



ENVIRONMENTAL HEALTH AND SAFETY PLAN

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in Cooperation with

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University of Washington
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Oregon State University
Scripps Institution of Oceanography
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Environmental Health and Safety Plan

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1 Introduction

This Environmental, Health and Safety (EHS) Plan is designed to promote safe work environments for OOI participants and for OOI equipment, by identifying hazards that could harm employees and contractors, outline procedures to prevent accidents, and establish the steps to take if an accident occurs.

1.1 Purpose and Objective

The purpose and objective of this EHS Plan and the Plans established by the individual IOs, is to:

- Identify and communicate OOI common project specific processes that can be used to categorize possible physical and health hazards specific to OOI activities;
- Determine the acceptable level of health and safety through interface evaluations (design reviews, operations and maintenance procedures), hazard control, and reporting methods; and,
- Identify procedures that can be used to prevent or reduce the likelihood of accidents as well as steps to take if an accident occurs.

This EHSP provides a system to identify, assess, and eliminate or control hazards that could impact personnel or critical systems. Additionally, the EHSP will provide OOI management with a proactive approach for assuring the safe design, development, construction, and operation of the OOI.

1.2 Scope

The OOI EHS Plan, in conjunction with the IO EHS Plans, provides direction and guidelines for governing and evaluating all aspects of health and safety for the overall OOI project. As appropriate, these Plans provide provisions for safety and interface activities involving, but not limited to, the design, construction, fabrication, integration, test, operation and maintenance of the OOI, as performed by the OOI Project team, which consists of project staff from the following organizations:

- Consortium of Ocean Leadership (Ocean Leadership)
- University of Washington (UW)
- University of California, San Diego (UCSD)
- Woods Hole Oceanographic Institution (WHOI), its sub-awardee Scripps Institution of Oceanography (SIO) at UCSD
- Oregon State University (OSU)
- Rutgers University

In addition, the OOI will apply this Plan (or the applicable IO EHS Plan) in its evaluation of project furnished equipment or required support equipment to the degree that this equipment affects the safety of personnel or critical hardware during manufacture, integration, test, or operation and maintenance activities.

Within the OOI, the IOs' EHS programs (as applicable) incorporate all areas of fabrication, development, testing, handling, and operation and maintenance of the system, subsystems and equipment. Each institution's EHS program is structured (as applicable) to manage the:

- Efficient integration of system safety concepts into the design and development of OOI products (see System Safety Program for specifics)

- Performance of preliminary hazard analyses and, on safety critical items, the development and implementation of appropriate system, subsystem and operational hazard analyses.
- Definition/development of applicable health and safety design criteria, verification tests, inspections, and assessment reports.
- Prevention of accidents resulting in personal injury or death, catastrophic facility or equipment damage, or project delay by minimizing accident potential.
- Incorporation of government and industry health and safety requirements into specific safety criteria, engineering requirements, and formal procedures.
- Dissemination of health and safety information to appropriate design, engineering, operations, and program management organizations.
- Administration of reporting, cataloging, tracking and resolution of identified hazards.
- Reduction of EHS incidents by training OOI and IO personnel to effectively identify and catalog EHS issues.

1.3 Applicable Documents

The following lists contain the documents that establish the standards and requirements for this EHS Plan and (as applicable) the individual IO EHS Plans.

Contracts/Sub-Awards

SA9-09 - The complete design, construction, and operation of the Regional Scale Nodes (RSN) of the OOI is the responsibility of the staff at the University of Washington, School of Oceanography, Seattle, WA, under sub-award SA9-09.

SA9-10 - The complete design, construction and operation of the Coastal/Global Scale Nodes (CGSN) of the OOI is the responsibility of Woods Hole Oceanographic Institution, Woods Hole, MA and its sub awardees, Oregon State University, Corvallis, OR, and Scripps Institution of Oceanography UCSD, La Jolla, CA, under sub-award SA9-10.

SA9-08 - The complete design, construction and operation of the OOI Cyberinfrastructure (CI) is the responsibility of The Regents of the University of California, University of California, San Diego, San Diego, CA, under sub-award SA9-08.

