



Accident Prevention Plan
For Sampling Activities for the
U.S. Army Corps of Engineers
Environmental Monitoring Boston Harbor Inner Harbor (BHIH)
Maintenance Dredging
Boston, MA

1. SIGNATURE SHEET

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Site Safety Officer

Date: *4/28/08*

Approved by: *Bernard Himmelsbach*
Bernard Himmelsbach (614-424-4302)
Battelle Senior Industrial Hygienist

Date: *4/28/08*

Concurred by: *Paul Dragos*
Paul Dragos (781-952-5329)
Battelle Project Manager

Date: *4/28/08*

Team personnel assigned to this project shall be familiar with the possible hazards involved, the safety procedures, and other information outlined in this plan. Prior to the commencement of work, the Team Leader/Site Safety and Health Officer will discuss additional procedures to be implemented, addressing any other site-specific conditions that may arise. All on-site personnel of Battelle and all subcontractors must sign the following Plan Acknowledgement Form.

By signing below, the undersigned certify they have had the opportunity to read and ask questions about this APP, and that they understand the procedures, equipment, and restrictions of this plan and agree to abide by them.



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Boston Harbor Inner Harbor (BHIH) Maintenance Dredging

Project Health and Safety Acknowledgement Form

No.	Name	Signature	Date	Company
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2. BACKGROUND INFORMATION

2.a Contractor

Battelle
397 Washington St.
Duxbury, MA 02332

2.b Contract Number

DACW33-03-D-0004

2.c Project Name

Boston Harbor Inner Harbor Maintenance Dredging Environmental Monitoring

2.d Project Description

The U.S. Army Corps of Engineers (Corps) is scheduled to conduct maintenance dredging of a portion of the Federal navigation channels in Boston Harbor, Massachusetts. The maintenance dredging has been broken into base work and optional contract work. The base work involves dredging the Main Ship Channel from a location approximately half-way between Spectacle Island and Castle Island upstream to approximately the North Jetty, the upper Reserved Channel, and the approach channel to the Navy Dry Dock, all to their authorized depths. The base plan dredging also involves the creation of a Confined Aquatic Disposal (CAD) cell in the Mystic River and the removal of the silty layer over another potential CAD cell in the Main Ship Channel.

The optional work which may be performed involves dredging the Main Ship Channel from the North Jetty upstream to the Inner Confluence, a portion of the Mystic River not previously deepened during the Boston Harbor Navigation Improvement Project (BHNIP), dredging in Chelsea River from just south of the Chelsea Street Bridge in the vicinity of the Keyspan Gas siphon up through the Chelsea Street Bridge. If the optional dredging is performed it will also require the creation of a CAD cell in the Main Ship Channel.

Approximately 1.3 million cubic yards (cy) of the 1.7 million cy to be dredged from the Federal channels is unsuitable for ocean placement and will be disposed into CAD cells located beneath the Federal channels. A “starter” cell will be sited in the Mystic River, but the majority of the material will be disposed into a single CAD cell located in the Main Ship Channel below the Inner Confluence. Material from the Chelsea River will be disposed into a previously used disposal cell (C12) in the Chelsea River. The remaining 400,000 cy of dredged material, plus the material excavated in constructing the CAD cells will be disposed at the Massachusetts Bay Disposal Site (MBDS).

In support of the maintenance dredge work described above, the project will require various types of environmental monitoring. In general, this work includes monitoring, sampling, and analysis as necessary to monitor potential water quality impacts from dredging to determine if any resuspended material may be impacting winter flounder spawning habitat. In addition, monitoring of dredged material CAD cell disposal operations which may be impacting water quality will also be performed.

The water quality monitoring will consist of shipboard operations in which dredge material plumes will be surveyed and sampled. An Acoustic Doppler Current Profiler (ADCP) will collect and display in real time high frequency acoustic backscatter data to track and map out the dredge plume. A more precise and accurate set of turbidity probes will be deployed on a Conductivity, Temperature, Depth (CTD) recorder and rosette system to collect whole water samples while simultaneously recording and displaying real time data. Whole water samples will be analyzed for total suspended solids (TSS). The real time data will allow the field staff to collect the water samples at various turbidity gradients, thus allowing for better post cruise calibrations of the ADCP and *in situ* turbidity signals. Additionally, a laboratory quality turbidity meter will be used on board to validate the *in situ* turbidity signals.



2.e Contractor accident experience

Battelle's total recordable case rate (TRC) in 2005 was 1.51, in 2006 was 0.97.15 and in 2007 was 0.99.. Battelle's Experience Modification Rate in 2005 was 0.98, in 2006 was 1.10, and in 2007 was 1.04. The EMR YTD for 2008 is 0.79.

2.f Listing of Phases of work and hazardous activities requiring accident hazards analysis

The following activities are detailed on the Accident Prevention Program Hazard Analysis in Appendix D:

1. Marine Operations: including transferring personnel and equipment to vessel
2. Sample Collection – deployment and retrieval of the ADCP and CTD/rosette
3. Sample preparation for storage/shipping/analysis
4. Water quality analysis
5. General

3. STATEMENT OF SAFETY AND HEALTH POLICY

The Battelle Safety Health and Emergency Response (SHER) Department develops, implements, and manages Battelle industrial hygiene, industrial safety, and emergency management programs that are fully integrated with Battelle operational requirements and provide the services and support necessary to maintain compliance with corporate policies and procedures, as well as applicable regulations and industry standards and policies. SHER staff work with researchers to assist them with complying with all corporate policies and procedures, applicable federal, state and local regulations and appropriate industrial standards and policies. The ultimate responsibility and accountability for compliance and staff safety falls upon Battelle department managers and the staff members themselves.

Battelle is committed to establishing and maintaining an accident-, injury- and occupational illness-free environment. Battelle corporate policy 1.6, Environmental, Safety and Health Program, states "It is Battelle policy to comply with the letter and spirit of all environmental, safety and health (ES&H) laws and regulations." ALL staff must plan and conduct their work in a responsible manner to create and maintain a safe and healthy environment in Battelle facilities and projects. The purpose of this program is to describe the operational framework and guidelines to address safety and health issues within Battelle.

The Battelle, Duxbury group ACES, also operates under a group specific Environment, Safety and Health Plan which is attached in Appendix E of this APP.

Section 01.A 06 of EM 385-1-1 states that "The Contractor shall erect and maintain a safety and health bulletin board in an area commonly accessed by workers. The bulletin board shall be maintained current, in clear view of onsite workers; and protected against the elements and unauthorized removal." Because a bulletin board and posters are not practicable for small vessel operations, this information will be available in a folder for personnel review.

4. RESPONSIBILITIES AND LINES OF AUTHORITY

4.a Corporate level

All Battelle staff are expected to contribute to establishing and maintaining a safe and healthy working environment. Written procedures that identify program requirements include specific responsibilities. The following roles and responsibilities have been defined for implementing this program:

- **President Battelle National Security Global Business**
 - Provide active leadership for effective implementation
 - Assume responsibility for the safe, overall operation
 - Provide a safe and healthy working environment for staff
 - Provide resources necessary to ensure continuous improvement



- **General Managers/Division Leaders -**
 - Ensure program implementation and compliance within the division
 - Take ownership of the safety program within their division
- **Vice President, Operations & Systems Services**
 - Provide S&H support to the President, NSGB
 - Oversee the Environment, Safety, Health and Quality Systems Management
 - Ensure Battelle staff are provided a healthy and safe environment
- **Vice President, ESH&Q Systems Management**
 - Ensure implementation of Battelle policy.
 - Provide S&H oversight, support and assessment to facilitate effective operations, and identify regulatory compliance requirements to enable management to meet their responsibilities
 - Ensure development and management of ESH&Q plans and applicable programs
 - Establish and oversee operation of the Safety Steering Committee and establish Committee operating procedures
- **Line and Support Management**
 - Implement safety and health programs within their respective organizations.
 - Ensure staff engage S&H resources when the level of expertise required is beyond their knowledge
 - Ensure staff in their area of responsibility receive necessary training
- **Safety, Health and Emergency Response**
 - Reports directly to the Vice President, ESH&Q SM to provide subject matter expertise in the development, implementation and oversight of S&H plans and programs
 - Serve as a direct resource to management technical support for implementing Safety, Health programs
 - Conduct audits and inspections to help communicate staff on S&H to ensure a safe work environment
 - Assist project teams in pre-planning of activities
- **Staff**
 - Work safely at all times and maintain safe work safety procedures
 - Make suggestions for safety improvement

4.b Project level

The implementation of accident prevention at this project location will be the shared responsibility of the Battelle Project Manager (PM), the Battelle Project Site Safety Officer (SSO), and all other Battelle and contractor personnel.

4.b.1 Battelle Project Manager

The Battelle PM, Paul Dragos, has the primary responsibility for ensuring the overall accident prevention of this project. As such, the PM is responsible for ensuring that the requirements of this APP are implemented. Some of the PM's specific responsibilities include:

- Assuring that all personnel to whom this APP applies have received a copy of it;
- Providing the Health and Safety Manager with updated information regarding environmental conditions at the site and the scope of site work;
- Providing adequate authority and resources to the on-site SSO to allow for the successful implementation of all necessary safety procedures;
- Supporting the decisions made by the SSO;
- Maintaining regular communications with the SSO; and,
- Coordinating the activities of all subcontractors and ensuring that they are aware of the pertinent accident prevention requirements for this project.

4.b.2 Battelle Site Safety Officer

All field technicians are responsible for implementing the safety requirements specified in this APP. However, one field individual will serve as the SSO. The SSO for this program is Matt Fitzpatrick. He will be responsible for all field operations covered by this APP. The SSO is responsible for enforcing the requirements of this APP once work



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begins. By design, the SSO has the authority to immediately correct all situations where noncompliance with this APP is noted and to stop work in cases where an immediate danger is perceived. Some of the SSO's specific responsibilities include:

- Assuring that all personnel to whom this APP applies have submitted a completed copy of the APP receipt and acceptance form;
- Assuring that all personnel to whom this APP applies have attended a pre-entry briefing;
- Maintaining a high level of accident prevention consciousness among employees at the work site;
- Procuring and distributing the personal protective equipment (PPE) needed for this project to Battelle employees and subcontractors;
- Verifying that all PPE and accident prevention equipment used by field personnel is in good working order;
- If required, setting up and maintaining the work zones and assuring proper decontamination of all site personnel and equipment;
- Notifying the PM of all noncompliance situations and stopping work in the event that an immediate danger situation is perceived;
- Monitoring and controlling the safety performance of all personnel within the established work areas to ensure that required safety and health procedures are being followed;
- Conducting accident/incident investigations and preparing accident/incident investigation reports;
- Conducting the pre-entry briefing; and,
- Initiating emergency response procedures in accordance with Section 7.0 of this APP.

4.b.3 Field Team

All field personnel covered by this APP are responsible for following the accident prevention procedures specified in this APP and for performing their work in a safe and responsible manner. Some of the specific responsibilities of the field personnel are as follows:

- Reading the APP in its entirety prior to the start of on-site work;
- Submitting a completed APP Acceptance Form;
- Bringing forth any questions or concerns regarding the content of the APP to the PM or the SSO prior to the start of work;
- Reporting all accidents, injuries, and illnesses, regardless of their severity, to the Battelle SSO; and,
- Complying with the requirements of this APP and the requests of the SSO.

5. SUBCONTRACTORS AND SUPPLIERS

5.a Subcontractors

Robert Carr
56 Dorothea Drive
Weymouth, MA. 02188

Mr. Robert Carr will captain the *R/V Aquamonitor* during the field operations.

5.b Means for controlling and coordinating subcontractors

The Battelle SSO will be onboard the Battelle vessel, *R/V Aquamonitor*, during all operations and will have direct contact with the boat captain.

5.c Safety responsibilities of subcontractors

The Ship's Master, or captain of the vessel, has ultimate authority and responsibility for the safety of the ship's crew and scientific staff. Additionally the subcontractor is responsible for maintaining the vessel and associated equipment in safe and proper working order.



6. TRAINING

For all marine operations, the SSO will conduct a pre-entry briefing before site activities begin. APP receipt and acceptance sheets will be collected at this meeting. Short safety refresher meetings will be conducted, as needed, throughout the duration of any project. Attendance of the pre-entry meeting is mandatory and will be documented by the SSO.

6.a Subjects to be discussed

Employees must be instructed in the site-specific aspects of emergency evacuation. For boat operations, emergency evacuation may require abandoning ship. The field team will review with the boat captain the details for determining when the boat will be abandoned, individual responsibilities, and the orderly procedures that will be followed if such a command is issued. All individuals involved in field operations are required to comply with all the applicable safety requirements contained in this APP. A pre-survey safety briefing shall be conducted aboard the vessel prior to departure to discuss:

- Planned operational procedures
- Individual responsibilities
- Potential risks that may be encountered in the completion of this task
- Deck safety including over-the-side equipment handling
- Cold water safety (as appropriate)
- Man overboard procedures
- Abandon ship procedures
- A project communications list shall be drafted that includes telephone numbers for emergency contacts, including personal physicians if required for medical reasons.

6.b Mandatory training and certifications

The SSO is certified in First Aid/CPR. The vessel captain shall possess the required license for operation of the vessel and shall meet all training requirements for this license. Proof of all required training shall be maintained on-site. Proof of these certifications are attached in Appendix F.

6.c Emergency response training

No specific emergency response training is required for this work. However, as emergency response contingency plans for severe weather and man-overboard situations are described in section 12.

7. SAFETY AND HEALTH INSPECTIONS

7.a Safety inspections

At least quarterly, ES&H facilities inspections are conducted. These inspections are detailed further in section of 4.4 of the Battelle Duxbury Environment, Safety and Health Plan which is attached in Appendix E of this APP.

Regular Work conducted for this project will occur over the course of approximately 3 months. Regularly scheduled safety inspections of the operations are scheduled for once every month. The SSO will oversee all operations and will maintain a daily log which will include daily activities and safety issues.

7.b External inspection/certifications

Personnel certifications are discussed above in Section 6. Additionally an annual floating plant inspection is required for this work under EM 385-1-1, Section 19.A.01.b. The results of this vessel inspection are included in Appendix B.

8. SAFETY AND HEALTH EXPECTATIONS, INCENTIVE PROGRAMS, AND COMPLIANCE



8.a Safety program goals, objectives, and accident experience for this contract

Battelle is committed to establishing and maintaining an accident-, injury- and occupational illness-free environment. Battelle corporate policy 1.6, Environmental, Safety and Health Program, states “It is Battelle policy to comply with the letter and spirit of all environmental, safety and health (ES&H) laws and regulations.” ALL staff must plan and conduct their work in a responsible manner to create and maintain a safe and healthy environment in Battelle facilities and projects.

Several situations are identified in Battelle’s General Disciplinary Action procedure as warranting disciplinary action including (but not limited to “Violation of Battelle health, safety, or security policies, practices, or procedures.” The following are considered when determining the appropriate disciplinary action: seriousness of the offense, previous disciplinary actions for the same or similar offenses committed by other staff members, previous disciplinary actions taken concerning the offending staff member, and the staff member's work history and performance.

The Safety and Industrial Hygiene program plan holds line and support management responsible for implementing safety and health programs within their respective organizations, ensuring staff engage S&H resources when the level of expertise required is beyond their knowledge, and ensure staff in their area of responsibility receive necessary training.

8.b Safety incentive program

The 'Safety Excellence Award' recognizes individuals who demonstrate safety leadership above and beyond the job requirements, provides consistent performance that reflects the values and spirit of Battelle's commitment to an injury-free, occupational illness-free, and accident-free environment, and/or has taken action taken to avoid near misses, incidents, and /or accidents that could have been harmful to Battelle staff.

