optional
3. Irgalan black stain mixed with acetic acid	Spills, splashing, inhalation	If practical, do procedure in a fume hood. PPE-splash proof safety goggles, lab coat, neoprene or chlorinated polyethylene gloves
4. 4', 6-diamidino-2-phenylindol (DAPI), solution preparation	Spills, splashing, inhalation	Do procedure in a fume hood. PPE-splash proof safety goggles, lab coat, heavy rubber or double rubber gloving. CPE adequate
5. Staining and filtering DAPI solution	Spills, splashing, inhalation	If practical, do procedure in a fume hood. PPE-splash proof safety goggles, lab coat, heavy rubber or double rubber gloving. CPE adequate
6. Staining and filtering, Irgalan black staining	Spills, splashing, inhalation	If practical, do procedure in a fume hood. PPE-splash proof safety goggles, lab coat, neoprene or chlorinated polyethylene gloves
7. Slide preparation	None	PPE optional. PPE-safety glasses, lab coat, rubber gloves optional. CPE adequate

Procedure	Potential Exposure	PPE and/or Engineering Controls
8. Analysis	None	PPE optional. PPE-lab coat, CPE adequate

WASTE GENERATION AND HANDLING

Follow all guidelines in the U.S. EPA's Characterization of Waste From Standard Analytical Methods.

SPECIAL PRECAUTIONS

Follow biological safety procedures in Chemical Hygiene Safety Manual. Wash hands thoroughly after procedure completion.

CHEMICAL HYGIENE SOP

No. 34

Laboratory Procedure: Analysis of phytoplankton

Method: Modified Utermohl

Description: Water samples are examined microscopically for identification and enumeration.

Chemicals Used: Potassium iodide, iodine crystals, nitric acid, hydrogen peroxide, potassium dichromate, hyrax, acetic acid, formaldehyde

Overall Glove Recommendation: Chlorinated Polyethylene (CPE)

SAFETY CONTROLS

Procedure	Potential Exposure	PPE and/or Engineering Controls
1. Lugol's solution, glacial acetic acid, potassium iodide, iodine preparation	Inhalation	Do procedure in a fume hood. PPE-splash proof safety goggles, lab coat, CPE or butyl gloves
2. Addition of Lugol's to sample	Splashing	General ventilation adequate. PPE-safety glasses, lab coat, butyl gloves. All PPE is optional but recommended in event of spill
3. Sample preservation with formaldehyde	Spills, inhalation	Formaldehyde is a carcinogen. Procedure must be done in the Designated Area fume hood. PPE-splash proof safety goggles, lab coat, viton or butyl gloves. CPE adequate

Procedure	Potential Exposure	PPE and/or Engineering Controls
4. Analytical procedure, preliminary screening	None	PPE optional. PPE-lab coat, rubber or CPE gloves when handling organisms. Decontaminate all surfaces, wash hands
5. Sample sedimentation, sedimented counting	None	PPE optional. PPE-lab coat, rubber or CPE gloves when handling organisms. Decontaminate all surfaces, wash hands
6. Diatom analysis, digestion in centrifuge with nitric acid	Spills, splashing, inhalation	Nitric acid is incompatible with heat and common metals. Extreme care must be taken. Do procedure in a fume hood or local exhaust. PPE-splash proof safety goggles, lab coat, CPE, viton or rubber gloves, face shield optional
7. Diatom analysis, addition of hydrogen peroxide, potassium dichromate, nitric acid	Spills, splashing, inhalation	Do procedure in a fume hood or local exhaust. Hydrogen peroxide and potassium dichromate are oxidizers, keep from flammables. PPE-splash proof safety goggles, lab coat, rubber or CPE gloves
8. Diatom analysis, centrifuge	Inhalation	Use local exhaust while centrifuging. PPE-safety glasses, lab coat, rubber or CPE gloves

Procedure	Potential Exposure	PPE and/or Engineering Controls
9. Diatom slide preparation, heating on hot plate	Heat (burns)	Use insulated gloves or tongs handling hot items
10. Addition of hyrax mounting median	None	PPE-safety glasses, lab coat, rubber or CPE gloves

WASTE GENERATION AND HANDLING

Follow all guidelines in the U.S. EPA's Characterization of Waste From Standard Analytical Methods.

SPECIAL PRECAUTIONS

Follow all Biosafety Rules in the Chemical Hygiene Safety Manual.

Preservation with formaldehyde must be done with extreme caution.

Wash hands thoroughly after procedure completion.

CHEMICAL HYGIENE SOP

No. 35

Laboratory Procedure: Analysis of zooplankton

Method: ----------

Description: Zooplankton are examined microscopically.

Chemicals Used: Formaldehyde, magnesium carbonate, sodium hypochlorite, polyvinyl lactophenol

Overall Glove Recommendation: Chlorinated Polyethylene (CPE)

SAFETY CONTROLS

Procedure	Potential Exposure	PPE and/or Engineering Controls
1. Lugol's solution preparation	See SOP No. 34	See SOP No. 34
2. Analysis, sub sample counts	None	PPE optional. PPE-lab coat, rubber or CPE gloves when handling samples
3. Microcrustacean analysis	None	PPE optional. PPE-lab coat, rubber or CPE gloves when handling samples
4. Sample preservation with formaldehyde	Spills, inhalation	Formaldehyde is a carcinogen. Procedure must be done in the Designated Area fume hood. PPE-splash proof safety goggles, lab coat, viton, CPE or butyl gloves
5. Rotifer sample analysis	Biological	PPE optional. PPE-lab coat, rubber or CPE gloves when handling samples

WASTE GENERATION AND HANDLING

Follow all guidelines in the U.S. EPA's Characterization of Waste From Standard Analytical Methods.

SPECIAL PRECAUTIONS

Follow Biosafety Rules in the Chemical Hygiene Safety Manual. Formaldehyde must be handled with care.

Wash hands thoroughly after procedure completion.

CHEMICAL HYGIENE SOP

No. 36

Laboratory Procedure: Analysis of total phosphorous

Method: CRL MIN7315

Description: Organic phosphorous is digested. The phosphate ions react to form a blue complex which is determined spectrophotometrically.

Chemicals Used: Sulfuric acid, ammonium persulfate, Levor IV, ammonium molybdate, ascorbic acid, potassium antimonyl tartrate, potassium dihydrogen phosphate, adenosine-5'-monophosphoric acid, hydrochloric acid

Overall Glove Recommendation: Chlorinated Polyethylene (CPE)

SAFETY CONTROLS

Procedure	Potential Exposure	PPE and/or Engineering Controls
1. Sulfuric acid solution, preservation of samples	Spills, splashing, inhalation	Do procedure in a fume hood. Add acid slowly, allow to cool. PPE-splash proof safety goggles, lab coat, viton, chlorinated polyethylene, polyethylene gloves
2. Ammonium persulfate solution preparation	Spills, splashing, inhalation	This material is a strong oxidizer. Keep from heat and flammables. Do procedure in a fume hood. PPE-splash proof safety goggles, lab coat, viton, butyl or neoprene gloves. CPE adequate

Procedure	Potential Exposure	PPE and/or Engineering Controls
3. Working digestion solution, sulfuric acid, solution, ammonium persulfate solution	Spills, splashing, inhalation	Keep from heat and flammables. Mix materials carefully. Do procedure in a fume hood. PPE-splash proof safety goggles, face shield, lab coat, viton gloves. CPE adequate
4. Ammonium molybdate stock solution	Spills, splashing, inhalation	Do procedure in a fume hood. PPE-splash proof safety goggles, lab coat, rubber gloves (no data on gloves). CPE adequate
5. Ascorbic acid stock solution	Splashing, inhalation	Do procedure in a fume hood. PPE-splash proof goggles, lab coat, rubber gloves. CPE adequate
6. Potassium antimonyl tartrate stock solution	Spills, inhalation	Do procedure in a fume hood. PPE-splash proof safety goggles, lab coat, rubber gloves (no data on gloves). CPE adequate
7. Combined color reagent mix	Spills, splashing, inhalation	Do procedure in a fume hood. Follow instructions for mixing in lab procedures. PPE-splash proof safety goggles, lab coat, rubber gloves. CPE adequate

Procedure	Potential Exposure	PPE and/or Engineering Controls
8. Manifold dilution water	Splashing	Do procedure in a fume hood. PPE-splash proof safety goggles, lab coat, rubber gloves. CPE adequate
9. Stock phosphorous calibration standard, potassium dihydrogen phosphate, sulfuric acid	Spills, splashing, inhalation	Do procedure in a fume hood. PPE-splash proof safety goggles, lab coat, viton gloves. CPE adequate
10. Stock phosphorous control standard, adenozine-5'-monophosphoric acid, sulfuric acid	Spills, splashing, inhalation	Do procedure in a fume hood. PPE-splash proof safety goggles, lab coat, viton gloves. CPE adequate
11. Digestion, wash glassware with hydrochloric acid	Spills, splashing, inhalation	May cause severe skin or respiratory burns. Do procedure in a fume hood. PPE-splash proof safety goggles, lab coat, CPE, neoprene or rubber gloves
12. Digestion, preparation of calibration standards	Spills, inhalation	Use local exhaust over operation. PPE-as outlined for each standard
13. Digestion, heating tubes	Inhalation, heat (burns)	Use local exhaust over operation. Allow a clean air purge before opening. Use insulated gloves handling hot items
14. Analysis	Inhalation	Use local exhaust over operation. PPE-as outlined for each standard

WASTE GENERATION AND HANDLING

Follow all guidelines in the U.S. EPA's Characterization of Waste From Standard Analytical Methods.

SPECIAL PRECAUTIONS

Use care preparing digestion solution to prevent violent reactions.

CHEMICAL HYGIENE SOP

No. 37

Laboratory Procedure: Determination of calcium, magnesium, potassium, and sodium.

Method: Flame atomic absorption.

Description: Water samples are analyzed by atomic absorption.

Chemicals Used: Nitric acid, hydrochloric acid, calcium standard, magnesium standard, potassium standard, sodium standard

Overall Glove Recommendation: Chlorinated Polyethylene (CPE)

SAFETY CONTROLS

Procedure	Potential Exposure	PPE and/or Engineering Controls
1. Sample preservation with nitric acid	Spills, splashing, inhalation	Nitric acid is incompatible with heat, common metals and powdered metals. Extreme care must be taken. Do procedure in a fume hood. PPE-splash proof safety goggles, lab coat, viton or rubber gloves, face shield optional. CPE adequate
2. Calcium standards, intermediate standards, working standards in nitric acid	Spills, splashing, inhalation	Nitric acid is incompatible with heat, common metals and powdered metals. Extreme care must be taken. Do procedure in a fume hood. PPE-splash proof safety goggles, lab coat, viton or rubber gloves, face shield optional. CPE adequate

Procedure	Potential Exposure	PPE and/or Engineering Controls
3. Magnesium standard, intermediate standards, working standards, in nitric acid	Spills, splashing, inhalation	Nitric acid is incompatible with heat, common metals and powdered metals. Extreme care must be taken. Do procedure in a fume hood. PPE-splash proof safety goggles, lab coat, viton or rubber gloves, face shield optional. CPE adequate
4. Potassium standard, intermediate standards, working standards in nitric acid	Spills, splashing, inhalation	Nitric acid is incompatible with heat, common metals and powdered metals. Extreme care must be taken. Do procedure in a fume hood. PPE-splash proof safety goggles, lab coat, viton or rubber gloves, face shield optional. CPE adequate
5. Sodium standard, intermediate standard, working standards in nitric acid	Spills, splashing, inhalation	Nitric acid is incompatible with heat, common metals and powdered metals. Extreme care must be taken. Do procedure in a fume hood. PPE-splash proof safety goggles, lab coat, viton or rubber gloves, face shield optional. CPE adequate

Procedure	Potential Exposure	PPE and/or Engineering Controls
6. Instrument calibration, burner operation	Heat (burns), compressed gas cylinder explosions	Keep combustibles away from operating area. Acetylene tank must be secure and upright. Follow all safety procedures in Compressed Gas Association Pamphlet P-1
7. Instrument calibration	Inhalation, spills	Do as many procedures as possible in a fume hood or use exhausting during operation. PPE-safety glasses or splash proof safety goggles, lab coat, rubber gloves. CPE adequate
8. Analytical procedure washing with hydrochloric acid	Spills, splashing, inhalation	May cause severe skin or respiratory burns. Do procedure in a fume hood. PPE-splash proof safety goggles, lab coat, neoprene or rubber gloves. CPE adequate

WASTE GENERATION AND HANDLING

Follow all guidelines in the U.S. EPA's Characterization of Waste From Standard Analytical Methods.

SPECIAL PRECAUTIONS

None

CHEMICAL HYGIENE SOP

No. 38

Laboratory Procedure: Determination of total calcium, magnesium, potassium, and sodium

Method: ICAP

Description: Water samples are analyzed by ICAP.

Chemicals Used: Nitric acid, plasma grade standards: calcium, magnesium, potassium, sodium

Overall Glove Recommendation: Chlorinated Polyethylene (CPE)

SAFETY CONTROLS

Procedure	Potential Exposure	PPE and/or Engineering Controls
1. Nitric acid handling, dilutions, sample preservation	Spills, splashing, inhalation, heating	Nitric acid is incompatible with heat and most common metals and powdered metals. Extreme care must be used when heating. Do procedure in a fume hood. PPE-splash proof safety goggles, lab coat, viton gloves, face shield. CPE adequate
2. Calcium	None	Do procedure in a fume hood. PPE-splash proof safety goggles, lab coat, rubber glove (data inconclusive on gloves). CPE adequate

Procedure	Potential Exposure	PPE and/or Engineering Controls
3. Potassium	Inhalation	Do procedure in a fume hood. PPE-splash proof safety goggles, lab coat, rubber gloves (data inconclusive on gloves). CPE adequate
4. Sodium	Inhalation	Do procedure in a fume hood. PPE-splash proof safety goggles, lab coat, rubber gloves (data inconclusive on gloves). CPE adequate
5. Magnesium	Inhalation	Do procedure in a fume hood. PPE-splash proof safety goggles, lab coat, rubber gloves (data inconclusive on gloves). CPE adequate
6. AR00 standard preparation in nitric acid	Spills, splashing, inhalation, heating	Nitric acid is incompatible with heat and most common metals and powdered metals. Extreme care must be used when heating. Do procedure in a fume hood. PPE-splash proof safety goggles, lab coat, rubber gloves (acid is diluted). CPE adequate

Procedure	Potential Exposure	PPE and/or Engineering Controls
7. AR01 standard preparation, calcium, magnesium in nitric acid	Spills, splashing, inhalation, heating	Nitric acid is incompatible with heat and most common metals and powdered metals. Extreme care must be used when heating. Do procedure in a fume hood. PPE-splash proof safety goggles, lab coat, rubber gloves (acid is diluted). CPE adequate
8. Lab control standards, high and low	Inhalation, splashing	Nitric acid is incompatible with heat and most common metals and powdered metals. Extreme care must be used when heating. Do procedure in a fume hood. PPE-splash proof safety goggles, lab coat, rubber gloves (acid is diluted). CPE adequate
9. Intermediate solution and dilution, magnesium, calcium, in nitric acid	Inhalation, splashing	Nitric acid is incompatible with heat and most common metals and powdered metals. Extreme care must be used when heating. Do procedure in a fume hood. PPE-splash proof safety goggles, lab coat, rubber gloves (acid is diluted). CPE adequate

Procedure	Potential Exposure	PPE and/or Engineering Controls
10. Analytical procedures, calibrations, etc.	Inhalation	Do as much as practical under a fume hood or a local exhaust vent. Avoid breathing fumes. PPE-safety glasses or splash proof safety goggles, lab coat, rubber gloves. CPE adequate

WASTE GENERATION AND HANDLING

Follow all guidelines in the U.S. EPA's Characterization of Waste From Standard Analytical Methods.

SPECIAL PRECAUTIONS

Many standards used are carcinogenic or very poisonous. Extreme care must be taken when handling these materials. Follow all procedures carefully in the analytical procedure manual.

Nitric acid used in these procedures is dilute enough to most likely not react with metals and heat. However, care must still be used.

CHEMICAL HYGIENE SOP

No 39

Laboratory Procedure: Liquid / liquid water extraction capture

Method: ---------

Description: Not yet determined.

Chemicals Used: Methylene chloride

Overall Glove Recommendation: Choice of below.

SAFETY CONTROLS

Procedure	Potential Exposure	PPE and/or Engineering Controls
Use of methylene chloride	Spills, splashing, inhalation, flammable	Concentrated vapors can be ignited by high heat source or flame. Material is a suspected carcinogen. Procedure must be done in the Designated Area fume hood. PPE- splash proof safety goggles, lab coat, viton, polyvinyl alcohol or neoprene gloves. These should offer adequate protection

WASTE GENERATION AND HANDLING

Follow all guidelines in the U.S. EPA's Characterization of Waste From Standard Analytical Methods.

SPECIAL PRECAUTIONS

CHEMICAL HYGIENE SOP

No. 39

Laboratory Procedure:	Liquid / Liquid Water Extraction Capture
Method:	Extraction
Description:	Particulate free water is passed through an agitated chamber containing dichloromethane (DCM). The DCM settles from effluent water back into the mixing chamber and the extracted water flows to waste.
Chemicals Used:	Methylene Chloride (DCM) resi-analyzed methanol 3,5 dichlorobiphenyl 2,3,5,6 tetrachlorobiphenyl 2,3,4,4',5,6 hexachlorobiphenyl

SAFETY CONTROLS

Procedure	Potential Exposure	PPE and/or Engineering Controls
Use of methylene chloride	Spills, splashing, inhalation, flammable	Concentrated vapors can be ignited by high heat source or flame. Material is a suspected carcinogen. Procedure must be done in the designated area fume hood. PPE - splash proof safety goggles, lab coat, viton, polyvinyl alcohol or neoprene gloves. These should offer adequate protection

Use of methanol	Spills,splashing, flammable, inhal-lation	Methanol is flam-mable. Keep away from ignition sources. Perform procedure in fume hood. PPE - splash proof goggles, lab coat, rubber or ne-oprene gloves.
Use of PCB standards	Spills, inhal-lation, skin, eye contact.	Suspected Carcinogen. Avoid breathing vapor or mist. PPE-lab coat, splash goggles, neoprene gloves suggested. Perform in area fume hood.

WASTE GENERATION AND HANDLING

Reagents containing methylene chloride must be disposed of as hazardous waste. Follow all guidelines in the U.S. EPA's Characterization of Waste From Standard Analytical Methods.

Disposal of PCBs is strictly regulated by the federal government. All waste residues containing PCBs (e.g. wiping cloths, absorbent material, used disposable protective gloves, clothing, etc.) should be collected, placed in proper containers, marked and disposed of in the manner prescribed by EPA regulations (See 40 CFR Part 761). Consult these regulations prior to any disposal of PCBs.

SPECIAL PRECAUTIONS

Keep containers closed when not in use.

Wash hands thoroughly after procedure completion.

CHEMICAL HYGIENE SOP

No. 40

Laboratory Procedure: Sampling for PCB Congeners

Method: Filtration

Description: Water is pumped to deck of research vessel through a hose. Water is then carried through a filtration system to remove the particulate phase. The filtrate is stored for later processing and analysis.

Chemicals Used: Acetone

SAFETY CONTROLS

Procedure	Potential Exposure	PPE and/or Engineering Controls
Wash carboys and parts in Acetone	Spills, Splashing, Inhalation, Fire	Acetone is Flammable. Do procedure in a fume hood when possible. Keep from ignition sources. PPE Splash proof goggles, lab coat, rubber or neoprene gloves. Check work area with properly calibrated LEL meter when cleaning carboys outside fume hood. Stop if greater than 10% LEL for Acetone.

WASTE GENERATION AND HANDLING

Reagents containing acetone must be disposed of as hazardous waste. Follow all guidelines in the U.S. EPA's Characterization of Waste From Standard Analytical Methods.

SPECIAL PRECAUTIONS

Use care in handling flammables. Keep containers closed when not in use.

Wash hands thoroughly after procedure completion.

APPENDIX M: GLNPO OCCUPANT EMERGENCY PLAN/FIRE PREVENTION PLAN

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CHAPTER 1: GENERAL

1. General. The Great Lakes National Program Office has an inherent responsibility to minimize the danger to life and property arising from the effects of bomb threats, bombs, enemy attack, fire, explosion, earthquake, serious weather disturbances, civil disturbances, and other disasters affecting the R/V *Lake Guardian*. To cope with these conditions, GLNPO requires the development of an occupant emergency plan and fire prevention plan in accordance with 29 CFR 1910.38. This plan is effective upon receipt and for execution upon direction of the Designated Official and/or Director of Facilities. The Occupant Emergency Plan for GLNPO occupants of the Chicago, Illinois General Services Administration Federal Building located at 77 West Jackson Blvd. is maintained and administered by the Regional Safety Office and is not included in the *GLNPO Health, Safety & Environmental Compliance Manual.*

2. Authority. The Great Lakes National Program Office has the authority to protect life and property in their owned and occupied buildings or vessels, and is responsible for the development of emergency preparedness and prevention programs.

3. Applicability. The responsibilities and procedures in this plan apply to all property under the charge and control of the Great Lakes National Program Office and to all persons entering in or on such property. Each occupant shall be responsible for the observance of these rules and regulations.

   This plan will be made known to all property occupants by:

   - Posting alarm signals on bulletin boards.
   - Posting evacuation routes on bulletin boards.
   - Posting a listing of protection personnel on bulletin boards.
   - Distributing emergency instructions to all personnel and contractors.

4. Annual Review.

   a. It is the responsibility of all Facility Occupant Emergency Officials to keep the roster of personnel current and to perform, in conjunction with all protection personnel, an annual review of the plan.

   b. During this annual review, any recommended changes, additions, and deletions will be submitted. However, pertinent changes should be submitted as they occur.

   c. The Designated Official will transmit the required changes to the plan to all protection officials.

d. Contractors are responsible for printing and distributing copies of the Occupant Emergency Plan to their personnel.

CHAPTER 2: ORGANIZATION

1. Responsibilities

   a. The establishment of the Protection Organization is a joint responsibility of all personnel and contractors. The R/V *Lake Guardian* ship operating contractor, the full-time occupants of R/V *Lake Guardian*, and the contract Chemical Hygiene Officer (CHO), will be responsible for providing the direction for implementation of the Occupant Emergency Plan. Personnel for the Organization will be recruited on an equitable basis from among all ship-board occupants prior to each cruise.

   b. To the extent possible and as conditions permit, GLNPO will install and maintain protective equipment, such as warning devices, alarm systems, and fire-fighting apparatus and will provide employee training for the operation of the equipment.

2. Advisory Committee. An advisory committee will be established to assist in the development of various phases of the Plan. The committee will consist of a representative from each agency who is assigned the responsibility for the development of the plan.

3. Coordinator. An official of GLNPO or the ship operating contractor will be the Coordinator for GLNPO vessels. The Coordinator is responsible for providing leadership, assistance, and follow-up to ensure establishment, implementation, and continuity of the Plan. He will provide information and guidance, advise on establishing the Organization, and will assist the Designated Official in recruiting qualified personnel for technical services such as utilities control and for making arrangements for training organization personnel.

4. Occupants. Occupants will acquaint themselves with the alarm system and emergency instructions. All occupants are expected to react to alarms promptly and follow the directions of Organization personnel during an emergency.

5. Basic Functions. Personnel will perform the following functions:

   a. Evacuation of Occupants. This function provides for the planned and directed evacuation of all occupants in the event of an emergency. This is performed under the direction of the Occupant Emergency Coordinator assisted by the Area Coordinators and their assistants.

   b. Fire Protection. This function provides for the fighting and control of fires (small fires) before the arrival of local fire-fighting forces. This is performed by fire protection personnel designated by the R/V *Lake Guardian* Station Bill.

c. First Aid. This function provides for emergency medical treatment by personnel trained in administering first aid. It is performed by the Medical Officer (usually the Captain or Chemical Hygiene Officer).

d. Utilities Control. This function provides for control of utilities in the event of an emergency. It includes the control of all electrical and mechanical equipment; water, gas, and steam valves and conduits; power switches, ventilation and refrigeration devices; and any other such equipment in the facility. Personnel employed in maintenance and facility operations will be assigned to this function under the direction of the Utilities Officer (Chief Engineer).

e. Bomb Search and Reconnaissance. This function provides for the handling of bomb threats, bomb searches, and reconnaissance.

6. Succession to Command. To provide continuity, certain persons are designated to command should the Designated Official be unable to discharge the duties and responsibilities of that position. The succession to command is as follows (descriptions on page 8):

a. Alternate Designated Official - Captain

b. Deputy Designated Official - 1st Mate

c. Alternate Deputy Designated Official - Chemical Hygiene Officer

d. Occupant Emergency Coordinator - Captain

e. Alternate Occupant Emergency Coordinator - Chemical Hygiene Officer

f. Fire Marshal - Captain

g. Alternate Fire Marshal - 1st Mate

h. Bomb Search and Reconnaissance Officer - Outside Assistance

i. Alternate Bomb Search and Reconnaissance Officer - Outside Assistance

j. Utilities Officer - Chief Engineer

k. Alternate Utilities Officer - Assistant Engineer

7.0 Vessel/Building Sheet

Location: 24 Sixth Street
Bay City Michigan, 48708

Name: U.S. EPA, GLNPO R/V Lake Guardian

Construction:

Length	180'	Range	6000 miles
Beam	40'	Endurance	15-30 days
Draft	11' - 15'	2 Main Engines	1150 HP
Berthing Capacity	42	2 Propellers	4 blade stainless
Cruising Speed	12 Kts.	3 Generators	135 KW
Fuel Consumption	110 GPH	2 Radars	40 Mile capability

Number of Occupants: 42 maximum

a. Area Coordinators

b. Zone Monitors

c. Ground Floor Exit Monitors

d. First-Aid Monitors

e. Fire Protection Monitors

CHAPTER 3: DUTIES AND RESPONSIBILITIES

1. Designated Official's Duties. The Designated Official is responsible for:
   - developing the Plan to protect life and property and to minimize damage in the event of a civil defense emergency or other disaster
   - coordinating such planning with the Director of Facilities, tenant agency officials, and the local civil defense director
   - selecting, organizing, and training an adequate staff to conduct the emergency operations required by the facility's Plan
   - directing and supervising the activities of the occupants during an enforced stay within the facility. The Designated Official performs the following duties:

   a. Ensures that the basic provisions of the Plan are disseminated to all persons employed in the facility.

   b. Requests the Director of Facilities to assist in planning for, obtaining, and installing necessary alarm systems, and in selecting qualified emergency service personnel.

   c. Establishes and reports to a control point from which the activities of the Organization may be directed in an emergency.

   d. Maintains liaison and cooperates with the principal officers of the tenant agencies, or their designees, on problems arising in the selection and training of tenant agency employees for the Organization.

   e. Arranges for posting, on appropriate bulletin boards, a roster of Organization personnel who have responsibility for in-shelter or other emergency operations.

   f. Takes all necessary actions to ensure that the facility's Organization operates safely and efficiently in emergencies.

   g. Exercises command responsibility for the orderly movement of all personnel (including non-tenants) in accordance with the Plan.

   h. Maintains liaison with the local civil defense director and local fire and police departments.

   i. Ensures that appropriate training courses are provided and that arrangements are made for obtaining assistance from the Red Cross, local fire and police departments and other sources, as required, to train the Organization staff.

   j. With the assistance of the Director of Facilities, coordinates arrangements for, and directs, fire and bomb evacuation drills.

k. Arranges for and supervises the storage of required supplies and equipment in the facility.

l. Conducts periodic inspections in the facility.

m. Directs all shelter management operations when fallout shelters are occupied.

n. Works closely and cooperates with the local or state civil defense director in all matters involving the facility's Plan, organization or operations.

2 Deputy Designated Official's Duties. The Deputy Designated Official will work closely with the Designated Official and will assume all duties of the Designated Official in the Designated Official's absence or if the Designated Official is incapacitated for any reason.

3. Occupant Emergency Coordinator. The Occupant Emergency Coordinator is responsible for supervising and expediting the planned and controlled movement of all occupants in an emergency. Under the general direction of the Designated Official, the Coordinator serves as head of the Personnel Movement Service (Area Coordinators, etc.) and performs the follow duties:

a. Plans personnel movement routes and establishes movement procedures to effect the personnel movement provisions of the Plan.

b. Assures that all Organization personnel responsible for occupant evacuation conduct an evacuation route search for suspicious items or hazardous conditions BEFORE any occupants are permitted to pass through public areas.

c. Trains, and designates in writing, all Area Coordinators.

d. Develops standard forms of facility protection assignments to be used by Area Coordinators.

e. Supervises and directs movement of personnel during drills and actual emergencies in accordance with the Occupant Emergency Plan.

f. Assures that all occupants, including members of the Organization, comply with procedures indicated by the alarm signals as specified by the Plan.

g. Reports to the control center during actual emergencies.

4. Area Coordinators. The Area Coordinators are assigned by and under the direction of the Occupant Emergency Coordinator. The Area Coordinators act as a liaison and focal contact point between the Zone Monitors and the Occupant Emergency Coordinator. Area Coordinators assume supervision of all protection personnel in the area and expedite the evacuation of personnel from their assigned area. Duties include the following:

a. Establishing contact with all Zone Monitors within their area of responsibility.

b. During drills or actual emergencies, maintaining a clear line of communication between the Occupant Emergency Coordinator and Zone Monitors.

c. Maintaining a current roster of all self-protection personnel.

d. Assuring that evacuation routes are clearly identified, posted on bulletin boards, and well known to the regular occupants of the area.

e. Assuring that evacuation procedures are well known to all regular occupants of the area.

f. Directing the calm and orderly flow of personnel during drills or actual emergencies along the prescribed evacuation routes.

g. Immediately establishing an alternate route of evacuation if a bomb, suspicious item or other hazardous condition is discovered along the normal route of evacuation. No part of a straight line route will be used if a suspicious item or other hazard is found within a corridor, stairwell, passageway, wing, etc.

h. Assuring that Fire Protection Monitors know the location of their duty stations, location of fire-fighting equipment in their area of responsibility, and the alarm signals which will direct them to their stations.

i. Coordinating the activities of Zone Monitors, Stairway Monitors, Fire Protection Monitors, and First-Aid Monitors.

j. Maintaining a current roster of personnel with evacuation assignments by listing name, emergency assignment, telephone number, and duly informing the Occupant Emergency Coordinator of any changes to the roster. The roster form is provided by the Occupant Emergency Coordinator.

k. Immediately reporting fires in his/her area to the Control Center and Occupant Emergency Coordinator.

l. Reporting to the Control Center after evacuation has been completed.

5. Zone Monitor. Under the direction of the Area Coordinator, the Zone Monitor supervises and expedites the evacuation of personnel from his assigned section of the area. Duties include:

a. Assuring that evacuation routes are clearly identified and are well known to the regular occupants.

b. Directing the calm and orderly flow of personnel during drills or actual emergencies along prescribed evacuation routes.

c. Immediately establishing an alternate route of evacuation if a bomb, suspicious item or other hazardous condition is discovered along the normal route of evacuation.

d. Appointing a column leader to guide personnel along prescribed evacuation routes to an area specified by the Area Coordinator.

e. Assuring that all personnel have vacated their areas when required.

f. Assuring that rooms are vacated, windows and doors closed, and electrical appliances switched off in appropriate areas during fire evacuations.

g. Assuring that windows and doors remain open and lights remain on during bomb threat evacuations.

6. Stairway/Elevator Monitor. Under the direction of the Area Coordinator, the Stairway/Elevator Monitor controls the movement of personnel in the stairway. Duties include:

a. Keeping the stairwell open.

b. Keeping personnel moving calmly and steadily, at a walking pace, and not permitting them to run.

c. Closing doors after all personnel in line have passed through and leaving the post only after the last person in line has passed through the door.

d. Controlling and/or restricting the use of passenger elevators by personnel.

7. Medical Officer. The Medical Officer serves as head of the Health and First-Aid Service. The officer is responsible for training and equipping all personnel assigned to perform medical or first-aid services in an emergency and supervising emergency first-aid or medical self-help operations within the facility during an emergency. Duties include:

a. Arranging with the American Red Cross or other sources for first-aid and medical self-help training for all Organization personnel who require such training.

b. Supervising the selection of first-aid or medical treatment areas in shelters and elsewhere as required.

c. Directing first-aid or medical self-help operations and controlling access to medical supplies, as required, to assure their proper use, conservation, and availability for emergency use.

d. Establishing policies and rules governing the emergency treatment of ill and injured persons, maintaining adequate sanitation and hygienic standards, and all other matters relating to emergency health, hygiene and medical activities during an emergency or during the occupation of an emergency shelter.

e. Inspecting the storage and handling of food and drinking water in emergency shelters.

8. First-Aid Monitor. Under the direction of the Medical Officer, the First-Aid Monitor administers immediate first-aid to injured personnel. Duties include:

a. Knowing the location of medical supplies and treatment areas.

b. Administering first-aid to injured persons.

c. Knowing the extent and type of first-aid to be administered in an emergency situation and whom to notify if more treatment is needed.

d. Reporting to the Emergency Treatment Center to assist the Medical Officer in the absence of injured persons and after all occupants have been evacuated.

9. Fire Marshal. The Fire Marshal organizes fire-fighting teams for initial fire-fighting operations. Duties include:

a. Providing fire-fighting instructions through available sources.

b. Assuring that fire fighters know their stations, locations of fire-fighting equipment in their area of responsibility, and the alarm signals which direct them to their duty stations.

c. Deploying fire-fighting personnel to fire areas to extinguish or contain fires pending the arrival of other fire-fighting forces and cooperating with such forces as directed.

10. Fire Protection Monitors. Fire Protection Monitors may operate hand-type fire extinguishers if provided with yearly training. Duties include:

a. Knowing the types of fires and appropriate extinguishers to use in fighting them.

b. Being familiar with the location, operation and capacity of fire extinguishers in an assigned area.

c. Recognizing alarm signals, and then taking appropriate action.

d. Using care in the operation of fire extinguishers to avoid unnecessary damage to personnel, equipment and records.

11. Utilities Officer. The Utilities Officer is responsible for controlling facilities and vessel utilities during an emergency. The Utilities Officer serves as head of the Utilities Control Team and performs the following duties:

    a. Establishes a plan to attend to mechanical devices; ventilation, water, gas and steam valves; power switches, etc. during an emergency.

    b. Dispatches individuals or teams, at the sound of emergency alarms, to predetermined control points for preplanned or directed action.

    c. Reports to the Control Center during emergencies.

12. Utilities Control Team. Under the direction of the Utilities Officer, the Utilities Control Team is responsible for controlling utilities in a facility or on board a vessel during an emergency. The Utilities Control Team reports to the Utilities Officer during emergencies.

13. Bomb Search and Reconnaissance Officer. The Bomb Search and Reconnaissance Officer is responsible for recruiting, organizing, training and equipping personnel assigned to bomb search activities. He shall establish contact with bomb disposal units of local law enforcement agencies and with the U.S. Army Explosive Ordnance Disposal Detachment in his area. The duties and responsibilities of the Bomb Search and Reconnaissance Officer are as follows:

    a. Ascertaining the structural composition of the facility or vessel to determine the possible effects of explosion.

    b. Establishing a cascade telephone system to alert all team members begin implementation of a building or vessel search.

    c. Coordinating search activities with local law enforcement search teams and/or the U.S. Army Explosive Ordnance Disposal Detachment in his area.

    d. Before personnel are evacuated, validating the probability that a suspicious item is most likely a bomb, time permitting.

14. Bomb Search Team. Members function under the direction of the Bomb Search and Reconnaissance Officer. However, they work directly with the Area Coordinator in their respective areas. Members are generally selected from those positions within the responsibility of the Occupant Emergency Coordinator. Duties include:

    a. Searching assigned areas for bombs, suspicious packages and items that do not fit their surroundings.

    b. Immediately reporting any suspicious items to the Area Coordinator who, in turn, relays the information to the Bomb Search and Reconnaissance Officer.

c. Reporting to the Area Coordinator when the search has been completed.

15. Supply Officer. The Supply Officer is responsible for the care of, and issuance to appropriate officials, all supplies, especially essential stocks of food, water, medical supplies, and sanitation equipment. He/she serves as head of the Supply Service and performs the following functions associated with emergency shelter management. Duties include:

a. Planning and scheduling distribution of supplies to appropriate leaders and regulates consumption in conformance with established emergency shelter management policy.

b. Procuring, as available and to the extent storage space permits, desirable items over and above basic stocking, through local government or other appropriate sources.

c. Establishing a program regulating the acceptance and storage of issued supplies and personnel supplies; maintaining an up-to-date inventory of all supplies and equipment; providing for and maintaining security storage of such material, and issuance of daily rations, medicines and other items to appropriate Organization officials.

d. Training Supply Assistants in sufficient numbers to expedite the supply functions of the Plan.

16. Supply Assistants. The Supply Assistants assist the Supply Officer in the performance of his duties.

17. Welfare Officer. The Welfare Officer is responsible for the organization and training of a staff who will provide for registration of emergency shelter occupants and their subsequent needs, such as unit feeding, billeting, recreation, information and religious requirements.

18. Welfare Assistants. The Welfare Assistants assist the Welfare Officer in meeting the feeding, billeting, recreation, information and religious requirements of emergency shelter occupants.

CHAPTER 4: TRAINING

1. General. A continuing program of training and education for all Organization personnel is imperative to ensure maximum effectiveness of the Organization. Personnel who are assigned duties and responsibilities in the Organization will require and be given specific training in the skills necessary to perform their assigned functions, e.g., first-aid, fire fighting, etc. The Designated Official, Director of Facilities, Fire Marshal, and each Area Coordinator, will be responsible for planning and arranging training (including periodic refresher training) of personnel appointed to the Organization. Such training must be sufficiently extensive to develop and maintain proficiency on the part of each person in order that all emergency duties may be accomplished rapidly and effectively.

2. Prior Experience. In order to minimize training requirements, whenever possible, personnel will be appointed to the Emergency Organization on the basis of prior experience. Personnel who have previously served in similar organizations will be utilized to the fullest extent possible. In addition, personnel will be considered for appointment on the basis of qualifications deriving from their normal occupations (i.e., medical personnel, building maintenance, etc.).

3. Civil Defense Training for Federal Employees.

   a. Executive Order No. 1052 of April 22, 1954 (19 F.R. 2379; 3 CFR) provides that heads of Federal agencies may authorize personnel of their respective agencies to participate in civil defense training programs and test exercises in cooperation with any state or political subdivision. Federal employees may be released for periods of up to 40 working hours during any calendar year for the purpose of receiving such civil defense training under the provision of the Executive Order.

   b. Each tenant agency is responsible for assuring that those of its employees who have been assigned duties within the Organization are available for appropriate training.

4. Educational Program. The Designated Official will assure that all personnel are kept informed concerning the general nature and concepts of the Plan and specific actions which all individuals are required to take under the Plan. Information furnished to the employees will be clear and concise. Video may be used periodically to advise all employees concerning necessary individual survival preparation and actions.

5. Drills. Organization personnel and facility or vessel occupants will participate in drills that will familiarize them with the actions they are expected to follow in the case of an emergency. Evacuation drills will be conducted periodically under the direction of the Designated Official and Director of Facilities. Drills will be announced in advance. After they are conducted, they should be documented in the ship's log.

CHAPTER 5: WARNING AND ALARM SYSTEMS

1. Civil Defense Warning Signals. The local government is responsible for disseminating civil defense warnings to the public. This is achieved through a system of centrally-controlled outdoor sirens. There are two civil defense warning signals:

   a. ALERT Signal. This is a steady tone or blast lasting three to five minutes which signals the broadcast of essential emergency information. Occupants will receive further instructions from the public address system.

b. ATTACK Warning Signal. This is a wavering tone or series of short blasts lasting three to five minutes signaling that an attack against the country has been detected. Upon hearing this warning, personnel should take the best shelter available and keep away from windows. Upon orders from the Area Coordinator, all occupants will proceed to the shelter area.

c. Signals within the Facility. A complete warning system has been devised for the RV *Lake Guardian* to operate manually by means of the General Alarm Switch, the Fire Alarm Switch, and the Public Address system located on the ship's bridge. Also, See the Station Bill in **Chapter 8, Attachment 8.1**.

2. Disaster Alarm Signals. A non-civil defense disaster will be signaled within the facility.
a. Fire Alarm. This is a fire alarm signal and a public address system announcement which informs occupants of the fire's location and instructs employees either to relocate or to complete the facility's evacuation. If the facility is evacuated, individuals should clear the immediate area around the facility and wait for verbal instructions from Organization officials.

b. Other Alarms. A rapid ringing of the ship's bell and a continuous ringing of general alarm bells for a period of about ten seconds (in accordance with the ship's station bill), followed by an oral alarm will be used to warn personnel of natural or other disasters. Natural disasters include earthquakes, floods and windstorms. Other disasters include explosions, escape of lethal gases, civil disturbances and bomb threats.

3. Communications Requirements. In collaboration with the Director of Facilities, the Designated Official will arrange for communication of warnings within the facility or vessel. Specific provisions will be made for informing all occupants of the existence of different warning signals, their meanings and what actions are to be taken. Warning signals will be tested on a regular schedule to ensure that the equipment is working properly. Drills should be scheduled often enough to enable the occupants to instantly recognize the sound and meaning of all warnings and to automatically take appropriate action.

CHAPTER 6: EMERGENCY AND EVACUATION PROCEDURES

1. Control Center. The Control Center on the R/V *Lake Guardian* is located on the _____ _____Bridge and is designated as the location that will be utilized by the Organization. All Organization personnel must know the telephone number and location of the Control Center in order for communications to be established in an emergency. During any period of emergency shelter occupancy, either prior to enemy attack or natural disaster, or subsequent to attack due to radioactive fallout, the Control Center may be shifted to O-2 Level.

Emergency Procedures.

a. Upon notification by the Designated Official, the Organization will inform the occupants of the emergency. Emergency actions are stated at the end of Chapter 6 of this Appendix.

b. It is important that the emergency procedures be known in advance so immediate action can be taken. Delays caused by reviewing instructions after the alarm has sounded could cause injury or death, which might be avoided if the occupants were familiar with instructions in advance.

3. Evacuation Procedures.

a. Under no circumstances should an evacuation take place due to a bomb threat without the evacuation route first being searched for bombs or suspicious items.

b. Evacuation may be required because of an emergency. Normally, the Designated Official will decide whether one area, various areas, or all areas will be evacuated. The Area Coordinator may decide to evacuate the area if there is an emergency and he/she thinks there is insufficient time to counsel the Designated Official. In some cases, the Area Coordinator will be forewarned and will instruct the occupants to line up in the corridor at the stairways.

c. The Designated Official will inform each Area Coordinator of the existence of an emergency, its location, sequence of evacuation, and if the evacuation will be partial or complete.

1. A partial evacuation will involve only the necessary area(s) and will be accomplished at the direction of the Area Coordinator.

2. A complete evacuation involves all areas. If there is an emergency in an area which requires a complete evacuation, the area in which the emergency exists will be evacuated immediately, i.e., the disaster floor or deck would be evacuated immediately, followed by other areas in accordance with the ship's Station Bill.

A – Fire In The Facility

1. Major Fire. A major fire is one which CANNOT be easily extinguished by the use of a portable fire extinguisher.

2. Minor Fire. A minor fire is one which CAN be extinguished by the use of a portable fire extinguisher.

3. When a major fire is discovered, the employee will activate the nearest fire alarm box and may call 911 on any of the ship's telephones to report the fire. Supervisors will ensure that all employees know the locations of alarm boxes and telephone systems in their area. The alarm boxes and 911 emergency systems are tied into the Bridge.

4. After an employee activates the fire alarm, the Area Coordinator should be contacted and given the location of the fire.

5. The Area Coordinator will contact the Designated Official and the Fire Marshall, who will then decide whether evacuation will be partial or complete. The Control Center will notify the Occupant Emergency Coordinator, who in turn will contact the Area Coordinator if any evacuation is to take place. The Area Coordinator may decide to evacuate the facility or vessel if, in their judgment, there is not sufficient time to contact the Designated Official.

6. The Fire Protection Monitors will use fire extinguishers to control small fires. In case of a major fire, the Zone Monitor will warn persons in the immediate vicinity to evacuate the affected area.

7. Immediately upon hearing the alarm, personnel will not activate the ventilating system, nor will it be automatically activated.

8. Occupants will take the following action when the fire alarm is sounded:

   a. Proceed as specified by the ship's Station Bill.

   b. Obey the instructions of the Area Coordinator and the monitors.

   c. Proceed into the stairway or exit in an orderly manner as directed by the Stairway Monitor.
   d. Walk to the 0-2 deck, or any alternate area specified by the Area Coordinator and stay in formation.

   e. If the facility is completely evacuated, wait for instructions from Organization officials.

   f. If time and safety permit, place classified documents in a safe or secure location; put exposed records in cabinets or desk drawers or spread covers over the records to protect them; and disconnect electrical equipment. The last person to leave the room closes, but does not lock, the door.

   g. Evacuation will utilize the routes shown on the evacuation floor plan which is posted in the Captain's office, the galley, and in the passageways of all labs. The nature of the emergency may require an alternate route.

   h. Upon evacuation, each Area Coordinator will report to the Occupant Emergency Coordinator located at the Emergency Control Center. Information given by the Area Coordinator will help keep organization officials aware of the progress of the evacuation.

   i. If a partial or complete evacuation has been ordered, personnel will exit according to the evacuation plan. In all cases, personnel will obey the Area Coordinator's and Monitor's instructions.

B – Bomb Threats and Civil Disorder

1. Guides. The following guides are established to assist in preparing for and minimizing the effects of emergencies.

   a. Protection of Priority Locations. Locations requiring priority protection (switchboards, teletype centers, heating plants, etc.) should be identified in advance and arrangements should made for protection of these locations. Consideration should be given to the use of existing heavy monumental-type metal doors, gates, etc., when available, as physical barriers to deter unauthorized entry of selected priority locations.

      (1) Planning and Inspecting. Survey the premises of specific occupants, whose locations have or may reasonably be expected to be the site of civil disorders or demonstrations, to determine if some entrances to the area should be closed, and if door latches are adequate and tamper resistant, if the site lends itself to installation of practical types of intrusion and fire alarm systems, or to the installation of automatic fire extinguishing systems to minimize fire losses and deter vandalism.

      (2) Suspicious Actions. All personnel, particularly guards and vessel personnel, shall be alerted to observe and report immediately any threats and all suspicious-looking persons, packages or equipment.

      (3) Building Service Spaces. All doors to service areas, such as mechanical rooms, transformer vaults, slop-sink rooms, wire closets, etc., should be locked at all times when not occupied. Access will be allowed only to authorized personnel.

      (4) Stairwells and Restrooms. Particular attention should be given to closets incapable of being locked, restrooms, stairwells and other areas where explosives might be concealed.

      (5) After-Hour Entry. Identifying and recording the presence of all persons entering or leaving the facility or vessel after normal hours is essential.

2. In case of a bomb threat, perform the following actions:

   a. Upon learning of a bomb threat:

      (1) Attempt to learn the exact location where the bomb has been or is going to be planted. Attempt to learn as much information as possible about the caller, e.g. vocal idiosyncrasies, race, sex, approximate age, group affiliation, etc. Listen for background noises or for other clues which might indicate the caller's identity and location. Information received should be carefully recorded and immediately relayed to the Designated Official.

(2) Persons receiving a letter or written message concerning a bomb threat will deliver it immediately to the Designated Official.

b. The Control Official or Federal Protective Service will notify the Designated Official and the Bomb Search and Reconnaissance Officer that a bomb threat has been received and give the location, if known. The Federal Protective Service will initiate the telephone cascade system to alert all team members to begin a visual search of the reported location. A suspicious item is never to be moved or disturbed. The telephone cascade system initiated by the Federal Protective Service is as follows:

(1) Federal Protective Services notifies the Occupant Emergency Coordinator.

(2) Occupant Emergency Coordinator alerts the Area Coordinator.

(3) Area Coordinator notifies the respective Zone Monitors.

(4) Zone Monitors search their assigned areas, including stairwells, restrooms, and utility rooms off the corridors.

(5) Available guards, maintenance men and personnel report to the Federal Protective Service for assignment. Personnel located at their assigned area will work under the direction of the Area Coordinator. Whenever possible, searchers will work in pairs and move with extreme caution, both during the search and after the bomb is located.

(6) Upon completion of a thorough inspection of their areas, searchers will report to the Zone Monitor who contacts the Area Coordinator to report the results of the search.

(7) The Area Coordinator contacts the Occupant Emergency Coordinator who notifies the Control Center of the results of the search.

c. In the event a suspicious-looking object is found, the finder performs the following actions:

(1) Does not remove or disturb the suspect object.

(2) Immediately evacuates all persons from the affected area.

(3) Notifies the Zone Monitor and calls Federal Protective Service Control to report that a suspicious item has been located.

(4) The Zone Monitor notifies the Area Coordinator that a suspicious item has been located.

(5) The Area Coordinator notifies the Occupant Emergency Coordinator that a suspicious item has been located.

(6) The Occupant Emergency Coordinator notifies the Control Center and the Designated Official that a suspicious item has been found and informs them of its location.

(7) The Control Center immediately notifies the Bomb Search and Reconnaissance Officer that a suspect item has been found and he/she will verify the item as threatening or non-threatening.

d. The Designated Official may order an immediate evacuation of the area near the affected location if the suspicious item is identified as a bomb.

e. If searchers locate a bomb, they will notify the Bomb Search and Reconnaissance Officer.

f. After disposal of the bomb, the Designated Official will give the signal for occupants to return to the area.

g. The Bomb Search and Reconnaissance Officer will then complete the report as shown on page 24.

C – Instruction Sheet For Initial Bomb Threat Report

1. Date of threat.

2. Time threat was received. Indicate if a.m. or p.m.

3. Print the exact words, as close as possible, used by the caller.

4. Did caller give a location where the device is supposedly planted?

5. Did caller state when the device would detonate? If so, list time.

6. Did caller state what type of device it was? If so, please describe.

7. Did caller describe the device? If so, please list description.

8. Did caller state why the bomb was placed? If so, please list.

9. Please describe anything that could be heard in the background such as street noises, office noises, music, children laughing, etc.

10. Check whether caller seemed to be male or female and the age group that comes closest to the sound of the voice.

11. Check any mannerisms, accents, speech patterns, etc., that could be detected in the voice.

12. Did you recognize the voice of the caller? Please indicate.

13. Name of person who completed the form.

14. Immediately report the call, with the above information, to the supervisor or the designated organization official.

D – Bomb Threat Data Report (Keep near Telephone)

Date Received_____ Time Received _____a.m./p.m.

Time Completed_____a.m./p.m.

Please try to record below the exact words spoken by the informant. Ask that the message be repeated – keep informant talking.

_____
_____
_____
_____
_____

Request Specific Information:

In what area is the bomb placed? _____
Where is the bomb placed? _____
When will the bomb explode? _____
What kind of bomb is it? _____
What does the bomb look like? _____
Why was the bomb placed? _____
Additional Information to be Recorded after Receiving the Threat:

Background Noises (describe): _____

_____

Voice Description:

Male _____ Female _____ Young _____ Middle Age_____Old Tone _____

Sober _____ Intoxicated _____ Nervous _____ Firm_____

Accent/Impediment _____ ____

_____

Was Voice Familiar: Yes _____ No _____ If so, who _____

Recipient's Name _____

Office Address _____

Telephone Number _____

IMMEDIATELY Notify your Official in charge who in turn will:

Call Director of Facilities

Daytime Extension:

Nighttime Extension:

E – Instruction Sheet for Follow-up Report

PLACE THE TIME AND DATE OF THE INITIAL REPORT IN THE UPPER RIGHT CORNER. If an initial report has not been completed and a suspicious package or bomb is found, or if a bomb detonates, include the agency name, building or vessel name, location and address in miscellaneous (9).

1. Include all agencies notified such as the Army Explosives Ordnance Disposal Unit, police, fire department, etc.

2. Self-explanatory.

3. Self-explanatory.

4. Self-explanatory. If exact number of persons is not known, estimate number.

5. Self-explanatory.

6. Describe items found, who was notified, and action taken to remove and identify these items.

7. Same as 6.

8. Self-explanatory. Describe physical damage in as much detail as possible.

9. See first paragraph above. Include any information not covered elsewhere on the form.

10. Other actions taken to augment security in the building.

11. Name of person completing the report.

1. Agencies notified of initial report: _____

_____

2. Public Area Search Conducted: _____ YES _____ NO

3. Complete search of all rooms/offices conducted: _____ YES _____ NO

4. Evacuation: Partial _____ YES _____ NO Complete _____ YES _____ NO

No. of Persons: _____ Time Evacuation Began: _____

Time Employees Returned: _____

5. Increased Security:

Was Package Inspection/Identification Instituted:_____YES _____ NO

Were Entrances and Exits Placed Under Control: _____YES _____ NO

Was Personal ID Required to Enter the Building: _____YES _____ NO

6. Were Suspicious Items Found: _____YES _____ NO

Description of Items: _____

Action Taken:_____

Final ID and Disposition of Items: _____

7. Bomb Device Found: _____YES _____ NO

Description of Items: _____

Action Taken:_____

Final ID and Disposition of Items: _____

8. Bomb Device Detonated: _____YES _____ NO TIME: _____

Date: _____ Location: _____ _____

Area:_____

Number of Persons Killed: _____

9. Miscellaneous: _____
_____
_____
_____

10. Other Actions Taken: _____
_____
_____
_____

11. Recorder: _____

Name Phone Room No.

_____
Date/Time Position Title

_____
Agency Address

F – Demonstrations

1. Criminal Jurisdiction: The handling of demonstrations, "sit-ins", etc., has been the subject of discussion among officials of the Department of Justice and it has been determined that the Designated Official, assisted by the Director of Facilities will handle such matters in close cooperation with the office of the United States Attorney in the Chicago Area. There must be mutual understanding and agreement regarding the action to be taken in such matters and assurance that such action is undertaken with legal authority and will not violate civil rights. The Designated Official, assisted by the Director of Facilities, is the point of liaison for all tenants in the planning and execution of action for handling demonstrations.

2. If possible, the following pertinent facts should be learned prior to demonstrations so that an appropriate plan may be prepared:

   a. Name of sponsoring organization.

   b. Time of demonstration.

c. Proposed schedule of events.

d. Exact location.

e. Activities planned.

f. Purpose of demonstrations.

g. Projected attendance.

h. Character and temperament of those expected to participate.

3. The Designated Official and the Director of Facilities should meet with occupants, local police, United States Attorney, United States Marshal and others as deemed necessary.

   a. The cascade plan of communication will be reviewed to ensure continuity of information and necessary action between the occupants.

   b. When a demonstration is expected to take place on GSA-controlled property, guards and other personnel shall be instructed in accordance with the plan of action agreed upon with the U.S. Attorney. Instructions will vary. They may include permitting the demonstration to take place provided that entrances are kept clear and Government property and operations are not adversely affected; participating in arrangements of a meeting between a representative group of demonstrators with appropriate Government officials; prohibiting entry into the facility by persons who parade bearing signs or who by other actions identify themselves as participants; calling on enforcement resources for assistance, etc. It is desirable to use procedures which appear most likely to gain the cooperation of the demonstrators.

   c. Agreement should be reached regarding the circumstances under which arrests may be necessary and the course of action to be followed in effecting such arrests. (In many instances, arrests are openly sought by demonstrators. Arrests should only be made when necessary.)

5. Plans will be made as to what action is to be taken if persons should gain entrance to the facility and then begin a demonstration, either individually or as a group. Normally, demonstrators shall be asked to leave. If they refuse, become disorderly, or offer passive resistance, i.e., lie or sit on the floor, it may become necessary to place them under arrest. An alternative to arrest is removing demonstrators from the building and restricting reentry. Again, arrests should be avoided if possible. Necessary arrests should be carried out under the guidance of the U.S. Attorney.

G – Explosions

In the event of an explosion, the following actions will be performed:

1. Occupants will take cover under tables, desks or other objects which will provide a measure of protection against flying glass or debris.

2. Occupants will contact the Federal Protective Service, activate the fire alarm system, and then notify self-protection personnel.

3. Occupants will contact the Area Coordinator to report the location of the explosion.

4. The Area Coordinator will contact the Federal Protective Service describing the situation as fully as possible.

5. The Federal Protective Service will notify the Designated Official and the Occupant Emergency Coordinator.

6. The Federal Protective Service will use the public address system to notify occupants and describe the situation as fully as possible.

7. After the effects of the explosion have subsided, the Designated Official will decide if an evacuation is necessary.

8. If an evacuation is necessary, occupants will evacuate under the direction of the Occupant Emergency Coordinator and staff.

9. If the facility is evacuated, occupants will wait outside the facility for further instructions from Organization officials.

H – Chemical Accidents

A chemical accident of disaster magnitude would include accidents involving large quantities of toxic gases. Should such an accident endanger occupants, perform the following actions:

1. Occupants will notify the Area Coordinator of danger.

2. Area Coordinator will telephone the Designated Official and describe the situation as fully as possible.

3. Designated Official will decide if evacuation is necessary.

4. If an evacuation is necessary, occupants will evacuate under direction of the Area Coordinator.

5. Designated Official will telephone the Fire Department and describe the situation as fully as possible.

6. First-Aid Monitors will administer first aid if necessary.

7. Occupants may avoid toxic fumes by moving cross wind; never move up wind or down wind.

I – Severe Windstorms

The U. S. Weather Bureau can forecast severe windstorms with a high degree of accuracy. However, if high winds develop during working hours with little or no warning, perform the following actions:

1. Take shelter away from glass and movable objects.

2. On the RV *Lake Guardian*, take direction from the Captain or Safety Officer.

3. The Utilities Control Officer will notify the Director of Facilities and the Designated Official of any damage.

4. The Director of Facilities will maintain contact with the National Weather Service for the latest weather information.

J – Earthquakes

Operations on board the R/V *Lake Guardian* in the Great Lakes Areas are not normally subject to earthquake, however, if one occurred, there would be little or no advance warning.

1. Upon feeling a serious quake, occupants will perform the following actions:

    a. Obtain shelter under tables, desks or other objects which will offer a measure of protection against flying glass or falling debris. If possible, stay at least 15 feet away from windows to avoid flying glass. Step under a doorway or into a corridor. Keep away from large overhead light fixtures.

    b. Do not leave shelter until advised to do so.

    c. If evacuation is necessary, evacuate under the direction of the Area Coordinator.

    d. Exit from the facility with extreme caution. Watch for falling or unstable debris, live electric wires, escaping gas, etc.

    e. Proceed to an area of safety.

    f. Take additional precautions as deemed necessary.

2. The Designated Official will notify the Fire Department of any fires.

3. Some of the following conditions may exist in conjunction with or following a serious earthquake:

   a. Presence of dead and/or injured persons. Some may be trapped in the facility or under debris.

   b. Disorder and unrest, including panic and looting.

   c. Fire.

   d. Shortage or contamination of drinking water.

   e. Shortage of water for fire fighting.

   f. Shortage of food supplies.

   g. Extensive damage to the structure rendering it potentially unsafe for occupation.

   h. Disruption of gas and electric power systems.

   i. Shortage of adequate living accommodations or shelters.

   j. Blocked and hazardous streets, highways, roads, bridges, etc.

   k. Major or complete disruption of public and private transportation facilities.

   l. Danger of widespread epidemic due to water contamination and breakdown of public health controls.

   m. Shortages of medical supplies and hospital facilities.

   n. Disruption of regular governmental operations.

   o. A large-scale evacuation from the metropolitan area.

4. Immediately after an earthquake, Organization personnel will perform the following actions:

   a. Administer first aid, and assist in any way with rescue operations. Move seriously injured to emergency treatment center.

   b. Disconnect office utilities: gas, electricity and water.

   c. Inspect all utility lines for damage.

d. Extinguish fires. Do not light fires after an earthquake.

e. Reserve telephones for emergency use only.

f. Be aware of hazards such as broken glass, spilled fluids, damaged equipment, crumbling ceilings, etc. Take corrective action if feasible.

g. If required, request assistance from outside sources, such as civil defense, disaster corps, etc.

h. Monitor radio for community disaster information.

i. Attempt to carry out routine procedures and return building to normal operation if possible.

K – Enemy Attack

Civil defense signals, warning of an enemy attack, are sounded by sirens operated by various cities and counties.

1. ALERT SIGNAL. This is a steady blast or tone lasting three to five minutes signifying that essential emergency information will be broadcast.

a. If evacuation is necessary, occupants will evacuate according to directions of the Area Coordinator.

b. Occupants will take personal possessions, such as coats, purses, food, etc., when leaving their work stations.

2. ATTACK WARNING SIGNAL. This is a wavering tone or a series of short blasts lasting three to five minutes; signifying that an attack against the country has been detected.

a. Occupants will perform the following actions:

1) Take cover under desks, tables, or any large objects which will afford a measure of protection against flying glass or debris.

2) Avoid windows.

3) Leave cover only when directed by the Area Coordinator.

4) Proceed to the shelter route indicated on the evacuation floor plan posted on the bulletin board on each floor.

5) Remain in shelter until other action is directed by Shelter Official.

6) Designated Official will contact appropriate authorities regarding further action to be taken.

L – Panic

1. Panic Defined. Panic may occur during an emergency. Panic is defined as "A sudden, unreasoning, hysterical fear, often spreading quickly." Panic can render crowd control difficult if not impossible, but the ability to control panic may save lives and greatly reduce injuries. While appealing to reason may seem futile, it may be possible to limit the spread of panic by assuming a strong, positive leadership position or by reassuring key members of the group.

2. Panic Deterrents. The likelihood of panic, and the physical causes of panic, can be eliminated by an effective program of informing tenant agency personnel of what is expected of them in an emergency. In an emergency, the Organization should be prepared to remove the injured and dead from general view, and to clear away debris with calmness. Emergency preparations should include clearly delineated routes to be taken in evacuating or going to shelter. In addition, the designation and placement of Organization personnel at locations where groups are likely to congregate will better enable them to take command of the emergency and provide calm, decisive instructions and information.

3. Antidotes to Panic. In certain circumstances, it is conceivable that, despite emergency preparations, a fearful, disorganized group may be on the verge of panic. Organization personnel should be prepared to deal with this situation according to the following principles:

a. Provide Assurances. Reassure the group by giving information and instructions calmly.

b. Eliminate Unrest. Dispel rumors. Identify troublemakers and prevent them from spreading discontent and fear through misinformation.

c. Exert Positive Leadership. Propose positive action in a firm and decisive manner. Stress what to do, rather than what not to do.

M – Physical Security of Facilities Alert Guidelines

1. Guidelines have been established in order to better understand the responsibilities and action to be taken in situations which necessitate a security alert.

2. Terms used in the guidelines are identified below:

a. Security Alert. A Security Alert is an action taken when conditions dictate the advisability of establishing security measures.

b. Degrees of Security Alert. There are three degrees of alert which can be declared when the condition has been identified:

1) Moderate

2) Medium or

3) Maximum

c. Conditions. A situation can be described by one of the following three conditions:

1) Gray

2) Yellow or

3) Red

d. Application. Generally, the condition that is selected to describe a situation will determine the degree of security alert:

Condition	Security Alert
Gray	Moderate
Yellow	Medium
Red	Maximum

N – Emergency Procedures

A Minor Fire. (A fire which CAN be extinguished with a portable fire extinguisher).

1. Do not sound the alarm.
2. If you know how to use the fire extinguisher, do so and then report the fire.(See Step 3)
3. Report the fire and its location immediately to your supervisor, any self- protection official.

A Major Fire. (A fire which CANNOT be extinguished with a portable fire extinguisher).

1. Pull down the handle on the nearest fire alarm box.
2. Notify your supervisor immediately.
3. If an evacuation is ordered by your Area Coordinator, follow the directions of self-protection personnel.

Evacuation

1. If there are visitors in your area, notify your supervisor and, if necessary, assist in their evacuation.
2. Use the nearest stairwell. Do not use the elevators.
3. If an evacuation is ordered by your Area Coordinator, follow the directions of self-protection personnel.

Suspicious Objects/Persons

1. Report suspicious persons and/or objects to your supervisor immediately.

2. Never touch a suspicious object and/or package!!!

Bomb Threats

1. Telephone Bomb Threat

   a. When a bomb threat is called in, keep caller on the line as long as possible. Attempt to learn where the bomb has been placed and the time it will detonate.

Prevention of Theft in the Facility

1. The prevention of theft of both Government and personal property is everyone's concern. Personnel should be aware of the types of theft that may occur and take precautionary measures to minimize losses.

2. Theft of calculators, electric typewriters, and adding machines is sometimes attempted by concealing these items in cardboard containers until they can be removed from the facility. No carton or container should be ignored regardless of how routine or innocuous its appearance may seem.

3. Extreme caution should be taken with personal items such as purses, pocketbooks, loose change, etc. Most of these thefts occur as a result of employees carelessly leaving such items unattended on desk tops or in unlocked drawers or cabinets. Reductions in these occurrences can be made if personnel exercise more care in managing their personal property. All valuables should be secured in locked containers, such as file cabinets, during working hours. If valuables have been kept in an office desk for years without incident, it is no guarantee that they will not be missing tomorrow. Personal items that have monetary or sentimental value are NOT secure when left in an office at night regardless of the precautions taken.

4. THE GOVERNMENT DOES NOT REIMBURSE INDIVIDUALS FOR THE LOSS (THEFT) OF PERSONAL ITEMS.

5. DO NOT LEAVE ANY PERSONAL BELONGINGS, THAT YOU ARE NOT WILLING TO LOSE, UNATTENDED IN THE OFFICE.

6. Suspicious or unusual situations or the loss of property should be reported immediately.

Fire Prevention

The following practices for fire prevention have been established throughout the R/V *Lake Guardian* in accordance with 29 CFR 1910.38:

A. Fire Hazards And Control Procedures

The following is a list of major fire hazards found on board the R/V *Lake Guardian* and their handling, storage, and control procedures:

- Combustible materials such as cardboard, paper, oils, etc. are used on board the R/V *Lake Guardian* on a regular basis. Combustible materials should not be allowed to accumulate near sources of heat or flame. They should be promptly disposed when no longer needed.

- Flammable materials such as laboratory chemicals, solvents, paints, products, etc. are used on board the R/V *Lake Guardian* on a regular basis. They should always be segregated according to chemical compatibility and they should never be stored near heat or flame. Bulk flammable materials are stored in the flammable materials storage locker and should only be removed when needed.

- Oxygen and acetylene bottles are stored on the "Foscle Deck" when not in use. Smoking and open flames are prohibited in this area. Hoses should be rolled up when not in use. Tank valves should be closed completely and safety caps installed when not in use.

- Acetone is frequently used in the laboratory areas on board the R/V *Lake Guardian*. No more than 4.0 liters of acetone are allowed at one time in any laboratory area. Acetone and other flammable laboratory chemicals should always be handled and transported inside of secondary containment devices.

- Laboratory heat sources (e.g. electrical appliances) are used on board the R/V *Lake Guardian* and must be inspected on a regular basis to ensure they are operating properly.

- Electrical cords used on board the R/V *Lake Guardian*, must be inspected on a regular basis. Damaged cords should be replaced or removed from service to prevent fire and/or injury.

- Gasoline fuel sources exist on the 0-2 deck and around equipment on the fantail. Care must be exercised in those areas to minimize heat sources.

- Heat and fuel sources exist in the Galley area (e.g. stove burners, oven cook tops, coffee pot, paper, cooking oil, etc.). Care should be taken to keep combustible and flammable materials away from heat sources at all times.

- Smoking areas have been established on board the R/V *Lake Guardian* in outside areas at least 10 feet away from flammable fuel sources. The areas have been designated in part to minimize the chance of fire.

- Portable fire extinguishers, fixed extinguishing systems, smoke detectors, emergency lighting, and notification systems have been installed in areas throughout the R/V *Lake Guardian.* These systems are regularly inspected in accordance with a facility fire inspection program.

B. Responsible Personnel

The following personnel are responsible for maintaining fire control equipment and fuel source hazards located on board the R/V *Lake Guardian*:

- Facility Fixed Extinguishing Systems; Ship Operating Contractor

- Facility Alarm System; Ship Operating Contractor

- Facility Portable Fire Extinguishers; Ship Operating Contractor and Ship Contract Chemical Hygiene Officer

- Emergency Lighting Systems; Ship Operating Contractor and Ship Contract Chemical Hygiene Officer

- Smoke Detectors; Ship Operating Contractor and Ship Contract Chemical Hygiene Officer

- Fuel Source Hazards (e.g. flammable or combustible materials); All facility personnel

C. Housekeeping And Fire Prevention Procedures

It is the intent of this section to make sure that hazardous accumulations of flammable or combustible materials are controlled so that a fast developing fire, rapid spread of toxic smoke, or an explosion will not occur.

The following housekeeping procedures must be followed to prevent the accumulation of flammable and combustible materials and waste residues on board the R/V *Lake Guardian*:

1. Maintain good housekeeping in all areas; this is one of the most effective means of preventing fire.

2. Bring to the attention of your supervisor any apparent existing fire safety hazard.

3. Obey "No Smoking" signs.

4. Do not toss matches, cigars, cigarettes, or pipe ashes into waste baskets or any type of receptacle containing combustible material.

5. Oily rags or similar flammable materials must be placed in approved metal containers provided for that purpose.

6. Coffee pots, microwave ovens, hot plates, or similar electrical equipment with heating elements may be used if such appliances are approved by Underwriters' Laboratory and installed in accordance with local fire codes and the Director of Facilities' approval.

7. Deposit all trash in receptacles provided for that purpose or arrange for its storage in regular trash rooms.

8. Exits, passageways, and lobbies must be kept clear of stored material to permit free movement of personnel and fire-fighting equipment.

D. Maintenance Procedures

The following maintenance procedures have been established for the R/V *Lake Guardian* heat-producing equipment to prevent accidental ignition of combustible materials:

- All heat-producing equipment used throughout the R/V *Lake Guardian* must be used and maintained in accordance with manufacturer specifications.

- Prior to using any heat-producing equipment, supervisors and/or operators should be thoroughly familiar with all equipment operation and maintenance procedures.

- Defective heat-producing equipment should be removed from service until repairs can be made.

- All fire extinguishing systems, emergency lighting, smoke detectors, and alarm systems installed on or near heat-producing equipment must be regularly inspected by ship personnel in accordance with established inspection procedures.

E. Employee Training And Awareness Programs

R/V *Lake Guardian* personnel are apprised of the fire hazards of the materials and processes to which they are exposed during regularly scheduled training sessions. The training sessions offered to R/V *Lake Guardian* personnel consist of the following:

- Regular Fire /Evacuation Drills (noted in the ship's log)

- Initial Orientation Program offered by the Contract Chemical Hygiene Officer which consists of the contents and location of the Occupant Emergency Plan/Fire Prevention Plan

- Initial Orientation Program offered by the Captain and/or First Mate which consists, in part, of general principles of fire extinguisher use, fire alarm station locations, emergency notification system operation (e.g. 911), emergency alarm signals, and evacuation procedures.