SA9-11 – The complete design and operation of the OOI Education and Public Engagement (EPE) is the responsibility of Rutgers University, The State University of New Jersey, under sub-award SA9-11.

Federal and State Laws

- 29 CFR Occupational Safety and Health Administration (OSHA) General Industry Standards
- 40 CFR U.S. Environmental Protection Agency (EPA) Protection of the Environment
- 49 CFR Department of Transportation (DOT)

Standards, Requirements and Regulatory Drivers

- Life Safety Code Handbook
- National Fire Protection Association (NFPA) Fire Codes and Handbook of Fire Protection
- Uniform Building Code (UBC)
- UNOLS Research Vessel Safety Standards (RVSS) - http://www.unols.org/publications/manuals/saf_stand/contents.htm

OOI and IO Plans

- 1006-00002 System Safety Management Plan (SSMP)
- 1006-100XX Safety Assessment Template
- 1010-00000 OOI Operations and Maintenance Plan

- 1100-00000 System Engineering Management Plan (SEMP)
- 1100-00003 Tracked Design Item Table (TDI)
- 1001-00001 OOI Environmental Compliance & Permit Plan
- Process Library (located in Alfresco: OOI>Reference>Process Library>EHS)
 - Hazard Assessment Procedure
 - Safety/Environmental Checklist (blank form)
 - Hazard Assessment Catalog (blank form)
 - Software Hazard Assessment Catalog (blank form)

- 2010-00008 CI EHS plan
- 3101-00009 CGSN EHS Plan
- 4011-00001 RSN EHS Plan

2 OOI Environmental Health and Safety Program

The OOI Project is conducted in accordance with the Cooperative Agreement between the National Science Foundation (NSF) and Ocean Leadership with subawards to the IOs and their subawardees.

Appropriate members of the OOI Program Management Office and each IO have responsibility for the safe design, construction, operation and maintenance of the OOI system. Each individual involved in the OOI is personally responsible for his/her own health and safe workplace practices.

2.1 Organizations and Responsibilities

Ocean Leadership - The Program Director/Principal Investigator is responsible for project safety and for certifying that the complete OOI System is safe for operation. The OOI Quality Manager, in his role as OOI EHS Manager, leads safety coordination across all IOs. He informs the Program Director, Project Managers and COTRs on all major EHS decisions; and, he is involved in all EHS related decision-making, as appropriate.

Under the direction of the Senior Project Manager, and with the assistance of the COTRs, the EHS Manager will support the IOs in their efforts to address safety in the design, manufacture, and transport of the hardware, software, and telecommunications systems they assemble and test. He will support them in their efforts to monitor their contributors, contractors and subcontractors, and in their efforts to ensure the safe integration, operation and maintenance of their portions of the OOI System.

Implementing Organizations (IO) - The Principal Investigator and Project Manager at each IO are responsible for executing the construction of OOI systems and subsystems and for organizing and directing the project team. The Principal Investigators are responsible for project safety and are responsible for certifying that their portion of the OOI System is safe for operation. The Project Manager is responsible for assuring that their IO's project safety activities are properly organized and that the safety effort is proceeding effectively. The IO Safety Representatives are responsible for leading safety activities, communicating EHS progress and issues to the IO Project Manager, and chairing IO health and safety meetings.

2.2 Process for OOI Program-Level EHS Management Decisions

For situations that require expediency, the IO Safety representatives, working in conjunction with their Principal Investigators, Project Managers and institutional EHS procedures, have the authority to act as appropriate to prevent or mitigate EHS issues that could result in property loss, a potential fatality, or injury.

All individuals involved in the OOI program are responsible for identifying hazards and bringing them to the attention of their appropriate Safety Representative and Project Engineer. This can be accomplished by using the OOI System Hazard Report form (Appendix A) or an equivalent form provided by the employee's home institution. At a minimum, the reporting individual should describe the hazard to

his/her IO Safety representative, who can use the OOI System Hazard Report form or the IO institution's equivalent form to document the hazard and the actions taken to reduce the severity of the potential accident.