9. ACCIDENT REPORTING

9.a Exposure data

All Battelle employees are required to report all occupational injuries or illnesses and near-misses to their supervisor and/or Battelle Columbus Operations (BCO) Health Services as soon as reasonably possible. Accident/incident investigations are performed by the employee’s supervisor with assistance from a designated Safety and Health Representative. Data regarding incidents which result in occupational injury and illness are maintained in conformance with 29 CFR 1904 by BCO Health Services at the Battelle headquarters.

Supporting Battelle plans/procedures are available upon request.

Upon completion of the project the contractor and subcontractor will complete and submit the Corps’ form “Monthly Record of Work-Related Injuries/Illnesses and Exposure”. This form is provided in Appendix G.

9.b Accident investigations, reports, and logs - immediate notification of major accidents

Any incident (other than minor first aid treatment) resulting in injury, illness, or property damage requires an accident investigation and report. Battelle will report recordable incidents: lost time injuries, injuries requiring medical attention, fires, fatalities, accidents involving the public, and property damage exceeding \$2,000. The report shall be made to the USACE Contracting Officer verbally within 24 hours and a written report of the accident must be submitted on ENG Form 3394 within 5 working days. The investigation should be conducted as soon as emergency conditions are under control. The purpose of the investigation is not to attribute blame but to determine the pertinent facts so that repeat or similar occurrences can be avoided. A Battelle Supervisor’s Accident Investigation Form is presented in Appendix C of this APP. The injured employee's supervisor should be notified immediately of the injury. In addition to Battelle reporting requirements, any reportable accident shall be verbally reported to the Corps Project Manager and the Corps Safety and Occupational Manager within 24 hours. A Corps ENG Form 3394 will be completed and submitted to the Corps within 5 working days.



10. MEDICAL SUPPORT

The phone numbers of the police and fire departments, ambulance service, local hospital, Battelle, and USACE representatives are provided as emergency references shown below. In the event an injury or illness requires more than first aid treatment, the SSO will accompany the injured person to the medical facility and will remain with the person until release or admittance is determined. The escort will relay all appropriate medical information to the on-site project manager.

The mobilization, demobilization, transferring samples and berthing throughout the survey duration will all take place at Hewitt’s Cove Marina in Hingham, MA. In the event of an emergency, the emergency personnel will be directed to the closest dock in the work area.

Emergency response	
Ambulance/Fire/Police:	911
U.S. Coast Guard: U.S. Coast Guard Station 427 Commercial St, Boston , MA	(617) 223-3214 Or (617) 223-3224
Medical Services: South Shore Hospital 55 Fogg Rd, Weymouth, MA 02190	(781) 340-8000
Onsite (vessel) medical support	
Matt Fitzpatrick (SSO) CPR/1 st Aid/AED/Bloodborne Pathogen	(508) 524-1168 Cell
Mike McKee CPR/1 st Aid/AED/Bloodborne Pathogen	(774) 240-4580 Cell
Mike Walsh CPR/1 st Aid/AED/Bloodborne Pathogen	(781) 706-9830 Cell
Jessica Fahey CPR/1 st Aid/AED/Bloodborne Pathogen	(617) 899-5577 Cell
Project Contacts	
Paul Dragos: Battelle Project Manager	(781) 952-5357 (508) 564-0701 Cell
Deirdre Dahlen Battelle Program Manager	(781) 952-5253
Catherine Rogers ACOE Project Manager	(978) 318-8231

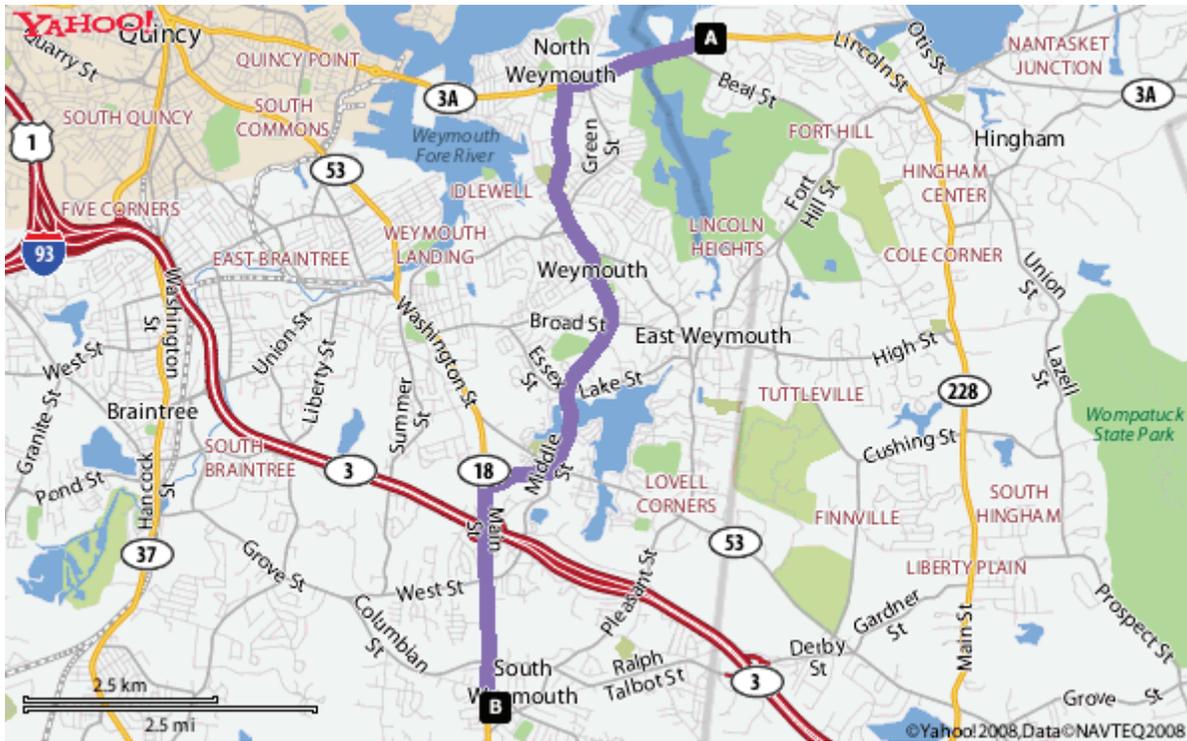


Figure 1. Map to South Shore Hospital from Hewitt's Cove Marina

Directions to Hospital:

Start at 349 LINCOLN ST, HINGHAM going toward SGT WILLIAM B TERRY DR	go 0.5 mi
Continue on BRIDGE ST(RT-3A)	go 0.7 mi
Turn LEFT on NORTH ST	go 0.9 mi
Continue on NORTON ST	go < 0.1 mi
Bear RIGHT on NORTH ST	go 0.2 mi
Continue on COMMERCIAL ST	go 0.2 mi
Bear RIGHT on MIDDLE ST	go 1.9 mi
Turn RIGHT on WINTER ST	go 0.5 mi
Turn LEFT on MAIN ST(RT-18)	go 1.7 mi
Turn LEFT on FOGG RD	go 0.1 mi
Arrive at 55 FOGG RD, WEYMOUTH , on the LEFT	go < 0.1 mi

11. PERSONAL PROTECTIVE EQUIPMENT

All personnel shall be required to have on hand the prescribed safety equipment as follows:

- Work clothes suitable for the anticipated weather and working conditions;
- Steel-toed safety boots; and
- A United States Coast Guard (USCG) approved Type III PFD or Type V work vest for ALL deck operations

The vessel will be required to carry an approved first aid kit. All personnel will be advised of the inherent risks of prolonged exposure to the elements, signs and symptoms of heat or cold stress, as appropriate to conditions, and measures for limiting heat or cold stress during field activities (see Appendix A). Plenty of cool water and beverages will be made available and sunscreen will be provided. Hygiene facilities shall be maintained for crew members to wash face and hands before eating and before taking breaks.



11.a Life jackets

All vessels are required to carry one USCG approved Type III Adult Life Jacket for every person on board. A Type III life jacket is designed to keep a person afloat, with their face up out of the water. All life jackets must be outfitted with a battery operated light unit or glow sticks and reflective tape. Life jackets should be stored in a readily accessible location. Be sure to check that there are adequate numbers of life jackets aboard before leaving the dock. Check the condition of the life jacket assigned to you. Tug tightly on the straps to see if they are secure, inspect fasteners for proper operation, and check for damage or deterioration. If you suspect that the life jacket is damaged, fold the jacket in half, and squeeze the two halves of the jacket together. If the sound of escaping air is heard, the life jacket is damaged, and the flotation material inside the jacket will absorb water if used. A defective life jacket should not be used, and a suitable replacement found.

In addition to the USCG approved Type III life jackets, the vessel will carry one USCG approved Type V personal flotation device for each individual who will be involved in the support of deck operations. The Type III life jackets should be worn by all craft support personnel at all times during operations. The type V life vest will be stowed in an accessible location for emergency use. The vessel will also be equipped with a Type IV throwable life ring attached to 60-90 feet of floating line.

12. PLANS, PROGRAMS, and PROCEDURES

12.a Marine operations

The vessel used for all operations will be appropriately sized to support the field team and all required support equipment. The Safety Checklist for Launches, Motorboats and Skiffs is contained in Appendix B. Captain's license will be maintained onboard the vessel and is attached in Appendix F of this APP. When appropriate, the Contractor shall issue the Notice to Mariners, notify the USCG, local Harbor Masters, etc., well in advance to minimize potential conflicts with local boat traffic, fishing, or security issues. The vessel will be equipped with one primary and one back-up VHF radio to permit communications with shore based personnel and the USCG.

The field team will review with the boat captain all emergency signals that he will use to communicate an emergency to the field crew. The team will also review what actions, if any, they will be assigned in the event of an emergency on the boat. All field crew members must know the locations of the radio, fire extinguishers, first aid kits, and other emergency equipment that is located within the boat. The SSO should review the operations of the boat radio in the event that the captain is injured or otherwise unable to operate it. The SSO (or designee), appointed for this project, is also capable of piloting the boat should the boat captain be unable to do so.

The following personnel protection measures shall be in place aboard the sampling vessel or any substitute vessel required by this task:

- A safe means for boarding or leaving the vessel shall be provided
- Projections or tripping hazards shall be removed or properly labeled with warning signs or distinctively marked with safety yellow. Tools, materials, extension cords, and hoses shall be placed down so as not to cause a tripping hazard.
- Access pathways shall be kept clear
- Hazardous edges which may cause injury to the head shall be properly padded
- Guardrails and/or toe-rails shall be provided at the stern opening
- Non-skid surfaces shall be applied on the exposed work deck area
- Electrical circuits with GFCI protection shall be provided in grounded 120V or 240V systems exposed to the weather

The following standing orders shall be in effect for the duration of project operations:

- NO night operations are permitted.
- Marine operations will be suspended in any dangerous weather condition including, fog, heavy rain, or the presence of dangerous lightening. NOAA Marine Weather Radio will be monitored for the latest advisories.



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Shipboard personnel should not perform activities on the vessel's open deck during such conditions. Activities should be confined to the enclosed portions of the vessel.

- Swimming is prohibited for all personnel unless necessary to prevent injury or loss of life.
- Passageways shall be kept clear of obstructions at all times.

Work area shall be kept clean and orderly, all waste shall be properly stowed while at sea and later disposed ashore at the end of each working day.

Using a ring buoy is the first course of action in the event an individual has fallen overboard. It can be thrown to a victim in the water, and it will provide sufficient flotation to keep the individual afloat until help arrives. This device should be stowed in a location on the vessel that provides quick and ready access to sampling personnel working on deck. It is important to check the location of the buoy before leaving the dock as a means of preparing yourself in the event of an actual emergency. All USCG approved ring buoys must be 30 inches in diameter, international orange in color, and fitted with reflective tape. It is recommended that these ring buoys be outfitted with 90 feet of buoyant line.

All personnel involved with the handling of sampling gear on deck should be aware that the most important rules to remember in a man overboard situation are to, NEVER LOSE SIGHT OF THE INDIVIDUAL IN THE WATER, and to inform the captain as quickly as possible. A ring buoy should be thrown to the general vicinity of the victim. Do not throw a ring buoy directly at the victim; hitting the victim with the ring buoy may cause injuries. The recovery of an individual from the water is best made by keeping the person to leeward, or to the downwind side of the vessel. In all recovery efforts, the stern should be kept away from the person in the water to avoid injury from the propeller. A boarding ladder, or other suitable means, should be available to facilitate recovery. A designated rescue swimmer, outfitted with a tether and lifejacket, should be standing by in the event the victim is injured, or incapacitated. A rescue harness may be required to hoist and recover an injured victim from the water.

12.b Contingency Plan for Severe Weather

To assure the safest possible on-the-water activities, the following severe weather plan (SWP) has been adopted to ensure that appropriate actions and precautions are implemented when there is a potential for severe weather to affect the ongoing marine activities. The SWP details procedures for monitoring weather conditions, safely evacuating personnel from vessel to the shore, and if required, move the vessels to safe harbor and suspending operations. This plan depends greatly upon the experience of Battelle field personnel and on the equipment being used at the time of the severe weather. The project manager will evaluate the conditions being encountered during survey operations and severe weather, and make a determination as to whether the operations can proceed in a safe manner and not compromise the quality of the data being collected.

A detailed weather forecast will be obtained for the Boston, Ma area via the National Weather Service Forecast Office for Boston, Ma (<http://www.erh.noaa.gov/er/box/>) or via VHF radio for the marine forecast for that day and the following days weather forecast to determine the impending weather. This will be performed by the SSO and vessel captain. The National Weather Service, coastal marine forecast for Boston Harbor is the locale for determining the impending weather forecasts. The weather forecasts will be discussed at each morning's health and safety briefing.

The following outlines the possible severe weather conditions and the steps, which will be executed in each situation. For all of the potential scenarios described below, Battelle field personnel will communicate the conditions and proposed course of actions immediately to the Battelle SSO and Project Manager for discussion and concurrence.

- High Winds - Of particular concern during periods of high winds is 1) the limited maneuverability of the survey vessel and 2) the quality of the survey data. Sustained wind speeds of 20 knots will initiate the start of taking the appropriate precautions for suspending of operations due to high winds. Should gale force winds (34-47 knots or 39-54 mph) be announced over the VHF / marine radio during operations, work will cease for minimum of one hour before the storm arrives, depending upon the work being performed. Although it is likely that the occurrence of high winds will affect data quality before the safety of vessel operations, the project manager will carefully evaluate continuing data collecting in protected areas against the risk of being unable to return to the marina through the more exposed, open water areas.
- Heavy Rains and Snow Squalls - In the event heavy rains (where visibility is obscured), or squalls are



Boston Harbor Inner Harbor (BHH) Maintenance Dredging

forecasted or encountered, all operations will be suspended until the heavy rains or squalls end and it is found that operations can proceed in a safe manner. Personnel may remain on the vessel during heavy rain or squall events. Should it be determined by the project manager that the weather conditions being encountered are dangerous and are worsening, all operations will cease and the vessel will seek the closest protected area.

- **Thunderstorms** - In the event a thunderstorm is forecasted, the project manager will monitor the activity on the NWS local Doppler Radar. In this event, all personnel will keep an "eye to the sky". Operations will cease when it is determined that thunderstorm cells are within five miles of the site, based on NWS Doppler Radar, or if lightning is observed from any location. Operations will be allowed to restart 30-minutes after the last lightning bolt is observed, unless NWS Doppler Radar shows other storms approaching.
- **Hurricanes** - In the event a hurricane warning is posted, the vessel will be pulled from the water and stored in a safe location.