First Aid

1. Purpose

   a. This Standard Operating Procedure is intended to provide guidance for Federal personnel in the event that emergencies arise that require emergency First Aid or Self-Help. It is not the intent of this procedure to delineate the specific and various methods of giving First Aid or Self-Help, but rather to indicate where they are to be administered and by whom.

   b. The procedures outlined herein pertain to emergencies arising from disasters only.

2. Responsibilities. Self-Help and First Aid training will be provided on request.

3. First Aid Treatment Stations. The following areas on board the R/V *Lake Guardian* have been designated as First Aid treatment stations in the event of a general emergency:

   1. The Bridge
   2. The O-2 Level
   3. The Captain's Office (primary)

4. Procedures in General Emergencies

   Procedures noted in the *R/V Lake Guardian Station Bill* that is posted throughout the vessel must be followed.

5. Evacuation of Casualties from Facility

   a. Contact the U.S. Coast Guard

   b. Evacuation of casualties will be made by the Police or Fire Department Emergency Service once the vessel arrives in port.

   b. Evacuation of casualties will be under the direct supervision of the Medical Officer.

6. Disaster Emergencies or emergencies involving 20 casualties or more will be treated in the following manner:

a. Response personnel, depending on the type of emergency, will be dispatched to the emergency site upon notification of a disaster type emergency.

b. Contact the U.S. Coast Guard. The Coast Guard will notify the appropriate authorities ((e.g., Police Department, EMS, etc.) and have them available once the vessel arrives in port.

Utilities Control

1. In case of emergency, utilities personnel will proceed to the following assigned stations:

   a. Electrician to sub-station master switch.

   b. Operating Engineer to water control point.

   c. One mechanic to gas control point.

2. Upon direction of the Utilities Officer, all electrical current, water service, gas and steam supplies will be turned off when deemed necessary for preservation of life or property.

Civil Defense Coordination

1. Pre-Emergency. The Designated Official and the Director of Facilities will establish and maintain liaison with local Civil Defense authorities in order to assure that this plan is at all times in agreement with current Civil Defense concepts and local planning. Revision to this plan will be made as necessary to assure that preparations for protection of life and property are never outmoded.

2. During Emergencies. In the event of a disaster, the Designated Official and Director of Facilities will reestablish contact with local Civil Defense authorities, at the earliest possible time, by telephone, radio or messenger, as feasible under existing conditions. Information and assistance will be sought as necessary and, reciprocally, the Facility Self-Protection Organization will provide assistance to Civil Defense authorities as soon as conditions permit.

Tests and Drills

1. Policy. The Self-Protection Organization will conduct such drills as are considered necessary to test and improve the various phases of this plan.

2. Approach. The Director of Facilities, under the guidance of the Designated Official, will schedule two building-wide drills each year.

   a. Participative Drills. In employee participation drills, the employees will evacuate the facility in accordance with the evacuation plan and will then return to their original area.

b. Non-Participative Drills. This drill consists of a test of the alarm system to ensure that all personnel can hear the alarm signals and that all alarms are functioning properly.

3. Advance Notice. The Director of Facilities will distribute written notice to all tenant agencies in advance of any drills or tests, in order to assure that all employees are positively aware that no actual emergency exists when warning signals are sounded. Agencies are to notify their self-protection personnel of any scheduled drills.

Occupant Emergency Plan

The purpose of this plan is to provide instructions to be followed in the event of an emergency occurring on board the R/V *Lake Guardian*.

The protection organization personnel in the plan will:

- Direct and supervise the evacuation of the vessel or building and/or movement to the shelter areas in the event of a disaster.
- Conduct drills to familiarize all employees with actions to be taken in the event of an emergency.
- Provide training of personnel necessary to staff the various protection teams.
- Coordinate action with local Fire Department, Police Department, Rescue Squad, etc.

O – Occupant Emergency Personnel

Occupant Emergency Coordinator:

Alternate Occupant Emergency Coordinator:

Emergency Control Center:

Area Coordinators	Name	Phone #

P – Protection Plan Personnel

Official	Title	Phone	Room
Occupant Emergency Coordinator			

Alternate

Medical Officer

Fire Marshall
Alternate

Utilities Officer
Alternate

First Aid Team

Utilities Control
Group

Q – Personnel to be Contacted in the Event of Emergency

Name	Area	Phone #

ADDITIONAL EMERGENCY TELEPHONE NUMBERS

Local Fire Department	Bay City, Michigan	911 or 517-892-8601
Emergency Ambulance Service	Bay City, Michigan	911 or 517-894-3122

APPENDIX N: HEALTH AND SAFETY MANUAL U.S. EPA R/V MUDPUPPY

HEALTH AND SAFETY MANUAL

USEPA R/V MUDPUPPY

September 1996

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INTRODUCTION

It is the policy of the USEPA, Great Lakes National Program Office (GLNPO), that all EPA employees working in offices, laboratories, field activities, and special programs are entitled to a comprehensive health and safety program. The goals of the program are to ensure that each employee is able to work in an environment free of recognized hazards and to reduce and mitigate occupational accidents as much as possible. These goals are accomplished through the development of standard operating procedures, training employees in the proper techniques for field investigations, proper use of and access to safety equipment, and proper protocol for inspections. This manual provides standard operating procedures and guidelines relative to the health and safety of persons involved in activities conducted on board the R/V Mudpuppy. The procedures outlined within this manual must be used only as supplemental information to the GLNPO Health, Safety and Environmental Compliance Manual which establishes policies, procedures, responsibilities, rules and guidelines to be adhered to by all GLNPO vessels.

BACKGROUND & PROCEDURES

As a follow through to the Assessment and Remediation of Contaminated Sediments (ARCS) Program, the GLNPO Sediment Assessment Program is designed to evaluate sites within the Great Lakes basin where the possibility of sediment contamination exists. Most of the work is done in one of the 42 Areas of Concern (AOCs) which are designated areas which have some known sediment problems. Funding for these assessments comes mostly from GLNPO and sample collection is often done from the R/V Mudpuppy. The sampling activities are always different in scope, as GLNPO's goal is to serve the grantee's (usually a Great Lake State or Tribe) needs.

The R/V Mudpuppy participates in sampling activities where the expected exposures are unknown or only suspected (e.g., screening level and wide area assessments) and where there is some knowledge of the types and levels of potential contaminant exposure (e.g., hotspot analyses). However, sediments are dynamic and heterogeneous in nature. Therefore, during sediment sample collection, field personnel may be exposed to sediment which represents a chemical or biological hazard. From a personal exposure perspective, all sediments should be handled as potentially hazardous unless there is scientific evidence to prove otherwise.

Sediment collection activities involve taking grab samples and long cores. Grab samples are collected with a Ponar dredge by lowering it to the bottom with a winch, retrieving the Ponar, and emptying the sediments into a large tray or bowl. The sample is usually transported to a shore-based laboratory station for homogenization

and subsampling. However, occasionally, homogenization and subsampling is done on the forward deck of the Mudpuppy. Either way, all leftover or slopped mud is hosed into the water while the vessel is still in an anchored position. Utensils are cleaned by hosing off and scrubbing with a brush. If necessary, equipment is decontaminated with solvents and/or dilute acid. All solvent and acid rinsates are collected in separate, labelled containers and disposed of by the grantee.

Core samples are taken with a Rossfelder P-4 vibro-corer. The sampling device usually has a 10-15' aluminum which contains a butyrate core liner. The core liner is extracted and can be sawed into sections of any length. The core (or core sections) is (are) capped, taped, labelled and sent to a shore-based laboratory station where they are characterized and subsampled. Deck clean-up involves hosing and scrubbing to remove slop.

Sampling personnel aboard the R/V Mudpuppy will generally include, at a minimum, one USEPA/GLNPO employee, two contractors, and one grantee. In the absence of an EPA Chief Scientist, EPA will be responsible for designating an acting Chief Scientist. Personnel responsible for boat operations will have experience in small craft vessels, as well as in the use of sampling equipment. Individuals from EPA and the contractor participating in sediment sampling activities must meet the training requirements described in **Chapter 2 of the GLNPO Health, Safety and Environmental Compliance Manual.** A copy of these requirements can be found in **Appendix A** of this manual. At a minimum, individuals participating in sampling activities must have 24 hour Field Safety Training or equivalent. Due to the nature of sampling activities on board the R/V Mudpuppy, individuals participating in sampling activities must be at least eighteen years of age.

Prior to commencing field operations, the field team should gather all site data available and assess the anticipated hazard level of sediments to be sampled. When assessing the sediments' hazard potential for a site, the depth sampled below the surface must always be considered because many Great Lake sites are characterized by having sediments which are more contaminated at depth. For example, if historical data available for a site comes from a Ponar dredge, and samples were found to be contaminated, all samples **below** the sampling depth must be treated as potentially hazardous.

Due to the nature of sampling activities on board the R/V Mudpuppy, stringent health and safety procedures have been implemented. Health & Safety Protocols developed for the R/V Mudpuppy can be found in **Appendix B.**

Personal Protective Equipment (PPE) procedures shall be implemented by all personnel working with contaminated sediment. Guidelines for the selection and use of PPE are set forth in **Appendix C, R/V Mudpuppy- Personal Protective Equipment Program.**

Sediment assessment and tributary monitoring may entail collecting long core and grab samples with low to high amounts of contamination. Sample collection procedures must be performed in accordance with developed **Standard Operating Procedures found in Appendix D.**

TRAINING, CERTIFICATION, MEDICAL MONITORING

GLNPO training courses encompass a wide range of criteria including laboratory safety training, radiation safety training, field health and safety, first aid and CPR, respiratory protection training, emergency response training, fire fighting, crane and derrick operations, occupational noise exposure, hazard communication, bloodborne pathogen, etc. It is the policy of GLNPO that EPA personnel and research vessel occupants, including ship contractors, laboratory contractors, and visiting scientists, have appropriate safety training specific to their job function in accordance with **Chapter Two of the GLNPO Health, Safety and Environmental Compliance Manual (See Appendix A).**

The GLNPO Safety Manager will record and certify that annually required training courses have been attended by all EPA field personnel. The GLNPO Safety Manager will also be responsible for maintaining records regarding annual training, medical monitoring and respirator fit testing certification for appropriate field personnel.

The Regional Medical Monitoring Selection Policy to be followed by all EPA Region V employees is detailed in Regional Order 3130. This program is designed to monitor the health of employees whose work regularly or periodically poses the possibility of exposure to hazardous materials.

COMPLIANCE REVIEW AND STANDARD OPERATING PROCEDURES

All personnel aboard GLNPO research vessels are required to comply with all applicable OSHA, USCG, and EPA regulations. Health, safety and environmental compliance standards for GLNPO research vessels are specified in the GLNPO Health, Safety and Environmental Compliance Manual.

Written health and safety Standard Operating Procedures (SOP) must be developed for specific tasks related to field or laboratory

operations. Within these SOPs, all safety, health and environmental compliance issues should be addressed. Standard Operating Procedures for the R/V Mudpuppy can be found as appendices to this manual. Additionally, Region V and GLNPO have developed SOPs which may be used to supplement laboratory or field SOPs (refer to the GLNPO Health, Safety and Environmental Compliance Manual). For convenience, portions of the GLNPO Health, Safety, and Environmental Compliance Manual have been extracted and appear in the appendices of this manual.

RESEARCH VESSEL HEALTH & SAFETY

Health & Safety Procedures During Sediment Sampling

When handling sediments of unknown contamination, all sediments must be treated as potentially hazardous unless scientific evidence proves otherwise. To reduce the potential of exposure, health and safety procedures during the handling of contaminated sediments is of utmost importance. This manual contains policies and procedures which have been developed and must be implemented during sediment sampling.

GLNPO has established a protocol which implements the minimum acceptable health and safety standards for the protection of persons aboard EPA vessels. All personnel aboard GLNPO research vessels are required to comply with the health, safety and environmental regulations in accordance with the GLNPO Health, Safety and Environmental Compliance Manual. Protocol requirements developed specifically for the R/V Mudpuppy, in accordance with the GLNPO Health, Safety and Environmental Compliance Manual, are contained in the appendices of this manual.

Hazard Communication

In accordance with OSHA's Hazard Communication Standard (29 CFR 1910.1200) an employer is required to develop a Hazard Communication Program. A successful program requires the cooperation of EPA and contracting personnel. It is the duty of GLNPO to assure that Hazard Communication Programs are implemented for all research vessels. The **Hazard Communication Program for the R/V Mudpuppy can be found in Appendix E** of this manual.

Hazardous materials used aboard the R/V Mudpuppy include such chemicals as organic solvents, corrosives, flammable liquids, and toxic or reactive chemicals. A **Chemical Inventory and Material Safety Data Sheets (MSDS)** for chemicals used aboard the R/V Mudpuppy can be found in **Appendix F** of this manual. MSDSs must be available during all sampling operations. MSDSs provide

information necessary for immediate response in the event of a spill or personal exposure.

Personal Protective Equipment

It is the policy of the EPA to protect the health and safety of all personnel, especially those persons engaged in work of a hazardous or toxic nature, by providing and requiring the use of proper Personal Protective Equipment (PPE). A **Personal Protective Equipment Program** has been developed for the R/V Mudpuppy and can be found in **Appendix C.**

Sediment assessment and sampling may entail collecting long core and grab samples with low to high amounts of contamination. Sample collection procedures must be performed in accordance with developed **Standard Operating Procedures found in Appendix C & D.** The SOP's contain listings of PPE required during sampling procedures.

To minimize the risk of exposure proper decontamination procedures must be followed during the donning and doffing of PPE. These procedures are outlined in **Appendix C** of this manual.
Donning and doffing procedures specific to those procedures used on the Mudpuppy can be found in **Appendix C.**

Additionally, Chapter 6 and Appendix I of the GLNPO Health, Safety and Environmental Compliance Manual establishes policies, responsibilities, and practices for the procurement, issuance, control and use of PPE by GLNPO employees.

Personal Flotation Devices

Each EPA vessel must be equipped with Personal Flotation Devices (PFDs) for at least 110 percent of the vessel's maximum complement. PFDs must be distributed throughout the vessel and readily accessible. Each PFD must be clearly stenciled with the vessel's name. PFDs (work vests/type III) must be worn at all times when working on the open deck **(see Appendix B for additional safety equipment requirements).**

First-aid Equipment

Medical first-aid kits shall be provided aboard all EPA vessels. The first-aid kit shall be stocked in accordance with the requirements found in **Appendix B**. The first-aid kit must be well organized, inspected and up-dated at least monthly. Expired materials must be replaced and disposed of immediately. A list of contents and any necessary user instructions must be posted inside the first-aid kit.

In the case of personal illness or accident deemed sufficiently serious by the Shipmaster to warrant treatment beyond the first aid facilities on board, the Shipmaster must be familiar with and shall follow the **Medical Emergency Procedures outlined in Appendix B** of this Manual.

Fire Fighting Equipment

Fire prevention programs must be established for all GLNPO vessels to reduce the possibility of fire. If fire does occur, well-developed fire fighting procedures will be implemented. The Shipmaster is in charge of fire prevention and protection. The Shipmaster will establish inspection schedules, provide recordkeeping, and ensure that all fire fighting equipment is properly inspected and in working order in accordance with **Appendix B** of this manual.

Safety Tests and Drills

It is the responsibility of the Shipmaster to conduct and record safety tests of equipment as well as procedural drills. Testing and drill requirements can be found in **Appendix B** of this manual.

Weather

Safe boat operations as well as personal safety can be greatly enhanced by establishing operational limitations based on weather conditions. Staying abreast of current and developing conditions is the responsibility of the Shipmaster. Maximum operating conditions are discretionary and final determinations should be made with consultation of the USEPA Chief Scientist and the Shipmaster, the Shipmaster having final authority.

Additionally, personal exposure to weather conditions can pose a threat to life and safety. Working in hot and cold environments can lead to injury, illness and death. The Shipmaster and the USEPA Chief Scientist must be aware of the signs and symptoms of hypothermia and heat stroke. If at any time conditions are such that they lead to impaired judgement and performance, unsafe work practices, or render a threat to human health and life, it is the Shipmaster's responsibility to deem conditions unsafe for work activities.

Safe Boat Operations

In addition to use of personal flotation devices, man overboard procedures, fire safety, weather awareness, distress signals, fueling procedures, and rules of the road, small boat operations include embarking, anchoring, and docking activities. Small Boat Standard Operating Procedures have been developed by Seaward Services Incorporated (SSI) and can be found within the document titled "**SSI Occupational Safety and Health Program Manual**" found in **Appendix G** of this manual. Additionally, GLNPO has developed small boat handling procedures which can be found in Chapter 5 of the GLNPO Health, Safety and Environmental Compliance Manual.

Load Handling Equipment

Many heavy or bulky items of research equipment are handled over the side of a vessel during sampling activities. All handling equipment involved in sampling activities must be installed and operated in accordance with applicable specifications and regulations. Operating limitations should be clearly posted, and operators of winches and cranes must receive adequate training in accordance with regulatory requirements. Equipment must be visually inspected prior to each use, and formally inspected periodically (annually). If damage or line stress is evident, the equipment must be removed from service until replaced or repaired. **See Appendix B for additional requirements.**

Distress Signals

GLNPO research vessels must be equipped with distress signal in accordance with **Appendix B** of this manual. Additionally, visual hand signals may be used to attract attention during a time of distress. Channel 16 on the marine radio is the channel reserved for emergency transmissions. If a "MAYDAY" distress call is heard from a vessel, allow the Coast Guard to respond. If a GLNPO research vessel is in a position to render assistance, contact the Coast Guard as soon as there is a break in radio traffic. The law requires that when possible and appropriate, assistance be rendered to other boaters in distress.

Communication

Adequate radio communications are essential to safety on board research vessels. All research vessels must have appropriate radio equipment, even if it is not legally required. Certain vessels are required to carry radio communication equipment and licensed operators in accordance with 47 CFR. Federal Communications Commission Rules and Regulations are also applicable. Part 81 governs maritime radio services. Research vessels must be equipped with sufficient numbers of long-range and short range radios with

adequate channels and power output to insure transmission of operational or emergency messages, and the receipt of weather information. A vessel should not deploy without at least two working means of communication.

ENVIRONMENTAL COMPLIANCE

Executive Order 12088, signed by President Carter in 1978, requires Federal Agencies to comply with all requirements of federal, state, and local environmental regulations. As such, EPA regions must comply with these regulations concerning air, water, hazardous and nonhazardous waste, toxic substance control, emergency planning, and community right-to-know. Each division is required to establish practices and procedures which comply with these regulations as they relate to individual operation. Specifically, GLNPO personnel must understand and comply with regulations detailed in the Toxic Substance Control Act (TSCA) and the Resource Conservation and Recovery Act (RCRA) (Chapter 9 of the GLNPO Health, Safety and Environmental Compliance Manual).

Additionally, all EPA employees, including USEPA contractors, are required to act in an environmentally responsible manner to protect themselves, the public, and the environment.

USEPA R/V MUDPUPPY

APPENDIX A

Chapter 2 - TRAINING, CERTIFICATION, AND MEDICAL MONITORING

REQUIRED TRAINING POLICY - OVERVIEW

It is the policy of the Great Lakes National Program Office that all EPA personnel and research vessel occupants, including ship contractors, laboratory contractors, and visiting scientists, have appropriate safety training specific to their job functions in accordance with EPA requirements. All required courses will be provided by the EPA Safety Manager, with the exception of Superfund training. (Superfund training will be provided by the Office of Superfund.) Training courses will be offered on an annual basis.

GLNPO training courses encompass a wide range of criteria including laboratory safety training, radiation safety training, field health and safety, first aid and CPR, respiratory protection training, emergency response, fire fighting, crane operation, industrial truck operation, occupational noise exposure, hazard communication, confined space entry, hot work and lockout-tagout procedures, as well as bloodborne pathogen training. In addition to training courses, GLNPO adheres to the regional medical monitoring selection policy followed by all EPA Region V employees.

2.1. Required Training Policy

All EPA and Contractor personnel who work in EPA owned or leased laboratory space (including laboratories on research vessels, and all field locations) must meet the safety training requirements specified in EPA Order 1440 and Regional Safety Manuals. These Regional Safety Manuals must be readily accessible at all locations. Supervisors must assure that their employees are aware of these manuals and that the requirements within the manuals will be implemented. Chapter Eight of EPA Order 1440 specifically addresses working with toxic substances in laboratories. Regional and laboratory safety regulations are designed to comply with the OSHA regulations 29 CFR Part 1910 "Occupational Exposures to Hazardous Chemicals in Laboratories". All laboratories are required to have a site-specific safety manual. The manual should include general laboratory safety rules, fire escape plans, emergency plans, environmental compliance rules, and a chemical hygiene plan. All laboratory personnel must receive training based on the content of the manual and must know its location for reference purposes.

2.1.1 24-Hour Laboratory Safety Course

As specified in Order 1440, Chapter Eight, a 24-Hour Laboratory Safety Course must be completed by all EPA and contractor personnel prior to working in an EPA laboratory on a full-time or part-time basis. The 24-hour Laboratory Safety Course is designed to cover all aspects of laboratory safety. New employees must receive on-the-job training including fire evacuation procedures, waste disposal procedures, protective equipment requirements, the location of eyewashes, fire alarms, spill control stations, and any site-specific safety rules. Topics such as potential sources of exposure, adverse health effects, work practices and engineering controls, environmental and medical monitoring procedures, and storage of incompatible materials should be covered, as well. Additionally, since all laboratories generate wastes, and some of theses wastes are hazardous under the RCRA regulations, the 24-hour training must include information regarding environmental compliance. This will ensure that laboratory personnel will understand compliance according to RCRA regulations and how it relates to their work practices. For further information, please refer to EPA Headquarters Order 3500.1 entitled "Training and Development for Compliance Inspectors/Field Investigators". In the event a new employee begins work in a laboratory prior to scheduled training, the employee should review the materials provided for the Laboratory Safety Class and refresher class. The employee should then be enrolled in the first available Laboratory Safety Class.

A training agenda for the 24-hour course can be found as **Attachment 2.1** of this chapter.

"General Laboratory Safety Rules" appear as **Attachment 2.2** of this chapter.

2.1.2 4-Hour Laboratory Safety Refresher Course

Following the completion of the 24-hour Laboratory Safety Course, an annual refresher course is required thereafter. The 4-Hour Laboratory Safety Annual Refresher Course is mandatory for all EPA and contractor personnel who work in EPA laboratories and is designed to review safety topics for personnel who already have a basic understanding of safety rules. Recent advances in health and safety regulations should be included during this refresher training. The 4-Hour Laboratory Safety Annual Refresher Course agenda appears as **Attachment 2.3** of this chapter.

2.1.3 GLNPO Research Vessel Laboratory Training Requirements

In addition to the 24-hour Laboratory Safety Course and the annual 4-hour Refresher Course, all laboratory personnel are required to attend a "site-specific" training orientation course prior to engaging in laboratory activities. This course is intended to familiarize EPA personnel and contractors with the laboratories in which they will work. An Annual Refresher Course is required for this training and participants are required to document attendance. The general training agenda for the course appears as **Attachment 2.4** of this chapter.

2.1.4 Radiation Safety Training

The U.S. Nuclear Regulatory Commission's Material License issued to the U. S. EPA Central Regional Laboratory (CRL) allows the limited use of radioactive materials aboard GLNPO research vessel laboratories. This license also allows GLNPO laboratories to use Carbon 14 and Nickel for laboratory research and sample analysis. While these materials may be used on a limited basis, Radiological Health and Safety Plans, in accordance with the U.S. Nuclear Regulatory Commission (NRC) Regulatory Guide 8.8 and DOE publication PNL-6577, will be implemented to maintain the lowest minimum exposure to personnel. Use of these materials are subject to the guidelines specified in the CRL Radiation Safety Manual as described in **Appendix J** of this manual. GLNPO research vessels must also follow the guidelines presented in the Chemical Hygiene Plan described in **Appendix J** of this manual.

A site-specific Radiation Safety Training Course is required for GLNPO personnel and contractors prior to working in a GLNPO facility where radioactive materials are used. This training must provide information on work operations using radioactive materials, personnel monitoring, protective clothing, and bioassay. These training requirements appear as part of the Chemical Hygiene Plan described in **Appendix J** of this manual and radiation safety SOPs appear as an attachment to the plan.

2.1.5 40-Hour and 24-Hour Field Health and Safety Training

Health and Safety training is required for all EPA field personnel. The training consists of a 40-hour Superfund Hazardous Waste Site Training Course for all OSCs, RPMs, and related personnel. All other field personnel, including inspectors, are required to take the EPA 24-hour Field Safety Training Course. All

training requirements will be in accordance with EPA Order 1440.2.

Since specific protection cannot be engineered into every field situation, it is essential that employees are trained to implement safe operational procedures and are familiar with the proper use of personal protective clothing and equipment. GLNPO employees and contractors, therefore, must successfully complete the 24-hour or 40-hour training required and hold certifications attesting that these requirements have been met. GLNPO employees and contractors are not permitted to engage in routine field activities until they have been trained and certified.

No persons, field EPA employees, or contractors will be permitted to participate in GLNPO-sponsored activities until they have received appropriate training .

2.1.6 8-Hour Field Health and Safety Annual Refresher Training

After certification in the 40-hour or 24-hour Field Health and Safety Training Courses, all GLNPO employees and contractor personnel are required to complete the 8-hour Refresher Training Course on an annual basis. The refresher instruction is designed as a review of subject areas necessary to maintain certification based on the initial 40-hour and 24-hour training.

For further details on this subject, refer to EPA Order 1440.2 Transmittal July 12, 1981.

2.1.7 First Aid and CPR

EPA employees classified as Chief Scientist and contractor personnel who work on board GLNPO vessels are required to attend an 8-hour course in First Aid/CPR.

CPR
Courses in Cardiopulmonary Resuscitation (CPR) will be offered throughout the year. Training may be given by fellow employees who are certified instructors or by instructors from an outside agency. Assuming that "someone else" will know CPR is a dangerous assumption. All EPA personnel aboard GLNPO vessels are required to attend an annual 4-hour course in CPR.

First Aid
First Aid, like CPR, will be taught throughout the year. This course is valuable to all, but especially important to personnel who are engaged in potentially hazardous activities. Like CPR, knowledge of First Aid is valuable outside the work place, as well. All personnel who are required to work on GLNPO research vessels must attend a 4-hour training session in First Aid, at minimum, once every three years.

2.1.8 Respiratory Protection

Employees performing tasks requiring the use of respiratory protective devices must receive training in the use and limitations of a respirator. Personnel must also be evaluated by a physician to ensure they are medically fit to wear a respirator. If respirators are issued, a written Respiratory Protection Program must be implemented. Training and program requirements can be found in OSHA 29 CFR 1910.134 and EPA Order 1440.3.

A written Respiratory Protection Program for GLNPO research vessels is described in **Appendix A** of this manual. All Emergency Response Personnel aboard the vessel must meet the requirements specified in the program.

2.1.9 Emergency Response Team Training

Prior to each GLNPO research vessel survey, it is necessary to have a designated emergency response team. The team must be trained in spill response, respiratory protection (including SCBA), and emergency response in accordance with OSHA 1910.120. The team members must also be trained in CPR and first aid and conduct practice drills on an annual basis.

In the event anyone aboard a ship at sea becomes ill or is injured beyond the clear capability of the ship to provide prompt and adequate care, a Medical Emergency (ME) exists and that person should be transferred to a facility providing emergency medical treatment.

If the Captain (or officer in charge) determines that a possible ME exists, the U.S. and/or Canadian Coast Guard should be contacted for advice and assistance. The Coast Guard may be hailed on radio Channel 16 throughout all the Great Lakes. The Coast Guard can provide medical consultation and evaluation of the situation and are equipped for evacuation by boat or helicopter, if needed.

Always contact the Coast Guard for advice. Not all ports have emergency medical facilities and not all may be suitable for a particular ME.

These procedures and numbers should be readily available for all employees aboard GLNPO research vessels.

Telephone numbers for Coast Guard areas and designated trauma centers appear as **Attachments 2.5** of this chapter.

2.2 SAFETY TRAINING FOR SHIP OPERATING PERSONNEL

Ship operating personnel must receive training specific to their job functions in accordance with all regulatory and policy requirements. Specific training areas such as fire fighting, heavy equipment operation, and powered industrial truck operation, are detailed in the following sections.

2.2.1 Fire Fighting

In the event of fire, a well-trained fire brigade must be available to respond immediately and be accompanied by a qualified chief in command. All members of the GLNPO research vessel fire brigade must be trained in accordance with the U.S. Coast Guard's fire brigade requirements. Training must include discussions of fire principles and fire classification, the use of portable fire extinguishers and proper extinguishing methods, in addition to overall fire safety awareness. Other qualifications of the brigade must include training and experience in fire protection and prevention in addition to well established firefighting organizational capabilities.

Response teams must be available 24 hours a day and regularly scheduled training for all members of the team must be conducted. Training sessions, at least one hour per week, are recommended. These sessions should include proper procedures on how to avoid fire, hands-on training for drills, including signals and individual responsibilities, as well as procedures for the prevention of bodily injury. A portion of this training must be devoted to the practice of emergency exit drills to make certain that all exits are clearly marked and easily passable and that all alarms are in maximum working order. Any deficiencies noted during drills or regular inspections must be corrected immediately.

Training documentation must be made available aboard the vessel and must include the date of training, name and social security number of the individual trained, and the name and qualifications of the trainer.

2.2.2 Cranes

Persons responsible for the operation of cranes, derricks, or hoists on all GLNPO research vessels are required to receive annual training in the proper use of Ship-Mounted Load Handling Equipment. Training documentation must be made available aboard the vessel and must include the date of training, name and social security number of the individual trained, and the name and qualifications of the trainer.

2.2.3 Powered Industrial Trucks (Fork Lifts)

The operator is one of the most important factors in the safe operation of industrial or fork-lift trucks. To ensure operator competence, and mental and physical fitness, training is required. Initial training must be performed in accordance with the National Safety Council Guidelines followed by refresher courses every two years. Training must include:

- Operator safety rules
- Basic material handling techniques
- Basic instruction on the operation of the truck
- A driver's performance test on an obstacle course which simulates actual driving conditions (e.g. maneuverability)

The operator should be trained to distinguish the differences between a fork-lift truck and a conventional car or truck. For example:

- A lift truck can be steered by either the front or rear wheels
- A lift truck steers more easily loaded than empty
- A lift truck is often driven as much in reverse as in forward gear

Employees who are assigned to operate powered industrial trucks and/or lift trucks should be given a certification card and should be required to carry it. "Rules of Operation" - Safety rules of operation will be given to all industrial truck and lift truck operators. These rules are described in **Attachment 2.6** of this chapter.

2.3 DOCUMENTATION

Documentation for all EPA required training courses and field certifications must be maintained by the branch or office safety representative, the GLNPO Safety Manager, the Branch or Division Safety Representative, the EPA Safety Manager, and the EPA Training Officer. In all cases, each attendant of an EPA required safety course must complete a Standard Form 182 prior to training and forward it to the Regional Training Officer. The information contained in this form will establish a permanent record and be maintained in the Human Resources Branch Training Data Management System.

The GLNPO Safety Manager will record and certify that annually required training courses have been attended by each field inspector or field personnel and issue proper documentation in the form of a certification card. The GLNPO Safety Manager will also be responsible for maintaining annual medical monitoring and respirator fit testing certification for appropriate field personnel.

2.4 MEDICAL MONITORING SELECTION POLICY

The Regional Medical Monitoring Selection Policy is detailed in Regional Order 3130 and is to be followed by all EPA Region V employees to whom it applies. The purpose of the Regional policy is to ensure consistency in EPA's approach to mandatory participation in the Medical Monitoring Program and to ensure that EPA provides the most comprehensive health protection possible for its employees. This program is specifically designed to monitor the health of employees whose work regularly or periodically poses the possibility of exposure to hazardous materials.

Medical monitoring may consist of a series of blood chemistry tests, urinalysis, pulmonary function tests, hearing testing, and chest x-rays. Other types of monitoring may be necessary based on the various hazards encountered by individual personnel. A physician is responsible for identifying and explaining the significance of all findings. No employee should leave the health unit with unanswered questions. Baseline or preplacement examinations are conducted prior to a job assignment where exposure to toxic substances or hazardous materials may be possible.

Three categories in which Medical Monitoring is mandatory are Hazardous Waste Site Workers, Laboratory Personnel, and Other Field Personnel or Inspectors who are exposed to toxic chemicals. Based on this policy, all GLNPO employees who

work with potentially toxic chemicals must be monitored for exposure.

The written Medical Monitoring policy is described in **Appendix B** of this manual.

2.5 ADDITIONAL HEALTH AND SAFETY COURSES

As well as courses that are required for field and laboratory personnel, other courses will be offered that are intended for all employees, including office workers who do not routinely work in unsafe situations. Courses for non-field/lab personnel will be offered that address potentially serious health risks. Some courses will be offered consistently throughout the year while others will be specially scheduled.

2.5.1 Occupational Noise Exposure

In 1983 OSHA promulgated a hearing conservation amendment to the 1971 noise standard. This standard defines an effective program and requires that a hearing conservation program be implemented if workers are exposed to levels equal to or greater than 85 dB measured on the A scale (slow response). When employees are subjected to noise at or above this PEL, regulations state, "the employer shall administer an effective hearing conservation program". Note: EPA employees and contractors, including all GLNPO personnel, are required to wear hearing protection in all work spaces where noise levels reach or exceed 85 dBA.

The hearing conservation program for GLNPO research facilities is described in **Appendix C** of this manual.

2.5.2 Hazard Communication

GLNPO will ensure that a Hazard Communication Program is in place on all research vessels and that all non-laboratory personnel aboard the vessels are familiar with the program. The Hazard Communication Program will be based on the Occupational Safety and Health Administration's regulation stated in 29 CFR 1910.1200. The program will contain a chemical inventory list, material safety data sheets, proper labeling requirements, and employee training specifications. The Hazard Communication Program for GLNPO is described in **Appendix D** of this manual.

2.5.3 Confined Space Entry

The Occupational Safety and Health Act of 1970 lead to the development of the Safety Training and Education Standard (29 CFR 1926.21) for confined spaces. This standard defines a confined space and requires that employees who enter confined spaces are trained to recognize the hazards of a confined space and know the precautions to take when entering and working in such a space. Training is also required for the use of appropriate personal protective and emergency equipment when working in or around confined spaces.

After review of fatality and injury data, the Occupational Safety and Health Administration found the existing standards to be inadequate in protecting workers from the hazards of confined spaces. In June, 1989, OSHA proposed a new rule for the protection of workers in general industry who work in confined spaces. This rule would require the development of a permitting system for confined space entry, and would address training, monitoring, and equipment necessary for entry into confined spaces. As of April 15, 1993, the permit, Required Confined Spaces Rules, has become effective as stated in 29 CFR Part 1910.146, Occupational Safety and Health Administration (OSHA), U.S. Department of Labor. Further information concerning the Confined Space Entry Program and its requirements is described in **Appendix E** of this manual.

2.5.4 Hot Work Procedures

If proper safeguards are not implemented, activities such as cutting, welding, heating, grinding or other activities that produce a flame or spark have the potential for creating a fire or explosion. To minimize hazards associated with hot work, Standard Operating Procedures (SOP) should be developed and followed.

These procedures should include measures for protecting the worker, the establishment of a hot work permitting system, monitoring for chemical exposure, and monitoring for fire and explosion potential. When welding, cutting, or heating, all personnel and contractors must comply with OSHA 29 CFR 1926.353 for Ventilation and Protection in Welding, Cutting, and Heating During Construction Activities. OSHA 29 CFR 1910.252, General Requirements, must also be followed. Additional information outlining Hot Work Procedures is described in **Appendix F** of this manual.

2.5.5 Lockout/Tagout

The purpose of lockout/tagout is to control the release of potentially hazardous energy. The unexpected energization of machines or equipment, or release of stored energy, can cause injury or death. Based on this definition, GLNPO's Lockout/Tagout program is based on the Occupational Safety and Health Administration's (OSHA) Control of Hazardous Energy Sources Standard found in 29 CFR 1910.147. The program is designed to safeguard the health and well being of GLNPO and contractor personnel from a variety of energy sources when performing daily repairs, maintenance, and servicing of their operating equipment. To minimize hazards associated with these activities, personnel must be trained to follow proper lockout/tagout procedures specified in the written program.

The GLNPO Lockout/Tagout Program includes energy source surveys, designations of authorized personnel, affected personnel, training, lockout/tagout methods and procedures, restoring equipment to use, and outside contractor information exchange. The GLNPO Lockout/Tagout Program is described in **Appendix G** of this manual.

2.5.6 Bloodborne Pathogens

If it is reasonably expected that an employee may be exposed to human blood or other potentially infectious materials, employers must protect their employees from the hazards of bloodborne pathogens and comply with the OSHA Bloodborne Pathogen Standard, 29 CFR 1910.1030. The standard requires procedures for the use of universal precautions, engineering controls, personal protective equipment, proper housekeeping, training, and handling of regulated waste. Due to the isolated nature of GLNPO research vessel shipboard operations, emergency **First** Aid response may be necessary and exposure to potential bloodborne **pathogens** may occur. Based on this assessment, a Bloodborne Pathogen **Program** has been developed for GLNPO research vessels and is described in **Appendix H** of this manual.

Attachment 2.1

Training Date: _____
Time: _____
Conducted By: _____

24-HOUR LABORATORY SAFETY TRAINING AGENDA GREAT LAKES NATIONAL PROGRAM OFFICE RESEARCH VESSEL PERSONNEL

1. IDENTIFICATION OF HAZARDOUS MATERIAL
2. POTENTIAL SOURCES OF EXPOSURE
3. TOXICOLOGY
4. METHODS OF CONTROL
   - A. Flow Relationships in Hazardous Materials Laboratories
   - B. Ventilation
   - C. Work Practices (Chemical Handling Protocols, Handling and Labeling)
5. MONITORING
6. PERSONAL PROTECTIVE EQUIPMENT
   - A. Clothing
   - B. Emergency Eyewash & Showers
   - C. Respiratory Protection
7. SPILL CONTROL
8. WASTE AND STORAGE MANAGEMENT
9. CHEMICAL HYGIENE PLAN
10. CONTINGENCY PLAN

Attachment 2.2 - GENERAL LABORATORY SAFETY RULES

All laboratories and analytical procedures have certain dangers in common. Almost all analytical procedures use chemicals that are considered toxic or hazardous; examples include acids, bases, and organic solvents. The samples for analysis often contain unknown biological hazards or hazardous and toxic chemicals. For these reasons, certain safety precautions are necessary throughout all laboratories and whenever handling an unknown sample.

Each laboratory and analytical procedure will have safety rules specified in the Laboratory Safety Manual or Standard Operating Procedure. These manuals and procedures will be specific to each laboratory, however, the following laboratory safety rules listed below will apply to all U.S. EPA Region V laboratories:

1. All exits and passageways must be unobstructed and allow free exit.

2. Eating, drinking or smoking in the laboratory is prohibited.

3. Appropriate personal protective equipment must be worn for each procedure. This includes lab coats, gloves, safety glasses, goggles, and occasionally respirators.

4. Pipetting by mouth is prohibited.

5. All safety signs should be observed and obeyed.

6. All toxic waste must be properly disposed according to RCRA regulations.

7. Flammable, toxic or radioactive material must be stored in approved containers.

8. All containers of chemicals and samples shall be labeled clearly and correctly.

9. All gas cylinders must be firmly secured to prevent falling.

10. All electrical equipment should be properly grounded and electrical cords inspected periodically to ensure that they are in good working condition.

11. Floors and surface working areas are to be kept clean, dry and free from corrosive chemicals. Spills must be cleaned up immediately.

12. Initiation of a laboratory analysis or experiment, not fully described in Standard Methods, AQC Manual or other procedural source, must be preceded by a survey of existing literature. The toxicity and other hazards connected with the reactants and products should be investigated thoroughly before starting any laboratory reaction.

CONTINGENCY PLANS

Contingency plans must be developed and implemented in cases of accidents or emergencies. A spill contingency plan is necessary when toxic or hazardous substances are on site. Personnel must be trained in spill cleanup procedures. Depending on the size of the laboratory and the operations performed in the laboratory, a special team may be needed for emergencies. At smaller installations, the local fire department or emergency response team may be contacted for emergencies. Emergency response teams will require training in respiratory protection, first aid, and spill cleanup. The duties of the team must be clearly defined. Evacuation plans should be distributed, posted and updated yearly.

VENTILATION REQUIREMENTS

Proper ventilation must be provided for analytical procedures and especially those involving the use of toxic substances. Most laboratories will be equipped with fume hoods to provide proper ventilation. Fume hoods must be tested semi-annually to assure proper flow rates and containment. Maintenance must be conducted on a regular basis to insure proper functioning. Exhaust air from glove boxes must be treated by filtration, reaction, absorption, adsorption, electrostatic precipitation or incineration depending on the chemical compounds being used. All exhaust air from primary containment equipment must be discharged by roof-mounted blowers and dispersed clear of occupied buildings and air intakes.

Additionally, a mechanical exhaust ventilation system must be in place to control laboratory room air movement. The air supply must originate from areas where the potential for contamination is low, and exhaust into outside areas.

STORAGE REQUIREMENTS

Proper storage techniques must be followed and are detailed in the following sections.

STORAGE OF COMPRESSED GAS CYLINDERS

Only compressed gas cylinders required for immediate use are allowed to be stored in laboratory work areas. Separate areas should be provided for storage of all other gas cylinders. Empty and full cylinders should not be stored together. Oxygen cylinders must not be stored near flammable gas cylinders. Cylinders of compressed gases must be stored with the valve end up and securely fastened to a wall or immovable object to prevent the cylinder from falling. All cylinders must be securely fastened (strapped or chained) to prevent falls. All cylinders must be kept away from heat sources.

STORAGE OF CHEMICALS

All chemicals or waste materials in the laboratory, stockroom, or bulk storage must be stored according to their chemical compatibility. Storage control will minimize the potential for accidental mixing by spillage, breakage, or fire. Major storage areas are required for the following types of chemical compounds: flammable solvents, corrosive liquids, and strong oxidizers. Additional storage may include areas for radioactive materials, biological hazards, highly toxic materials and compressed gases.

When working in laboratory areas, only the minimum amount of chemical needed for analysis operations should be stored. Separate storage areas (stockrooms) should be provided for the main bulk of chemicals. Incompatible chemicals should either be stored in separate safety storage cabinets, divided by a wall, or enclosed by a tray to prevent accidental mixture. These storage areas and containers should always be properly labeled.

The main storage areas should be divided to accommodate incompatible chemicals. Depending on the amount of chemicals in storage, approved safety storage cabinets can be used. If necessary, storage rooms can also be used.

No more than five one-liter containers of Class I and II materials should be stored in open laboratory areas. Open laboratory areas include reagent shelves and bench

tops. All glass containers must be protected by an outer sheath or made of unbreakable glass.

Storage areas for waste collection should be provided and properly designated. Provisions for containment and separation of incompatible waste materials are also required.

Attachment 2.3

Training Date:
Time:
Conducted By:

4-HOUR LABORATORY SAFETY TRAINING AGENDA GREAT LAKES NATIONAL PROGRAM OFFICE RESEARCH VESSEL PERSONNEL

1. CHEMICAL HEALTH AND SAFETY RESPONSIBILITIES

   A. Federal Safety and Health Regulations

   B. EPA Occupational Health and Safety Program

   C. OSHA 1910.1450 Occupational Exposures to Hazardous Chemicals in the Laboratories.

2. RIGHT TO KNOW

   A. Chemical Inventory

   B. Hazard Identification

   C. MSDS

   D. Labeling

   E. Training

3. CONTROLS

   A. Chemical Handling and Storage

      1. Flammable Materials
      2. Corrosives
      3. Highly Toxic Chemicals

B. Ventilation

C. Personal Protective Equipment

4. SOPs/SAFETY PLANS/EMERGENCY PROCEDURES

5. SPILL CONTROL/HAZARDOUS WASTE

ATTACHMENT 2.4

Training Date:
Time:
Conducted By:

TRAINING AGENDA
FOR
GREAT LAKES NATIONAL PROGRAM OFFICE
RESEARCH VESSEL PERSONNEL

I. Subject

1. GLNPO Chemical Hygiene Plan

- general overview
- use of PPE
- health and safety SOPs for analytical procedures
- MSDS overview

2. Environmental and Health and Safety Procedures

- hazmat/waste transportation
- hazmat storage/spill prevention
- hazardous/common waste
- contingency plan (plan, SCBA, APR, spill cart, instruments, fire, identify team members)

3. General

- MSDS review for specific materials
- safety committee
- lockout/tagout awareness
- general comments

II. Participants

Name - Print	Name - Sign	Date

Attachment 2.5

MARINE MEDICAL

EMERGENCY OPERATIONS PLAN

U. S. C. G. Group: Great Lakes

In the event anyone aboard a ship at sea becomes ill or is injured beyond the clear capability of the ship to provide prompt and adequate care, a Medical Emergency (ME) exists and that person should be transferred to a facility providing emergency medical treatment.

If the Captain (or officer in charge) determines that a possible ME exists, the U.S. and/or Canadian Coast Guards should be contacted for advice and assistance. The Coast Guards may be hailed on radio Channel 16 throughout all the Great Lakes. The Coast Guards can provide medical consultation and evaluation of the situation and are equipped for evacuation by boat or helicopter, if needed.

Always contact the Coast Guard for advice. Not all ports have emergency medical facilities and not all may be suitable for a particular ME. These procedures and telephone numbers should be readily available to all employees aboard our research vessels.

2.5.1 Coast Guard Areas

Buffalo
Lake Ontario & East 1/2 of Lake Erie

Coast Guard: (716) 846-4152
Health Services: (716) 846-4167
Trauma Centers: Mercy Hospital, Buffalo, NY
(716) 828-2790
Sisters of Charity, Buffalo, NY
(716) 862-2840

Detroit
West 1/2 of Lake Erie and Lower 2/3 of Lake Huron

Coast Guard: (313) 568-9524
Health Services: (313) 568-9526
Trauma Centers: Detroit Receiving, Detroit, MI
(313) 745-3349
Henry Ford, Detroit, MI
(313) 641-4029

Sault St. Marie
Lake Superior and Upper 1/3 of Lake Huron and Upper 1/3 of Lake Michigan

Coast Guard: (906)635-3233
Health Services: (906)635-3225
Trauma Centers: Marquette Gen., Marquette, MI
(800)562-9753

Northern Michigan Regional, Petosky, MI
(616)348-4000

Grand Haven
Eastern 1/2 of Lake Michigan

Coast Guard: (616)847-4501
Health Services: (616)847-4542
Trauma Centers: Ottawa County Hospital
(616)847-5310

Milwaukee
Western 1/2 of Lake Michigan
Coast Guard: (414)747-7181
Health Services: (414)747-7111
Trauma Centers: Froederct General Hospital
(414)259-3000

2.5.2 Great Lakes Regional Hospitals

ILLINOIS
Chicago

Northwestern Memorial Hospital
Superior St. & Fairbanks Court
Chicago, IL 60611
(312)908-2000
Ask for Emergency Rm.; 5-10 minutes from harbor.

Columbus Hospital
2520 N. Lakeview Avenue
Chicago, IL 60614
(312)883-7300
5-10 minutes from Lake; unsure of distance from harbor.

Hammond

St. Margaret Hospital
5454 Hohman Avenue
Hammond, IN 46320
(219)932-2300

Charlevoix

Charlevoix Area Hospital
Lakeshore Drive
Charlevoix, MI 49720
(616)547-0027
1 mile from harbor.

Frankfort

Paul Oliver Memorial Hospital
224 Park Avenue
Frankfort, MI 49635
(616)352-9621
Half mile from harbor.

Zion

American International
Emmaus & Shiloh Boulevard
Zion, IL 60099
(708)872-4561
Unknown distance from harbor. There is more than one in area

INDIANA
Gary

Methodist Hospitals Northwest Indiana
600 Grant Street
Gary, IN 46402
(219)886-4000
20 miles from harbor; 15 minutes.

MICHIGAN
Arcadia (See Frankfort)

Escanaba

St. Francis Hospital
3401 Ludington Street
Escanaba, MI 49829
(906)786-3311
2 miles from harbor.

Grand Haven

N. Ottawa Community Hospital
1309 Sheldon Road
Grand Haven, MI 49417
(616)847-5310
2 blocks from harbor.

Harbor Springs (See Petoskey)

Leland (See Frankfort or Traverse City)

Ludington

Memorial Medical Center
One Atkinson Drive
Ludington, MI 49431
(616)845-2390
1 mile from harbor.

Manistique

Schoolcraft Memorial Hospital
500 Main Street
Manistique, MI 49854
(906)341-2163
3 blocks from harbor.

Pentwater (See Ludington)

Petosky

Northern Michigan Hospital
416 Connable Street
Petosky, MI 49770
(616)348-4520
10 miles from harbor.

Portage Lake (See Manistee)

Traverse City

Munson Medical Center
1105 Sixth Street
Traverse City, MI 49684
(616)922-9000
5 minutes from bay

MINNESOTA
Duluth

St. Mary's Emergency Care Trauma Center
407 E. Third Street
Duluth, MN 55805
(218)726-4353

Holland

Holland Community Hospital
602 Michigan Avenue
Holland, MI 49423
(616)394-3202
10-15 minutes from harbor.

Manistee

West Shore Hospital
1465 E. Parkdale
Manistee, MI 49660
(616)723-3501 Ext. 150
5 miles from harbor.

Montague/Whitehall/Muskegon

Hackley Hospital
1700 Clinton Street
Muskegon, MI 49443
(616)726-3511
3 miles from harbor.

Mercy Hospital
1700 Oak Avenue
Muskegon, MI 49442
(616)739-3916
10 miles from harbor.

South Haven

South Haven Community Hospital
955 S. Bailey Avenue
South Haven, MI 49090
(616)637-5271

WISCONSIN

Gill's Rock (See Sturgeon Bay)

Kenosha

Kenosha Hospital
6308 Eighth Avenue
Kenosha, WI 53140
(414)656-2201
5-8 blocks from harbor.

Manitowoc

Holy Family Medical Center
2300 Western Avenue
Manitowoc, WI 54221
(414)684-2011
21 blocks from Lake.

Port Washington

St. Mary's Ozaukee
743 N. Montgomery Street
Port Washington, WI 53074
(414)284-7911

Sheboygan

Sheboygan Memorial Medical
2629 N. 7th Street
Sheboygan, WI 53083
(414)459-5553
5 minutes or less from harbor.

St. Nicholas Hospital
1601 N. Taylor Drive
Sheboygan, WI 53081
(414)459-8300
3-4 min. from harbor

SUPERIOR

Sturgeon Bay

Door County Memorial
330 S. 16th Place
Sturgeon Bay, WI 54235
(414)743-5566
5-10 miles from harbor.

Green Bay

St. Mary's Medical Center
1726 Shawano Avenue
Green Bay, WI 54303
(414)498-4560
1 hour from bay.

Kewaunee

St. Mary's Memorial
First & Lincoln
Kewaunee, WI 54216
(414)388-2210
5 minutes or less from harbor; about 2 miles

Milwaukee

St. Luke's Medical Center
2900 W. Oklahoma Avenue
Milwaukee, WI 53215
(414)649-6000

Racine

St. Mary's Medical Center
3801 Spring Street
Racine, WI 53405
(414)636-4201
5-10 minutes from harbor.

St. Luke's Memorial
1320 Wisconsin Avenue
Racine, WI 53403
(414)636-2201
5-10 minutes from harbor.

Two Rivers

Two Rivers Community Hospital &
Hamilton Memorial Home
2500 Garfield Street
Two Rivers, WI 54241
(414)793-1178 Ext. 125
6 blocks from Coast Guard Station

CANADA

Thunder Bay

Port Arthur General Hospital
460 N. Court St.
Thunder Bay, Ontario P7A4X6
(807)343-6621
5-10 minutes from Marina

Welland Canal

Welland Co. General Hospital
Third Street
Welland, Ontario L3B4W6
(416)732-6111
30 minutes from Lake Ontario

*NOTE: All hospitals listed provide 24-hour Emergency Room Service with a physician on duty.

Attachment 2.6 POWERED INDUSTRIAL TRUCKS (FORK LIFTS)

RULES OF OPERATION

Safe rules of operation must be followed by all powered industrial truck drivers. The drivers should keep the following rules conveniently located, refer to them frequently, and use them as a checklist for safety. These rules have been developed in accordance with ANSI-B56.1-1983 (Revised).

1. At the beginning of each use, check brakes, steering controls, forks, hoists, warning devices and lights. Report any defects to the supervisor immediately. Also check to see that the fire extinguisher is in place and properly serviced.

2. Always face the direction of travel.

3. Before you start driving, look to see that no person or object is in your path. Always look before backing up.

4. Do not drive over objects lying on the floor such as trash, lumber and pipes. These could damage the truck, shift or topple the load, or flip out and strike another employee.

5. Use low gear when going down ramps or steep grades. On upgrades, keep the load in front. On downgrades, keep the load in back.

6. Under normal traffic conditions, keep to the right.

7. Avoid quick starts or turns, and jerky stops; always come to a complete stop before reversing the direction of travel.

8. Keep a safe distance between vehicles at all times (three truck lengths).

9. Make a complete stop at all doors, corners, exits and stop signs.

10. No horseplay at any time!

11. Keep alert--concentrate on the job at hand.

12. Remember that pedestrians have the right of way at all times.

13. Never drive with wet or greasy hands. If necessary, keep a towel or rag handy at all times.

14. Reduce speed on wet and slippery floors.

15. Whether loaded or empty, carry forks and platforms on lift trucks as low as possible. This lowers the center of gravity and reduces the possibility of overturning the truck or dumping the load.

16. Don't run trucks onto elevators unless authorized to do so. Be sure you have sufficient clearance before entering any elevator or going through a doorway. Once the truck is in the elevator, shut off the power, set the brakes and stay in the operator's seat in case of an emergency.

17. Check the clearance of any overhead crane or other object before raising forks or tiering.

18. Never use your truck as an elevator for other employees (for example, to service light fixtures or stock material).

19. When leaving the truck at any time, shut off the power, set the brakes, remove the ignition key, and put the forks or platforms in the down position.

20. Never leave a truck in an aisle. Park the truck to one side, so traffic will not be blocked.

21. Before driving the truck into a freight car or trailer, always secure the bridging plate with bolts or pins so that it cannot move when the power wheels of the truck pass over it; and before moving the truck onto the bridge or into the carrier, walk into the freight car, truck or trailer and check the floor for holes or weak spots (the weight of your truck might break the floor).

22. Keep your feet and legs inside the guard, which is there to protect you.

23. Drive with extreme care, especially during shift changes.

USEPA R/V MUDPUPPY

APPENDIX B

APPENDIX B: R/V MUDPUPPY - HEALTH & SAFETY PROCEDURES DURING SEDIMENT SAMPLING

INTRODUCTION

This Appendix has been developed in accordance with Chapter 10, and Appendix O, of the GLNPO Health, Safety and Environmental Compliance Manual. Applicable portions of the GLNPO Manual have been extracted and incorporated into this appendix. Additionally, relative information specifically developed for safety aboard the R/V Mudpuppy has been incorporated.

BACKGROUND

The Sediment Assessment Program is designed to sample and evaluate areas of sediment where the possibility of contamination exists. During sampling activities, field specialists and laboratory analysts may be exposed to sediment which represents a chemical or biological hazard. Therefore, the potential for exposure should always be of foremost concern when handling sediments of unknown contamination.

The Great Lakes National Program Office (GLNPO) sediment sampling activities are grouped into the following five categories:

1. Sediment sampling at "Areas Of Concern" (AOC)
2. Tributary sediment monitoring
3. Open lake sediment monitoring
4. Support for EPA regions for Superfund and enforcement activities
5. Miscellaneous activities

Sediment assessment and tributary monitoring may entail collecting long core samples with low to high amounts of contamination. Typical AOC assessment span six to twenty days. Open lake sediment monitoring is generally conducted aboard the R/V Lake Guardian.

Sediment sampling to support EPA regional offices or other governmental agencies provides the largest degree of diversity in sampling activities. Sampling operations range from the use of all or part of the R/V Mudpuppy equipment to field-flexible sampling plans based on observations of samples and/or their environments. Most of GLNPO's sediment sampling activities, however, will be performed on board the R/V Mudpuppy either on an outdoor work bench or in a mobile laboratory.

SAFETY

General

Prior to commencing field operations, the field team should gather as much information as possible on the on the site data and assess the sediment hazard potential. If hazard is un-know the site should be treated as potentially hazardous.

Appendix B of this manual (R/V Mudpuppy Health & Safety Manual) contains information regarding the proper selection and uses of Personal Protective Equipment (PPE) during sediment sampling aboard the R/V Mudpuppy. Additionally, Appendix B contains proper procedures for the donning and doffing of PPE.

Facility Engineering Protection

The following guidelines should be implemented during sediment assessment to decrease the potential of cross contamination and the tracking of potentially hazardous materials:

Housekeeping - Good housekeeping practices are essential, not only from a general safety stand point, but also from a contamination reduction stand point. Potentially contaminated materials are not allowed within the cabin area.

Work Surfaces - Following sampling activities all work surfaces shall be decontaminated to the extent possible.

Clean-up of Equipment - Following sampling activities, all sampling equipment shall be decontaminated to the extent possible.

Sediment Storage - Sediments samples must be stored inside capped core tubes or inside sample containers.

Sediment Assessment/Field Operations Safety Rules

The following rules must be followed by sediment assessment field personnel:

1. **No** eating, drinking or smoking is permitted during **sediment** sampling.

2. **When** away from the dock, a Personal Flotation Device (PFD) must be worn anytime you are out of the cabin.

3. No one is to go onto the cabin roof without permission from the Captain.

4. No one is to climb onto, stand up on, or move around top of the cabin roof while the vessel is underway.

5. While underway, no one is to move to the aft deck by way of the outboard edge and handrail.

6. While underway, ~~try to~~ keep movement to a minimum.

7. When lifting equipment with the boom and winch, hard hats, work vest, and steel toed shoes/boots must be worn.

8. When collecting sediment samples, only designated collection crew are to be on the forward deck.

9. When collecting sediment, PPE must be worn in accordance with Appendix B of this manual.

10. No contaminated PPE is to be worn or carried into the cabin area.

11. When sediment is present on the forward deck, no one is to step out onto the deck unless the minimum PPE requirements have been met.

12. Heat-related emergencies are of primary concern on board the R/V Mudpuppy. Good judgement is essential. Pace yourself and know your limits. During extreme heat the Captain will be monitoring your condition. It is recommended that you drink plenty of water (not while in a contaminated suit) and take several breaks if needed. If you feel the effects of heat stress, inform the Captain.

13. The Captain is in charge of the vessel and the overall safety of the vessel. Obey the Captain's orders.

14. Do not stand under pieces of equipment that are suspended.

15. Do not stand on cables or ropes.

16. A single layer of gloves must be worn when on top of the cabin.

17. Do not sit on air conditioning unit on top of cabin roof.

18. Use common sense at all times.

HEALTH AND SAFETY PROTOCOL FOR EPA VESSELS

This section contains applicable health and safety requirements, as stated in Appendix O of the GLNPO Health, Safety, and Environmental Compliance Manual, "Health & Safety Protocol For EPA Vessels".

General Provisions

EPA vessels are public vessels of the United States. The Code of Federal Regulations (CFR) exempts public vessels from many of the regulations specified for certification of commercial shipping. However, it is the intent of EPA to maintain compliance with standards of marine safety as set forth by international convention, U.S. Law, the Code of Federal Regulations, regulatory bodies, U.S. Coast Guard guidance, accepted industry standards and codes satisfactory for maritime use. This protocol (this section [Health & Safety Protocol For EPA Vessels]) describes essential requirements that must be met to attain these overall marine health and safety objectives.

All aspects of "good marine practice" cannot be set forth in statutes, regulations, or standards. The absence of a written protocol for a specific issue should not be interpreted that the issue has a diminished importance or priority. Ship Masters should emphasize to all personnel on board an EPA Vessel that general health and safety be considered at all times.

Implementation

It is EPA's intent to modify, as appropriate, vessel operating contracts and Health & Safety Manuals to incorporate the requirements outlined in this protocol. Unless otherwise noted herein, it is the responsibility of the Ship Master to implement and comply with the requirements of this protocol.

Medical Monitoring/Recordkeeping

All medical monitoring and recordkeeping for personnel on board the R/V Mudpuppy must be conducted in accordance with Chapter Two of the GLNPO Health, Safety and Environmental Compliance Manual. It is necessary to maintain, on board the vessel, certification and medical clearance documentation for all personnel conducting work activities which fall under the provisions set forth in 29 CFR 1910.120 (HAZWOPER). Annual physical examinations are required for all crew members on board EPA vessels.

Divers

Since the R/V Mudpuppy does not anticipate being involved in any diving activities, protocol for divers/diving will not be included in this document. Should the situation change, refer to the GLNPO Health, Safety, and Environmental Compliance Manual for Diving Protocol.

Training Requirements

First Aid and CPR - All licensed crew members and EPA Chief Scientists shall maintain current First Aid and CPR certifications

Fire Fighting - At least one crew member on board the R/V Mudpuppy shall attend and successfully complete a Fire Fighting course.

Medications and Medical Supplies

A sufficient supply of medications and medical supplies shall be available on board the R/V Mudpuppy for the treatment of non-emergency sicknesses and injuries. Supplies must be kept in a convenient location and be readily available for use. The medical cabinet must be inventoried and restocked monthly. Expired medications shall be disposed of immediately. A list of the contents, and any necessary instructions, shall be posted inside the medical cabinet. It is the Ship Masters responsibility for replenishing stocks, discard expired medications, updating listings, posting use instructions and keeping the cabinet well organized.

Medical Emergencies

In the case of personal illness or injury deemed sufficiently serious by the Ship Master to warrant treatment beyond the first aid abilities on board, the following course of action shall be implemented:

1. Survey equipment in the water shall be immediately recovered and the vessel shall make for the nearest port at the highest speed possible, consistent with safety.

2. Radio contact with the port of arrival shall be made and dockside clearance with an ambulance standing by shall be requested.

The Ship Master is responsible for maintaining a directory of all USCG Stations, with applicable telephone numbers. The Ship Master must be aware of the nearest medical facility in respect to the vessel's operational area.

Reporting Medical Emergencies

In accordance with OSHA requirements, following any applicable injury on board, EPA personnel shall complete Form CA-1, "Federal Employee's Notice of Traumatic Injury and Claim for Continuation of Pay/Compensation". This form shall be filed with the employee supervisor for appropriate action. Additionally, any accident to any person on board which results in property damage, injury or death, shall be reported immediately to the appropriate EPA Ship Project Officer by either the injured party, the Chief Scientist or the Ship Master. A written confirmation of the accident must be submitted within 48 hours after an accident occurs. Such report shall include full details of the accident, including witness statements. The Ship Contractor shall provide a written report

the EPA Project Officer on any claim made by a third party against the Ship Contractor.

Survey Personnel Reporting On Board

A sign-in sheet should be completed by each person arriving on board the R/V Mudpuppy. The sheet shall be maintained by the Chief Scientist or the Ship Master for the duration of the survey. The sheet shall contain, at a minimum, the following information:

1. Date(s) of Survey
2. Name and Address
3. Telephone Number
4. Emergency Contact Person

Orientation

Each person reporting on board the R/V Mudpuppy shall receive a shipboard orientation prior to sailing. The orientation shall include:

1. Review of the R/V Mudpuppy Health & Safety Manual
2. Review of the R/V Mudpuppy Health & Safety Rules
3. Requirements & Proper Use of PPE
4. Location of Emergency Equipment
5. Emergency Response Procedures
6. Review of Applicable MSDSs

Safety Equipment & Procedures

In addition to the Personal Protective Equipment (PPE) required under Appendix B of the R/V Mudpuppy Health & Safety Manual, the following safety equipment is required on board:

Fire Extinguishers - It is recommended that a minimum of three fire extinguishers must be maintained on board the R/V Mudpuppy. Monthly inspections must be informed to ensure the extinguishers are properly charged and ready for use. Additionally, the extinguishers must be inspected annually by a certified outside contractor.

Life Jackets - The vessel shall be equipped with life jackets for at least 110 percent of the vessel's maximum complement. Life jackets must be readily accessible and clearly stenciled with the vessel's name. All life vests must be US Coast Guard (USCG) Approved and meet the working standard as set forth by USCG regulations.

Ring Life Buoys - Ring buoys shall be distributed so they are readily available on both sides of the vessel. All unit shall be stored so they are capable of being rapidly cast loose and not permanently secured in any way.

Work Vests - Work vest shall be available and used by all persons involved in deck operations.

Distress Signals - A minimum of twelve approved, in-date, hand held, and/or rocket-propelled red parachute flare distress signals shall be carried on board. These distress signals shall be stored in the cabin area and shall be kept easily accessible for immediate use.

Safety Inspections/Tests

It is the responsibility of the ship's contractor to conduct inspections and tests, and to document the results of such inspections/tests. The following is a list of required inspections and tests to be conducted on board the R/V Mudpuppy:

Emergency Power Systems - Emergency power systems are to be inspected/tested on a weekly basis.

Emergency Eye Wash - Emergency eye wash must be inspected/tested on a weekly basis

Fire Extinguishers - Fire extinguishers must be inspected on a weekly basis. Additionally, annual inspections must be conducted by a certified outside contractor.

Emergency Radio - Prior to each survey, the emergency radio must be tested to ensure it is in proper working order.

Lifesaving devices - On an annual basis, all life rings and PFDs must be inventories and inspected.

Load Handling Gear - Visual inspections must be conducted prior to each use. Additionally, annual inspections must be conducted by a certified outside contractor (must include load testing).

First Aid Equipment - must be inventoried and restocked at least monthly.

Also required are any inspections mandated by the USCG or the GLNS Health, Safety and Environmental Compliance Manual that do not appear in this listing.

Hazardous Or Chemical Waste

Any hazardous waste generated on board shall be stored and disposed of in accordance with applicable regulations. EPA Chief Scientist shall be responsible for ensuring proper storage and disposal of hazardous waste. All waste containers must be properly labeled to include the chemical content and the accumulation start date.

Annual and Periodic Safety Audits

Annual and periodic safety audits will be conducted by Regional Managers or their delegated officials in accordance with the GLNPO Health, Safety and Environmental Compliance Manual.

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APPENDIX C

APPENDIX C: R/V MUDPUPPY - PERSONAL PROTECTIVE EQUIPMENT POLICIES & PROCEDURES

INTRODUCTION

This appendix has been developed in accordance with Appendix I of the GLNPO Health, Safety, and Environmental Compliance Manual. Applicable portions of the GLNPO manual have been extracted and included as part of the R/V Mudpuppy Personal Protective Equipment (PPE) requirements and procedures. Additionally, other relevant PPE requirements and procedures have been developed and are included in this appendix.

POLICY

It is the policy of the Environmental Protection Agency to administer its programs in a manner that will assure the protection of the health and safety of all persons involved in routine field and laboratory work, especially those persons engaged in work of a hazardous nature, by providing and requiring the use of specified personal protective clothing and equipment.

REFERENCES

1. Occupational Safety and Health Act, P.L. 91-596
2. 29 CFR 1910, Subpart I. Sections 132, 133, 134, 135, 136, 137 and 139
3. EPA Order 1440.2 Health and Safety Requirements for Employees engaged in field activities, EPA Order 1440.3 Respiratory Protection
4. GLNPO Health Safety and Environmental Compliance Manual Appendix I

DEFINITIONS/RESPONSIBILITIES

Applicable terms and responsibilities are defined as follows:

Field Activities

The term field activities, means EPA program activities that are conducted by EPA employees outside of EPA administered facilities. These activities include, but are not limited to, environmental and pesticide sampling, field analysis, inspection of water and waste water treatment plants, hazardous material spills and waste site investigations, inspections, and sampling.

Applicability

The provisions of this section are applicable to all GLNPO employees at all operational levels. They are also applicable to EPA contractors and other governmental agencies.

Regional Administrator

The Regional Administrator is responsible for implementing the regional safety program of which the requirements of this section are a part. It is the responsibility of the Regional Administrator to require Division and Office Directors to budget the funds necessary to procure Personal Protective Equipment (PPE).

Division & Office Directors

The Division and Officer Directors are responsible for assigning staff to field work which may require the use of PPE.

Supervisors

In accordance with the procedures of this manual, the supervisor is responsible for determining the level of protection required (in consultation with the Health & Safety Officer). He/she is responsible for controlling, issuing, and inspecting the PPE selected. He/she is responsible for identifying employees who require keeping an accurate inventory and for maintaining the PPE in a functional condition. He/she is responsible for identifying employees who require training and certification in accordance with the provisions of EPA Orders 1440.2, 1440.3 and OSHA 29 CFR 1910.120; and for ensuring these requirements are contained in their position description. He/she is responsible for recommending appropriate correction and/or disciplinary action of employees who choose to violate or neglect safety requirements.

Regional Health & Safety Manager

The Regional Health & Safety Manager (RHSM) is responsible for assisting supervisors in the selection, procurement, issuance, and maintenance of PPE. The RHSM should review each procurement request related to safety, health or personal security, to assure that the request is justified and appropriate. The RHSM will determine if the item, or acceptable alternative, is available in the Region, based on the Regional inventory of all PPE. The RHSM is responsible for identifying program ares that require certification. As a member of the Region 5 training committee, the RHSM advises the Office of Personnel regarding the Health and Safety Training Requirements of EPA 1440.2, 1440.3, and OSHA 29 CFR 1910.120, and recommends the required funding. The regional Health and Safety Manager shall be responsible for administering the Respiratory Protection Program in Region 5.

Employees

Employees are responsible for the PPE issued to them and are required to wear and use the PPE as prescribed in this section

Additionally, the employee is responsible for reporting any damage and/or malfunction of the PPE issued them.

Employees assigned PPE are required to sign a receipt for such items. Information contained in the receipt should include:

1. They have received proper training in the use and maintenance of these items.

2. They have read the safety procedures and agree to accept the responsibilities provided therein.

3. They accept responsibility for the maintenance and use of the assigned PPE. Cleaning, sanitizing and maintaining a respiratory is included in this responsibility. Any damage, excessive wear, or malfunction of equipment must be reported immediately to the individual's supervisor. Individuals are responsible for the cost of replacement of PPE which is lost, damaged, or stolen through their own negligence.

4. Items provided from a general supply will be maintained by the organizational unit responsible for its supply and issuance.

SELECTION OF PPE

All PPE selected for use must meet the standard set forth in Appendix I of the GLNPO Health, Safety and Environmental Compliance Manual. All PPE, when applicable, must meet the approval/certification requirements set forth by OSHA regulations.