For identification and resolution of safety issues for items listed on the Tracked Design Item (TDI) Table, 1100-0003_Tracked_Design_Item_Table_OOI, that are not imminently dangerous and do not require an expedient management decision, but do need to be elevated due to the hazard severity, the hazard assessment (hazard assessments & software safety assessments) will be sent to the Safety Reviewers (OOI Senior Project Manager, Operations and Maintenance Manager, and the Senior Systems Engineer). At the IO level (IO in charge of the TDI), the PM, Safety Representative, Responsible Engineer and the IO OMM will receive copies. Together, they will review the hazards and the methods to control them and document hazard acceptance.

All decisions will be documented per the Safety Assessment Template (1006-100XX) and then sent to the system level CCB for final hazard acceptance. (See "Hazard Review Procedure" in Process Library in Alfresco.) The Responsible Engineer will be responsible for CCB submission along with action items resulting from the CCB.

The completed Safety Assessment Template will be given a document title and number and then posted to Alfresco.

2.2.1 Safety Reviewers (SR) Duties

The SR shall carry out the following duties:

1. Review the completed hazard review of the operational hardware, software, and Support Equipment (SE) design as presented at SR Meetings. The Lead Engineer will determine the Responsible Engineer to present the Hazard Analysis at the SR Meeting.
2. Evaluate techniques for minimizing or safely controlling the hazards that cannot be eliminated.
3. Review hazard-related interfaces involving the operational hardware, equipment handling, facility equipment, operating software, special materials, electrical power, etc.
4. Evaluate appropriate test, operations and maintenance schedules and sequences to assure maximum personnel and equipment safety.

The Chairperson of the SR (the OOI O&M Manager) is responsible for:

1. Organizing the team and appropriate safety representatives and conducting the associated meetings.
2. Assigning action items or tasks to the members of the team or other project personnel, as necessary, to carry out team functions.

The OOI EHS Manager, as a member of the SR, is responsible for:

1. Supporting and advising the SR chairman in organizing meetings to carry out the duties of the team.
2. Assessing safety concerns regarding the interfaces between personnel, hardware, software, and/or equipment elements.
3. Acting as consultant to the team on safety matters (i.e. policy, requirements, standards, etc.)
4. Suggesting areas for team evaluation and subjects for consideration.

2.2.2 Safety Readiness Reviews

The OOI EHS Manager, OL President/OOI Principal Investigator/OOI Senior PM may request an external contractor to perform independent safety reviews. This type of review compares the level of

safety analyses, documentation, procedures, and verification of safety controls for adequacy on the program. The review should evaluate the level of safety support and determine if the safety program is properly oriented to provide the maximum safety necessary to assure that potential mishaps are prevented by elimination or control of identified hazards. A secondary part of the review process is to determine if all hazards were identified, if hazard assessments were and are performed correctly with reasonable impacts projected, and if hazards are properly controlled. By performing this type of external check the OOI leadership is assured that the project has made the best attempt at producing an operationally safe and maintainable system.

A safety readiness review of the existing OOI facilities, equipment (shore stations, buoys, power generators, etc.), and test plans will be accomplished prior to system testing of operational or test critical hardware. As required, *ad hoc* teams may be appointed by the President/Program Director/Senior PM to assure that the testing meets the acceptability criteria of safety and readiness for the operation.

Prior to OOI system deployment, a group composed of the OOI EHS Manager and other personnel identified by OL and the IOs, will perform environmental health and safety inspections at IO facilities.

Prior to the start of OOI operations, there shall be a health and safety review of OOI operation facilities and/or operational safety programs and procedures. The final OOI system Commissioning is contingent upon a pre-operational review and approval by representatives of all involved organizations to assure compliance with EHS requirements.

2.2.3 IO Sub-Awardee/Subcontractor Activities

The IO Safety Representatives have the responsibility to obtain a proper safety plan from each sub-awardee or subcontractor that meets the OOI requirements and contains processes and procedures consistent with OOI's. To the maximum extent possible, existing contractor plans should be used. The IO Safety representatives are also responsible for subcontractor safety evaluations, requirements, and controls. Responsibilities include, but are not limited to, furnishing safety requirements and interface information to the subcontractor and obtaining appropriate safety evaluations and reports from the subcontractor.