In Summary:

- All vessels and personnel will maintain radio or cellular telephone communications/contact with the Project Manager. Daily reports will be made regarding weather delays.
- National Weather Service (NWS) local weather forecasts will be monitored daily by onsite personnel for predicted inclement weather. Local weather forecasts will be discussed at daily health and safety meeting.
- All personnel shall be aware of the forecast and keep an "eye to the sky". Unpredicted storms may also occur without warning. The project manager will also monitor NWS Local Doppler Radar as required and notify the field team if impending questionable weather is predicted.
- Work will be suspended when a sustained wind of 20 knots is encountered or in the event of Gale force winds (34 - 47 knots or 39-54 mph).
- During times of poor visibility, lightning storms or heavy rains, operations will be postponed.

12.c Deck safety

There are inherent risks associated with going to sea, especially when equipment is being deployed and retrieved over the side. You must be aware of what is happening around you at all times, in order to take the necessary precautions to avoid personal injury. All personnel involved in the support deck operations MUST be properly attired in the required safety gear, including safety shoes and a USCG approved Type V personal flotation device (work vest). Personnel directly involved with handling equipment over the side should also be cognizant of potential snag hazards. Items such as loose clothing, rings, or other personal effects may become snagged on equipment during a deployment resulting in serious personal injury, or a possible man overboard situation. These items should be removed and properly stowed before leaving the dock.

- All personnel shall be briefed on project equipment and procedure prior to departure
- Prior to departure, an inspection shall be conducted to ensure that all equipment is properly secured
- Heavy weights should not be suspended above the deck without positive lateral control, taglines are recommended
- A pre-launch conference shall be held prior to the first deployment of the CTD/rosette to ensure maximum coordination. One person shall be given charge of the actual operation.
- When it is necessary that work be performed near the edge of the deck where no guard rail is present, it should be done in a stable position, such as kneeling or sitting. If it must be done from a standing position the employee's work vest should be attached to a lifeline that is manned and attached to a fixed object, if conditions warrant.

12.d Mobilization/demobilization

There are a number of safety related concerns that must be addressed during this phase of the project. The fact that the vessel is still at the pier does not relieve personnel of their responsibility for wearing the required safety gear, which includes safety shoes and a USCG approved Type V work vest. A work vest shall be worn at any time there



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exists the risk of falling into the water. This includes accessing, or disembarking the vessel from gangways or ladders, or at any time working along the edge of the pier or on the exposed decks of the project vessel.

Personnel going topside in the area of the bridge, for the purpose of mounting project equipment, should be aware of certain dangers that are not readily apparent. High frequency radar and radio waves and the associated amounts of electrical power necessary to operate those components may be present. These have the potential of inflicting serious injury or death. Personnel going aloft in these areas should obtain prior permission from the Captain, and ensure that all radio and radar transmitters are placed on the “stand-by” position, and the power is secured to all antennae.

12.e Chemical Hazards

Not Applicable

13. CONTRACTOR INFORMATION

Information on how Battelle will meet the requirements of the EM 3851-1 is included as applicable in each of the sections above and in the attached supporting documentation.

14. SITE-SPECIFIC HAZARDS AND CONTROLS

Site specific hazards and controls for each activity of this operation and provided in the Accident Prevention Program Hazard Analysis (Appendix D) and in the Physical Hazards and Controls discussion of (Appendix A).

APPENDIX A

PHYSICAL HAZARDS AND CONTROLS

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Depending on the season, the hazards of both heat stress and cold stress could be of concern to the field crew.

1. HEAT STRESS

Types of Heat Stress

Heat related problems include **heat rash, fainting, heat cramps, heat exhaustion, and heatstroke.**

Heat rash can occur when sweat isn't allowed to evaporate, leaving the skin wet most of the time and making it subject to irritation.

Fainting may occur when blood pools to lower parts of the body and as a result, does not return to the heart to be pumped to the brain. Heat related fainting often occurs during activities that require standing erect and immobile in the heat for long periods of time.

Heat cramps are painful spasms of the muscles due to excessive salt loss associated with profuse sweating.

Heat exhaustion results from the loss of large amounts of fluid and excessive loss of salt from profuse sweating. The skin will be clammy and moist and the affected individual may exhibit giddiness, nausea, and headache.

Heat stroke occurs when the body's temperature regulatory system has failed. The skin is hot, dry, red, and spotted. The affected person may be mentally confused and delirious. Convulsions could occur. **EARLY RECOGNITION AND TREATMENT OF HEAT STROKE ARE THE ONLY MEANS OF PREVENTING BRAIN DAMAGE OR DEATH.** A person exhibiting signs of heat stroke should be removed from the work area to a shaded area. The person should be soaked with water to promote evaporation. Fan the person's body to increase cooling.

Increased body temperature and physical discomfort also promote irritability and a decreased attention to the performance of hazardous tasks.

Early Symptoms of Heat-Related Health Problems:

- decline in task performance
- reduced coordination
- decline in alertness
- unsteady walk
- excessive fatigue
- reduced vigilance
- muscle cramps
- dizziness

Susceptibility to Heat Stress Increases due to:

- lack of physical fitness
- lack of acclimation
- increased age
- dehydration
- obesity
- drug or alcohol use
- sunburn
- infection

People unaccustomed to heat are particularly susceptible to heat fatigue.

The Effect of Personal Protective Equipment

Sweating normally cools the body as moisture is removed from the skin by evaporation. However, the wearing of certain personal protective equipment (PPE), particularly chemical protective coveralls (e.g., Tyvek), reduces the body's ability to evaporate sweat and thereby regulate heat buildup. The body's efforts to maintain an acceptable temperature can therefore become significantly impaired by the wearing of PPE.

Measures to Avoid Heat Stress:

The following guidelines should be adhered to when working in hot environments:

- Establish work-rest cycles (short and frequent are more beneficial than long and seldom).
- Identify a shaded, cool rest area.
- Rotate personnel, alternative job functions.



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- Water intake should be equal to the sweat produced. Most workers exposed to hot conditions drink less fluid than needed because of an insufficient thirst. **DO NOT DEPEND ON THIRST TO SIGNAL WHEN AND HOW MUCH TO DRINK.** For an 8-hour workday, drink about 16 ounces before starting work, and 5 to 7 ounces every 15 to 20 minutes during hot work.
- Eat lightly salted foods or drink salted drinks such as Gatorade to replace lost salt.
- Save most strenuous tasks for non-peak heat hours such as the early morning or at night.
- Avoid alcohol during prolonged periods of heat. Alcohol will cause additional dehydration.
- Avoid double shifts and/or overtime.

The implementation and enforcement of the above mentioned measures will be the joint responsibility of the project manager, on-site field coordinator, and accident prevention officer. Potable water and fruit juices should be made available each day for the field team.

Heat Stress Monitoring Techniques

Site personnel should regularly monitor their heart rate as an indicator of heat strain by the following method:

Check radial pulse rates by using fore-and middle fingers and applying light pressure to the pulse in the wrist for one minute at the beginning of each rest cycle. If the pulse rate exceeds 110 beat/minute, shorten the next work cycle by one-third and keep the rest period the same. If, after the next rest period, the pulse rate still exceeds 110 beats/minute, shorten the work cycle again by one-third.

2. COLD STRESS

Types of Cold Stress

Cold injury is classified as either localized, as in frostbite, frostnip, or chilblain; or generalized, as in hypothermia. The main factors contributing to cold injury are exposure to humidity and high winds, contact with wetness, and inadequate clothing.

The likelihood of developing frostbite occurs when the face or extremities are exposed to a cold wind in addition to cold temperatures. The freezing point of the skin is about 30° F. The fluids around the cells of the body tissue freeze, causing the skin to turn white. This freezing is due to exposure to extremely low temperatures. As wind velocity increases, heat loss is greater and frostbite will occur more rapidly.

Symptoms of Cold Stress

The first symptom of frostbite is usually an uncomfortable sensation of coldness, followed by numbness. There may be a tingling, stinging, or aching feeling in the effected area. The most vulnerable parts of the body are the nose, cheeks, ears, fingers, and toes.

Symptoms of hypothermia, a condition of abnormally low body temperature, include uncontrollable shivering and sensations of cold. The heartbeat slows and may become irregular, the pulse weakens and the blood pressure changes. Pain in the extremities and severe shivering can be the first warning of dangerous exposure to cold.

Maximum severe shivering develops when the body temperature has fallen to 95° F. This must be taken as a sign of danger and exposure to cold must be immediately terminated. Productive physical and mental work is limited when severe shivering occurs.

Methods to Prevent Cold Stress

When the ambient temperature, or a wind chill equivalent, falls to below 40° F (American Conference of Governmental Industrial Hygienists recommendation), site personnel who must remain outdoors should wear



Boston Harbor Inner Harbor (BHIH) Maintenance Dredging

insulated coveralls, insulated boot liners, hard hat helmet liners, and insulated hand protection. Wool mittens are more efficient insulators than gloves. Keeping the head covered is very important, since 40% of body heat can be lost when the head is exposed. If it is not necessary to wear a hard hat, a wool knit cap provides the best head protection. A facemask may also be worn.

Persons should dress in several layers rather than one single heavy outer garment. The outer piece of clothing should ideally be wind and waterproof. Clothing made of thin cotton fabric or synthetic fabrics such as polypropylene is ideal since it helps to evaporate sweat. Polypropylene is best at wicking away moisture while still retaining its insulating properties. Loosely fitting clothing also aids in sweat evaporation. Denim is not a good protective fabric. It is loosely woven which allows moisture to penetrate. Socks with high wool content are best. If two pairs of socks are worn, the inner sock should be smaller and made of cotton, polypropylene, or a similar type of synthetic material that wicks away moisture. If clothing becomes wet, it should be taken off immediately and a dry set of clothing put on.

If wind conditions become severe, it may become necessary to shield the work area temporarily. The SSO and the PM will determine if this type of action is necessary. Heated break trailers or a designated area that is heated should be available if work is performed continuously in the cold at temperatures, or equivalent wind chill temperatures, of 20° F.

Dehydration occurs in the cold environment and may increase the susceptibility of the worker to cold injury due to significant change in blood flow to the extremities. Drink plenty of fluids, but limit the intake of caffeine.

Respiratory protection

Due to the non-volatile nature of the contaminants of concern and the fact that the samples will be wet, the generation of vapors and/or dusts is not anticipated for this sampling effort. As such, respiratory protection is not necessary.

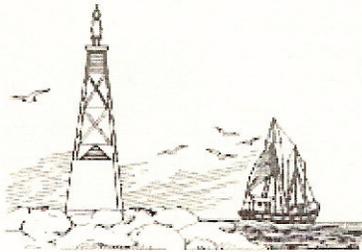
Personal decontamination

All re-usable PPE worn by each individual employee (boots, rain gear or gloves) shall be washed daily while working on the boat. Disposable PPE will be removed in and placed in lined garbage bags.

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APPENDIX B
VESSEL INSPECTIONS

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BOSTON OFFICE
10 Mazzeo Drive, Suite 217
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Tel: 781-963-8445
Fax: 781-963-9598

MAINE/NH OFFICE
400 Commercial St., Suite 4
Portland, ME 04101-4660
Tel: 207-775-7933
Fax: 207-775-7471

Marine Safety Consultants, Inc.

Tel: (508) 996-4110
Fax: (508) 990-2094

26 Water Street P.O. Box 615

Fairhaven, MA 02719-0615

MARINE CONDITION AND VALUATION SURVEY REPORT

Date: October 22, 2007

File No.: 07-1124

To: Battelle Ocean Sciences
397 Washington Street
Duxbury, MA 02332

Vessel's Name: AQUAMONITOR
Date of Survey: October 16, 2007
Location of Survey: Hingham, MA

THIS IS TO CERTIFY THAT on October 16, 2007 the undersigned surveyor did, at your request, attend survey of a 1991 4.5' fiberglass research vessel while afloat at Hewitt's Cove Marina in Hingham, MA in order to ascertain the general overall condition of the vessel and to determine its suitability for the intended service.

Doc. No.: 974104

Hull No.: MTD43008J091

Type: 45' research vessel

Hailing Port: Duxbury, MA

Owner: Battelle Memorial Institute

Address: 397 Washington St, Duxbury, MA.

The scope of this Condition & Valuation Survey was limited to surveying the vessel to determine the structural integrity of the vessel, and its suitability for service as intended by the manufacturer. Survey included those spaces and equipment that could be sighted without removals or operation.

No sea trials were conducted during this survey. A non-intrusive survey was conducted of the diesel propulsion engine and auxiliary systems.

The survey was conducted accompanied by Mike Walsh, Captain.

Description: The R/V AQUAMONITOR is of the semi-displacement, down east lobster type, hull form and design, being configured as a western rigged stern trawler for ocean research purposes. The hull is of solid fiberglass construction, with cabin forward with large trunk, followed by the fully enclosed pilothouse with open work deck aft, hydraulic crane rig off the pedestal at the back of the wheel house, with large aluminum square tube and welded gantry aft over the open transom, with triple drum wire winch mounted on the center of the deck, and raised on an aluminum pedestal.



Boston Harbor Inner Harbor (BHIH) Maintenance Dredging

VESSEL: AQUAMONITOR

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FILE NO.: 07-1124

The hull below the main deck features four (4) individual watertight compartments, being the forecastle, followed by the engine room, followed by the cargo hold, followed by the lazarette.

The forecastle features bunks forward, which have been converted to gear storage, with an anchor locker ahead. To port is an enclosed head followed with water sampling instrumentation. To starboard is a storage area.

The pilothouse finds four (4) forward facing windows of safety glass set in aluminum frames, with sliding aluminum framed windows port, starboard and aft to starboard, providing good visibility for the operator. Entry to the pilothouse is by centerline weathertight door. The helm is forward to starboard, with the array of electronics placed for full advantage of the operator. A manually operated spotlight is on the overhead above the helm station.

Mounted on the pilothouse roof, aft, is a tubular aluminum mast in support of radar antenna and navigation and trawling lights.

The hydraulic crane is set on tabernacle and features box aluminum boom and hydraulic pistons for directional placement. Lifting is by 500' of 1/4" galvanized wire on a new Pullmaster PL 2 hydraulic winch. The boom has a reported capacity of 1500 pounds.

The owner reports the crane has been recently refitted with new hydraulic rams, hydraulic piping and a new stainless steel pedestal mount.

The aft gantry is also hydraulically deployed, and features a centerline hanging block with safety strap. The hydraulic rams on the gantry were recently renewed.

The work deck is well laid out, with low freeboard bulwarks port and starboard sides, supplemented by removable section pipe railing. The deck is flush and well coated, constructed of fiberglass over plywood core. Access to internal compartments is by flush mounted Freeman single bolt hatches, which appears to be water tight.

L.O.A.: 45'

Beam: 15.2'

Draft: 4'

Gross Ton: 20

Net: 16

Builder: Mount Desert Island Boatworks, Inc; Manset, ME

Year Built: 1991

Rebuilt: unknown

Purchase Cost: unknown

Vessel to be Used For: coastal research

Navigational Limits: coastwise North Atlantic

Vessel's Berth: Hewitt's Cove, Hingham, MA.

Laid Up: ashore, Duxbury, MA.

Professional Crew (if any explain): captain & deckhand

- HULL -

The survey of the hull was begun with sighting for damage, and for indications of general maintenance and condition. No notable problems were discovered from our observation of the external hull.

Our findings are as follows:

Topsides: blue gelcoat

Condition: very good



Boston Harbor Inner Harbor (BHH) Maintenance Dredging

VESSEL: AQUAMONITOR

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FILE NO.: 07-1124

Bottom: anti-fouling paint over gelcoat

Condition: not inspected

The vessel was reportedly last hauled out during the winter of 2006-2007 at that time the propeller was reconditioned, sacrificial zinc anodes were renewed and the salt water pumps were rebuilt in addition to routine bottom maintenance.

Stern: very good

Stern: open transom

Frames: very good

Floor Timbers: pressure treated wood construction

Deck Beams: 4" x 4" timbers

Decks: fiberglass

Bilge: clean and dry

Superstructure: trunk cabin to raised pilothouse

Interior: utility construction

Bulkheads: generally wood, (3) watertight

Ventilation: Marine Air air conditioning unit

The hull to deck joint, where visible, was inspected and found to be in very good condition.