PPE REQUIREMENTS ON BOARD R/V MUDPUPPY

Standard Level of Protection

Personnel regularly engaged in field work must be equipped with the following minimum level of PPE:

1. Steel toed shoes/boots

2. Safety glasses/goggles and face shield when applicable

3. Hard Hat

Field Work of a Hazardous Nature

In addition to the above PPE requirements, personnel assigned to field activities of a hazardous or potentially hazardous nature such as those performed on board the R/V Mudpuppy, must be equipped with the following PPE:

1. disposable protective suit (tyvek or saranacs)

2. two layers of disposable gloves (latex and rubber)

3. disposable boot covers

4. respiratory protection as appropriate

5. personnel flotation device (type III minimum)

6. Exposure suits (during cold weather operations over water)

ISSUANCE AND TRAINING IN USE OF PPE

All of the PPE listed in this section, as specified for use in field operations must be issued to the employee or made available. If PPE is required for the task, it must be worn during sampling operations. No one may enter a controlled area without proper PPE. Personnel issued PPE must be trained in the proper use and limitation of such PPE. All personnel engaged in field work activities must receive training in compliance with the provisions of EPA Order 1440.2 and 1440.3. Personnel shall not be permitted to engage in routine field activities unless they have been trained and certified to a level commensurate with the degree of anticipated hazards. All personnel shall have a minimum of 24 hours of health and safety training prior to becoming involved in routine field activities. In addition, employees engaged in field activities requiring the use of respiratory protection must be properly trained in the uses and limitations of such devices and must be certified by a physician as physically capable of wearing such devices.

LEVELS OF PROTECTION

There are four basic levels of protection:

Level A - Provides the maximum protection. Consists of supplied air or SCBA, and a fully encapsulated protective suit. Even the breathing apparatus is inside the suit.

Level B - Provides maximum respiratory protection (supplied air or SCBA). Provides skin protection equal to or greater than level C.

Level C - Provides skin protection requiring the use of personal protective clothing, inner and outer gloves, boot covers, respiratory protection and general PPE requirements listed in Level D. Generally, Level C respiratory protection involves the use of negative pressure or positive pressure air purifying respirator.

Level D - Minimum protection. Consists of common work clothes, safety glasses, hard hat, steel toed shoes/boots

Any of these levels my be modified, to a certain extent, based on specific hazard assessments. For example, persons on board the R/V Mudpuppy generally work in a modified Level C mode of protection. Specifically, all of the skin and eye protection requirements of Level C protection are met, but most of the time respiratory protection is not necessary.

PPE DONNING AND DOFFING PROCEDURES

Due to the potential hazards associated with sediment sampling on board the R/V Mudpuppy, standard operating procedures require that, at a minimum, modified Level C protection be worn during sediment sampling activities. However, levels of protection (ie. use of respiratory protection, etc.) may increase depending on the degree of hazard.

When required to wear PPE, you wear it to protect yourself from contact with potentially hazardous materials. Equally, proper donning and doffing procedures of PPE play and important role in avoiding contact with potential hazardous materials. The following lists the proper order in which Level C PPE should be donned on doffed:

Donning

1. Don PFD (or mustang suit during cold weather)
2. Don disposable protective suit
3. Don disposable boots
4. Seal boots to suit using duct tape
5. Don inner gloves (latex), ensure gloves are tucked inside of suit (these will be the last things to come off during doffing procedure)
6. Don outer gloves (rubber or neoprene)
7. Seal outer gloves to suit with duct tape
8. Seal any other necessary opening with duct tape
9. Don respiratory protection if applicable (if wearing a hooded suit, put hood on after respirator is donned; never wear straps of respirator outside of hood)
10. Don hard hat, safety glasses, and face shield

Doffing

1. Wash and rinse hard hat, face shield, boot covers, suit and gloves
2. Remove tape, dispose in proper container
3. Remove boot covers, dispose in proper container
4. Remove outer gloves, dispose in proper container
5. Remove hard hat, face shield, and safety glasses
6. Remove disposable suit, dispose in proper container
7. Wash and rinse inner glove
8. Remove respiratory protection, if applicable
9. Remove inner gloves, dispose in proper container

Note: **Supplies** may be re-used provided they are properly decont**aminated**, properly stored (ie. in a plastic bag), and are not damaged.

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APPENDIX D

1. Long Core Sediment Sampling Using a Vibro-Corer onboard the R/V *Mudpuppy*

1.1 Overview

The following SOP explains the technique for collecting sediment core samples (up to 5 m) using a Rossfelder P-4 Vibro-corer. The procedures covers the following activities:

- Site position.
- Securing the vessel for sampling.
- Sampling procedure.

Any questions on sampling methods or operation of equipment should be directed to the following individuals:

Rick Fox
U.S. EPA GLNPO
77 W. Jackson (G-9J)
Chicago IL. 60604
Phone: 312-353-7979

NOTE: This SOP is written primarily for illustrating the technique of sampling and subsampling long sediment core samples (i.e., up to 5 m). Details on labeling and transport are left to individual project leads and what is considered appropriate for the specific project.

1.2 Sample Handling and Preservation

Due to the expense of operating the vessel to collect the samples and the analysis costs, every sample is important. Any contamination through mishandling or lack of preservation could cause a bias in the data estimates.

- At a minimum, nitrile gloves and Saranac coveralls should be used during sampling and subsampling activities.
- Sample containers must be kept free of contamination and should remain sealed until use.
- Preservatives should be fresh and dated.
- Samples should be stored in coolers with freeze packs as soon as possible.
- Coolers should be checked at a minimum of twice a day to determine that the appropriate temperature is maintained.
- Mode of sample transport must maintain the integrity of the samples.

1.3 Interferences

A sampling activity may be collecting more than one type of sample at a site. When sampling for benthic organisms will take place, it is important to collect benthic organism samples prior to the collection of any other types of samples, as other sampling may disturb the surface benthic community.

All attempts should be made to stabilize the vessel as much as possible in order to collect vertical cores. When the vessel is moving, the corer can enter the sediments at an angle.

1.4 Safety

In any field operation, emphasis must be place on safety. Site operators must be aware of the potential safety hazards to which they are subjected. There is a safety manual specifically developed for the R/V Mudpuppy. All personnel on board must be familiar with the contents of this document prior to implementing any data collection activities, follow all safety protocols and equipment guidelines, and be prepared for emergency situations. The ship's captain is the primary authority during vessel operations. The captain is also responsible for determining whether a sampling activity will be implemented during inclement weather. The sampler is responsible for his/her safety from potential hazards including but not limited to:

-Electrical. For obvious problems (fire, scorching, blown fuses), turn off the power for the circuit involved and notify captain (lead). Never attempt electrical repairs.

-Protection. The sampler should be prepared for working with large and or heavy equipment where safety shoes, head, hand, protective clothing (Tyvek or Saranac), and eye protection are necessary. Some sites may require respirators. Samplers should have clothing available for weather extremes.

-Sampling. Never force glassware with unprotected hands. Care must be taken around the samplers to avoid injuries and slipping overboard when positioning samplers.

-Chemicals. Organic solvents and acids are occasionally used for equipment decontamination and should not be ingested or come into contact with bare skin or flame (if flammable).

1.5 Equipment and Supplies

The following equipment and supplies would be needed for a typical sampling at one station:

vibro-corer (Rossfelder Model P-4)
rolling box for vibrating head
winch
4" aluminum core tubes
4" butyrate core liners
stainless steel nose cone with core catcher
metal sampling tray (15 cm. deep)
HPDE sediment sample bottles
glass bottles for organic contaminant samples*
ice chests*
Labels*

markers/pencils*
Plastic bags for sample bottles*
GPS or locational equipment
generator (230 V, 60 Hz, 3 phase, 14 A)
heavy duty riveter and stainless steel rivets
hammer
chisel
nail punch
safety equipment (i.e., hard hats with face shields, gloves, Saranac suits, steel toed boots**, boot covers, safety glasses**)
core caps
hacksaw
carpet knife
flanged pipe
mallet

* must be provided by the grantee
** must be provided by the individual user

1.6 Collection Procedure

This procedure will detail the collection of long sediment core samples (up to 5 m) from a site location. When benthic organism samples are being collected at the same site, it is important to collect benthic organism samples prior to the collection of sediment samples to minimize disturbances of the benthic organisms.

1.6.1 Sample Location

The sample location may be either defined prior to sampling, where the R/V Mudpuppy would be destined for a particular point, or the site will be selected during the sampling procedure. Generally, sites should be located with GPS within approximately 5 meters. If the vessel is heading to a pre-determine site, the locational equipment will be used to locate the site. However, actual locational readings should not occur until the vessel is anchored at the sampling site. The position is determined by the captain.

1.6.2 Securing the Vessel

Once on the sampling site, the vessel must be secured since drifting and rotation can cause the coring device to enter sediments at an angle.

1) Triple anchor the vessel, as instructed by the captain.

2) Establish sampling location with locational equipment (if location does not need to be accurately predetermined, this can be done while sampling).

1.6.3 Sampling Procedure - Vibro-corer

This procedure is used to collect long sediment core samples.

1) Measure the water depth.

2) Insert butyrate core liner into core tube. Insert nose cone into liner as far as possible.

3) Push nose cone and liner into core tube until nose cone and core tube rivet holes line up. Pop rivet into place with stainless steel rivets.

4) Cut of excess butyrate tubing (with a hacksaw), leaving 2 inches of butyrate tube sticking out of the top of the core tube.

5) Insert the core tube into the vibrating head, making sure that the butyrate tube slides into the check valve.

6) Tighten the collar to the vibro-corer (three bolts) and then to the core tube (two bolts). **If the two bolts are tightened prior to the three bolts, the core tube may be lost.**

7) Lift the entire assembly with the winch to a vertical position so that it is suspended just off the bow of the sampling vessel. Measure water depth.

8) Lower the entire assembly until the core nose is just above sediment surface. Turn on generator and vibrating head.

9) Slowly lower the vibro-corer by running out 10-20 cm of cable at a time. Monitor core tube penetration by feeling for slack in the cable.

10) When vibro-corer ceases to penetrate the sediment (stops lowering or is "refused"), or the vibrating head is near the sediment surface, reverse the winch and pull the unit from the sediment. **Do not allow vibrating head to become imbedded into the sediments.**

11) Turn off the power to the vibrating head and the generator when the core "breaks free" of the sediment and retrieve coring unit to deck, setting the vibrating head into the rolling box.

12) Loosen collar, separate the core tube from the vibrating head, and decant water from core tube.

13) Chisel off rivets and remove the core nose. Pull the core liner out of the core tube. If the core tube does not pull out it should be hammered through with a flanged pipe and mallet.

14) Cap the bottom of the core liner with a red cap plug and remove liner from the core tube. Saw off excess core liner at

the sediment surface and cap the top of the tube with a red cap plug.

15) Handle and subsample core as desired, either on-board or at a shore-based location.

5) Transfer sediment to required sample container.

6) Repeat steps 2 through 5 until an adequate volume of sediment has been collected, moving the winch arm first, then the sampling vessel slightly as needed to assure the collection of surficial sediment.

7) Mix the sediments in a stainless steel mixing bowl.

8) Homogenize for 5 minutes.

9) Transfer sediment into sample bottles (100 ml to 10 L capacity, as appropriate). Label each bottle with station number and other necessary information.

10) Place sample bottles into ice chests, and change freezer packs as necessary (usually once or twice a day).

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APPENDIX E

APPENDIX E: R/V MUDPUPPY - HAZARD COMMUNICATION PROGRAM

COMMITMENT

The U.S. EPA is firmly committed to providing a safe and healthful work environment for all EPA personnel and contractors. In order to meet this commitment, all GLNPO facilities and Research Vessels are required to comply with OSHA's Hazard Communication Standard, 29 CFR 1910.1200. This Hazard communication program has been developed as outlined in the GLNPO Health, Safety, and Environmental Compliance Manual.

RESPONSIBILITIES

Hazard Communication Coordinator

The role if the Hazard Communication Coordinator on board the R/V Mudpuppy will be fulfilled by the EPA Chief Scientist.

The responsibility of the Hazard Communication Coordinator to ensuring compliance by coordinating the following functions:

1. Maintenance of the hazardous chemical inventory.
2. Maintenance of a complete Material Safety Data Sheet (MSDS) file and current employee MSDS notebook.
3. Training of all employees and contractors regarding chemical safety.
4. Updating of training as new chemicals are added or processes are changed.
5. Labeling of all transfer and waste containers.
6. Dissemination of hazard information to outside contractors.

A successful Hazard Communication Program requires the cooperation of EPA and contracting personnel. It is the duty of GLNPO specifically the Hazard Communication Coordinator, to assure that hazard communication is given proper priority. All personnel are encouraged to ask questions and keep informed so that GLNPO can maintain a safe and healthy workplace.

ACCESS TO THE WRITTEN PROGRAM

All, or any part, of this written Hazard Communication Program must be available to all EPA personnel, Contracting personnel, and their designated representatives. Interested persons can contact the Hazard Communication Coordinator for review and copying of the document.

LABELING

In accordance with the OSHA Hazard Communication Standard (29 CFR 1910.1200), all containers shall be labeled as specified below.

1. No hazardous chemicals will be accepted for use on board GLNPO vessels or shipped to any outside location unless labeled with at least the following information:

   A. Identity of the hazardous chemical(s)
   B. Appropriate hazard warnings for the chemical(s)
   C. Name and address of the chemical manufacturer, importer, or other responsible party.

2. All spray bottles or other transfer containers will be labeled with at least the following information:

   A. Identity of the hazardous chemical(s)
   B. Appropriate hazard warnings for the chemical(s)

3. The Hazard Communication Coordinator is responsible for reviewing labels and assuring that the label information is kept current.

4. No label is to be defaced or removed when material is received or in use. Any container with missing labels will be removed from service until proper labels are installed.

MATERIAL SAFETY DATA SHEETS

A Material Safety Data Sheet (MSDS) containing information required by 29 CFR 1910.1200 shall be maintained for each hazardous substance. The MSDS shall be the most current one supplied by the chemical manufacturer, importer, or distributor. MSDS will be readily available for review by all personnel. Chemicals brought on board the R/V Mudpuppy must be accompanied by an MSDS. This rule applies to all EPA and contracting personnel. Without an MSDS, chemicals will not be permitted on board.

An office file containing the current chemical inventory and appropriate MSDSs will be maintained on board the R/V Mudpuppy. Additionally, the R/V Mudpuppy maintains a computer program-chemical information system. The program provides ready access to pertinent chemical information.

PERSONNEL INFORMATION AND TRAINING POLICY

All EPA personnel and contractors, including temporary contractors who may possibly be exposed to chemical hazards shall be appropriately informed and/or trained concerning the potential hazards of the chemicals in GLNPO facilities. All EPA person-

and contractors, including temporary contractors, shall be informed of the details contained in this program, including an explanation of the labeling system, MSDSs, and how to interpret and use this information. All EPA personnel and contractors, including temporary contractors, shall be provided with additional training when new chemical hazards are introduced or prior to performing non-routine tasks that could involve exposure to hazardous chemicals. When appropriate, reinforcement of training will be conducted through topics at safety meetings. The extent of information transmitted to the EPA personnel and contractors during training sessions will be dictated by the degree of chemical hazard present. The following source of information will be used during training sessions:

1. The text of the Hazard Communication Standard (29 CFR 1910.1200)

2. An inventory list of hazardous chemicals

3. Applicable MSDSs

4. The written Hazard Communication Program

CONTRACTOR POLICY

Outside contractors shall be provided with all necessary information concerning the potential hazards of the substances to which they may be exposed and appropriate protective measures required to minimize their exposure. Whenever possible, the contractor or agency management should be provided with a list of the hazardous chemicals and the MSDSs for the materials their employees may be exposed to by virtue of their work activities. In addition, contractors must have MSDSs on site for all potentially hazardous chemicals they use or produce in GLNPO facilities.

USEPA R/V MUDPUPPY

APPENDIX F

USEPA R/V MUDPUPPY
CHEMICAL INVENTORY

This sheet must be completed as chemicals are brought on board the R/V Mudpuppy. MSDSs must be available for all chemicals contained in this listing. OSHA requires that these records be maintained for a period of thirty years.

Date	Chemical	Manufacturer	Quantity

MATERIAL SAFETY DATA SHEET

EM SCIENCE

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Manufacturer.....:

EM SCIENCE
A Division of **EM Industries**
P.O. Box 70
480 Democrat Rd.
Gibbstown, N.J. 08027

Preparation Date.: 03/01/91
Date MSDS Printed.: Apr 25, 1995

Information Phone Number.: 609-354-9200
Hours: Mon. to Fri. 8:30-5
Chemtrec Emergency Number: 800-424-9300
Hours: 24 hrs a day

Catalog Number(s):
SX1244A SX1244E SX1244P

Trade Name.....:
N/A
Chemical Name....:
Sulfuric Acid Solutions
Chemical Family..: Mineral Acid Solutions
Formula.....:
H_2SO_4 + H_2O (various concentrations)

Molecular Weight.: 98.08

2. COMPOSITION / INFORMATION ON INGREDIENTS

Component	CAS #	Appr %
Sulfuric Acid	7664-93-9	52-92%
Water		

Item No.	Approx % H_2SO_4
SX1244A	52
SX1244E	93
SX1244P	92

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

CAUSES SEVERE BURNS.
MAY BE FATAL IF INHALED OR SWALLOWED.
May Cause Damage To Respiratory Passages and Lungs.
REACTS VIOLENTLY WITH WATER.
STRONG OXIDIZER.

Appearance.....:
Colorless/gray, viscous liquid

POTENTIAL HEALTH EFFECTS (ACUTE AND CHRONIC)

Symptoms of Exposure:
Causes severe burns on contact with any body tissue.
May be fatal by inhalation or ingestion.
Inhalation of mist may damage respiratory tract and lungs.

Medical Cond. Aggravated by Exposure:
Data not available.

Routes of Entry.....:
Inhalation, ingestion or skin contact.

Carcinogenicity.....:
The material is not listed (IARC, NTP, OSHA) as cancer causing agent.

4. FIRST AID MEASURES

Emergency First Aid:
GET MEDICAL ASSISTANCE FOR ALL CASES OF OVEREXPOSURE.
INGESTION: do NOT induce vomiting; dilute by giving milk or water if conscious; get medical attention immediately
SKIN: immediately flush thoroughly with large amounts of water; remove all contaminated clothing & shoes; get immediate medical help
Eyes: Immediately flush thoroughly with water for at least 15 minutes.
continue flush while waiting for medical assistance
INHALATION: remove to fresh air; get immediate medical assistance

5. FIRE FIGHTING MEASURES

Flash Point (F).....:	Noncombustible
Flammable Limits LEL (%).:	N/A
Flammable Limits UEL (%).:	N/A

Extinguishing Media.....:
Dry chemical or sand. Do not use water or foam.

Fire Fighting Procedures.:
Wear self-contained, positive pressure, breathing apparatus.
Wear full face shield and protective clothing (rubber or neoprene).

Fire & Explosion Hazards.:
Reacts with most metals to form hydrogen gas which forms explosive mixtures with air; may ignite combustible material on contact.

6. ACCIDENTAL RELEASE MEASURES

Spill Response:
Evacuate the area of all unnecessary personnel.
Wear suitable protective equipment listed under Exposure / Personal Protection.
Eliminate any ignition sources until the area is determined to be free from explosion or fire hazards.

Contain the release and eliminate its source, if this can be done without risk.
Take up and containerize for proper disposal as described under Disposal.
Comply with Federal, State, and local regulations on reporting releases. Refer to Regulatory Information for reportable quantity and other regulatory data.

EM SCIENCE recommends SPILL-X neutralizers and absorbent agents for various types of spills.
Additional information on the SPILL-X products can be provided through the EM SCIENCE Technical Service Department (609) 354-9200.
The following EM SCIENCE SPILL-X neutralizer and absorbent is recommended for this product:

SX0861 Acid Spill Treatment Kit

7. HANDLING AND STORAGE

Handling & Storage:
-Keep container closed and protected against physical damage
Do not store near combustible materials or powdered metals
Do not get in eyes, on skin or on clothing
When diluting: add acid to water; NEVER ADD WATER TO ACID
Do not breathe solution mist.
Retained residue may make empty containers hazardous; use caution!

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

ENGINEERING CONTROLS AND PERSONAL PROTECTIVE EQUIPMENT:

Ventilation, Respiratory Protection, Protective Clothing, Eye Protection
Material should be handled or transferred in an approved fume

hood or with adequate ventilation.
Protective gloves (Natural rubber, Neoprene or equivalent) must be worn to prevent skin contact
Protective clothing (Natural rubber, Neoprene or equivalent) should be worn when handling this material
Safety glasses with side shields must be worn at all times.
Wear self-contained breathing apparatus and full face shield if TLV is exceeded

Work / Hygenic Practices:
Wash thoroughly after handling.
Do not take internally.
Eye wash and safety equipment should be readily available.

EXPOSURE GUIDELINES

OSHA - PEL:

Component	TWA PPM	TWA MG/M^3	STEL PPM	STEL MG/M^3	CL PPM	CL MG/M^3	Skin
Sulfuric Acid		1					
Water							

ACGIH - TLV:

Component	TWA PPM	TWA MG/M^3	STEL PPM	STEL MG/M^3	CL PPM	CL MG/M^3	Skin

Sulfuric Acid
1 3

Water

9. PHYSICAL AND CHEMICAL PROPERTIES

Boiling Point (C 760 mmHg).: N/A
Melting Point (C).....: Sec.II
Specific Gravity (H20 = 1).: Sec.II
Vapor Pressure (mm Hg).....: N/A 20C
Percent Volatile by Vol (%): N/A
Vapor Density (Air = 1)....: N/A
Evaporation Rate (BuAc = 1): N/A
Solubility in Water (%)....: Miscible
Appearance.....:
Colorless/gray, viscous liquid

10. STABILITY AND REACTIVITY

Stability.....: Yes
Hazardous Polymerization:
Does not occur
Hazardous Decomposition.:
SO_x, Hydrogen (in presence of metals)
Conditions To Avoid.....:

Adding water to acid can cause violent exothermic reaction, possibly causing fire. Can react violently with alkalies.

Materials To Avoid.....:
(X)Water
( )Acids
(X)Bases
( )Corrosives
(X)Oxidizers

(X)Other :

Reducing agents, metal powders, cyanides, acetic acid, combustible matter

11. TOXICOLOGICAL INFORMATION

Toxicity Data:

orl-rat LD50: **2140 mg/kg**
ihl-gpg LC50: **18 mg/cu.m.**

Toxicological Findings:
None
Cited in Registry of Toxic Effects of Substances (RTECS)

12. DISPOSAL CONSIDERATIONS

EPA Waste Numbers: D002
Treatment:
Specified Technology - Neutralize to pH 6-9. Contact your local permitted waste disposal site (TSD) for permissible treatment sites.

ALWAYS CONTACT A PERMITTED WASTE DISPOSER (TSD) TO ASSURE COMPLIANCE WITH ALL CURRENT LOCAL, STATE AND FEDERAL REGULATIONS.

13. TRANSPORT INFORMATION

DOT Proper Shipping Name...:
Sulfuric Acid

TSCA Inventory.....:
This product is a "Mixture". The CAS numbers of all components are listed on the TSCA Inventory.

Component	SARA EHS (302)	SARA EHS TPQ (lbs)	CERCLA RQ (lbs)
Sulfuric Acid	Y	1000	1000
Water			

Component	OSHA Floor List	SARA 313	DeMinimis for SARA 313 (%)
Sulfuric Acid	Y	Y	1.0
Water			

15. OTHER INFORMATION

Comments:
None
NFPA Hazard Ratings:
Health : 3
Flammability : 0
Reactivity : 2

Special Hazards: W

Revision History:
02/01/82 04/17/86 06/05/87 10/27/87 02/20/90

N/A = Not Available
N/E = None Established

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MATERIAL SAFETY DATA SHEET

EM SCIENCE

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Manufacturer.....:

EM SCIENCE
A Division of **EM Industries**
P.O. Box 70
480 Democrat Rd.
Gibbstown, N.J. 08027

Preparation Date.: 03/03/94
Date MSDS Printed.: Apr 25, 1995

Information Phone Number.: 609-354-9200
Hours: Mon. to Fri. 8:30-5
Chemtrec Emergency Number: 800-424-9300
Hours: 24 hrs a day

Catalog Number(s):

HX0603	HX0603I	HX0603P	HX0603PS	HX0603T	HX0603TP
HX0603Y	HX0606	314	315	317	321

Trade Name.....:
Muriatic Acid, 23 deg. Be
Chemical Name....:
Hydrochloric Acid
Chemical Family..: Inorganic Acid
Formula.....:
HCl

Molecular Weight.: 36.46

2. COMPOSITION / INFORMATION ON INGREDIENTS

Component	CAS #	Appr %
Hydrochloric Acid	7647-01-0	100%

Approximate per cent indicates that this product is a concentrated acid. Hydrochloric acid is approximately 37%.

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

CAUSES SEVERE **BURNS.**
MAY BE FATAL IF INHALED OR SWALLOWED.
VAPOR EXTREMELY IRRITATING.
May Cause Damage To Respiratory Passages and Lungs.

Appearance.....:
Clear, colorless liquid; acrid odor

POTENTIAL HEALTH EFFECTS (ACUTE AND CHRONIC)

Symptoms of Exposure:
Eye contact causes severe burns and permanent eye damage.
Skin contact causes severe burns, possible deep ulceration.
Inhalation causes damage to nasal and respiratory passages, pulmonary edema.
Ingestion causes burns of mouth, throat and gastrointestinal tract.

Medical Cond. Aggravated by Exposure:
Respiratory conditions

Routes of Entry.....:
Inhalation, ingestion or skin contact.

Carcinogenicity.....:
The material is not listed (IARC, NTP, OSHA) as cancer causing agent.

4. FIRST AID MEASURES

Emergency First Aid:
GET MEDICAL ASSISTANCE FOR ALL CASES OF OVEREXPOSURE.
Skin: Immediately flush thoroughly with large amounts of water.
Eyes: Immediately flush thoroughly with water for at least 15 minutes.
Inhalation: Remove to fresh air; give artificial respiration if breathing has stopped.
Ingestion: do not induce vomiting; give water or milk if conscious; get medical attention.

5. FIRE FIGHTING MEASURES

Flash Point (F).....:	Noncombustible
Flammable Limits LEL (%).:	N/A
Flammable Limits UEL (%).:	N/A

Extinguishing Media.....:
Water spray

Fire Fighting Procedures.:
Wear self-contained breathing apparatus and protective clothing.

Fire & Explosion Hazards.:
Contact with metals produces hydrogen which may form explosive mixtures with air.

6. ACCIDENTAL RELEASE MEASURES

Spill Response:
Evacuate the area of all unnecessary personnel.
Wear suitable protective equipment listed under Exposure / Personal Protection.
Eliminate any ignition sources until the area is determined to be free from explosion or fire hazards.
Contain the release and eliminate its source, if this can be done without risk.

Take up and containerize for proper disposal as described under Disposal.
Comply with Federal, State, and local regulations on reporting releases. Refer to Regulatory Information for reportable quantity and other regulatory data.

EM SCIENCE recommends SPILL-X neutralizers and absorbent agents for various types of spills.
Additional information on the SPILL-X products can be provided through the EM SCIENCE Technical Service Department (609) 354-9200.
The following EM SCIENCE SPILL-X neutralizer and absorbent is recommended for this product:

SX0861 Acid Spill Treatment Kit

7. HANDLING AND STORAGE

Handling & Storage:
Keep container tightly closed.
Store in a cool, well-ventilated area separated from incompatible materials.
Do not breathe vapor.
Do not get in eyes, on skin or on clothing.
Handle empty containers with caution.
Add acid cautiously to water when diluting - never add water to acid.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

ENGINEERING CONTROLS AND PERSONAL PROTECTIVE EQUIPMENT:

Ventilation, Respiratory Protection, Protective Clothing, Eye Protection
Respiratory Protection: If workplace exposure limit(s) of product or any component is exceeded (see TLV/PEL), a NIOSH/MSHA approved air supplied respirator is advised in absence of proper

environmental control. OSHA regulations also permit other NIOSH/MSHA respirators (negative pressure type) under specified conditions (see your safety equipment supplier). Engineering and/or administrative controls should be implemented to reduce exposure.
Material must be handled or transferred in an approved fume hood or with equivalent ventilation.
Protective gloves (Neoprene, Nitrile or equivalent) must be worn to prevent skin contact.
Safety glasses with side shields must be worn at all times.

Work / Hygenic Practices:
Wash thoroughly after handling.
Do not take internally.
Eye wash and safety equipment should be readily available.

EXPOSURE GUIDELINES

OSHA - PEL:

Component	TWA PPM	TWA MG/M^3	STEL PPM	STEL MG/M^3	CL PPM	CL MG/M^3	Skin
Hydrochloric Acid					5	7	

ACGIH - TLV:

Component	TWA PPM	TWA MG/M^3	STEL PPM	STEL MG/M^3	CL PPM	CL MG/M^3	Skin
Hydrochloric Acid							

9. PHYSICAL AND CHEMICAL PROPERTIES

Boiling Point (C 760 mmHg).:	110C	20.24%
Melting Point (C).....:	-74C	
Specific Gravity (H20 = 1).:	1.1885	
Vapor Pressure (mm Hg).....:	@ 160	20C
Percent Volatile by Vol (%):	99.9+	
Vapor Density (Air = 1)....:	1.25	
Evaporation Rate (BuAc = 1):	2.0	
Solubility in Water (%)....:	Miscible	

Appearance.....:
Clear, colorless liquid; acrid odor

10. STABILITY AND REACTIVITY

Stability.....: Yes

Hazardous Polymerization:
Does not occur

Hazardous Decomposition.:
Toxic hydrogen chloride gas

Conditions To Avoid.....:
Heat; contact with metals.

Materials To Avoid.....:
( )Water
( )Acids
(X)Bases
( )Corrosives
( )Oxidizers
(X)Other :

Alkalies and amines; contact with metals produces hydrogen

11. TOXICOLOGICAL INFORMATION

Toxicity Data:

ihl-hmn LDLo: 1300 ppm/30M
orl-rbt LD50: 900 mg/kg

Toxicological Findings:
Tests on laboratory animals indicate material may produce adverse mutagenic and reproductive effects.
Cited in Registry of Toxic Effects of Substances (RTECS)

12. DISPOSAL CONSIDERATIONS

EPA Waste Numbers: D002
Treatment:
Specified Technology - Neutralize to pH 6-9. Contact your local permitted waste disposal site (TSD) for permissible treatment sites.

ALWAYS CONTACT A PERMITTED WASTE DISPOSER (TSD) TO ASSURE COMPLIANCE WITH ALL CURRENT LOCAL, STATE AND FEDERAL REGULATIONS.

13. TRANSPORT INFORMATION

DOT Proper Shipping Name...:
Hydrochloric Acid, Solution

14. REGULATORY INFORMATION

TSCA Inventory.....:
This product is a "Mixture". The CAS numbers of all components are listed on the TSCA Inventory.

Component	SARA EHS (302)	SARA EHS TPQ (lbs)	CERCLA RQ (lbs)
Hydrochloric Acid	Y	500	5000

Component	OSHA Floor List	SARA 313	DeMinimis for SARA 313 (%)
Hydrochloric Acid	Y	Y	1.0

15. OTHER INFORMATION

Comments:
None
NFPA Hazard Ratings:
Health : 3
Flammability : 0
Reactivity : 0
Special Hazards:

Revision History:
11/01/83 03/01/84 11/01/84 12/08/86 10/27/87 02/20/90 03/01/91
11/26/91 12/08/92 04/27/93

N/A = Not Available
N/E = None Established

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Carcinogenicity.....:
The material is not listed (IARC, NTP, OSHA) as cancer causing agent.
May contain trace amount of Benzene (See section two).

4. FIRST AID MEASURES

Emergency First Aid:
GET MEDICAL ASSISTANCE FOR ALL CASES OF OVEREXPOSURE.
Skin: Wash thoroughly with soap and water.
Eyes: Immediately flush thoroughly with water for at least 15 minutes.
Inhalation: Remove to fresh air; give artificial respiration if breathing has stopped.
Ingestion: If conscious, drink water and induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person.
Remove contaminated clothing and wash before reuse.

5. FIRE FIGHTING MEASURES

Flash Point (F).....:	0F (cc)
Flammable Limits LEL (%).:	2.60
Flammable Limits UEL (%).:	12.80

Extinguishing Media.....:
Dry chemical, "Alcohol" foam, Water spray, CO_2.
Use water spray to cool exposed containers

Fire Fighting Procedures.:
Wear self-contained breathing apparatus.

Fire & Explosion Hazards.:
Dangerous fire and explosive hazard.
Vapor can travel distances to ignition source and flash back.
Hot organic chemical vapors or mists are susceptible to sudden spontaneous combustion when mixed with air. Ignition may occur at

temperatures below published autoignition or ignition temperatures. Ignition temperatures decrease with increasing vapor volume and vapor/air contact time and are influenced by pressure changes. Ignition may occur at typical elevated temperature process conditions, especially in process operating under vacuum if subjected to sudden ingress of air, or outside process equipment operating under elevated pressure if sudden escape of vapors or mists to the atmosphere occurs.

6. ACCIDENTAL RELEASE MEASURES

Spill Response:
Evacuate the area of all unnecessary personnel.
Wear suitable protective equipment listed under Exposure / Personal Protection.
Eliminate any ignition sources until the area is determined to be free from explosion or fire hazards.
Contain the release and eliminate its source, if this can be done without risk.
Take up and containerize for proper disposal as described under Disposal.
Comply with Federal, State, and local regulations on reporting releases. Refer to Regulatory Information for reportable quantity and other regulatory data.

EM SCIENCE recommends Spill-X absorbent agents for various types of spills. Additional information on the Spill-X products can be provided through the EM SCIENCE Technical Service Department (609) 354-9200.
The following EM SCIENCE Spill-X absorbent is recommended for this product:

SX0863 Solvent Spill Treatment Kit

7. HANDLING AND STORAGE

MATERIAL SAFETY DATA SHEET

EM SCIENCE

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Manufacturer.....:

EM SCIENCE
A Division of **EM Industries**
P.O. Box 70
480 Democrat Rd.
Gibbstown, N.J. 08027

Preparation Date.: 12/01/92
Date MSDS Printed.: Apr 25, 1995

Information Phone Number.: 609-354-9200
Hours: Mon. to Fri. 8:30-5
Chemtrec Emergency Number: 800-424-9300
Hours: 24 hrs a day

Catalog Number(s):

AX0110	AX0115	AX0115P	AX0116	AX0118	AX0120
AX0120S	AX0120T	AX0125	AX0126		

Trade Name.....:
Dimethyl Ketone; 2-Propanone
Chemical Name....:
Acetone
Chemical Family..: Ketone
Formula.....:
CH_3COCH_3

Molecular Weight.: 58.08

2. COMPOSITION / INFORMATION ON INGREDIENTS

Component	CAS #	Appr %
Acetone	67-64-1	100%

Acetone may contain trace amount of Benzene (less than 0.002%).
Benzene (CAS# 71-43-2) has been found to cause cancer.
Notification of carcinogenic ingredients in quantity less than
0.1% is not required under Federal Hazard Communication Law.

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW
EXTREMELY FLAMMABLE LIQUID AND VAPOR.
HARMFUL IF INHALED OR SWALLOWED.
CAUSES EYE IRRITATION.
May Cause Damage To Central Nervous System, Liver and Kidneys.
Chronic Exposure During Pregnancy May Be Harmful.

Appearance.....:
Colorless liquid; pungent odor.

POTENTIAL HEALTH EFFECTS (ACUTE AND CHRONIC)

Symptoms of Exposure:
Harmful if inhaled or swallowed.
High concentrations or prolonged exposure causes headache, dizziness, nausea, irritation of eyes and respiratory tract, narcosis and eventually unconsciousness.
May cause damage to Central Nervous System, liver and kidneys.
Prolonged or repeated skin contact may cause irritation.
Eye contact causes irritation.
Animal studies show adverse effects on fertility when females were exposed chronically during pregnancy.

Medical Cond. Aggravated by Exposure:
Skin conditions, pregnancy.

Routes of Entry.....:
Inhalation, ingestion or skin contact.

EXPOSURE GUIDELINES

OSHA - PEL:

Component	TWA PPM	TWA MG/M^3	STEL PPM	STEL MG/M^3	CL PPM	CL MG/M^3	Skin
Acetone	1000	1800	1000	2400			

ACGIH - TLV:

Component	TWA PPM	TWA MG/M^3	STEL PPM	STEL MG/M^3	CL PPM	CL MG/M^3	Skin
Acetone	750	1780	1000	2380			

9. PHYSICAL AND CHEMICAL PROPERTIES

Boiling Point (C 760 mmHg).: 56C
Melting Point (C).....: - 94C
Specific Gravity (H20 = 1).: 0.7905
Vapor Pressure (mm Hg).....: 184 20C
Percent Volatile by Vol (%): 99.9+
Vapor Density (Air = 1)....: 2.0
Evaporation Rate (BuAc = 1): 14.48
Solubility in Water (%)....: Miscible
Appearance.....:
Colorless liquid; pungent odor.

10. STABILITY AND REACTIVITY

Stability.....: Yes

Handling & Storage:
Keep container closed.
Store in a cool area away from ignition sources and oxidizers.
Do not breathe vapor.
Do not get in eyes.
Avoid prolonged or repeated skin contact.
Electrically ground all equipment when handling this product.
Retained residue may make empty containers hazardous; use caution!

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

ENGINEERING CONTROLS AND PERSONAL PROTECTIVE EQUIPMENT:

Ventilation, Respiratory Protection, Protective Clothing, Eye Protection
Respiratory Protection: If workplace exposure limit(s) of product or any component is exceeded (see TLV/PEL), a NIOSH/MSHA approved air supplied respirator is advised in absence of proper environmental control. OSHA regulations also permit other NIOSH/MSHA respirators (negative pressure type) under specified conditions (see your safety equipment supplier). Engineering and/or administrative controls should be implemented to reduce exposure.
Material should be handled or transferred in an approved fume hood or with adequate ventilation.
Protective gloves (Butyl rubber, CPE, Polyurethane or equivalent) should be worn to prevent skin contact.
Safety glasses with side shields should be worn at all times.

Work / Hygenic Practices:
Wash thoroughly after handling.
Do not take internally.
Eye wash and safety equipment should be readily available.

Hazardous Polymerization:
Does not occur.
Hazardous Decomposition.:
CO_x
Conditions To Avoid.....:
Heat, contact with ignition source

Materials To Avoid.....:
( )Water
(X)Acids
( )Bases
( )Corrosives
(X)Oxidizers
(X)Other :

Potassium t-Butoxide; Nitric and Sulfuric Acid Mixture,
Bromine, Chlorine

11. TOXICOLOGICAL INFORMATION

Toxicity Data:
orl-mus LD50: 3000 mg/kg
orl-rat LD50: 5800 mg/kg
ihl-hmn TCLo: 500 ppm

Toxicological Findings:
Tests on laboratory animals indicate material may produce adverse mutagenic and reproductive effects.
Cited in Registry of Toxic Effects of Substances (RTECS)

12. DISPOSAL CONSIDERATIONS

EPA Waste Numbers: U002 D001
Treatment:
Specified Technology - Incineration to a level below TCA (Total Constituent Analyses) levels. Contact your local permitted waste

disposal company (TSD) for permissible treatment site.

ALWAYS CONTACT A PERMITTED WASTE DISPOSER (TSD) TO ASSURE COMPLIANCE WITH ALL CURRENT LOCAL, STATE AND FEDERAL REGULATIONS.

13. TRANSPORT INFORMATION

DOT Proper Shipping Name...:
Acetone

14. REGULATORY INFORMATION

TSCA Inventory.....:
The CAS number of this product is listed on the TSCA Inventory.

Component	SARA EHS (302)	SARA EHS TPQ (lbs)	CERCLA RQ (lbs)
Acetone			5000

Component	OSHA Floor List	SARA 313	DeMinimis for SARA 313 (%)
Acetone	Y	Y	1.0

Comments:
None

NFPA Hazard Ratings:
Health : 1
Flammability : 3
Reactivity : 0
Special Hazards:

Revision History:
08/26/81 07/01/83 06/01/84 06/01/85 09/12/86 06/05/87 08/28/87
10/27/87 03/21/89 10/06/89 05/01/90 05/11/90 03/01/91

N/A = Not Available
N/E = None Established

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USEPA R/V MUDPUPPY

APPENDIX G

R/V MUDPUPPY

SHIPBOARD WINCH DOCUMENTATION AND OPERATOR STATUS

NAME OF WINCH:_____

Manufacturer_____ Model_____ Serial No_____

Date of mfg_____ Max Load/Rated Line Pull_____**pounds** (_____KG)

Drum Capacity_____feet of ____inch dia wire rope (_____meters of_____mm dia rope)

Drive: *Gasoline__ Diesel__ Electric__ Electric chain__ Hydraulic__ Electro-Hydraulic__*
Horsepower_____ Electric power: ____VAC. ____Hz, __Phase.

Wire rope payout meter: *NO__ YES__* Type: *Mechanical__ Electrical__*
Drum speed control: *NO__ YES__* Type_____
Load sensor: *NO__ YES__* Type_____
Levelwind: *NO__ YES__* Type_____

Location on Ship:_____

ANCILLARY EQUIPMENT: (A Frame use, davits, number and size of fairleads, special running rigging
features)_____
_____
_____

WINCH OPERATIONAL STATUS AS OF: _____.

TEST LOAD CERTIFICATION: Weight:_____pounds. Date certified:_____.
WIRE ROPE INSTALLED: Type_____ Nominal Dia.____inches.
Length:_____**feet.**
Maximum safe working load: _____**pounds**. (For sampling, use a safety factor of 5 ... the wirerope manufactureres listed breaking strength).
Termination of cable to drum: Type_____
Is cable color coded? *NO__ YES__* Number of feet from bitter end of rope ____ color __
-or- First rap on drum, color _____
Second rap, color _____
Third rap, color _____

QUALIFIED OPERATORS:

_____ Date:_____

_____ Date:_____

_____ Date:_____

RESPONSIBLE SSI AUTHORITY:_____

Seaward Services, Inc.

R/V MUDPUPPY
CREW ~ PASSENGER LIST

DATE:_____ LOCATION:_____

Captain: _____

Engineer: _____

Marine Technician: _____

USEPA Representative:_____

• PASSENGERS

NAME	ORGANIZATION

USEPA R/V MUDPUPPY

APPENDIX H

R/V MUDPUPPY-CONFINED SPACE ENTRY PROGRAM

PURPOSE

In accordance with the U. S. Environmental Protection Agency Regional Policy, each Division Office or other unit of the U. S. EPA is responsible for establishing a specific Standard Operating Procedure (SOP) for each area of potential confined space entry. The SOP must reflect all activities, specific needs, and exposure potential. Additionally, in accordance with the U. S. EPA Regional policy, the Great Lakes National Program Office (GLNPO) has implemented a confined space entry policy (Refer to Appendix E of the GLNPO Health, Safety & Environmental Compliance Manual). Personnel working on board the R/V Mudpuppy are required to adhere to both the Regional and Division policies. This program has been developed in accordance with OSHA 29 CFR 1910.146 and U. S. EPA policies as outline in EPA Order 1450.4. All personnel working on-board the R/V Mudpuppy are required to comply with the policies and procedures set forth in this document.

CONFINED SPACE DEFINED

A confined space is a space which has any one of the following characteristics:

- limited openings for entry and exit
- unfavorable natural ventilation
- not designated for continuous worker occupancy
- contains a hazardous atmosphere or has the potential for such

A confined space may have a combination of these characteristics, which can complicate work and rescue operations in and around these spaces. A survey of the R/V Mudpuppy has identified the forward and after holds of the vessel as confined spaces.

HAZARDOUS ENVIRONMENTS OR ATMOSPHERES

As defined, a hazardous atmosphere is one which presents a potential for death, disablement, injury, or acute illness. The atmosphere in a confined space may be extremely hazardous because of the lack of natural air movement. This characteristic of confined spaces can result in oxygen-deficient atmospheres, flammable atmospheres and/or toxic atmospheres.

Oxygen-Deficient Atmospheres:

An oxygen-deficient atmosphere has less than 19.5% available oxygen. Any atmosphere with less than 19.5% oxygen should not be entered without an approved Self-Contained Breathing Apparatus (SCBA). The oxygen level in a confined space can decrease because of work being done in the area (e.g. welding, cutting, or brazing), it can be decreased by certain chemical reactions (e.g. rusting), through bacterial action (e.g. fermentation), or it can be decreased if oxygen is displaced by other gases, such as carbon dioxide or nitrogen. Total displacement of oxygen by other gas will result in unconsciousness, followed by death.

Flammable Atmospheres:

Two elements make up a flammable atmosphere: 1) the oxygen content in the air; and 2) a flammable gas, vapor, or dust in the proper mixture. Different gases have different flammable ranges. If a source of ignition (e.g. a sparking tool) is introduced into a space containing a flammable atmosphere, an explosion will result.

An oxygen-enriched atmosphere (above 23.5%) will cause flammable materials, such as clothing and hair, to burn violently when ignited. Therefore, when ventilating a confined space never use pure oxygen. Ventilate with natural air.

Toxic Atmospheres:

Most substances (liquids, vapors, gases, mists, solid materials, and dusts) should be considered hazardous in a confined space. Toxic substances can come from: products stored in the area; work being performed in the area; areas adjacent to the confine space; or equipment in the area (e.g. combustion engine). Toxicants produced in and around the area can accumulate in the confined space creating a hazardous environment.

REQUIREMENTS

Testing The Atmosphere

Prior to entering a confined space, atmospheric testing must be conducted to determine if the atmosphere is safe for entry. If testing reveals oxygen-deficiency, or the presence of toxic gases or vapors, the space must be ventilated and re-tested before entry. If ventilation is not possible and entry is necessary (e.g. for emergency rescue), entry personnel must don supplied air respiratory protection.

NEVER TRUST YOUR SENSES TO DETERMINE IF THE AIR IN A CONFINED SPACE IS SAFE! YOU CAN NOT SEE OR SMELL MANY TOXIC GASES AND VAPORS, NOR CAN YOU DETERMINE THE LEVEL OF OXYGEN PRESENT.

Ventilation

Ventilation by a blower or fan may be necessary to remove harmful gases and vapors from a confined space. The method and equipment chosen are dependent upon the size of the confined space opening, the gases to be exhausted (e.g. are they flammable ?), and the source of makeup air.

Under certain conditions where flammable gases or vapors have displaced the oxygen level, but are too rich to burn, forced air ventilation may dilute them until they are within the explosive range. Also, if inert gases (e.g. carbon dioxide, nitrogen, argon) are used in the confined space, the space should be well ventilated and re-tested before a worker may enter.

Ventilation should be continuous where possible, because in many confined spaces the hazardous atmosphere will form again when the flow of air is stopped.

Isolation

Isolation of a confined space is a process where the space is removed from service by:

- Lockout/tagout - Lockout all electrical sources, preferably at disconnect switches remote from equipment.
- Blanking and Bleeding - pneumatic and hydraulic lines
- Disconnecting - belt and chain drives, and mechanical linkages on shaft-driven equipment.where possible, and
- Securing - mechanical moving parts within a confined space with latches, chains, clocks, blocks, or other devices.

Respirators

Respirators are devices that can allow workers to safely breathe without inhaling toxic gases or particles. Two basic types are **air-purifying**, which filter dangerous substances from the air; and **air-supplying**, which deliver a supply of safe breathing air from a tank or an uncontaminated area nearby.

Only air-supplying respirators should be used in confined spaces where there is not enough oxygen !

In selecting the proper respirator for the job, knowledge of the hazard, and thorough training in the use and limitations of respirators are very important. The issuance and use of respiratory equipment must be performed in accordance with the policies set forth in the *GLNPO Health, Safety and Environmental Compliance Manual.* Questions regarding the proper selection and use of respirators on board the R/V Mudpuppy should be addressed by the Regional Safety Manager or his/her designee.

Personal Protective Equipment

In addition to respiratory protection, the proper selection of Personal Protective Equipment (PPE) is very important. Selection must be based on the potential health and safety hazards associated with work activities. Prior to work activities an assessment must be conducted to evaluate the need and determine proper selection of PPE. Minimum protective equipment requirements should include: hard hat, steel toed shoes/boots, safety glasses, and harness.

Standby Rescue

A Standby person must be assigned to remain outside of the confined space and be in constant contact (visual or speech) with the person inside. The standby person should not have any other duties but to serve as standby and know who should be notified in the event of an emergency. Standby personnel should not enter a confined space until help arrives, and then only with proper protective equipment, life lines, and respirators.

Over 50% of workers who die in confined spaces are would-be rescuers. Rescuers must be trained in and follow established emergency procedures and use appropriate equipment and techniques. Steps for safe rescue must be included in all confined space entry procedures. Rescue should be well planned and drills should be conducted on emergency procedures. Unplanned rescue, such as when someone instinctively rushes in to help a downed co-worker, can easily result in a double fatality.

TRAINING

In accordance with OSHA 29 CFR 1910.146 and EPA Policy, prior to participating in confined space entry, personnel must be properly trained in the uses of respiratory protective equipment, monitoring equipment, personal protective equipment, and be knowledgeable in the confine space programs implemented by the GLNPO. Team leaders must be trained in first aid and CPR and be knowledgeable in the hazards associated with confined spaces.

PRE-ENTRY CHECKLIST/CONFINED SPACE ENTRY PERMIT

A pre-entry checklist/confined space entry permit must be completed prior to entering a confined space. This checklist/permit can be found as **Attachment 1** to this document. Permits must remain on file on board the vessel. Additionally, copies of the permits should be forwarded to the GLNPO Safety Representative on a quarterly basis.

ATTACHMENT 1

R/V MUDPUPPY - PRE-ENTRY CHECKLIST/CONFINED SPACE ENTRY PERMIT

The following checklist must be completed and the permit signed by a competent person/team leader prior to entering a confined space.

DO NOT ENTER A CONFINED SPACE UNTIL YOU HAVE CONSIDERED EVERY QUESTION, AND HAVE DETERMINED THE SPACE TO BE SAFE.

SECTION A:

YES/NO

_____ Is entry necessary? Specify purpose: _____

SECTION B:

TESTING

_____ Are the instruments used in atmospheric monitoring properly calibrated?

_____ Was the atmosphere in the confined space tested?

_____ Was the oxygen level at least 19.5% - not more than 23.5%?

_____ Were toxic, flammable, or oxygen-displacing gases/vapors present?
-hydrogen sulfide
-carbon monoxide
-methane
-other (list)_____

SECTION C:

MONITORING

_____ Will the atmosphere in the space be monitored while work is going on?

_____ Continuously?

_____ Periodically? (If yes, give intervals: _____)

SECTION D:

VENTILATION

_____ Has the space been ventilated for at least 15 minutes before entry?

_____ Will ventilation be continued during entry?

_____ Is the air intake for the ventilation system located in an area that is free of combustible dusts and vapors and toxic substance?

_____ If atmosphere was found unacceptable and then ventilated, was it re-tested before entry?

If reason for entry does not include to use of chemicals, welding equipment, or involve any renovation activities or additional potential hazards associated with work activities, you may skip sections E through G and proceed to Section H.

SECTION E:

ISOLATION

_____ Has the space been isolated from other systems?

_____ Has electrical equipment been locked out?

_____ Have disconnects been used where possible?

_____ Has mechanical equipment been blocked, chocked, and disengaged where necessary?

_____ Have lines under pressure been blanked and bled?

SECTION F:

CLOTHING & EQUIPMENT

_____ Is special clothing required (boots, protective clothing, safety glasses, hard hat)?
(If so, specify: _____)

_____ Is special equipment required (rescue equipment, communication equipment, etc.)?
(If so, specify: _____)

_____ Are special tools required (non-sparking)?
If so, specify: _____)

SECTION G:

RESPIRATORY PROTECTION

_____ Are MSHA/NIOSH approved respirators of the type required available on site?

_____ Is respiratory protection required (air-purifying, supplied air, SCBA, etc.)
(If so, specify type: _____)

_____ Can you get through the opening with a respirator on? (If you don't know, find out before you try to enter).

SECTION H:

TRAINING

_____ If respiratory protection is required (e.g. during renovation activities) have
personnel been trained in the proper use of a respirator?

_____ Have personnel received first aid/CPR training?

_____ Have personnel been trained in confined space entry and do know what hazards to look for?

SECTION I:

STANDBY/RESCUE

_____ Will there be a standby person on the outside in constant visual or auditory communication with the person on the inside? If so, name

_____

_____ Will the standby person be able to see and/or hear the person inside at all times?

_____ Has the standby person been trained in rescue procedures?

_____ Will safety lines and harness be required to remove a person?

_____ Rescue procedures available to be followed in the event of an emergency?

_____ Are you familiar with emergency rescue procedures?

_____ Do you know who to notify and how in the event of an emergency?

SECTION J:

PERMIT

Emergency Numbers: _____

Authorized Entrant(s):_____

Duration of Entry: _____to _____ . Note: Duration of entry is not to exceed 12 hours. If conditions exist which may change or have an effect on the health and safety status of the confined space the permit must be re-issued.

Signature of this permit is an authorization in writing that the space has been tested by a qualified person, and that the space is safe for entry; following the pre-cautions listed.

Entry is permitted: (Signature)_____ Date:_____

USEPA R/V MUDPUPPY

APPENDIX I

R/V MUDPUPPY - SITE SAFETY PLAN (insert project name)

This page must be completed, signed and dated prior to engaging in field activities.

Project Site Location: _____

EPA Project Manager: _____

EPA Site Safety Officer: _____

EPA Plan Preparer: _____

EPA Plan Reviewer: _____

Preparation Date: _____

Expiration Date: _____

APPROVED BY: U.S. EPA Region V Health & Safety Manager

_____
(Signature and Date) - **IF NECESSARY**

GLNPO Health and Safety Management Advisor

_____
(Signature and Date) - **IF NECESSARY**

GLNPO Health & Safety Representative/Consultant

_____
(Signature and Date)

GLNPO Project Manager

_____
(Signature and Date)

1.0 PURPOSE

In accordance with OSHA 29 CFR 1910.120 and EPA policy, a Site Specific Safety Plan must be completed prior to engaging in sampling activities of sites were hazardous constituents are present or when the potential for hazardous constituents exist. The plan is designed to identify, evaluate, and control safety and health hazards and provide for emergency response. To ensure that proper health and safety measures are implemented during sampling activities on board the R/V Mudpuppy, all onsite personnel are required to adhere to the contents of this document as well as all applicable health and safety requirements implemented by the Great Lakes National Program Office (GLNPO).

2.0 APPLICABILITY

The provisions of the plan are mandatory for all on-site personnel. This plan has been developed under U. S. EPA guidelines and complies with applicable regulations, including Occupational Safety and Health Administration (OSHA) standards [29 Code of Federal Regulations (CFR) 1910 and 1926].

U. S. EPA-GLNPO will require that all contractors and subcontractors follow the health and safety requirements listed below:

- Employees must have appropriate training [40-hour OSHA required (29 CFR 1910.120) health and safety course for hazardous waste workers, or certified equivalent training and 8-hour update training].

- Personnel working at hazardous waste sites must have had an annual physical (or physician's waiver for biennial physical) and be certified "fit for duty" and "fit for respirator use", if necessary, by a qualified physician.

- Proof of training and physical must be obtained before site work may begin.

- Personnel must have appropriate personal protective equipment for the specific job (i.e. hard hat, safety shoes, respirator, hearing protection, gloves, etc.)

- All equipment and field operations must meet applicable safety standards and satisfy an inspection by GLNPO Project Manager or his/her designee. Unsafe equipment or operations will necessitate shut down of the job.

3.0 SITE CHARACTERIZATION AND ANALYSIS

Prior to field activities, this document must be completed by the GLNPO Project Officer and submitted to the appropriate Health and Safety Representatives (i.e., GLNPO Health & Safety Consultant for moderate to low hazard sites, GLNPO Section Team Leader, and GLNPO Safety Team Leader). Based on the site characterization and analysis, it shall be determined to what extent this plan will be detailed. Sites with the potential to pose acute hazards (high hazard ranking) shall be submitted to the GLNPO Health and Safety Management Advisor and the Regional Health & Safety Manager for approval within twenty days (or as soon as possible) prior to sampling activities. Completed plans of high ranking and moderate hazards must be signed/approved by appropriate personnel prior to field activities.

General Information

Site Location:

Objective:

Material Types: Liquid: ____Solid: ____Sludge: ____Gas: ____Sediment: ____

Characteristics: Corrosive: ____Ignitable: ____Radioactive: ____Volatile: ____
Toxic: ____Reactive: ____Unknown: ____

Unusual Site Features:

Status:

Background Review: Completed: _____ Preliminary: _____ Incomplete: ____

Documentation/Summary (Overall Hazard): Serious/High: ____
Moderate: ____ Low: ____ Unknown: ____

Brief Summary of Hazard Evaluation:

_____
_____
_____
_____
_____
_____
_____

4.0 SITE DESCRIPTION

Date of Activities:_____

Location of Sampling Site(s):

_____

Known or Potential Hazards:

_____

Additional Information:

_____

_____

5.0 OBJECTIVE: (describe actions and tasks to be accomplished; i.e. identify contaminated sediments, sampling methods)

_____
_____
_____
_____
_____

6.0 ONSITE ORGANIZATION & COORDINATION

Project Team Leader: _____

Site Safety Officer: _____

Field Team Leader: _____

Field Team Members: _____

_____

_____

Federal Agency Reps: _____

State Agency Reps: _____

Local Agency Reps: _____

Contractors: _____

_____

_____

All persons onsite must be listed above. All activities on site must be cleared with the Team Leader.

7.0 ONSITE CONTROL

_____(Name) has been designated as onsite control coordinator.

The prevailing wind conditions are _____. Whenever possible, sampling activities should occur downwind of the cabin area. When sampling areas where the potential exist for airborne concentrations of contaminants could exceed OSHA Permissible Exposure Limits (PELs), sampling activities must occur downwind of the cabin area.

8.0 HAZARD EVALUATION

The following substance(s) are known or suspected to be on site:

____PCBs ____ Metals (Please Circle - Including: Mercury, Arsenic, Cadmium, Lead, Chromium, Zinc, and Nickel)

____PAHs ____AHs

Additional hazards not listed above: _____

_____

_____

The primary hazards associated with substance are as follows: [for hazard information on PCBs, PAHs, AHs, and Metals (including: Mercury, Arsenic, Cadmium, Lead, Chromium, Zinc, and Nickel) listed above, refer to attachment 1 of this document]

_____

_____

In addition to the substances listed above, the following analytical chemicals are expected to be brought on site (MSDSs must be accompany any chemicals brought on board):

_____

_____

Hazardous substance information form(s) for the involved substance(s) have been completed and are attached.

9.0 PERSONAL PROTECTIVE EQUIPMENT

Based on the evaluation of potential hazards, the following levels of personal protection have been designated for use for the applicable wok tasks:

NOTE - Under normal operations, the minimum Personal Protective Equipment (PPE) required to be worn by personnel working on deck aboard the R/V Mudpuppy include; hard hat, steel toed footwear, tyvek coveralls, boot covers, personal floatation device, and double gloves (e. g. Level D - modified level D/C; no respiratory protection). Modification to the level of protection should be specified in the space provided below.

Location	Job Function	Level of Protection			
On deck during sampling activities	_____	A	B	C	D
Above cabin during sampling	_____	A	B	C	D
Sample Prep	_____	A	B	C	D
Inside cabin area	_____	A	B	C	D
After deck	_____	A	B	C	D

Specific protective equipment for each level of protection (specify; i.e. SCBA, Tyvex, etc.):

_____

_____

_____

_____

_____

10.0 ONSITE WORK PLAN

(Include all tasks to be performed, persons or agency performing tasks, and necessary precautions to be implemented while performing tasks)

Under usual circumstances the following tasks are performed on board the R/V Mudpuppy:

- Sediment collection using the vibracore - conducted by the Mudpuppy Field Crew
- Sediment extraction from the vibracore - conducted by the Mudpuppy Field Crew
- Packaging of sediment samples for transportation - conducted by the Mudpuppy Field Crew
- Boat positioning and anchoring - conducted by the Mudpuppy Field Crew

The following additional activities will be conducted on board (specify tasks and personnel performing tasks):

_____
_____
_____
_____
_____
_____
_____

The work party was briefed on the contents of this plan at (Time & Date)_____.

11.0 COMMUNICATION PROCEDURES

Channel _____has been designated as the radio frequency for emergency communication.

_____(# of horn blast) is the emergency signal to indicate that all personnel should leave the sampling area.

The following hand signals should be used in the absence of verbal communication:

Hand gripping throat = out of air, can't breath.
Hands on top of head = need assistance
Thumbs up = OK, I'm all right, I understand
Thumbs down = No, Negative

12.0 DECONTAMINATION PROCEDURES

Personnel and equipment leaving the Sampling area (Exclusion Zone) shall be thoroughly decontaminated. The standard decontamination protocol on board the R/V Mudpuppy is as follows:

- Decontamination is conducted in Level D PPE
- Water is used as a decontamination solution using a garden hose
- Proper doffing procedures shall be implemented following decontamination

If other decontamination procedures are required, please list equipment required and procedure(s) implemented:

_____
_____.

13.0 SITE SAFETY & HEALTH PLAN

_____(Name)) is the designated Site Safety Officer and is directly responsible for the safety recommendations on site.

Emergency Medical

_____ & _____(Names) are qualified and designated as first aid responders on site.

_____(name) Medical facility is located at _____(address).

Local ambulance service is available from _____ at _____(phone). Their response time is _____.

First aid/safety equipment is available as follows:

Emergency eye wash is located on the bow of the vessel
First aid kit is located inside the cabin area
PFD's are located inside cabin area
Ring buoys are located forward and aft
Fire extinguishers throughout vessel

Emergency medical information for substances present or suspected to be present:

Substance	Exposure symptoms	First Aid Instructions

Environmental Monitoring

The following environmental monitoring equipment shall be used on site at specified intervals (cross out if not applicable):

Combustible Gas Indicator - continuously/hourly/daily/other _____
O2 Monitor - continuous/hourly/daily/other _____
Colorimetric tubes (type) _____ continuously/hourly/daily/other _____
HNU/OVA - continuously/hourly/daily/other _____
Geiger Counter - continuously/hourly/daily/other _____
Other _____(specify)- continuously/hourly/daily/other _____

Emergency Procedures

The Site Safety Officer shall be notified of any on site emergencies and be responsible for ensuring that appropriate procedures are followed.

PPE Failure

If a site worker experiences personal protective equipment failure they shall immediately leave the area and not re-enter until equipment has been repaired or replaced.

Other Equipment Failure

If equipment on site fails to operate properly, the Team Leader and Site Safety Officer shall be notified and then determine the effect of this failure on continuing operations.

Personal Monitoring

The following personal monitoring will be in effect on site:

Personal exposure sampling - (describe sampling program, include equipment types) _____
_____

Medical Monitoring

The expected air temperature will be _____degrees F. If it is determined that heat stress monitoring is required (mandatory if over 70 degrees F) physiologic monitoring must be conducted in accordance with the Heat Stress Monitoring Program found in **Appendix** ____ of the R/V Mudpuppy Supplemental Health, Safety and Environmental Compliance Manual. Monitoring procedures include monitoring body temp, pulse, and fluid intake.

14.0 SITE SPECIFIC ORIENTATION

This is to certify that all site personnel have read the above plan and are familiar with its provisions.

Site Safety Officer (name)_____ _____(signature)

Team Leader (name)_____ _____(signature)

Other Site Personnel:
(name)_____ _____(signature)

_____ _____

_____ _____

ATTACHMENT 1: HAZARD EVALUATION

The following substance(s) are known or suspected to be on site: (Circle if applicable)

Arsenic, Cadmium, Chromium, Lead, Mercury, Zinc, PCBs, PAHs, oil and grease.

The primary hazards associated with substance are as follows:

Arsenic - oxidizes rapidly when exposed to atmosphere. Oxidation products of arsenic are more toxic. Oxidation product Arsine - extreme acute toxicity can occur within a few hours at concentrations of 3-10 ppm. Other systemic effects include: poisonous by inhalation and ingestion, human carcinogen, irritation of digestive tract, decrease in production of red and white blood cells, abnormal heart function, blood vessel damage, liver and/or kidney damage, and impaired nerve function. There are also latent symptoms associated with exposure to arsine. These symptoms include: headache, dizziness, garlic odor of breath, numbness, chills and tingling of hands and feet, nausea, vomiting, abdominal cramping, abdominal tenderness and rigidity, bronzing of the skin, pulmonary edema, jaundice. The OSHA PEL/TWA for Arsine is 0.05ppm (0.2 $mg/m^{3)}$.

Cadmium - Human carcinogen, inhalation hazard; pulmonary edema, ingestion hazard; coughing tightness of chest, headache, chills, muscular ache, anosmia, emphysema, nausea, vomiting, diarrhea, mild edema. The OSHA PEL/TWA for Cadmium is 0.2 mg/m^3 with a ceiling concentration limit of 0.6 mg/m^3 for dusts and 0.1 mg/m^3 with a ceiling concentration limit of 0.3 mg/m^3 for fumes.

Chromium - Potential human carcinogen, effects lungs, respiratory system, and skin, irritant to mucous membranes, can cause ulcerations of nares and respiratory tract. The OSHA PEL/TWA for Chromium is 1 mg/m^3.

Lead - Inhalation, contact and ingestion hazard; weakness, insomnia, abdominal pain anemia, tumors hypotension, etc. Target organs include the GI tract, Central nervous system, kidneys, and tissue. The OSHA PEL/TWA is 0.100 mg/m^3 (air concentrations must be maintained at a level by which blood lead level remain <0.080 mg/100g of whole blood [OSHA 1910.1025]).

Mercury - Inhalation, absorption, ingestion and contact hazard; causing dizziness, blurred vision, emotional disturbance, diarrhea, nausea, vomiting, skin burns, etc. Target organs include the Central nervous system, kidneys, eyes, and skin. The OSHA PEL/TWA for Mercury compounds is 0.01 mg/m^3.

Zinc - Can effect the respiratory system, skin, and eyes. Symptoms of exposure include: dry mouth, coughing, conjunctivitis, chills, tightness of chest, headache, cramps, blurred vision, low back pain, vomiting, etc. OSHA PEL/TWA varies dependent upon the specific zinc compound. The PEL for Zinc oxide fumes is 5 mg/m^3.

PCBs - Inhalation, absorption, contact, and ingestion hazard. Irritant to the eyes and skin; dermal carcinogen. Target organs - skin, eyes, and liver. The OSHA PEL/TWA for PCBs is 0.5 mg/m^3 for skin. NIOSH has established an REL of 0.001 mg/m^3.

PAHs - (Polynuclear Aromatic Hydrocarbons) Inhalation, absorption, ingestion, and contact hazard. Target organs - blood, CNS, skin, bone marrow, eyes, kidney, liver, and respiratory system. Signs and symptoms of exposure include but are not limited to irritation to the mucous membrane, head ache, dizziness, staggering, fatigue, depression, dermatitis, etc. The OSHA PEL/TWA for PAHs varies with the chemical composition; check appropriate references for specific PELs.

Nickel - NIOSH has identified Nickel as an occupational human carcinogen. Hazards: Inhalation, ingestion, and contact hazard. Target organs include lungs, paranasal sinus, and CNS. Signs and symptoms of exposure include: head ache, vertigo, nausea, vomiting, epigastric pain, cough, weakness, pneuitis, delirium, convulsions. The OSHA PEL/TWA for Nickel is o.1 mg/m^3 for soluble compounds and 1 mg/m^3 for metals and insoluble compounds.

APPENDIX O: GLNPO POLICY, MEMORANDUMS, STANDARD OPERATING PROCEDURES, REGULATORY UPDATES:

USEPA GLNPO

STANDARD OPERATING PROCEDURES

FOR

WINTER OPERATIONS

December 1994

DISCLAIMER

Approval of this document by the Great Lakes Program Office (GLNPO) does not signify that the contents represent the views and policies of the USEPA, nor does the mention of trade names or commercial products constitute endorsement or recommended use.

INTRODUCTION

This document describes the Standard Operating Procedures (SOP), as required by the USEPA Great Lake National Program Office (GLNPO) Maritime Safety Program, for winter sampling activities. This SOP has been developed with the objective of minimizing the hazards associated with winter sampling operations.

This SOP applies to all EPA personnel, EPA contractors or federal, state, or local government agencies, and persons who operate or are passengers on board USEPA GLNPO vessels during winter work activities.

LIFESAVING AND SAFETY EQUIPMENT

Rescue Boats - At all times during winter sampling activities, a rescue boat must be outrigged into a deployable position. Members of the crew responsible for man overboard rescue procedures must be well trained and readied for response activities. A response time of three minutes must be demonstrated by response team personnel.

All lifesaving equipment, such as lifelines, ring buoys, rescue boats and associated equipment, must remain unobstructed at all times.

PERSONAL PROTECTIVE EQUIPMENT

Harnesses/Lifelines - When working on deck, specifically on the fantail or around the perimeter of the vessel, persons must wear safety harnesses and a lifeline should be rigged and used.

Personal Flotation Devices (PFDs) - All persons working on deck must wear, at a minimum, a type III PFD.

Hard Hats - Persons working on the bow of the vessel, or in any area where over head hazards may be present, must wear hard hats. (Refer to Protective Clothing, Head Covering section for additional information)

Protective Clothing - Humans are thermally sensitive creatures, and as such, must pay close attention to the temperatures in which they work. The most common types of cold injuries include hypothermia, a dangerous lowering of the body's temperature, and frostbite. To prevent hypothermia and frostbite, persons must be aware of the body as a heat source and the importance of clothing and insulation. A critical element in regulating heat loss is the type of fabric one chooses to wear. The insulating and ventilating properties of a given fabric or fill will determine how well one can moderate body temperature under certain conditions. The

following is a list of recommended personal clothing for use by persons involved in winter sampling activities:

1. Outer Shell/Mustang Suit™ - Outer layer of clothing which is capable of affording protection from wind, rain, and cold. Should be large enough to fit comfortably over insulating layers of clothing. A Mustang Suit, in addition to providing a warm outer shell, provides flotation and insulation from cold water immersion. Mustang apparel provides a barrier to the cold water outside the garment and allows your body to heat the water that's inside, thereby increasing cold water survival time.

2. Boots - Must be of the steel toe type for those working on deck. Should be insulated or capable of affording room for insulated socks. Should be waterproof and slip resistant.

3. Head Covering - Probably one of the most important items in protective clothing for cold work environments. With the brain receiving 20 percent of the body's blood supply, and 50 percent of our body heat is lost through our head, the conservation of heat in the head will mean that our bodies will have more heat available to heat our hands and feet. Wool is the recommended fabric since wool fibers provide insulation while remaining "breathable" and are capable of wicking moisture away from the body. Thus making it possible for wool to provide warm insulation even when wet. Keep in mind that the hat must be capable of being worn under a hard hat. There are hats available which are specifically designed to be worn with hard hats.

4. Gloves - Warm water resistant gloves or those gloves capable of providing warmth when wet (polypropylene, wool) should be used to protect the hands from exposure. If required to perform fine work with fingers, one may want to consider using a two layer system when choosing gloves. This will provide optimum warmth when needed, with the ability to remove the outer layer when it is necessary to perform fine work. If liners are used (inner glove) they should be of a fabric capable of wicking moisture away from the skin. Polypropylene or wool are examples of this type of fabric.