The sub-award or contract manager must assure that, if required, the contract specifies or allows for, the delivery of safety data to verify equipment safety that meets the OOI system safety requirements. Equipment verification data requests for safety certification must require that the applicable data be furnished to the IO Safety Representative and OOI EHS Manager to assure that sufficient information will be received to support the Project Manager's safety evaluation in accordance with the contract, Cooperative Agreement, or sub-award.

2.2.4 Documentation

This section describes those documents required by the project for performance of the environmental health and safety tasks. Other documentation requirements may be added as the SR finds necessary. The safety documents will be generated to assure appropriate project safety requirements are described as follows:

- A System Safety Data Package (i.e., OOI Hazard Assessment Report) is prepared to obtain safety approval for operation of the OOI CI, Regional Scale, Coastal, and Global Scale Nodes (all items listed in the TDI Table (1100-0003_Tracked_Design_Item_Table_OOI). It includes operational arrays, moorings, buoys and subsystem sensors, safety matrices, hazards and their controls, handling/operational plan for the operational system handling and testing at the sites and all supporting information.
 - Operating Plans and/or Procedures include testing and operating plans and procedures to be used for the test/operation activity at IO institution facilities, and for the operating sites/observatories assembly, test and alignment activities. These plans and procedures contain the necessary safety restrictions and directions to assure safety requirements are met. The approval of such plans and hazardous procedures will be by via the change control process. Plans

related to Tracked Design Items will be reviewed by the OOI PMO as an Entry Criteria for TRR. Included under this category: Site Initialization/Startup Procedures identify hazardous operations during startup operations. Those items involving hazards shall be clearly marked in the initialization and startup sequence.

- Emergency Procedures address the types of plausible emergencies during each phase of the operations. The steps necessary to minimize injury to people during operation and deployment of OOI systems and equipment are described. The steps to be taken, the responsible people, involved emergency crews, equipment and facilities to be employed, etc., are included. The procedures will be reviewed and approved by OOI Project Management as appropriate.

3 Health and Safety Training

3.1 Personnel Training and Certification

The OOI EHS Manager reviews areas requiring personnel training and certification relating to operations. The IO Safety Representatives review the same for their areas of responsibility and follow their institutional EHS training program.

3.2 Training and Certification

Each IO Safety Representative shall ensure that training and certifications are performed as necessary in accordance with the institutional requirements. These may include but are not limited to activities such as confined space access, ship operations, high-voltage electrical safety, lockout/tagout, hazard communication, equipment handling, storage, hardware removal/maintenance installation, equipment and test operations. Training shall be done by organizations and personnel best qualified to do so, and/or by organizations having operational responsibility. Personnel training shall comply with OSHA and ANSI standards and monitored by the OOI EHS Manager.

3.3 Audit Program

Each IO Safety Representative shall periodically survey the hazardous project elements under the IO's responsibility in accordance with institutional practices. Training and other safety records shall be maintained in accordance with the IO EHS Plan. Audits of internal records will be performed in accordance with the IO EHS Plan. Records will be available for review by the OOI EHS Manager upon request. The IO Safety Representatives will work with their institutional EHS personnel for correction of hazards and any IO EHS Plan Audit deficiencies identified in the audit. Audit items to be corrected will be tracked via JIRA and discussed at the bi-weekly Safety Meeting.

The OOI EHS Manager also oversees activities associated with the Operational and Test Systems. The COTRs may require/request special health and safety audits of any areas, at his/her discretion. Formal reviews may serve as an audit if sufficient details of the hazardous activities and the safety precautions to be used are a part of the review.

4 Internal and External Communications

The OOI EHS Manager will hold bi-weekly meetings with the IOs to pro-actively address EHS issues, address corrective and preventive actions, and as a forum at which all program participants can express their opinions and help make the EHSMS more effective. Regular meeting attendees include IO Safety Representatives, with the Principle Investigators and Project Managers attending as needed, and all OOI employees are welcome to attend. Meeting minutes will be posted to the Confluence "OOI – Environmental, Health and Safety" area. Action items will be tracked via JIRA. The IO Safety

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Representatives will be Change Control Board (CCB) reviewers for EHS procedures and will be given adequate opportunity for input to draft EHS documents before CCBs.