The vessel's seacocks and through-hull fittings were examined and found satisfactory. Flanges for the through-hulls were examined closely for bedding compound, cracks and corrosion. Seacocks were operated from inside the vessel and found to work easily and smoothly. We recommend all seacocks be disassembled annually, cleaned and lubricated with waterproof grease.

A fid of soft wood, conical in shape, of suitable size should be tied off to each seacock fitting with a line. Should a catastrophic failure occur of the seacock, the fid could be driven into the hole. Rubber hose connections to the seacocks were found satisfactory and double clamped. Seacocks were installed using backing blocks to reinforce the hull and distribute stresses in the hull as a result of seacock installation.

High stressed areas around deck fittings, such as cleats, stanchions, radius of hatch corners, chain plates and bulwarks were surveyed closely for delamination and found to be satisfactory.

It is our opinion that the interior of the vessel has adequate ventilation, and an adequate number of escape hatches are fitted. Rubber gaskets around these hatches appear in satisfactory condition, but some dogs may require adjustment to maintain weathertight integrity. Some port lights were opened and appeared to operate satisfactorily with no deficiencies.

Complete and careful inspection was made of all available bilge spaces, and laminate reinforcement at the corners of the hull, such as the transom, were found intact with no visible evidence of delamination noted. Attachments of bulkheads and longitudinals, floors and stiffeners, were found to be satisfactory.

- FITTINGS & EQUIPMENT -

Covers and Awnings: none

Deck Hardware: stainless steel cleats, kingpost and chocks

Steering Gear: Hydraulic by double rams to tiller arms

Ground Tackle: Danforth S2000 on chain leader to 200' of 1" nylon rode

Anchor Windlass: none

Winches: 30" hydraulic deck winch, custom hydraulic by electric clutch

- ELECTRONICS -

GPS: Northstar 952X

Autopilot: Robertson AP22

Radio Telephones: (2) Uniden-MC 535

Compass: Ritchie Powerdamp 6"

with distress frequency



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VESSEL: AQUAMONITOR

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FILE NO.: 07-1124

Radar: Furuno 1761

Depth Finder: Furuno FCV-582

Miscellaneous Instruments: Jensen stereo/CD

Clock: yes

Horn: compressed air dual trumpet

Barometer: no

Bell: yes

Navigation Computer: yes-with Winplot Software

- GALLEY -

Make & Type of Stove: none

Galley Equipment: (1) microwave forward

Water: pressurized cold water to head sink

Ventilation: natural flow

Refrigeration: (2) under counter refrigerator

- EMERGENCY EQUIPMENT -

Portable Extinguishers: (2) BC II; (1) 20# Co2
(1) BC I

Date of Inspection: January 2007

Date of Inspection: January 2007

Built-in System: Halon

Searchlight: yes, fixed on roof

Flares: Ocean Service - exp. 6/08

Survival Suits: (9) Stearns /provide up to date lights

Life Jackets: (9) Type I PFDs

First Aid Kit: yes, well stocked

Life Raft: Wardle-Storys 10 man SOLAS A pack, exp. 5/08

EPIRB: Category I model 51010, # ADCD04C4F941C01, battery exp. 5/08, release exp. 2/08, reg. 1/08

Oil Spill response Kit: (1)

Rescue Ladder: (1) atop the Pilothouse

Life Ring: (1) 30" with line attached

- TANKS -

Fuel: diesel

No. & Capacity: (3) 770 gallons

Shape: rectangular

Material: fiberglass

Location: outboard engine and lazarette

Secured: built in

Filling Lines & Vents: U. S. Coast Guard A1

Valves: yes at equipment

Location & Accessibility: under pilothouse

Fuel Lines & Connections: very good

Additional Fuel or Inflammables: none

Would Overflow run Inboard or Outboard: outboard

Water Tanks, No. & Capacity: (1) 40 gallon

Shape: square

Location: under forward sole

Material: plastic

- MACHINERY -

Main Engine - Location: under pilothouse

No. Type: (1) diesel

Make: Caterpillar

Model: 3406-581 Turbo

Serial: 4TBQ5068

No. Cyls.: 6

R.P.M.: 2,100

H.P.: 581@2,100

Reduction Gear: MB 5114, Twin Disc

Approx. Speed: 14K

Year: 1991

When Overhauled: 2001 (major) / 10,021 current hours

Engine Bed: fiberglass stringers

Pan Under Engine: none

Engine Cooling System: heat exchanged

Ventilation: natural flow through air boxes

Blower: none

Fuel Pump: injection



Boston Harbor Inner Harbor (BHIH) Maintenance Dredging

VESSEL: AQUAMONITOR

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FILE NO.: 07-1124

Bowls: plastic

Engine Silencer: yes, new stainless steel

Exhaust Line: stainless steel, dry vertical

Controls: double lever Morse

Bearings: flax, packing

Propeller: four (4) blade bronze

Propeller Shafts: 3" stainless steel - 2001

Bearings: cutlass

Rudder: stainless steel skeg mounted

Bilge Pumps: (2) Rule 1500 on automatic, engine room and lazarette, (1) Rule 1000 aft engine room

Air Compressor: none

Through Hull Valves: bronze body, quick acting ball type

Filters: Racor

Cooled: raw water heat exchanged

Engine Generator: alternator

Shaft Log, Type: fiberglass tube

Stuffing Box: bronze adjustable

Spare: yes, three (3) blade

Struts: none

Propeller Protection: in aperture

Toilets: Type III with holding tank

The main propulsion engine was surveyed with no obvious discrepancies. No evidence of overheating was observed, such as blistering paint on exhaust risers and manifolds or heat exchangers. The engine appears to have been generally well maintained and associated components are in place, clean and tight.

The engine foundations and mounts were surveyed and found satisfactory. The engine is fitted to stringers. Random engine mountings were tested for tightness and found satisfactory. Hoses and clamps were sighted and found satisfactory. No obvious leaks were observed in the main engine or reverse reduction gear. Pulleys and belts were examined for proper tension and wear and found satisfactory. Clutch and throttle cables were not tested during this survey, but brackets supporting this system were found in place and secure.

The fuel system was examined, including the triple fuel tanks. They appeared to have been tested to comply with USCG 33 CFR 183.510. Non-metallic fuel hoses were found in good condition and USCG approved Type A1. The system is equipped with primary and secondary fuel filtering systems, which were observed to be without leaks.

The stuffing box was examined, without disassembly. We recommend, as preventive maintenance, that the stuffing box be regularly re-packed and adjusted as necessary to allow two to three drips per minute while the shaft is turning.

The engine exhaust system was carefully surveyed for leaks, corrosion and failed hoses and fittings. This system was found to be satisfactory. Additionally, we find the design of the system to be satisfactory.

Steering system is of the hydraulic type using double ram. We found the system to be in good condition.

- ELECTRICAL SYSTEM -

Auxiliary Generator: Kohler

Ventilation: natural flow

Serial No.: 474941

Voltage: 120/240

Cooled: heat exchanged

Filter: cartridge filter

Storage Batteries, Engine: (2) 8D, new 2003

Lighting System: adequate

Wiring: marine grade

Switchboard: yes

Location: in cargo hold

Model: 18.5 CC0Z

Kilowatts: 18.5 KW

No. Cyls.: 4

Fuel Pump: injection

Bowls: metallic

Lighting: 12V

Battery Installation: very good

Condition: very good

Fused or Circuit Breakers: breakers



Boston Harbor Inner Harbor (BHIH) Maintenance Dredging

VESSEL: AQUAMONITOR

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FILE NO.: 07-1124

Lightning Arrestors: none

Aerials: VHF, radar, GPS

Battery Charger: Guest 2610 10 amp

The electrical system was given careful consideration during our survey, with attention to wiring, terminals and connections. We randomly pulled gently on electrical connections and found them to be generally tight and secure. Connectors are generally made with ring and spade type connectors. We observed no areas of chafing of electrical conductors where they pass through bulkheads or where they passed around components.

The vessel is equipped with both AC and DC electrical systems and survey found them to be generally satisfactory. Batteries are of the marine type, deep cycle lead acid. Batteries are properly stored in boxes, and conductors are run, for the most part, above the bilges and are neatly bundled and secured. A circuit breaker panel for both AC and DC electrical systems is found to be well marked.

Navigation lights appear to comply with USCG Navigation Rules, with no modifications or interferences to restrict visibility of the lights found. We recommend, in the interest of safe navigation, that an operational test of the lights be conducted prior to getting underway on each voyage.

- VALUATION -

This vessel is fitted with highly specialized and expensive gear necessary for its mission as a research vessel, primarily outfitted for water column sampling on the Continental Shelf, and within the bays and sounds of the North Atlantic Coast. These factors in addition to the increased cost of replacement vessel attribute to the AQUAMONITOR maintaining its fair market value as listed below

Subject to consideration of the preceding remarks, and considering the age of the vessel, its condition in comparison to vessels of like size, age and service, and in consideration of the current market, the following estimated values are considered appropriate:

Estimated Fair Market Value: \$390,000.00

Estimated Replacement Cost: \$550,000.00

- COMMENTS & RECOMMENDATIONS -

The R/V AQUAMONITOR was found to be in overall very good condition for its age. It is obvious that ownership takes great pride in the vessel with an excellent maintenance program in place with all systems and appurtenances found to be in good operating condition. This, along with the extensive array of navigation electronics, and specialized research equipment, leads us to place these values.

We find that, following the undertaking of the following recommendations, the vessel is considered in good condition and fit for its intended service as a coastal research vessel, structurally intact, complies with standards and regulations, and presents a reasonable insurance risk.

1. Provide up to date lights for PFD's and Survival Suits.

Standards, as published by the American Boat & Yacht Council and the National Fire Protection Association, as well as the applicable regulations of the United States Coast Guard were referenced for the purpose of determining survey compliance.

This report is based on examination of the vessel, and of those parts, spaces and equipment that could be sighted without removals or operation, and is rendered without bias or prejudice. In accepting same, it is agreed that the extent of obligation of this surveyor, with respect thereto, is limited to furnishing a competent survey, and in the making of this report, this surveyor is acting on behalf of the person or firm requesting same and no liability shall attach to this surveyor, for the accuracy, errors and/or omissions therefore.



Boston Harbor Inner Harbor (BHIH) Maintenance Dredging

VESSEL: AQUAMONITOR

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FILE NO.: 07-1124

Naval architecture and marine engineering analysis as usually performed in the design stage of the vessel's construction were not part of this survey and typical subjects such as adequacy of stability and seakeeping were not within the scope of this survey.

Submitted without prejudice,
MARINE SAFETY CONSULTANTS, INC.

Neil C. Rosen NAMS-CMS
Marine Surveyor

NCR/jpr

Note: The EPIRB and life raft are currently being recertified and will be available for field work at the time of the survey.

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APPENDIX C

**SUPERVISOR'S ACCIDENT
INVESTIGATION REPORTING FORM**

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Boston Harbor Inner Harbor (BHIH) Maintenance Dredging

Injured Employee _____

Job Title _____

Home Office _____

Division/Department _____

Date/Time of Accident _____

Location of Accident _____

Witnesses to the Accident _____

Injury Incurred? _____

Nature of Injury _____

Engaged in What Task When Injured? _____

Will Lost Time Occur? _____ How Long? _____

Date Lost Time Began _____

Were Other Persons Involved/Injured? _____



Boston Harbor Inner Harbor (BHIH) Maintenance Dredging

How Did the Accident Occur? _____

What Could Be Done to Prevent Recurrence of the Accident? _____

What Actions Have You Taken Thus Far to Prevent Recurrence? _____

Supervisor's Signature _____
Title _____
Date _____

Reviewer's Signature _____
Title _____
Date _____

Note: If insufficient space is provided on this form, provide additional information on a separate page and attach. The completed accident investigation report must be submitted to the Regional Accident prevention Manager within two days of the occurrence of the accident.



APPENDIX D

ACCIDENT PREVENTION PROGRAM HAZARD ANALYSIS



Boston Harbor Inner Harbor (BHIH) Maintenance Dredging

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Boston Harbor Inner Harbor (BHIH) Maintenance Dredging

ACCIDENT PREVENTION PROGRAM HAZARD ANALYSIS		
Contract No: DACW33-03-D-0004	Project: Water Quality monitoring – Boston Harbor, Ma	Phase: Water Quality Monitoring
Date: April 2008	Location: Boston, Ma	Prepared by: Matt Fitzpatrick
PRINCIPAL STEPS	POTENTIAL HAZARDS	RECOMMENDED CONTROLS
1. Marine operations : Including transferring personnel and equipment to vessel	Man Overboard	<ul style="list-style-type: none"> • All personnel working over the water or near the waters edge, with any possibility of falling into the water, shall wear an approved USCG work vest at all times. • Personnel and visitors are required to wear Type III or Type V PFD when transferring to vessel • Provide safe access (gangways, ladders, or ramps for vertical breaks of 19 inches or more). • Personnel will be instructed in the response plan for a man overboard emergency, including individual responsibilities and location of rescue equipment.
	Back Injuries	<ul style="list-style-type: none"> • Site personnel will be instructed in and use proper lifting techniques, including bending at the knees, avoiding twisting motions while lifting, and holding loads close to the body while lifting and carrying. • Mechanical devices will be used when possible to reduce manual handling of materials. • Team lifting will be used when mechanical devices are not available.
	Slip, Trip, Fall Hazards	<ul style="list-style-type: none"> • Work areas and means of access shall be maintained safe and orderly. • Even terrain or decking shall be used for unloading areas • Ensure all guardrails are in good condition and meet regulatory requirements. • Appropriate shoes with slip resistance shall be worn by personnel.
	Dropped Objects	<ul style="list-style-type: none"> • Steel toe boots meeting ANSI Standard Z-41 will be worn.



Boston Harbor Inner Harbor (BHIH) Maintenance Dredging

ACCIDENT PREVENTION PROGRAM HAZARD ANALYSIS		
Contract No: DACW33-03-D-0004	Project: Water Quality monitoring – Boston Harbor, Ma	Phase: Water Quality Monitoring
Date: April 2008	Location: Boston, Ma	Prepared by: Matt Fitzpatrick
PRINCIPAL STEPS	POTENTIAL HAZARDS	RECOMMENDED CONTROLS
	Cold Stress	<ul style="list-style-type: none"> • Personnel will be instructed in cold stress recognition and prevention. • Personnel must notify the SSO if symptoms of cold stress are perceived in any member of the crew. • Personnel shall be provided with a heated shelter (or gathering point) whenever temperatures (or wind chills) are below 20 degrees F. Air temperature and wind will be monitored. • Personnel are recommended to wear appropriate layered clothing, with a water/wind proof outer layer. • Drinking liquids will be available and used for re-hydration during breaks. • Work shall be conducted during warmer hours of the day, generally 0700-1530; No night work is permitted.
1. Marine operations : Including transferring personnel and equipment to vessel (continued)	Heat Stress	<ul style="list-style-type: none"> • Personnel will be instructed in heat stress recognition and prevention. • Personnel must notify the SSO if symptoms of heat stress are perceived in any member of the crew. • A shaded or cooled shelter (or gathering point) shall be identified for rest periods when working in hot temperatures. • Establish work-rest cycles if symptoms of heat stress appear in workers. • Personnel are recommended to wear appropriate clothing. • Drinking liquids will be available and used for re-hydration during breaks. • If necessary work shall be conducted during cooler times of the day, generally early mornings and late afternoon. No night work is permitted.
	Harbor traffic - collisions	<ul style="list-style-type: none"> • The captain shall issue the Notice to Mariners, notify the U.S. Coast Guard (USCG), local Harbor Masters, etc., well in advance to minimize potential conflicts with local boat traffic, fishing, or security issues. • Vessel shall conform to all Federal and State regulations, pertaining to marine work, including holding a current USCG inspection if required and maintaining a licensed captain aboard at all times during operations. • No night operations are permitted.