5. Thermal Underwear - Clothing designed to be worn against the skin is a crucial part of cold weather clothing. Cotton fabrics are not recommended for cold and wet environments because of its' loss of warming properties when wet and its inability to wick moisture away from the skin. Thermal underwear constructed of polypropylene

fibers provide good insulating values in a maritime environment. Polypropylene reduces heat stress and increases comfort and warmth by wicking moisture away from the body.

6. Socks - Warm socks made of polypropylene or wool are recommended. Make sure to have sufficient supply in the event they become wet.

OPERATION LIMITATIONS

Icing - The effects of icing on a vessel is a reduction in stability due to an increase in displacement and a rise in vertical center of gravity. In addition, a heeling movement may also develop due to an off-center accumulation of ice. Ship operators must be aware of the dependency of ice accumulation on the vessel heading. The need for the ship operator to make good a specific course can greatly influence the symmetry or asymmetry of ice accumulation.

When a vessel operates in areas where icing conditions are present, the operator must be aware that icing increases with the amount of time spent in icing conditions. **Attachment 1** contains basic graphs which can be used to provide the operator with a means of estimating the likelihood of ice accumulation on the vessel. Generally, any time the air temperature is below 28^{0}F, icing can occur. Wind speed, vessel heading and air temperature must all be considered when calculating expected icing conditions.

Safe operations as well as personal safety can be greatly increased by establishing operational limitations based on weather conditions. Staying abreast of current conditions and developing conditions is the responsibility of the Shipmaster. Maximum operating conditions are discretionary and final determinations should be made with consultation of the USEPA Chief Scientist and the Shipmaster, with the Shipmaster having final authority.

DECK EQUIPMENT

During icing conditions, all deck equipment should be covered and secured. Derricks, booms and like items should be stowed in the lowered position.

HEALTH AND SAFETY

Restricted Areas - There are a multitude of hazards which can occur in heavy weather. Persons involved in winter work who are exposed to weather must be aware of the potential hazards and safety requirements associated with work activities. To minimize the potential hazards associated with winter work

activities, several areas on board the vessel have been designated as restricted areas. Weather decks subjected to seas are off limits unless permission has been granted from the Captain, and when applicable, in conjunction with the Health and Safety Officer. Such areas include, but are not limited to, the following:

1. Top of Pilot House

2. Mast

3. Rosette Work Platform

4. The O2 Deck

5. O1 Deck

6. Starboard & Port Weather Decks

7. Stern

Movement throughout the vessel should be limited to the interior whenever possible.

Buddy System - When involved in activities on deck, all persons will comply with the buddy system. The buddy should be capable of providing his or her partner with assistance, observe his or her partner for signs and symptoms of exposure, periodically check the integrity of his or her partners protective clothing, notify the bridge or others in the event of an emergency or need of assistance. The Buddy System alone may not be sufficient to ensure that help will be provided in an emergency. Therefore, persons on deck must be in line-sight or establish radio communication (or equivalent) with the Bridge at all times.

Hypothermia - As mentioned earlier in this document, hypothermia and frostbite are the most common cold injuries to humans. There are great individual differences in the body's ability to produce and conserve heat. When a body's loss of heat exceeds the ability to produce it, and the conditions persist over time, hypothermia results. To prevent hypothermia, it is important that the body be provided with the energy needed to produce heat. Energy is provided by food and drink. If you are cold, eat. Drink when you need to drink. Fatigue is a real danger. If cold, take steps to correct the problem. However, if a person has failed to prevent hypothermia, it is important that everyone involved in sampling activities be capable of recognizing the signs and symptoms of exposure. Early recognition is extremely important. The victim will often not realize nor admit they are experiencing the signs and symptoms of hypothermia.

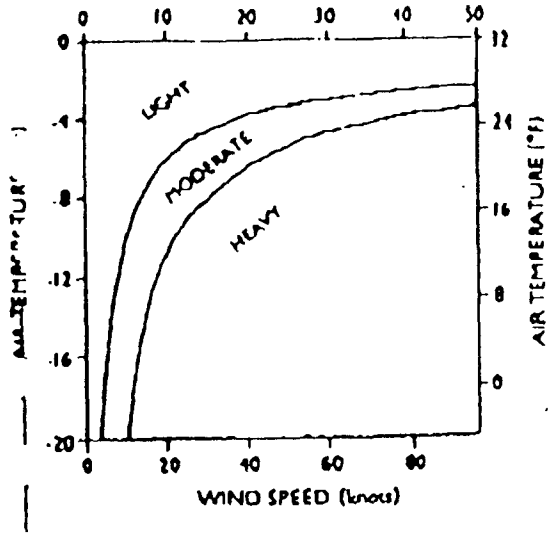
Some of the symptoms include slurred or slowed speech, incoherence, failing memory, stumbling, and drowsiness. All individuals involved in winter work activities must receive training in regards to hypothermia (and frostbite). **Attachment 2**, which can be used as a training guideline, contains information which includes: the definition of hypothermia (and frostbite) and associated risk factors, signs and symptoms of exposure, and prehospital treatment procedures for exposed victims.

Communication - Persons working on deck must remain in constant communication with the Bridge. Communication can be established by means of a two way radio or, when applicable, the ship's PA system maybe utilized.

When operating in icing conditions, a regular radio watch with shore and other vessels must be established and maintained by the ship's operator throughout the icing event.

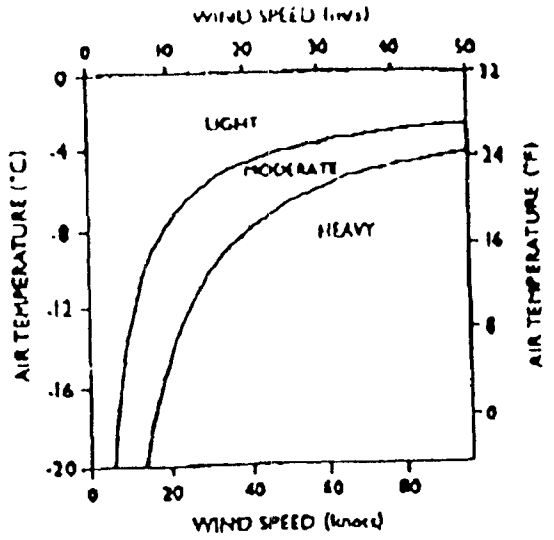
Water Tight Doors - During an icing event, all watertight doors, manholes and hatch covers must be battened down.

Attachment I



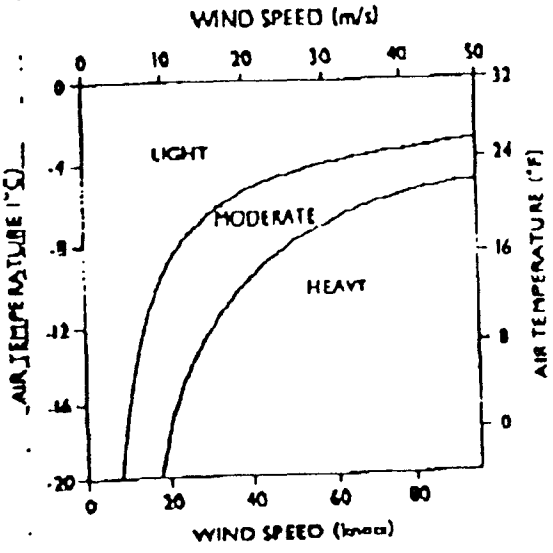
ng conditions for vessels heading into or abeam of
the wind for water temperatures of +1°C (34°F)

ht Icing - Less than 0.7cm/hr (0.3in/hr)
oderate Icing - 0.7 cm/hr (0.3in/hr) to 2.0 cm/hr (0.8in/hr)
Heavy Icing - Greater than 2.0cm/hr (0.8in/hr)



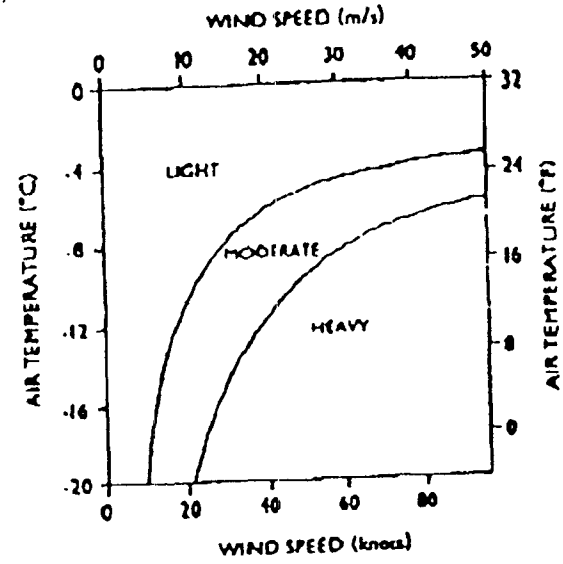
Icing conditions for vessels heading into or abeam of
the wind for water temperatures of +3°C (37°F)

Light Icing - Less than 0.7cm/hr (0.3in/hr)
Moderate Icing - 0.7cm/hr (0.3in/hr) to 2.0 cm/hr (0.8in/hr)
Heavy Icing - Greater than 2.0cm/hr (0.8in/hr)



Icing conditions for vessels heading into or abeam of
the wind for water temperatures of +5°C (41°F)

Light Icing - Less than 0.7cm/hr (0.3in/hr)
Moderate Icing - 0.7cm/hr (0.3in/hr) to 2.0 cm/hr (0.8in/hr)
Heavy Icing - Greater than 2.0cm/hr (0.8in/hr)



Icing conditions for vessels heading into or abeam of
the wind for water temperatures of +7°C (45°F)

Light Icing - Less than 0.7cm/hr (0.3in/hr)
Moderate Icing - 0.7cm/hr (0.3in/hr) to 2.0 cm/hr (0.8in/hr)
Heavy Icing - Greater than 2.0cm/hr (0.8in/hr)

Figure 1-25 EXPECTED ICING RATES

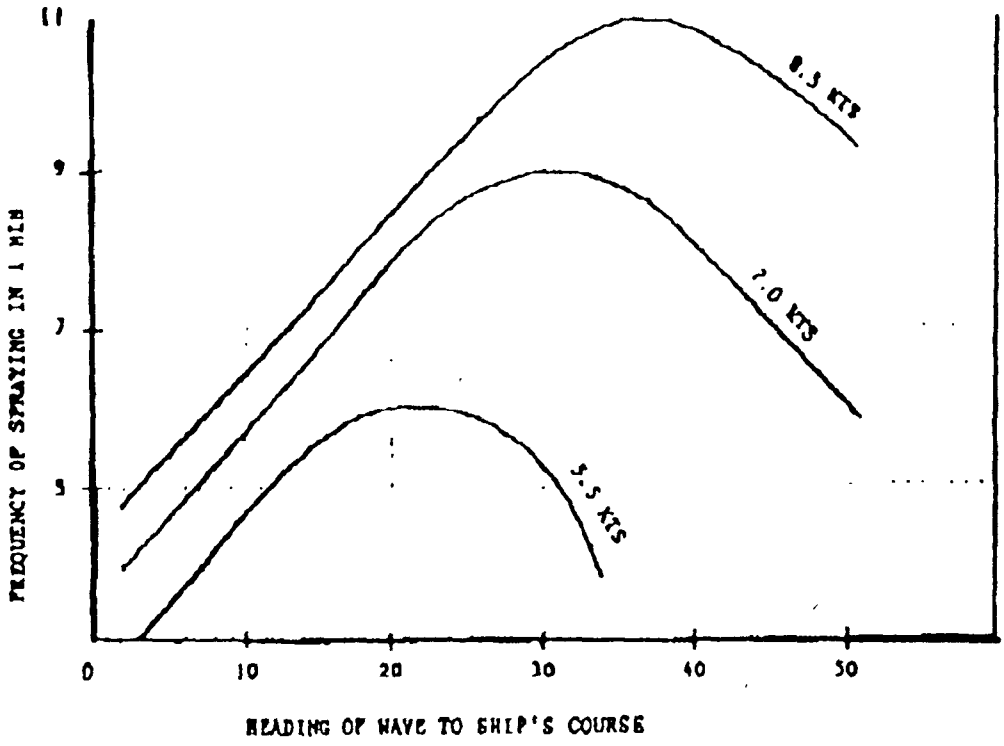
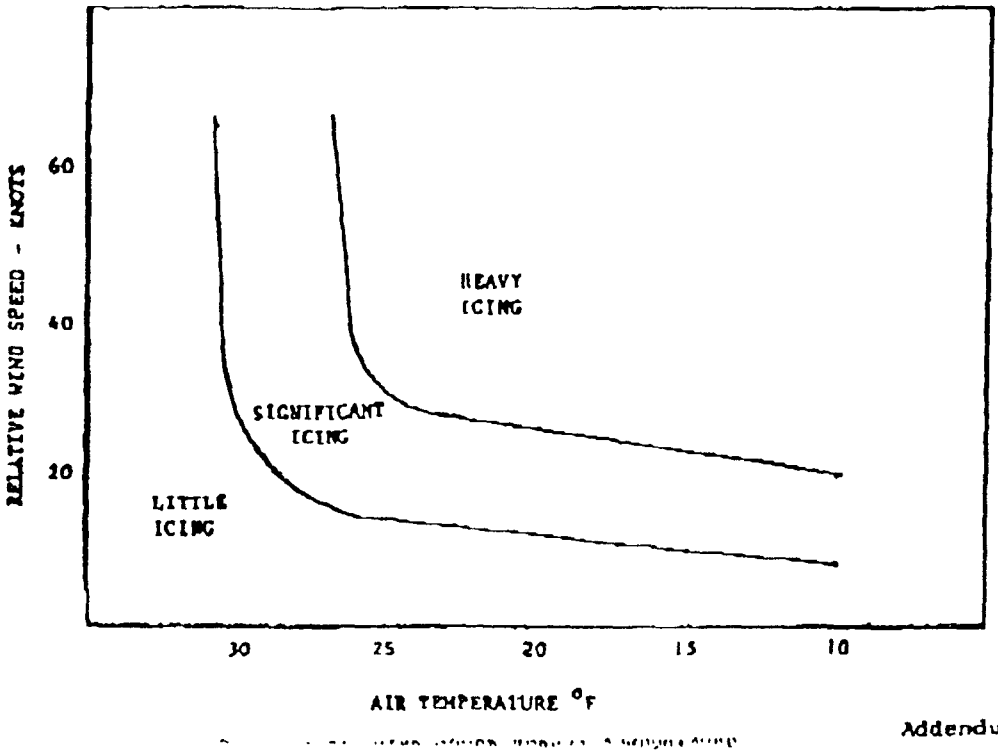


Figure 1-23 AMOUNT OF SPRAYING VERSUS HEADING OF SHIP TO WAVE



Attachment II

Hypothermia

Hypothermia is defined as a spontaneous drop in core body temperature below 95°F (35°C). Hypothermia can occur at air temperatures up to 18.3°C (65°F) or in water up to 22.2°C (72°F). All people, including those in excellent physical condition, can become hypothermic given the necessary environmental conditions and exposure duration. Heat loss is increased greatly by low environmental temperatures, low relative humidity, and high winds. Inappropriately light or porous clothing allows body heat to escape. Also, clothing made damp by rain or perspiration loses much of its insulating properties and allows further heat loss.

Immersion Hypothermia. Because of the very high thermoconductivity of water (25 times that of air), the body loses heat rapidly when submerged, however, patients with submersion times of up to 40 minutes have been successfully resuscitated with no subsequent neurologic impairment.

Risk Factors. Risk factors for hypothermia include: alcohol or drug intoxication, receiving medications such as barbiturates, phenothiazine, general anesthetics, reserpine, tricyclic antidepressants. Some medical conditions may also be predisposing factors such as adrenal insufficiency, diabetes, neurologic, cardiovascular disease with diminished cardiac output, acute or pre-existing skin conditions.

Signs and Symptoms

Mild Hypothermia

In mild hypothermia the core temperature is 32° to 35°C or 90° to 95°F.

1. Skin - The skin is often cool to the touch.

2. Neurologic - Some mildly hypothermic patients are asymptomatic. Otherwise, neurologic findings include ataxia, slow gait, incoordination, and dysarthria. Confusion and apathy may be apparent. Deep tendon reflexes are usually normal or hyperactive. Pupillary reactions are normal.

3. Cardiovascular - Most patients with mild hypothermia have no significant cardiovascular abnormalities. Decreased or increased heart rate, hypotension, and hypertension have variously been reported.

4. Pulmonary - Respiratory rate is generally normal or slightly decreased.

5. Musculosketal - Generalized weakness and fatigue are common complaints. Shivering is usually present.

Severe Hypothermia

In severe hypothermia the core temperature is below 32°C, 90°F.

1. Skin - The skin feels cold to the touch and bluish. Edema may be present. Signs of frostbite may develop if the patient was exposed to subfreezing temperatures.

2. Neurologic - Severely hypothermic patients always manifest altered levels of consciousness, progressing from lethargy and stupor (32° to 27°C) to frank coma (<27°C). Inappropriate and dangerous behavior, such as paradoxical undressing, may occur.

   Confusion and hallucinations may be present, making the patient difficult to manage. Pupils become dilated at 29°C (84°F). Deep tendon reflexes diminish between 30°C and 20°C (86°F and 68°F). Deep tendon reflexes, voluntary motion, and response to pain are absent at core temperatures below 26°C (79°F). Corneal reflexes are retained the longest and do not disappear until the body reaches 23°C (73°F).

3. Cardiovascular - Decreased blood pressure and heart rate are common at temperature below 32°C (90°F). At very low temperatures (<26°C or 79°C) pulse and blood pressure recordings may be unobtainable.

   Cardiac dysrhythmias become major considerations at temperatures below 30C° (86°F). Atrial fibrillation and flutter are fairly common. Premature ventricular contractions (PVC's) are also seen. Spontaneous ventricular fibrillation is possible at core temperatures below 30°C but becomes more likely as temperatures reach 28°C (82°F). Ventricular fibrillation and asystole are very likely to occur as the temperature reaches 22°C (72°F).

4. Pulmonary - Respiratory rate decreases at core temperatures below 32°C (90°F). Bronchial secretions are increased in response to the cold, potentially leading to bronchopneumonia and further respiratory impairment.

5. Musculoskeletal - Severe hypothermia is characterized by marked weakness, fatigue, limitation of movement, and sometimes frank rigidity. Shivering is usually absent at core temperatures below 32°C.

   In addition to cardiac complications, other important potential metabolic complications include aspiration pneumonia, pancreatitis, decreased renal function, metabolic acidosis, respiratory acidosis, hyperglycemia, hypoglycemia, electrolyte disturbances, and rarely disseminated intravascular coagulation.

Treatment

If hypothermia is suspected, the patient's temperature should be taken with a low range rectal thermometer or probe; capable of measuring temperatures as low as 28°C. In most instances, use of a low-reading rectal probe (laboratory thermometer or commercially available hypothermic thermometer) is recommended.

Prehospital

Prehospital management of the hypothermic patient consists of four parts: (1) basic and advance life support; (2) prevention of further heat loss; (3) stabilization of associated injuries; and (4) rapid transport to the hospital.

I. Basic and Advanced Life Support

Gentle Handling. Rough, jerky movements and other stimulation may precipitate ventricular fibrillation in the severely hypothermic patient. Therefore, transfers, movements, and procedures undertaken at all levels of patient care should be done as smoothly and gently as possible.

Airway. Establish an adequate airway. Indications for endotracheal intubation include apnea, severe hypoventilation (<6 breaths/min), and inability of the patient to protect the airway from vomitus, blood, and secretions. Because intubation may precipitate ventricular fibrillation in the severely hypothermic patient, it should be done as gently and atraumatically as possible, preferably by the most experienced person. Esophageal obturator airway (EOA) is an acceptable, though far less desirable, alternative to the endotracheal tube for the apneic patient.

Conscious patients with good airway reflexes do not require intubation; however, they still may need frequent suctioning of secretions. As in all patients with associated known or suspected trauma, airway control should be accomplished without manipulation of the cervical spine.

Fluid Therapy. Volume depletion is often present in the hypothermic patient. Although usually secondary to plasma volume depletion from cold diuresis, hypovolemia may also be the result of blood loss from associated trauma.

An intravenous line should be established in the hypothermic patient for both drug and fluid administration. Hypotensive (<90mm Hg systolic) patients should receive a 300 ml (5 ml/kg) bolus of isotonic saline (0.9% NaCl) or D5-0.9% NaCl. Patients with persistent hypotension and evidence of blood loss should receive continuous rapid volume infusion.

Cardiac Monitoring and Treatment of Dysrhythmia. Because hypothermic patients are extremely prone to dysrhythmia, a cardiac monitor should be attached as soon as possible. Benign dysrhythmias (atrial fibrillation and flutter, premature atrial and ventricular contractions, sinus bradycardia, and sinus tachycardia) are usually corrected with rewarming and, therefore, do not require treatment in the field. Dysrhythmias that result in severely reduced or absent cardiac output (ventricular tachycardia, ventricular fibrillation, complete heart block, and asystole) require immediate attention. Cardiopulmonary resuscitation (CPR) should be started immediately on the unconscious, apneic patient who has no pulse or measurable blood pressure. Standard pharmacologic and countershock therapy may be initiated with some notable modifications:

1. Bradycardia associated with severe hypothermia is usually physiologic and therefore requires no treatment other than rewarming. Atropine, is usually ineffective. Isoproterenol, may be arrhythmogenic in the hypothermic patient, and may cause a fall in blood pressure and promote heat loss.

2. PVC's should be watched closely but generally do not require treatment.

3. Ventricular fibrillation secondary to hypothermia usually occurs at core temperatures below 30°C (86°F). Treatment consists of immediate countershock at 200 to 300 joules, followed by a second countershock, should the first be unsuccessful. CPR is started if effective cardiac output is not re-established. Medications for the treatment of ventricular fibrillation include: Lidocaine HCl, 1 mg/kg bolus, repeat with 0.5 mg/kg after 10 minutes; begin IV drip at 1 to 4 mg/min; bretylium tosylate, 5 to 10 mg/kg bolus; epinephrine, .01 mg/kg bolus; and sodium bicarbonate, 1 mEq/kg bolus.

   Hypothermic patients in cardiac arrest may respond to pharmacologic and countershock therapy, but it is more likely that they will not! The patient with a hypothermic myocardium is relatively refractory to drugs and countershock, and requires rewarming before these interventions become effective. Treating the hypothermic cardiac arrest victim with multiple drug doses and countershock is discouraged. Rather, the major emphasis should be on rapid rewarming.

4. Cardiopulmonary resuscitation in the hypothermic cardiac arrest victim should be started as soon as possible and continued as long as necessary. Because of the reduction in cerebral oxygen

requirements, severely hypothermic patients (particularly children) can survive several hours of resuscitation and remain neurologically intact. Under no circumstances should resuscitation be discontinued in the field; rewarming to at least 32°C (90°F) must be done at the hospital before discontinuing resuscitation.

5. Other medications that can be administered are thiamine and D50W, and naloxone. Thiamine and D50W are given because many hypothermic patients are also hypoglycemic; 50 ml of 50% dextrose (D50W) may given intravenously to those patients with altered levels of consciousness. A blood sample should be obtained prior to administration of the dextrose so that laboratory confirmation of hypoglycemia may be made later. Dextrose given to the alcoholic hypoglycemic patient rarely precipitates Wernicke's syndrome. It is prevented by giving a dose of thiamine, 100 mg IV, before giving the dextrose. Patients with altered levels of consciousness in whom you suspect narcotic use may receive naloxone. The dose is 0.8 mg (2 ampules) for adults and 0.4 mg (1 ampule) for children; both administered intervenously.

II. Prevention of Further Heat Loss

The prehospital provider should take measures to ensure that the hypothermic patient does not become more hypothermic in transit. This precaution is distinct from actual rewarming, which is not a primary goal during prehospital care. In fact, many investigators recommend keeping the patient cool during transport.

The activity level of the patient is kept to a minimum. Wet clothing should be removed and replaced with dry clothes and blankets. Areas of the body that lose large amounts of heat, such as the head, neck, and trunk, especially, should be covered. Sips of warm fluids may be given by mouth, but only to the awake, alert patient. Alcoholic beverages are absolutely contraindicated.

The only active rewarming method recommended for field use is warm humidified oxygen. Oxygen heated to 40 to 45°C (104 to 113°F) and administered to the patient via face mask or endotracheal tube supplies a small amount of core heat to the respiratory tree. It also reduces heat lost through ventilation. Although not widely available, a portable device for heating oxygen in the filed has been described by Lloyd. Soda lime and water are the heat sources.

III. Stabilization of Associated Injuries

Appropriate immobilization of the cervical spine is mandatory for patients with known or suspected head and neck trauma and who have altered levels of consciousness. Near-drowning victims often have preceding head and neck trauma resulting in unconsciousness, paralysis, aspiration, and hypothermia.

Immobilization of the cervical spine is best accomplished using a backboard, a rigid cervical collar, and sandbags.

Splinting of injured extremities may be done in the field if the patient is stable and if the time permits. Frostbitten areas should be padded and then loosely wrapped to protect them from further injury. Thawing of frostbitten areas generally should not be attempted prior to arrival at the hospital!

IV. Rapid Transport to the Hospital

The definitive treatment for the hypothermic patient is rewarming. Because it usually cannot be done safely in the field, efforts should be made to transport the patient to the hospital as rapidly as possible.

Hypothermic patients in cardiac arrest should receive no more than one course of drugs and two courses of countershock therapy in the field. Prolonged prehospital resuscitation are generally futile and sometimes detrimental. With CPR in progress, patients should be transported to the hospital, preferably one where cardiopulmonary bypass procedures can be performed if needed. The hospital should be notified prior to arrival so that he "pump team" and equipment can be readied.

Rewarming Techniques

Definitive therapy for most cases of hypothermia involves rewarming the body to near normal temperature. Rewarming techniques include passive external, active external, and active core rewarming.

Passive External Rewarming. This method allows patients to rewarm themselves without the application of external or internal heat sources. Passive external rewarming, although rather slow, is safe and effective for most hemodynamically stable patients with mild hypothermia.

By combining the effects of reduced heat loss and endogenous heat gain, core temperature should increase at a rate of approximately 1°C/hr using passive external rewarming. The following procedures are recommended: (1) remove the patient's cold or wet clothing and dry the skin with towels; (2) place the patient in a warm room, away from wind and drafts; and (3) cover the patient with blankets or other insulating material.

Active External Rewarming. Rewarming the patient by applying a heat source to the body surface is an old, albeit controversial, technique. Although it is a rapid method of rewarming, many clinicians recommend against its u se because of potential hypotension from active external rewarming, known as "rewarming shock" and possible ventricular fibrillation.

Still, there are proponents of active external rewarming techniques. they recommend these methods primarily for patients with hypothermia of short-term duration (e.g., exposure, immersion) whose cardiovascular systems can tolerate the added stress. Also, patients undergoing active rewarming must be closely monitored for dysrhythmias and hypotension and have adequate intravenous access established for fluid replacement in the event that hypotension occurs.

The following are active external rewarming techniques:

1. Heated blanket, hyperthermic mattresses
2. Hot water bottles placed at areas of rapid heat exchange (e.g., neck, flanks, axillae, and groin)
3. Immersion in warm water bath (40°C, 104°F). Active external rewarming is not recommended in the field!

Prevention

Cold injuries can best be prevented by wearing warm, lose, dry clothing (designed to resist wind and rain) in multiple layers on the head, body, and extremities to prevent heat loss. One should keep dry at all costs; materials lose insulation properties when wet. Wet garments should be replaced as soon as possible with dry one, and constrictive garments should not be worn.

Jobs should be designed so that workers remain relatively active when exposed to cold environments and provided with dry, wind-protected, heated shelters for tasks involving stationary work positions.

Workers exposed to the cold should be physically fit, without underlying vascular, metabolic, or neurologic diseases that place them at increased risk for hypothermia. They should be cautioned to avoid smoking and drug or alcohol use. New workers should be introduced into the work schedule slowly and instructed in the use of protective clothing, recognition of impending frostbite and early signs and symptoms of hypothermia, proper warming procedures, and first-aid treatment.

Frostbite

Frostbite is caused by exposure to temperatures below freezing, causing ice crystal to form in tissues. A combination of high winds and cold is much more dangerous than cold alone.

Predisposing Factors:

- Subfreezing temperature 20°F (-7°C)
- Wind-chill factor
- Alcohol and drug intoxication
- Underlying illness; diabetes, peripheral vascular disease
- High altitude
- Conduction injury (e.g., frozen metal object)
- Fatigue
- Previous history of frostbite injury
- Tocacco use

Signs and Symptoms

Frostbite occurs most often on distal and exposed body parts. Fingers, toes, cheeks, nose, and ears are common sites. In mild cases with superficial freezing(frostnip) pain, pricking, itching sensation and numbness will occur without complete loss of sensation.

In more severe deep frostbite skin is white, feels firms, edematous, immobile, no sensation or pain.

Treatment

Rapid thawing of the frozen body part by immersion in warm water is the treatment of choice, methods that are contraindicated are hot-or-cold water immersion, and rubbing the frozen body part with ice or snow.

In the Field

Rewarming may be attempted for frostnip. Immersion in warm water (temperatures of 38 to 43°C or 100 to 110°F) is the preferred method. An alternative method is direct contact with one's own skin or with a companion's skin.

In cases of severe frostbite, hospitalization is recommended. Extremities can be rewarmed by removing wet gloves, socks and shoes; drying the extremities and covering them again with dry clothing; and either elevating them or placing them next to a warmer part of the body (e.g., placing the hands in the armpits). Caution: Rewarming should not be attempted if refreezing is likely prior to definitive therapy.

Rewarming of the frostbitten parts of the body can be accomplished by placing them in water heated to 40 to 42°C and leaving them there until thawing is complete but no longer (often 30 minutes). Dry heat is not recommended. Frostbitten parts should not be exercised, rubbed, or exposed to pressure. Dressings and bandages should not be applied. Great care should be taken to avoid any trauma to the extremity during and after thawing. For example, the extremity should not touch the sides or bottom of the rewarming container. Gentle manual or mechanical circulation of the water helps the thaw to be more uniform.

The goal of field management is to protect the frostbitten area from further injury followed by rapid evacuation to a medical facility.

Attachment III

My signature at the bottom of the second page indicates my understanding and concurrence with the following requirements.

RELEASE

In consideration for being allowed to board the Research Vessel Lake Guardian on this ___day of_____, 19__, I agree that, while on board the vessel, I will follow all safety instructions and emergency procedures which I have been given and those which I will be given; and I, on behalf of myself, my personal representatives, assigns, heirs, and next of kin, hereby release and discharge and covenant not to sue the United States, its agents and its employees (hereinafter referred to as "releasees") with respect to any liability to me, my personal representatives, assigns, heirs, and next of kin, relating to any injury, loss, or damage incurred by me while on board the Lake Guardian, whether caused by the negligence of the Releasees or by other causes.

I represent that I have been given comprehensive instructions on safety and on emergency procedures, and have been informed that I will be restricted from entering hazardous areas of the vessel. I understand that my safety will depend upon my following all such instructions and restrictions while on board the vessel. I understand further that, because of the potential for having to don floatation gear in the event of an emergency, all persons who board the vessel must be at least nineteen years of age and in good physical condition.

INFORMED CONSENT ADDENDUM

The R/V Lake Guardian sustained collision damage November 26, 1994, consisting of a six inch split in the hull plates at the bow of the vessel, which punctured the forepeak tank, approximately two and a half feet above the water line. This damage has been inspected by the EPA safety Manager, the U.S. Coast Guard, and the American Bureau of Shipping. Repairs, consisting of removing the split steel plate and welding a replacement steel plate in place of the split, have been made. the forepeak tank is water tight and the vessel has been certified as seaworthy.

WINTER OPERATIONS ADDENDUM

Persons boarding the vessel during winter operations (November through March) should be aware of the possibility of below freezing air temperatures, strong winds and icy decks, and should bring adequate protective clothing to prevent frost bite while working outdoors.

Safety rules will be amended to take consideration of hypothermia due to 0°-3° lake water temperature, deck and superstructure icing conditions, or the approach of ice fields. Survey activity will be aborted in favor of safe ship operations. Schedules may be interrupted for several days due to weather.

Violation of safety rules will result in the offender being put ashore at the first port of opportunity.

ACKNOWLEDGEMENT OF RECEIPT OF SAFETY INSTRUCTIONS

I represent that, prior to boarding the Research Vessel Lake Guardian, I was given comprehensive instructions on safety and on emergency procedures, and was informed that I will be restricted from entering hazardous areas of the vessel. I understand that my safety will depend upon my following all such instructions and restrictions while on board the vessel. I understand further that, because of the potential for having to don floatation gear in the event of an emergency, all persons who board the vessel must be at least nineteen years of age and in good physical condition.

In consideration for being allowed to board the Research Vessel Lake Guardian on this ____day of _____, 19__, I agree that, while on board the vessel, I will follow all safety instructions and emergency procedures which I have been given and those which I will be given.

_____

First, Middle, Last Name

STANDARD OPERATING PROCEDURE (NO. 6-REVISED)
FUELING TRANSFER PROCEDURE

1.0 SCOPE

This procedure shall be followed each time a transfer of fuel oil takes place.

2.0 REFERENCES

Code of Federal Regulations Titles 33 & 46

3.0 RESPONSIBILITY AND AUTHORITY

The ship's Chief Engineer, acting under the authority of the Master, shall be responsible for performance of the procedures described here-in.

4.0 EQUIPMENT REQUIRED

Included in procedure.

5.0 PROCEDURE

5.1 Ship To Shore Transfer Procedures

1. There will be no visitors, smoking, fires, open flames, open lights, no grinding and no burning or welding while fuel is being transferred . A sign will be posted and an announcement will be made over the vessel's intercom system to inform personnel.

2. All power tools and other equipment that could spark, i.e. drills, saws, etc., will be secured.

3. Before transferring fuel oil.

a. Check gaskets in all fittings and replace those suspected to be damaged.
b Check the fittings themselves to insure they are not cracked or stripped.
c Examine all hoses and make sure they are in good working order. Look for tears, frays, kinks or other weak spots that might cause the hose to burst or leak.
d Display the "Bravo" flag by day, or an all around red light by night.
e Place oil soak pads and 5 gallon buckets by all fittings. Plug containment bins. Be prepared to transfer containment bin contents to a suitable container for disposal, should a leak occur.
f. All "cam lock" fittings must be securely closed with all tabs fully engaged. Wire tabs in place to prevent accidental openings.
g Check all mooring lines to make sure they are secure.

h. Sound all tanks using water paste. Log the soundings and the draft of the vessel prior to and after the transfer.

i. Establish good communications with the pumping station via VHF radios.

j When ever possible, the hoses should be air tested by the shore station as to the integrity of the seals.

k. Ensure that all involved personnel are at their appropriate stations. Chief engineer will man the fuel transfer manifold in the engine room. The assistant engineer and marine electrician will be positioned at the port and stbd sounding wells. One seaman will stand by the transfer connection and one will standby in the pilot house. All of the above people will have radios and will be in communication with the Chief in the engine room

l. The appropriate amount of Drew Chemical Amerstat 10 Fuel Oil Treatment should added to the fuel tanks prior to transfer. A maintenance dose of 13 oz per 1000 gal of fuel added via the sounding tubes will suffice.

m. If loading by tanker truck, make sure they have permission from the USCG Captain of the Port to transfer fuel at that specific location.

4. When the above procedures have been completed, and all necessary valves have been opened (see number 6 of this section), transfer may commence. During the pumping process, persons will not leave their station unless relief is approved by the Chief. Persons should be on the look out for people in violation of the open flame restriction. Have soundings made as often as needed. As the tanks approach 80% capacity, slow transfer and stop at 90%.

Note: In accordance with 33 CFR 156.150, whenever oil or hazardous materials are transferred to or from a vessel, a declaration of inspection form must be filled out and signed prior to the transfer procedure This form must be maintained on board for a period of one month.

5. Upon the completion of the transfer, ensure that all valves used during the transfer are properly closed. It is the responsibility of the Chief Engineer to double check that these valves are indeed closed. Whenever possible the hoses should be blown down or sucked back to prevent any spillage during disconnect

6. The following procedure shall be used for opening and closing valves:
Note: The following assumes that all valves are closed prior to transfer.

a. Open fuel oil filling valve.
b. Open manifold filling valve.
c. Open both port and stbd filling valves for which ever tanks are to be filled first (1's, 2's or 3's).
d. Open deck valve.
e To secure, close in reverse order.

Never close both port and stbd fill valves when fuel oil is pumping. Hose blow out could occur Always open the next tank before closing the previous tank

5.2 Tank to Tank Transfer Procedure

5.2.1 Any time fuel oil is transferred between two storage tanks (excluding the day tanks), the following procedures will be followed:

1. The Chief Engineer will be in the engine room controlling the manifold valves. Two Engineers will be responsible for sounding the tanks which are being transferred.

2. All personnel will be in communication via radios.

3 All spill precautions from the fueling SOP stated above will be followed.

5.2.2 When fuel is transferred to the day tanks, the following procedure will be followed.

1 The Chief Engineer, or his designee, will be responsible for the transfer of fuel oil to the Day Tanks. No other persons are needed.

2. At no time during transfer procedures shall transfer personnel engage in any other activities Additionally, at no time should level indicator alarms be disconnected/silenced

3. Fuel will be pumped from the storage tanks to the day tanks vis the transfer pumps The fuel will pass through a pre-filter and a water separator, then through a fuel oil meter, and finally into the day tanks.

4 A constant watch of the tank level indicator for the day tank will be made. At no time should the level go above 10. .

5 When transfer is complete, the valves should be returned to their closed position

6.0 DISCHARGE CLEAN-UP

In the unfortunate event that oil or hazardous material from any sources is discharge into the water or upon the adjoining areas during transfer procedures, transfer shall immediately stopped. No person may resume transfer operations until the discharge is stopped, contained and the area has been cleaned up

7.0 PROCEDURES FOR REPORTING OIL SPILLS

The Federal Water Pollution Control Act prohibits the discharge of oil or oily waste into or upon the navigable waters of the United States or the waters of the contiguous zone if such discharge causes a film or sheen upon or a discoloration of the surface of the water or causes a sludge or emulsion beneath the surface of the water. The law requires that all discharges be reported to the US. Coast Guard. Fines for non-compliance with the law can result in civil and criminal penalties.

8.0 VESSEL SCHEMATIC

Attached is a schematic diagram of the R/V Lake Guardian's fuel oil piping system.

9.0 PRODUCT LISTINGS

Number 2 Marine Diesel Fuel Oil
Drew Chemical Amerstat 10 Fuel Oil Treatment

DESCRIPTION OF FUEL OIL TRANSFER SYSTEM

FUEL OIL FROM ANY TANK CAN BE TRANSFERRED TO SHORE AND VICE VERSA THROUGH THE FUEL OIL MANIFOLD TO THE FILL/DISCHARGE CONNECTIONS LOCATED AT FR 64 ON MAIN DECK STBD AND FR 67 ON MAIN DECK PORT SIDE. THE FUEL TRANSFER PUMP LOCATED IN THE ENGINE ROOM STBD SIDE IS USED TO TRANSFER FUEL. A STANDBY FUEL OIL TRANSFER PUMP IS ALSO PROVIDED. OIL SPILL CONTAINERS ARE INSTALLED UNDER THE FILL/DISCH. CONNECTIONS AND ALL FUEL TANK VENTS (OVERFLOWS) TO COLLECT ANY SPILLS OR OVERFLOWS FROM THE FUEL TANKS DURING FUELING OR DEFUELING OPERATIONS. IN CASE OF SPILLS INTO THESE CONTAINERS THE OIL IS REMOVED BY MANUAL MEANS AND EMPTIED INTO THE DIRTY OIL TANK. - LOCATED PORT SIDE FR 70-74 IN THE INNER BOTTOM IN THE ENGINE ROOM.

LOCATIONS OF TANK OVERFLOWS AND OIL SPILL CONTAINERS ARE AS FOLLOWS:

FR 52-53 STBD SIDE MAIN DECK--------NO. 1 & 2 FUEL OIL TANKS

FR 57 STBD SIDE MAIN DECK----------NO 3 FUEL OIL TANK

FR 60 STBD SIDE MAIN DECK----------STBD FUEL OIL DAY TANK

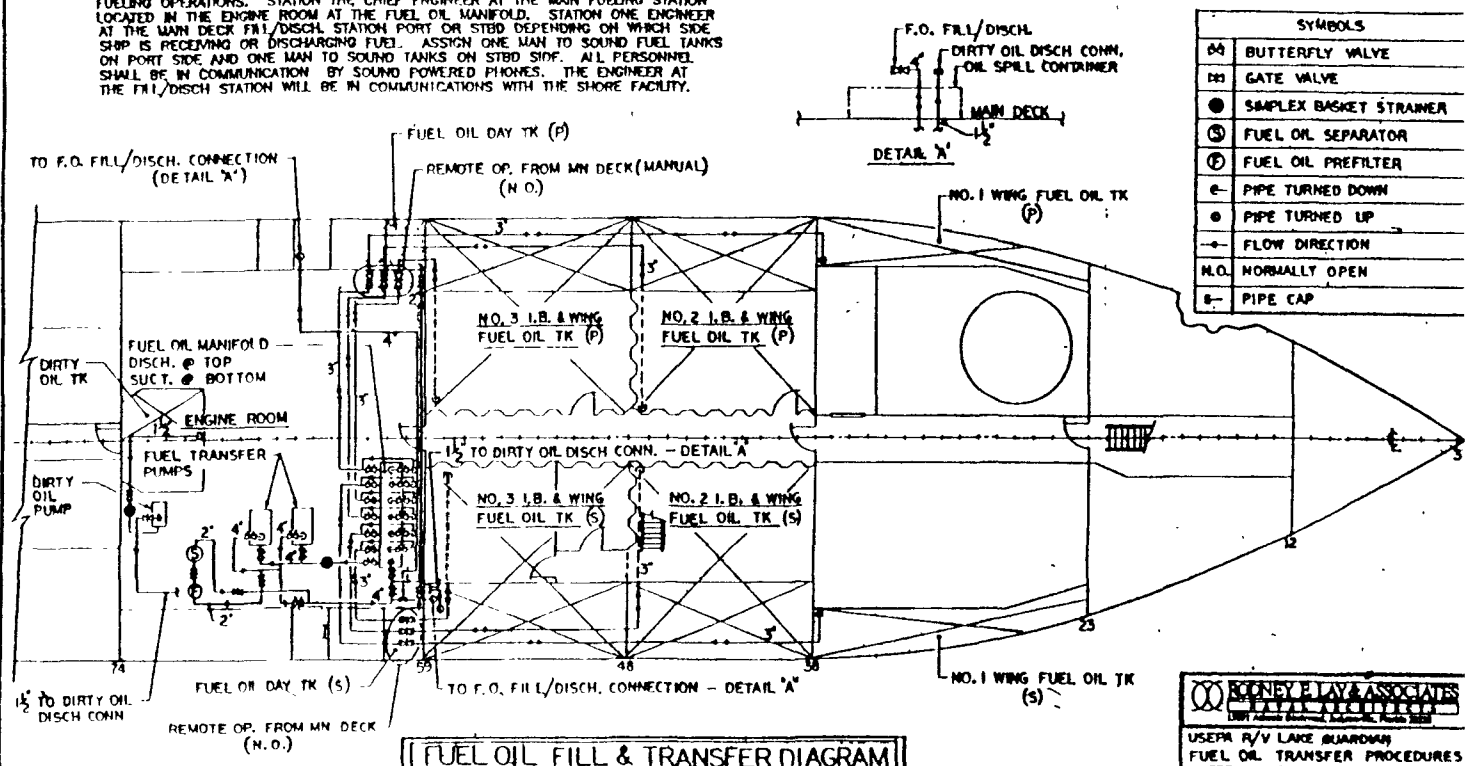
FR 84-88 PORT SIDE MAIN DECK-------NO. 1,2 & 3 FUEL OIL TANK AND PORT FUEL OIL DAY TANK

FUEL OIL TRANSFER PROCEDURE

NOTE: BEFORE FUELING OPERATIONS BEGIN, SECURE THE VESSEL TO THE DOCK OR OTHER VESSEL WITH BOW, STERN AND SPRING LINES TO PREVENT SHIFTING DURING FUELING.

1. THE MASTER OR A DESIGNATED OFFICER SHALL BE IN THE PILOT HOUSE DURING FUELING OPERATIONS. STATION THE CHIEF ENGINEER AT THE MAIN FUELING STATION LOCATED IN THE ENGINE ROOM AT THE FUEL OIL MANIFOLD. STATION ONE ENGINEER AT THE MAIN DECK FILL/DISCH. STATION PORT OR STBD DEPENDING ON WHICH SIDE SHIP IS RECEIVING OR DISCHARGING FUEL. ASSIGN ONE MAN TO SOUND FUEL TANKS ON PORT SIDE AND ONE MAN TO SOUND TANKS ON STBD SIDE. ALL PERSONNEL SHALL BE IN COMMUNICATION BY SOUND POWERED PHONES. THE ENGINEER AT THE FILL/DISCH STATION WILL BE IN COMMUNICATIONS WITH THE SHORE FACILITY.
2. CHIEF ENGINEER INSURE ALL VALVES IN THE FUEL SYSTEM ARE CLOSED EXCEPT FOR VALVES MARKED NORMALLY OPEN. OPEN VALVE ON MANIFOLD TO FUEL TANK TO BE FILLED OR SUCTION TAKEN FROM.
3. REMOVE BLIND FLANGE FROM FILL/DISCH CONN. AND ATTACH FUEL HOSE. ENGINEER RECEIVES PERMISSION FROM CHIEF ENGINEER AND NOTIFIES THE SHORE FACILITY TO COMMENCE FUELING.
4. MAN SOUNDING TANK BEING FILLED OR EMPTIED SOUNDS TANK AT FREQUENT INTERVALS AND REPORTS WHEN TANK IS 90% FULL OR WHEN TANK IS EMPTY, CHIEF ENG. THEN SHIFTS TO ANOTHER TANK BY OPENING AND CLOSING REQD. VALVES ON MANIFOLD.
5. DURING FUELING THE ENGINEER AND MEN SOUNDING TANKS SHALL KEEP A CLOSE VISUAL CHECK ON THE SPILL CONTAINERS. IF AN OVERFLOW OCCURS HE SHALL IMMEDIATELY NOTIFY THE CHIEF ENG. TO SHIFT TANKS OR SECURE THE FUEL VALVE AT THE FILL/DISCH. CONN.
6. WHEN ALL TANKS ARE TOPPED OFF OR EMPTIED, THE ENGINEER AT THE FILL/DISCH. CONNECTION IS TO NOTIFY THE SHORE FACILITY TO SECURE FUELING.
7. REMOVE FUEL HOSE AT THE FILL/DISCHARGE CONNECTION AND REPLACE BLIND FLANGE, USING CAUTION TO PREVENT SPILLS FROM FUEL REMAINING IN THE HOSE.
8. SECURE VALVES IN THE FUEL SYSTEM EXCEPT THOSE THAT ARE NORMALLY OPEN.

NOTE: ANY OIL SPILLS INTO THE WATER SHALL BE IMMEDIATELY REPORTED TO THE MASTER OF THE VESSEL.



FUEL OIL FILL & TRANSFER DIAGRAM

ROONEY, LAY & ASSOCIATES
NAVAL ARCHITECTS

USEPA R/V LAKE GUARDIAN
FUEL OIL TRANSFER PROCEDURES

DATE: 4 AUG 89 | DWG NO. 2503-1820

R/V LAKE GUARDIAN
STANDARD OPERATING PROCEDURE FOR THE HVAC MAINTENANCE SYSTEM
MAY 1997

INTRODUCTION

These Standard Operating Procedures (SOPs) were developed to comply with the Heating Ventilation, and Air Condition (HVAC) requirements noted in the U. S. Environmental Protection Agency (USEPA) *Facility Safety Manual* and the USEPA *Safety, Health and environmental Audit Protocol.*

FILTER REPLACEMENT

General Requirements

To Maintain acceptable indoor air quality conditions on board the R/V Lake Guardian, all air filters associated with the HVAC system must be cleaned and replaced on a regular basis in accordance with EPA 4870, FS1-05 (12). To comply with this requirement, the following schedule has been developed FOR the cleaning and replacing of HVAC filters on board the Lake Guardian:

1. All air filters associated with the R/V Lake Guardian HVAC system should be inspected at least quarterly during periods of regular use by qualified personnel. At that time, air filters should be cleaned as needed. In addition, filters that appear to be worn or broken should be replaced.

2. All air filters associated with the R/V Lake Guardian HVAC system shall be replaced, at a minimum, on an annual basis.

Inspection Requirements

Inspection requirements, task assignments, and record keeping documents for the maintenance of the ship's HVAC system are maintained/generated by a computerized Preventive maintenance System referred to as "MAINTAINIT". The system automatically generates work assignments (Task Reports) based on parameters previously entered by the user. The Task Report include equipment description, inspection frequency, equipment location, and task instructions. The Chief Engineer is responsible for the maintaining the program, and making revisions when necessary. Additionally, the Chief Engineer is responsible for generating Task Reports, assigning the task, and recordkeeping. Inspections procures shall be conducted in accordance with Task Instructions found within the task report (see attachment for Task Report).

HVAC DUCT AND AIR HANDLER CLEANING

General Requirements

To Maintain acceptable indoor air quality conditions on board the R/V Lake Guardian, all air handling units and HVAC duct systems on board the Lake Guardian must be cleaned on a regular basis in accordance with EPA 4870, FS1-05 (12). To comply with this requirement, the following schedule has been developed:

1. All air handlers and duct work associated with the R/V Lake Guardian HVAC system should be inspected at least quarterly during periods of regular use by qualified personnel.

Inspection Requirements

Inspection requirements, task assignments, and record keeping documents FOR the maintenance of the ship's HVAC system are maintained/generated by a computerized Preventive Maintenance System referred to as "MAINTAINIT". The system automatically generates work assignments (Task Reports) based on information previously entered by the user (ie. The Chief Engineer). The Task Report include equipment description, inspection frequency, equipment location, and task instructions. The Chief Engineer is responsible for the maintaining the program, and making revisions when necessary. Additionally, the Chief Engineer is responsible for generating Task Reports, assigning the task, and recordkeeping. Inspections procures shall be conducted in accordance with Task Instructions found within the task report (see attachment for Task Report).

HVAC MECHANICAL SYSTEMS

General Requirements

To Maintain acceptable indoor air quality conditions on board the R/V Lake Guardian, all Mechanical components associated with the HVAC system on board the Lake Guardian must be regularly inspected and maintained. To comply with this requirement, the following schedule has been developed:

1. On a quarterly basis evaporators shall be cleaned and inspected
2. On a quarterly basis condensers shall be inspected and cleaned
3. On a quarterly basis motors shall be inspected and lubricated
4. On a quarterly basis belts shall be inspected and replaced as needed

Inspection Requirements

Inspection requirements, task assignments, and record keeping documents for the maintenance of the ship's HVAC system are maintained/generated by a computerized Preventive Maintenance System referred to as "MAINTAINIT" The system automatically generates work assignments (Task Reports) based on parameters previously entered by the user (ie. The Chief Engineer). The Task Report include equipment description, inspection frequency, equipment location, and task instructions. The Chief Engineer is responsible for the maintaining the program, and making revisions when necessary. Additionally, the Chief Engineer is responsible for generating Task Reports, assigning the task, and recordkeeping. Inspections procures shall be conducted in accordance with Task Instructions found within the task report (see attachment for Task Report).

PERIODIC PERFORMANCE TESTING/INDOOR AIR QUALITY SURVEY

General Requirements

Ventilation is one of the must critical factors affecting indoor air quality. Other factors are physical (e.g. dusts), chemical (e.g. cleaners), and biological (e.g. fungus/molds) materials present in a facility. ASHRAE Guidelines and EPA Policy Requirements have been established as a basis FOR performance testing of the ventilation system on board the R/V Lake Guardian to ensure a minimum of indoor air quality problems.

Monitoring Requirements

On an annual basis, the following specifications for indoor air quality should be measured and reported by personnel under the direction of a Certified Industrial Hygienist (CIH):

1. Carbon Monoxide
   - A. Shops and industrial areas - 18 ppm
   - B. Offices and laboratories - 9 ppm
     [EPA 4870, FS1-05 (12)]

2. Carbon Dioxide levels should not exceed 1000 ppm [EPA 4870, FS1-05 (12)]

3. Formaldehyde
   - A. Shops and industrial areas - 0.5 ppm
   - B. Offices and laboratories -0.1 ppm
     [EPA 4870, FS1-05 (12)]

4. Temperature and Humidity
   - A. Summer - Maximum 78 degrees F and 60% RH
   - B. Minimum - 68 degrees F and 30% RH
     [ASHRAE 62-1989]

Inspections

Inspection activities and monitoring results associated with the above requirements should be noted during the Annual Industrial Hygiene Survey Report for the R/V Lake Guardian.

STANDARD OPERATING PROCEDURE

Small Boat Operational Safety

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Prepared by _____ Date _____

Approved by _____ Date _____

Rev. _____

Small Boat Operational Safety

1.0 Scope

The scope of this manual is to provide standard operating procedures for the safe navigation, handling, maintenance and operation of small boats, inflatable craft and related marine science equipment.

2.0 References

Environmental Protection Agency, Region 5: Health & Safety Manual, Section 18-2.

North Pacific Fishing Vessel Owner's Association: Vessel Safety Manual, 1986.

Outboard Marine Corporation: Owner's/Operator's Manual

Avon Inflatables Inc.: Owner's Manual

3.0 Responsibility

The operator in command of any small craft is ultimately responsible for the safe operation of the vessel and it's equipment, and for the safety of everyone aboard. As well, the vessel owner must provide a seaworthy vessel. However, each occupant must attend constantly to his own safety and perform his work in a safe and prudent manner, using all safeguards provided for his protection or the protection of others.

4.0 Frequency of Inspection

Prior to any small craft being taken out, it should be inspected to insure that mechanical functions, such as the motor, lights, radio, etc., are operating, that any necessary documentation is on board, that standard safety equipment is on board and that there is sufficient fuel.

5.0 Preparation and Weather

Before leaving on your trip, get the weather forecast. Look at the charts (and tide tables) and plan your route. Collect and weigh the passengers personal gear, the sampling apparatus and all other "stores" going aboard. Load the gear so that it will not roll or slide when the boat rocks or tosses Before leaving on your trip, you should take the following precautions:

- If the weather forecast is somewhat unfavorable, load the boat lightly so that it will float high in the water. If a storm is predicted, postpone the trip.

- If your course takes you out sight of land, at least one person aboard should know how to navigate. At least two people should know how to read charts and locate sandbars, shallows, rocks, rapids, etc..

- The Coast Guard recommends that you file a "float plan" with someone who can request a search if you do not return as expected. The float plan should give a detailed description of the boat and its planned course. It should list the people aboard, the type and frequencies of the emergency radio, and the names and telephone numbers of the Coast Guard or other agency personnel who should be notified if you fail to return as expected.

In addition, before departure, check for local storm warnings. Your charts will show the location of storm warning display stations, and your radio will carry weather bulletins. A discussions of storm warnings follows:

- A small craft warning means winds may reach 38 mph (33 knots) or conditions are dangerous for the sort of boats generally used by EPA. A triangular red pennant, displayed at a storm warning display station, signals a small craft warning.

- Two triangular red flags signal a gale warning: winds from 39 to 54 mph (34-47 knots).

- A single square red flag with a black center displayed at a storm warning display station signals a storm warning: winds of 55 to 73 mph (48-63 knots).

- Two square red flags with black centers signals a hurricane or tropical cyclone, with winds in excess of 74 mph (63 knots).

6.0 Boarding

A. When your board a small boat, grasp both sides of the boat and then step into the middle. If you put all your weight on the side nearest the dock, you may push that side under water. If you step down and push the boat away, the boat may move away before you are in, (it helps to have someone steady the boat while you step in).

B. When one person is in the boat, a second person can pass gear and supplies to him or her. If the cargo being passed over is heavy, be careful not to tip the boat and lose your balance. Distribute the weight evenly, and secure all cargo so it cannot move when the boat rocks.

C. On larger boats, the load capacity should be displayed on a plate mounted in the boat A certificate of compliance for an outboard motorboat will show the manufacturer's rating of maximum horsepower that can be safely used on the boat's engine.

D. A combination capacity plate will also list the maximum number and weight of persons that can be carried safely, as well as the maximum weight (of persons, motor and gear) that can be carried safely. The certificate of compliance and the capacity may be shown on separate plates.

7.0 Outboard Motor Operation

The operator of any small boat is responsible for the correct operation of the boat and for the safety of its occupants. All operators should read the Evinrude Outboards Manual and be familiar with its contents before operating the boat. Section 7.0 of this SOP covers but a small portion of the manual and pertains solely to the starting, stopping and basic operation of outboard motors. The Evinrude Outboards Manual can be found in its entirety in the Ship's Equipment ringbinder. Copies of this are located in the Captain's office, the Lab. office and the Chief Engineer's room.

A. Starting and Operation

1) During the initial operation of a new motor, the operator must follow the **"Engine Break-In"** procedure as described in the **General Information** section of the Evinrude Outboards Manual.

*note: Failure to follow the "Engine Break-In" procedure can result in serious engine damage.

2) Place fuel tank in boat so tank will not shift around. Be sure fuel line is not wedged under tank. Allow fuel line slack to permit steering.

*note: Do not operate motor out of water even momentarily. Water pump may be damaged or motor may overheat.

8.0 Fueling

When handling fuel and refueling remember that gasoline is very flammable. Certain precautions must be carefully and completely observed every time that a boat is fueled with gasoline.

Before Fueling

A. Make sure that your boat is secured to the fueling pier. Fuel before dark, if possible.
B. Stop engines, motors, fans and other devices that can produce a spark. Open the master switch if the electrical system has one. Put out all galley fires and open flames.
C. Close all ports, windows, doors and hatches so that fumes cannot blow aboard and below.
D. Disembark all passengers and any crew member not needed for the fueling operation.
E. Prohibit all smoking on board and nearby.
F. Have a checked fire extinguisher close at hand.
G. Measure the fuel in the tanks and do not order more than the tank will hold; allow for expansion.

While Fueling

A. Keep nozzle or can spout in contact with the fill opening to guard against static sparks.
B. Do not spill gasoline.
C. Do not overfill. Filling a tank until fuel flows from the vents is dangerous.
D. For outboards, remove portable tanks from boat and fill on shore.

After Fueling

A. Close fill openings.
B. Wipe up any spilled gasoline; dispose of wipe-up rags on shore.
C. Open all ports, windows, doors and hatches; turn on bilge power. Ventilate boat at least four minutes.
D. Sniff low down in tank and engine compartments. If any odor of gasoline is present, do not start engine; continue ventilation actions until odor can no longer be detected Check for any drips and liquid fuel.
E. Be prepared to cast off lines as soon as engine starts; get clear of pier quickly.

Inboard engines require special ventilation equipment. Use it. Boats with enclosed spaces where spilled fuel or fuel vapors can accumulate must have powered ventilation to clear away the fuel vapors. This requirements does not normally apply to open boats.

9.0 Rules of the Road

A. Every vessel must at all times maintain a proper lookout by sight and hearing as well as by all other available and appropriate means, to keep fully appraised of the situation and any risk of collision.

B. Under normal circumstances, the helmsman will satisfy this need, but he must be qualified, alert and have no other responsibilities. The use of an automatic steering mechanism and/or the use of radar at night or in fog does not justify the absence of a human helmsman at the controls, observing all around the horizon and ready to take over immediately if needed.

C. All vessels must proceed at a safe speed at all times. The factors to be considered in determining "safe speed" include but are not limited to:

- The state of visibility.
- Traffic density including concentration of fishing or other vessels.
- Your vessel's maneuverability, with special referenceto stopping distance and turning ability.
- At night, the presence of background lights such as those from shore, or from the back-scatter of your vessel's own lights.
- The state of wind, sea and current and the proximity ofnavigational hazards
- The vessel's draft in relation to the available depth of water.

D. Meeting Situations

Every vessel must use all available means appropriate including lookout (eyes and ears), radar and radio to determine if the risk of collision exists. If the vessel is equipped with radar, a radar plot should be maintained to detect any risk of collision.

Where possible, contact the other vessel by radio and ask what its intentions are. Action to avoid a collision should be taken well in advance of any potential meeting. Any course of speed change should be large enough to be obvious to any approaching vessel. A succession of small alterations of course should be avoided.

1. **Meeting Another Vessel Head-On**
   When two power-driven vessels are approaching one another head-on, unless otherwise agreed each should pass on the port side of the other. Neither vessel has the right of way over the other, and both must alter course to starboard, if necessary, to provide sufficient clearance for safe passage.

2. **Crossing Situations**
   When two power-driven vessels are crossing so as to involve risk of collision, the vessel on the right has the right-of-way, while the vessel on the left must keep clear. Vessels are crossing if they are not meeting head-on or nearly so, and each has the other on a relative bearing forward of 22 ½ degrees abaft (behind) the beam, port or starboard.

3. **Overtaking Another Vessel**
   If one vessel is coming up on another from more than 22.5 degrees abaft (behind) its beam, and making greater speed so as to close the distance between them, the vessel astern is said to be overtaking the slower vessel. Any overtaking vessel must keep out of the way of the vessel it is overtaking. The overtaking vessel is burdened, whereas the overtaken vessel is privileged. A vessel that is being overtaken shall keep her course and speed, but may take action to avoid collision by her maneuver alone, as soon as it becomes apparent to her that the vessel required to keep out of the way is not taking appropriate action.

10.0 Mooring (see figure 1)

A. The bow line runs through the bullnose or bow chock. The stern line runs through after chocks. These lines should be run well up the dock to reduce fore and aft motion.

B. Breast lines may be run perpendicular from the bow, waist or quarter to keep the vessel from moving away from the pier.

C. Spring lines may be run from the bow or quarter to eliminate forward or aft movement of the vessel.

D. Use only spliced eyes in the ends of mooring lines, no knots. Send the eye to the dock so the man on board can tend the line.

E. Before you leave the vessel at its mooring, check the condition of dock cleats, piles and rails to be sure they're strong enough to hold it.

F. Avoid extreme bends in mooring lines where they pass through hawse holes or fairleads (use a minimum bending radius of 3 times the diameter of the line to avoid wear or failure). Use rubber hose or some other material as chafing gear around the bends.

G. If two bights or eye splices are to be placed over the same bollard, the second should be led up and through the eye of the first so that either can be removed independently.

H. When making a hitch on a cleat, start with at least one full turn around the base before you begin taking turns over the horns. Use only figure-eight turns, no knots or hitches that may jam under tension.

I. Synthetic lines are slippery, with little friction; use extra turns. Watch your hands to avoid pinching or crushing injuries.

J. When snubbing a line on a cleat, never try to hold a vessel without first taking turns on a cleat. Stand well back from the cleat, out of the bight and at 90 degrees to the angle of pull. Use extra turns with synthetic lines that may slip and pull you into the cleat.

11.0 Ground Tackle (see figure 2)

A. The **"rode"** refers to all gear between the vessel and the anchor, including line or chain and connecting swivels or shackles. The rode may be all chain or a combination of chain and wire or line. The rode must be marked by length so the man setting the anchor knows how much has been paid out.

B. The rode absorbs most of the loading due to waves and should be compliant. Chain and line best serve this requirement, and if wire rope is chosen for the rode, a short length of chain (10-12 feet) should be used to attach the anchor to the rope. The chain portion of the rode provides extra holding weight and helps keep the pull horizontal so the anchor flukes dig into the bottom. Chain withstands the wear of lying on the bottom better than wire or line, and helps weigh the anchor.

C. The rode should have a breaking strength of five times the anchor hold if made of line or wire, and two times the design load if made of chain.

D. The term **"bow roller"** refers to rollers that permit the rode to be paid out or heaved in, and that serve to secure the anchor when the vessel is underway.

E. The term **"hawse"** refers to pipes or holes that pass through the bulwarks to lead the anchor line or chain. The hawse pipes or holes may be used for storing certain types of anchors so that they can be quickly deployed.

F. The anchor must be securely stowed in it's bow roller or hawse pipe to prevent its breaking loose and causing damage in a seaway.

G. **Riding chocks**, **stoppers** and **dogs** are devices that take the strain off the winch or windlass when the vessel is riding at anchor. The anchor rode should always be stoppered or dogged so the vessel doesn't ride on the winch or windlass brake.

H. A **"wildcat"** is a sprocket wheel that engages the anchor chain as it is being hauled in on vessels equipped with windlasses. The wildcat should always be dogged when the vessel is riding on the chain.

I. The terms **"capstan"** or **"gypsy head"** refer to vertical or horizontal drums fitted to a windlass for handling the line portion of the anchor rode or other forward mooring lines. When you're working a line on a capstan or gypsy head, stand as far back as possible and watch your hands. Where possible, stand at right angles to the direction of pull.

J. On vessels equipped with windlasses, after passing over the wildcat or gypsy, the chain or line drops down the chainpipe into the chain locker below.

K. The bitter end of the line or chain must be securely fastened in the chain locker to prevent losing the ground tackle overboard. On vessels equipped with winches and wire rods, leave one full layer of turns on the drum to "lock" the wire in place.

L. **Scope** is defined as the length of the rode (measured from the hawse or bow roller) compared to the depth. A scope of 7 to 1 is the general rule for anchoring (7 feet of rode for every foot of depth), although this rule may not be practical in deep water. Adequate scope is essential to enable the flukes of the anchor to dig into the bottom. With adequate scope, every pull of the vessel sets the anchor deeper. Too little scope and the pull of the vessel lifts the shank and the flukes come free. Too much scope and the rode may part because of the additional weight of the line, wire or chain itself.

M. The term **"shots"** refers to lengths of chain connected to form the anchor cable. The standard shot is about 15 fathoms long. Anchor elements consist of:

- **Flukes** or **palms** (the flat members that grab the bottom).
- **Shank** (the metal bar that joins the crowns to the ring or hole that accepts the rode).
- **Stock** (a crosspiece that helps position the flukes so they dig into the bottom).

12.0 Anchoring (see figure 3)

A. Don't leave the anchor windlass in gear when you are underway. Use the hand brake and dogs or stoppers in case you lose power and have to set the anchor manually.

B. The anchor should always be let go with the vessel moving slowly to avoid paying the chain down on top of the anchor and fouling the flukes. Under normal conditions, let go with slight sternway.

C. Always send two men forward to work the anchor gear in case one gets hung-up Only one man works the gear, however, and he stands to the side and out of the bight. The other man stands well clear.

D. Don't anchor on underwater cables or pipes, or where your vessel will interfere with other vessel operations.

E. When you're letting go, maintain control over the anchor and rode by means of the winch or windlass brake. If you are handling the chain over a wildcat, never put your fingers into the links, use the palm of the hands. Stand as far back from the wildcat as possible and stay out of the bight.

F. If you are obliged to let go at high speed, let the rode run until the vessel loses way sufficiently to make it safe to snub her. There is no harm in letting out a considerable length of rode, then heaving in to the proper scope. Checking the vessel's speed by means of her ground tackle may damage the rode to the extent that it later parts under moderate stress.

G. Always maintain an anchor watch to ensure that the vessel doesn't drag or break free unnoticed. The watch should take visual bearings and ranges to use as reference points. Setting the radar range ring on the shoreline, and using fathometer depth alarms both serve as good warning mechanisms, but nothing replaces the human eye.

H. If a storm approaches, the best course of action is to seek the open sea. If you must ride out a storm in an anchorage, use extra scope. It may be advisable to set a second anchor to form a mooring, or to drop a second anchor underfoot to prevent the vessel from surging back and forth across the wind.

I. Ideally, anchor gear should be inspected annually, with special attention paid to detachable chain links, shackles and swivels. During annual maintenance, the anchor rode should be laid out on deck and examined for damage throughout it's length. Scale and corrosion should be removed, and detachable links, shackles and swivels replaced as necessary.

J. To distribute wear, chain shots should be rotated. On all-chain rods, a worn or defective shot should be shifted to the bitter end until it can be replaced.

K. The anchor hinges must be lubricated sufficiently to keep the flukes from seizing up, particularly if the anchor is rarely used. Screw-type shackles used to connect segments of the anchor rode should be moused or otherwise locked to prevent them from coming loose when the anchor is on the bottom.

Basic Guides to Boating Safety

1. Carry proper equipment - know how to use it!!
2. Maintain boat and equipment in top condition.
3. Know and obey the Rules of the Road.
4. Operate with care, courtesy and common sense.
5. Always keep your boat under complete control.
6. Watch posted speeds; slow down in anchorages.
7. Do not **ever** overload your boat.
8. See that lifesaving equipment is accessible.
9. Check local weather reports before departure.
10. Inspect hull, engine and all gear frequently.
11. Keep bilges clean, electrical contacts tight.
12. Guard rigidly against any fuel system leakage.
13. Have fire extinguishers instantly available.
14. Take maximum precautions when taking on fuel.
15. Be sure to allow adequate scope when anchoring.

U. S. EPA GLNPO
SUPPLEMENTAL HEALTH & SAFETY GUIDELINES
FOR
GRANTEES, CO-OPERATORS, AND CONTRACTORS

MARCH 1995

INTRODUCTION/GLNPO HEALTH & SAFETY POLICY STATEMENT

It is the policy of the U.S. EPA, Great Lakes National Program Office (GLNPO), that all EPA employees, grantees, co-operators, contractors, and special program participants are entitled to a comprehensive health and safety program. The goals of the program are to ensure that each person working on board GLNPO research vessels is able to work in an environment free of recognized hazards, and to reduce and mitigate occupational accidents as much as possible. These goals are accomplished through:

1. Training in the proper techniques for field investigations, proper use of and access to safety equipment, and proper protocol for inspections;

2. Development of standard operating procedures for routine and non-routine work environments;

3. Enabling employees and contractors to identify those work situations where they believe a hazard exists without any adverse action taken against them.

This document outlines polices, responsibilities, procedures, and guidelines, pertinent to Grantees, Co-Operators and Contractors, as stated in the GLNPO Health, Safety, and Environmental Compliance Manual. This document must be used only as supplemental information to increase the Grantee's, Contractor's and Co-Operator's awareness of the GLNPO policies and procedures, and is not meant to be all-inclusive. A copy of the GLNPO manual and appropriate appendices are available aboard over-night research vessels, and are available from the GLNPO offices.

These policies and procedures are coordinated by the GLNPO Health and Safety Team in conjunction with the Regional Health and Safety Manager. In addition to the policies and procedures set forth by GLNPO, all applicable requirements of the Occupational Safety and Health Administration, the provisions of the Executive Order 12196 and other relevant statutes, laws, polices and guidance of the Federal Government regarding occupational health and safety, as well as environmental compliance, shall be implemented.

RESPONSIBILITIES

EPA Personnel

The responsibilities of relevant EPA personnel are detailed in Chapter One of the GLNPO Health, Safety, and Environmental Compliance Manual.

Contractors, Grantees, Co-Operators

All Contractors, Grantees, and Co-operators that are involved in field activities on EPA vessels are required to have read the contents of this document as well as adhere to the specific requirements as outlined by GLNPO.