All employees have the right to stop work and correct an EHS issue. Each IO PM has assigned a person with EHS responsibilities. IO employees and associated contractors should contact their IO Safety Representative for assistance with correcting any EHS items. The IO Safety Representative will, as necessary or required within their institution, solicit assistance from the IO Institutional EHS representative to correct an issue. The IO Safety Representative will also communicate with the OOI EHS Manager regarding hazards identified, assessed and the controls put in place to reduce the potential for injury and environmental impact.

The EHS meeting is also used to solicit input from the IOs when implementing the EHS Management System, along with looking at a consistent way of evaluating safety and environmental hazards consistently across the project. Any EHS Action items from design reviews that the PMO is review authority per the Tracked Design Item (1100-00003) will be tracked using JIRA.

Any accidents will be managed as directed by the policies of the IOs institution. In the case of an accident/incident involving OOI personnel or equipment on shore, the IO shall notify the OOI PI within 24 hours and when available shall forward a copy of the IO EHS accident/incident information when available and if releasable outside the institution (as determined by EHS and legal policy). IOs' can forward their institutional accident investigation forms or use the example provided in Appendix B. At sea upon an accident/incident involving OOI personnel or equipment after being notified by the IO Marine Operations of the initial incident report, the IO shall forward within 24 hours to the OOI PI the Marine Operations notification report. In the case of the PI's absence, the Senior Project Manager and the O&M Manager will be notified so they can notify the NSF within 24 hours of the accident. Per UNOLS policy, when the full investigation report is available and releasable by UNOLS and per the IO safety and legal release policy outside the institution, it shall be forwarded to OOI. The threshold for accident notification will be the standard OSHA recordable injury notification and documentation to the Institutions OSHA accident log.

External Communications (environmental) are also conducted in regards to obtaining the necessary permits for testing and deployment of OOI RSN and CG infrastructure. The roles and responsibilities of OL, the IOs for the RSN and CGSN, their respective environmental consultants, and the NSF are defined in the Environmental Compliance and Permit Plan (DCN 1001-00001) with respect to the environmental analysis process, including drafting of the SSEA, drafting of official correspondence (including letters of intent, transmittal, notifications, and other official correspondence) and applying for permits and approvals. The plan addresses both environmental compliance under NEPA and other applicable federal and state laws (e.g., ESA, National Historic Preservation Act, Coastal Zone Management Act, Marine Mammal Protection Act, the Magnuson-Stevens Fishery Conservation and Management Act), and the permitting needs of the OOI Program. Appendix A of the Environmental Compliance and Permit Plan is the OOI Permit, Notification, and Environmental Compliance List, which provides a summary of requirements for compliance with NEPA and other applicable federal and state laws, required permits, authorizations, and notifications for each component of the marine infrastructure. This list will be migrated to and maintained on the OOI Software Application Framework in the near future. Information about the OOI and environmental compliance and related activities can be found on the OOI website (www.oceanobservatories.org).

Communication with organizations and/or individuals will be conducted in a manner consistent with the terms and conditions contained in the NSF-OL Cooperative Agreement (Award OCE-0957938). In the event that an external party has questions/comments about the EHSMS (environmental), the Associate Project Director will document the request and the corresponding answer.

Contractors must notify OOI and/or the associated IO about the safety and environmental hazards they may introduce while performing their operations. Contractors may also be asked to participate in accident/incident investigations and any environmental investigations (e.g., fuel spill, oil spill) to determine root cause and ensure the same accident/spill does not happen again.

The expectation of the OOI project is for contractors to reduce their employees' accident and injury potential to as low as possible and to minimize the severity of the potential injury. OOI will inform contractors of the hazards of their operations and expects the contractors to inform OOI of their hazards. This documentation can be in the form of operations and maintenance manuals, vendor/contractor training along with initial design considerations reducing the injury potential and/or chemical and fuel spill potential.