Boston Harbor Inner Harbor (BHIH) Maintenance Dredging

ACCIDENT PREVENTION PROGRAM HAZARD ANALYSIS		
Contract No: DACW33-03-D-0004	Project: Water Quality monitoring – Boston Harbor, Ma	Phase: Water Quality Monitoring
Date: April 2008	Location: Boston, Ma	Prepared by: Matt Fitzpatrick
PRINCIPAL STEPS	POTENTIAL HAZARDS	RECOMMENDED CONTROLS
	Severe or dangerous weather	<ul style="list-style-type: none"> Marine operations will be suspended in any dangerous weather condition including, strong wind, high seas or the presence of dangerous lightening. NOAA Marine Weather Radio will be monitored for the latest advisories. Ship scientists should not perform activities on the vessel's open deck during such conditions. Activities should be confined to the enclosed portions of the vessel.
	Sunburn	<ul style="list-style-type: none"> Sunscreen of at least SPF 15 should be worn. If necessary work shall be conducted during cooler times of the day, generally early mornings and late afternoon. No night work is permitted. Wear clothing that covers the skin, hats with wide brims, and sunglasses with UV protection.
2. Data/Sample Collection	Heavy equipment handling	<ul style="list-style-type: none"> The Rosette and CTD will be lowered and retrieved using hydraulic lifting equipment. Steel toe boots meeting ANSI Standard Z-41 will be worn. One crew member shall be designated to control and/or signal winching of heavy equipment. Work area shall be kept clear of unnecessary personnel.
	Overhead movement of equipment.	<ul style="list-style-type: none"> Personnel will be required to wear hard hats that meet ANSI Standard Z-89.1.
	Pinch hazards	<ul style="list-style-type: none"> Keep hands clear of the winch and hydraulic rams at all times.
	Slip, trip, fall hazards	<ul style="list-style-type: none"> Work areas and means of access shall be maintained safe and orderly. Even terrain or decking shall be used for unloading areas Ensure all guardrails are in good condition and meet regulatory requirements.
4. Sample preparation for storage/shipping/analysis	Contact with contaminated water	<ul style="list-style-type: none"> No chemical hazards are anticipated from contact with Boston Harbor water. However, the follow procedures will be adhered to as a precaution, and as a policy of good work practices: Chemical protective gloves shall be worn for handling water. Personal hygiene facilities shall be maintained for crew members to wash face and hands before eating and before taking breaks.



Boston Harbor Inner Harbor (BHIH) Maintenance Dredging

ACCIDENT PREVENTION PROGRAM HAZARD ANALYSIS		
Contract No: DACW33-03-D-0004	Project: Water Quality monitoring – Boston Harbor, Ma	Phase: Water Quality Monitoring
Date: April 2008	Location: Boston, Ma	Prepared by: Matt Fitzpatrick
PRINCIPAL STEPS	POTENTIAL HAZARDS	RECOMMENDED CONTROLS
5. Rosette Sampler	Inspect the sampler for proper operation. Replace equipment that shows signs of undue wear or weakness.	<ul style="list-style-type: none"> • Personnel handling the rosette sampler shall be trained in its proper use. • If mechanical equipment is to be used to handle the rosette sampler, hand or other signals to control movement of the equipment shall be established and agreed upon. Standard hand signals can be found in USACE EM385-1.
6. ADCP	Inspect the ADCP for proper operation. Replace equipment that shows signs of undue wear or weakness.	<ul style="list-style-type: none"> • Personnel handling the rosette sampler shall be trained in its proper use. • No mechanical equipment is needed to lower the ADCP into the water.
7. General	Vessel shall conform to all Federal and State regulations, pertaining to marine work, including holding a current USCG inspection if required and maintaining a licensed captain aboard at all times during operations.	<ul style="list-style-type: none"> • Captain shall brief all personnel on the orientation of the vessel • Location of life jackets and their proper use, • Response plan for a man overboard emergency, • Location of ring buoys, and their proper use • Location of fire extinguishers and the instructions for their proper use • General safety matters, including a review for deploying life raft, and EPIRB location • Review of procedures and individual responsibilities during deck operations
	Work areas should be checked for safe access, proper guarding, and work surfaces	<ul style="list-style-type: none"> • Field team leader shall brief all personnel on the task and sampling activities • Response plan for a man overboard emergency, • Location of ring buoys, throw lines, and rescue skiff and their proper use • Review of procedures and individual responsibilities operations



APPENDIX E

ACES ENVIRONMENTAL, SAFETY AND HEALTH PLAN

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Battelle

The Business of Innovation

**Battelle Memorial Institute
ACES**

Environment, Safety and Health Plan

REV. 6

November 17, 2004

**BATTELLE ACES
397 Washington Street
Duxbury, Massachusetts 02332-0601**



APPROVAL PAGE

Prepared By:

Mary Jane Ferson
Health and Safety Officer

Date

This Environment, Safety and Health Plan, has been reviewed and approved by the following.

Approved By:

Charlene C. Lariviere
Chairperson, ES&H Committee
Battelle ACES

Date

Mark D. Curran
Operations Manager
Battelle ACES

Date

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3. INTRODUCTION

3.a Purpose and Scope

This document presents the Environment, Safety and Health (ES&H) Program of Battelle ACES. The purpose of this ES&H Plan is to define the policies of the ES&H Program, and to describe the administrative processes, personnel responsibilities and accountabilities, and the procedures, equipment, and facilities necessary to ensure a safe and healthful workplace and environmentally compliant operations.

The Battelle ACES ES&H Program encompasses all aspects of the business, including operation of the facility and the conduct of laboratory and field activities performed as part of environmental monitoring and research projects.

3.b Policy Statement

It is Battelle's policy to provide a safe and healthful working environment for its staff members and to operate in a manner that ensures protection of the public and the environment. It is Battelle's objective to comply with both the *letter* and the *spirit* of all ES&H laws and regulations. As part of the Environmental Protection Agency Market Sector of Battelle Memorial Institute's Columbus, Ohio Division, Battelle ACES is fully committed to this policy. The protection of the public, the prevention of occupational injury and illness, and the prevention of damage to the environment are the paramount objectives of Battelle ACES. To meet these objectives, Battelle ACES has developed and implemented the program described below.

3.c Environment, Safety, and Health Program

The conduct of operations that are safe and environmentally protective requires that every staff member accept responsibility for the implementation of the ES&H program. The program comprises four key elements that each Battelle ACES employee, regardless of his position or activity, must understand and implement. These elements are described below.

Training and Qualification. Each individual must be fully trained and qualified to perform his/her job safely and in an environmentally sound manner. Training may include lectures, demonstrations, outside courses, videos, etc. (Section 3.0).

Exposure Minimization. The exposure of staff members to hazardous substances and conditions must be maintained at or below recognized acceptable exposure levels. Minimization of exposure is obtained through engineering controls, personal protective equipment (PPE), and safe work practices (Section 4.1).

Employee Concerns. Staff members are encouraged to be proactive concerning ES&H issues by identifying deficiencies and communicating their concerns through the appropriate channels, which include the ES&H Officer, representatives of the ES&H Committee, and management (Section 7.0).

Notification. A formal system of safety-related notification allows staff members to notify management of unsafe conditions. Management must in turn communicate potentially unsafe or environmentally unsound conditions to appropriate staff and affected clients (Section 7.0).

The implementation of the above elements is described in the following sections of this document.

3.d Plan Distribution, Approval, and Revision

The ES&H Plan is available to each Battelle ACES employee on the Duxbury website. Each staff member is expected to read the plan, become familiar with its contents, and adhere to the stated policies and procedures during the performance of his/her work.

Prior to its issue, this document was reviewed by Battelle ACES management and by the ES&H Committee. The signatures in the front of the plan indicate management consensus and approval.

To ensure that the plan remains current, it is reviewed annually and updated as needed. The control block in the upper right-hand corner of each page signifies that this is a revision-controlled document. Each time the plan, or a section of the plan, is revised, the revision number is incremented by one and the date of issue changed. Each revision is reviewed as described above and the revised portion(s) issued to the staff.

3.e Related ES&H Documents

The ES&H Plan describes the framework of the Battelle ACES ES&H Program. It is supported by the following documents:

- Battelle ACES Contingency Plan for Emergency Response Procedures
- Battelle ACES Contingency Plan for Hazardous Waste Accumulation Areas
- Battelle's Safe Work Practices Handbook
- Battelle Columbus Operations Environment, Safety and Health Management Plan
- Battelle Columbus Operations Personal Protective Equipment Program
- Battelle Columbus Operations Accident/ Incident Reporting and Investigation Program
- Battelle Columbus Operations Hearing Conservation Program
- Battelle Columbus Operations Hazardous Energy Control Program
- Battelle Columbus Operations Chemical Safety Information Program
- Battelle Columbus Operations Fall Protection Program
- Battelle Columbus Operations Blood-borne Pathogen Exposure Control Program
- Battelle Columbus Operations Confined Space Program
- Battelle Columbus Operations Asbestos Operations/ Maintenance program
- Battelle Columbus Operations Respiratory Protection program

In addition, the ES&H Plan is supplemented by Standard Operating Procedures (SOP) (Section 4.10) and project work plans (Section 4.2). These documents provide specific procedures in the event of hazardous substance spill or other emergency, as well as the unique hazards that may be associated with projects or routine laboratory or field procedures.

3.f Definitions

The following definitions are from the Occupational Safety and Health Administration (OSHA) standards (29 CFR 1910.1200 and 1910.1450).

Chemical means any element, chemical compound or mixture of elements and/or compounds.

Exposure or *exposed* means that an employee is subjected to a hazardous chemical in the course of employment through any route of entry (inhalation, ingestion, skin contact or absorption, etc.), and includes potential (e.g., accidental or possible) exposure.

Hazardous chemical means any chemical which is a physical hazard or a health hazard.

Hazard warning means any words, pictures, symbols, or combinations thereof appearing on a label or other appropriate form of warning which convey the hazard(s) of the chemical(s) in the container(s).

Health hazard 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 system, and agents which damage the lungs, skin, eyes, or mucous membranes.

Material safety data sheet (MSDS) means written or printed material concerning a hazardous chemical which is prepared in accordance with 29 CFR 1910.1200(g).

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, and oxidizer, pyrophoric, unstable (reactive) or water-reactive.

4. RESPONSIBILITIES, AUTHORITIES, AND ACCOUNTABILITIES

To ensure the safe and environmentally sound operation of Battelle's facilities, every staff member must accept responsibility for the implementation of the ES&H program. Specific responsibilities, authorities, and accountabilities are identified below.

4.a EPA Market Sector Vice President and General Manager

The Vice President and General Manager of the Environmental Protection Agency Market Sector maintains ultimate responsibility and authority for the control of health and safety hazards within the EPA Market Sector.

4.b Business Unit Management

The Operations Manager is fully accountable for the safety of all individuals employed by the Battelle ACES Business Unit and for the facility's compliance with all applicable environmental regulations. The execution of the ES&H Program is the responsibility of the Operations Manager, who

- Designates the ES&H Officer
- Provides the resources necessary to implement the ES&H Program
- Ensures that all projects conducted by Battelle ACES are performed in accordance with Battelle, EPA Market Sector, and Battelle ACES guidelines
- Reviews all project proposals and approves the ES&H considerations described in the proposal

4.c ES&H Officer

The ES&H Officer reports directly to the Operations Manager. The ES&H Officer is the focal point for all ES&H-related issues, and has the authority to stop or modify any operation that presents an unacceptable risk to Battelle staff, the public, or the environment. The Facilities Manager serves as the alternate ES&H Officer. The ES&H Officer is responsible for

- Developing and administering the ES&H Plan
- Ensuring that an adequate training program is available to the staff
- Conducting periodic inspections of facilities
- Reviewing proposed scopes of work for ES&H considerations and approving Proposal Information Form (PIF) C
- Overseeing the medical monitoring program
- Serving as the point of contact for all ES&H-related audits or inspections conducted by regulatory agencies
- Monitoring the procurement, use, and disposal of chemicals used in the laboratory to ensure compliance with applicable regulations
- Ensuring the conduct of emergency drills and tests of emergency equipment
- Maintaining records related to ES&H issues
- Making recommendations to management concerning ES&H deficiencies and issues
- Attending all ES&H Committee meetings

- Knowing the current legal requirements concerning regulated substances

The ES&H Officer is also the Chemical Hygiene Officer, required under 29 CFR Part 1910.1450 (Section 5). In the implementation of the above tasks, the ES&H Officer/Chemical Hygiene Officer is supported by the ES&H Committee, Corporate Safety Services, and outside consultants.

4.d Field Activities Coordinator

The Field Activities Coordinator is responsible for the operational conduct of Battelle ACES field programs. Specific responsibilities include

- Working in conjunction with the ES&H Officer to ensure compliance with the Battelle ACES Field Safety documents
- Conducting field safety training
- Approving field project work/survey plan

The Field Activities Coordinator has the authority to suspend field operations that in his/her opinion are unsafe or unwise.

4.e Radiation Safety Officer (Position Does Not Presently Exist)

Battelle ACES is not currently licensed by the NRC to perform work utilizing radioactive materials, and as such does not staff the position of Radiation Safety Officer, nor does it maintain a radiation safety program as Battelle ACES staff members do not perform work utilizing radioactive materials (GCMS instruments contain sealed source radioactive elements which are licensed to the equipment manufacturer, and are not opened or altered by Battelle staff).

Any work subcontracted by Battelle ACES which involves the use of radioactive materials must be reviewed by the Battelle ACES ES&H officer prior to commencement in order to ensure that the contracted firm has an appropriate radiation safety program in place.

4.f Department Managers/Laboratory Group Supervisors

Department Managers and Laboratory Group Supervisors are responsible and fully accountable for the safety of their staff members and the day-to-day management of ES&H requirements. This includes recognizing and correcting potential health and environmental hazards of the work conducted by their organization, implementing control procedures and practices to eliminate hazards, and adhering to safe exposure guidelines. The paramount responsibility of Department Managers and Laboratory Group Supervisors is to ensure that staff members under their direction are appropriately trained to perform their assigned tasks.

4.g Project Managers

Project managers are responsible for

- Ensuring that project proposals are reviewed for potential health and safety hazards
- Identifying any hazards greater than normal work practices, specifying them in the PIF, and addressing the associated ES&H considerations in a written project plan
- Ensuring that project personnel are aware of any ES&H requirements that are unique to the project and that personnel have received any necessary project-specific ES&H training
- Ensuring that the work conducted on their project adheres to Battelle ACES, EPA Market Sector, and

4.h ES&H Committee

The primary mission of the Battelle ACES ES&H Committee is to serve as a means of communicating ES&H issues to management and staff. Specifically, the ES&H Committee

- Identifies and presents ES&H concerns to the ES&H Officer and management for resolution
- Communicates ES&H policies and procedures to the staff
- Performs inspections of their representative areas
- Provides review of ES&H procedures, policies, and any accidents that have occurred and makes recommendations as appropriate

The ES&H Committee is composed of both administrative and technical personnel who represent each of the business operations on site. Among these voting representatives; at least one technician and one exempt research staff member must serve as voting members at all times. Each member must have a designated alternate; both the committee representatives and their alternates are appointed based on their manager's recommendation. The term for each committee member is one year. At the end of the one- year period, the committee member may be replaced, or reappointed, at his/her manager's discretion. A chairperson is elected from one of the voting members and serves for a period of one year.

In addition to the voting representatives, the ES&H Officer and the Facilities Manager attend the meetings. If a vote results in a tie, the ES&H Officer casts the deciding vote.