All Contractors, Grantees, and Co-operators performing work for Region V, or for any EPA activity or organization serviced by Regional Safety Personnel, shall contain provisions, in writing, which require these persons to follow, at a minimum, the same rules and requirements that U.S. EPA personnel follow while performing similar work. Wherever possible, contractual provisions should require that all safety equipment and services (e.g. personal protective equipment, medical monitoring, training, etc.) be equivalent to that required for EPA personnel.

Designated Chief Scientists, while undergoing surveillance and research operations, should ensure that all survey activities are conducted safely and in accordance with the health, safety, and environmental protocols of GLNPO.

All persons are expected to follow all health and safety rules and must perform their duties in a manner which will protect their own well being and that of their fellow workers. Persons are required to use safety equipment, personal protective equipment, and other safety devices and, moreover, to follow safety procedures that GLNPO deems necessary for their protection. Refusal or neglect to follow GLNPO policies and procedures can result in dismissal from EPA vessels.

Reporting of Un-Safe/Un-Healthful Work Conditions

If a persons considers a situation or a work condition to be un-safe or un-healthful, it is his/her responsibility to report it to either the Chief Scientist, Captain, or Ship's Chemical Hygiene and Safety Officer, as soon as the potential hazard is recognized. The GLNPO Health and Safety Manager, in conjunction with the Regional Health and Safety Manager, and his/her staff will investigate the situation and recommend corrective actions, if necessary.

INJURY & ILLNESS

When a persons suffers an injury or illness, whether traumatic or non-traumatic, while on board EPA vessels, there are necessary procedures which must be followed in order to protect the person's interest and well being. These procedures are as follows:

1. Inform your supervisor as soon as possible

2. Report the injury/incident to the Bridge or Safety Officer

3. Complete Accident/Injury/Incident Report

Note: In the event of a medical emergency involving bodily fluids, it is GLNPO Policy that only Designated First Aid Responders who have received appropriate First Aid/CPR and Bloodborne Pathogen training participate in response activities.

Investigation

In the event of an injury or illness, an investigation will be conducted. Investigation of an accident

or illness is necessary to prevent similar occurrences. It is not designed to establish guilt or innocence, but is an attempt to identify and abate potential hazards.

Record-Keeping

In accordance with OSHA regulations, it is the responsibility of the employer to maintain and keep current special Injury and Illness forms for submission to the Department of Labor. It is recommended that all contractors, grantees, and co-operators research their responsibilities in complying with this regulatory requirement.

TRAINING, CERTIFICATION, AND MEDICAL MONITORING

All EPA contractors, grantees, and co-operators who work in EPA owned or leased laboratory space (including laboratories on research vessels) must meet the safety training requirements specified in EPA Order 1440 and Regional Safety Manuals. Supervisors must ensure that their employees are aware of these requirements and that applicable requirements are implemented.

Chemical Hygiene

GLNPO has developed a Chemical Hygiene Plan in accordance with OSHA 29 CFR 1910.1450, "Occupational Exposures to Hazardous Chemicals in Laboratories". All laboratory personnel must receive training based on the contents of the GLNPO Health and Safety Manual and the Chemical Hygiene Plan. Additionally, contractors, grantees and co-operators are encouraged to pursue their own responsibilities in regards to the Standard.

24-Hour Laboratory Safety Course

As specified in Order 1440, Chapter 8, a 24-hour Laboratory Safety Course is required by all EPA and contractor personnel prior to working in an EPA laboratory. A training agenda can be found in Chapter 2 of the GLNPO Health, Safety, and Environmental Compliance Manual, Attachment 2.1. An annual 4-hour refresher class is also required.

GLNPO Research Vessel Laboratory Training

In addition to the 24-hour Laboratory Safety Course and 4-hour annual refresher, all laboratory personnel are required to attend a "site-specific" training orientation course prior to engaging in laboratory activities on-board EPA research vessels. This training will be performed on board the vessel prior to departure.

Radiation Safety Training

A site-specific training course is required for all personnel prior to working in laboratories where radioactive materials are used.

Other training not listed in this document may be required based on specific job assignments and responsibilities (i.e., Fire Fighting, First Aid/CPR, Bloodborne Pathogen, Respiratory Protection, Emergency Response, Cranes, Hearing Conservation, Hazard Communication, Lockout/Tagout, etc.). To ensure compliance with GLNPO policies, it is recommended that contractors, grantees, and co-operators review Chapter 2 of the GLNPO Health, Safety, and Environmental Compliance Manual for further training requirements.

No persons, whether EPA employees, contractors, grantees, or co-operators will be allowed to participate in GLNPO sponsored activities until they have received appropriate training.

COMPLIANCE REVIEW AND STANDARD OPERATING PROCEDURES

Any contract which involves field or laboratory work or otherwise appears to impact health, safety, or the environment must be reviewed and approved by the Safety Manager while in the initial planning stage. In accordance with the GLNPO Health, Safety, and Environmental Compliance Manual, all EPA contracts must contain provisions which require the contract employee to follow all safety, health, and environmental compliance rule and regulations.

Written Health and Safety Standard Operating Procedures (SOP) must be developed for specific tasks related to field or laboratory operations. Health and Safety SOPs may address issues such as Safety Procedures, Personal Protective Equipment (PPE), Training Requirements, etc. Additionally, all marine sampling, recovery, and operational activities are required to have SOPs for specific activities which impact safety, health, or environmental compliance.

RESEARCH VESSEL HEALTH AND SAFETY

Unique to GLNPO research vessels is their on-board laboratories. This feature, in addition to normal marine operations, requires adherence to rigorous health and safety procedures. It is the policy of GLNPO to ensure that all persons aboard each research vessel receive health and safety training relative to the specific hazards they may encounter while on board.

Attachments to this document contain basic health and safety guidelines to be followed while on board EPA vessels.

In conclusion, one must remember, all the programs, training, and rules in the world can not replace the need for common sense. In most situations, common sense can prevail. If people just take a moment to review their task, and identified any potential hazards associated with the task, and take preventative measures to minimize or eliminate such hazards, you can greatly reduce any risk associated with the task. Being aware of the hazards in the environment around you and being prepared can be the key to performing tasks safely.

ATTACHMENTS

HEALTH & SAFETY GUIDELINES FOR LABORATORY OPERATIONS

Although the following guidelines highlight some of the primary health and safety issues aboard the R/V Lake Guardian, by no means do they provide a thorough instruction and training program. All guests are required to attend the initial Health and Safety Orientation/Video presented at the beginning of the cruise, as well as review the GLNPO Health, Safety & Environmental Compliance Manual, located in the laboratory office.

1. No eating, drinking or smoking permitted in laboratories.

2. Safety glasses and laboratory coats must be worn at all times when working in the laboratories.

3. No shorts or sandals are to be worn in the laboratories.

4. Short sleeves are permitted in the laboratory **only if** lab coats are worn.

5. Laboratory equipment must be secured against rocking of the ship.

6. The Chemical Hygiene Officer (CHO) must be informed of all chemicals brought onboard.

7. ***A Material Safety Data Sheet (MSDS) must accompany every chemical brought onboard the R/V Lake Guardian.***

8. The CHO must be informed of all chemical waste streams.

9. The CHO must be informed of any chemical spill.

10. Groups using the ship are responsible for containing and removing any hazardous waste they generate.

11. No waste is to be discharged overboard (except virgin sediment).

12. Spill kits are located in every laboratory.

13. No laboratory work may be conducted in the hazardous materials locker.

14. The carry-buckets provided in the hazardous materials locker must be used to transport material to and from the locker.

15. Hazardous material in quantities greater than 4 liters must be stored in the hazardous materials locker.

16. Please provide your own secondary supplies, such as tape, pens, computer disks, gloves, safety glasses, etc.

HEALTH AND SAFETY GUIDELINES FOR SHIP OPERATIONS

Although the following guidelines highlight some of the primary health and safety concerns aboard the R/V Lake Guardian, by no means do they provide a thorough instruction and training program. All guests are required to attend the initial Health and Safety Orientation/Video presented at the beginning of the cruise, as well as review the GLNPO Health, Safety & Environmental Compliance Manual, located in the laboratory office.

1. Remember the general safety rule when moving about the ship ***"One hand for you, one hand for the ship"*** at all times.

2. Due to machinery, noise levels and other personal hazards, the engine room, accessible via the galley, is off limits.

3. Fire doors must be kept closed at all times.

4. Exit doors, spill kits, safety showers, eye washes and fire extinguishers must be unobstructed.

5. The top of the container laboratories may not be used as an observation area or for recreation.

6. Report any observed or suspected spills from the ship into the water to the Captain and the CHO immediately.

7. No liquor, drugs or weapons are allowed.

8. Smoking is allowed on the outside decks where there is no gasoline storage. Absolutely no smoking when we are taking on fuel.

9. Access to the bridge is allowed **preceded** by a knock on the door. Enter only from the leeward side (opposite the side from which the wind is blowing).

10. When on the bridge please refrain from speaking until spoken to as the Captain or mate on watch may be in the process of receiving/sending radio communications or plotting a course.

11. Please interrupt your conversation when you hear traffic on the radio until the Captain or mate on watch signals that it is acceptable to resume conversation.

12. When the ship is entering or leaving port, or during periods of poor visibility or high traffic activity, and at the Master's discretion, the pilot house should not be visited. You may assemble on the 0-2 level (boat deck) if you so desire.

13. Please keep the noise level to a minimum and do not let doors slam behind you so as not to disturb sleeping shipmates.

HEALTH & SAFETY GUIDELINES FOR DECK/SAMPLING OPERATIONS

Although the following guidelines highlight some of the primary health and safety issues aboard the R/V Lake Guardian, by no means do they provide a thorough instruction and training program. All guests are required to attend the initial Health and Safety Orientation/Video presented at the beginning of the cruise, as well as review the GLNPO Health, Safety & Environmental Compliance Manual, located in the laboratory office.

1. Work vests must be worn while working on the fantail and rosette deck.

2. Sandals and other open-toed shoes are prohibited when working on deck or in the laboratories.

3. Hardhats, gloves and steel-toed shoes must be worn when working in conditions where there is a possibility of injury to the head, hands or feet. Common sense and good judgement should dictate the appropriate safety gear to be worn in any given situation; however, if in doubt, please ask the Chemical Hygiene Officer.

4. No one is to work alone on the fantail at any time.

5. The fantail is not to be used as an area for recreation.

6. Persons on the fantail while the crane or A-frame is in operation must wear a hard hat.

7. Only authorized ship's crew are allowed on the fantail during docking and undocking procedures. Do not attempt to access the fantail during these procedures. Absolutely no one is allowed to depart the vessel until the "All Clear" is announced by the Captain.

8. Only authorized ship's crew should operate the ship's equipment such as winches, davits, A-frames and cranes; however, during extended operations scientific personnel may be asked to participate in these evolutions.

9. While steaming during hours of darkness, no unauthorized lights should be displayed on deck. This is to comply with the "Rules of the Road"; lights shown forward of the pilot house are detrimental to the night vision of the conning officer. While on station and engaged in sampling/testing operations, adequate aft-facing night lighting will be provided.

10. Scientific personnel should direct all inquiries to the Master through the Chief Scientist in matters concerning work on deck, navigation, safe working parameters, use of ship's equipment, etc. Use of this procedure will avoid working at cross-purposes.

HEALTH & SAFETY GUIDELINES
EMERGENCY OPERATIONS AND PROCEDURES

Although the following guidelines highlight some of the primary health and safety issues aboard the R/V Lake Guardian, by no means do they provide a thorough instruction and training program. All guests are required to attend the initial Health and Safety Orientation/Video presented at the beginning of the cruise, as well as review the GLNPO Health, Safety & Environmental Compliance Manual, located in the laboratory office.

1. First concern is the safety of yourself, the crew and the ship.

2. Anyone taking personal medication should so indicate on the "In case of Accident" form. All guest scientists are required to fill out this emergency medical form during the safety orientation.

3. All injuries or illnesses are to be reported to the bridge as soon as possible so that proper attention may be given to the patient.

4. In the case of emergency, you can reach the pilot house from any phone on the ship by simply dialing 911.

5. First-aid kits are located in all of the laboratories and in the Captain's office.

6. Safety equipment found in your stateroom:
   a. Personal Flotation Device #1 - Life Preserver
   b. Personal Flotation Device #2 - Immersion Suit
   c. Kick-out panel in door.

7. In the event of a fire or abandon-ship emergency, take both of your PFD's mentioned above to your assigned life boat on the 02 deck (i.e. boat deck or bridge deck) and await further instructions. Do **NOT** don your life preserver or immersion suit inside of the ship.

8. In the event of a man-overboard emergency:
   a. Yell, "Man overboard!"
   b. Throw life ring or any item that will float.
   c. Keep the person in sight.
   d. Notify the Bridge as soon as possible (dial 911).

9. Refer to a station bill for your life boat assignment and explanation of alarm signals. Station bills are located in the galley, Captain's office, passageway outside of the biology lab and in the pilot house.

10. A test of the ship's general alarm is performed daily at noon.

11. The ship's crew is trained and certified in CPR and Basic First-Aid Response.

12. It is the responsiblity of the visting party's supervisor to ensure that all guest's under his/her direction are accounted for in case's of rough seas. Should members of the party become severly seasick, careful monitoring of their condition would be requested to avoid extreme physical or even mental deterioration such that their personal health and safety would be in jeopardy.

R/V LAKE GUARDIAN
STANDARD OPERATING PROCEDURE - PREPARATIONS FOR EMERGENCIES

PURPOSE

This Standard Operating Procedure (SOP) has been developed in accordance with 46 CFR 185.25, for the preparation of emergencies. It is the duty of the Master to ensure that this SOP is comprehensive and that the "Emergency Checkoff List" contained in this document is posted in a conspicuous place (ie. the Pilot House, and/or Lounge) accessible to all Crew Members and Passengers.

POLICY

In accordance with 46 CFR 185.25 and GLNPO Policy, before getting underway the Master of the vessel shall ensure that suitable public announcements, instructive placards, or both are provided in a manner which affords all passengers the opportunity to become acquainted with:

1. Stowage location of life preservers;
2. Proper methods of donning and adjusting life preservers of the type(s) carried on board the vessel;
3. The type and location of all life saving devices carried on board the vessel; and
4. The location and content of the "Emergency Checkoff List" contained in this document

EMERGENCY CHECKOFF LIST

In accordance with 46 CFR 185.25-5, an **"Emergency Checkoff List"** has been developed for the R/V Lake Guardian and appears as **Attachment 1** of this document. It is the duty of the Master to ensure the list is comprehensive and is posted in a conspicuous place where it is accessible for viewing by all persons on board the vessel.

ATTACHMENT 1: EMERGENCY CHECKOFF LIST

Rough Weather

Rough weather, at sea or crossing hazardous bars:

1. Close all water-tight and weather tight doors, hatches, and portholes to prevent taking water aboard.

2. Keep bilges dry to prevent loss of stability due to water in bilges.

3. Keep passengers stationary and off weather decks.

4. Have passengers put on life preservers if the going becomes very rough or you are about to cross hazardous bar.

5. Never abandon a vessel unless actually forced to do so.

6. If assistance is needed use the International Distress call over the radiotelephone or call the USCG immediately.

7. Prepare life rafts for launching.

Man Overboard

1 Hail "Man Overboard"

2. Throw a ring buoy overboard as close to the person as possible.

3. Mark location using differential GPS

4. Post a lookout to keep the person overboard in sight.

5. Maneuver the vessel to pick up the person in the water.

6 Have crew member put on life preserver, attach a safety line to him and havehim/her stand by to jump into the water to assist the person overboard if necessary.

7 If person is not immediately located, notify the USCG and other vessels in the vicinity by radiotelephone.

8 Continue search until released by USCG

Fire At Sea

1. Cut off air supply to fire, close hatches, ports, doors, and ventilators, etc.

2 Immediately use portable fire extinguishers at base of flames for inflammable liquid or grease fires or water for fires in ordinary combustible materials.

3. If fire is in machinery space, shut off fuel supply and ventilation, and discharge fixed CO2 extinguishing system.

4. Maneuver vessel to minimize effect of wind on fire.

5. If unable to control fire, immediately notify USCG and other vessels in the vicinity by radiotelephone, etc.

6 Move persons away from fire, have them don life preservers, and if necessary, prepare to abandon ship.

REVISED 5/31/97

IN-PORT VISITOR FIRE AND EVACUATION PLAN

This In-Port Visitor Evacuation Plan will be in effect in all ports of call, including Bay City, Michigan, during all prearranged group guided tours and all public open houses. Establishing communication links with appropriate emergency and port authorities will be done prior to, or immediately after, entering all ports of call.

When entering or upon arriving at a planned port destination, the Master or Mate on watch will establish a means of contacting the local Fire Department, Police and emergency medical response service while in port. This information will be made visibly prominent on the Bridge and on the Quarter Deck. Every effort shall be made by the Master or Mate on watch to arrange for the local Fire Department, Police, and EMS as may be practicable, to visit and tour the R/V Lake Guardian. Additionally, local emergency response services shall be provided with a copy of this evacuation plan.

Prior to the beginning of on board tours, the Master or Senior Ships Officer on board, in concert with the USEPA Public Affairs Representative, will designate an area off ship to reassemble the on board tour group in the event of an evacuation. The purpose for the reassembly area is for establishing accountability of the visitors. Prior to tour activities and visitor arrival, the Master or Senior Ship Officer on board will brief the Tour Guides and Deck Watch with the location of the off ship reassembly area and the immediate areas off ship to be kept clear in the event of incoming emergency vehicles.

It is the **NUMBER ONE PRIORITY** of all shipboard crew members, whether on or off duty, to facilitate the evacuation of tour groups or open house guests in the event of a fire or ship emergency events. Should the Fire Alarm or General Alarm be sounded during the hours of public visitation, all crew members will make a conscientious effort to locate and help evacuate any visitors encountered on their way to their assigned emergency station.

All Tour Guides, Deck Watch Members, and ship personnel on watch during public admittance days are required to be in direct radio contact with the bridge, Marine Channel 73, at all times. In addition, all personnel must carry dependable flashlights for use in the event of power failure.

PREPLANNED GROUP TOURS

TOUR GUIDES: During all preplanned tours, the Tour Guide or Senior USEPA Public Affairs Representative shall "log" the names of each individual in the groups being brought on board. The log is to remain at the reception desk located on the Quarter Deck. The Tour Guide will inform the group of evacuation procedures including the following:

1. Point out the off ship reassembly area and explain the necessity to determine the accountability of guests

2. Request that all visitors remain together as much as possible during the tour

3. Inform guests that physically handicapped individuals must be accompanied by an able body adult capable of carrying the individual off the ship in the event of an emergency situation

QUARTER WATCH: Throughout the entire open house period, the Quarter Deck Watch shall diligently maintain a body count of all visitors coming on board and all visitors exiting the ship. This count is essential to ensure that the number of visitors on board is limited in accordance with USEPA directives. Most importantly, the count is necessary to ensure that all open house visitors on board can be accounted for at any given moment should evacuation of the vessel become necessary.

WHEN FIRE ALARM OR GENERAL ALARM SOUNDS

CREW MEMBERS: Follow the ship emergency billet assignments and ship protocols with the exception of the tour guides and the assigned Quarter Deck Watch until all visitors are safely off the ship and the Bridge directs you to proceed to your assigned billet. Evacuation of visitors is the NUMBER ONE PRIORITY for all ship crew members whether on or off duty.

BRIDGE: Notify the Fire Department or appropriate shoreside emergency response group.

TOUR GUIDES: Calmly lead your tour group along the best ship evacuation route to the shore reassembly area.

BRIDGE: As soon as information is available, announce over the ship's PA system the location of the fire or emergency situation. Advise Tour Guides and Quarter Deck Watch of development via radio. Make announcements approximately every 30 seconds over the ship's PA system, with clear, concise directions, for all visitors to evacuate the ship and the locations to avoid. This will assist all crew members in providing assistance and direction.

QUARTER WATCH: Maintain your station to assist all visitors ashore until the Bridge advises you that the evacuation is complete. Take special care to make an accurate head count of departing visitors. When the head count equals the number counted on board, notify the bridge.

TOUR GUIDES: Notify the Bridge as soon as you reassemble your tour in the designated area off ship and have accounted for all visitors.

CREW MEMBERS: While responding to your assigned billet station, a concerted effort shall be made to look for and seek out any shipboard visitors. If you encounter a visitor, assist them off ship or provide directions using the safest route. If encountering a tour group, ask the tour guide if they need any assistance in guiding the people ashore. If assistance is needed, do so before reporting to your station. When your area of the ship is clear of visitors and you are on station, communicate this fact to the Bridge.

BRIDGE: When the Fire Department or other emergency response units arrive, advise all crew members of further actions to take. The Master or Senior Ship's Officer on board will interface with the emergency response unit.

SURVEY PLAN

 Date: _____

This form is provided to the user/sponsor for assistance in determining the vessel requirements for the project Close attention to detail is essential to the success of the project. So please, please complete the form as accurately as possible. Draw a single line through any item that does not apply. Do not include any information which is or may be deemed classified Additional information may be provided on the last page

1.0 GENERAL

Project Title:_____Survey Title:_____GUARDIAN Requested by:_____

Organization: _____

Project/Work Assignment Manager: _____ Organization._____

Survey Chief Scientist:_____Organization:_____Organization Address: _____

_____

Phone No.:_____ Fax No :_____ EPA Grant/Contact:_____ Work Assignment No.:_____

Principal Investigator:_____Organization: _____P.I. Telephone No.:_____

FAX No.:_____ _____

Comments._____

2.0 SCHEDULE OF OPERATIONS

FUNCTION	DATE	TIME	LOCATION	FUNCTION	DATE	TIME	LOCATION
Commence Mobilization	____	____	_____	Complete Mobilization	____	____	_____
Pre-sail Conference	____	____	_____	Dock Trials	____	____	_____
Depart Home Base	____	____	_____	Arrive on Station	____	____	_____
Depart Station	____	____	_____	Arrive Home Base	____	____	_____
Start Demobilization	____	____	_____	Finish Demobilization	____	____	_____
Post-sail Conference	____	____	_____				

Allowable Weather/Breakdown Days _____ Maximum Duration (Days) _____

Comments: _____

_____

3.0 CHEMICAL BACKGROUND INFORMATION (Including standards, spikes, and instrument calibration chemicals)

NOTICE: A MATERIAL SAFETY DATA SHEET (MSDS) MUST ACCOMPANY EVERY CHEMICAL OR REAGENT THAT IS BROUGHT ABOARD THE LAKE GUARDIAN. COMPLIANCE WITH THIS REQUEST IS ABSOLUTELY NECESSARY PRIOR TO THE SHIP'S DEPARTURE. ADDITIONALLY, CHEMICAL WASTES GENERATED BY SHIP'S USERS MUST BE REMOVED BY USERS. THE USER IS RESPONSIBLE FOR PROVIDING PROVISIONS FOR PROPER WASTE STORAGE METHODS/CONTAINERS

CHEMICAL NAME	QUANTITY	CONCENTRATION
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

4.0 SURVEY JUSTIFICATION AND RATIONALE

_____

_____

_____

5.0 OBJECTIVES

Project: _____

_____

_____

_____

Survey: _____

_____

_____

_____

6.0 ENVIRONMENTAL MANAGEMENT QUESTIONS ASKED BY PROJECT/SURVEY

_____

_____

_____

_____

7.0 SURVEY LOCATION AND DESCRIPTION (Attach Detail/Figures If Needed)

Survey Area(s) Name(s) or Geographic

Name: _____

Survey Area Locations (Provide Map): _____

Survey Area Boundary Coordinates (Lat/Long): _____

Survey Station Types (Water/Sediment): _____

Number of Stations By Type: _____

Water Depth Required: _____ Sediment Zone Required: _____

Survey Transect Lengths: _____ Transect Line Spacings: _____

Other _____

8.0 SURVEY/SAMPLING METHODOLOGIES (Attach Detail/Tables/Figures If Needed)

Method Descriptions: _____

_____

_____

Method Rationale: _____

_____

_____

Diving On Survey: YES: ___ NO: ___ (If yes, see Section 15 and 16)

9.0 SEQUENCE OF SURVEY TASKS/EVENTS

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

10.0 SURVEY LOCATION AND DESCRIPTION

1. HF	_____	FREQ	_____
2 VHF	_____	FREQ	_____
3. UHF	_____	FREQ	_____
4 LORAN-C	_____		
5. RADAR	_____		
6 GYROCOMPASS	_____		
7. SATNAV	_____		
8 OMEGA	_____		
9. DECCA	_____		
10 OTHER COMMUNICATION	_____		
11 OTHER NAVIGATION	_____		

11.0 SHIPBOARD SERVICES EQUIPMENT SUPPLIES

1. HANDLING EQUIPMENT

   PROJECT SUPPLIED _____ GUARDIAN SUPPLIED (Attach GUARDIAN Check List If Appropriate):

2. LABORATORIES REQUIRED

   PROJECT SUPPLIED _____ GUARDIAN SUPPLIED (Attach GUARDIAN Check List If Appropriate). _____

3. DIRECT DECK ACCESS _____

4. WINCH REQUIREMENTS

   PROJECT SUPPLIED _____ GUARDIAN SUPPLIED (Attach GUARDIAN Check List If Appropriate): _____

5. LIFTING GEAR

   PROJECT SUPPLIED _____ GUARDIAN SUPPLIED (Attach GUARDIAN Check List If Appropriate): _____

6. OTHER DECK EQUIPMENT: _____

7. ELECTRICAL POWER REQUIREMENTS

   Description and Location: _____

   _____

   _____

8. WATER REQUIREMENTS

   Fresh **Quality** **Distilled** **Quantity**

9. HYDRAULICS

   Pressure **Volume**

10 AIR

   Pressure ***Volume***

11. SMALL CRAFT

    PROJECT SUPPLIED _____ GUARDIAN SUPPLIED (Attach GUARDIAN Check List If Appropriate): _____

    IF PROJECT SUPPLIED, PROVIDE

    Size_____ Weight_____ O.B. Motor_____

    Purpose_____

    Will the Guardian need to carry the small craft? **YES** ____ **NO** ____

11.0 SHIPBOARD SERVICES EQUIPMENT SUPPLIES (Continued)

12. CREW ASSISTANCE - The crew of the Lake Guardian includes a Science Officer and Marine Technician who are responsible for operating the ship's science, sampling and laboratory equipment to facilitate your survey goals. There are also several professional seamen on board to handle the deck gear (cranes, winches, A-frames, davits, etc...) for your use. Beyond this scope however, it is requested that your scientific party include the appropriate number of personnel to complete the remainder of your project requirements

Rating (Type) _____ **Number of Personnel** _____

Rating (Type) _____ **Number of Personnel** _____

Rating (Type) _____ **Number of Personnel** _____

13. OTHER SHIP REQUIREMENTS:

1. _____

2. _____

14. SHORE SUPPORT MOBILIZATION FORCE:

Welders _____ **Riggers** _____

Mechanics _____ **Machinists** _____

Laborers _____

12.0 OPERATING

Sea State:	Wave Height	MAX	____	MIN	____		
Atmospheric Conditions:							
	Wind Speed	MAX	____	MIN	____	Direction	____
	Temperature	MAX	____	MIN	____		
	Cloud Cover	ANY	____	O'CAST	____	SUN	____
	Precipitation Permitted		____	Not Permitted	____		
	Visibility	MAX	____	MIN	____		
	Time of Day	ANY	____	DAYLIGHT	____	NIGHT	____

13.0 SCIENTIFIC PARTY

1. Point of Contact _____
2. Number of Personnel _____ Maximum Number of Persons to a Cabin _____

NAME	SURVEY RESPONSIBILITY	ORGANIZATION	TIME/PLACE OF ARRIVAL AND DEPARTURE
1)_____	_____	_____	_____
2)_____	_____	_____	_____
3)_____	_____	_____	_____
4)_____	_____	_____	_____
5)_____	_____	_____	_____
6)_____	_____	_____	_____
7)_____	_____	_____	_____
8)_____	_____	_____	_____
9)_____	_____	_____	_____
10)_____	_____	_____	_____

Please indicate below if any persons in your science party have taken any courses or obtained training and/or certification in

A.	Laboratory Health & Safety	B	Field Health & Safety
C.	Hazardous Materials Handling	D.	Emergency Spill Response
E.	Respiratory Protection	F.	Radiation Safety
G.	First Aid and/or CPR	H.	Fire Fighting
I.	Small Boat Handling	J	Lockout/Tagout
K	Crane/Derrick Operation	L.	Bloodborne Pathogens

NAME	TRAINING, COURSE OR CERTIFICATION OBTAINED	OBTAINED WHEN
1)_____	_____	_____
2)_____	_____	_____
3)_____	_____	_____
4)_____	_____	_____
5)_____	_____	_____
6)_____	_____	_____
7)_____	_____	_____
8)_____	_____	_____
9)_____	_____	_____
10)_____	_____	_____

COMMENTS: _____

14.0 PROPOSED REPORTING REQUIREMENTS

12. CREW ASSISTANCE

Debriefing Telephone Call: **YES** ___ **NO** ___ **No. Of Days After Demob.:** ____

Survey Report Due Date (20 Days After Demob.): _____

Final Report/Other Document Description. _____

Other Comments: _____

15.0 DIVING OPERATING

Locations: _____

Potential Hazards: _____

Depth Range. _____ Maximum Depth: _____

SURVEY PLAN

 Date: _____

Dive Master: _____ Organization: _____

Dive #2: _____ Organization: _____

Dive #3: _____ Organization: _____

Dive #4: _____ Organization: _____

Dive #5: _____ Organization: _____

Dive #6: _____ Organization: _____

Dive #7: _____ Organization: _____

Dive #8: _____ Organization: _____

Dives' Tasks: _____

_____

_____

REQUIREMENTS REMINDER:

OXYGEN WILL BE ON SITE ON BOTH THE GUARDIAN AND TENDER BOAT.

(Oxygen Will Be Provided By The GUARDIAN.)

STANDBY DIVER WILL BE SUITED UP IN THE TENDER BOAT READY TO DIVE.

(Dive Team Scheduling And Bottom Time Planning Must Allow For This)

GUARDIAN Anchored: **YES:** __ **NO:** __ Tender Boat Anchored: **YES:** __ **NO:** __

Communications: _____

Tender Boat. _____

Special Equipment Needed: _____

_____

Other: _____

_____

_____

16.0 DIVER EMERGENCY AID LIST

DIVERS ALERT NETWORK (DAN) **24-Hour Telephone No.:** **(919) 684-8111**

NEAREST DECOMPRESSION CHAMBER (Facility Name And Address): _____

_____

Telephone No.: _____ 24-Hour Telephone No : _____

Telephone Call On Day Of Initial Diving Operations To Be Made By: _____

Hyperbaric Physician(s): _____ Telephone No.. _____

NEAREST HOSPITAL (Facility Name And Address): _____

_____

Telephone No.: _____ 24-Hour Telephone No : _____

Hyperbaric Physician(s): _____ Telephone No.: _____

NEAREST COAST GUARD STATION (Facility Name And Address): _____

_____

VHF Channel. _____ Telephone No.: _____

FIRST AID EQUIPMENT: _____

Location: _____

Oxygen Location: _____

DIVER MEDIC (Name If Planned): _____

SPECIAL CONSIDERATIONS: _____

_____

_____

_____

_____

_____

_____

_____

_____

APPENDIX P: WELCOME ABOARD AND SAFETY ORIENTATION

WELCOME ABOARD THE R/V LAKE GUARDIAN

The United States Environmental Protection Agency, Seaward Services, Inc. and the Master, officers and crew of the R/V Lake Guardian welcome you aboard. We hope your stay on board will be a pleasant one. Our goal will be to assist you to bring your research programs to a safe and successful conclusion.

We appreciate your cooperation in accomplishing this goal and we ask that you review the material in this handout. Should you have any questions or encounter problems regarding the items presented herein, please bring them to the attention of the ship's Master via the Chief Scientist.

This informational handout will provide some essential facts and useful information to ensure you have a safe and comfortable voyage. Please do not hesitate to ask questions concerning any subject about the ship. We will be happy to provide explanations and/or demonstrations when possible. If you find you are having a problem, please bring it to the attention of the ship's Master (Captain), the Mate on watch or the Chief Scientist.

OPERATING AUTHORITY

The R/V Lake Guardian is operated for and under the control of the USEPA's Great Lakes National Program Office. An operating crew of professional seamen is furnished by Seaward Services, Inc. Lab support is provided by personnel from Enviroscience. Lab and ship safety overview is provided by USEPA appointed Chemical Hygiene Officer. When the ship is at sea, a senior scientist from USEPA/GLNPO is assigned responsibility for all scientific operations and activities aboard the ship, in conjunction with the ship's Master. For all ship operations and safety at sea, the Master has full legal authority and thus has final control of all ship movements.

MISSION

The R/V Lake Guardian's mission is to gather information about the chemical and biological conditions of the Lakes, and to monitor the pollutant concentrations in water, sediments, air, fish and other biological matter. On occasion, the ship may be provided for use for other scientific interests, including research activities of other federal, state and local agencies as well as academia.

GENERAL DESCRIPTION

The R/V Lake Guardian is USEPA's newest, largest and cleanest surveillance and monitoring vessel. It was converted in 1990 from a former offshore oil field service vessel originally built in 1981. During the conversion period, all of the structures aft of the exhaust stacks were added. In 1991, the four container labs and the HVAC (heating, ventilation and air conditioning) van were added to the ship, as well as the large stern A-Frame. The ship is 180 feet in overall length, with a beam (width) of 40 feet. Depending on loading conditions, it can have a draft (underwater portion of hull) of up

to 11 feet. Lake Guardian is powered by two 1125 HP Caterpillar diesel engines, each driving its own propeller shaft. Electrical power is provided by three 135 KW Caterpillar diesel engines. A bow thruster, powered by a 300 HP Caterpillar diesel engine, aids in the ship's ability to maneuver in close quarters. It is also used in station keeping. When operating at full power, the ship can make 13 miles per hour and may consume in excess of 100 gallons of fuel per hour.

LABORATORIES AND SCIENTIFIC EQUIPMENT

There are three fixed laboratories located aboard the R/V Lake Guardian: chemistry lab (main deck -port side), microbiology lab (main deck - starboard side), wet lab (main deck-port side aft part of deckhouse). In addition, there are four portable (container) labs mounted on deck which are accessed from the passageway connected to the wet lab. These labs, from forward to aft, are the organic extraction lab, organic analytical lab, primary productivity lab, and the hazardous materials storage locker.

Located on top of the organic extraction lab is the HVAC van. (This unit contains machinery to support the analytical and extraction HVAC systems and no science personnel user equipment is contained inside. Science personnel are requested not to enter this space). The equipment and instruments contained in these labs are primarily for support of the basic monitoring function of the ship. Some or all of this equipment may be made available for use by guest scientists at the discretion of the USEPA Project Officer, Chief Scientist or his designated representative.

RESPONSIBILITY OF THE MASTER

The ship's Master (Captain) assumes responsibility for the safe operation and navigation of the ship. He is responsible for the safety of all personnel on board and may curtail, delay or cease all operations if, in his judgement, the vessel, personnel or equipment are in jeopardy. The Master will confer with the Chief Scientist in making decisions at these times, and will comply with the test plan so far as possible to achieve the goals set forth therein.

STANDARD OPERATING PROCEDURES

A manual of Standard Operating Procedures (SOP's) is located on the main deck passageway. Included in this manual are procedures for performing certain functions aboard the vessel which could endanger the safety of personnel or equipment. At their earliest opportunity, all scientific personnel should read and become familiar with these procedures. Further, in the laboratory office is the **USEPA GLNPO Health, Safety and Environmental Compliance Manual**. Again, it is incumbent upon all scientific personnel to become familiar with this manual and to abide by the requirements contained therein.

LIFE ABOARD THE R/V LAKE GUARDIAN

Knowledge of the ship's layout will assist you in accomplishing your daily activities, and is vital in determining the appropriate response for emergency situations, both real and simulated. Please study

the deck plans, note the locations of fixed fire stations, life rings, portable fire extinguishers and abandon ship stations.

Because of the R/V Lake Guardian's unique mission, schedules and routines are inherently rigid. It is suggested that you keep abreast of vessel movements, scientific activities and the weather so that you are aware of emerging conditions which may affect you and/or your work aboard the ship.

The R/V Lake Guardian has berthing for up to 43 persons, including the crew. Most staterooms set aside for scientific personnel have two fixed bunks (upper and lower) as well as a fold down pullman bunk for a third person. These pullman bunks are used only when a maximum complement of personnel are carried aboard. When this situation arises, some scientists and crew members may have to share accommodations. Stateroom assignments are made jointly by the ship's Master and the Chief Scientist.

Each stateroom and bunk contains a card which designates the emergency mustering location for the persons in that stateroom. Located on the back of each stateroom door is a diagram showing the occupants of that room the quickest means of egress. You should become familiar with this diagram soon after being assigned your stateroom.

During the course of your cruise, you will be asked to participate in emergency preparedness drills in concert with the ship's operating crew and USEPA personnel. Emergency drills are a most important and very necessary part of shipboard life, since they serve to ensure that you and your shipmates are properly trained in the event of an emergency or casualty to an individual or to the ship. You will be instructed on how to abandon ship, how to "muster" in one location should a fire occur (in order to account for everyone), how to report a man overboard, how to operate a hand-portable fire extinguisher, how to deploy a life ring, how to don a survival suit and life jacket.

Drills can be perceived as a nuisance to some, since at times some individuals will be inconvenienced by having to participate in drills during their off-duty hours. Although some drills are unannounced, we try to schedule them within a five hour period between 1000 and 1500, and/or while the ship is not engaged in sampling operations.

PRE-BOARDING PREPARATIONS

Science personnel should allow sufficient time prior to the departure date to turn in rental cars, load equipment, prepare their staff, check supplies, etc.. Use your enclosed Pre-Boarding Check Off-Sheet to ensure that you have adhered to the minimum standard requirements and guidelines. Sailing time may be delayed at the Masters discretion, if science/technical personnel report aboard in a condition which he considers unsafe. Further delays in sailing are announced should equipment malfunction occur, or when late deliveries of equipment and supplies are experienced. Current or forecast weather conditions may also delay sailing time.

REPORTING ABOARD

Plan to report aboard at least one hour before sailing time. Upon arrival you should report to the First Mate, who will sign you aboard and provide an orientation of the vessel's physical arrangements including assigned berthing area. In addition, please supply the Chemical Hygiene Officer with your chemical inventory and provide all necessary Material Data Safety Sheets (MSDS's). For your safety, you are required to accomplish the following immediately after receiving your stateroom assignment.

- Ensure that your life jacket is in place near your bunk.
- Ensure that your survival suit is in place near your bunk.

Shortly after reporting aboard for your cruise, you will either be given a safety orientation by the Captain of the ship or the Chemical Hygiene Officer, or you will attend the presentation of a safety video produced exclusively for the R/V Lake Guardian. It is imperative that you attend this orientation or video when scheduled, and pay close attention to what the Captain has to say - someday your life or that of your shipmates may depend on it!

Refer to a nearby station bill and find your assigned life raft as well as your fire and abandon ship stations. Station bills are located at several areas throughout the ship. These areas include the Captain's office, focsle deck, mess deck, passageway outside of the biology and chemistry labs and the pilot house.

Become familiar with the signals for fire and abandon ship (you will hear these in the safety video); a drill will be conducted upon departure from the first port and at least once per week thereafter.

> ***Safety Rule:*** *One hand for you, and one hand for the ship*. This means that when carrying large or bulky items, you should always have one hand available and ready to grab a safe handhold in case the vessel suddenly rolls, or if you lose your balance. This may mean making several trips with your gear or asking a shipmate to help you. Similarly, keep safe handholds in mind so you can grab for them automatically if you must clutch for support.

WORK DECK

The Chief Scientist or his designated representative will advise the Master of any sampling, launching, streaming or retrieval activity required. The ship's cranes, winches, tools, rigging, etc. are to be operated by ship's crew only; however during extended operations scientific personnel may be asked to participate in these evolutions. Scientific personnel should direct all inquiries to the Master through the Chief Scientist in matters concerning work on deck, navigation, safe working parameters, use of ship's equipment, etc. Use of this procedure will avoid working at cross-purposes.

BERTHING ARRANGEMENTS

Scientific personnel quarters are located as follows:

Focsle Deck - Five staterooms port and starboard aft of the fire door.
Main Deck - One stateroom starboard side between the forward fire doors.

Berthing assignments for these spaces are made by the First Mate or Chief Scientist. Linens, towels, etc. will be provided when you arrive on board. Upon departure from the vessel, kindly strip your bunk and store the soiled linen in the laundry basket provided near the washing machine on the port side of the main deck, forward. Fresh linen will be issued once per week, the time of which will be announced in advance.

MESSING

Our cook and steward prepare and serve varied and nutritious meals for our crew and the embarked scientific party. Normal meal hours are as follows:

Breakfast: 0730-0830 Lunch: 1130-1230 Dinner: 1700-1800

When large numbers of personnel are carried aboard, it is requested that meals be eaten comfortably but quickly. Eat and enjoy your meals but please do not "dally in the galley". We have seating for 19 but on occasion must feed up to 43 personnel. Located adjacent to the coffee pot is a rack on which to stow your personal coffee mug. You are responsible for washing your own mug after each use.

We request that the mess area be vacated by all personnel 30 minutes before and after each meal in order that the steward have ample space to prepare the area for meals and to square away after meals. Certain other amenities are expected and required:

1. Appropriate clothing shall be worn to meals; this includes shirt and shoes.

2. Traditional shipboard protocol dictates that hats, caps and other headgear be removed when entering the mess area while the ship's company is at mess.

3. Some late arrivals to meals due to watch standing can be expected; however, general nonconformity with the meal schedule is considered poor form. Ship's crew reporting for watch on occasion may be served ahead of someone who has been waiting. Since the crew must report on time, your consideration of this possibility will be appreciated.

4. Anyone on a special diet or who has a need to eat late, should notify the cook and you will be accommodated.

5. When entering the mess area for meals, neither space nor sanitary considerations permit visits to the galley to look things over. A menu is posted on the whiteboard. Take your dinnerware from the dispensers provided and proceed to the salad bar and hot table and then the seat of your choice.

6. At all times, the mess area is designated a no-smoking area, as are all interior spaces aboard the ship.

7. No food is permitted in the lounge during mealtimes; however, snacks are permitted in the lounge between meals and in the evening.

8. Night rations are available and located in the small refrigerator below the salad bar which is designated for your use during other than meal hours. Feel free to partake of the cold cuts, leftovers, fruit and soft drinks provided. Please cover, label and date any food items returned to the refrigerator. In addition, do not store any food items in the steel, tin or aluminum cans from which they were obtained.

9. Except for your personal coffee mug, do not hand wash dishes or cups, but leave them in the cart provided. They will be properly cleaned and sanitized in the dishwasher.

The stainless steel refrigerator in the galley and the walk-in refrigerator and freezer contain food for preparation of regular meals. We request that you do not open these units, but rather ask the cook for any item which you cannot find in the salad bar refrigerator. We further request that any mess gear used outside of normal meal hours be scraped clean by the user and placed in the cart provided for dishes and utensils to be cleaned.

WASHING MACHINES AND DRYERS

Washing machines and dryers are provided and available for the use of all personnel aboard. The washing machines should only be used when you have a full load; use for partial loads will deplete the ship's fresh water supply and holding capacity. Use less than ½ cup of detergent for a full load; additional soap creates heavy sudsing which strains the machine and can leave residue in your clothing. Low phosphate detergent is provided for your use by the ship; do not use other types of soap in the washing machine. The washing machines may be used while the ship is on station and collecting samples since the ship has the ability to contain all waste water.

Personal use of the washers and dryers is permitted within the following format:

a. Write name on space provided with attached erasable pen.

b. Remember that all washing machine water drains into our sanitary holding tank thus reducing our time at sea. Therefore, in order to conserve water and sanitary tank capacity, we ask that you bring enough clean clothing such that you do not need to continually wash your clothes.

c. Do not overload or underload these machines.

d. Keep track of finish times and promptly remove clothing from machines to allow others to use them.

e. Lastly, make sure machines are empty and that lint screens are clean.

f. Again, prior to final departure, please strip your bunk and place all your dirty linens inside of your pillowcase and deposit in the laundry room.

POTABLE WATER AND SEWAGE CAPACITY

The potable water and sewage holding capacity onboard the R/V Lake Guardian is severely limited. The showers, sinks, washing machines and toilets drain into a holding tank (for later transfer ashore).

The following guidelines are set forth to ensure conservation of resources:

1. Flush toilets only when required for human waste; all other disposable materials should be placed in a waste container. Do not place sanitary napkins or any other foreign articles in toilets.

2. Also, please wait and make sure your toilet finishes flushing after use. Because our toilet system uses lake water and is sometimes loaded with sand particles, the valves occasionally do not close and we will have a toilet that continually flushes. As a result, the holding tank will fill prematurely. Call 911 (Bridge) to report a running toilet, leaking shower, basin, or any other leaking pipe.

3. Due to limited sanitary capacity, please limit your showers to one per day and conserve water where possible. Each shower head is equipped with a mixing valve. In order to control the water temperature turn the handle counterclockwise to increase the temperature and clockwise to decrease the temperature.

CLEANLINESS

Cleanliness of the vessel is an "all hands" evolution. Our limited crew size demands that each person on board do his share to assist in maintaining clean, neat and orderly conditions. Personnel assigned to each space are responsible for the cleanliness of that space, including staterooms. Public areas of the vessel (heads, passageways, mess area, etc.) are assigned to members of the crew for cleaning. However, when you leave the lounge area, please remove all trash and return books, games, snacks, etc. to the racks. Leave the lounge ready for the next person. Your cooperation in this matter will be appreciated.

Upon final departure, please do not remove or take any items belonging to the ship as a souvenir. We are held accountable for all government property, and the next group to sail with us may need to use these items.

PERSONAL POSSESSIONS

Seaward Services, Inc. cannot be responsible for the loss of personal effects. Items of significant value should be left ashore, or given to the ship's Master for storage in the ship's safe.

COMMUNICATIONS

Daily radio or cellular telephone contact is made with the GLNPO office and occasionally, with Seaward Service's office. The Master can handle routine or emergency traffic via the marine operator as may be required. Personal and business calls will be made by credit card or collect only, unless prior arrangements have been made to pay for this service.

Use of the cellular phone, when activated and in a coverage area, is for government and business use only. Permission to use the phone must be obtained from the Master or Chief Scientist and all calls must be logged.

SMOKING

In an effort to maintain the enclosed spaces of the ship as "sweet smelling" as possible, we insist that smokers restrict this habit to designated outside areas.

FUELING

There is absolutely no smoking allowed when we are taking on fuel. Whenever the vessel is taking on fuel, as evidenced by the red "bravo" flag flying by day, or by a red light on the mast at night, the smoking lamp shall be extinguished throughout the vessel. Announcements shall be made to further warn personnel when fueling operations are being conducted. When completed, the smoking lamp will be re-lit.

ALCOHOLIC BEVERAGES AND ILLEGAL DRUGS

Alcoholic beverages and illegal drugs in any form will not be consumed or brought aboard by any persons. Any personnel found to be in violation of this regulation will have the substance confiscated and upon arrival at the next port will be discharged from the vessel. Further, any person found to be in violation shall be reported to the local authority and prosecuted to the full extent of the law.

FIREARMS

Firearms are prohibited onboard the R/V Lake Guardian at all times.

TOURS OF THE VESSEL BY THE PUBLIC

The R/V Lake Guardian is funded by taxpayer dollars and an effort is made by USEPA and Seaward Services, Inc. to insure that the vessel is available to the general public on a not-to-interfere basis with scientific operations, repair and maintenance work or crew privacy. With this in mind, scientific and crew personnel desirous of providing individuals a tour of the vessel must first check with the Master or the USEPA Project Scientist before conducting such a tour. We request that tours be conducted only during the hours of 0900-2000, with the exception of mealtimes. Only public areas (lab passageways, pilothouse, open deck areas) of the vessel may be shown. Berthing areas are off limits for tours, except for unoccupied cabins which may have open doors for viewing purposes only. Visitors should not enter the cabins. Ship's company abrogating this simple courtesy will be subject to immediate discharge from the vessel.

IN CONCLUSION

This Welcome Aboard handout has been provided for your use in becoming familiar with the Lake Guardian and its operation. Although it is a relatively large ship, after several weeks at sea it can sometimes seem mighty small, especially to individuals without any previous seagoing experience. However, if we all work as a team and everyone does his/her own job (and Mother Nature smiles upon us), we can all expect another rewarding experience, both personally and professionally.

Once again, **WELCOME ABOARD!**

APPENDIX Q: MARINE SANITATION STANDARD OPERATING PROCEDURE

Attachment 1

R/V LAKE GUARDIAN STANDARD OPERATING PROCEDURE FOR FREE AVAILABLE CHLORINE TEST OF POTABLE WATER SYSTEMS

It has been recommended by the Naval Hospital Occupational Health and Preventative Medicine Department that Free Available Chlorine (FAC) tests shall be performed aboard the Lake Guardian. This test will be performed by the E/T or M/T prior to shore to ship connection of the potable water hose. In addition, this test will be performed 30 minutes after the water has settled in the vessel's tanks and is to be collected at the riser.

In accordance with the "Manual of Naval Preventative Medicine Standards" a FAC level of 0.2 ppm should be maintained in the vessel's tanks, and a trace level reading should be maintained throughout the ship's distribution system.

Free Available Chlorine Test Procedure for Potable Water

This procedure uses the DPD (N,N-Diethyl-p-Phenylenediamine) Method with 13 mm viewing depth tubes in the Orbeco-Hellige Pocket Comparator No. 605.

1. After letting the line flush for 1-2 minutes, fill one of the test kit tubes with water to 10 ml line. Insert into the top left side opening of comparator (next to hinge). This tube will serve as compensation for sample color or turbidity (blank).

2. Rinse a second tube with water, leaving just enough to moisten tablet when added.

3. Add one DPD No. 1 Tablet and crush with plastic stirring rod.

4. Remove rod. Fill tube with water sample to 10 ml line and mix using stirring rod. Insert this tube into the right-hand opening in the comparator.

5. Place DPD disc in comparator, revolve until a match is obtained between one of the glass standards and the test solution. The result in parts per million (milligrams per liter) of FREE AVAILABLE CHLORINE is read directly from the figure appearing in the upper opening at the right side of the front cover of the comparator.

HIGHER RANGE EXTENSION

Chlorine residuals greater than the highest value on a color disc may be easily tested by diluting the sample with distilled or deionized water. For example, the DPD tablet is dissolved in 5 ml of the distilled or deionized water, to which sample is added to the 10 ml line. The reading obtained, is multiplied by the dilution factor 10/5 = 2. Likewise, if 2 ml of sample is added to 8 ml of distilled deionized water, in which a tablet has been dissolved, the reading obtained is multiplied by 10/2 = 5.

DIRECTIONS FOR USE OF THE ORBECO-HELLIGE POCKET COMPARATOR

To insert a Color Disc, open the front cover of the comparator and place the center of the disc on the ring with the numbers facing outward. With the cover closed, the numbers are so arranged that only one result number is visible when a standard is completely centered in the field of view.

The observation fields for colorimetric comparison are seen through the two central openings. These appear as concentric half-fields through the Magnifying Prism Attachment. The right-hand field shows the tube containing treated sample which is placed in the right-hand opening at the top of the comparator. The left-hand field shows one of the color standards and the tube containing the "blank" (usually clear water or untreated sample - sometimes called the "compensation tube"), which is placed in the left-hand top opening. This "blank" eliminates possible errors due to color or turbidity in the sample fluid, and the preparation is covered in the procedure supplied with each Color Disc.

In tests where only 5 ml of sample is utilized, insert the tube only sufficiently to permit the color of the solution to be seen in the right-hand field. After the tubes are in the comparator, color comparison is accomplished by rotating the disc so that one standard after another is brought into the left-hand field, and until a color match is achieved.

When using a Pocket Comparator equipped with a Magnifying Prism Attachment, the color fields should be viewed with the eye in line with the center of the lens at approximately 10 inches viewing distance. The half-fields should be free of shadow effect, which is caused by off-center or oblique observation. For best results, rest the eyes between readings, preferably by viewing a gray or green background. CAUTION: DO NOT PLACE THE EYE CLOSE TO THE PRISM OR PROLONG OBSERVATION BEYOND 10-15 SECONDS.

When a color match is obtained with one of the Standards, the result is read directly from the figure seen through the opening at the right side of the front cover. If the color of the test solution is intermediate between two Standards, the value may be estimated by interpolating between the corresponding values.

For comparisons in daylight, northern exposure is best, but any indirect lighting from outdoors usually is satisfactory. Direct
sunlight should always be avoided, and while making color comparisons, the opal glass at the back of the comparator should directly face the light. Care should be taken to avoid nonuniform illumination of the two light fields from pronounced shadows.
Cleanliness is most important in all colorimetric measurements. Observing some simple cleanliness guidelines will save time and effort. The Comparator, Prism Attachment and Color Disc should always be kept clean. Should solutions be accidentally spilled in the Comparator, the back cover should be opened and interior cleaned, and the interior of the opal glass cleaned periodically regardless. Drying the outside of the Precision Tube before insertion will help minimize dirt or corrosive effects on the interior parts. Should a squeaking noise occur when the front or back cover are opened, it can be corrected by placing a drop of oil along the inner hinge rim.

FREE AVAILABLE CHLORINE TEST
R/V LAKE GUARDIAN

SAMPLE MEDIA: 13mm viewing depth tubes in Orbeco-Hellige Pocket Comparator.

DATE/TIME	LOCATION	RESULTS	PASS/FAIL	TASTE OR ODOR PROBLEMS (Y OR N) IF YES, RESOLUTION/COMMENT	SIGNATURE

STANDARD OPERATING PROCEDURE FOR BACTERIOLOGICAL TESTING OF POTABLE WATER (PRESENCE/ABSENCE TEST)

Product Use:
Colilert is used for the simultaneous detection, specific identification and confirmation of total coliforms and *E. coli* in water.

Principle:
Colilert is based on the Defined Substrate Technology (DST). DST utilizes indicator-nutrients which cause target microbes contained the sample and incubated in the DST reagent system to produce a color change (or another signal, i.e., fluorescence), both indicating and confirming their presence. The indicator-nutrient is cleaved by the target microbe which metabolizes the nutrient and frees the indicator to express a specific color. The growth and reproduction process of the target microbe if fueled by the nutrient.

Colilert is a specially designed reagent formulation of salts, nitrogen and carbon sources that are specific to total coliforms. It provides specific indicator nutrients: ONPG (O-Nitrophenyl-β-d-Galactopyroniside) and MUG (4-Methyllumbelliferyl-β-d-Glucuronide) for the test microbes, total coliforms and *Escherichia coli.* As these nutrients are metabolized, yellow color (from ONPG) and fluorescence (from MUG) are released confirming the presence of total coliforms and *E. coli* respectively. Non-coliform bacteria are suppressed and cannot metabolize the indicator nutrients. Consequently, they do not interfere with the specific identification of the target microbes during the test incubation period.

Performance Characteristics:
Total coliforms and *E. coli* are specifically and simultaneously detected and identified at 1 CFU/100 mL of sample, in 24 hours or less, by inoculating the reagent with the water sample and incubating it. No further sample manipulation or testing is required. Field and in-house data show Colilert to be sensitive and specific for the detection of total coliforms and *E. Coli* at the 1 CFU/100 mL level in water samples with as many as 20,000 heterotrophic bacteria present per mL.

Materials Required:
1. 35 ± 0.5°C Incubator
2. Long wavelength (365nm) ultraviolet lamp.
3. Color and fluorescence comparator.
4. 120 mL sterile high clarity polystyrene vessels with 100 mL fill line and screw caps with sodium thiosulfate
5. Colilert reagent tubes. Each tube provides reagent sufficient for 100 mL water sample.

Storage and Shelf Life:
Store and 4-30°, away from light in a cool, dry environment. Colilert is stable under these conditions for at least 15 months from date of manufacture.

Sample Collection:

When the sample is collected, leave ample air space in the bottle (at least 2 5 cm or 1 in.) to facilitate mixing of the sample by shaking, preparatory to examination. Care must be exercised to take samples that will be representative of the water being tested and to avoid contamination of the sample at the time of collection or in the period before examination.

The sample bottle shall be kept unopened until the moment it is to be filled. Remove the cap as a unit, taking care to avoid soiling. During sampling, do not handle the cap or neck of the bottle and protect them from contamination. Hold the bottle near the base, fill it without rinsing, replace the cap immediately and secure the cap.

The samples of water should be collected once a week from two locations throughout the ship. One sample should be taken from a forward or aft tap on the focsle deck, and the other sample should be taken from a tap on the 01 deck at the opposing end (fore or aft) of where the first sample was taken. In addition, one sample per month should be collected from alternating potable water tanks in the engine room. The tap should be opened fully and the water allowed to run to waste for 2-3 minutes or for a time to permit clearing of the service line. The flow from the tap should be restricted to one that will permit filling the bottle without splashing. Leaking taps that allow water to flow over the outside of the tap must be avoided as sampling points.

Procedural Notes:

1. Avoid touching or otherwise contaminating the reagent or the inside of the reaction vessels or caps.
2. Colilert is for analytical testing only.
3. Adhere to good laboratory practice throughout the testing procedure.
4. Thoroughly mix all samples immediately before inoculating.
5. Never autoclave Colilert prior to use. This process will destroy the reagent system, which is heat labile.
6. Avoid prolonged exposure of the inoculated Colilert to direct sunlight. The indicator compounds may be hydrolyzed, creating a false-positive (yellow) result.
7. After inoculation, Colilert should be incubated for 24 hours at 35 ± 0.5°C. Avoid incubation at this temperature beyond 28 hours because heterotrophic bacteria present my overcome the suppressant systems after this time, yielding a false positive. Yellow color after the 28 hour incubation period should be verified or the sample repeated.
8. Colilert is a primary water test. Colilert performance characteristics do not apply to samples altered by any form of pre-enrichment or concentration. This includes any method such as growth on a membrane filter or growth in lactose based broth in which there is a non-specific growth enhancing step, or any pre-filtration method such as filtering the sample through a membrane filter and then using the filter to inoculate in Colilert.
   a. Do not transfer colonies or cultures pre-grown in any enrichment media to Colilert. Colonies grown in such non-specific media may or may not be coliforms. Colilert's suppressant reagents may be overloaded by transferring such heavy inocula of certain very weak β-galactosidase containing non-coliforms (e.g., some *Aeromonas* and *Pseudonmonas*), causing a false positive total coliform result. Similarly, transfer of high numbers of other heterotrophs (for example, Flavobacterium) can cause a false positive β-glucuronidase fluorescence and inaccurate indication that E. coli is present. While one would not normally expect to encounter such extremely high levels of heterotrophs in a water sample, pre-enrichment could produce them.

b. Do not pre-filter a sample and then place that filter in Colilert. The filtration step can concentrate coliforms but also non-coliforms, heterotrophs, particulates, and certain chemicals (divalent cations, heavy metals, etc.) which can overlay and suppress coliforms adversely affecting the sensitivity of the test. Furthermore, coliform bacteria can become trapped in the filter, restricting their access to the indicator-nutrients in the Colilert reagent and their subsequent growth and detection.

9. Do not dilute sample in buffered water for addition to Colilert. Colilert is already buffered and additional buffer compounds can adversely affect the growth of the target microbes and test performance.
10. If additional confirmation is desired after incubating 24 to 28 hours and reading results, transfer 0.1 mL with a pipet to EC + MUG or other confirmation media.
11. Upon mixing of Colilert reagent with the sample, a transient blue color may appear in containing 40-50 times the amount of free chlorine normally found in drinking water. The sample should be considered invalid and testing discontinued.
12. High calcium salt concentrations in certain waters may cause a slight precipitate. This *should not* affect results.

Test Procedure:

1. Aseptically open a tube of Colilert reagent and add the contents to a 100 mL water sample in a sterile, transparent, non-fluorescent borosilicate glass container or high clarity polystyrene sterile vessels.
2. Shake vigorously be repeated inversion to aid dissolution of the reagent. Some particles may remain undissolved. Dissolution will continue during incubation.
3. Incubate reagent/sample mixture at 35 ± 0.5°C for 24 hours.
4. Read the reaction at 24 hours. If yellow color is seen, check for fluorescence. Color should be uniform throughout the vessel. If not, mix by inversion before reading.

Test Results and Interpretation:

At 24 hours, compare each reaction vessel against the color comparator dispensed into an **identical vessel**. If no yellow is observed, the test is negative for total coliforms and *E. coli.* If the sample has a yellow color greater or equal to the comparator, the presence of total coliforms is confirmed.

If yellow is observed at 24 hours, check each vessel for fluorescence by placing it three-five inches from the U.V. lamp. Observe for fluorescence in a dark environment. If fluorescence if vessel(s) is greater or equal to fluorescence of the comparator, the presence of *E. coli* is specifically confirmed.

The comparator is the lowest level of yellow and fluorescence which can be considered positive. A typical positive test is much more intense than the comparator.

If a sample is yellow after 24 hours if incubation, but slightly less than the positive comparator, it may be incubated up to an additional 4 hours. If the sample is coliform positive, the color will intensify. If it does not intensify, consider the sample negative. Some water samples containing humic material may have an innate color. If a water sample has background color, compare inoculated Colilert vessel to a control blank of the same water sample.

If an inoculated Colilert vessel is inadvertently incubated *over 28 hours* - the following guidelines apply: No yellow after this incubation period should be verified or the test repeated.

Quality Control Procedures:

Routine quality control should be conducted on each lot of Colilert received to ensure integrity and proper product performance.

Recommended Procedure:

1. Aseptically empty contents of a tube of Colilert into a sterile vessel containing 100 mL sterile distilled water Mix thoroughly to aid dissolution.
2. Aseptically aliquot one-third of the sterile water/Colilert mixture into each of 3 sterile transparent (but non-fluorescent) borosilicate glass water collection/culture vessels or equivalent.
3. Label the vessels "*Escherichia coli*," "*Klebsiella pneumoniae*," and "*Pseudomonas aeruginosa*," respectively.
4. Touch a sterile inoculating loop to an 18`-24 hour pure culture slant of one of the bacteria listed. (Alternately, ATCC strains below may be used as source of inoculum).
5. Transfer the inoculum to the appropriately labeled Colilert vessel.
6. Repeat steps 4 and 5 for the two remaining control organisms.
7. Incubate the inoculated Colilert vessels at 35 ± 0.5°C for 24 hours.
8. Results should be observed within 24 hours as follows:

E. coli - Yellow and fluorescent (ATCC #25922, 11775 or equivalent).

K. pneumoniae - Yellow, no fluorescence (ATCC #9997 or equivalent).

Pseudomonas aeruginosa - No color, no fluorescence (ATCC #10145 27853 or equivalent).

ATCC (American Type Culture Collection, 1-800-321-0207)

R/V LAKE GUARDIAN
POTABLE WATER PRESENCE/ABSENCE TEST

SAMPLE MEDIA: COLILERT* PA PRESENCE/ABSENCE TEST

DATE	SAMPLE I.D.	LOCATION	START INCUBATION	END INCUBATION	RESULTS	PASS/FAIL	SIGNATURE

COMMENTS: _____

_____

_____

_____

*Colilert is referred to as MMO-MUG by the EPA in the Federal Registry and as Chromogenic Substrate by *Standard Methods*

R/V LAKE GUARDIAN FREEZER/REEFER LOG

_____MONTH YEAR _____

DAY	FREEZER	AM / PM		REEFER		AM / PM	
1							
2							
3							
4							
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R/V LAKE GUARDIAN
ICE MACHINE CLEANING

DATE	DRAINED	DISINFECTED	INITIALS

APPENDIX R: U.S. EPA GREAT LAKES NATIONAL PROGRAM OFFICE *R/V LAKE GUARDIAN* HAZARDOUS MATERIALS / HAZARDOUS WASTE CONTINGENCY PLAN

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ATTACHMENTS

Attachment 1: Waste Stream Analysis

Attachment 2: Laboratory Floor Plan

Attachment 3: Chemical Storage by Room

Attachment 4: Emergency Phone Numbers

Attachment 5: Emergency Equipment Locations

Attachment 6: Emergency Response Team

Attachment 7: OSHA 29 CFR 1910.120 Health & Safety Plan Compliance Procedures

Attachment 8: Notification To Emergency Assistance Authorities

R/V LAKE GUARDIAN LABORATORIES
HAZARDOUS MATERIALS/WASTE CONTINGENCY PLAN

This contingency plan has been developed to address emergencies which may occur relating to hazardous waste generated in the laboratory and hazardous materials used in the laboratory. The plan is designed to minimize hazards to human health and the environment from fires, explosions, or any unplanned sudden or inadvertent release of hazardous waste or hazardous materials affecting the vessel, air, soil, or surface water.

Copies of this contingency plan have been distributed to emergency assistance authorities indicated in **Attachment 8**.

I. DESCRIPTION OF FACILITY AND ACTIVITIES

The *Lake Guardian* is a research vessel owned by the U.S. Environmental Protection Agency and operated by the EPA's Great Lakes National Program Office (GLNPO) in conjunction with other scientific monitoring and surveillance programs. The home port of the *Lake Guardian* is located at 24 Sixth Street in Bay City, Michigan. The ship has been equipped with three permanent laboratories and can accommodate as many as eight portable laboratories. Sailing operations are administered by an 13 member crew and, at any one time, as many as 29 scientists may be on board to conduct research.

The *Lake Guardian* laboratories provide research services supporting the Clean Water Act and the Great Lakes Water Quality Agreement between the U.S. and Canada. Most water and sediment samples taken from the Great Lakes are prepared and analyzed in the laboratories aboard ship. A variety of chemicals are stored on the ship to facilitate appropriate testing. Most of these chemicals are in small quantity.

The laboratories may generate specific hazardous wastes depending on the type of analysis being done on board the vessel. Generating a combined total of less than 100 kg. of hazardous waste per month, the laboratories are considered under the Resource Conservation and Recovery Act (40 CFR 260-263) to be a conditionally exempt waste generator. The laboratories, however, are prepared to comply with the RCRA small quantity generator requirements. All such wastes are designated for off-site disposal and consist of the following waste streams:

1. Acidic waste from metals preparation and metals standards. This waste contains hydrochloric acid and/or nitric acid and metals.

2. Basic or neutral waste from chlorine or ammonia analytical systems. This waste contains sodium hydroxide and/or phenol.

3. Organic solvent waste containing less than 50 mg/l PCBs.

4. Low level radioactive waste.

5. Acidic wastes from Dissolved Oxygen studies and Dissolved Organic Carbon studies.

6. Formaldehyde from Biology Studies

See **Attachment 1** for waste stream analysis.

II. HAZARDOUS MATERIAL STORAGE

Hazardous materials are stored in the Hazardous Materials Locker and in the laboratories. The laboratories maintain small quantities of reagents and chemicals used on a daily basis. All other storage is in the locker. Refer to **Attachment 2** for a diagram of the laboratories and **Attachment 3** for specific storage locations.

III. HAZARDOUS WASTE STORAGE

Hazardous wastes are stored in three areas consisting of the satellite storage area, the primary storage area, and the interim or secondary storage. Storage and labeling methods for each area is as follows:

A. Satellite Storage

Hazardous waste generated during preparation and analytical operations is temporarily stored in the laboratory where it is generated.

The acidic and basic hazardous wastes are stored in polyethylene containers and the organic solvent hazardous waste is stored in flammable liquid storage containers. Each waste container is labeled and coded with NFPA label or colored label. The wastes are color-coded as follows:

1. Red - Acid waste from metals preparation and metals standards;

2. Blue - Basic or neutral waste;

3. Purple - Organic waste solvents containing more than 50 mg/l PCBs;

4. Green - Organic waste solvents containing less than 50 mg/l PCBs.

5. Orange - Flammable Solvents

B. Primary Storage

The primary storage area for all hazardous wastes is the Hazardous Materials Locker. This room is also the storage area for all hazardous materials prior to their use in the laboratories. The locker is divided into two storage areas, one containing the storage cabinets for corrosives and poisons and the other containing the cabinets for flammables. The storage areas are separately diked and a dry chemical fire suppression system has been installed.

C. Interim or Secondary Storage

Secondary storage at a land facility has been proposed. Until that storage area is completed, interim storage is currently maintained at the Sears Warehouse in Bay City, Michigan. Transport of hazardous waste or materials to interim storage may be performed only by EPA personnel following the established transport guidelines.

IV. IMPLEMENTATION OF THE CONTINGENCY PLAN

The contingency plan will be implemented immediately whenever there is a fire, explosion, or release of hazardous waste or hazardous materials which could threaten human health or the environment. The following emergency procedures will be carried out in the event of an emergency.

A. General Procedures

In the event of a release of hazardous waste or hazardous materials, the Emergency Coordinator (EC), Captain, and ship's Safety Committee will be notified immediately. A list of emergency response team phone numbers are provided in **Attachment 6.** The Safety Committee is comprised of the Captain, EPA Supervisor, the Chemical Hygiene Officer (CHO), and Group Supervisor if an outside group is using the ship. The Emergency Coordinator will identify the character, source, and amount of any released material and determine whether the release can be abated by ship emergency response personnel. The Emergency Coordinator must advise the Captain and Safety Committee members of the conditions relating to the release event. If the Emergency Coordinator concludes that qualified ship personnel can abate the release, he will specify the task assignments to qualified emergency response team personnel **Attachment 6**.

Response activities involving hazardous material/waste releases must be performed in accordance with **Attachment** 7, OSHA 29 CFR 1910.120 Health & Safety Plan Compliance.

If the Emergency Coordinator determines that the release cannot be controlled by ship personnel and/or the health of ship personnel is endangered, the Captain will implement the evacuation plan (See "Occupant Emergency Plan" as it appears in **Appendix M** of the GLNPO *Health and Safety and Environmental Compliance Manual).* The Captain, with

the assistance of the Emergency Coordinator, also has the responsibility to notify the GLNPO office and appropriate authorities, such as the National Response Center and the Coast Guard. (See **Chapter 2, Attachment 2.5** of this manual and **Attachment 4** of this appendix.)

B. Hazardous Materials or Waste Spill Response Procedures

In the event of a spill, the personnel assigned to emergency response will evaluate the spill, consult the material safety data sheets or waste analyses, and use appropriate procedures and equipment for spill clean-up. If the chemical nature of the spill is not known, the spill will be treated as a highly toxic and hazardous material. See **Attachment 5** of this appendix for locations of emergency response equipment.