Meetings are held no less than once a month. The chairperson of the committee is responsible for scheduling the meeting in consultation with the ES&H Officer. If an ES&H Committee member is not able to attend, he/she is responsible for notifying his designated alternate to attend.

Minutes are recorded at each meeting. A draft of the minutes is sent to the Committee for review. A final copy is sent to the committee members, the Battelle ACES Resource Management Group (RMG), the Battelle Corporate Safety Office, and the EPA Market Sector Vice President and General Manager.

4.i Hazardous Waste Coordinator/Handlers

The Hazardous Waste Coordinator is responsible for overseeing the operation of satellite waste collection areas, the waste storage area, arranging for waste to be disposed of in accordance with Massachusetts Hazardous Waste Regulations (310 CMR 30.000), and for overseeing the packaging, labeling and shipment of materials from the site which are considered hazardous per DOT/ IATA regulations. Specific responsibilities of the Hazardous Waste Coordinator include

- Overseeing and approving the packaging, labeling, and shipment of all materials from the site which are regulated by the Department of Transportation (DOT) and the International Air Transport Association (IATA)
- Supervising the activities of the Hazardous Waste Handlers
- Packaging and labeling waste containers
- Arranging for waste removal
- Maintaining, tracking, and filing the manifest records
- Conducting inspections of the waste storage area
- Ensuring that proper and adequate waste-handling materials and PPE are available
- Maintaining emergency spill response equipment
- Ensuring that the Hazardous Waste Handlers and those shipping DOT/ IATA regulated materials are properly trained

The Hazardous Waste Coordinator is assisted by several Hazardous Waste Handlers, who collect, label, and transport hazardous substances to the storage area until disposal offsite. Hazardous Waste Handlers are responsible for following the established procedures outlined in this plan and in applicable standard operating procedures (SOP).

4.j Staff Members

Each staff member has a basic responsibility for his/her own safety. Battelle ACES provides a safe and healthful work place; however, each individual ultimately controls his/her actions in the workplace and, therefore, is responsible for his/her own safety and that of his/her co-workers. Each staff member is expected to

- Be aware of, and act in accordance with, ES&H procedures, postings, and pertinent regulations
- Report any unsafe condition or practice to his/her immediate supervisor or appropriate management authority
- Notify his/her supervisor of any medical condition (or related limitations) that could be affected or aggravated during the performance of the individual's job.

5. TRAINING AND QUALIFICATION

It is Battelle ACES' policy that each employee be cognizant of ES&H requirements and be fully trained to perform his responsibilities in a safe and environmentally sound manner. An orientation program is presented to all staff members on their first day of employment. The staff member is introduced to the ES&H Officer, who presents an overview of the Battelle ACES ES&H Program and distributes copies of the ES&H Plan and the Contingency Plan for Emergency Response Procedures. The staff member is then introduced to his ES&H Committee representative, who is responsible for reviewing building-specific ES&H issues (e.g., emergency exit routes, the location of fire extinguishers, pertinent ES&H postings) with the employee. All new staff receive initial training in the general principles of fire extinguisher use and the hazards involved with incipient stage fire fighting. This training is repeated annually. Additional ES&H training may be required based on the staff member's responsibilities and is described below.

It is the responsibility of the individual's supervisor to determine the minimum training requirements. Training needs are based on the employee's assignment and previous training.

5.a Hazard Communication/Lab Standard

All personnel who work in the laboratory or are exposed to hazardous chemicals receive training in the contents and requirements of 29 CFR 1910.1450 and 29 CFR 1910.1200, as appropriate. The training is coordinated by the individual's supervisor and the ES&H Officer and includes

- Introduction to the standards
- Monitoring policies
- Medical consultation/examination policies
- Personal protective equipment
- Engineering exposure controls
- Protective laboratory practices
- Material Safety Data Sheets (MSDS)
- Battelle ACES general safety policies/procedures
- Location of emergency equipment

Refresher courses are conducted periodically.

The use of non-routine or proprietary chemicals, or the operation of non-standard equipment in the laboratory may require additional training on a project-specific basis. The training is coordinated by the ES&H Officer and Project Manager. All training must be completed before the work is performed.

5.b Hazardous Waste Operations

The Hazardous Waste Coordinator and his/her alternate receive 40-hour training in Hazardous Waste Operations and Emergency Response (HAZWOPER), as defined in 29 CFR 1910.120, and Department of Transportation (DOT) and International Air Transport Association (IATA) training relative to the shipment of any DOT/ IATA regulated materials from the site. Prior to participating in activities that involve hazardous waste, all potential waste handlers must receive hazardous waste handling training. This training includes

- Classifications of hazardous waste
- Spill management/emergency response
- Federal and state regulations
- Exposure reduction methods
- Personal protective equipment
- Self-contained breathing apparatus (SCBA) use
- Hazardous waste manifest requirements
- Containment types
- Handling procedures

Once trained, the Hazardous Waste Coordinator, his/her alternate, and Waste Handlers are required to attend annual refresher courses to maintain their status.

5.c Field Operations

Prior to each field effort, the specific hazards related to that particular operation are reviewed. Specific training requirements are identified and addressed at that time. All field survey members should be able to swim and have had basic boating safety training. The location of the boat's safety features, including life vests, fire extinguishers, and first aid kits, will be reviewed at the time of departure. Each survey participant should be able to operate the vessel's communication system. For survey participants on board EPA vessels, the Ship's Master or his/her designate is responsible for describing the safety policies and for demonstrating the procedures and equipment.

5.d Confined Space Entry

Entry into designated confined spaces (Section 4.8) is restricted to authorized personnel. These individuals must be trained in confined-space entry procedures and in the operation of the gas detector instrument, ventilating blower, and emergency retrieval apparatus. Authorized rescue personnel must also have training in the proper use of personal protective equipment, including respiratory protective equipment, necessary to perform rescue duties. Rescue personnel must also have basic first aid and cardiopulmonary resuscitation (CPR) training. Battelle ACES will follow the procedures set forth in Battelle Columbus Operation's Confined Space Program, document # SIH-PP-08.

5.e Forklift Operation

Forklift operators are trained by qualified instructors (i.e., have attended instructor training courses) on site. Training covers the requirements of 29 CFR 1910.178 and comprises attending a classroom course, watching a video presentation, participating in hands-on training, and demonstrating proficiency in the operation of the fork lift. Upon successful completion of training, the individual is issued a certification which is maintained in the Facilities Office.

5.f Optional Training Resources

In addition to the required training presented above, Battelle ACES regularly offers ES&H-related courses and seminars that are open to all staff. These courses may include CPR, first aid, proper lifting procedures, and office ergonomics. A library of ES&H videos is also available to the staff for their use and may be obtained through the ES&H Officer or the Battelle ACES Human Resources Office. The ES&H resources of Battelle's Columbus, Ohio Operations are also available to Battelle ACES staff.

6. GENERAL PROCEDURES

6.a Exposure Minimization

It is Battelle ACES' policy that exposure of staff members to hazardous chemicals and/or conditions is maintained at or below recognized acceptable exposure levels. To achieve compliance with acceptable exposure levels, Battelle ACES uses engineering controls, efficient and effective PPE, and safe work practices. Specific application of exposure-minimization procedures and equipment to laboratory and field operations is described in Sections 5.0 and 6.0, respectively.

6.b Approvals

All proposals submitted by Battelle ACES must include a PIF-C (Risk Assessment Questionnaire). This document identifies the potential risk associated with the proposed work and must be approved by the Operations Manager. Work which involves the following components must be approved by the ES&H Officer

- Poisons; foods; drugs; toxic, hazardous, pathogenic, incapacitating, carcinogenic, or unknown materials or agents
- Nuclear or radioactive materials/ devices (WORK LIMITED TO SUBCONTRACTORS: SEE SECTION 2.5)
- Aircraft, watercraft, construction, high pressures
- Underwater diving (WORK LIMITED TO SUBCONTRACTORS: SEE SECTION 6.3)
- Explosive or flammable materials
- Submission of a safety plan (required by sponsor or a regulatory agency)
- Hazards associated with work conditions involving high structures; confined spaces; unusual electrical requirements; work on, over, in or near streams, waterways, lakes, and oceans; unusual aviation procedures; work in aggressive, hostile environments; or high-stored-energy mechanical systems

Any ES&H considerations associated with hazards greater than normal work practices must be addressed in a project-specific plan.

6.c Medical Program

6.c.1 Employee Exposure Determination

To ensure that laboratory employees' exposure to OSHA- regulated substances does not exceed Permissible Exposure Limits (PEL), the employee's exposure to any substance regulated by a standard which requires monitoring is measured 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). Exposure monitoring is initiated (1) when required by OSHA regulations, (2) when it is suspected that exposure has resulted in an illness, or (3) at an employee's request with a justifiable reason for monitoring. Monitoring may also be initiated at the discretion of the ES&H Officer as a means to measure the effectiveness of controls.

If the initial monitoring described above discloses employee exposure over the action level (or in the absence of an action level, the PEL), the exposure monitoring provisions of the relevant standard are immediately implemented. Monitoring is terminated in accordance with the relevant standard.

Employees are notified of monitoring results within 15 working days after the receipt of the results. Notification of personal monitoring is in writing and is sent to the individual involved. The results of area monitoring are posted in an appropriate location that is accessible to all employees.

6.c.2 Work History Forms

All staff who work with hazardous substances are required to complete a work history form on an annual basis. Work history forms provide Battelle Health Services and the ES&H Officer with the information needed to determine if an employee is required to have a medical examination. Employees who work with substances that require a medical examination by law or at the recommendation of Battelle Health Services are notified by the ES&H representative that an examination is required. The ES&H rep will then schedule the physical. Medical examinations are conducted annually provided that the employee has worked with a substance that requires examination.

Battelle also provides (on a voluntary basis) medical exams once every two years for all staff 40-50 years of age, and annually for all staff over 50.

6.c.3 Medical Consultations and Examinations

All employees who work with hazardous chemicals are provided an opportunity to receive medical attention, including any follow-up examinations that the examining physician determines to be necessary, under the following circumstances

- Whenever an employee develops signs or symptoms associated with a hazardous chemical to which the employee may have been exposed
- 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 is established for the affected employee as prescribed by that particular standard
 - 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 is provided with the opportunity for medical consultation. Such consultation is for the purpose of determining if a medical examination is indicated
 - Whenever a health screening physical is indicated by Battelle policy

All medical examinations and consultations are performed by or under the direct supervision of a licensed board-certified occupational health physician and are provided without cost to the employee, without loss of pay and at a reasonable time and place.

If a medical consultation or examination is indicated, the examining physician is provided with the following information

- The identity and concentration of the hazardous chemical(s) to which the employee may have been exposed
- A description of the conditions under which the exposure occurred including quantitative exposure data, if available
- A description of the signs and symptoms of exposure that the employee is experiencing

For any examination or consultation, a written opinion is obtained from the examining physician, which includes the following

- The results of the examination and any associated tests
- Any recommendation for further medical follow-up
- Any medical condition that is 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
- 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

The individual may obtain a copy of the results by contacting Battelle Health Services at Battelle's Columbus, Ohio site.

All employees requesting a medical consultation/examination due to a work-related injury or chemical exposure are required to follow these procedures

- The employee must report the accident/incident to his/her supervisor and/or the ES&H Officer immediately
- The employee signs an accident/incident analysis form completed by the supervisor
- The employee obtains the "Employee's Statement of Work Place Injury" form from Human Resources, completes it, and returns it to Human Resources along with the "Supervisor's Supplemental Report" that has been completed by his/her supervisor
- An appropriate physician performs a consultation or examination and provides the employee with his/her opinion as to the results of examination. In addition, the physician submits related information, as requested by the ES&H Officer, pertinent to the relevant standard.

Battelle ACES has an arrangement with the Occupational Health Office at the Jordan Hospital in Plymouth, MA to provide all work- related health services.

6.d Inspections

At least monthly, each ES&H Committee representative is responsible for performing walk-through inspections of their designated area to identify deficiencies or potential areas of concern. If possible, the ES&H Committee representative corrects the deficiency his/her self. If the deficiency is of serious or hazardous nature, the ES&H Committee representative contacts the ES&H Officer immediately. The results of the inspections are summarized in a written report that describes the deficiencies noted and the corrective action taken. This report is submitted to the ES&H Chairperson and included on the agenda of the next ES&H meeting. Outstanding deficiencies or ES&H concerns are brought to the attention of the ES&H Officer and management for resolution.

In addition to the above inspections, formal inspections of the entire facility are conducted every 6 months. These inspections are conducted by qualified safety personnel (CSP, CIH, or equivalent), either representatives of Battelle Safety Offices or outside consultants. The objective of the inspections is to identify safety deficiencies of any nature and to ensure compliance with applicable federal and state standards.

Inspections and testing of PPE and fume hoods is discussed in Section 5.5.2. Additional inspections of the laboratory areas are addressed in Section 5.5.3.

6.e Emergency Alarm System Testing/Drills

Emergency alarm equipment is tested on a regular basis, and drills are conducted periodically. Emergency alarms include Fire Alarms and the Emergency Buzzer System. Hazardous Chemical Spill Response drills are also conducted as described below.

The Emergency Buzzer System in the Chemistry Buildings is tested once every two months in order to insure the proper operation of system actuation buttons and signaling bells and lights. Staff working in the Chemistry Buildings and the Administration Building receptionist receive training in the use of this system during their staff orientation. Testing of the system is the responsibility of the Facilities Manager.

Fire alarm system detection, actuation, and signaling devices are tested annually per building. Staff fire evacuation drills are also conducted periodically as a means of assessing the effectiveness of the system in alerting staff in the event of a fire. The Duxbury Fire Department often attends the drills to offer constructive advice on improving evacuation procedures. Scheduling and conduct of the testing and drills is the responsibility of the Facilities Manager.

A Hazardous Chemicals Spill Response Drill is conducted once every two years. This may be in the form of either a table top exercise or a functional drill, and is used to determine the effectiveness of the Battelle ACES Hazardous Waste Handlers and Emergency Response Coordinators at managing a hazardous substances spill. The drill is observed by the ES&H Officer and the Hazardous Waste Coordinator in order to assess response and cleanup procedures.

6.f Emergency Procedures

6.f.1 General Emergencies

The actions to be taken in the event of a serious injury or a life-threatening emergency that requires immediate medical intervention are described in Medical Emergency or Trauma Sheets posted on every floor of every building and in all laboratories near the emergency buzzer. Briefly

- Call the operator at the front desk (dial “0”). If there is no response after 5 seconds, dial
- 9-911 (the Duxbury Emergency Coordinator).
- Explain the nature and location of the emergency and state your name and phone number
- If the victim has lost consciousness, contact the two nearest CPR-certified staff members. Individuals trained in CPR are identified both on the Medical Emergency or Trauma Sheets and on the phone list.
- Contact the ES&H Officer
- Send a staff member to direct the emergency medical staff to the incident

6.f.2 Emergency Response Procedures for Release of Hazardous Substances

Emergency response procedures have been developed for use when hazardous material is released to the air, soil, surface water, and ground water as a result of fires, explosions, spills, or any other unplanned sudden or non-sudden release. These procedures are to be implemented in potential or actual hazardous-materials release situations and are designed to prevent or minimize hazards to the health, safety, and welfare of Battelle ACES employees and the public and to the environment.

The Battelle ACES Contingency Plan for Emergency Response Procedures describes procedures, equipment, and personnel responsibilities associated with such an emergency. A copy of the Emergency Contingency Plan is distributed to each staff member and to the appropriate local and state authorities.

6.g NPDES Monitoring

Monitoring of the Battelle ACES effluents is conducted under NPDES (National Pollutant Discharge Elimination System) permit No. MA0025852. Monitoring is conducted per permit requirements, and results are summarized on a Discharge Monitoring Report form and submitted to the specified agencies. Specific details of NPDES monitoring procedures are described in SOP 5-107.