1. Liquid Acid Spill

In the event of liquid acid spill, the following procedures will be implemented:

a. Before entering the area, response personnel will be equipped with appropriate personal protective equipment, as determined by the EC. Equipment used in this situation may include Self-Contained Breathing Apparatus, Tyvek suits, chemical resistant boots, and neoprene gloves.

b. If possible, the leaking container will be moved in such a way that further release of acid is prevented. The container will the be diked with absorbent booms. (Absorbent booms are long pliant tubes containing absorbent material.)

c. The spill will be contained through the use of absorbent booms to prevent further spread of the material.

d. Acid neutralizing spill material such as lime chips will be sprinkled over the spill area and will be used until the liquid has been neutralized. Neutralization will be determined by using pH paper.

e. Once the liquid has been neutralized, the absorbent booms will be placed into a collection drum and covered with neutralization material. The solidified spill material will be shoveled or scooped into the collection drum, as well, using a nonreactive, non-sparking shovel.

f. After the spill has been contained, remaining liquid in the leaking container will be placed in a secure container. If it is not feasible to transfer the liquid, the container will be placed in a secure overpack.

g. Solid surfaces contaminated by the spill, such as floors and walls, will be

triple washed and rinsed with a commercial-grade aqueous detergent solution such as "Det-O-Jet". "Washing" refers to scrubbing the area with a fresh solution used for each wash cycle. A sufficient amount of fresh fluid, enough to cover the contaminated surface completely, must be used in each wash and rinse. The floors will be dried with a clean cloth after each rinse. Precautions must be taken to contain any runoff from the scrubbing and to properly dispose of wastes generated during the cleaning.

h. The decontamination material, wash and rinse solutions, and all disposable equipment used during the clean-up will be placed in the collection drum and the EC will arrange for its transfer to a disposal site.

2. Liquid Base Spill

In the event of a liquid base spill the following procedures will be implemented:

a. Before entering the area, response personnel will be equipped with the appropriate personal protective equipment as determined by the EC. Equipment in this situation may include self-contained breathing apparatus, Tyvek suits, chemical-resistant boots, and neoprene gloves.

b. If possible, the leaking container will be moved in such a way that further release of material is prevented. The container will be diked with absorbent booms.

c. The spill will be contained through the use of absorbent booms to prevent further spread of the material.

d. Basic neutralizing spill material, such as anhydrous citric acid granules, will be sprinkled over the spill area.

e. Once the spill has been neutralized, as determined by pH paper, the absorbent booms will be placed into a collection drum and covered with neutralization material. The solidified spill material will be shoveled or scooped into the collection drum using a non-reactive, non-sparking shovel.

f. After the spill has been contained, material remaining in the leaking container will be place in a secure container. If it is not feasible to transfer the material, the leaking container will be placed in a secure overpack.

g. Solid surfaces contaminated by the spill, such as floors and walls, will be triple washed and rinsed with a commercial-grade aqueous detergent solution such as "Det-O-Jet". "Washing" refers to scrubbing the area with a fresh solution used for each wash cycle. A sufficient amount of fresh fluid, enough to cover the contaminated surface completely, must be used in each wash and rinse. The floors will be dried with a clean cloth after each rinse. Precautions must be taken

to contain any runoff from the scrubbing and to properly dispose of wastes generated during the cleaning.

h. The decontamination material, wash and rinse solutions, and all disposable equipment used during clean-up will be placed in the collection drum and the EC will arrange for its transfer to a disposal site.

3. Organic Solvent Spill Containing Less Than 50 ppm PCBs

a. Before entering the area, response personnel will be equipped with the appropriate personal protective equipment as determined by the EC. Equipment used in this situation may include self-contained breathing apparatus, Saranex-coated Tyvek suits, chemical-resistant boots, and Silvershield gloves.

b. If possible, the leaking container will be moved in such a way that further release of solvent is prevented. The container will be diked with absorbent booms.

c. The spill will also be contained with absorbent booms to prevent the further spread of the material. Absorbent material, such as activated charcoal or activated carbon, will be spread over the area to adsorb the solvent.

d. Once the liquid has been adsorbed, the absorbent booms will be placed into a collection drum and covered with absorbent material. The solid absorption residue will be shoveled or scooped into the collection drum. The shovel or scoop used will be made from a non-sparking material, such as brass.

e. After the spill has been contained, the remaining liquid in the leaking container will be transferred to a secure container. If it is not feasible to transfer the liquid, the container will be placed in a secure overpack.

f. Solid surfaces contaminated by the spill, such as floors and walls, will be triple washed and rinsed with a commercial-grade aqueous detergent solution such as "Det-O-Jet". "Washing" refers to scrubbing the area with a fresh solution used for each wash cycle. A sufficient amount of fresh fluid, enough to cover the contaminated surface completely, must be used in each wash and rinse. The floors will be dried with a clean cloth after each rinse. Precautions must be taken to contain any runoff from the scrubbing and to properly dispose of wastes generated during the cleaning.

g. The decontamination material, wash and rinse solutions, and all disposable equipment used during the clean-up will be placed in the collection drum and the EC will arrange for its transfer to disposal site.

4. Organic Solvent Spill Containing More Than 50 ppm and Less Than 500 ppm PCBs

Materials containing more than 50 ppm and less than 500 ppm of polychlorinated biphenyls (PCBs) are used only occasionally and in small quantities in the *Lake Guardian* laboratories. Since the total amount of PCBs that could be purified from the solutions on board is less than one pound, the following procedures are appropriate and will be implemented for clean-ups.

a. Before entering the area, response personnel will be equipped with the appropriate personal protective equipment. Equipment used for this particular release will include self-contained breathing apparatus, Saranex-coated Tyvek suits, chemical resistant boots, and Silvershield gloves.

b. If possible, the leaking container will be moved in such a way that further release of material is prevented. The container will be diked with absorbent booms.

c. If the emergency response team is unable to determine the boundaries of the spill, a statistically valid sampling survey will be performed in the area to determine the extent of the spill.

d. The spill will be contained through the use of absorbent booms to prevent further spread of the material. Solvent absorbent material, such as activated charcoal or activated carbon, will be sprinkled over the spill area. Once the spill has been absorbed, the absorbent booms will be moved to a collection drum and covered with absorbent. The solidified spill material will be shoveled or scooped into the collection drum using a non-sparking shovel, such as one made of brass.

e. After the spill has been contained, material remaining in the leaking container will be placed in a secure container. If it is not feasible to transfer the material, the leaking container will be placed in a secure overpack.

f. Solid surfaces contaminated by the spill, such as floors and walls, will be triple washed and rinsed with a commercial-grade aqueous detergent solution such as "Det-O-Jet". Washing means scrubbing the area with a material in which PCBs are at least 5% soluble. A sufficient amount of PCB-free fluid, enough to cover the contaminated surface completely, must be used in each wash/rinse. Precautions must be taken to contain any runoff from the scrubbing and to properly dispose of wastes generated during the cleansing.

g. After the solid surfaces, contaminated by the spill, have been triple washed/rinsed, the surfaces will be sampled to determine the quantity of PCBs remaining. The sampling will be done in accordance with 40 CFR Part 761.123. The testing will ensure that the area has been cleaned to 10 ug/100 square centimeters if the spill occurred in a work area, or 100 ug/100 square centimeters if the spill occurred in the flammable storage room.

h. At the completion of clean-up, the EC will document the clean-up with records

and certification of decontamination. The records and certification will be maintained for a period of at least five years by the EC. The records and certification will consist of the following:

1) Identification of the source of the spill (e.g., type of equipment);

2) Estimated or actual date and time of the spill;

3) The date and time clean-up was completed or terminated (if clean-up was delayed by emergency or adverse weather: the nature and duration of the delay);

4) A brief description of the spill location;

5) Preclean-up sampling data used to establish the spill boundaries if required because of insufficient visible traces, and a brief description of the sampling methodology used to establish the spill boundaries;

6) A brief description of the solid surfaces cleaned and of the wash/rinse method used;

7) A certification statement signed by the responsible party stating that the cleanup requirements have been met and that the information contained in the record is true to the best of his/her knowledge.

- While not required for compliance with TSCA regulations, the following information would be useful if maintained in the records:

  1) Additional pre- or post-cleanup sampling;

  2) The estimated cost of the cleanup by manhours, dollars, or both.

Due to the quantity of PCBs used and stored, it is extremely unlikely that more than one pound of PCBs could be spilled aboard the *Lake Guardian*. Specific procedures to address this type of spill are not contained in this contingency plan. In the event that such a spill occurs, the Office of Pesticides and Toxic Substances will be contacted to obtain guidance for appropriate cleanup measures in the shortest possible time after discovery of the spill, but in no case later than 24 hours after discovery. Additionally, clean-up of more than one pound of PCBs will be conducted in accordance with 40 CFR Part 761.125. Spills involving more than 10 pounds of PCBs will be immediately reported to the National Response Center at 1-800-424-8802.

5. Other Liquid Spill

In the event of a spill involving a liquid that is not a base, acid, or solvent, the following procedures will be used:

a. Before entering the area, response personnel will be equipped with the appropriate personal protective equipment. Equipment used in this situation may include self-contained breathing apparatus, Saranex-coated Tyvek suits, chemical- resistant boots, and Silvershield gloves.

b. If possible, the leaking container will be moved in such a way that further release of liquid is prevented. The container will then be diked with absorbent booms.

c. The spill will be contained with absorbent booms to prevent the further spread of the material. Adsorbent material such as activated charcoal or activated carbon will be spread over the area to adsorb the liquid.

d. Once the liquid has been adsorbed, the absorbent booms will be removed to a collection drum and covered with absorbent material. The solid, resulting from absorption, will be shoveled or scooped into the collection drum. The shovel or scoop used will be made of a non-sparking material, such as brass.

e. After the spill has been contained, the remaining liquid in the leaking container will be transferred to a secure container. If it is not feasible to transfer the liquid, the container will be placed in a secure overpack.

f. Solid surfaces contaminated by the spill, such as floors and walls, will be triple washed and rinsed with a commercial-grade aqueous detergent solution such as "Det-O-Jet". "Washing" refers to scrubbing the area with a fresh solution used for each wash cycle. A sufficient amount of fresh fluid, enough to cover the contaminated surface completely, must be used in each wash and rinse. The floors will be dried with a clean cloth after each rinse. Precautions must be taken to contain any runoff from the scrubbing and to properly dispose of wastes generated during the cleaning.

g. The decontamination material, wash, and rinse solutions, and all disposable equipment used during the cleanup will be placed in the collection drum and the EC will arrange for its transfer to disposal site.

h. If the spilled liquid is mutagenic, teratogenic, or carcinogenic, the contaminated area will be sampled to determine the quantity of chemical remaining on the solid surfaces. The sampling will be performed in a statistically valid manner. No detectable traces of chemical should remain in the area.

6. Solid Spill

In the event of a spill involving a solid hazardous chemical that is not water or air reactive, the following procedures will be used:

a. Before entering the area, response personnel will be equipped with the appropriate

personal protective equipment. Equipment used in this situation may include self-contained breathing apparatus, Saranex-coated Tyvek suits, chemical- resistant boots, and Neoprene gloves.

b. The leaking container will be picked up and placed in a collection drum.

c. Using a broom and dustpan made of non-reactive materials, the spilled solid will be swept up and placed in the collection drum. Care will be taken to sweep up as much of the spilled material as possible.

d. Any remaining spill material will be picked up using a damp cloth. The cloth and contaminated broom should be disposed of as solid hazardous waste.

e. Solid surfaces contaminated by the spill, such as floors and walls, will be triple washed and rinsed with a commercial-grade aqueous detergent solution such as "Det-O-Jet". "Washing" refers to scrubbing the area with a fresh solution used for each wash cycle. A sufficient amount of fresh fluid, enough to cover the contaminated surface completely, must be used in each wash and rinse. The floors will be dried with a clean cloth after each rinse. Precautions must be taken to contain any runoff from the scrubbing and to properly dispose of wastes generated during the cleaning.

f. If the spilled solid is mutagenic, teratogenic or carcinogenic, the contaminated area will be sampled to determine the quantity of material remaining on the solid surfaces. No detectable traces of chemical should remain in the area.

7. Mercury Spill

In the event of a mercury spill, the following procedures will be implemented:

a. Before entering the area, response personnel will remove all gold, copper, or silver jewelry and be equipped with the appropriate personal protective equipment. Equipment used in this situation will include self-contained breathing apparatus, Saranex-coated Tyvek suits, chemical-resistant boots, and Silvershield gloves.

b. If possible, the leaking container will be moved in such a way that further release of mercury is prevented. The container will then be placed in a hard-sided waste collection container.

c. The mercury will be collected in one area through the use of wooden spatulas.

d. Following collection using a spatula, an aspirator will be used to retrieve as much of the material as possible. The material will be placed in a polyethylene collection bottle.

e. Small droplets of mercury that cannot be collected through the use of an aspirator will be picked up with a mercury absorbent, such as "Cinnasorb". If "Cinnasorb" is used, the area should be covered at least twice with the absorbent paste. The waste paste will be placed in a wide-mouth polyethylene bottle and allowed to dry before the bottle is closed (the bottle may then be placed in the collection drum).

f. Once all visible traces of mercury have been collected, material such as "Resisorb" will be sprinkled over the spill area to collect small amounts of mercury inaccessible to physical cleanup (such as cracks in tile or cement). The absorbent powder will remain on the spill area for a period of one hour, then removed and placed in the collection drum.

g. Solid surfaces contaminated by the spill, such as floors and walls, will be triple washed and rinsed with a commercial- grade aqueous detergent solution such as "Det-O-Jet". "Washing" refers to scrubbing the area with a fresh solution used for each wash cycle. A sufficient amount of fresh fluid, enough to cover the contaminated surface completely, must be used in each wash and rinse. The floors will be dried with a clean cloth after each rinse. Precautions must be taken to contain any runoff from the scrubbing and to properly dispose of wastes generated during the cleaning.

8. Radioactive Material Spill

GLNPO laboratories are equipped with two types of radioactive materials, Nickel-63 and Carbon-14. The Radiation Safety Officer (RSO) for the ship shall be notified and work in conjunction with the Safety Committee members should a release of radioactive materials occur.

Nickel-63 is contained in sealed source devices in laboratory equipment. In the event that a sealed source device is found to be leaking, the area will be immediately evacuated and the Air and Radiation Division will be contacted for guidance. Emergency response personnel will re-enter the area ONLY under the direction of a representative from the Air and Radiation Division and will work to mitigate the hazard under the division's supervision.

Water contaminated with quantities of Carbon-14 generated by GLNPO laboratories is stored and shipped to CRL for disposal. In effect, this water is non-hazardous according to the Nuclear Regulatory Commission's regulations and can be disposed of via city sewers following testing. In the event that the water is spilled or leaks from its container prior to disposal into a city sewer system, the spills and leaks will be considered hazardous and the following procedures will be implemented:

a. Before entering the area, response personnel will be equipped with the appropriate personal protective equipment. Equipment used in this situation will include Saranex-coated Tyvek suits, chemical-resistant boots, and rubber gloves.

b. Emergency response personnel shall use a radiation counter to assist in determining the boundaries of the spill.

c. The spill will be contained through the use of absorbent booms to prevent further spread of the material.

d. Sawdust or vermiculite will be sprinkled over the spill area. Once the spill has been absorbed, the absorbent booms will be moved to a collection drum and covered with absorbent. The solidified spill material will be shoveled or scooped into the collection drum using a non-sparking shovel, such as one made of PVC or brass.

e. Solid surfaces contaminated by the spill, such as floors and walls, will be triple washed and rinsed with a commercial-grade aqueous detergent solution such as "Det-O-Jet". "Washing" refers to scrubbing the area with a fresh solution used for each wash cycle. A sufficient amount of fresh fluid, enough to cover the contaminated surface completely, must be used in each wash and rinse. The floors will be dried with a clean cloth after each rinse. Precautions must be taken to contain any runoff from the scrubbing and to properly dispose of wastes generated during the cleaning.

f. After the solid surfaces contaminated by the spill have been triple washed/rinsed, the area will be wipe tested to determine the quantity of Carbon-14 remaining on the solid surfaces. The RSO will ensure that Carbon-14 readings are no higher than background readings taken in other areas of the laboratory.

g. The decontamination material, wash and rinse solutions, and all disposable equipment used during the cleanup will be placed in the collection drum and the RSO will arrange for its transfer to CRL for disposal.

C. Fire or Explosion Resulting in Fire

Procedures for fire or explosions resulting in fire are established by the ship's Captain and appear on the Watchquarter Station Bill. Only those persons who have been trained in ship firefighting and are assigned to those duties on the bill shall take part in the emergency response (see **Chapter 7, Attachment 7.1** as it appears in the *GLNPO Health and Safety and Environmental Compliance Manual*).

D. Medical Treatment

In the event that personnel are injured during a hazardous material/waste emergency, the following procedures will be used:

1. The ship's Captain, in coordination with a designated First Aid Responder, will evaluate the injury and determine whether hospital treatment is necessary. If so, the Captain will make the necessary arrangements. Emergency response team members and/or designated First Aid Responders will provide first aid assistance until medical help can be obtained.

2. All injuries, regardless of severity, should be reported to the Captain, Safety Officer, and Safety Committee for proper accident investigation.

EPA employees potentially exposed to toxic chemicals will be requested to undergo medical monitoring. This service will be provided to EPA employees through the U.S. Public Health Service.

ATTACHMENT 1 - WASTE STREAM ANALYSIS
R/V LAKE GUARDIAN HAZARDOUS MATERIAL CONTINGENCY PLAN

ERAL SPRINGS Corporation
lox 500
Vashington, WI 53074
284-9101

WASTE STREAM PROFILE SHEET

WS# 10-2603
WO#
TH# 13274
DATE 3/11/92
SALES REP

I. GENERATOR INFORMATION

ID# MI6680090317
COMPANY U.S. E.P.A., Lake Guardian
ADDRESS 24 Sixth St.
Bay City, MI 48708
GENERAL CONTACT Peg Froehlich
CY CONTACT
517) 894-2805
)
EMERGENCY PHONE NUMBER ( )

II. CUSTOMER INFORMATION

NAME OF COMPANY U.S. E.P.A. Region 5
BILLING ADDRESS 230 South Dearborn Street
Chicago, IL 60606
CONTACT Janusz Porosilo
PHONE (312) 886-6587
FAX ( )
FOR CUSTOMER USE

III. GENERAL INFORMATION

ME Waste from COD Systems
(Yellow)
PRODUCING WASTE lab analysis

IV. VOLUME AND PACKAGING

ANTICIPATED VOLUME 8-12 Drums FREQUENCY 90 Days
CURRENT INVENTORY 4-6 Drums
CONTAINER TYPE ☒ DRUMS ☐ CUBE ☐ CYLINDER
WEIGHT SIZE 5, 30, 55 g
☐ BULK SOLIDS ☐ BULK LIQUIDS

V. COMPOSITION: TOTALS MUST ADD UP TO 100%

Sulfuric Acid	1-5 %
Chromic Acid	1-5 %
Water	90-98 %

VI. PHYSICAL DESCRIPTION/QUALITATIVE SCREEN

PHYSICAL STATE ☒ LIQUID ☐ SOLID ☐ SEMI-SOLID ☐ SLUDGE ☐ GAS ☐
VISCOSITY ☒ LOW ☐ MEDIUM ☐ HIGH
LIQUID LAYERING ☒ NONE ☐ BILAYERED ☐ MULTI-LAYERED
COLOR Clear Tan
% SOLIDS 0 % LIQUIDS 100
SPECIFIC GRAVITY 1.04 pH < 1
FLASHPOINT > 200 °F % WATER 97
BTU/lb N/A % HALOGENS N/A
OXIDIZER ☐ YES ☒ NO ACID REACTIVITY ☐ YES ☒ NO
PUMPABLE ☒ YES ☐ NO WATER REACTIVITY ☐ YES ☒ NO

VII. METALS AND ORGANICS

		TOTALS (ppm)	TCLP (mg/l)
TC	(As)	N/A	< 0.20
	(Ba)		< 1.20
JM	(Cd)		0.20
IUM TOTAL	(Cr)		35.0
	(Pb)		1.32
RY	(Hg)		35.8
UM	(Se)		< 0.30
	(Ag)		0.28
	(Ni)		< 0.40
JM	(Tl)		N/A
	(Cu)		0.28
	(Zn)		0.24
			N/A

	TCLP (mg/l)
D017 2,4,5-TP (SILVEX)	N/A
D018 BENZENE	
D019 CARBON TETRACHLORIDE	
D020 CHLORDANE	
D021 CHLOROBENZENE	
D022 CHLOROFORM	
D023 O-CRESOL	
D024 M-CRESOL	
D025 P-CRESOL	
D026 CRESOL	
D027 1,4-DICHLOROBENZENE	
D028 1,2-DICHLOROETHANE	
D029 1,1-DICHLOROETHYLENE	
D030 2,4-DINITROTOLUENE	

	TCLP (mg/l)
D034 HEXACHLOROETHANE	N/A
D035 METHYL ETHYL KETONE	
D036 NITROBENZENE	
D037 PENTACHLOROPHENOL	
D038 PYRIDINE	
D039 TETRACHLOROETHYLENE	
D040 TRICHLOROETHYLENE	
D041 2,4,5-TRICHLOROPHENOL	
D042 2,4,6-TRICHLOROPHENOL	
D043 VINYL CHLORIDE	

mg/l ppm OR %

mg/l ppm OR %

WSHO-2603

SHIPPING INFORMATION (FROM 49 CFR)

A DOT SHIPPING NAME "RQ" Waste Corrosive Liquid, N.O.S. (Sulfuric Acid, Chromic Acid) (D002, D007, D009)

ZARD CLASS Corrosive Material

NUMBER UN1760

TABLE QUANTITY 1/0.454

MBER 60

HAZARDOUS CHARACTERISTICS (FROM 40 CFR)

HAZARDOUS CODE(S) D002, D007, D009

WASTE	PYROPHORIC	☐ YES	☒ NO	DIOXIN BEARING	☐ YES	☒ NO	WATER REACTIVE	☐ YES	☒ NO
	EXPLOSIVE	☐ YES	☒ NO	PESTICIDES/HERBICIDES	☐ YES	☒ NO	BIOLOGICAL	☐ YES	☒ NO
	RADIOACTIVE	☐ YES	☒ NO	SHOCK SENSITIVE	☐ YES	☒ NO			

NTS

AUTHORIZATION TO CORRECT WSPS:

RIZE MINERAL SPRINGS CORPORATION TO MAKE CORRECTIONS TO THIS WSPS, SUCH CORRECTIONS BEING CONSISTENT WITH THE RESULTS OF SAMPLE CHARACTERIZATION AND/OR TORY REQUIREMENTS. I UNDERSTAND THAT A CORRECTED COPY WILL BE SENT TO ME.

☒ YES ☐ NO INITIAL: PAF

CERTIFICATION

L SAFETY DATA SHEET (MSDS) ATTACHED ☐ YES ☒ NO

ROFILE COMPLETED BY (CHECK ONE) A. ☐ GENERATOR B. ☒ MINERAL SPRINGS CORPORATION C. ☐ INDEPENDENT CONTRACTOR WORKING ON BEHALF OF THE GENERATOR

Y CERTIFY THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED IN THIS AND ALL ACCOMPANYING DOCUMENTS. BASED INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THAT THE SUBMITTED INFORMATION IS TRUE TE AND COMPLETE, AND THAT ALL KNOWN OR SUSPECTED HAZARDS HAVE BEEN DISCLOSED. IF THE BOXES ABOVE FOR GENERATOR OR INDEPENDENT CTOR ARE CHECKED, I FURTHER CERTIFY THAT THE WASTE CHARACTERIZATION UPON WHICH MINERAL SPRINGS CORP RELIES IS ACCURATE AND COMPLETE. E THAT MY EMPLOYER AND I MAY BE HELD LIABLE UNDER FEDERAL LAW, AND THE LAWS OF MANY STATES, FOR THE INFORMATION PROVIDED IN THIS FORM AND COMPANYING MATERIALS.

Peggy A. Froelich

TOR'S SIGNATURE

2. Peggy A. Froelich

NAME (TYPE OR PRINT)

3/18/92

4. Chemical Hygiene Officer

TITLE

RAL SPRINGS Corporation
ox 500
/ashington, WI 53074
284-9101

WASTE STREAM PROFILE SHEET

WSI# 10-2790
WO#
TH# 11276
DATE 3/11/92
SALES REP

I. GENERATOR INFORMATION

ID MI6680090317
COMPANY U.S. E.P.A., Lake Guardian
ADDRESS 24 Sixth St.
Bay City, MI 48708

GENERAL CONTACT Peg Froehlich

TY CONTACT
517) 894-2805
)
EMERGENCY PHONE NUMBER ( )

II. CUSTOMER INFORMATION

NAME OF COMPANY U.S. E.P.A., Region 5
BILLING ADDRESS 230 South Dearborn Street
Chicago, IL 60606

CONTACT Janusz Porosilo
PHONE (312) 886-6587
FAX ( )
FOR CUSTOMER USE

III. WASTE GENERATION INFORMATION

E Basic Waste (Blue)

RODUCING WASTE From Cl, NHy, or TKN
Analytical System

IV. VOLUME AND PACKAGING

ANTICIPATED VOLUME 12-24 Drums FREQUENCY Annually
CURRENT INVENTORY 12-24 Drums
CONTAINER TYPE ☒ DRUMS WEIGHT 500# SIZE 55 gal
☐ CUBE ☐ BULK SOLIDS
☐ CYLINDER ☐ BULK LIQUIDS

V. CONSTITUENTS (TOTALS MUST ADD UP TO 100 %)

ITS	
Sodium Hydroxide	<2 %
Mercuric Sulfate	<2 %
Phenol/Cyanide	<2 %
Water	>98 %
	%
	%
	%
	%
	%
	%
	%

VI. PHYSICAL DESCRIPTION (QUALITATIVE SCREEN)

PHYSICAL STATE ☒ LIQUID ☐ SOLID ☐ SEMI-SOLID
☐ SLUDGE ☐ GAS ☐ _____
VISCOSITY ☒ LOW ☐ MEDIUM ☐ HIGH
LIQUID LAYERING ☒ NONE ☐ BILAYERED ☐ MULTI-LAYERED
COLOR Clear Light Green
% SOLIDS < 1 % LIQUIDS > 99
SPECIFIC GRAVITY 1.00 pH 12.8
FLASHPOINT > 200 °F % WATER > 98
BTUs N/A % HALOGENS N/A
OXIDIZER ☐ YES ☒ NO ACID REACTIVITY ☐ YES ☒ NO
PUMPABLE ☒ YES ☐ NO WATER REACTIVITY ☐ YES ☒ NO

VII. ANALYTICAL DATA

	TOTALS (ppm)	TCLP (mg/l)
(As)	N/A	<0.20
(Ba)		<1.20
(Cd)		0.53
M TOTAL (Cr)		0.20
(Pb)		<1.5
(Hg)		19.4
(Se)		<0.30
(Ag)		<0.10
(R)		N/A
(T)		
(Cy)		
(Sl)		
XLOR		

	TCLP (mg/l)
D017 2,4,5-TP (SILVEX)	N/A
D018 BENZENE	
D019 CARBON TETRACHLORIDE	
D020 CHLORDANE	
D021 CHLOROBENZENE	
D022 CHLOROFORM	
D023 O-CRESOL	
D024 M-CRESOL	
D025 P-CRESOL	
D026 CRESOL	
D027 1,4-DICHLOROBENZENE	
D028 1,2-DICHLOROETHANE	
D029 1,1-DICHLOROETHYLENE	
D030 2,4-DINITROTOLUENE	
D031 HEPTACHLOR	

	TCLP (mg/l)
D034 HEXACHLOROETHANE	N/A
D035 METHYL ETHYL KETONE	
D036 NITROBENZENE	
D037 PENTACHLOROPHENOL	
D038 PYRIDINE	
D039 TETRACHLOROETHYLENE	
D040 TRICHLOROETHYLENE	
D041 2,4,5-TRICHLOROPHENOL	
D042 2,4,6-TRICHLOROPHENOL	
D043 VINYL CHLORIDE	

mg/l ppm OR %

mg/l ppm OR %

< 25 ppm

WS#10-2790

[redacted]

DOT SHIPPING NAME "RQ" Waste Corrosive Liquid, N.O.S.(Sodium Hydroxide)(D002,D009)

RQ CLASS Corrosive Material
NUMBER UN1760
BULK QUANTITY 1/0.454
NER 60

[redacted]

HAZARDOUS CODE(S) D002,D009

ITS	PYROPHORIC	☐ YES	☒ NO	DIOXIN BEARING	☐ YES	☒ NO	WATER REACTIVE	☐ YES	☒ NO
	EXPLOSIVE	☐ YES	☒ NO	PESTICIDE/HERBICIDES	☐ YES	☒ NO	BIOLOGICAL	☐ YES	☒ NO
	RADIOACTIVE	☐ YES	☒ NO	SHOCK SENSITIVE	☐ YES	☒ NO			

S

[redacted]

E MINERAL SPRINGS CORPORATION TO MAKE CORRECTIONS TO THIS WSPS, SUCH CORRECTIONS BEING CONSISTENT WITH THE RESULTS OF SAMPLE CHARACTERIZATION AND/OR TY REGULATIONS. I UNDERSTAND THAT A CORRECTED COPY WILL BE SENT TO ME.

☒ YES ☐ NO INITIAL: PAF

[redacted]

AFETY DATA SHEET (MSDS) ATTACHED ☐ YES ☒ NO

TLE COMPLETED BY (CHECK ONE) A. ☐ GENERATOR B. ☒ MINERAL SPRINGS CORPORATION C. ☐ INDEPENDENT CONTRACTOR WORKING ON BEHALF OF THE GENERATOR

ERTIFY THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED IN THIS AND ALL ACCOMPANYING DOCUMENTS. BASED UIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THAT THE SUBMITTED INFORMATION IS TRUE AND COMPLETE, AND THAT ALL KNOWN OR SUSPECTED HAZARDS HAVE BEEN DISCLOSED. IF THE BOXES ABOVE FOR GENERATOR OR INDEPENDENT OR ARE CHECKED, I FURTHER CERTIFY THAT THE WASTE CHARACTERIZATION UPON WHICH MINERAL SPRINGS CORP RELIES IS ACCURATE AND COMPLETE. HAT MY EMPLOYER AND I MAY BE HELD LIABLE UNDER FEDERAL LAW, AND THE LAWS OF MANY STATES, FOR THE INFORMATION PROVIDED IN THIS FORM AND PANYING MATERIALS.

1. Peggy A. Froelich
1 SIGNATURE

2. Peggy A. Froelich
NAME (TYPE OR PRINT)

3/18/92

4. Chemical Hygiene Officer
TITLE

RAL SPRINGS Corporation
ox 500
/ashington, WI 53074
284-9101

WASTE STREAM PROFILE SHEET

WSI# 10-2602
WO#
TH# 11631
DATE 3/11/92
SALES REP

I. GENERATOR INFORMATION

ID# MI6680090317
COMPANY U.S. E.P.A., Lake Guardian
ADDRESS 24 Sixth St.
Bay City, MI 48708

LOCATION/GENERAL CONTACT Peg Froehlich

CITY CONTACT
517) 694-2805
)
EMERGENCY PHONE NUMBER ( )

II. CUSTOMER INFORMATION

NAME OF COMPANY U.S. E.P.A., Region 5

BILLING ADDRESS 230 S. Dearborn Street
Chicago, IL 60606

CONTACT Janusz Porosilo
PHONE (312) 886-6587
FAX ( )
FOR CUSTOMER USE

III. WASTE STREAM GENERAL INFORMATION

NAME Organic Waste Solvents containing less than 50 mg/l PCB's

PRODUCING WASTE lab testing

IV. VOLUME AND PACKAGING

ANTICIPATED VOLUME 2-4 dr. FREQUENCY quarterly
CURRENT INVENTORY 1-2 dr.
CONTAINER TYPE ☒ DRUMS WEIGHT 500# SIZE 5,55 gal
☐ CUBE ☐ BULK SOLIDS
☐ CYLINDER ☐ BULK LIQUIDS

V. COMPOSITION (TOTALS MUST ADD UP TO 100%)

Acetone	2.44 %
Benzene	5.74 %
2-Butanol	30.3 %
Diethyl Ether	0.75 %
Ethyl Acetate	34.0 %
Methylene Chloride	0.11 %
1-Propanol	6.9 %
Inert Ingredients	19.76 %
	%
	%
	%

VI. PHYSICAL DESCRIPTION (QUALITATIVE SCREEN)

PHYSICAL STATE ☒ LIQUID ☐ SOLID ☐ SEMI-SOLID
☐ SLUDGE ☐ GAS ☐ _____
VISCOSITY ☒ LOW ☐ MEDIUM ☐ HIGH
LIQUID LAYERING ☒ NONE ☐ BILAYERED ☐ MULTI-LAYERED
COLOR Varies
% SOLIDS 0 % LIQUIDS 100
SPECIFIC GRAVITY 0.82 g/ml pH 5.5
FLASHPOINT 50 °F % WATER N/A
BTU/# 13,000 % HALOGENS < 0.11
OXIDIZER ☐ YES ☒ NO ACID REACTIVITY ☐ YES ☒ NO
PUMPABLE ☒ YES ☐ NO WATER REACTIVITY ☐ YES ☒ NO

VII. REGULATORY INFO

		TOTALS (ppm)	TCLP (mg/l)
TIC	(As)		N/A
d	(Ba)		
JM	(Cd)		
AUM TOTAL	(Cr)		
	(Pb)		
JRY	(Hg)		
UM	(Se)		
	(Ag)		
	(Ni)		
JM	(Tl)		
R	(Cu)		
	(Zn)		
E			

	TCLP (mg/l)
D017 2,4,5-TP (SILVEX)	N/A
D018 BENZENE	
D019 CARBON TETRACHLORIDE	
D020 CHLORDANE	
D021 CHLOROBENZENE	
D022 CHLOROFORM	
D023 O-CRESOL	
D024 M-CRESOL	
D025 P-CRESOL	
D026 CRESOL	
D027 1,4-DICHLOROBENZENE	
D028 1,2-DICHLOROETHANE	
D029 1,1-DICHLOROETHYLENE	
D030 2,4-DINITROTOLUENE	

	TCLP (mg/l)
D034 HEXACHLOROETHANE	N/A
D035 METHYL ETHYL KETONE	
D036 NITROBENZENE	
D037 PENTACHLOROPHENOL	
D038 PYRIDINE	
D039 TETRACHLOROETHYLENE	
D040 TRICHLOROETHYLENE	
D041 2,4,5-TRICHLOROPHENOL	
D042 2,4,6-TRICHLOROPHENOL	
D043 VINYL CHLORIDE	

mg/l ppm OR %
mg/l ppm OR %

WS#10-1602

SHIPPING INFORMATION (49 CFR)

DOT SHIPPING NAME "RQ" Waste Flammable Liquid, N.O.S. (F002,F003,F005,D001)

ARD CLASS Flammable Liquid

UMBER UN1993

BLE QUANTITY 10/4.54

BER 27

HAZARDOUS CHARACTERISTICS (49 CFR)

AZARDOUS CODE(S) F002,F003,F005,D001

STE	PYROPHORIC	☐ YES	☒ NO	DIOXIN BEARING	☐ YES	☒ NO	WATER REACTIVE	☐ YES	☒ NO
	EXPLOSIVE	☐ YES	☒ NO	PESTICIDES/HERBICIDES	☐ YES	☒ NO	BIOLOGICAL	☐ YES	☒ NO
	RADIOACTIVE	☐ YES	☒ NO	SHOCK SENSITIVE	☐ YES	☒ NO			

S

AUTHORIZATION TO CORRECT WSPS

E MINERAL SPRINGS CORPORATION TO MAKE CORRECTIONS TO THIS WSPS, SUCH CORRECTIONS BEING CONSISTENT WITH THE RESULTS OF SAMPLE CHARACTERIZATION AND/OR RY REQUIREMENTS. I UNDERSTAND THAT A CORRECTED COPY WILL BE SENT TO ME.

☒ YES ☐ NO INITIAL: PAF

CERTIFICATION

AFETY DATA SHEET (MSDS) ATTACHED ☐ YES ☒ NO

FILE COMPLETED BY (CHECK ONE) A. ☐ GENERATOR B. ☒ MINERAL SPRINGS CORPORATION C. ☐ INDEPENDENT CONTRACTOR WORKING ON BEHALF OF THE GENERATOR

CERTIFY THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED IN THIS AND ALL ACCOMPANYING DOCUMENTS. BASED QUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THAT THE SUBMITTED INFORMATION IS TRUE, AND COMPLETE, AND THAT ALL KNOWN OR SUSPECTED HAZARDS HAVE BEEN DISCLOSED. IF THE BOXES ABOVE FOR GENERATOR OR INDEPENDENT OR ARE CHECKED, I FURTHER CERTIFY THAT THE WASTE CHARACTERIZATION UPON WHICH MINERAL SPRINGS CORP. RELIES IS ACCURATE AND COMPLETE. HAT MY EMPLOYER AND I MAY BE HELD LIABLE UNDER FEDERAL LAW, AND THE LAWS OF MANY STATES, FOR THE INFORMATION PROVIDED IN THIS FORM AND MPANYING MATERIALS.

Peggy A. Froelich

TS SIGNATURE

Peggy A. Froelich

NAME (TYPE OR PRINT)

3/18/92

Chemical Hygiene Officer

TITLE

AL SPRINGS Corporation
x 500
ashington, WI 53074
84-9101

WASTE STREAM PROFILE SHEET

WSI# 10-2789
WO#
TH# 13275
DATE 3/11/92
SALES REP

I. GENERATOR INFORMATION

MI6680090317
COMPANY U.S. E.P.A., Lake Guardian
ADDRESS 24 Sixth St.
Bay City, MI 48708

GENERAL CONTACT Peg Froehlich
CONTACT
517) 894-2805
)
EMERGENCY PHONE NUMBER ( )

II. CUSTOMER INFORMATION

NAME OF COMPANY U.S. E.P.A., Region 5
BILLING ADDRESS 230 South Dearborn Street
Chicago IL 60604
CONTACT Janusz Porosilo
PHONE (312) 886-6587
FAX ( )
FOR CUSTOMER USE

III. GENERAL INFORMATION

Acidic Waste (Red)

PRODUCING WASTE Metals Prep and
Metal Standards

IV. VOLUME AND PACKAGING

ANTICIPATED VOLUME 3 Drums FREQUENCY Annually
CURRENT INVENTORY 1-2 Drums
CONTAINER TYPE ☒ DRUMS ☐ CUBE ☐ CYLINDER
WEIGHT 500# SIZE 55 gal.
☐ BULK SOLIDS ☐ BULK LIQUIDS

V. COMPONENTS TOTALLING UP TO 100%

Water	97 %
Hydrochloric Acid	<1 %
Nitric Acid	<1 %

VI. PHYSICAL DESCRIPTION

PHYSICAL STATE ☒ LIQUID ☐ SOLID ☐ SEMI-SOLID ☐ SLUDGE ☐ GAS ☐
VISCOSITY ☒ LOW ☐ MEDIUM ☐ HIGH
LIQUID LAYERING ☒ NONE ☐ BILAYERED ☐ MULTI-LAYERED
COLOR Orange Brown
% SOLIDS 0 % LIQUIDS 100
SPECIFIC GRAVITY 1.02 pH <1
FLASHPOINT > 200 °F % WATER 97
BTU/lb N/A % HALOGENS N/A
OXIDIZER ☒ YES ☐ NO ACID REACTIVITY ☐ YES ☒ NO
PUMPABLE ☒ YES ☐ NO WATER REACTIVITY ☐ YES ☒ NO

VII. ANALYTICAL RESULTS

	TOTALS (ppm)	TCLP (mg/l)
(Ag)	N/A	<0.20
(Ba)		<2.32
(Cd)		<0.10
(Cr)		1.72
(Hg)		<1.5
(Pb)		7.33
(Se)		<0.30
(As)		<0.10
(Ni)		N/A
(T)		
(Cu)		
(Zn)		

	TCLP (mg/l)
D017 2,4,5-TP (SILVEX)	N/A
D018 BENZENE	
D019 CARBON TETRACHLORIDE	
D020 CHLORDANE	
D021 CHLOROBENZENE	
D022 CHLOROFORM	
D023 O-CRESOL	
D024 M-CRESOL	
D025 P-CRESOL	
D026 CRESOL	
D027 1,4-DICHLOROBENZENE	
D028 1,2-DICHLOROETHANE	
D029 1,1-DICHLOROETHYLENE	
D030 2,4-DINITROTOLUENE	
D031 HEPTACHLOR	

	TCLP (mg/l)
D034 HEXACHLOROETHANE	N/A
D035 METHYL ETHYL KETONE	
D036 NITROBENZENE	
D037 PENTACHLOROPHENOL	
D038 PYRIDINE	
D039 TETRACHLOROETHYLENE	
D040 TRICHLOROETHYLENE	
D041 2,4,5-TRICHLOROPHENOL	
D042 2,4,6-TRICHLOROPHENOL	
D043 VINYL CHLORIDE	✓

mg/l ppm OR %
mg/l ppm OR %

FREE SULFIDE <75ppm TOTAL CYANIDE <0.23mg/

WS#10-278

T SHIPPING NAME "RQ" Waste Oxidizer, Corrosive Liquid, N.O.S.(Nitric Acid, Hydrochloric Acid (D001,D002,D009)

) CLASS Oxidizer
BER NA9191
E QUANTITY 1/0.454
R 45

VIOUS CODE(S) D001,D002,D009

E	PYROPHORIC	☐ YES	☒ NO	DIOXIN BEARING	☐ YES	☒ NO	WATER REACTIVE	☐ YES	☒ NO
	EXPLOSIVE	☐ YES	☒ NO	PESTICIDES/HERBICIDES	☐ YES	☒ NO	BIOLOGICAL	☐ YES	☒ NO
	- RADIOACTIVE	☐ YES	☒ NO	SHOCK SENSITIVE	☐ YES	☒ NO			

MINERAL SPRINGS CORPORATION TO MAKE CORRECTIONS TO THIS WSPS, SUCH CORRECTIONS BEING CONSISTENT WITH THE RESULTS OF SAMPLE CHARACTERIZATION AND/OR REQUIREMENTS. I UNDERSTAND THAT A CORRECTED COPY WILL BE SENT TO ME.

☒ YES ☐ NO INITIAL: PAF

TY DATA SHEET (MSDS) ATTACHED ☐ YES ☒ NO

LE COMPLETED BY (CHECK ONE) A. ☐ GENERATOR B. ☒ MINERAL SPRINGS CORPORATION C. ☐ INDEPENDENT CONTRACTOR WORKING ON BEHALF OF THE GENERATOR

RTIFY THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED IN THIS AND ALL ACCOMPANYING DOCUMENTS. BASED IRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THAT THE SUBMITTED INFORMATION IS TRUE, ND COMPLETE, AND THAT ALL KNOWN OR SUSPECTED HAZARDS HAVE BEEN DISCLOSED IF THE BOXES ABOVE FOR GENERATOR OR INDEPENDENT I ARE CHECKED, I FURTHER CERTIFY THAT THE WASTE CHARACTERIZATION UPON WHICH MINERAL SPRINGS CORP. RELIES IS ACCURATE AND COMPLETE. AT MY EMPLOYER AND I MAY BE HELD LIABLE UNDER FEDERAL LAW, AND THE LAWS OF MANY STATES, FOR THE INFORMATION PROVIDED IN THIS FORM AND 'ANYING MATERIALS

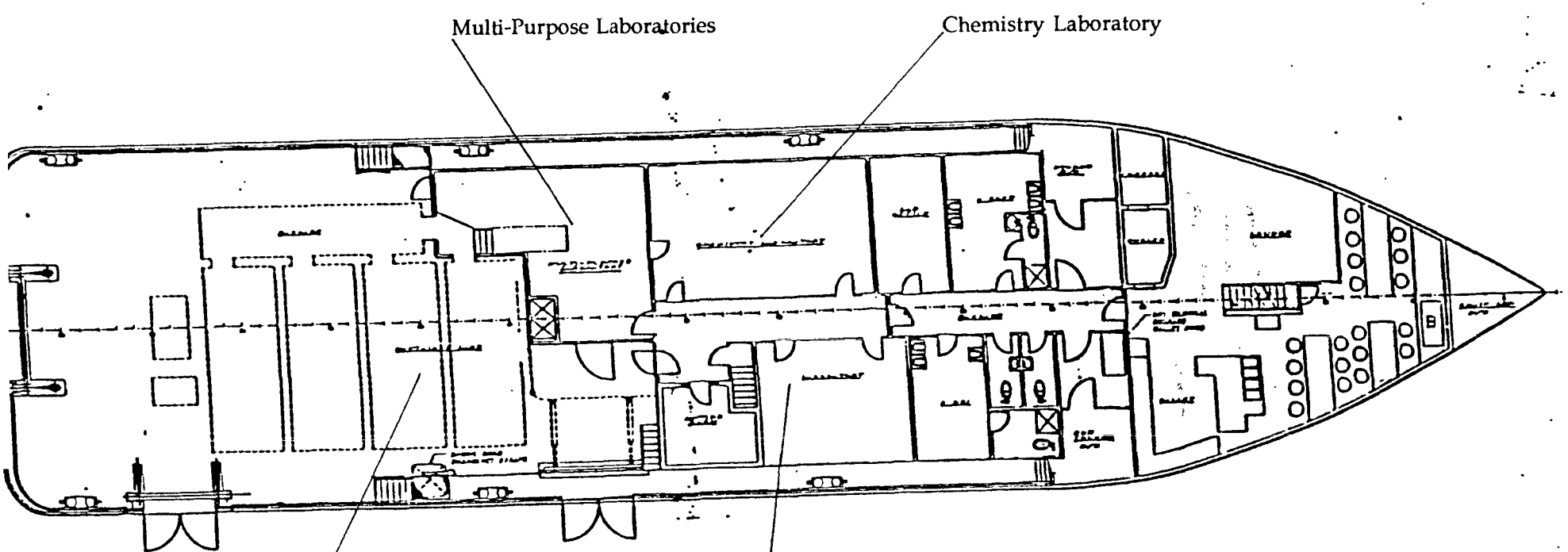
Peggy A. Froelich
SIGNATURE

2. Peggy A. Froelich
NAME (TYPE OR PRINT)

3/18/92

4. Chemical Hygiene Officer
TITLE

ATTACHMENT 2 - LABORATORY FLOOR PLAN
R/V LAKE GUARDIAN HAZARDOUS MATERIAL CONTINGENCY PLAN



Legend

☐ Non Laboratory Areas

US EPA R/V Lake Guardian Bay City, Michigan	Site Location Not to scale
HELIX ENVRIONMENTAL, INC. 7720 Paragon Road, Suite B Dayton, Ohio 45419	10-30-92

Attachment 3 – CHEMICAL STORAGE BY ROOM
R/V LAKE GUARDIAN HAZARDOUS MATERIAL CONTINGENCY PLAN

* Indicates materials that may be stored in amounts equal to or greater than 1 gallon (4 liters).

Chemistry Lab

Acetic Acid (Glacial)
Acetone
Aerosol 22
1-Amino-2-Naphthyl-4-Sulfamic Acid
Ammonium Chloride
Ammonium Molybdate
Ammonium Peroxydisulfate (Ammonium Persulfate)
Antimony Potassium Tartrate
Anasorb Molecular Sieve
(L+) Ascorbic Acid
Barium Chloride
Buffer Salts (pH 4.01, pH 6.86, pH 9.18)
Bio Rex Sodium form Cation Exchange Resin
Brij-35
Cadmium (Coarse)
Cadmium Metal
Carbon (Activated)
Carbon Tetrachloride
Chelex 100
Corn Starch
Cupric Bromide
Cupric Bromide Powder
Cupric Sulfate 5 Hydrate
Disodium Ethylenediamine Tetraacetate
Drierite (CaSO4)
Ethanol
Ethylenediamine Dihydrochloride (Tetrasodium)
Ferric Nitrate 9 Hydrate
Ferrous Sulfate
Hexamethylenetetramine
Hydrochloric Acid
Hydrazine Sulfate
(L+) Glutamic Acid
Magnesium Carbonate
Magnesium Sulfate
Manganese Dioxide
Manganous Sulfate
Mercuric Oxide Red

Mercuric Thiocyanate
Mercury Indicator
Methanol
Methenamine
Methylmercuric Bromide
Methylmercury (II) Hydroxide
Methylthymol Blue
N-(1-Naphthyl) ethylenediamine Dihydrochloride
Nitric Acid
Oxalic Acid
Phenol
Phenolphthalein
(B) Phenylethylamine
Phosphoric Acid
Phosphorus Standard Solution
Platinizing Solution
Potassium Bi-iodate
Potassium Chloride
Potassium Dichromate
Potassium Hydroxide
Potassium Iodide
Potassium Nitrate
Potassium Persulfate
Potassium Phosphate Monobasic
Potassium Sulfate
Silicon Reference Solution
Soda Lime
Sodium Azide
Sodium Bicarbonate
Sodium Bisulfite
Sodium Borate
Sodium Bromide
Sodium Carbonate
Sodium Chloride
Sodium Citrate
Sodium Lauryl Sulfte
Sodium Hydroxide
Sodium Meta-phosphate
Sodium Nitroprusside
Sodium Potassium Tartrate
Sodium Phosphate Dibasic
Sodium Silicate
Sodium Salicylate
Sodium Sulfate
Sodium Sulfite

Sodium Thiosulfate
Stannous Chloride
Starch
Sulfanilamide
Sulfuric Acid

Biology Lab (Starboard Lab)

Dricote
Glutaraldehyde
Irgalan Black Stain
Plate Count Agar

Wet Lab

Buffer Solutions pH 4, pH 7, pH 10
Club Soda
Formalin
Lugol's Solution
Turbidity Standards 0.5 NTU, 10 NTU, 20 NTU

Extraction Lab*

Acetone
Hexane
Methanol
Methylene Chloride

Analytical Lab

Compressed Gases: Helium
Nitrogen
Oxygen
5% Methane, 95% Argon

Primary Productivity

Ecoscint Scintillation Cocktail
Radiac Wash

Hazardous Materials Locker*

Acetic Acid (Glacial)
Acetone
Ethanol
Formaldehyde
Hexane
Hydrochloric Acid
Lugol's Solution
Methanol
Methylene Chloride
Nitric Acid
Phosphoric Acid
Sulfuric Acid

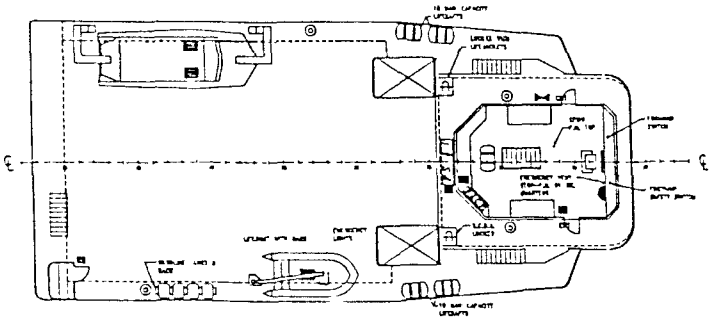
Attachment 4 – EMERGENCY PHONE NUMBERS
R/V LAKE GUARDIAN HAZARDOUS MATERIAL CONTINGENCY PLAN

In the event of a release of hazardous waste or hazardous materials, the Captain, with the assistance of the Emergency Coordinator, has the responsibility to notify the GLNPO office and appropriate authorities such as the National Response Center and the Coast Guard (Refer to Section IV. A. of this appendix).

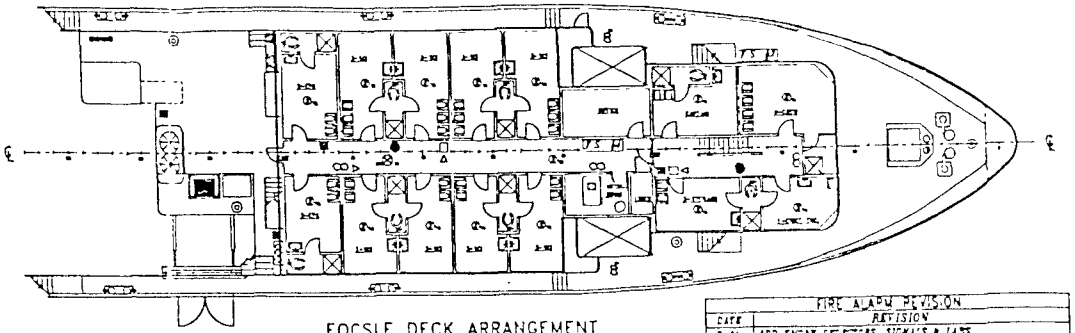
FIRE DEPARTMENT.....911 (Where Available)
POLICE DEPARTMENT.....911 (Where Available)

DAVID ROCKWELL	(312) 353-1373
A. JAMES FINN, SAFETY OFFICER	(312) 353-2075
STEVE GURSKI (RSO)	(312) 886-5301
AIR AND RADIATION DIVISION	(312) 886-5301
NATIONAL RESPONSE CENTER	(800) 424-8802
U.S. COAST GUARD 24 Hour Line – Great Lakes Region	(800) 321-4400
U.S. COAST GUARD - Detroit	(313) 568-9580
U.S. COAST GUARD - Toledo	(419) 729-2651
MICHIGAN DNR	(800) 292-4706
OHIO EPA	(800) 282-9378
MICHIGAN STATE FIRE MARSHALL	(517) 322-1924
OSHA	(800) 321-6742

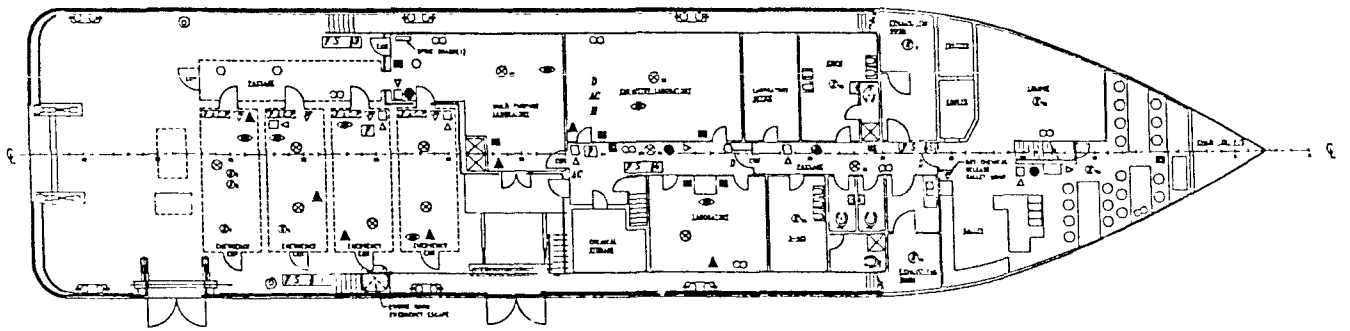
ATTACHMENT 5 - EMERGENCY EQUIPMENT LOCATIONS



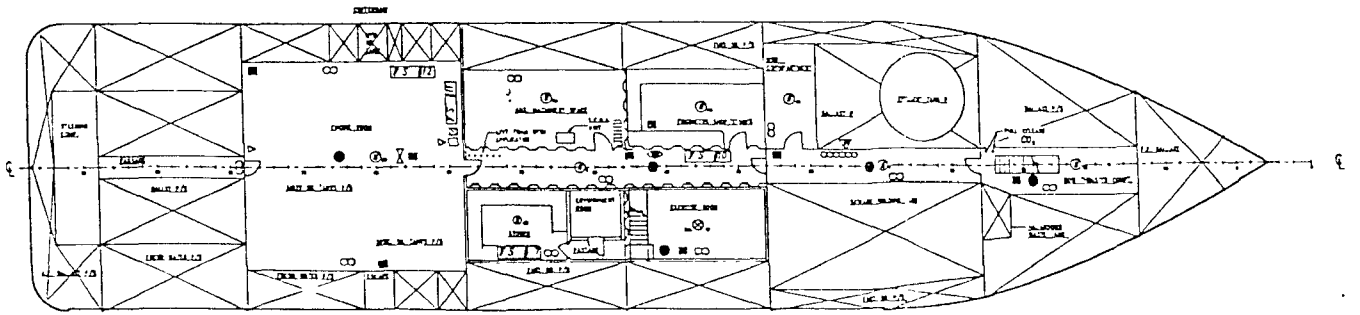
BRIDGE DECK ARRANGEMENT



FOCSLE DECK ARRANGEMENT



MAIN DECK ARRANGEMENT



HOLD ARRANGEMENT

FIRE ALARM REVISION	
DATE	REVISION
7-91	ADD SMOKE DETECTORS SIGNALS & LABS
8-92	CONNECT CO, ADD SMOKE & HEAT DETECTORS ADD SIGNALS
	REPLACE CONT. LAMPS F.B.I & MAKE CONT. LAB & CDR
12-92	ALL SURVIVAL SUITS ARE IN LOCKERS OF EACH STATEROOM
12-92	LOCATION OF RAINGEAR, HARDHATS & BOOTS
12-92	EYE WASH STATION
12-92	SPILL RESPONSE KIT
12-92	ADD TWELVE S.C.B.A. UNITS
12-92	ADD TWO EMERGENCY SHOWERS

GENERAL LEGEND		
SYMBOL		TOTAL
■	CO, EXTINGUISHER	24
⊗	SMOKE DETECTOR (ORIGINAL)	9
●	GENERAL ALARM	9
F.S. 12	FIRE STATION & ZONE NUMBER	12
	EMERGENCY LIGHT	19
	GENERAL ALARM CONTACT MAKER	1
	CO, BOTTLE RACK	1
▷	FIRE HT	5
	EMERGENCY SB.WAY	1
	RING BUOY W/LINE & LIGHT	2
	ALARM BELL	1
	OXYGEN BOTTLE STORAGE	1
	ACETYLENE BOTTLE STORAGE	1
F.A.C.P.	SMOKE ALARM PANEL	1
	FOG BELL	1
	LIFE JACKET	20
	LIFE JACKET ADV. LOCKER, EXPOSURE SUITS	43/43
	75# CO, WITH REEL & NOZZLE	1
	20# PYRENE EXTINGUISHER	2
	CO, SIREN	1
	AFFF FOAM WITH APPLICATOR	1
	PHOTO-ELECTRIC HEAT, SMOKE DETECTORS	1
	135 DEG FT HEAT DETECTOR	9
	HORN, STROBE	1
	RATE COMPENSATED HEAT DETECTOR 135°	9
	PRESSURE SWITCH - CO OR DRY CHEMICAL	1
	EYE WASH STATIONS	1
	SPILL RESPONSE KITS	1
	LOCATION OF RAINGEAR, HARDHATS AND BOOTS	1
	MANUAL PULL STATION	1
D	DOOR MAGNET	9
AC	EMERGENCY AC CUT OFF	1
H	EMERGENCY HYDRAULIC CUT OFF	1

SEAWARD SERVICES INC.

R/V LAKE GUARDIAN
FIRE AND SAFETY PLAN

D

02-2013

Attachment 6 – EMERGENCY RESPONSE TEAM

EMERGENCY COORDINATOR

MELODY PIEPER,
EMERGENCY COORDINATOR.....(517)894-2805 or (937) 435-9715

Or Dial 911 onboard the R/V *Lake Guardian* and report incident

ALTERNATE EMERGENCY COORDINATORS:

ALTERNATE EMERGENCY COORDINATOR.....

Or Dial 911 onboard the R/V *Lake Guardian* and report incident

ALTERNATE EMERGENCY COORDINATOR.....

Or Dial 911 onboard the R/V *Lake Guardian* and report incident

Attachment 7 – OSHA 29 CFR 1910.120
HEALTH & SAFETY PLAN COMPLIANCE PROCEDURES

I. General

The following "Generic Site Safety Plan" should be used in the event that the U.S. EPA GLNPO R/V *LAKE GUARDIAN* Hazardous Waste/Hazardous Materials Contingency Plan becomes implemented. Utilization of the plan will minimize response hazards and will assure compliance with applicable regulations.

II. Respiratory Protection

All Contingency Plan Response Personnel, who enter exclusion zones, must utilize SCBA (Level "B") respiratory protection during clean-up/response efforts. This requirement eliminates the necessity for Response Personnel to perform and determine the required levels of respiratory protection based on air monitoring results.

It is not anticipated that Level "A" personal protection will be required for response activities onboard the R/V *Lake Guardian.*

III. Air Monitoring Requirements

Air monitoring for explosive atmospheres must be performed with a properly calibrated LEL meter when incidents involve unknown or confirmed flammable materials. LEL monitoring must be performed continuously during these types of response activities.

The GLNPO R/V *Lake Guardian.* Chemical Hygiene Officer is responsible for proper maintenance and calibration of the ship's LEL/O_2 meter.

During response activities, Response Personnel should evacuate any area where 10% LEL readings are observed in work areas and should not resume operations until the readings fall below 10% LEL. Readings of 10% are required because of "indoor" responses.

IV. Decontamination

Response Personnel must follow guidelines in the "Decontamination" section of this attachment for Level "B" activities. Materials for Level "B" decontamination are provided onboard the R/V *Lake Guardian..*

Appendix B. Generic Site Safety Plan

This appendix provides a generic plan based on a plan developed by the U.S. Coast Guard for responding to hazardous chemical releases.[1] This generic plan can be adapted for designing a Site Safety Plan for hazardous waste site cleanup operations. It is not all inclusive and should only be used as a guide, not a standard.

A. SITE DESCRIPTION

Date_____ Location_____

Hazards_____

Area affected_____

_____

Surrounding population_____

Topography_____

Weather conditions_____

_____

_____

Additional information_____

_____

_____

_____

_____

B. ENTRY OBJECTIVES - The objective of the initial entry to the contaminated area is to (describes actions, tasks to be accomplished; i.e., identify contaminated soil; monitor conditions, etc.)_____

_____

_____

_____

C. ONSITE ORGANIZATION AND COORDINATION - The following personnel are designated to carry out the stated job functions on site. (Note: One person may carry out more than one job function.)

PROJECT TEAM LEADER_____

SCIENTIFIC ADVISOR_____

SITE SAFETY OFFICER_____

PUBLIC INFORMATION OFFICER_____

SECURITY OFFICER_____

RECORDKEEPER_____

FINANCIAL OFFICER_____

FIELD TEAM LEADER_____

FIELD TEAM MEMBERS_____

_____

_____

_____

_____

_____

[1] U.S. Coast Guard. Policy Guidance for Response to Hazardous Chemical Releases. USCG Pollution Response COMDTINST-M16465.30.

FEDERAL AGENCY REPS (i.e., EPA, NIOSH)

STATE AGENCY REPS

LOCAL AGENCY REPS

CONTRACTOR(S)

All personnel arriving or departing the site should log in and out with the Recordkeeper. All activities on site must be cleared through the Project Team Leader.

D. ONSITE CONTROL

(Name of individual or agency) has been designated to coordinate access control and security on site. A safe perimeter has been established at (distance or description of controlled area)

No unauthorized person should be within this area.

The onsite Command Post and staging area have been established at _____

The prevailing wind conditions are _____. This location is upwind from the Exclusion Zone.

Control boundaries have been established, and the Exclusion Zone (the contaminated area), hotline, Contamination Reduction Zone, and Support Zone (clean area) have been identified and designated as follows: (describe boundaries and/or attach map of controlled area)

These boundaries are identified by: (marking of zones, i.e., red boundary tape - hotline; traffic cones - Support Zone; etc.)

E. HAZARD EVALUATION

The following substance(s) are known or suspected to be on site. The primary hazards of each are identified.

Substances Involved	Concentrations (If Known)	Primary Hazards
(chemical name)		(e.g., toxic on inhalation)

The following additional hazards are expected on site: (i.e., slippery ground, uneven terrain, etc.)

Hazardous substance information form(s) for the involved substance(s) have been completed and are attached.

F. PERSONAL PROTECTIVE EQUIPMENT

Based on evaluation of potential hazards, the following levels of personal protection have been designated for the applicable work areas or tasks:

Location	Job Function	Level of Protection
Exclusion Zone		A B C D Other
		A B C D Other
		A B C D Other
		A B C D Other
Contamination Reduction Zone		A B C D Other
		A B C D Other
		A B C D Other
		A B C D Other

Specific protective equipment for each level of protection is as follows:

Level A: Fully-encapsulating suit; SCBA; (disposable coveralls)

Level B: Splash gear (type); SCBA

Level C: Splash gear (type); Full-face canister resp.

Level D:

Other

The following protective clothing materials are required for the involved substances:

Substance	Material
(chemical name)	(material name, e.g., Viton)

If air-purifying respirators are authorized, (filtering medium) is the appropriate canister for use with the involved substances and concentrations. A competent individual has determined that all criteria for using this type of respiratory protection have been met.

NO CHANGES TO THE SPECIFIED LEVELS OF PROTECTION SHALL BE MADE WITHOUT THE APPROVAL OF THE SITE SAFETY OFFICER AND THE PROJECT TEAM LEADER.

G. ONSITE WORK PLANS

Work party(s) consisting of ____ persons will perform the following tasks:

Project Team Leader	(name)	(function)
Work Party #1		
Work Party #2		
Rescue Team (required for entries to IDLH environments)		
Decontamination Team		

The work party(s) were briefed on the contents of this plan at _____.

H. COMMUNICATION PROCEDURES

Channel ____ has been designated as the radio frequency for personnel in the Exclusion Zone. All other onsite communications will use channel ____.

Personnel in the Exclusion Zone should remain in constant radio communication or within sight of the Project Team Leader. Any failure of radio communication requires an evaluation of whether personnel should leave the Exclusion Zone.

__(Horn blast, siren, etc.)__ is the emergency signal to indicate that all personnel should leave the Exclusion Zone. In addition, a loud hailer is available if required.

The following standard hand signals will be used in case of failure of radio communications:

Hand gripping throat	Out of air, can't breathe
Grip partner's wrist or both hands around waist	Leave area immediately
Hands on top of head	Need assistance
Thumbs up	OK, I am all right, I understand
Thumbs down	No, negative

Telephone communication to the Command Post should be established as soon as practicable. The phone number is _____.

I. DECONTAMINATION PROCEDURES

Personnel and equipment leaving the Exclusion Zone shall be thoroughly decontaminated. The standard level _____ decontamination protocol shall be used with the following decontamination stations: (1) _____
(2) _____ (3) _____ (4) _____ (5) _____
(6) _____ (7) _____ (8) _____ (9) _____
(10) _____ Other _____

Emergency decontamination will include the following stations: _____
_____
_____
_____

The following decontamination equipment is required: _____
_____
_____
_____

__(Normally detergent and water)__ will be used as the decontamination solution.

J. SITE SAFETY AND HEALTH PLAN

1. _____(name)_____ is the designated Site Safety Officer and is directly responsible to the Project Team Leader for safety recommendations on site.

2. Emergency Medical Care

(names of qualified personnel) are the qualified EMTs on site. (medical facility names), at (address), phone _____ is located _____ minutes from this location. (name of person) was contacted at (time) and briefed on the situation, the potential hazards, and the substances involved. A map of alternative routes to this facility is available at (normally Command Post).

Local ambulance service is available from _____ at phone _____. Their response time is _____ minutes. Whenever possible, arrangements should be made for onsite standby.

First-aid equipment is available on site at the following locations:

First-aid kit	_____
Emergency eye wash	_____
Emergency shower	_____
(other) _____	_____

Emergency medical information for substances present:

Substance	Exposure Symptoms	First-Aid Instructions

List of emergency phone numbers:

Agency/Facility	Phone #	Contact
Police		
Fire		
Hospital		
Airport		
Public Health Advisor		

3. Environmental Monitoring

The following environmental monitoring instruments shall be used on site (cross out if not applicable) at the specified intervals.

Combustible Gas Indicator	- continuous/hourly/daily/other	_____
O_2 Monitor	- continuous/hourly/daily/other	_____
Colorimetric Tubes	- continuous/hourly/daily/other	_____
(type) _____		_____
_____		_____
_____		_____
HNU/OVA	- continuous/hourly/daily/other	_____
Other _____	- continuous/hourly/daily/other	_____
_____	- continuous/hourly/daily/other	_____

4. Emergency Procedures (should be modified as required for incident)

The following standard emergency procedures will be used by onsite personnel. The Site Safety Officer shall be notified of any onsite emergencies and be responsible for ensuring that the appropriate procedures are followed.

Personnel Injury in the Exclusion Zone: Upon notification of an injury in the Exclusion Zone, the designated emergency signal _____ shall be sounded. All site personnel shall assemble at the decontamination line. The rescue team will enter the Exclusion Zone (if required) to remove the injured person to the hotline. The Site Safety Officer and Project Team Leader should evaluate the nature of the injury, and the affected person should be decontaminated to the extent possible prior to movement to the Support Zone. The onsite EMT shall initiate the appropriate first aid, and contact should be made for an ambulance and with the designated medical facility (if required). No persons shall reenter the Exclusion Zone until the cause of the injury or symptoms is determined.

Personnel Injury in the Support Zone: Upon notification of an injury in the Support Zone, the Project Team Leader and Site Safety Officer will assess the nature of the injury. If the cause of the injury or loss of the injured person does not affect the performance of site personnel, operations may continue, with the onsite EMT initiating the appropriate first aid and necessary follow-up as stated above. If the injury increases the risk to others, the designated emergency signal _____ shall be sounded and all site personnel shall move to the decontamination line for further instructions. Activities on site will stop until the added risk is removed or minimized.

Fire/Explosion: Upon notification of a fire or explosion on site, the designated emergency signal _____ shall be sounded and all site personnel assembled at the decontamination line. The fire department shall be alerted and all personnel moved to a safe distance from the involved area.

Personal Protective Equipment Failure: If any site worker experiences a failure or alteration of protective equipment that affects the protection factor, that person and his/her buddy shall immediately leave the Exclusion Zone. Reentry shall not be permitted until the equipment has been repaired or replaced.

Other Equipment Failure: If any other equipment on site fails to operate properly, the Project Team Leader and Site Safety Officer shall be notified and then determine the effect of this failure on continuing operations on site. If the failure affects the safety of personnel or prevents completion of the Work Plan tasks, all personnel shall leave the Exclusion Zone until the situation is evaluated and appropriate actions taken.

The following emergency escape routes are designated for use in those situations where egress from the Exclusion Zone cannot occur through the decontamination line: (describe alternate routes to leave area in emergencies)

In all situations, when an onsite emergency results in evacuation of the Exclusion Zone, personnel shall not reenter until:

1. The conditions resulting in the emergency have been corrected.
2. The hazards have been reassessed.
3. The Site Safety Plan has been reviewed.
4. Site personnel have been briefed on any changes in the Site Safety Plan.

5. Personal Monitoring

The following personal monitoring will be in effect on site:

Personal exposure sampling: (describe any personal sampling programs being carried out on site personnel. This would include use of sampling pumps, air monitors, etc.)

Medical monitoring: The expected air temperature will be (°F) . If it is determined that heat stress monitoring is required (mandatory if over 70°F) the following procedures shall be followed:
(describe procedures in effect, i.e., monitoring body temperature, body weight, pulse rate)

All site personnel have read the above plan and are familiar with its provisions.

	(name)	(signature)
Site Safety Oficer		
Project Team Leader		
Other Site Personnel		

Appendix C. Sample Hazardous Substance Information Form

COMMON NAME:_____ CHEMICAL NAME:_____

I. PHYSICAL/CHEMICAL PROPERTIES

		SOURCE
Natural physical state: Gas____ Liquid____ Solid____		
(at ambient temps of 20°C-25°C)		
Molecular weight	_____ g/g-mole	
Density[a]	_____ g/ml	
Specific gravity[a]	_____ @ _____ °F/°C	
Solubility: water	_____ @ _____ °F/°C	
Solubility[b]: _____	_____ @ _____ °F/°C	
Boiling point	_____ °F/°C	
Melting point	_____ °F/°C	
Vapor pressure	_____ mmHg @ _____ °F/°C	
Vapor density	_____ @ _____ °F/°C	
Flash point	_____ °F/°C	
(open cup_____; closed cup_____)		
Other: _____	_____	

II. HAZARDOUS CHARACTERISTICS

A. TOXICOLOGICAL HAZARD	HAZARD?	CONCENTRATIONS (PEL, TLV, other)	SOURCE
Inhalation	Yes No		
Ingestion	Yes No		
Skin/eye absorption	Yes No		
Skin/eye contact	Yes No		
Carcinogenic	Yes No		
Teratogenic	Yes No		
Mutagenic	Yes No		
Aquatic	Yes No		
Other: _____	Yes No		

B. TOXICOLOGICAL HAZARD	HAZARD?	CONCENTRATIONS	SOURCE
Combustibility	Yes No		
Toxic byproduct(s):	Yes No		
_____			
_____			
Flammability	Yes No		
LFL			
UFL			
Explosivity	Yes No		
LEL			
UEL			

[a]Only one is necessary.
[b]For organic compounds, recovery of spilled material by solvent extraction may require solubility data.

C. REACTIVITY HAZARD	HAZARD? Yes	No	CONCENTRATIONS	SOURCE
Reactivities:				
_____			_____	_____
_____			_____	_____

D. CORROSIVITY HAZARD	HAZARD? Yes	No	CONCENTRATIONS	SOURCE
ph _____				
Neutralizing agent:				
_____			_____	_____
_____			_____	_____

E. RADIOACTIVE HAZARD	HAZARD? Yes	No	*EXPOSURE RATE*	*SOURCE*
Background	Yes	No	_____	_____
Alpha particles	Yes	No	_____	_____
Beta particles	Yes	No	_____	_____
Gamma radiation	Yes	No	_____	_____

III. DESCRIPTION OF INCIDENT:

Quantity involved _____

Release information _____

_____

Monitoring/sampling recommended _____

_____

IV. RECOMMENDED PROTECTION:

Worker _____

_____

Public _____

_____

V. RECOMMENDED SITE CONTROL:

Hotline _____

_____

Decontamination line _____

_____

Command Post location _____

_____

VI. REFERENCES FOR SOURCES:

_____

_____

_____

_____

_____

_____

_____

_____

SAMPLE HAZARDOUS SUBSTANCE INFORMATION FORM FILLED OUT FOR VINYL CHLORIDE

COMMON NAME: Vinyl Chloride CHEMICAL NAME: Chloroethene

I. PHYSICAL/CHEMICAL PROPERTIES

			SOURCE
Natural physical state: Gas ✓ Liquid ___ Solid ___ (at ambient temps of 20°C-25°C)			CHRIS
Molecular weight	62.5	g/g-mol	CHRIS
Density[a]		g/ml	
Specific gravity[a]	0.9121 @ 20	°F/(°C)	CHEM DIC
Solubility: water	slightly @ —	°F/°C	CHEM DIC
Solubility[b]: alcohol	soluble @	°F/°C	CHEM DIC
Boiling point	7.2	(°F) °C	CHRIS
Melting point	-244.8	(°F) °C	CHRIS
Vapor pressure	2,300 mmHg @ 20	°F/(°C)	CHEM DIC
Vapor density	2.2 @ —	°F/°C	NFPA
Flash point (open cup ✓; closed cup ___)	-110	°F/(°C)	CHRIS
Other: Polymerizes readily in air and water			OHMTADS

II. HAZARDOUS CHARACTERISTICS

A. TOXICOLOGICAL HAZARD	HAZARD?	CONCENTRATIONS (PEL, TLV, other)	SOURCE
Inhalation	(Yes) No	PEL-TWA 1 ppm/TLV-TWA 5ppm	OSHA/ACGIH
Ingestion	Yes No		"
Skin/eye absorption	(Yes) No		SITTIG
Skin/eye contact	(Yes) No	Skin burn from contact	OHMTADS
Carcinogenic	(Yes) No	TLV 5ppm/PEL 1ppm	ACGIH/OSHA
Teratogenic	Yes No		
Mutagenic	Yes No		
Aquatic	Yes No		
Other: ___	Yes No		

B. TOXICOLOGICAL HAZARD	HAZARD?	CONCENTRATIONS	SOURCE
Combustibility	(Yes) No		
Toxic byproduct(s): Hydrogen chloride	(Yes) No		
Phosgene, carbon monoxide			
Flammability	(Yes) No		
LFL		3.6	OHMTADS
UFL		33	OHMTADS
Explosivity	Yes No		
LEL			
UEL			

[a]Only one is necessary.
[b]For organic compounds, recovery of spilled material by solvent extraction may require solubility data.

C. REACTIVITY HAZARD	HAZARD? (Yes) No	CONCENTRATIONS	SOURCE
Reactivities: Polymerizes in air, sunlight or heat			CHRIS

D. CORROSIVITY HAZARD	HAZARD?	CONCENTRATIONS	SOURCE
ph _____	Yes (No)		
Neutralizing agent:			

E. RADIOACTIVE HAZARD	HAZARD?	EXPOSURE RATE	SOURCE
Background	Yes (No)		
Alpha particles	Yes (No)		
Beta particles	Yes (No)		
Gamma radiation	Yes (No)		

III. DESCRIPTION OF INCIDENT:

Quantity involved 1,000 lbs

Release information Suspected Leaking Cylinder

Monitoring/sampling recommended

IV. RECOMMENDED PROTECTION:

Worker Level B protection. Protective clothing materials recommended: CPE or Viton

Public

V. RECOMMENDED SITE CONTROL:

Hotline

Decontamination line

Command Post location

VI. REFERENCES FOR SOURCES:

CHRIS – Chemical Hazards Response Information System Manual II
ACGIH – TLVs – Threshold Limit Values for Chemical Substances and Physical Agents in the Work Environment 1984-85
CHEM DIC – Condensed Chemical Dictionary, Tenth Edition, 1981
NFPA – Fire Protection Guide on Hazardous Materials, Seventh Ed., 1978
OHMTADS – Oil and Hazardous Materials Technical Assistance Data System, EPA 1984
SITTIG – Handbook of Toxic and Hazardous Chemicals, Marshall Sittig, 1981
OSHA – 29 CFR Part 1910.1017

Appendix D. Sample Decontamination Procedures for Three Typical Levels of Protection[a]

F.S.O.P. No. 7

Process: DECONTAMINATION PROCEDURES

INTRODUCTION

1.1 The objective of these procedures is to minimize the risk of exposure to hazardous substances. These procedures were derived from the U.S. Environmental Protection Agency, Office of Emergency and Remedial Response's (OERR), "Interim Standard Operating Safety Guides (revised Sep. 82)". This version of the guides is in a format that is more appropriate for use in the field.

1.2 Protective equipment must be worn by personnel when response activities involve known or suspected hazardous substances. The procedures for decontaminating personnel upon leaving the contaminated area are addressed for each of the EPA, OERR designated levels of protection. The procedures given are for the maximum and minimum amount of decontamination used for each level of protection.

1.3 The maximum decontamination procedures for all levels of protection consist of specific activities at nineteen stations. Each station emphasizes an important aspect of decontamination. When establishing a decontamination line, each aspect should be incorporated separately or combined with other aspects into a procedure with fewer steps (such as the Minimum Decontamination Procedures).

1.4 Decontamination lines are site specific since they are dependent upon the types of contamination and the type of work activities on site. A cooling station is sometimes necessary within the decontamination line during hot weather. It is usually a location in a shaded area in which the wind can help to cool personnel. In addition, site conditions may permit the use of cooling devices such as cool water hose, ice packs, cool towels, etc. When the decontamination line is no longer required, contaminated wash and rinse solutions and contaminated articles must be contained and disposed of as hazardous wastes in compliance with state and federal regulations.

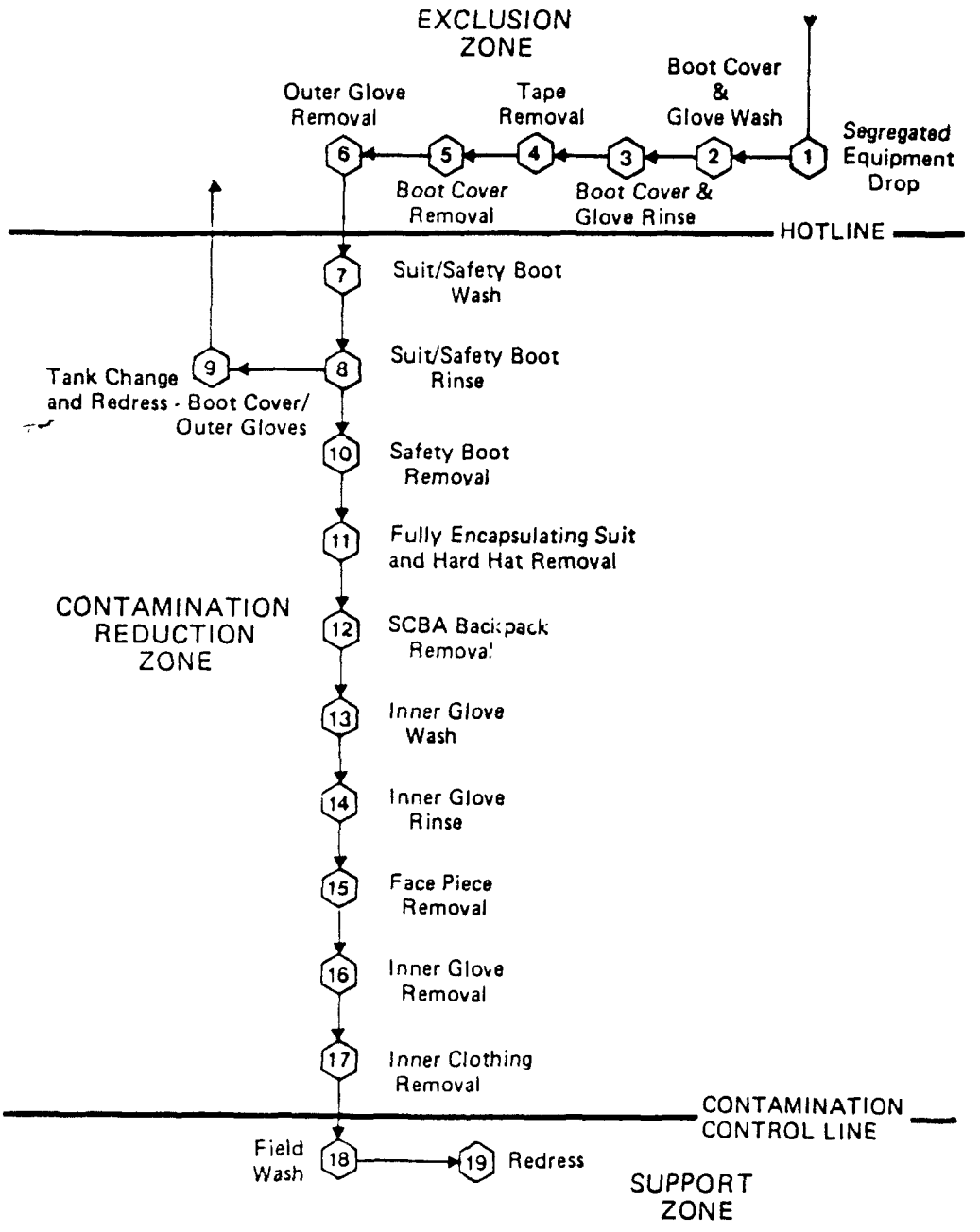
[a] **Source:** Excerpted from *Field Standard Operating Procedures for the Decontamination of Response Personnel (FSOP 7).* EPA Office of Emergency and Remedial Response, Hazardous Response Support Division, Washington, DC. January 1985.

F.S.O.P. No. 7

PROCESS DECON PROCEDURES

MAXIMUM DECONTAMINATION LAYOUT

LEVEL A PROTECTION

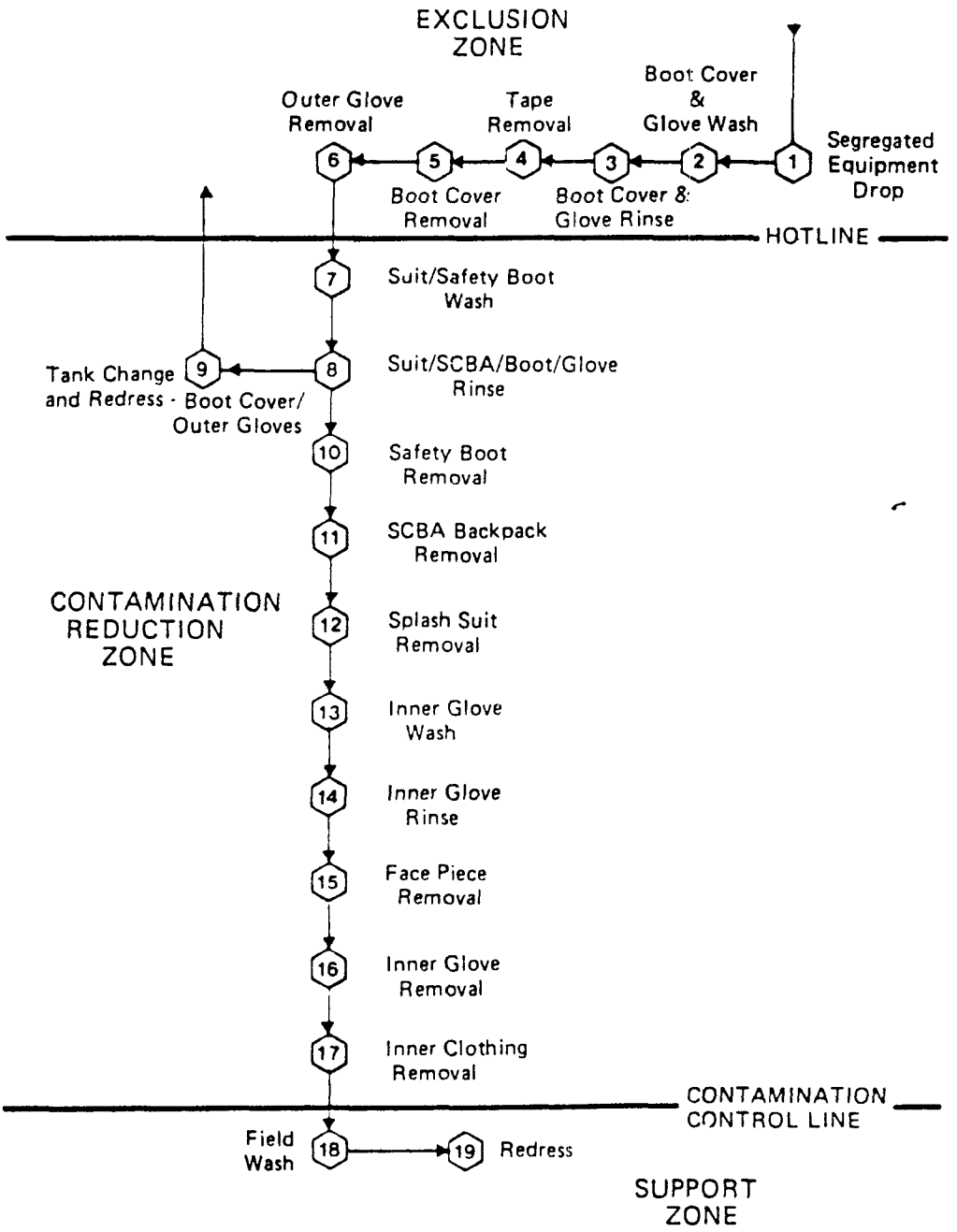


P.S.O.P. No. 7

PROCESS DECON PROCEDURES

MAXIMUM DECONTAMINATION LAYOUT

LEVEL B PROTECTION

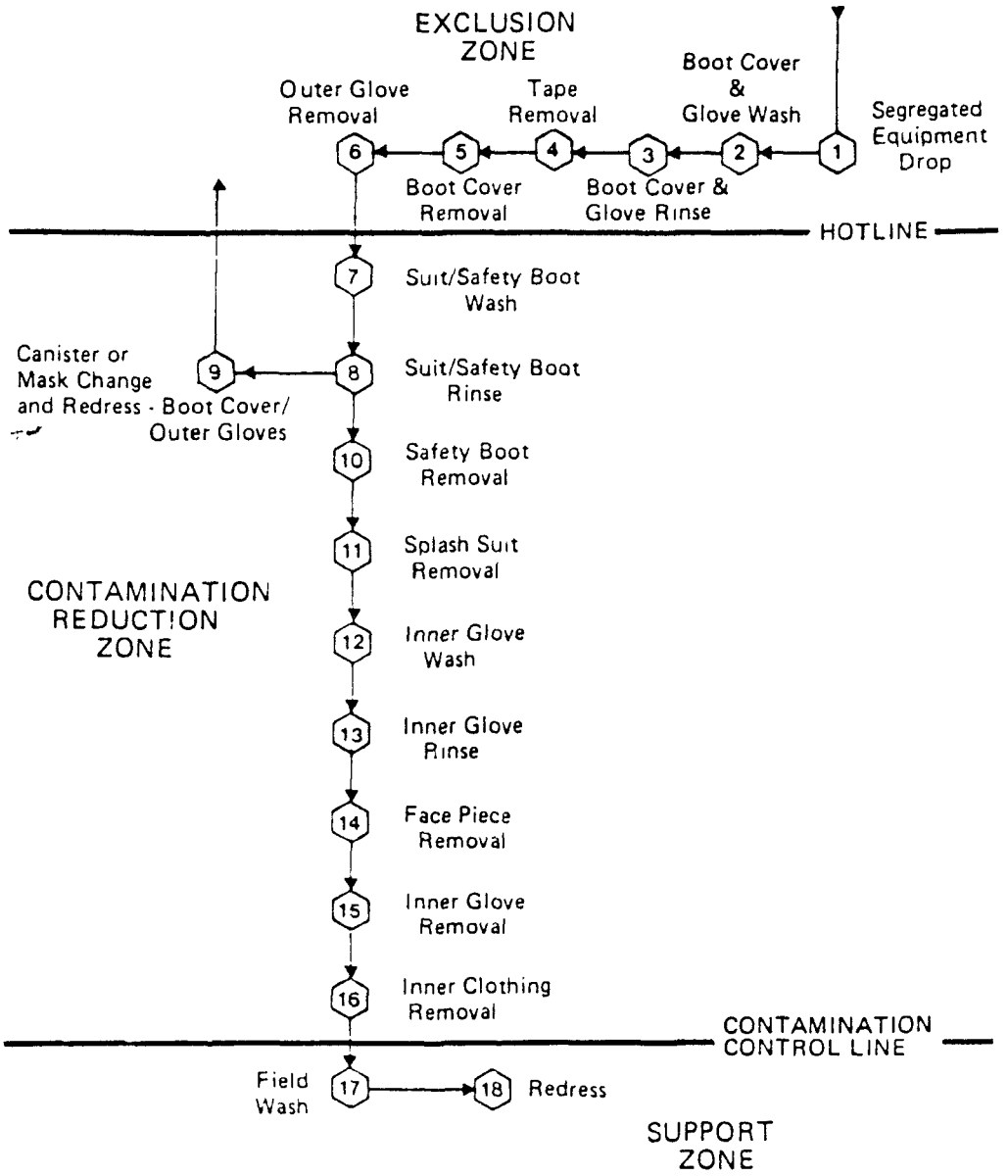


F.S.O.P. No. 7

PROCESS DECON PROCEDURES

MAXIMUM DECONTAMINATION LAYOUT

LEVEL C PROTECTION

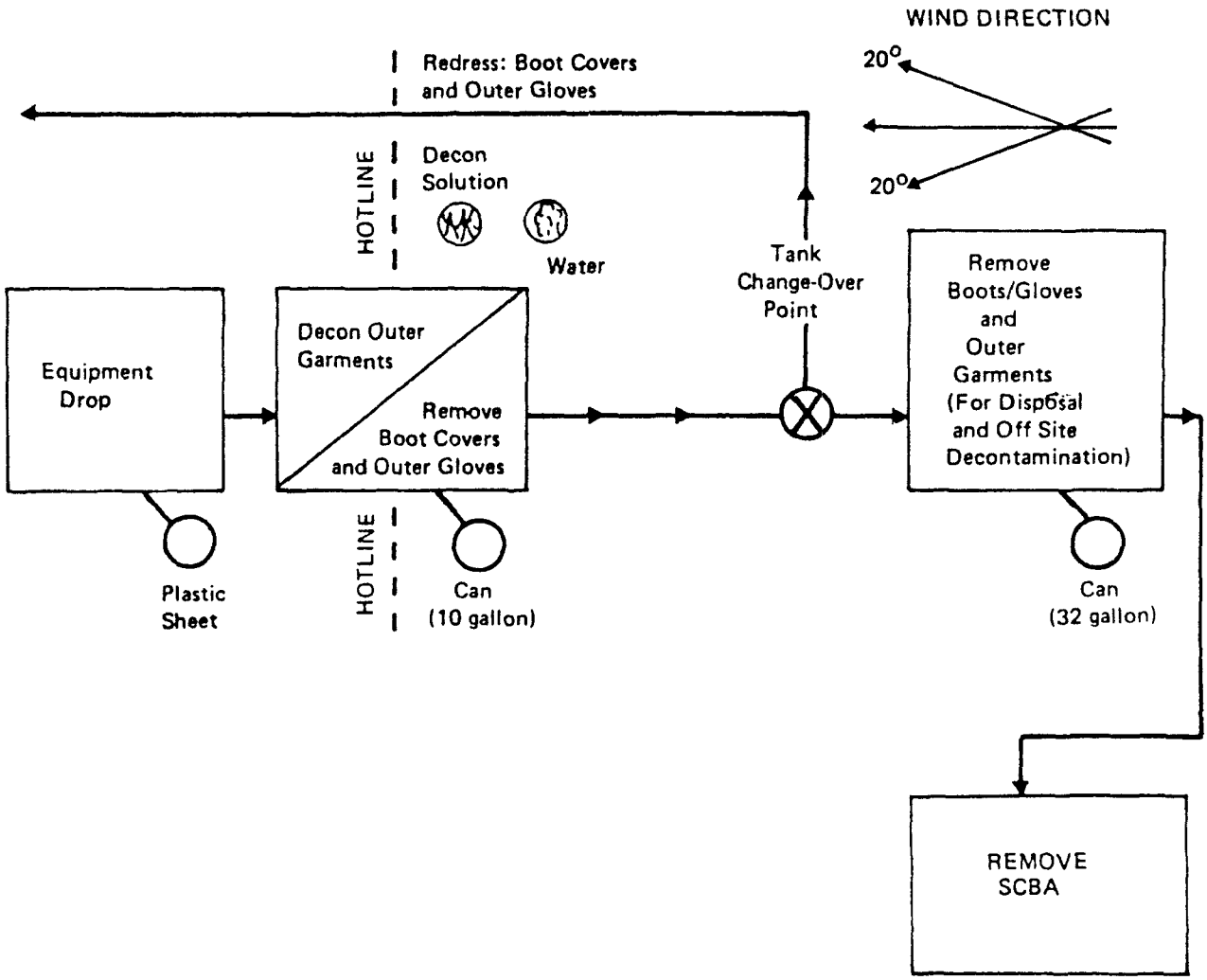


F.S.O.P. No. 7

PROCESS DECON PROCEDURES

MINIMUM DECONTAMINATION LAYOUT

LEVELS A & B PROTECTION

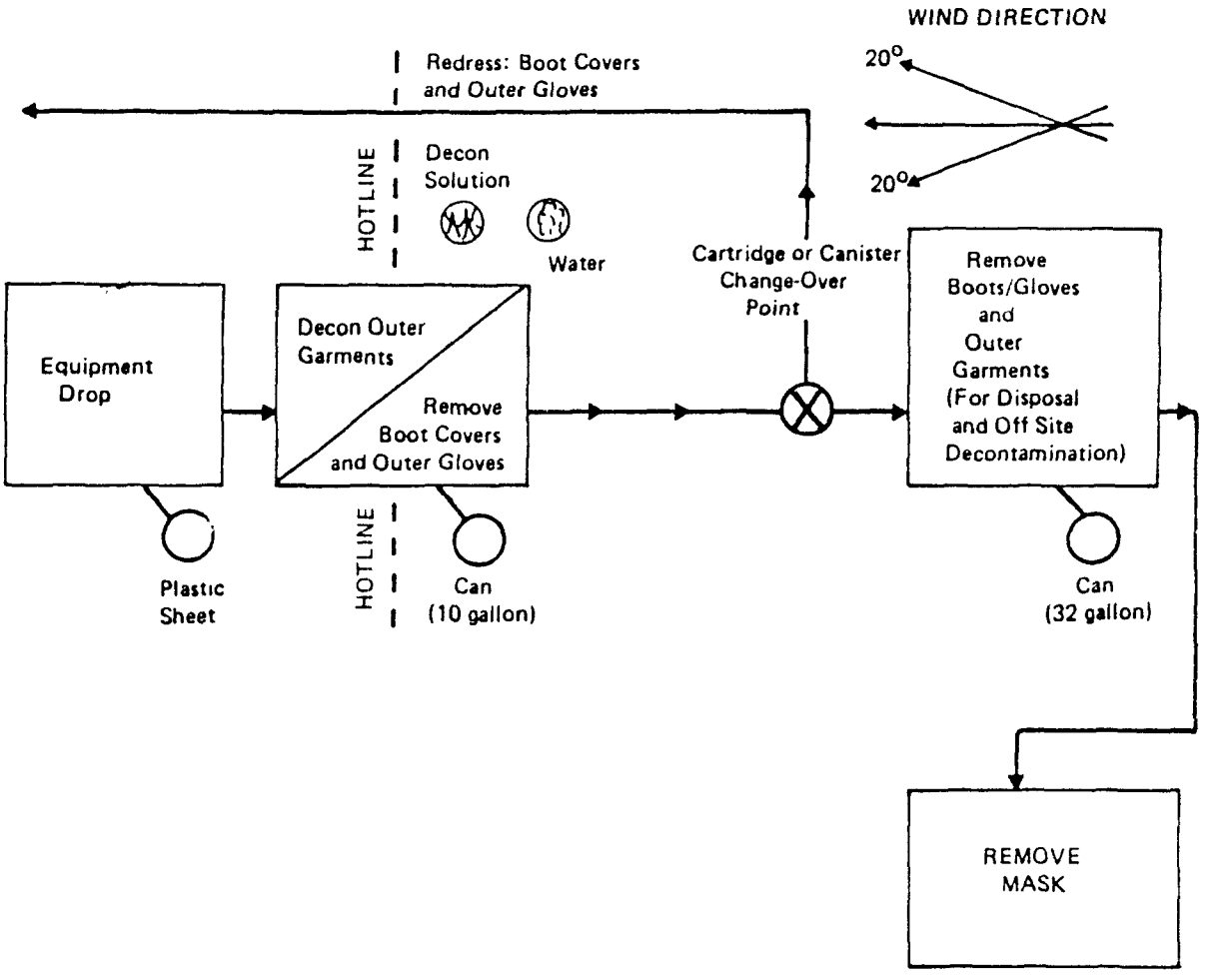


F.S.O.P. No. 7

PROCESS DECON PROCEDURES

MINIMUM DECONTAMINATION LAYOUT

LEVEL C PROTECTION



EQUIPMENT NEEDED TO PERFORM MAXIMUM DECONTAMINATION MEASURES FOR LEVELS A, B, AND C

Station 1:
a. Various Size Containers
b. Plastic Liners
c. Plastic Drop Cloths

Station 2:
a. Containers (20-30 Gallons)
b. Decon Solution or Detergent Water
c. 2-3 Long-Handled, Soft-Bristled Scrub Brushes

Station 3:
a. Containers (20-30 Gallons)
OR
High-Pressure Spray Unit
b. Water
c. 2-3 Long-Handled, Soft-Bristled Scrub Brushes

Station 4:
a. Containers (20-30 Gallons)
b. Plastic Liners

Station 5:
a. Containers (20-30 Gallons)
b. Plastic Liners
c. Bench or Stools

Station 6:
a. Containers (20-30 Gallons)
b. Plastic Liners

Station 7:
a. Containers (20-30 Gallons)
b. Decon Solution or Detergent Water
c. 2-3 Long-Handled, Soft-Bristled Scrub Brushes

Station 8:
a. Containers (20-30 Gallons)
OR
High-Pressure Spray Unit
b. Water
c. 2-3 Long-Handled, Soft-Bristled Scrub Brushes

Station 9:
a. Air Tanks or Face Masks and Cartridge Depending on Level
b. Tape
c. Boot Covers
d. Gloves

Station 10:
a. Containers (20-30 Gallons)
b. Plastic Liners
c. Bench or Stools
d. Boot Jack

Station 11:
a. Rack
b. Drop Cloths
c. Bench or Stool

Station 12:
a. Table

Station 13:
a. Basin or Bucket
b. Decon Solution
c. Small Table

Station 14:
a. Water
b. Basin or Bucket
c. Small Table

Station 15:
a. Containers (20-30 Gallons)
b. Plastic Liners

Station 16:
a. Containers (20-30 Gallons)
b. Plastic Liners

Station 17:
a. Containers (20-30 Gallons)
b. Plastic Liners

Station 18:
a. Water
b. Soap
c. Small Table
d. Basin or Bucket
e. Field Showers
f. Towels

Station 19:
a. Dressing Trailer is Needed in Inclement Weather
b. Tables
c. Chairs
d. Lockers
e. Cloths

EQUIPMENT NEEDED TO PERFORM MINIMUM DECONTAMINATION MEASURES FOR LEVELS A, B, AND C

Station 1:
a. Various Size Containers
b. Plastic Liners
c. Plastic Drop Cloths

Station 2:
a. Containers (20-30 Gallons)
b. Decon Solution
c. Rinse Water
d. 2-3 Long-Handled, Soft-Bristled Scrub Brushes

Station 3:
a. Containers (20-30 Gallons)
b. Plastic Liners
c. Bench or Stools

Station 4:
a. Air Tanks or Masks and Cartridges Depending Upon Level
b. Tape
c. Boot Covers
d. Gloves

Station 5:
a. Containers (20-30 Gallons)
b. Plastic Liners
c. Bench or Stools

Station 6:
a. Plastic Sheets
b. Basin or Bucket
c. Soap and Towels
d. Bench or Stools

Station 7:
a. Water
b. Soap
c. Tables
d. Wash Basin or Bucket

FSOP 7: MAXIMUM MEASURES FOR LEVEL A DECONTAMINATION

Station 1:	Segregated Equipment Drop	1. Deposit equipment used on site (tools, sampling devices and containers, monitoring instruments, radios, clipboards, etc.) on plastic drop cloths or in different containers with plastic liners. During hot weather operations, a cool down station may be set up within this area.
Station 2:	Boot Cover and Glove Wash	2. Scrub outer boot covers and gloves with decon solution or detergent/water.
Station 3:	Boot Cover and Glove Rinse	3. Rinse off decon solution from station 2 using copious amounts of water.
Station 4:	Tape Removal	4. Remove tape around boots and gloves and deposit in container with plastic liner.
Station 5:	Boot Cover Removal	5. Remove boot covers and deposit in container with plastic liner.
Station 6:	Outer Glove Removal	6. Remove outer gloves and deposit in container with plastic liner.
Station 7:	Suit and Boot Wash	7. Wash encapsulating suit and boots using scrub brush and decon solution or detergent/water. Repeat as many times as necessary.
Station 8:	Suit and Boot	8. Rinse off decon solution using water. Repeat as many times as necessary.
Station 9:	Tank Change	9. If an air tank change is desired, this is the last step in the decontamination procedure. Air tank is exchanged, new outer gloves and boot covers donned, and joints taped. Worker returns to duty.
Station 10:	Safety Boot Removal	10. Remove safety boots and deposit in container with plastic liner.
Station 11:	Fully Encapsulating Suit and Hard Hat Removal	11. Fully encapsulated suit is removed with assistance of a helper and laid out on a drop cloth or hung up. Hard hat is removed. Hot weather rest station maybe set up within this area for personnel returning to site.
Station 12:	SCBA Backpack Removal	12. While still wearing facepiece, remove backpack and place on table. Disconnect hose from regulator valve and proceed to next station.
Station 13:	Inner Glove Wash	13. Wash with decon solution that will not harm the skin. Repeat as often as necessary.
Station 14:	Inner Glove Rinse	14. Rinse with water. Repeat as many times as necessary.
Station 15:	Face Piece Removal	15. Remove face piece. Deposit in container with plastic liner. Avoid touching face with fingers.
Station 16:	Inner Glove Removal	16. Remove inner gloves and deposit in container with liner.

FSOP 7: MAXIMUM MEASURES FOR LEVEL A DECONTAMINATION

Station 17:	Inner Clothing Removal	17. Remove clothing and place in lined container. Do not wear inner clothing off-site since there is a possibility that small amounts of contaminants might have been transferred in removing the fully-encapsulating suit.
Station 18:	Field Wash	18. Shower if highly toxic, skin-corrosive or skin-absorbable materials are known or suspected to be present. Wash hands and face if shower is not available.
Station 19:	Redress	19. Put on clean clothes.

FSOP 7: MINIMUM MEASURES FOR LEVEL A DECONTAMINATION

Station 1:	Equipment Drop	1. Deposit equipment used on-site (tools, sampling devices and containers, monitoring instruments, radios, clipboards, etc.) on plastic drop cloths. Segregation at the drop reduces the probability of cross contamination. During hot weather operations, cool down stations maybe set up within this area.
Station 2:	Outer Garment, Boots, and Gloves Wash and Rinse	2. Scrub outer boots, outer gloves and fully-encapsulating suit with decon solution or detergent and water. Rinse off using copious amounts of water.
Station 3:	Outer Boot and Glove Removal	3. Remove outer boots and gloves. Deposit in container with plastic liner.
Station 4:	Tank Change	4. If worker leaves Exclusion Zone to change air tank, this is the last step in the decontamination procedure. Worker's air tank is exchanged, new outer gloves and boot covers donned, joints taped, and worker returns to duty.
Station 5:	Boot, Gloves and Outer Garment Removal	5. Boots, fully-encapsulating suit, inner gloves removed and deposited in separate containers lined with plastic.
Station 6:	SCBA Removal	6. SCBA backpack and facepiece is removed (avoid touching face with fingers). SCBA deposited on plastic sheets.
Station 7:	Field Wash	7. Hands and face are thoroughly washed. Shower as soon as possible.

FSOP 7: MAXIMUM MEASURES FOR LEVEL B DECONTAMINATION

Station 1:	Segregated Equipment Drop	1. Deposit equipment used on site (tools, sampling devices and containers, monitoring instruments, radios, clipboards, etc.) on plastic drop cloths or in different containers with plastic liners. Segregation at the drop reduces the probability of cross-contamination. During hot weather operations, cooldown stations may be set up within this area.
Station 2:	Boot Cover and Glove Wash	2. Scrub outer boot covers and gloves with decon solution or detergent and water.
Station 3:	Boot Cover and Glove Rinse	3. Rinse off decon solution from station 2 using copious amounts of water.
Station 4:	Tape Removal	4. Remove tape around boots and gloves and deposit in container with plastic liner.
Station 5:	Boot Cover Removal	5. Remove boot covers and deposit in container with plastic liner.
Station 6:	Outer Glove removal	6. Remove outer gloves and deposit in container with plastic liner.
Station 7:	Suit and Safety Boot Wash	7. Wash chemical-resistant splash suit, SCBA, gloves and safety boots. Scrub with long-handle scrub brush and decon solution. Wrap SCBA regulator (if belt mounted type) with plastic to keep out water. Wash backpack assembly with sponges or cloths.
Station 8:	Suit, SCBA, Boot, and Glove Rinse	8. Rinse off decon solution using copious amounts of water.
Station 9:	Tank Change	9. If worker leaves exclusion zone to change air tank, this is the last step in the decontamination procedure. Worker's air tank is exchanged, new outer gloves and boot covers donned, and joints taped. Worker returns to duty.
Station 10:	Safety Boot Removal	10. Remove safety boots and deposit in container with plastic liner.
Station 11:	SCBA Backpack Removal	11. While still wearing facepiece, remove backpack and place on table. Disconnect hose from regulator valve.
Station 12:	Splash Suit Removal	12. With assistance of helper, remove splash suit. Deposit in container with plastic liner.
Station 13:	Inner Glove Wash	13. Wash inner gloves with decon solution.
Station 14:	Inner Glove Rinse	14. Rinse inner gloves with water.
Station 15:	Face Piece Removal	15. Remove face piece. Deposit in container with plastic liner. Avoid touching face with fingers.
Station 16:	Inner Glove Removal	16. Remove inner gloves and deposit in container with liner.

FSOP 7: MAXIMUM MEASURES FOR LEVEL B DECONTAMINATION

Station 17:	Inner Clothing Removal	17. Remove inner clothing. Place in container with liner. Do not wear inner clothing off-site since there is a possibility that small amounts of contaminants might have been transferred in removing the fully-encapsulating suit.
Station 18:	Field Wash	18. Shower if highly toxic, skin-corrosive or skin-absorbable materials are known or suspected to be present. Wash hands and face if shower is not available.
Station 19:	Redress	19. Put on clean clothes.

FSOP 7: MINIMUM MEASURES FOR LEVEL B DECONTAMINATION

Station 1:	Equipment Drop	1. Deposit equipment used on-site (tools, sampling devices and containers, monitoring instruments, radios, clipboards, etc.) on plastic drop cloths. Segregation at the drop reduces the probability of cross contamination. During hot weather operations, cool down station may be set up within this area.
Station 2:	Outer Garment, Boots, and Gloves Wash and Rinse	2. Scrub outer boots, outer gloves and chemical-resistant splash suit with decon solution or detergent water. Rinse off using copious amounts of water.
Station 3:	Outer Boot and Glove Removal	3. Remove outer boots and gloves. Deposit in container with plastic liner.
Station 4:	Tank Change	4. If worker leaves exclusive zone to change air tank, this is the last step in the decontamination procedure. Worker's air tank is exchanged, new outer gloves and boot covers donned, joints taped, and worker returns to duty.
Station 5:	Boot, Gloves and Outer Garment Removal	5. Boots, chemical-resistant splash suit, inner gloves removed and deposited in separate containers lined with plastic.
Station 6:	SCBA Removal	6. SCBA backpack and facepiece is removed. Avoid touching face with finger. SCBA deposited on plastic sheets.
Station 7:	Field Wash	7. Hands and face are thoroughly washed. Shower as soon as possible.

FSOP 7: MAXIMUM MEASURES FOR LEVEL C DECONTAMINATION

Station 1:	Segrated Equipment Drop	1. Deposit equipment used on site (tools, sampling devices and containers, monitoring instruments, radios, clipboards, etc.) on plastic drop cloths or in different containers with plastic liners. Segregation at the drop reduces the probability of cross contamination. During hot weather operations, a cool down station may be set up within this area.
Station 2:	Boot Cover and Glove Wash	2. Scrub outer boot covers and gloves with decon solution or detergent and water.
Station 3:	Boot Cover and Glove Rinse	3. Rinse off decon solution from station 2 using copious amounts of water.
Station 4:	Tape Removal	4. Remove tape around boots and gloves and deposit in container with plastic liner.
Station 5:	Boot Cover Removal	5. Remove boot covers and deposit in containers with plastic liner.
Station 6:	Outer Glove Removal	6. Remove outer gloves and deposit in container with plastic liner.
Station 7:	Suit and Boot Wash	7. Wash splash suit, gloves, and safety boots. Scrub with long-handle scrub brush and decon solution.
Station 8:	Suit and Boot, and Glove Rinse	8. Rinse off decon solution using water. Repeat as many times as necessary.
Station 9:	Canister or Mask Change	9. If worker leaves exclusion zone to change canister (or mask), this is the last step in the decontamination procedure. Worker's canister is exchanged, new outer gloves and boot covers donned, and joints taped worker returns to duty.
Station 10:	Safety Boot Removal	10. Remove safety boots and deposit in container with plastic liner.
Station 11:	Splash Suit Removal	11. With assistance of helper, remove splash suit. Deposit in container with plastic liner.
Station 12:	Inner Glove Rinse	12. Wash inner gloves with decon solution.
Station 13:	Inner Glove Wash	13. Rinse inner gloves with water.
Station 14:	Face Piece Removal	14. Remove face piece. Deposit in container with plastic liner. Avoid touching face with fingers.
Station 15:	Inner Glove Removal	15. Remove inner gloves and deposit in lined container.

FSOP 7: MAXIMUM MEASURES FOR LEVEL C DECONTAMINATION

Station 16:	Inner Clothing Removal	16. Remove clothing soaked with perspiration and place in lined container. Do not wear inner clothing off-site since there is a possibility that small amounts of contaminants might have been transferred in removing the fully-encapsulating suit.
Station 17:	Field Wash	17. Shower if highly toxic, skin-corrosive or skin-absorbable materials are known or suspected to be present. Wash hands and face if shower is not available.
Station 18:	Redress	18. Put on clean clothes.

FSOP 7: MINIMUM MEASURES FOR LEVEL C DECONTAMINATION

Station 1:	Equipment Drop	1. Deposit equipment used on-site (tools, sampling devices and containers, monitoring instruments, radios, clipboards, etc.) on plastic drop cloths. Segregation at the drop reduces the probability of cross contamination. During hot weather operations, a cool down station may be set up within this area.
Station 2:	Outer Garment, Boots, and Gloves Wash and Rinse	2. Scrub outer boots, outer gloves and splash suit with decon solution or detergent water. Rinse off using copious amounts of water.
Station 3:	Outer Boot and Glove Removal	3. Remove outer boots and gloves. Deposit in container with plastic liner.
Station 4:	Canister or Mask Change	4. If worker leaves exclusive zone to change canister (or mask), this is the last step in the decontamination procedure. Worker's canister is exchanged, new outer gloves and boot covers donned, joints taped, and worker returns to duty.
Station 5:	Boot, Gloves and Outer Garment Removal	5. Boots, chemical-resistant splash suit, inner gloves removed and deposited in separate containers lined with plastic.
Station 6:	Face Piece Removal	6. Facepiece is removed. Avoid touching face with fingers, Facepiece deposited on plastic sheet.
Station 7:	Field Wash	7. Hands and face are thoroughly washed. Shower as soon as possible.

ATTACHMENT 8 - NOTIFICATION TO EMERGENCY ASSISTANCE AUTHORITIES

APPENDIX S: GLNPO RESEARCH VESSELS–PROCEDURES FOR THE TRANSPORTATION OF HAZARDOUS MATERIALS /WASTE BY GREAT LAKES NATIONAL PROGRAM OFFICE VIA GOVERNMENT VEHICLE AND GOVERNMENT DRIVER

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Attachment One:	Sample US Government Bill of Lading
Attachment Two:	DOT Form F 5800.1
Attachment Three:	Sample Uniform Hazardous Waste Manifest

GLNPO RESEARCH VESSELS: PROCEDURES FOR THE TRANSPORTATION OF HAZARDOUS MATERIALS/WASTE BY GREAT LAKES NATIONAL PROGRAM OFFICE VIA GOVERNMENT VEHICLE AND GOVERNMENT DRIVER

It is the policy of the United States Environmental Protection Agency, Region 5, to comply with all applicable regulations when transporting hazardous materials by government vehicle. This document discusses the Department of Transportation (DOT) regulations for transporting hazardous materials. Great Lakes National Program Office will follow the regulations as required. All materials/waste must be transported by government vehicle and government employee driver based upon provisions set forth by the carrier.

I. PACKAGING

When transporting hazardous materials, the materials should be in the original containers and shipping cartons/crates as received from the supplier. If this is not feasible, Great Lakes will package the materials in DOT-approved packaging materials prior to shipment. It is important to note that cardboard packaging must be protected from wetting. If a cardboard package loses its structural integrity for any reason, the packaging is not longer DOT approved. Therefore, tarpaulins or covered vehicles should be used when transporting such packages.

II. BILL OF LADING

A bill of lading must be used for each shipment. Refer to **Attachment 1** of this Appendix for sample US Government Bill of Lading. The following items must be completed for each bill of lading:

A. Origin

- From Milwaukee:

  United States Environmental Protection Agency
  Great Lakes National Program Office
  c/o University of Wisconsin
  Great Lakes Research Program
  1600 E. Greenfield Avenue
  Milwaukee, WI

- From Chicago:

  United States Environmental Protection Agency
  Great Lakes National Program Office

536 S. Clark
Chicago, IL 60604

- From Bay City:

United States Environmental Protection Agency
Great Lakes National Program Office
R/V Lake Guardian
24 Sixth Street
Bay City, MI 48708

B. Shipper

United States Environmental Protection Agency
Great Lakes National Program Office
230 S. Dearborn
Chicago, IL 60604

C. Destination/Consignee

- To Milwaukee:

United States Environmental Protection Agency
Great Lakes National Program Office
c/o University of Wisconsin
Great Lakes Research Program
E. Greenfield Avenue
Milwaukee, WI

- To Bay City:

R/V Lake Guardian
Warehouse
102 Ninth Street
Bay City, MI 48708

D. Transportation Company:

United States Environmental Protection Agency

E. Place an X in the column marked HM before each hazardous material listed on the bill of lading.

F. Identify the hazardous material using the proper DOT shipping name, hazard class, identification number, and reportable quantity, if applicable. Refer to 49 CFR 172.101 for a Hazardous Materials Table in regards to transportation.

G. List the total quantity or weight of the hazardous material.

H. Write/type the following statement on the bill of lading:

"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 DOT."

Copies of the completed bill of lading shall be forwarded to the Region 5 Health and Safety Office, the GLNPO office, and a file maintained on board the Lake Guardian.

A driver of a vehicle containing hazardous material shall ensure that the bill of lading is readily available to, and recognizable by, authorities in the event of accident or inspection. Specifically, the driver shall:

1. Clearly distinguish the bill of lading, if it is carried with other shipping papers or other papers of any kind, by either distinctively tabbing it or by having it appear first; and

2. Store the shipping paper as follows:

   a. When the driver is at the vehicle's controls, the shipping paper shall be:

      1) Within his/her immediate reach while he/she is restrained by the lap belt; and

      2) Either readily visible to a person entering the driver's compartment or in a holder which is mounted to the inside of the door on the driver's side of the vehicle.

b. When the driver is not at the vehicle's controls, the shipping paper shall be:

1) In a holder which is mounted to the inside of the door on the driver's side of the vehicle; or

2) On the driver's seat in the vehicle.

III. LABELING

Each package must be marked as required by 49 CFR, Part 172, Hazardous Materials Table. For example, acetone packages must be labeled with a red diamond-shaped flammable label.

IV. PLACARDING (49 CFR Part 172.503)

If the government vehicle is transporting the following materials, placards (markings on the sides of the vehicle) are required:

- Class A explosives
- Class B explosives
- Poison A
- Flammable solid ("Dangerous When Wet" label only)
- Radioactive material
- Uranium hexafluoride, fissile (containing more than 1.0 percent U235)
- Uranium hexafluoride, low specific activity (containing 1.0 percent or less U235)

A placard is NOT required when transporting 60 millicuries or less of Carbon-14.

If the government vehicle is transporting less than 1000 pounds total of the following materials, placards (markings on the side of the vehicle) are NOT required:

- Class C explosives
- Blasting agents
- Nonflammable gas (chlorine)
- Nonflammable gas (oxygen, cryogenic liquid)
- Flammable gas
- Combustible liquid
- Flammable solid
- Oxidizer
- Organic peroxide

- Poison B
- Corrosive material
- Irritating material

For example, if the vehicle contains 600 lbs. of phenol (a poison B material), it would not be placarded. But, if the truck contained 600 lbs. of phenol and 400 lbs. of acetone (a flammable liquid), a placard is necessary. In this instance, since two types of hazardous materials are being transported, a ":Dangerous" placard would be used. Refer to 49 CFR Part 172, Hazardous Materials Table, when determining the type of placard required.

V. LOADING AND UNLOADING

The following requirements will be adhered to when loading or unloading hazardous materials:

A. Any tank, barrel, drum, cylinder or other packaging, not permanently attached to a motor vehicle, which contains any flammable liquid, compressed gas, corrosive material, poisonous material, or radioactive material must be secured against movement within the vehicle on which it is being transported, under conditions normally incident to transportation. For example, crates or cartons of acetone must be strapped via a method that prevents movement of the package.

B. Smoking on or about any motor vehicle while loading or unloading any explosive, flammable liquid, flammable solid, oxidizing material or flammable compressed gas is forbidden.

C. During the loading or unloading of any explosive, flammable liquid, flammable solid oxidizing material or flammable compressed gas into or from any motor vehicle extreme care shall be taken to keep fire away and to prevent persons in the vicinity from smoking, lighting matches, or carrying any flame or lighted cigar, pipe or cigarette.

D. No hazardous material shall be loaded into or on, or unloaded from, any motor vehicle unless the handbrake be securely set and all other reasonable precautions be taken to prevent motion of the motor vehicle during such loading or unloading procedures.

E. No tools which are likely to damage the effectiveness of the closure of any package or other container, or likely adversely to affect such package or container, shall be used for the loading or unloading of any explosive or other dangerous article.

F. Containers of explosives, flammable liquids, flammable solids, oxidizing materials, corrosive materials, compressed gases, and poisonous liquids or gases, must be so braced as to prevent motion thereof relative to the vehicle while in transit. Containers having valves or other fittings must be so loaded such that there will be the minimum likelihood of damage thereto during transportation.

G. Reasonable care should be taken to prevent undue rise in temperature of containers and their contents during transit. There must be no tampering with such container or the contents thereof, nor any discharge of the contents of any container between point of origin and point of billed destination. Discharge of contents of any container must not be made prior to removal from the motor vehicle.

H. In any single vehicle, hazardous materials shall not be loaded together if prohibited by the loading and storage chart (Refer to 49 CFR 177.848, Segregation and Separation Chart of Hazardous Materials.)

VI. FLAMMABLE LIQUIDS

Unless the engine of the motor vehicle is to be used for the operation of a pump, no flammable liquid shall be loaded into, or on, or unloaded from any motor vehicle while the engine is running.

VII. FLAMMABLE SOLIDS AND OXIDIZING MATERIALS

When transporting flammable solids and oxidizing materials, the following shall be adhered to:

A. All flammable solids and oxidizing materials shall be contained entirely within the body of the vehicle and shall be covered by suitable means, and if the vehicle has a tailgate, it shall be closed and secured in place during transportation.

B. Special care shall be taken in the loading of any motor vehicle with flammable solids or oxidizing materials which are likely to become hazardous to transport when wet, to keep them from being wetted during the loading process and to keep them dry during transit. For example, care should be taken with ground, crushed or pulverized charcoal, and lump charcoal.

C. Whenever a motor carrier has knowledge concerning the hazards of spontaneous combustion or heating of any material to be loaded on a motor vehicle, the material shall be loaded to afford sufficient ventilation of the load to provide reasonable assurance against fire; and the motor vehicle shall be unloaded as soon as practicable after reaching its destination.

VIII. CORROSIVE MATERIALS

A corrosive material is a liquid or solid that causes visible destruction or irreversible alterations in human skin tissue at the site of contact, or in the case of leakage from its packaging, a liquid that has a severe corrosion rate on steel.

The following discusses the general requirements for transportation of corrosive materials.

- Bottles containing corrosive liquids must have enough headspace to allow for heat expansion. The package must not be completely full of liquid at 130 degrees Fahrenheit.

Bottles containing corrosive liquids may not be packed in the same package with any other hazardous materials, except:

- Bottles containing corrosive liquids cushioned by noncombustible, nonreactive, absorbent material and securely packed in tightly closed metal packaging, except hydrofluoric acid, which must be overpacked in packaging other than one made of metal, may be packed with other hazardous materials. This exception does not apply to the following chemicals:

nitric acid exceeding 40 percent concentration, perchloric acid, hydrogen peroxide exceeding 52 percent strength by weight, or nitrodydrochloric or nitrohydrochloric acid diluted, which may not be packed in the same package with any other article under any circumstances.

- Bottles of corrosive liquids are overpacked in accordance with 49 CFR Part 173.25.

- The corrosive material is contained in a battery (refer to 49 CFR Part 173.257-260).

It is important to note that 49 CFR Part 173 Subpart F is a complex standard relating to the transportation of corrosive materials. GLNPO should consult this Subpart before transporting any corrosive material. If GLNPO has questions relating to interpretation of the standard, the Region 5 Health and Safety officer should be consulted.

IX. CARBON-14

When transporting small quantities of Carbon-14, GLNPO is not required to comply with the regulations applicable to the transport of radioactive material. CFR Part 172.421 states that Carbon-14 materials whose activity per package does not exceed 60 millicuries in solid form or 6 millicuries in liquid form are excepted from the specification packaging, shipping paper and certification, marking, and labeling requirements if:

- The materials are packaged in strong, tight packages that will not leak any of the radioactive materials during conditions normally incident to transportation.

- The radiation level at any point on the external surface of the package does not exceed 0.5 mrems per hour (over the background levels).

- The non-fixed (removable) radioactive surface contamination on the external surface of the package does not exceed .00001 millicuries. To ensure that GLNPO meets this requirement, carboys containing Carbon-14- contaminated water should be thoroughly washed with soap and water before shipment. If the carboys are enclosed in cardboard boxes, care should be taken to prevent ALL splashing of radioactive water onto the box. If the box is splashed, it should be discarded as low level radioactive waste and a new box used. Contaminated boxes should be double bagged, then transported to CRL for disposal as low level radioactive waste.

- The outside of the inner packaging or, if there is not inner packaging, the outside of the packaging itself bears the marking "Radioactive".

- Although not required by DOT regulations, a bill of lading will be completed for each shipment of limited quantities of radioactive materials. The radioactive material will be identified on the bill of lading as Excepted Radioactive Material, limited quantity, n.o.s., UN2910. When shipping Carbon-14-contaminated water to Central Regional Laboratory, the laboratory will be given a copy of the bill of lading in addition to the normal distribution list.

- Instead of the shipper's certification statement, the following notice will be placed on the bill of lading (this notice IS required by DOT regulations):

  "This package conforms to the conditions and limitations specified in 49 CFR 173.421 for excepted radioactive material, limited quantity, n.o.s., UN2910."

When transporting Carbon-14 in solid sodium bicarbonate form, the material should be in the original packaging as received by GLNPO; and the packaged material must be placed in a cooler that has been filled with some type of cushioning material to prevent breakage of the ampules. The cooler should be secured via straps or some other method to prevent movement during transport.

When transporting Carbon-14-contaminated water, the carboys must be secured via straps, tarpaulin or some other appropriate method to prevent movement of the carboys during transport.

X. HAZARDOUS MATERIALS INCIDENTS

In the event of ANY incident involving release of hazardous materials during the course of transportation (including loading, unloading, and temporary storage), the Region 5 safety officer must be immediately notified.

Immediate notice to the Department of Transportation (DOT), and Coast Guard Command Center/National Response Division in Washington, D.C., of hazardous materials incidents must be given if, as a direct result of hazardous materials:

- A person is killed,
- A person receives injuries requiring hospitalization,
- Estimated carrier or other property damage exceeds $50,000,
- Fire, breakage, spillage or suspected radioactive contamination occurs involving shipment of radioactive material,
- Fire, breakage, spillage or suspected contamination of etiologic agents; or,
- A situation exists that, in the judgment of the carrier, should be reported, e.g. a continuing danger to life exists at the scene of the incident.

Each notice to the DOT, as required above, shall be given to the DOT National Response Division, Washington, D.C., by telephone (800-424-8802). Notice involving etiologic agents may be given to the Director, Center for Disease Control Prevention, Emergency Response Branch 24-Hour Hotline (404-633-5313), in place of the notice to the DOT. Each notice must include the following information:

- Name of reporter
- Name and address of carrier represented by reporter
- Phone number where reporter can be contacted
- Date, time, and location of incident
- Classification, name, and quantity of hazardous materials involved, if such information is available
- Type of incident, nature of hazardous material involved, and whether a continuing danger to life exists at the scene.

In addition, each reportable incident shall be reported, in writing, in duplicate, on DOT Form F 5800.1 to the DOT within 15 days of the date of discovery. Also, unintentional releases of hazardous materials from a package must be reported using DOT Form F 5800.1, see **Attachment 2** of this Appendix. The report shall be sent to:

Information Systems Manager
Research and Special Programs Administration
Department of Transportation
Washington, D.C. 20590

The above oral and written reporting requirements do NOT apply to:

- Consumer commodities
- Paint or paint-related materials when shipped in packages of five gallons or less
- Wet electric storage battery, either filled with acid or alkali.

XI. HAZARDOUS SUBSTANCE DISCHARGE NOTIFICATION

When a hazardous substance is discharged in a REPORTABLE QUANTITY into or upon the navigable waters or adjoining shorelines, the person in charge of the vessel, transport vehicle, or facility shall notify the U.S. Coast Guard National Response Center (800-424-8802), and furnish to the official to whom the discharge notification is made:

- The information required in Form F 5800.1, Section VIII
- The name of the shipper of the hazardous substance
- The quantity of the hazardous substance, if known.

An estimate of the quantity of the hazardous substance removed from the scene and the manner of disposition of any unremoved hazardous substance shall be entered in Part H of Form F5800.1. To determine the reportable quantity for a spilled chemical, one should consult the Hazardous Materials Table (for example, a spill involving 1000 or more pounds of phenol is a reportable spill). Refer to 49 CFR 177.848, Segregation and Separation Chart of Hazardous Materials.

XII. HAZARDOUS WASTE

When transporting RCRA/TSCA waste materials from GLNPO Research Vessels to secondary storage areas via government vehicle and government employee driver, GLNPO must comply with the regulations applicable to the transportation of those materials. EPA's regulations incorporate and require compliance with the DOT provisions on labeling, marking, placarding, using proper containers and reporting discharges.

When transporting RCRA/TSCA waste materials from GLNPO Research Vessels, the following guidelines must be followed:

- Manifest

  The waste materials must be manifested (See **Attachment 3** of this appendix for sample Uniform Hazardous Waste Manifest) and the designated government driver must keep the manifest with the hazardous waste. After successful transport of the waste materials, the driver must return a copy of the manifest to the Chemical Hygiene Officer or her/his designate. If the driver is not able to deliver the waste to the designated storage area, he is to return the waste to the GLNPO Research Vessel.

- Containers/Labeling

  Waste containers of materials to be transported must be labeled in accordance with RCRA/TSCA regulations prior to transport. Labels should include the waste type, date of accumulation, RCRA waste code number, TSCA label if greater than 50 ppm, and the EPA Hazardous Waste Generator I.D. Number. Each waste container (5-gallon plastic carboy provided by waste contractor) should be transported within a secondary containment tray or pan, and the lids should be secured prior to transport. Wastes must not be mixed or combined prior to transport.

- Emergency Response

  In the event of a discharge of waste materials, the driver must take immediate action to protect human health and the environment, including treatment or containment of the spill and notification of proper authorities. During the time of transport, the driver must possess (and be formally trained in the use of) the GLNPO Hazardous Materials/Hazardous Waste Contingency Plan. Clean-up practices indicated in the plan should be followed if necessary. Adequate spill supplies should accompany waste materials during transport. The driver must also comply with Sections X and XI of this document in the event of an incident involving hazardous waste.

ATTACHMENT 1 - BILL OF LADING

U.S. GOVERNMENT BILL OF LADING

ORIGINAL

B/L NO. ▶ D- 0,031,888

1 TRANSPORTATION COMPANY TENDERED TO	2 SCAC	3. DATE B/L PREPARED	4 ROUTE ORDER/RELEASE NUMBER
5 DESTINATION *(Name, address and ZIP code)*	6 SPLC *(Dest.)* 7. SPLC *(Orig.)*	8 ORIGIN *(Name, address and ZIP code)*	
9 CONSIGNEE *(Name, address and ZIP code of installation)*	10 GBLOC *(Cons.)*	11. SHIPPER *(Name, address and ZIP code)*	
12. APPROPRIATION CHARGEABLE		13. BILL CHARGES TO *(Dept./agency, bureau/office mailing address and ZIP code*	
14 VIA *(Route shipment when advantageous to the Government)*			AGENCY LOC CODE

15. MARKS AND ANNOTATIONS *(If extra services are ordered, see Administrative Directions No. 2 on reverse)*

16 PACKAGES NO	KIND	17. HM	18. DESCRIPTION OF ARTICLES *(Use carrier's classification or tariff description if possible, otherwise use a clear nontechnical description)*	19. WEIGHT* *(Pounds only)*	FOR USE OF BILLING CARRIER ONLY Services	Rate	Charges
			CLASSIFICATION ITEM NO SAMPLE				
					TOTAL CHARGES		

20 TARIFF/SPECIAL RATE AUTHORITY	21. PICKUP SERV. FURNISHED ☐ YES VEHICLE FULLY LOADED ☐ YES	SHIPPER'S INITIALS	22. CARRIER WAY/FREIGHT BILL NO. AND DATE

23. STOP THIS SHIPMENT AT FOR:	24. FURNISH INFORMATION ON CAR/TRUCKLOAD/CONTAINER SHIPMENTS INITIALS & NO.	SEAL NUMBERS APPLIED BY	LENGTH/CUBE ORDERED	LENGTH/CUBE FURNISHED	MARKED CAPACITY ORDERED	MARKED CAPACITY FURNISHED	DATE FURNISHED

25. CARRIER'S PICKUP DATE *(Year, month, & day)* / /	26a. SIGNATURE OF AGENT	26b. PER	B/L NUMBER D- 0,031,888

27. MODE	28. ESTIMATE	29 NO. OF CLS/TLS	30. TYPE RATE	31. PSC	32. REASON

Received by the transportation company named above, subject to conditions named on the reverse hereof, the property hereinafter described, in apparent good order and condition (contents and value unknown), to be forwarded to destination by the said company and connecting lines, there to be delivered in like good order and condition to said consignee.

FOR USE OF ISSUING OFFICE

33a ISSUING OFFICE *(Name and complete address)*

33b. GBLOC

ISSUING OFFICER

33d CONTRACT/PURCHASE ORDER NO. OR OTHER AUTHORITY

33e. DATED

33f FOB POINT NAMED IN CONTRACT

CERTIFICATE OF CARRIER BILLING—CONSIGNEE MUST NOT PAY ANY CHARGES

34a. DELIVERED ON *(Year, month & day)* / /

34b. AT *(Actual delivery point)*

34c. BY *(Name of delivering carrier)*

34d. DELIVERED THIS CONSIGNMENT COMPLETE & IN APPARENT GOOD ORDER EXCEPT AS MAY BE INDICATED ☐ SHORTAGE ☐ DAMAGE

34e
- ☐ CARRIER OS&D REPORT ATTACHED
- ☐ DELIVERY AT DESTINATION FURNISHED
- ☐ ACCESSORIAL SERVICES CERTIFICATION ATTACHED

34f. NAME OF BILLING CARRIER

34g. SIGNATURE OF CARRIER'S AGENT

ATTACHMENT 2 - DOT Form F 5800.1

DEPARTMENT OF TRANSPORTATION
HAZARDOUS MATERIALS INCIDENT REPORT

REQUIREMENTS: The regulations requiring reporting of hazardous materials incidents are contained in the Code of Federal Regulations (CFR), Title 49 Parts 100 to 179 (governing the transport of hazardous materials by rail, air, water and highway). Failure to comply with the reporting requirements contain therein can result in a civil penalty.

A Guide for Preparing the Hazardous Materials Incident Report is available from the Information Systems Manager, Office of Hazardous Materials Transportation, DHM-63, Research and Special Programs Administration, U.S. Department of Transportation, Washington, DC 20590

PUBLIC REPORTING BURDEN FOR THIS COLLECTION OF INFORMATION IS ESTIMATED TO AVERAGE 1 HOUR PER RESPONSE, INCLUDING THE TIME FOR REVIEWING INSTRUCTIONS, SEARCHING EXISTING DATA SOURCES, GATHERING AND MAINTAINING THE DATA NEEDED, AND COMPLETING AND REVIEWING THE COLLECTION OF INFORMATION. SEND COMMENTS REGARDING THIS BURDEN ESTIMATE OR AN OTHER ASPECT OF THIS COLLECTION OF INFORMATION, INCLUDING SUGGESTIONS FOR REDUCING THIS BURDEN, TO INFORMATION SYSTEMS MANAGER, OFFICE OF HAZARDOUS MATERIALS TRANSPORTATION, DMH-63, RESEARCH AND SPECIAL PROGRAMS ADMINISTRATION, U.S. DEPARTMENT OF TRANSPORTATION, WASHINGTON, DC 20590; AND TO THE OFFICE OF INFORMATION AND REGULATORY AFFAIRS, OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

TEAR HERE

HAZARDOUS MATERIALS INCIDENT REPORT

Form Approved OMB No 213

INSTRUCTIONS. Submit this report in duplicate to the Information Systems Manager, Office of Hazardous Materials Transportation, DHM-63, Research an Special Programs Administration, U.S. Department of Transportation, Washington, D.C 20590. If space provided for any item is inadequate, complete that item under Section IX, keying to the entry number being completed. Copies of this form, in limited quantities, may be obtained from the Information Syste Manager, Office of Hazardous Materials Transportation. Additional copies in this prescribed format may be reproduced and used, if on the same size and kin of paper.

I. MODE, DATE, AND LOCATION OF INCIDENT

1. MODE OF TRANSPORATION ☐ AIR ☐ HIGHWAY ☐ RAIL ☐ WATER ☐ OTHER

2. DATE AND TIME OF INCIDENT (Use Military Time, e.g. 8:30am = 0830, noon = 1200, 6pm = 1800, midnight = 2400) Date: / / TIME:

3. LOCATION OF INCIDENT (Include airport name in ROUTE/STREET if incident occurs at an airport)

CITY. STATE

COUNTY. ROUTE/STREET:

II. DESCRIPTION OF CARRIER, COMPANY, OR INDIVIDUAL REPORTING

4. FULL NAME	5. ADDRESS (Principal place of business)

6. LIST YOUR OMC MOTOR CARRIER CENSUS NUMBER, REPORTING RAILROAD ALPHABETIC CODE, MERCHANT VESSEL NAME AND ID NUMBER OR OTHER REPORTING CODE OR NUMBER

III. SHIPMENT INFORMATION (From Shipping Paper or Packaging)

7. SHIPPER NAME AND ADDRESS (Principal place of business)	8. CONSIGNEE NAME AND ADDRESS (Principal place of business)

9. ORIGIN ADDRESS (If different from Shipper address)	10. DESTINATION ADDRESS (If different from Consignee address)

11. SHIPPING PAPER/WAYBILL IDENTIFICATION NO.

IV. HAZARDOUS MATERIAL(S) SPILLED (NOTE: REFERENCE 49 CFR SECTION 172.101.)

12. PROPER SHIPPING NAME	13. CHEMICAL/TRADE NAME	14. HAZARD CLASS	15. IDENTIFICATION NUM (e.g. UN 2764, NA 202(

16. IS MATERIAL A HAZARDOUS SUBSTANCE? ☐ YES ☐ NO

17. WAS THE RQ MET? ☐ YES ☐ NO

V. CONSEQUENCES OF INCIDENT, DUE TO THE HAZARDOUS MATERIAL.

18. ESTIMATED QUANTITY HAZARDOUS MATERIAL RELEASED (Include units of measurement)	19. FATALITIES	20. HOSPITALIZED INJURIES	21. NON-HOSPITAL INJURIES
22. NUMBER OF PEOPLE EVACUATED			

23. ESTIMATED DOLLAR AMOUNT OF LOSS AND/OR PROPERTY DAMAGE, INCLUDING COST OF DECONTAMINATION OR CLEANUP (Round off in dollars)

A. PRODUCT LOSS	B. CARRIER DAMAGE	C. PUBLIC/PRIVATE PROPERTY DAMAGE	D. DECONTAMINATION/ CLEANUP	E. OTHER

24. CONSEQUENCES ASSOCIATED WITH THE INCIDENT: ☐ VAPOR (GAS) DISPERSION ☐ MATERIAL ENTERED WATERWAY/SEWER
☐ SPILLAGE ☐ FIRE ☐ EXPLOSION ☐ ENVIRONMENTAL DAMAGE ☐ NONE ☐ OTHER.

VI. TRANSPORT ENVIRONMENT

25. INDICATE TYPE(S) OF VEHICLE(S) INVOLVED: ☐ CARGO TANK ☐ VAN TRUCK/TRAILER ☐ FLAT BED TRUCK/TRAILER
☐ TANK CAR ☐ RAIL CAR ☐ TOFC/COFC ☐ AIRCRAFT ☐ BARGE ☐ SHIP ☐ OTHER:

26. TRANSPORTATION PHASE DURING WHICH INCIDENT OCCURRED OR WAS DISCOVERED:
☐ EN ROUTE BETWEEN ORIGIN/DESTINATION ☐ LOADING ☐ UNLOADING ☐ TEMPORARY STORAGE/TERMINAL

27. LAND USE AT INCIDENT SITE: ☐ INDUSTRIAL ☐ COMMERCIAL ☐ RESIDENTIAL ☐ AGRICULTURAL ☐ UNDEVELOPED

COMMUNITY TYPE AT SITE: ☐ URBAN ☐ SUBURBAN ☐ RURAL

29. WAS THE SPILL THE RESULT OF A VEHICLE ACCIDENT/DERAILMENT? ☐ YES ☐ NO
IF YES AND APPLICABLE, ANSWER PARTS A THRU C.

A. ESTIMATED SPEED:	B. HIGHWAY TYPE: ☐ DIVIDED/LIMITED ACCESS ☐ UNDIVIDED	C. TOTAL NUMBER OF LANES: ☐ ONE ☐ THREE ☐ TWO ☐ FOUR OR MORE	SPACE FOR DOT USE ONLY

THIS FORM MAY BE REPRODUCED

VII. PACKAGING INFORMATION: If the package is overpacked (consists of several packages, e.g. glass jars within a fiberboard box), begin with Column A for information on the innermost package.