The Facilities Manager is responsible for conducting the necessary NPDES monitoring and reporting functions. In the Manager's absence, his/her designated alternate is responsible for performing the necessary NPDES functions.

6.h Confined Space Entry

Battelle ACES follows the Battelle Columbus Operations Confined Space Program, document # SIH-PP-08. Confined spaces are classified as either permit required or non-permit required spaces, depending on the hazards (or potential hazards) present and the physical constraints of the space. The procedures and safety requirements for entry into each of these spaces are detailed in the above document.

A confined space is defined as an area that

- Is large enough and so configured that an employee can bodily enter and perform assigned work; and
- Has limited or restricted means for entry or exit (for example, tanks, vessels, silos, storage bins, hoppers, vaults, and pits are spaces that may have limited means of entry.); and
- Is not designed for continuous employee occupancy

A permit confined space is an area that meets all of the above confined space requirements and has one or more of the following characteristics:

- Contains or has a known potential to contain a hazardous atmosphere;
- Contains a material with the potential to engulf an entrant;
- Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or a floor which slopes downward and tapers to a smaller cross-section; or,
- Contains any other recognized serious safety or health hazard (not to be limited to atmospheric hazards, but also including mechanical, electrical, radiological, and other hazards).

A *non-permit* confined space is a confined space that does not contain or, with respect to atmospheric hazards, have the potential to contain any hazard capable of causing death or serious physical harm.

Battelle's confined space permit system consists of a Confined Space Entry Form (CSE), which is used to determine whether a space is to be classified a permit or non-permit confined space and which is the instrument which authorizes entry into permit-required confined spaces. Once posted, the CSE Form will serve as a permit for entry into the confined space. The CSE Form will identify the permit space, define the conditions under which the confined space may be entered, state the reasons for entering the space, list the anticipated hazards of the entry, document monitoring for known and suspected hazards, list eligible Attendants, Authorized Entrants and individual(s) who will be in charge of the entry, list any personal protective equipment which may be required, list methods of communication with entrant, describe rescue methods, list required rescue equipment, identify rescue team and list emergency phone number(s), and establish the length of time for which the form remains valid.

At the Duxbury site, the lower level of the seawater Pump House, the seawater and utility manholes, and the area below the flume tank (located in the lower level of the Chemistry South building) are designated as confined spaces and entry is restricted to authorized personnel. Training of authorized personnel is discussed in Section 3.4.

Prior to entry, the atmosphere within the confined space must be monitored using a gas-detection instrument. Oxygen content, combustible vapors, and hydrogen sulfide vapors will be monitored. Periodic monitoring after entry may also be required if the potential exists for the atmosphere to change. If initial monitoring results show unacceptable levels, or if the potential exists for the atmosphere to change, mechanical ventilation must be used to achieve acceptable levels. Proper respiratory equipment must be available to and used by authorized rescue personnel when needed. For persons entering manholes, a safety line that is connected to a retrieval tripod must be used.

An attendant must be present at all times when an individual enters a permit required confined space. The attendant must be stationed outside the space and within visual or auditory range. Under no circumstances shall the attendant enter the space to perform a rescue. The Attendant must perform a non- entry rescue only, using the equipment provided from outside the space without entering the space. The attendant must have received confined space training.

6.i Forklift Operation

Operation of forklifts is restricted to trained operators. Training requirements are discussed in Section 3.5. Forklifts must be operated in accordance with Battelle policies and 29 CFR 1910.178. General guidance includes

- Hands, feet, and head must be kept inside the operator's compartment. The guards that are provided for the protection of the operator are effective only within the confines of the operator's compartment.
- Abrupt stops or changes in direction that could cause the forklift to tip or the load to shift should be avoided (except in cases of emergency).
- The operator must be alert when traveling and should watch for pedestrians and slow down for turns.
- Stunt driving and horseplay are dangerous to personnel and equipment and are not permitted
- Loads should be examined before moving to ensure that they are securely and safely loaded
- No one shall ride on the forks of a lift truck or hitch a ride in any manner. A forklift is built for one operator.
- Clear vision should be maintained at all times. Loads should be carried as close to the ground as conditions allow to increase stability and maneuverability. If visibility is affected, the forklift should be driven in reverse.
- Personnel should stay out from under the elevated portion of the forklift.
- A safe distance from the edge of ramps or platforms should be maintained.

Additional guidelines on the safe operation of forklifts may be found in the Battelle Safe Work Practices Handbook.

6.j Standard Operating Procedures

Battelle Columbus Operations (BCO) has developed the BCO Environment, Safety, and Health Management Plan (document # BCO-PP-001) which describes Battelle's overall management system for ES&H and the interface of the various ES&H functions between and within the BCO divisions (which includes the division CREMS is part of, the EPA Market Sector). This program is supplemented by Battelle ACES SOPs that describe procedures specific and unique to the Duxbury facility.

Each procedural or equipment SOP prepared by Battelle ACES must contain a section discussing the specific hazards associated with the procedure or piece of equipment. In addition, SOPs describing ES&H procedures are prepared as needed. The procedures associated with the preparation, review, and approval of Battelle ACES SOPs are described in SOP 6-001.

Manuals containing these SOPs are available to all staff.

7. LABORATORY OPERATIONS (CHEMICAL HYGIENE PLAN)

The analyses of environmental samples for chemical, biological, and physical parameters is an important component of the work performed by Battelle ACES. Under OSHA, a written program (“Chemical Hygiene Plan”) that is capable of (1) protecting employees from health hazards associated with hazardous chemicals in the laboratory, and (2) keeping exposures below specified limits, must be developed and implemented by the employer (29 CFR Part 1919.1450). This section of the ES&H Plan was developed to serve as the Battelle ACES Chemical Hygiene Plan.

7.a Scope and Application

The information provided in this section applies to all Battelle ACES employees engaged in laboratory use of hazardous chemicals. A copy of this plan must be available to all staff who work in laboratories that contain chemicals that are known or suspected to be hazardous. These substances are to include those which have been identified by OSHA, IARC, or NTP as possessing characteristics that are toxic to humans.

7.b Basic Rules and Procedures

The following are basic rules and procedures that *must* be followed by individuals performing work in the laboratories.

- Working alone with potentially hazardous chemicals or operations after normal business hours is not permitted. An individual may work alone during normal business hours when performing an operation that has been judged to be safe by the responsible manager or supervisor. An emergency buzzer system is in place to allow an individual working alone to alert staff in other buildings of the need for assistance in the event of an accident or emergency.
- Unattended operations are permitted only when judged by the responsible manager or supervisor to be safe and when plans have been made to avoid hazards in case of failure of the unattended operation. An emergency notification card should be placed on the door identifying staff members responsible for the equipment and indicating the instructions for emergency shutdown of the apparatus.
- Inappropriate behavior (e.g., practical jokes, horseplay) is not allowed in the laboratories. A professional and cautious attitude is required at all times.
- Personnel should never expose themselves unnecessarily to chemicals. It should never be assumed that a specific chemical is nontoxic. Many times the full hazards of a chemical are not known. Volatile hazardous chemicals should be placed in a hood before opening them and all open containers of chemicals should be kept inside the hood. The exception to this is in the benthic laboratory. Open containers of ethanol (e.g., sorting dishes, sample jars) are permitted when the containers are in use; however, containers should be covered whenever possible.
- If a hazardous chemical container drips or spills, the exterior surface should be cleaned immediately.

- All protective clothing, including laboratory coats, gloves, and coveralls, must be removed before entering the lunchroom or other areas where individuals eat or drink.
- Smoking is not permitted inside any of the Battelle Duxbury Operation buildings. Outside areas are provided for staff use.
- Food, beverages, chewing gum, or tobacco products are not to be consumed or stored in the laboratories. In addition, cosmetics are not to be applied or stored in laboratories.
- Hands should be washed after handling chemicals and as soon as practical after removing a laboratory coat.
- Shoes having permeable uppers (e.g., sandals, clogs, or nylon athletic shoes) may not be worn by individuals working with hazardous materials.
- Mouth pipetting is not allowed. Use mechanical pipette aids only.
- Loose clothing or long hair that could be caught in machinery or come in contact with open flames should be confined.
- Glassware should be disposed of with care and in designated containers.
- An open flame should be used only when necessary and extinguished as soon as it is no longer needed. All occupants of a laboratory must be notified before a flame is ignited. An open flame or spark should **not** be used in any laboratory where volatile flammables are present. Any work performed with a flame or spark requires prior approval from the Laboratory Group Supervisor.

Open flames such as Bunsen Burners should not be used

- To heat a flammable liquid
 - To carry out a distillation under reduced pressure
 - When flammables are present in the immediate area
- Weighing paper, boats, or other means should be used to protect a balance when weighing dry chemicals.
 - Plastics should not be used to protect surfaces from organic solvents; foil should be used instead.
 - Vacuum lines, including water aspirators, should be protected with an absorbent or liquid trap to prevent entry of the chemicals into the vacuum lines, the environment, or sink drains.
 - An apparatus that is a closed system should not be used to conduct reactions in, or have heat applied to, unless it is designed and tested to withstand pressure. Pressure vessels and ancillary systems must be reviewed for appropriate use.

7.c Chemical Procurement, Distribution, and Storage

Procedures for the procurement and distribution of chemicals are presented in SOPs 5-015, 5-027, and 5-132. The guidelines presented below should be followed for chemical storage.

- Store all chemicals in their proper places. Return chemicals to the designated storage location when finished with them.
- Keep storage of chemicals in the laboratory to the minimum amount necessary for the conduct of research.
- Label chemicals according to SOP 5-217.
- Store chemicals separated by compatibility groups in the laboratory. Incompatible storage can lead to the unwanted combination of reactive chemicals. Chemicals are incompatible when the mixture will form a third highly toxic chemical, or the combination creates enough heat to ignite fumes of chemicals in storage. Recognizing that exceptions exist, the general compatibility groups for laboratory

storage are as follows:

- Organic Acids
 - Oxidizing Acids
 - Oxidizers
 - Bases
 - Flammables
 - Volatile Solvents
- Store water reactive and light sensitive materials in an inert atmosphere.
 - Extremely volatile flammable materials should be stored in explosion-proof refrigerators.
 - Flammables should be stored in a flammable liquid safety cabinet. Four-liter containers of flammables in glass containers must be stored in a properly fitted protective jacket (B-jacket) when not in an approved cabinet.
 - Acids should be stored below counters, not in overhead cabinets or shelves.
 - Periodically assess the chemicals on hand to determine if there are excess or leftover chemicals from previous projects. Dispose of, or store, chemicals not needed for present work.

Disposal of chemicals is described in Section 5.10.

- Expiration dates of chemicals should be monitored and outdated chemicals disposed of.

7.d Ventilation

The laboratory hood is the single most important safety control for limiting exposure in the laboratory. Fume hoods must be used whenever an employee handles a potentially hazardous substance that emits a gas, fume, or dust. All fume hood face velocities must be maintained at 100 (\pm 20%) lineal feet-per-minute (FPM). All fume hoods are tested regularly to ensure proper functioning. Testing is described in Section 5.5.2.

Laboratory staff are instructed in the proper use of fume hoods by their supervisor or his/her designate. Instruction must include maximum sash openings, chemical storage requirements for hoods, and hood operation.

Staff members should adhere to the following guidelines when using a fume hood:

- The air flow should be checked with an air velocity meter, or by taping tissue paper to the sash, to ensure that the hood is on.
- The hood sash should be pulled down as far as practical when chemicals are in the hood.
- Operations should be conducted as far to the rear of the hood as possible (at least 6" from the front of the hood). The hood provides little protection against exposure when operations are performed too close to the hood opening.
- Fanning movements, walking briskly past a hood, and placing large objects inside of hoods should be avoided, whenever possible. These activities may result in a deterioration of the hood's ability to capture chemical vapors.
- Hoods used for chemical procedures should not be used to store items. The work area inside the hood must be clear of clutter to ensure that there is no interference with the operation of the hood or the procedure being conducted within the hood.

Laboratory staff should immediately report any abnormalities in hood functions to their supervisor, the ES&H Officer, or the Facilities Manager. If the fume hood cannot be adjusted or repaired at once, it must not be used until corrective measures have been implemented. A notice must be posted on the front of the hood indicating the fume hood is nonfunctional and must not be used.

7.e Housekeeping, Maintenance, and Inspections

7.e.1 Housekeeping

Housekeeping procedures within the laboratories should adhere to the following guidelines:

- The work environment should be kept free of tripping hazards. Unobstructed access to exits and emergency equipment should be maintained.
- Work areas and benches should be kept free of clutter.
- Work areas and benches should be cleaned regularly using a wet sponge or similar method. Methods that stir up dust such as sweeping or vacuuming should not be used when staff are present or when samples are exposed.
- Items must not be stored in the hallways or stairways.
- Cleaning and decontamination of the laboratory work area is the responsibility of the individual working in that area and should be done immediately following the completion of a work project or a day's work, whichever comes first.

7.e.2 Maintenance

The Facilities Manager is responsible for ensuring that the monthly testing of the eyewashes, emergency showers, self-contained breathing apparatuses (SCBAs), and hoods for proper operation is conducted. The eye-wash is operated until the water runs clear to maintain it free of sediment. Emergency showers are tested to ensure they are in good working order. After each test, the appropriate form is signed and dated to indicate an inspection has been performed.

Fume hoods are inspected for proper face velocity determination. If the inspection results indicate that a fume hood needs velocity adjustment, the Facilities Manager or his/her designee notifies the Laboratory Group Supervisor and Department Manager and implements the necessary corrective action. The results of fume hood inspection are maintained in the Facilities Manager's office and are accessible to all staff upon request. A record of inspection is also maintained on the face of the fume hood.

The Facilities Manager or his/her designee is responsible for checking each fire extinguisher in each building each month to ascertain that it is mounted on the wall in its proper place, that the pressure is within the usable range, that the seal has not been broken, and that access to it is not obstructed. In addition, a representative from a fire prevention firm contracted by Battelle ACES annually inspects all extinguishers and completes the inspection card on each extinguisher. Exit and emergency lights are also checked at this time.

7.e.3 Inspections

In addition to the inspections described in Section 4.4, quarterly inspections of the analytical laboratories are conducted. These inspections include, but are not limited to, labeling and signs, housekeeping, chemical storage and disposal, maintenance of records, work practices, and personal protective equipment and apparel. If significant deficiencies are noted, written reports of findings may be prepared and submitted to the Department Manager, who will work with the ES&H officer to implement corrective actions.

7.f Personal Protective Equipment (PPE) and Safety Equipment

7.f.1 Lab Coats

All visitors and Battelle ACES laboratory staff must wear fully-fastened lab coats when present in a lab that contains hazardous chemicals or that has potential for physical hazards, e.g., heating water. A lab coat is not required for an analytical instrument laboratory meeting the following requirements

- The laboratory is not used for chemical storage

- Quantities of chemicals brought into the room are no more than a few milliliters or a gram

Lab coats are issued to all laboratory staff at no cost to the employee. All lab coats are cleaned, maintained, and inventoried weekly by the Battelle ACES' supplier. A reserve supply of coats is available for visitors and temporary use by new employees.

Laboratory coats or coveralls should be changed frequently. Protective clothing should not be taken from Battelle for laundering or for any purpose other than work. Only clean lab coats should be taken for offsite work.

7.f.2 Eye and Face Protection

Eye protection approved by the American National Standard Institute for Occupational and Educational Eye and Face Protection Z87.1 must be worn at all times whenever a chemical is handled on site or in the field, when equipment operating in the room presents a potential eye hazard, when operations are being conducted in the room that could possibly cause an eye injury, or when the posted entrance requirements include eye protection.

External visitors and all Battelle ACES staff must wear safety glasses (those with side shields are required) when in a laboratory that contains hazardous chemicals or that has potential for physical hazards, e.g., stacked beakers/flasks. Safety glasses are issued to all laboratory staff at no cost to the employee. A reserve supply of safety glasses is available for visitors and for temporary use by new employees. A program to provide prescription safety glasses to all laboratory staff, at no cost to the employee, is in effect.

The use of contact lenses in the laboratory should be avoided unless necessary. If lenses are worn, the Laboratory Group Supervisor must be notified so that special precautions can be implemented.

All staff, working with any chemical or object that is capable of exploding, splashing, or emitting a projectile, are required to wear full face shields in addition to safety glasses, or safety goggles.

7.f.3 Gloves

Gloves must be worn when handling any chemical that has the potential to cause burns, irritation, or one that is transdermally toxic. Gloves appropriate to the situation should be used when handling hazardous or toxic chemicals. The procedures listed below should be followed when working on a project or with chemicals that require gloves.

- Disposable gloves should be discarded after each use with chemicals and immediately after contact with known acutely hazardous chemicals. Frequent changes are recommended to prevent chemical penetration (surgical gloves offer limited protection). Contaminated gloves should be kept in a hood or container until decontaminated. Gloves should be decontaminated or discarded at the end of a project, or the day's work, whichever is first.
- Gloves should be removed at the workbench or hood after handling chemicals to ensure that doorknobs and other surfaces are not contaminated.
- Non-disposable gloves should be decontaminated or cleaned immediately after use and before disposal.

7.f.4 Respirators

In work situations where engineering controls cannot be used to maintain respiratory hazard exposure levels at or below acceptable levels, or where employees work with large quantities of hazardous chemicals (including hazardous waste), employees are required to be fitted for, receive, and use an air purifying respirator. Issuing of a respirator is accompanied by a medical-fitness evaluation and training in the proper use, cleaning, cartridge types, and storage of the respirator. Once a respirator has been issued, the employee receives an annual fit test to ensure proper seal. The Battelle ACES ES&H Officer is responsible for the fitting and training of all staff in need of respirators.

All laboratory staff members working with any chemical that generates a dust which cannot be controlled within acceptable exposure levels by engineering controls must use an appropriate dust mask. The use of one-string dust masks is not allowed. Dust masks are issued by the ES&H Officer as work projects dictate.

7.f.5 Self-Contained Breathing Apparatus

All Hazardous Waste Handlers are trained in the use of self-contained breathing apparatus (SCBA). In the event of a large-quantity or highly toxic spill, SCBAs must be used by the Hazardous Waste Handlers responding to the spill.

The cylinder pressure of each SCBA is checked monthly and at the time of each use. Monthly inspections are conducted of the entire apparatus, including the regulator, face piece, and breathing tube. Every six years, a hydrostatic test is performed on the air cylinders by an individual certified by the manufacturer. Records of inspections and testing are maintained by the ES&H Officer.

7.f.6 Eyewashes and Emergency Showers

An eyewash and emergency shower are provided in each laboratory area where chemicals are used. This equipment must be maintained free of obstacles to ensure they are accessible during an emergency. Eyewashes and emergency showers are tested monthly to ensure that they are working properly (Section 5.5.2).

7.f.7 Spill Cleanup Kits

Spill cleanup kits, including decontamination solutions where appropriate, are readily available where hazardous chemicals are stored or used.

7.f.8 Fire Extinguishers

Fire extinguishers are located on every floor of each building and are marked with locational signs. Fire extinguisher training is discussed in section 3.0.

7.f.9 Emergency Buzzer System

The Emergency Buzzer System is located in each of the laboratory areas of the Chemistry North and South Buildings. This system is designed for use by individuals working in laboratories who, in an emergency situation, may need to alert personnel in other areas of the facility of the need for assistance.

7.g Signs and Labels

Material safety data sheets (MSDS) are received for each chemical ordered and forwarded to the Sample Preparation Laboratory Supervisor who maintains a master file. If proprietary chemicals are received (e.g., for pesticide registration or method validation under Good Laboratory Practice Standards), it is the Project Manager's responsibility to obtain safety data for the material and to forward it to the Sample Preparation Laboratory Supervisor for filing. Copies are distributed to the appropriate laboratories.

All substances that are either highly toxic, teratogenic, carcinogenic and/or OSHA-regulated must be clearly labeled as such in the work area, which is defined as the location where these regulated toxic substances regularly are used (e.g., fume hoods or work bench). The label must include the chemical name and toxic or poisonous nature (e.g., teratogen), and must be placed so that it is clearly visible.

As long as the original contents remain in chemical containers, the label must not be removed from the container or defaced in such a way that the hazard information is obscured. All solvents, reagents, and chemicals are labeled according to SOP 5-217. Samples in process need not be labeled with the concentrations of individual components if either this information is unknown or if a reference is given to a notebook and page where complete information is located.

7.h Spills and Accidents

7.h.1 Spills

All spills must be cleaned up promptly. Using the appropriate gloves and paper towels or other absorbent material, the chemical should be picked up and deposited in containers within a hood (when available) or in a plastic bag that can be sealed.

If the spill is greater than 1 square foot, or is less than 1 square foot but highly toxic, a Hazardous Waste Handler and the Laboratory Group Supervisor should be contacted immediately. **ONLY TRAINED INDIVIDUALS WITH THE PROPER EQUIPMENT SHOULD ATTEMPT TO CLEAN UP THE SPILL.** If a flammable chemical is spilled, the potential for an explosion hazard should be assessed and the appropriate actions (i.e., turning off the power source to the room) taken. If toxic chemicals are spilled in sufficient quantity as to constitute an emergency, the emergency response procedures delineated in the Contingency Plan for Emergency Response Procedures should be initiated.

7.h.2 Exposure Reporting and Emergencies

All exposure or possible exposure to hazardous chemicals should be reported to the Laboratory Group Supervisor immediately. Emergencies within the laboratory should follow the same procedures as outlined in Section 4.6.1.

Any time chemicals inadvertently come in contact with the body, immediately flush the area with copious amounts of water:

- If in the eyes — flush eyes with water immediately at the nearest eye wash for no less than 15 minutes. If the person is wearing contact lenses, the lenses should be removed immediately.
- If on the hands or arms — use the sink.
- If on other areas of the body — use the safety shower.

While flushing the spill, remove all contaminated clothing, jewelry, and watches. Spills that penetrate closely fitting clothing can be especially dangerous if the clothing is not removed, since this allows for further and prolonged contact with the skin.

7.i Training

Training of laboratory personnel is discussed in Section 3.1.

7.j Waste Disposal

Hazardous waste operations are managed by the Hazardous Waste Coordinator who is assisted by the Hazardous Waste Handlers. All hazardous waste management activities must be conducted in accordance with all applicable federal and state laws. Battelle ACES is classified as a small quantity generator. Battelle ACES uses an outside contractor for shipment and waste disposal management. Details of hazardous waste labeling, collection, transfer, storage, and disposal are provided in SOP 5-114.

Hazardous wastes generated during field/shipboard operations are to be returned to Battelle ACES for proper disposal (Section 6.8).

8. FIELD OPERATIONS

8.a Scope and Application

Field operations generally comprise three activities: open ocean surveys on large (>80 feet) vessels, nearshore or coastal sampling in small vessels (<50 feet), or land-based sampling of coastal regions. Due to location and the equipment used, field sampling is inherently risky; bad weather greatly increases the risks. This section of the Battelle ACES ES&H Plan defines the policies and organizational responsibilities and authorities associated with field sampling and describes the work practices and personal protective equipment implemented to minimize the risks.

8.b Responsibilities and Authorities

In order to address the varying safety needs of field projects, each field project requires the writing of a field survey or work plan, which includes the Field Safety Checklist. The Project Manager and Survey/Field Project Task Leader is responsible for completing the plan and safety checklist, which must be submitted to the ES&H Officer and the Field Coordinator for review and approval prior to work commencing.

The Ship's Master, or captain of the vessel, has ultimate authority and responsibility for the safety of the ship's crew and scientific staff. The Chief Scientist or Survey Task Leader is responsible for ensuring that the individuals under his/her direction are properly trained and for implementing the ES&H procedures necessary for the scientific work being performed. The responsible survey leader also must be aware that severe fatigue or seasickness may result in increased risk, and should monitor each team member to ensure that the individual is capable of performing his/her responsibilities in a safe manner.

Each member of the field sampling team is responsible for

- Being aware of the Battelle ACES ES&H requirements, including general policies and procedures, field considerations, and survey-specific concerns
- Conducting the operations in a manner that is safe and protective of the public and the environment

8.c Underwater Diving

Battelle ACES utilizes subcontractors where research activities require the use of divers. It is the Battelle project managers responsibility to ensure that the hired firm has an adequate dive program and diving safety plan in place. The hired firm is responsible for supplying all personnel and equipment, including safety equipment, necessary to carry out the work. The Battelle project manager must forward the firm's diving safety plan to the ES&H officer for review before work begins. The Battelle project manager may refer to the formerly-used Battelle Ocean Sciences Scientific Diving Program and Diving Safety Manual and, when applicable, EPA diving protocols as a guide in assessing a subcontractor's dive program and diving safety program.

Field operations which report to CREMS are responsible for the generation and implementation of a Diving Program and Diving Safety Plan, which will be reviewed by the Battelle ACES ES&H Officer.

8.d Personal Protective Equipment (PPE) and Safety Equipment

It is the responsibility of the Chief Scientist or Field/Survey Task Leader to determine the types of personal protective equipment and safety equipment that are necessary for a particular field program/survey. The equipment that may be necessary includes

- Work vests
- Hard hats
- Ear protection
- Survival or exposure suits
- Safety lines
- Steel-toed boots
- Life raft
- Emergency Position Indicating Radio Beacon (EPIRB)

All vessels must meet Coast Guard requirements and must have, at a minimum, life vests for all occupants of the vessel, a radio (or other means of communication), flares or other signaling device, a horn, a fire extinguisher, and a first aid kit.

Collection or processing of particular types of samples may dictate additional ES&H requirements. For example, eye protection and appropriate protective gloves must be worn, and an eyewash must be available, when working with solvents or acids. The types of personal protective equipment and safety equipment that are required for a specific survey are identified in the Field Safety Checklist that is part of each survey plan.

8.e Basic Rules and Procedures

The safety of the field crew is the most critical concern. Sampling operations should *never* jeopardize the safety and well being of the crew. The safety of the general public is also of first priority — all vessels must be operated in a safe manner and in accordance with applicable boating or maritime regulations.

SOPs on the conduct of field operations exist and include detailed descriptions on the specific hazards associated with each operation. Nonroutine hazards or conditions are addressed in project-specific survey plans. General guidance for safe field practices includes

- All heavy equipment and supplies must be secured to ensure that shifting with the sea's movement does not occur.
- Individuals under the influence of any drug that could impair reactions are not allowed to operate heavy gear or to participate in any activity that could result in harm to the individual or other survey team members.
- Loose clothing or long hair that could be tangled in lines or gears should be confined. Jewelry that is potentially entrapping should be removed.
- Material handling equipment (e.g., A-frames, davits, shackles, chains, winches) must be inspected prior to use and periodically during the survey. Equipment that is questionable in terms of strength or condition should be replaced or repaired.
- Individuals are not permitted to conduct fieldwork alone where a potential hazard exists.

8.f Chemical Handling and Storage

For those field efforts that require the use of hazardous chemicals, precautions must be taken during the transport, storage, and use of the chemicals to avoid employee exposure and release to the environment. To prevent breakage, non-breakable containers are used for chemical storage whenever possible. If glass containers are required, the containers should be placed in secondary containers (e.g., B jackets) or adequately packaged to prevent breakage. All containers must be labeled according to the requirements of SOP 5-217. MSDS for the chemicals involved must be available to field personnel.

Hazardous chemicals must be stored as follows:

- Away from living areas
- Flammables must be stored away from heat and potential ignition sources
- Incompatible chemicals should be stored separately (Section 5.3)

The use of hazardous chemicals in the field should follow the same guidelines as those implemented in the laboratory. Appropriate protective gloves and approved safety glasses or goggles must be used when handling chemicals. Adequate ventilation must be available: chemicals should be handled in a fume hood or outside on deck. If ventilation is not sufficient to maintain exposures within permissible levels, respiratory protection must be used.

Dry ice is often used to maintain samples at the proper temperature. Insulated gloves should be used to handle both the ice and frozen samples to avoid skin and tissue damage. Dry ice should not be placed in a walk-in freezer, or other similar confined space, because of the danger of suffocation due to oxygen depletion.

8.g Training

Training of field personnel is discussed in Section 3.3.

8.h Emergency Spills and Waste Disposal

Spills of hazardous substances must be cleaned up immediately. Small spills may be cleaned up using gloves and absorbent material (PPE appropriate to the substance spilled must be utilized, including respiratory protection if ventilation is not adequate (See Section 6.6). Spill cleanup kits must be taken into the field and must be readily available to personnel.

Hazardous waste may be generated during field operations as a result of sample processing and equipment decontamination. Any waste produced must be captured, retained in the appropriate containers, and returned to Battelle ACES for disposal according to SOP 5-114. No hazardous waste is to be disposed at sea or released into the environment.

9. EMPLOYEE CONCERNS AND NOTIFICATION PROCEDURES

Battelle ACES staff members are encouraged to identify ES&H deficiencies and to express ES&H-related concerns. Staff may communicate their concerns to their ES&H representative, supervisor, or the ES&H Officer. Personnel are protected from discrimination or reprisal for expressing these concerns in the following ways:

Open door policy — Staff members are first encouraged to address ES&H concerns with their immediate supervisor and, if not satisfied, to move up the management hierarchy, one level at a time.

Battelle Safety Offices — Staff members may also contact the Battelle Safety Offices (614-424-4181) for assistance.

Regulatory complaint process — Staff members may submit a formal safety complaint to OSHA.

It is management's responsibility to promptly convey information on conditions that have a potential impact on safety or the environment to appropriate staff members and affected clients. To ensure this is accomplished, staff members detecting an unsafe condition must promptly notify management.

It is important to understand that the above notifications must not take precedence over the staff member's actions to ensure he/she obtains any required emergency assistance. The staff member must notify management following a request for emergency assistance. To obtain emergency assistance the staff member should call the appropriate numbers listed below:

0 (Front desk operator)
5266 (Duxbury Emergency Coordinator)

10. RECORDS

All safety training records are kept on file by the ES&H Officer. Copies of training records are maintained for a period of 5 years after the termination of a staff member's employment. For carcinogenic and/or chronically toxic substances that are regulated by OSHA, safety training records will be maintained for a period of no less than 20 years after the termination of a staff member's employment.

Employee medical monitoring records are maintained by Battelle Health Services, together with the original work history forms. Copies of work history forms and accident reports are kept by the Battelle ACES Human Resources Office.

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APPENDIX F
CERTIFICATIONS



Boston Harbor Inner Harbor (BHIH) Maintenance Dredging

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Boston Harbor Inner Harbor (BHIH) Maintenance Dredging



Boston Harbor Inner Harbor (BHH) Maintenance Dredging



April 28, 2008



Boston Harbor Inner Harbor (BHIH) Maintenance Dredging

 **MATT FITZPATRICK**
has completed a National Safety Council

First Aid Course

Training Center: **Jordan Health System, Inc.**
Course Completion Date: **03/14/2007**
Expiration Date: **03/14/2010**
Instructional Hours: **6**

Security Control No. **239002**

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3-7-07 **3-7-09**
Issue Date Recommended Renewal Date

AHA Region **Southeastern MA**

Training Center **Jordan Hospital**

Training Site **Jordan Hospital**

Instructor **Nancy L. Pelletier**

Holder's Signature 

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APPENDIX G

MONTHLY RECORD OF WORK-RELATED INJURIES/ILLNESSES AND EXPOSURE FORM