ITEM	A	B	C
30. TYPE OF PACKAGING, INCLUDING INNER RECEPTACLES (e.g. Steel drum, tank car)			
31. CAPACITY OR WEIGHT PER UNIT PACKAGE (e.g. 55 gallons, 85 lbs.)			
32. NUMBER OF PACKAGES OF SAME TYPE WHICH FAILED IN IDENTICAL MANNER			
33. NUMBER OF PACKAGES OF SAME TYPE IN SHIPMENT			
34. PACKAGE SPECIFICATION IDENTIFICATION (e.g. DOT 17E, DOT 105A100, UN 1A1 or none)			
35. ANY OTHER PACKAGING MARKINGS (e.g. STC, 18/16-55-88, Y1 4/150/87)			
36. NAME AND ADDRESS, SYMBOL OR REGISTRATION NUMBER OF PACKAGING MANUFACTURER			
37. SERIAL NUMBER OF CYLINDERS, PORTABLE TANKS, CARGO TANKS, TANK CARS			
38. TYPE OF LABELING OR PLACARDING APPLIED			
39. IF RECONDITIONED OR REQUALIFIED — A. REGISTRATION NUMBER OR SYMBOL			
39. IF RECONDITIONED OR REQUALIFIED — B. DATE OF LAST TEST OR INSPECTION			
40. EXEMPTION/APPROVAL/COMPETENT AUTHORITY NUMBER, IF APPLICABLE (e.g. DOT E1012)			

VIII. DESCRIPTION OF PACKAGING FAILURE: Check all applicable boxes for the package(s) identified above.

41. ACTION CONTRIBUTING TO PACKAGING FAILURE

	A	B	C		A	B	C	
a.	☐	☐	☐	TRANSPORT VEHICLE COLLISION	j.	☐	☐	☐	CORROSION
b.	☐	☐	☐	TRANSPORT VEHICLE OVERTURN	k.	☐	☐	☐	METAL FATIGUE
c.	☐	☐	☐	OVERLOADING/OVERFILLING	l.	☐	☐	☐	FRICTION/RUBBING
d.	☐	☐	☐	LOOSE FITTINGS, VALVES	m.	☐	☐	☐	FIRE/HEAT
e.	☐	☐	☐	DEFECTIVE FITTINGS, VALVES	n.	☐	☐	☐	FREEZING
f.	☐	☐	☐	DROPPED	o.	☐	☐	☐	VENTING
g.	☐	☐	☐	STRUCK/RAMMED	p.	☐	☐	☐	VANDALISM
h.	☐	☐	☐	IMPROPER LOADING	q.	☐	☐	☐	INCOMPATIBLE MATERIALS
i.	☐	☐	☐	IMPROPER BLOCKING	r.	☐	☐	☐	OTHER_____

42. OBJECT CAUSING FAILURE

	A	B	C	
a.	☐	☐	☐	OTHER FREIGHT
b.	☐	☐	☐	FORKLIFT
c.	☐	☐	☐	NAIL/PROTRUSION
d.	☐	☐	☐	OTHER TRANSPORT VEH
e.	☐	☐	☐	WATER/OTHER LIQUID
f.	☐	☐	☐	GROUND/FLOOR/ROADW
g.	☐	☐	☐	ROADSIDE OBSTACLE
h.	☐	☐	☐	NONE
i.	☐	☐	☐	OTHER

43. HOW PACKAGE(S) FAILED

	A	B	C	
a.	☐	☐	☐	PUNCTURED
b.	☐	☐	☐	CRACKED
c.	☐	☐	☐	BURST/INTERNAL PRESSURE
d.	☐	☐	☐	RIPPED
e.	☐	☐	☐	CRUSHED
f.	☐	☐	☐	RUBBED/ABRADED
g.	☐	☐	☐	RUPTURED
h.	☐	☐	☐	OTHER_____

44. PACKAGE AREA THAT FAILED

	A	B	C	
a.	☐	☐	☐	END, FORWARD
b.	☐	☐	☐	END, REAR
c.	☐	☐	☐	SIDE, RIGHT
d	☐	☐	☐	SIDE, LEFT
e.	☐	☐	☐	TOP
f.	☐	☐	☐	BOTTOM
g.	☐	☐	☐	CENTER
h	☐	☐	☐	OTHER_____

45. WHAT FAILED ON PACKAGE(S)

	A	B	C	
a.	☐	☐	☐	BASIC PACKAGE MATER
b.	☐	☐	☐	FITTING/VALVE
c.	☐	☐	☐	CLOSURE
d.	☐	☐	☐	CHIME
e.	☐	☐	☐	WELD/SEAM
f.	☐	☐	☐	HOSE/PIPING
g.	☐	☐	☐	INNER LINER
h	☐	☐	☐	OTHER

IX. DESCRIPTION OF EVENTS: Describe the sequence of events that led to incident, action taken at time discovered, and action taken to prevent future incidents. Include any recommendations to improve packaging, handling, or transportation of hazardous materials. Photographs and diagrams should be submitted when necessary for clarification. ATTACH A COPY OF THE HAZARDOUS WASTE MANIFEST FOR INCIDENTS INVOLVING HAZARDOUS WASTE. Continue on additional sheets if necessary.

46 NAME OF PERSON RESPONSIBLE FOR PREPARING REPORT	47 SIGNATURE	
48 TITLE OF PERSON RESPONSIBLE FOR PREPARING REPORT	49 TELEPHONE NUMBER (Area Code)	50. DATE REPORT SIGNED

ATTACHMENT 3 - SAMPLE UNIFORM HAZARDOUS WASTE MANIFEST

DNR

MICHIGAN DEPARTMENT OF NATURAL RESOURCES

DO NOT WRITE IN THIS SPACE

ATT. ☐ DIS. ☐ REJ. ☐ PR. ☐

Required by authority of Act 64 1979 as amended and Act 136 PA 1969

Failure to file is punishable under section 299 548 MCL or Section 10 Act 136 PA 1969

Please print or type

Form Approved OMB No 2050-0039 Expir

UNIFORM HAZARDOUS WASTE MANIFEST

1 Generator's US EPA ID No | Manifest Document No

2 Page 1 of

Information in the shaded a is not required by Feder law

3 Generator's Name and Mailing Address

4 Generator's Phone ( )

A. State Manifest Document Number MI 2756776

B. State Generator's ID

5 Transporter 1 Company Name | 6 US EPA ID Number

C. State Transporter's ID

D. Transporter's Phone

7 Transporter 2 Company Name | 8. US EPA ID Number

E. State Transporter's ID

F. Transporter's Phone

9. Designated Facility Name and Site Address

SAMPLE

10. US EPA ID Number

G. State Facility's ID

H. Facility's Phone

	11. US DOT Description (including Proper Shipping Name, Hazard Class, and HM ID NUMBER).	12. Containers No	Type	13 Total Quantity	14. Unit Wt/Vol	I. Waste No.
a.						
b.						
c.						
d						

J. Additional Descriptions for Materials Listed Above

K. Handling Codes for Wastes Listed Above

a/ /

b/ /

c/ /

d/ /

15. Special Handling Instructions and Additional Information

16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations.

If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determine to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes th present and future threat to human health and the environment; OR; if I am a small quantity generator, I have made a good faith effort to minimize my wast generation and select the best waste management method that is available to me and that I can afford.

Printed/Typed Name | Signature | Date Month Day Yea

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name | Signature | Date Month Day Yea

18 Transporter 2 Acknowledgement or Receipt of Materials

Printed/Typed Name | Signature | Date Month Day Yea

19. Discrepancy Indication Space

20. Facility Owner or Operator Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19

Printed/Typed Name | Signature | Date Month Day Yea

GENERATOR

TRANSPORTER

FACILITY

N AT 1-800 292-4706 OR OUT OF STATE AT 517 373 7660 AND THE NATIONAL RESPONSE

MUST BE REPORTED TO THE MICHIGAN POLLUTION EMERGENCY ALERTING SYSTEM, IN I 1-800-424 8802 24 HOURS PER DAY.

ALL CE

EPA Form 8700-22 (Rev. 9/88)

APPENDIX U: SURVEY FOR NON-FRIABLE ASBESTOS CONTAINING MATERIALS

DRAFT

NON-FRIABLE ASBESTOS OPERATION AND MAINTENANCE PLAN

Prepared for

USEPA GLNPO
R/V LAKE GUARDIAN

By

Melody A. Pieper, CHMM
March 1995

INTRODUCTION AND BACKGROUND

Asbestos-Containing Material (ACM) was identified on board the R/V Lake Guardian in 1994. This Asbestos Operations and Maintenance Plan is a direct result of the identification of this material, and represents a sound, safe approach to managing the potential exposures associated with non-friable asbestos.

Friable Asbestos-containing materials may present a health hazard to occupants if airborne asbestos fibers are inhaled. Non-friable materials pose no health hazards, provided they are maintained in an intact and un-damaged condition. The objective of the plan is to identify the location of the ACM and to notify occupants of the presence of the material, and to ensure that the material is not disturbed or damaged.

An Asbestos Operation and Maintenance Plan is an active document, and may be revised as necessary to accommodate changing conditions and regulatory requirements.

Asbestos Health Hazards

Asbestos is the name of a class of magnesium-silicate minerals that occur in fibrous form, including chrysotile, amosite, anthophyllite asbestos, tremolite asbestos, and actinolite asbestos. Asbestos fibers are fire-resistant, chemical-resistant and abrasion-resistant and have been extensively used in the manufacture of a wide variety of products.

Microscopic fibers can be released to the air from asbestos-containing materials (ACM) when they are damaged or deteriorated. Friable materials can be crumbled with hand pressure, and are likely to release fibers into the air. Fibrous or fluffy materials, such as sprayed-on fireproofing or pipe insulation, are considered friable, and can readily release fibers if disturbed. Materials such as vinyl-asbestos floor tile, asphalt roofing felts, and transite are considered to be non-friable and generally do not release airborne fibers unless they are subjected to sanding, grinding or sawing operations.

Asbestos fibers can cause a disabling respiratory disease and various types of cancers if the fibers are inhaled while airborne. Breathing or ingesting fibers from contaminated clothing or skin can also result in these diseases. Many of the asbestos related diseases have a latency period of 20-30 years after initial exposure. The most common lung disease is asbestosis, or scarring of the lining of the lung, which can cause shortness of breath, coughing, fatigue, and other symptoms. Lung cancer and mesothelioma are also, more rarely, associated with asbestos exposure, and can cause shortness of breath and pain in the walls of the chest or abdomen. Lung cancer is usually fatal and mesothelioma is always fatal.

Asbestos on the Lake Guardian

In 1994, it was assumed that the lining of one of the ship's chemical storage cabinets contained a non-friable asbestos-containing material, commonly referred to as transite. In a non-friable state this material poses no health risks. However, it is important that the material remain in an intact and un-damaged condition. Additionally, no persons shall be permitted to grind, sand, or saw into this material, or in any other way damage this material thus rendering the material friable.

Options For Control Of Asbestos

Encapsulation

Since the ACM is classified as non-friable, and is in excellent condition, the current condition of the cabinet lining poses no health hazard. Additionally, for extra protective measures, the cabinet lining has been encapsulated with an epoxy material.

Inspections

An on-going inspection program of the encapsulated material has been established on a semi-annual basis, to ensure that the encapsulated material does not become damaged.

Statement of Objectives

The objectives of USEPA GLNPO are:

To prevent exposures of occupants to unhealthy levels of airborne fibers,

To remove or repair all deteriorated ACM as soon as possible using control methods necessary to protect human health and the environment,

And to minimize damage to existing ACM.

Overall Strategy

Vessel occupants will be notified of the Asbestos Operation and Maintenance Program. No one will be permitted to grind, sand, or drill into the lining of the cabinet, or in any way damage the ACM without specific approval from the Asbestos Manager. Should it be necessary to perform work activities which may in some way damage the material, thus creating the potential for the release of fibers, appropriate preventative measures will be implemented. Such measures would include: ensuring persons performing work activities are properly trained/certified to work with ACM, issuance of appropriate PPE, use of wetting methods, and use of negative pressure enclosure when applicable.

Personnel Involvement

Asbestos Manager/Inspector

The Asbestos Manager/Inspector duties consist of ensuring that all portions of this program are implemented. Additionally, it is the Asbestos Manager/Inspectors responsibility to perform required semi-annual inspections in accordance with the program. The Inspector must be trained/certified in the inspection of ACM.

Appendix V - ANNUAL AND PERIODIC INSPECTIONS AND SURVEYS

1. STANDARDS/COMPREHENSIVE PROGRAM

For all inspections or surveys conducted in Region 5, standards and regulations will apply in the following order of importance:

1) EPA regulations in CFR form or as EPA Orders or regulations
2) OSHA regulations contained in various CFRs (e.g. 29 CFR 1910, 29 CFR 1926)
3) All applicable laws and regulations including those from Department of Transportation, the Coast Guard, state and local environmental laws and regulations, in addition to consensus programs such as the National Fire Protection Association and the American National Standards Institute.

All appropriate standards and regulations will be used to assess and evaluate hazardous conditions during inspections. If a conflict exists in the application of various standards and regulations, the Regional Health and Safety Manager will determine which standard or regulation applies based on professional judgment and risk assessment techniques.

A summary of required inspections, frequency of inspections, and personnel responsible for specific inspections can be found in the table below.

SAFETY INSPECTIONS AND SURVEYS REQUIRED OF GLNPO

PERIOD	INSPECTOR	TITLE
Weekly	Facility Safety Officer	General Safety Inspection
Weekly	Ship Operations Contractor	Drinking Water Inspections
Weekly	Facility CHO/Safety Officer	Hazardous Waste Storage Area Inspections
Weekly	Lab Safety Officer	Laboratory Eyewash and Safety Shower Inspection
Monthly	Ship Operations Contractor	Ship Fire Alarms
Wkly/Monthly	Facility Safety Officer and Ship Operations Contractor	Fire Extinguisher & Fire Hydrant Inspections
Monthly	Safety Officer and Ship Operations Contractor	SCBA Inspections

PERIOD	INSPECTOR	TITLE
Monthly	Ship Operations Contractor	Life Safety Equipment Inspections
Semi-annual	EPA Staff	Safety and Health and Environmental Compliance Surveys
Semi-annual	Outside Contractor	Ship Fire Alarms
Semi-annual	Ship Chemical Hygiene Officer	Laboratory Hood Inspections
Annual	EPA Industrial Hygiene Consultant	Industrial Hygiene Surveys
Annual	EPA Staff/Consultant	Environmental Compliance Audit
Annual	Ship Operations Contractor and Outside Consultant	Crane and Rigging Inspections
Annual	Naval Hospital - Great Lakes, IL	Occupational Health Inspection
Annual	Naval Hospital - Great Lakes, IL	Preventive Medicine Inspection
Annual	Naval Hospital - Great Lakes, IL	Sanitation (and refrigeration) Inspection
Periodic	CHOL Safety Officer	Sanitation Card Refrigeration Inspection
5 Year	Outside Contractor	Hull Inspection
Prior to each tour	Ship Operations Contractor	Open House Public Safety Checklist

2. SEMI-ANNUAL SAFETY, HEALTH, AND ENVIRONMENTAL COMPLIANCE SURVEYS

As required by EPA Order 1440, all Region 5 GLNPO facilities, spaces, vehicles, vessels, and equipment will be inspected or evaluated by the Regional Health and Safety Manager. The purpose of these inspections is to assess, evaluate and reduce hazards, as well as to ensure the effectiveness of Safety Programs throughout GLNPO.

All inspections will be followed by a written Safety Inspection Deficiency Notice Report, stating the location of the inspection (division, branch, type of occupancy, and so on), the hazards observed, the applicable regulations or standards, the risk assessment of the hazard (serious, non-serious, etc.), and the necessary corrective measure(s).

A cover letter to the Division or Office Director will accompany the report and will require a first abatement report to be submitted within 45 days with subsequent reports every 45 days until all deficiencies are corrected or abated. All abatement or hazard correction reports should be sent to the Regional Health & Safety Manager.

3. ANNUAL INDUSTRIAL HYGIENE SURVEYS

Yearly Industrial Hygiene Surveys are required for all EPA laboratory facilities. The purpose of these surveys is to evaluate and reduce occupational health hazards in Regional laboratories and to evaluate the overall Occupational Health Program in these laboratories. These surveys will be conducted by a qualified Industrial Hygienist under the overall direction of the Regional Health and Safety Manager. Survey reports will be sent to the Division or Office Director. A cover letter containing comments relative to the overall Occupational Health Program of the facility will be attached to the survey. In addition, the cover letter will provide recommended abatement procedures.

4. ANNUAL ENVIRONMENTAL COMPLIANCE AUDITS

Regional Environmental Compliance Audits will be conducted as part of the Annual Regional Safety Inspection. Environmental compliance findings, such as the use, transportation, and disposal of hazardous waste, will be included in the Safety Inspection Deficiency Notice Report. Environmental compliance findings will be labeled to distinguish them from safety findings.

5. SPECIAL STUDIES

Special studies relating to safety, occupational health or environmental compliance issues are conducted yearly at the discretion of the Regional Health & Safety Manager. Most of these studies involve occupational health issues such as indoor air quality or use of rare or unusual chemicals and are issues cited by management or employees in a specific work area. Under the direction of the Regional Health & Safety Manager, all special studies are conducted by qualified professionals in the subject being studied (e.g. Industrial Hygienist, Environmental Protection Specialist, etc.). Results of the studies will be shared with all concerned employees and management. If abatement procedures are required, the Regional Safety Manager will coordinate such activities with the division or office concerned.

6. DEFICIENCY ABATEMENT PROCEDURES AND TRACKING

All deficiencies or hazards noted in a Semi-annual Inspection Report must be followed by subsequent reports every 45 days from receipt of the initial report until all deficiencies are corrected or abated. Each abatement report from the Division or Office Director need only refer to those deficiencies or hazards which were detailed in the previous abatement report.

Once deficiencies are reported to the Regional Health and Safety Manager in an abatement report from a division or office, each individual deficiency or hazard, its cost, expected time of abatement and other related factors are tracked by an automated Deficiency or Hazard Abatement System. This tracking system will generate a letter to the appropriate division or office every 45 days if Abatement Reports are not received. This system will also enable the Regional Health and Safety Manager to inform senior management of abatement status and percentage of hazards abated and other related factors relative to a given division, office or the Region overall.

7. FIRE PROTECTION SYSTEMS STANDARD OPERATING PROCEDURES

To ensure that GLNPO research vessel fire protection systems are ready for use at all times and that all equipment provided is properly maintained, fire protection systems standard operating procedures must be developed and implemented. A standard checklist must be completed for each inspection and the checklist must be signed by the inspector.

The following areas are included in **Attachment 1** and must be inspected in accordance with all regulatory and Standard requirements, including NFPA Standards and 46 CFR Part 189:

- •Fire Detection And Alarm System
- •Fire Alarm Check List
- •Monthly Fire Extinguisher Inspection Check List
- •Weekly Fire Extinguisher Inspection Check List
- •Container Lab Extinguishing Systems
- •Galley Extinguishing Systems
- •Emergency Lighting Systems
- •Fire Pumps, Main Hose, Hose Stations
- •Engine Room Carbon Dioxide System

8. SHIP FIRE ALARMS/SEMI-ANNUAL INSPECTIONS BY OUTSIDE CONTRACTOR AND MONTHLY INSPECTIONS BY SHIP OPERATIONS CONTRACTOR

Comprehensive inspections of GLNPO research vessel fire alarm systems will be performed semi-annually by qualified contractor(s). The contractor(s) must be approved by the Regional Safety Manager prior to inspection activities. In addition to semi-annual inspections, comprehensive inspections will be performed on a monthly basis by the ship operations contractor.

Semi-annual and monthly fire alarm inspection procedures are located in **Attachment 1.1** of this chapter. A comprehensive fire alarm checklist for the R/V Lake Guardian, to be used by the inspector, is located in Attachment **1.10** of this chapter.

All records of inspection must be maintained on board each vessel inspected. Copies of the records must also be maintained at GLNPO located in Chicago, Illinois..

9. MONTHLY FIRE EXTINGUISHER AND FIRE HYDRANT INSPECTIONS

9.1 Inspection: Extinguishers will be inspected when first placed into service and inspected at 30-day intervals thereafter. Sometimes, extinguishers will be inspected more frequently as situations and circumstances warrant. The inspection procedure for monthly fire extinguisher inspections is found in **Attachment 1.3** of this chapter. NOTE: In addition to the required monthly fire extinguisher inspections, weekly fire extinguisher inspections will be performed by the ship operating contractor. A weekly inspection checklist is also found in **Attachment 1.4** of this chapter.

9.2 Corrective Action: When inspection of an extinguisher indicates a deficiency listed on the inspection checklist, immediate corrective action will be taken.

9.3 Rechargeable Extinguishers: When inspection of a rechargeable extinguisher indicates a deficiency listed on the checklist, appropriate maintenance procedures will be immediately taken.

9.4 Non-rechargeable Dry Chemical Extinguisher: When inspection of a non-rechargeable dry chemical extinguisher indicates a deficiency among the checklist items, it will be discharged and removed from service.

9.5 Recordkeeping: Records will include the following: the date of inspection, the inspectors name, and any deficiencies noted. Inspectors will remove deficient fire extinguishers from service until repairs are made. Temporary replacement extinguishers must be used to provide continuous protection.

10. ANNUAL AND PERIODIC CRANE AND RIGGING INSPECTIONS

Annual inspections are required for all derricks, cranes, hoists or rigging. Inspections will be performed in accordance with OSHA 29 CFR 1910.179-181 by an outside certified contractor.

11. WEEKLY INSPECTIONS OF EYEWASH AND SAFETY SHOWERS

Weekly inspections will be performed to ensure the proper working condition of eyewash stations and safety showers. Eyewash stations and showers must be maintained in accordance with ANSI Z 358.1. A weekly inspection checklist appears as **Attachment 2** of this chapter.

12. ANNUAL AND PERIODIC OCCUPATIONAL HEALTH/PREVENTIVE MEDICINE/SANITATION INSPECTIONS

Annual and periodic occupational health, preventive medicine, and sanitation inspections will be coordinated by designated personnel. This inspection will be performed by the U.S. Navy or qualified equivalent. In addition, on vessels providing food service, periodic food service inspections must be performed in accordance with the standard operating procedures specified in the Standard Operating Procedures for Vessel Sanitation (**Attachment 3** of this chapter). The Food Service Inspection Checklist, **Attachment 4** of this chapter, should also be completed. Periodic in-house inspections will also be conducted by the ship's Safety Officer. Certificates of Acceptance for the annual and periodic inspections should be kept on board GLNPO research vessels and copies should be provided to GLNPO in Chicago, Illinois.

13. LIFE SAFETY EQUIPMENT INSPECTIONS

Inspections of all life safety equipment, such as life rafts and escape equipment, on board GLNPO research vessels will be inspected monthly by the ship operations contractor. The inspections are designed to ensure safe operation of all life safety equipment in the event of an emergency. A drawing, showing the locations of escape equipment, has been posted in the galley, and within the passageways to the labs; see **Attachment 1.11** of this chapter.

Records of inspection must be maintained on board each research vessel and at GLNPO in Chicago, Illinois.

14. SEMI-ANNUAL LABORATORY HOOD INSPECTIONS AND REPORTS

The EPA policy for laboratory hood face velocities is 100 cubic feet per minute (cfm). GLNPO research vessels' fume hoods must be tested for adequate face velocity on a semi-annual basis by the ship's Chemical Hygiene Officer. An evaluation form appears as **Attachment 5** of this chapter. Copies of the semi-annual laboratory hood inspection and report must be sent to EPA headquarters in Washington, D.C.

15. DRINKING WATER INSPECTIONS

Inspections of potable drinking water systems on board GLNPO research vessels will be performed in accordance with all regulatory and policy requirements. The inspections will be performed by the ship's operations contractor or Health and Safety personnel.

EPA policy requires that EPA facilities monitor drinking water for lead and copper and take appropriate action if levels are at or above the action level. GLNPO complies with this policy through monitoring of shipboard drinking fountains and sink faucets that are used as sources of drinking water.

If a research vessel contains a potable water supply, monitoring for coliform and Free Available Chlorine (FAC) will be conducted by the ship operations contractor or Health and Safety Personnel. Frequency of testing will be determined based the vessels usage and the frequency of taking on potable water. However, the period of time between testing should not exceed one month. Sampling data sheets can be found as **Attachment 10** of this chapter.

Copies of all inspection records will be maintained on board each vessel inspected and at GLNPO in Chicago, Illinois.

16. MONTHLY SCBA INSPECTIONS

In case of emergency, a self-contained breathing apparatus (SCBA) is used as respiratory protection in hazardous or oxygen-deficient atmospheres. Monthly inspections must be conducted to ensure the readiness of the SCBA. A generic inspection checklist appears as **Attachment 6** of this chapter. Additionally, ten minute escape devices must be inspected monthly.

17. WEEKLY HAZARDOUS WASTE STORAGE AREA INSPECTIONS

Inspections of hazardous waste storage areas will be conducted on a weekly basis. This inspection will confirm that hazardous wastes are stored in segregated areas and in leak-free, properly-labeled containers with no evidence of spillage. Improper storage or extended accumulation dates will be immediately noted and corrected. The Weekly Hazardous Waste Storage Area Inspection Sheet and Spill Cart Inspection Form appear as **Attachments 7 & 8** of this chapter.

18. EMERGENCY SUPPLIES AND EQUIPMENT INSPECTIONS/RCRA REQUIREMENTS

The Chemical Hygiene Officer is responsible for ensuring that inspections of all emergency supplies and equipment are performed in accordance with applicable RCRA generator requirements. Also, as required by RCRA, locations of shipboard emergency supplies and equipment will be posted throughout all operational areas where hazardous wastes are generated and stored.

19. HULL INSPECTIONS (5-YEAR DRY DOCK REQUIRED BY U.S. COAST GUARD)

All US EPA research vessels must comply with the US Coast Guard and the American Bureau of Shipping five-year dry-docking and overhaul inspection requirements. Inspection Specifications are included in **Attachment 9** of this Chapter; "Specifications for Dry-Docking and Overhaul Inspection".

20. SAFETY CHECKLIST FOR IN-PORT OPEN HOUSES

Prior to in-port open house activities, the ship operations contractor must ensure that the ship is safe and secure for visitors by completing the "Pre-Open House Checklist" The checklist is explained in more detail in **Chapter 8** of this manual.

21. SANITATION AND FOOD HANDLING INSPECTIONS

Sanitation and refrigeration inspections will be conducted annually by an outside contractor (eg. Naval Hospital). Sanitation standard operating procedures appear as **Attachment 3** of this chapter and a food handling inspection form appears as **Attachment 4.** Additionally, periodic inspection will be conducted by the ship's health and safety personnel.

22. DOCUMENTATION

All inspection records that are completed for GLNPO research vessels must be filed on board each vessel inspected. Copies of all inspection records must also be provided to the GLNPO in Chicago, Illinois.

Attachment 1 FIRE PROTECTION SYSTEMS - STANDARD OPERATING PROCEDURES

1.0 SCOPE

These Standard Operating Procedures contain the necessary information for the testing and inspection of all vessel fire protection systems. It is intended to ensure that the systems will be ready for use at all times and that all equipment provided is maintained and replaced after each use or needed repairs. The procedure requires that a checklist be completed for each inspection. The checklists detail the extent of the inspection made and must be signed, upon completion, by the person performing the inspection. These checklists will serve as a record of the testing performed on the fire protection systems.

2.0 REFERENCES

The recommended procedures for the testing of the various fire protection systems have been taken from the USCG regulations and NFPA Standards. The criteria applicable to fire protection systems has been developed from the following:

46 CFR Part 189 -	Oceanographic and Research Vessels
NFPA Standards -	NFPA 10 - Fire extinguishers, Portable
NFPA 20 -	Fire Pumps, Centrifugal
NFPA 14A -	Standpipe and Hose Systems, Inspection, Testing and Maintenance
NFPA 12 -	Carbon Dioxide Extinguishing Systems
NFPA 17A -	Wet Chemical Extinguishing Systems
NFPA 17 -	Dry Chemical Extinguishing Systems
NFPA 72H -	Testing Procedures for Local, Auxiliary, Remote Station, and Proprietary Protective Signaling Systems
NFPA 101 -	Life Safety Code (Emergency Lighting)

3.0 RESPONSIBILITIES AND AUTHORITY

It is the duty of the Captain, or person designated by the Captain, to ensure that fire fighting equipment aboard an EPA research vessel is ready for use at all times and that such equipment is provided, maintained, and replaced after use in accordance with proper procedure. No changes or repairs can be made to any fire protection system without the Captain's knowledge and consent. All fire protection equipment must be 100% operational before the vessel will be permitted to leave the dock. When repairs or modifications are made to any fire protection system, and the system cannot be returned to full operational status, the condition shall be so noted and explained in the vessel's log book. Interim compensatory measures, such as a roving fire watch or additional portable extinguishers, shall be provided, at the Captain's discretion, until the system can be fully repaired.

4.0 EQUIPMENT REQUIRED

Most of the required tests and inspections can be performed with ordinary tools and equipment available on board the vessel. Where some pieces of specialized hardware is required, it is listed in the specific procedure for the system being inspected.

5.0 PROCEDURE

This procedure contains the written instructions for the testing and maintenance of the vessel's fire protection systems. Each system is provided with separate instructions and checklists. The frequency of the inspections is noted within each procedure. Typically, a monthly and annual or semi-annual inspection is required. The attached comprehensive Fire Inspection Standard Operating Procedures have been developed and should be completed as indicated by qualified fire inspectors.

ATTACHMENT 1.1 FIRE DETECTION AND ALARM SYSTEM

Procedure - Monthly

The fire detection systems shall be inspected monthly, or at approximately 30-day intervals. Extension of the schedule up to one week is permitted in unusual circumstances. The inspection should include the following:

1) The green "Power "On" indicator lamp should be illuminated.

2) The control panel lamp test switch should be depressed to verify that all lamps are functional.

3) No yellow trouble lamps or red alarm lamps should be illuminated.

4) The battery trouble lamp should not be illuminated.

5) The voltage meter should be above 24 volts.

6) No obvious damage, disconnected wires, or altered circuits should be evident.

7) One device should be randomly activated to ensure that the system is functional and the alarms are audible throughout the vessel.

When any deficient condition is found, it shall be listed on the checklist, and steps taken to correct the deficiency. The person performing the inspection should then complete, sign, and date the attached checklist.

Procedure - Semi-annually

The Fire Detection and Alarm system must be inspected and serviced semi-annually by a qualified service technician. The inspection should include those items specified by NFPA 72H.

CHECKLIST - FIRE DETECTION AND ALARM SYSTEMS

Location
Bridge_____
Lab 1A_____
Lab 2A_____
Lab 3A_____
Lab 4A_____

The green "Power On" indicator lamp is illuminated _____

Lamp test shows that all lamps are functional _____

No yellow trouble or red alarm lamps are illuminated _____

The battery trouble lamp is not illuminated _____

The voltage meter reads above 24 volts _____

No obvious damage, disconnected wires, or altered circuits _____

Location and type of device tested _____

All alarms audible _____

Comments:_____
_____
_____
_____
_____

_____ _____
Inspected By Date

Attachment 1.2 FIRE ALARM CHECK LIST

A semi-annual test of the fire alarm system aboard all GLNPO vessels is required.

One sixth of all smoke detectors must be inspected monthly. Each monthly inspection will comprise a different group of detectors ensuring that each detector is inspected semi-annually.

The fire alarm checklist must include the following items:

- All smoke detectors must be identified by location.
- All pull stations must be identified by location.
- All heat detectors must be identified by location.
- Carbon dioxide pressure switches (usually found in engine rooms) be identified by location.

Comments and discrepancies must be addressed at the end of the checklist and the inspector's signature and date of inspection must appear on the form.

Smoke Detectors

LOCATION	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	94	95	96	97
BRIDGE																
201																
202																
203																
204																
O-1 FWD PASSAGEWAY																
207																
208																
209																
210																
211																
212																
O-1 AFT PASSAGEWAY																
213																
214																
215																
216																
CREW LOUNGE																
GALLEY																
FWD PASSAGEWAY																
AFT PASSAGEWAY																
108																
111																
WET LAB- 1																
EXTRACTION LAB																
ANALYTICAL LAB																
PRODUCTIVITY LAB																
HAZ MAT LAB																
MTL STORE-ROOM																
EXERCISE ROOM																
PORT&STBD EXHAUST																
BOW THRUSTER																
MSD COMP																
ENGR WORKSHOP																
AUX MACH ROOM																
ENGINE ROOM																
FWD ENG PASS																
AFT ENG PASS																
CO2 SYS ENG ROOM																
INSPECTOR																
DEFICIENCY																
CORRECTED																

ATTACHMENT 1.3

Inspection will be performed in accordance with NFPA Standard No. 10.

MONTHLY INSPECTION CHECKLIST
FOR
FIRE EXTINGUISHERS

Date:_____

Fire Extinguisher Number (#):_____

Y	N	
❒	❒	Located in designated place.
❒	❒	No obstruction to access or visibility.
❒	❒	Operating instructions on nameplate legible and facing outward.
❒	❒	Seals and tamper indicators not broken or missing.
❒	❒	Determine fullness by weighing or "hefting".
❒	❒	Examine for obvious physical damage, corrosion, leakage, or clogged nozzle.
❒	❒	Pressure gauge reading or indicator in the operable range or position.

Comments/Discrepancies: _____

_____

Signature:_____

Date:_____

WEEKLY FIRE EXTINGUISHER INSPECTION CHECKLIST

Station #	✓ If OK	Comments	Action Taken If Needed	Location	Initial
1				Bridge AFT	
2				Bridge FWD	
3				Outside - AFT Doghouse	
4				0-1 Level - FWD Passageway	
5				0-1 Level - AFT Passageway	
6				0-1 Level Outside AFT Bulkhead	
7				Mess Deck FWD	
8				Galley	
9				Main Deck Outside Crew Quarters	
10				Main Passageway Outside Chemlab	
11				Inside Chemlab - Stbd Wall FWD	
12				Inside Chemlab- Stbd Wall AFT	
13				Biology Lab - Port wall FWD	
14				Biology Lab - Port wall AFT	
15				Wet Lab - Starboard Side	
16				Wet Lab - Port Side	
17				Rear of Bowthruster	
18				Outside MSD Room Portside - Lower Passageway	
19				Outside Aux. Machine Room - Portside Passageway	
20				Machine Shop - FWD of Lathe	
21				Machine Shop - AFT Bulkhead	
22				Engine Room FWD at Entrance	
23				Engine Room Starboard Side	
24				0-1 Level Outside AFT	
25				Engine Room Port Side	
26				Exercise Room Starboard Side	

Week Ending _____ Signature _____

Attachment 4.1.4

WEEKLY FIRE EXTINGUISHER INSPECTION CHECKLIST

#	Location	Type	Date	✓ if OK	Comments or Action Taken	Initial
1	Bridge Deck AFT (outside)	CO2				
2	Bridge Deck FWD (outside)	CO2				
3	Emerg. gear locker PORT (Spare extinguishers)	1-CO2 2-ABC				
4	Bridge AFT (inside)	CO2				
5	Bridge FWD (inside)	ABC				
6	Focsle Deck Passageway FWD	CO2				
7	Captain's Cabin	ABC				
8	Focsle Deck Passageway AFT	CO2				
9	Focsle Deck STBD (Rosette)	CO2				
10	Focsle Deck HVAC	CO2				
11	Mess Deck FWD	CO2				
12	Galley Sink	ABC				
13	Galley AFT	CO2				
14	Main Deck Passageway FWD	CO2				
15	Main Deck Passageway AFT	CO2				
16	Chem lab FWD	ABC				
17	Chem lab AFT	ABC				
18	Bio lab FWD	ABC				
19	Bio lab AFT	ABC				
20	Wet lab FWD	ABC				
21	Wet lab AFT	ABC				
22	Exercise Room	CO2				
23	Bow Thruster Room	CO2				
24	MSD Room (Passageway)	CO2				
25	Mach. Shop FWD (Lathe)	ABC				
26	Mach. Shop AFT	CO2				
27	Aux.Mach.Rm. (Passageway)	CO2				
28	Engine Room FWD	CO2				
29	Engine Room STBD	CO2				
30	Engine Room PORT	CO2				

Week Ending_____ Signature_____

Attachment 1.5 - CONTAINER LAB EXTINGUISHING SYSTEMS

Procedure - Monthly

The Container lab fire extinguishing systems shall be inspected monthly, or at approximately 30-day intervals. Extension of the schedule up to one week is permitted in unusual circumstances. The inspection should include the following:

1) Cylinder should be securely fastened to the bulkhead.

2) Manual release and nozzles should be unobstructed.

3) Tamper indicators and seals should be intact.

4) No obvious physical damage should be present.

5) Pressure gauge should be in the operable range.

When any deficiency is found, it shall be noted on the checklist, and steps shall be taken to correct the condition. The person performing the inspection should complete, sign, and date the attached checklist.

Procedure - Annually

The lab extinguishing system must be inspected and serviced by a qualified technician. The inspection should include those items specified by NFPA 17.

CHECKLIST - CONTAINER LAB EXTINGUISHING SYSTEMS

Location Lab 1A_____

Lab 2A_____

Lab 3A_____

Lab 4A_____

The cylinder is in place and securely fastened to the bulkhead: _____

The manual release station and the nozzles are unobstructed: _____

The tamper indicators and seals are intact: _____

There is no obvious physical damage or corrosion: _____

The pressure gauge is in the operable range: _____

Comments_____

_____

_____

Inspected By_____ Date_____

Attachment 1.6 - GALLEY EXTINGUISHING SYSTEM

Procedure - Monthly

The galley fire extinguishing system shall be inspected monthly, or at approximately 30-day intervals. Extension of the schedule up to one week is permitted in unusual circumstances. The inspection should include the following:

1) Red lever in the control head should be horizontal with the pin in place, and the system indicator positioned in the "set", not the "released", position.

2) Manual release should be unobstructed with the pin in place.

3) Cylinder pressure gauge should be in the green operable range.

4) There should be two nozzles on the piping above the range with blowoff caps in place.

5) There should be no visible signs of damage to the system, and the cylinder and piping should be securely fastened to the bulkhead.

6) The fusible link should be in place in the hood above the range.

When any deficient condition is found, it shall be noted on the checklist, and steps shall be taken to correct the deficiency. The person performing the inspection should complete, sign, and date the attached checklist.

Procedure - Annually

The galley extinguishing system must be inspected and serviced by a qualified service technician. The inspection should include those items specified by NFPA 17A.

CHECKLIST - GALLEY EXTINGUISHING SYSTEM

The red lever on the control head is horizontal with the pin in place: _____

The system indicator is in the "set" position, not the "released " position: _____

The manual release is unobstructed with the pin in place: _____

The cylinder pressure gauge is in the green operable zone: _____

There are two nozzles on the piping above the range: _____

Blowoff caps are in place; _____

There are no visible signs of damage to the cylinder and piping and they are securely fastened to the bulkhead: _____

The fusible link is in place in the hood above the range: _____

Comments_____

_____

_____

Inspected By_____ Date_____

Attachment 1.7 - EMERGENCY LIGHTING

Procedure - Monthly

The emergency lighting units shall be inspected monthly, or at approximately 30-day intervals. Extension of the schedule up to one week is permitted in unusual circumstances. The inspection should include the following:

1) The test switch should be depressed for at least 30 seconds. The lamps shall illuminate, and the charge indicator shall momentarily indicate rapid charge.

2) The lamps shall be aimed to illuminate the exit path.

When any deficient condition is found, it shall be listed on the checklist, and steps shall be taken to correct the deficiency. The person performing the inspection should complete, sign, and date the attached checklist.

Procedure - Semi-Annually

On a semi-annual basis, each lighting unit should be tested by performing a deep cycle discharge test by unplugging the unit. If the unit is deemed functional, it will be re-energized. The lamps shall remain illuminated for a period of 1-1/2 hours. If the lamps do not remain illuminated for the full 90 minutes, the batteries shall be replaced.

This annual testing procedure will also serve as the monthly inspection for that particular month.

CHECKLIST - EMERGENCY LIGHTING

Test Period Monthly _____ Semi-Annual_____

Location	Test Switch	Charge Indicator	Aim Correct	Deep Cycle

Inspected By:_____ Date:_____

Attachment 1.8 - FIRE PUMPS, MAIN HOSE, HOSE STATIONS

Procedure - Weekly

The fire pumps, fire main, and hose stations shall be inspected weekly. Extension of the schedule up to one week is permitted in unusual circumstances. The following should be checked:

1) Test each fire pump on a staggered basis. Start the pump and operate on recirculation or allow to flow through a convenient outlet. Operate the pump for at least 10 minutes and check for abnormal conditions such as noise, vibration or leakage.

2) Visually observe each valve on the fire main and verify that the valves are sealed in the open position.

3) Inspect each fire hose and verify that:

- The gate valve is closed
- The valve handle is present
- The hose and nozzle each have a gasket in place
- The hose is present and not damaged or mildewed
- A spanner wrench is present
- The nozzle is present and the open/shut handle operates freely.
- There are no visible signs of leakage.

When any deficient condition is found, it shall be listed on the checklist, and steps shall be taken to correct the deficiency. The person performing the inspection should complete, sign, and date the attached checklist.

Procedure - Annually

1) At least annually, the electric fire pump and the diesel fire pump shall be flowed to determine if each is capable of flowing 100 gpm at the two highest outlets at a nozzle pressure of 50 psi. Single 50 foot lengths of hose and 1/2 inch diameter nozzles should be used.

2) At least annually, each length of fire hose should be hydrostatically tested to the maximum pressure it is subjected to but not less than 100 psi.

3) At least annually, the fire main should be flushed by flowing each outlet for at least five minutes or until clean water appears.

4) At least annually, each valve in the fire main should be cycled through a complete open-close cycle. The valves should be returned to their correct position.

CHECKLIST

FIRE PUMPS

Pump Tested:

Electric Fire Pump: _____

Diesel Fire Pump: _____

Bilge Pump: _____

Start Time: _____ Stop Time:_____ Pressure at gauge:_____

Started from engine room: _____ Bridge:_____

Noise/Vibration/Leakage: _____

Comments:_____

_____

Inspected By:_____ Date:_____

R/V LAKE GUARDIAN
FIRE MAIN CHECKLIST

_____ Electric fire pump sea chest valve open

_____ Electric fire pump discharge valve open and locked

_____ Electric bilge pump discharge valve closed

_____ Fire main isolation valve at forward bulkhead open

_____ Diesel fire pump at sea chest valve open

_____ Diesel fire pump discharge valve open

Comments: _____
_____
_____
_____
_____

Inspected By: _____ Date: _____

FIRE HOSE STATIONS

Hose Station Number 1 2 3 4 5 6 7 8 9 10 11 12

1) Gate valve closed: _____

2) Gate valve handle present: _____

3) Two gaskets present and in good condition: _____

4) Hose in good condition: _____

5) Spanner Wrench Present: _____

6) Nozzle present; handle free: _____

7) No visible leakage: _____

All OK 1.__ 2.__ 3.__ 4.__ 5.__ 6.__ 7.__ 8.__ 9.__ 10.__11.__12.__

Comments:

_____

_____

Inspected By:_____ Date:_____

LOCATION OF FIRE STATIONS

1. O-2 DECK Aft of Pilot House
2. FOCSLE DECK forward port side
3. O-1 Deck midship port side
4. Hotel Deck outside Captain's Office
5. MAIN DECK aisleway port side outside Laundry Room
6. MAIN DECK aisle stbd outside of Productivity LAB
7. Science STORE ROOM
8. FANTAIL stbd
9. FANTAIL port
10. Engine Room main aisleway port side outside machine shop
11. ENGINE ROOM forward bulkhead
12. ENGINE ROOM port side forward

Attachment 1.9 - ENGINE ROOM CARBON DIOXIDE EXTINGUISHING SYSTEM

Procedure - Monthly

The engine room carbon dioxide system shall be inspected monthly, or at approximately 30-day intervals. Extension of the schedule up to one week is permitted in unusual circumstances. The inspection should include the following:

1) Six cylinders should be present, connected to the manifold, and securely mounted.

2) There should be two control cylinders, two control valves, and discharge delay that are sealed in position with locking pins and tamper indicators.

3) The two system release handles are in place, with "Break Glass" and operating instructions present; two brass hammers present.

4) The manual pull cables and conduits between the releases are in good operating condition and are connected to the valve operators.

5) The two emergency air breathing apparatus are in the engine room and their gauges are in the operable range.

6) Four system nozzles in the engine room are not damaged, clogged or obstructed.

When any deficient condition is found, it shall be noted on the checklist, and steps shall be taken to correct the deficiency. The person performing the inspection should complete, sign and date the attached checklist.

Procedure - Annually

The engine room carbon dioxide system must be inspected and serviced by a qualified technician The inspection should include those items specified by NFPA 12. The inspection should include a weight check of the cylinders. The cylinders should be recharged if a weight loss of more than 10% of the marked agent weight occurs.

CHECKLIST - ENGINE ROOM CARBON DIOXIDE SYSTEM

Six cylinders are present, connected to the manifold, and securely mounted:
_____

No visible signs of damage: _____

Two control cylinders, two control valves, and one discharge delay are sealed in position with locking pins and tamper indicators: _____

Two system release handles are in place, with "Break Glass" and operating instructions present:_____

Two brass hammers present:_____

The manual pull cables and their conduits from the releases to the valve operators are connected:_____

No visible sign of damage:_____

Two emergency air breathing apparatus are located in the engine room:_____

The air breathing apparatus pressure gauges are in operable range:_____

Four system nozzles in the engine room are not damaged, clogged or obstructed:_____

Comments:_____

_____

_____

Inspected By:_____ Date:_____

ATTACHMENT 1.10 - R/V LAKE GUARDIAN FIRE ALARM CHECK LIST

A semi-annual test of the fire alarm system is required.

One sixth of all smoke detectors must be inspected monthly. Each monthly inspection will comprise a different group of detectors insuring that each detector is inspected semi-annually.

- 1 smoke detector for the navigating bridge (Pilot House)

- 16 smoke detectors located on the 01 deck as follows:

Y	N	
❑	❑	Room 201
❑	❑	Room 202
❑	❑	Room 203
❑	❑	Room 204
❑	❑	Forward passageway
❑	❑	Room 207
❑	❑	Room 208
❑	❑	Room 209
❑	❑	Room 210
❑	❑	Room 211
❑	❑	Room 212
❑	❑	After passageway
❑	❑	Room 213
❑	❑	Room 214
❑	❑	Room 215
❑	❑	Room 216

- 8 smoke detectors on the main deck as follows:

Y	N	
❑	❑	Crew's Lounge
❑	❑	Galley
❑	❑	Forward passageway
❑	❑	After passageway
❑	❑	Chem Lab
❑	❑	Bio Lab
❑	❑	Room 111
❑	❑	Wet Lab - 1
❑	❑	Rm. 3 SCI (Forward of Bio-Lab)
❑	❑	Crews Rm (Forward of Lab Office)

Y	N	
❑	❑	• Organic Extraction Laboratory - 2 smoke detectors, 1 manual pull station
❑	❑	• Organic Analytical Laboratory - 2 smoke detectors, 1 manual pull station
❑	❑	• Primary Productivity Lab - 2 smoke detectors, 1 manual pull station
❑	❑	• Hazmat Van - 3 smoke detectors, 1 manual pull station
❑	❑	• 1 smoke detector for the storage room(by the exercise room)
❑	❑	• 1 smoke detector for the exercise room
❑	❑	• 2 heat detectors for the port and starboard exhaust uptakes
❑	❑	• 1 heat detector for the bow thruster compartment
❑	❑	• 1 smoke detector for the MSD compartment
❑	❑	• 1 heat detector for the engineer's shop
❑	❑	• 1 heat detector for the auxiliary machinery compartment
❑	❑	• 1 heat detector for the engine room
❑	❑	• 1 heat detector for the forward engine room passageway
❑	❑	• 1 heat detector for the engine room aft passageway
❑	❑	• Carbon dioxide system pressure switch for the engine room

_____

_____

Comments/Discrepancies

_____

Signature

_____

Date

Attachment 2
R/V LAKE GUARDIAN - GENERAL LABORATORY WEEKLY INSPECTION CHECKLIST

A check mark indicates inspection met GLNPO standards. If conditions are unacceptable, indicate date corrected or make comment below.

	LAB:	Bio	Chem	Wet	Extr	Ana.	PP	Haz
1)	Eyewash working properly	___	___	___	___	___	___	___
2)	Hoods uncluttered	___	___	___	___	___	___	___
3)	Containers properly labeled	___	___	___	___	___	___	___
4)	Hoods used at proper sash height	___	___	___	___	___	___	___
5)	Waste containers properly labeled	___	___	___	___	___	___	___
6)	Chemicals kept in secondary containers	___	___	___	___	___	___	___
7)	Chems stored according to compatibility	___	___	___	___	___	___	___
8)	Combustibles stored away from heaters	___	___	___	___	___	___	___
9)	GFCIs functioning properly	___	___	___	___	___	___	___
10)	Access to spill, first aid and other emergency equipment unobstructed	___	___	___	___	___	___	___
11)	Power cords in good working condition/free from visible damage	___	___	___	___	___	___	___
12)	Compressed cylinders secured	___	___	___	___	___	___	___
13)	Exits unobstructed	___	___	___	___	___	___	___

Comments:

_____

_____

_____

Inspected by: _____ Date: _____

ATTACHMENT 3 - VESSEL SANITATION

1.0 SCOPE

To provide references and procedures to be used to ensure the proper sanitation for the vessel and crew.

2.0 REFERENCES

U.S. Public Health Publications
U.S. Navy Potable Specifications

3.0 RESPONSIBILITY - QUALIFIED PERSONNEL

A. The Chief Engineer or Marine Tech, under the authority of the Master, will undertake to fill and test, with the proper test chemical kits, the ship's potable water tanks under Section #7 below.

B. The cook, under the authority of the Master, will be responsible to store, prepare, and cook all foodstuffs and dispose of all garbage aboard and adhere to daily and weekly inspections as listed below.

4.0 EQUIPMENT REQUIRED

- Potable water test kits
- Potable water hoses and fittings
- Sewage hoses and fittings
- Rat guards for mooring lines (should be inspected by First Mate)
- Temperature gauges for freezers and refrigerators
- Fixed and hand-held appliances

5.0 ANNUAL INSPECTION

The Master shall arrange for this inspection by a qualified public health person or U.S. Navy counterpart, and the certificate of acceptance is to be kept on board with copies sent to the EPA and the government contractor.

6.0 PERIODIC INSPECTIONS

A. For all refrigerators and freezers in use:

1. Mount a temperature chart on the face of each door.

2. Record the temperatures twice daily.

3. Notify the Chief Engineer if temperatures are above 42°F in the refrigerators or above 10°F in the freezers.

B. Automatic Dishwasher:

1. Daily check water temperature at 180°F minimum.

2. Remove daily or more often any debris in bottom of dishwasher.

3. Use caution when opening door when dishwasher is in "Dry" cycle. Hot steam can cause burns.

C. Trash Compactor:

1. Make sure that proper size bags are being used and installed properly.

2. Do not place pressurized cans or glass in the compactor (injuries could result).

3. Close door securely before turning key or pressing start.

4. If compactor will not function electrically, notify Chief Engineer.

D. All appliances used in the galley department must be checked during each use to ensure safe operation.

E. Chief Engineer will test drinking water daily for coliforms and FACs. Suggested kit - Colilert ONPG MUG Presence/Absence kit.

1. Test different locations each day:

a. galley
b. drinking fountains
*Note on inspection log time and location.

2. Periodically test all remote faucets and sinks where potable water is obtainable.

3. Any outlet which fails to test should be logged and tagged "Do Not Drink".

4. Notify Master who will investigate the cause and determine if more of the system is contaminated, and if so, take corrective action immediately.

7.0 POTABLE WATER

A. Chief Engineer will comply with Section 3.A of this attachment

B. Use only designated potable hoses.

C. Disinfect hose fittings and valve openings at both ends.

D. Inspect all hoses under pressure for leaks. If any found, replace damaged section.

E. Maintain vessel trim while filling.

F. Notify bridge when pumping commences and is secured; advise quantity taken aboard.

G. Drain all hoses, cap open ends, store equipment in Potable H_20 Storage Trunk.

8.0 SANITARY DISCHARGE

A. Equip work party with protective boots, gloves, suitable coveralls and VHF portable radios.

B. Place containment pan under discharge valve to contain dripping during connecting and disconnecting procedure.

C. Stretch hoses to either truck, sewer opening or fixed station, then connect lines insuring no kinks or bends. This could result in a burst hose.

D. Before pumping is complete, it may be necessary to flush all toilets to ensure that no lines are backed up if the holding tank was at capacity before pump out.

E. Keep bridge apprised of pumping start and stop times when using septic trucks hauling two or three loads.

F. Upon completion, close discharge valves, flush lines, coil hoses and stow in proper rack or reel.

G. Remove containment pan, wash down and hose off deck, dock and any protective clothing as necessary before stowing.

H. Return VHF radios to bridge.

I. Chief Engineer to trim vessel and advise Master when operation is complete and log is signed on.

9.0 REFRIGERATION

A. Notify Chief Engineer immediately of any malfunction with freezers, refrigerators or ice machine.

B. Keep temperature logs as outlined under Section 6.0.A of this attachment.

C. Food to be rotated to prevent freezer burn.

D. Any spilled or spoiled food is to be removed and, if necessary, the unit defrosted and thoroughly cleaned before returning it to service.

STANDARD OPERATING PROCEDURE

EMERGENCY SHOWER INSPECTION

Table of Contents

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7.0	Operation	3

Prepared by: _____ Date _____

Approved by: _____ Date _____

Rev. _____

Emergency Shower Inspection

1.0 Scope

To provide standard operating procedures for the safe use and proper installation, maintenance and inspection of the emergency shower equipment.

2.0 References

Haws Emergency Equipment Catalog
GLNPO Chemical Hygiene Plan and Safety Manual

3.0 Responsibility - Qualified Personnel

A. The ship's Science Officer, Marine Science Technician, Chemical Hygiene Officer or their appointed designee, under the authority of the Master, will be responsible for routine maintenance and weekly testing of the emergency shower unit using the appropriate test kit as well as keeping accurate records of the data produced.

B. It shall be the responsibility of each specified authority to ensure that the flow of water required is in fact available as a result of regular system inspections.

4.0 Installation

A. Units should be installed in close proximity to hazardous areas, clearly identified as emergency shower stations, free from obstructions and accessible within 10 feet of at least one exit from each laboratory.

B. Emergency showers should be connected to the main potable water supply.

C. Minimum pipe size to shower should be no smaller than 1 and 1/4" IPS.

5.0 Maintenance

A. Water pressure at the shower should be no less than 30 PSI or more than 90 PSI during operation.

6.0 Inspection

A. All emergency shower units should be tested weekly. Since there is no floor drain available, a Haws Shower Test Kit, Model 9010, should be used.

B. Accurate records should be kept that indicate that adequate flow exists with absence of sediment. The date of the inspection, name of the inspector and details regarding the state of the equipment will be included. (See attached shower inspection chart).

7.0 Operation

A. To insure adequate operation of the units, all persons should be instructed in the proper use of the emergency shower equipment.

B. The injured person should immediately make use of the facility by showering and removing all clothing as
quickly as possible.

C. Any emergency use of the safety shower should immediately be reported to the Bridge and recorded in the ship's log.

R/V LAKE GUARDIAN EMERGENCY SHOWER INSPECTION

Location	Equipment Condition	Adequate Flow	Sign Visible	Inspection Date	Repair Date	Inspector	Discrepancy
Passage Outside Chemistry Laboratory (#1)	Not Acceptable_____	No_____	Yes_____				
	Acceptable_____	Yes_____	No_____				
Multi-Purpose Laboratory (#2)	Not Acceptable_____	No_____	Yes_____				
	Acceptable_____	Yes_____	No_____				
Modular Passage Forward (#3)	Not Acceptable_____	No_____	Yes_____				
	Acceptable_____	Yes_____	No_____				
Modular Passage Aft (#4)	Not Acceptable_____	No_____	Yes_____				
	Acceptable_____	Yes_____	No_____				

STANDARD OPERATING PROCEDURES

EYE WASH INSPECTION

Table of Contents

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7.0	Operation	3

Prepared by _____ Date _____

Approved by _____ Date _____

Rev. _____

1.0 Scope

To provide standard operating procedures for the safe use and proper installation, maintenance and inspection of the emergency eye wash equipment.

2.0 References

Haws Emergency Equipment Catalog
GLNPO Chemical Hygiene Plan and Safety Manual

3.0 Responsibility - Qualified Personnel

A. The ship's Science Officer, Marine Science Technician and/or the Chemical Hygiene Officer or their appointed designee, under the authority of the Master, will be responsible for routine maintenance and weekly testing of the emergency eye wash unit as well as keeping accurate records of the data produced.

B. It shall be the responsibility of each specified authority to ensure that the flow of water required is in fact available as a result of regular system inspections.

4.0 Installation

A. Units should be installed in close proximity to hazardous areas, clearly identified as eye wash stations, free from obstructions and easily accessible.

B. Eye washes should be connected to the main potable water supply.

C. Eye wash fountains should be connected with piping no smaller than 3/4" IPS. All eye wash units should be attached to a drain by a code approved method to facilitate ease of testing.

5.0 Maintenance

A. Water pressure at the eye-wash fountain should be no less than 30 PSI or more than 90 PSI during operation.

B. Because of sediment accumulation in standing pipes, flushing times should be determined by the Science Officer, Marine Science Technician or designated appointee prior to ship's departure.

6.0 Inspection

A. All emergency eye-wash units should be tested weekly. The unit should be flushed for the required amount of time as determined above.

B. Accurate records should be kept that indicate that adequate absence of sediment and proper eye dispersion rates are being met. The date of the inspection, name of the inspector and details regarding the state of the equipment will be included. (See attached eye wash inspection chart).

7.0 Operation

A. To insure adequate operation of the units, all persons should be instructed in the proper use of the emergency eye wash equipment.

B. Eyes should be continually rinsed at the scene of the accident for at least 15 minutes and a doctor or nurse contacted as soon as possible.

C. Any emergency use of the eye wash unit must be immediately reported to the Bridge and recorded in the ship's log.

R/V LAKE GUARDIAN EYE WASH INSPECTION

Location	Equipment Condition	Adequate Flow	Proper Eye Dispersion	Sign Visible	Date	Repair Date	Inspector	Discrepancy
Chemistry Laboratory Forward	Not Acceptable_____	No_____	No_____	No_____				
	Acceptable_____	Yes_____	Yes_____	Yes_____				
Chemistry Laboratory Aft	Not Acceptable_____	No_____	No_____	No_____				
	Acceptable_____	Yes_____	Yes_____	Yes_____				
Biology Laboratory	Not Acceptable_____	No_____	No_____	No_____				
	Acceptable_____	Yes_____	Yes_____	Yes_____				
Multi-Purpose Laboratory	Not Acceptable_____	No_____	No_____	No_____				
	Acceptable_____	Yes_____	Yes_____	Yes_____				
Organic Extraction Laboratory	Not Acceptable_____	No_____	No_____	No_____				
	Acceptable_____	Yes_____	Yes_____	Yes_____				
Analytical Laboratory	Not Acceptable_____	No_____	No_____	No_____				
	Acceptable_____	Yes_____	Yes_____	Yes_____				
Primary Productivity Laboratory	Not Acceptable_____	No_____	No_____	No_____				
	Acceptable_____	Yes_____	Yes_____	Yes_____				
Engine Room	Not Acceptable_____	No_____	No_____	No_____				
	Acceptable_____	Yes_____	Yes_____	Yes_____				
Hazardous Materials Locker	Not Acceptable_____	No_____	No_____	No_____				
	Acceptable_____	Yes_____	Yes_____	Yes_____				

ATTACHMENT 6, MONTHLY INSPECTION FOR SELF-CONTAINED BREATHING APPARATUS

SCBA Number and Location _____

COMPLETENESS

Ensure that all required components are available: facepiece, breathing tube assembly, regulator, hose assembly, cylinder, valve assembly, harness, back-plate assembly complete with all straps.

CYLINDER PRESSURE

Ensure cylinder is charged to 2216 psi and that cylinder is within hydrostatic test date.

CONDITION CHECK

A. Visually check for any signs of wear, deterioration, wrinkling, or broken parts; check facepiece, valves, and breathing tube assembly.

B. Check facepiece and breathing tube for elasticity and cracks

C. Check head harness for wear and elasticity, ensure it is properly attached to face-piece

D. Check regulator for breakage or missing screws

E. Check cylinder and valve assembly for deep scratches dents, heat exposure, or other deformities

F. Examine backframe and harness for signs of wear

LEAK CHECK

Check Breathing System:
open valve fully, hold breath and place face-piece against face, close cylinder valve and observe remote gauge. If pressure decreases this indicates a leaks. If there is a leak, use soap; solution to isolate affected area.

Negative Pressure Leak Test:
close main valve, gently inhale until the air in system is gone and a negative pressure should be maintained with no leakage through the regulator

ALARM CHECK

Place face-piece to face, turn cylinder fully on, turn cylinder off, watch gauge while breathing slowly, alarm should sound when the regulator gauge indicates 1/4 remaining service life:

DISINFECTION

Disinfect SCBA with safety cleaning equipment after use

REPORT ANY DEFICIENCIES TO THE SAFETY EQUIPMENT MANAGER

Notes: _____

_____

Inspected By: _____ Date: _____

Attachment 7 - HAZARDOUS WASTE STORAGE AREA INSPECTION

Location _____

✓Y	or N	
❑	❑	Are the containers in good condition (no leaks, rusting containers, or bulges)?
❑	❑	Is the storage area free of debris?
❑	❑	Are the containers properly contained (e.g., in a diked area)?
❑	❑	Is the floor dry (no sign of spills)?
❑	❑	Are the containers properly labeled, including start accumulation date?
❑	❑	Are the inorganic containers interlined with polyethylene?
❑	❑	Are the containers closed?
❑	❑	Are containers holding incompatible wastes kept apart by physical barrier or sufficient distance?
❑	❑	Is spill cart adequately stocked (see spill cart inspection form)?

If any of the above were answered no, please provide explanation:

_____

_____

_____

1. Number of waste containers from **dissolved oxygen** analytical process:_____
   Total amount in gallons: _____
2. Number of **Green** Label Flammable (<50 ppm PCBs) Hazardous Waste Containers:_____
   Total amount in gallons: _____
3. Number of **Yellow** Label Acid Hazardous Waste Containers:_____
   Total amount in gallons: _____
4. Number of **acetone/water** rinse water waste containers:_____
   Total amount in gallons: _____
5. Number of Radioactive Waste Containers:_____
   Total amount in gallons/activity: _____
6. Other miscellaneous waste streams: _____

   Total amount in gallons: _____
   Oldest accumulation start date:_____
   Most recent shipment by date_____

_____ _____

Inspected By Date Reviewed By Date

Attachment 8 - SPILL CART CHECKLIST FORM

QUANTITY	DESCRIPTION
30	Universal Spill Control Pillows™, 1 liter size
50	Hazardous Material Disposal Bags, 12"x18"
20	VBS Blankets™
4 kg	Hg Absorb™ Powder
1.1 kg	Resisorb™
3.2 kg	Neutrasorb® Acid Neutralizer
1.2 kg	Neutracit® Caustic Neutralizer
1	Chemop™
6	Chemsponges™
1	Spill Squeegee, floor size, 18" head
1	Spill Squeegee, bench size, 8" head
1	24 oz. Mophead & handle
1	Polypropylene Broom
1	Bench Brush
1	Dust Pan
1 roll	KIMTEX ™ Towels, 9 3/4"x 100 ft. roll
1	Sponge, cellulose
1	Liquid Cleaner, 32 oz.
1	Clorox, 1 gallon
1 roll	pH Paper
1 roll	Barricade tape, 100 ft.
1	Sealing Tape for clothing containers, 180 ft.
1 each	Safety Flashlight & Power Shell Battery Pack
1	Tongs, 20" long
1	SpillKART™ with rigid liner
6	SpillKART™ Liners, yellow, 36" x 48"
1	Mop Bucket, 35 qt.
1	Wringer
1	Floor Sign
1	Glass Disposal Box, 8" x 8" x 10"
2	Chemical Spill Clothing Kits, each kit includes:
1	Total Body Coverall, polylaminated Tyvek
1 pair	Nitrile Gloves
1 pkg.	Disposable Polyethylene Gloves
1 pair	Chemical Splash Goggles, fog-free lens
1	Respirator with dust, acid gas/organic vapor cartridges
1	Hydrogen Fluoride Respirator
1	Toxic Dust Respirator

Checked By: _____

Date: _____

Attachment 9 - GLNPO SPECIFICATIONS FOR DRY-DOCKING AND OVERHAUL INSPECTIONS

The following items must be included in a five year dry-docking and overhaul inspection:

1. Dry Docking

2. Services
   a. Docking Services
   b. Shore Power
   c. Gangway
   d. Fire Hose
   e. Waste Removal: Unclassed/Hazardous
   f. Office Space

3. Hull Inspection
   a. Bottom Plate

4. Zinc Anodes
   a. Zinc Restoration

5. Engine Alignment

6. Propellers
   a. Propeller Inspection
   b. Propeller Restoration

7. Propeller Shafts/Bearing

8. Rudder

9. Sea Chests/Overboard Values

10. Bottom Paint

11. Vents

12. Water Tight Doors/Hatches

13. Transducer

14. Anchors/Chains

15. Inclining

16. Electrical

17. Alarm System
    a. Tank Level Alarm System

18. Pumps
    a. Hydraulic
    b. Fire
    c. Bilge
    d. Repairs

19. Engines
    a. Mains
    b. Generators

20. Safety Equipment
    a. Rafts
    b. Extinguishers
    c. Fire Suppression Systems

21. Navigation Equipment
    a. Auto Pilot
    b. Gyroscope
    c. Radars
    d. LORAN

22. Waste Holding Tanks

23. Labor Rates

Attachment - R/V LAKE GUARDIAN - GENERAL WEEKLY INSPECTION CHECKLIST

_____ Emergency lighting functional

_____ Emergency exits unobstructed

_____ Fire doors closed

_____ Tool room equipment clean and free of accumulated debris and shavings

_____ Machine guards in place on tool room equipment

_____ Dielectric mat placed in front of main control panel in Engine Room

_____ Circuit boxes in safe condition and doors are closed

_____ Compressed cylinders properly secured

_____ All GFCIs are functional

_____ All extension cords are grounded, in good condition, and not in permanent use

_____ No combustibles stored in exhaust trunks (port or starboard)

_____ Paint locker in good order with no open containers, and amount of paint is within allowable limits

_____ Freezer and refrigerator panic bars are operational

_____ Door closers functioning properly

Comments:

_____

_____

_____

Inspected by: _____ Date: _____

R/V LAKE GUARDIAN
PRE-SAIL CHECKLIST

SHIP-BOARD CHECKLIST

____ ENSURE MAGNETIC DOOR CLOSURES ARE DEACTIVATED

____ ORIENTATION AND PAPERWORK COMPLETED FOR ALL NEWLY ARRIVED PERSONS

____ DECKS SECURED

____ SAMPLING EQUIPMENT SECURED

____ ENSURE RESTRICTED AREAS ARE SECURED (TAPED OFF WITH CAUTION TAPE)

BRIDGE CHECKLIST

____ NAVIGATIONAL LIGHTS FUNCTIONAL

____ TASK LIGHTS FUNCTIONAL

____ GYRO STEERING ALARM FUNCTIONAL

____ FURUNO FATHOMETER FUNCTIONAL

____ ELECTRONIC HAILER FUNCTIONAL

____ PORTABLE HAILER AVAILABLE AND FUNCTIONAL

____ LORAN LC-90 FUNCTIONAL

____ LORAN NORTHSTAR FUNCTIONAL

____ RAY-88 VHF FUNCTIONAL

____ STANDARD VHF RADIOS AVAILABLE AND CHARGED

____ CLOCKS SET AND FUNCTIONAL

____ RECORDING BAROMETER FUNCTIONAL

____ WALL BAROMETER FUNCTIONAL

____ THERMOMETERS (2) AVAILABLE AND FUNCTIONAL

____ GENERAL ALARM FUNCTIONAL

____ CO2 AL ARM FUNCTIONAL

____ HOSE-McCANN ENGINE ROOM PHONE FUNCTIONAL

____ DECCA RADAR (LARGE) FUNCTIONAL

____ DECCA RADAR (SMALL) FUNCTIONAL

____ NAVIGATIONAL INSTRUMENTS FUNCTIONAL

____ PILOT RULES AVAILABLE

____ NOTICE TO MARINERS PUBLICATIONS CURRENT

____ LIGHT LIST AVAILABLE

____ COAST PILOT

____ NAVIGATIONAL CHARTS AVAILABLE

____ LOG BOOK AVAILABLE

____ NIGHT ORDER BOOK AVAILABLE

____ RADIO LOG AVAILABLE

____ FAN-ENGINE CONSOLE LIGHTS FUNCTIONAL

____ SEARCH LIGHTS FUNCTIONAL

____ INTERCOM FUNCTIONAL

____ HYDRAULIC STEERING FUNCTIONAL

____ MAGNETIC COMPASS LIGHTS FUNCTIONAL AND FULL OF OIL

____ DAY SHAPES AVAILABLE

Pre-Sail Check
Page

____ GYRO REPEATER LIGHTS FUNCTIONAL

____ DESK LAMP FUNCTIONAL

____ FURUNO DEPTH RECORDER PAPER AVAILABLE

____ SINGLE SIDE BAND RADIO FUNCTIONAL

____ 12 VOLT BATTERIES (AFT OF PILOT HOUSE) FUNCTIONAL

____ FIRST AID KIT STOCKED AND AVAILABLE

____ BINOCULARS AVAILABLE (3)

____ WINDSHIELD WIPERS (FORWARD) FUNCTIONAL

____ WINDSHIELD WIPERS (AFT) FUNCTIONAL

____ SHIP'S BELL FUNCTIONAL

____ INSIGNIAS AVAILABLE : BRAVO, EPA, SSI, CAPTAIN ISMA

____ GUEST BOOK AVAILABLE

____ WORK VESTS AVAILABLE

____ EPIRB AVAILABLE AND FUNCTIONAL

____ FOG SIGNAL (AUTO) FUNCTIONAL

____ SURVIVAL SUITS AVAILABLE

____ EMERGENCY FLARES AVAILABLE (CHECK EXPIRATION DATE)

____ VERY PISTOL AVAILABLE

____ LINE THROWING DEVICE AVAILABLE

____ PORTABLE COMPASS AVAILABLE

____ ALIDADE AVAILABLE AND FUNCTIONAL

____ NAVIGATIONAL TRIANGLES AVAILABLE

____ SPARE BULBS AVAILABLE FOR EQUIPMENT

____ STATION BILL UPDATED AND POSTED (ENSURING CREW MEMBERS ARE AWARE OF THEIR RESPONSIBILITIES, AND ARE CAPABLE OF PERFORMANCE)

NOTICE

This boat is not to be put into operation until necessary equipment is installed and a pre-deployment safety inspection is conducted.

The following will be included in the pre-deployment safety inspection:

_____ 1. Sufficient Number of Personal Flotation Devices (PFD)
_____ 2. Sufficient Fire Extinguisher
_____ 3. Proper Loading of Equipment (No overloading of vessel)
_____ 4. Proper Navigation Lighting
_____ 5. Check For Fuel Leaks; Condition of Fuel line
_____ 6. Sound Producing Device Available
_____ 7. Visual Distress Signals, if appropriate (Ex. night travel or travelling in waters greater than 2 miles in width)
_____ 8. Paddles or Oars
_____ 9. Anchor and Line
_____ 10. Dewatering Device (Pump, Bucket, or Scoop)
_____ 11. Condition of Wiring
_____ 12. First Aid Kit
_____ 13. Radio
_____ 14. Tool Kit (optional)
_____ 15. Fender (optional)
_____ 16. Perform a General Condition Inspection

VESSEL: _____ INSPECTED BY: _____

DATE: _____

U.S. Environmental Protection Agency
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Chicago, IL 60604-3590