Contractors should also practice pollution prevention, and when possible, substitute a non-hazardous substance for a hazardous substance.

5 Legal and Other Requirements

The OOI EHS Manager will receive legal updates from Federal/State OSHA and EPA via a monthly email service. Legal updates are also received through various trade publications and the daily Federal Register. Any Federal updates affecting operations will be sent to the management team at all IOs and state-specific updates will be sent to the specific IO for incorporation into the OOI and IO EHSPs.

Other documentation requirements, from a safety and environmental standpoint, are the operations and maintenance manuals provided by the equipment vendors along with Best Management Practices (BMPs).

A list of regulations pertaining to the OOI project can be found at on the OOI EHS confluence page under "EHS – Legal and Other Requirements"

6 Use of Non-UNOLS Vessels

In the event that non-UNOLS vessels are used for any deployment or recovery, the checklist found in Appendix C must be completed along with a walk through of the ship to ensure the vessel is able to accommodate the personnel and equipment deployment safely.

This process should take place as early as possible so that any necessary corrections can be made in a timely manner. The correction of any deficiencies should be insisted upon before entering into a charter agreement. The overall goal is to ensure a chartered vessel meets the same safety standards expected of a comparable size UNOLS vessel, and meets or follows Institution policies for chartering non-UNOLS vessel. Reference the Chapter 18 Chartering of Non-Institution Vessels of the UNOLS Research Vessel Safety Standards (RVSS) at http://www.unols.org/publications/manuals/saf_stand/contents.htm for more details.

7 Navigational Safety

As detailed in the *Site-specific Environmental Assessment for the NSF-Funded Ocean Observatories Initiative* (SSEA; NSF, 2011), *Finding of No Significant Impact/Decision Document* (FONSI; NSF, 2011), and *Supplemental Environmental Report* (SER; NSF, 2013) (available for review at <http://www.nsf.gov/geo/oce/envcomp/index.jsp>), the OOI will continue to conduct discussions with the U.S. Coast Guard (USCG) and fishing communities to recommend voluntary, non-regulatory "areas to be avoided" around the RSN infrastructures and CSN infrastructure sites. OOI will not propose recommended areas to avoid around GSN infrastructure.

The diameters of these proposed avoidance areas or zones relate to water depths (larger zones in deeper water). Discussions with the OFCC are on-going to finalize the extent of avoidance zones around the RSN Secondary Infrastructure, including the Endurance Oregon off-shore and shelf sites. A 0.2-nautical mile (nm) radius avoidance area applies to the CSN Endurance Array inshore sites and 0.5-nm radius for the shelf and offshore Endurance sites. An avoidance area of 0.5-nm radius is proposed for all Pioneer Array mooring sites while the array is operated at its initial location on the mid-Atlantic shelf. Because the Pioneer Array is re-locatable, the size and locations of the Pioneer Array areas to avoid are subject to change, depending upon its location (and depth) in subsequent years. The RSN and CSN Endurance cabled sites would be clearly marked on charts distributed by the Oregon Fishermen's Cable

Committee (OFCC) and distributed to members, and locations of RSN and CSN sites will be communicated to the USCG to facilitate appearance on National Oceanographic and Atmospheric Administration (NOAA) electronic navigation charts (see Table 2-13 of the SSEA and Table 10 of the SER). Both RSN and CSN sites will also be published in Notice to Mariners (NM) and Local Notice to Mariners (LNM), and communicated to marine user communities. There will be active radar transponders on some surface buoys as well as required U.S. Coast Guard markings.

In accordance with Oregon State law, Ocean Leadership and the OFCC have entered into a formal agreement that would address concerns of the fishing industry regarding installation and operation of the RSN cable and potential impacts on fishing revenues from potential loss of gear associated with the installation and operation of the proposed RSN infrastructure off the coast of Oregon. All Pioneer Array moorings, Endurance Array Washington Line moorings, Endurance Oregon surface moorings, and Endurance Oregon inshore moorings would be either permitted as Private Aids to Navigation (PATONs) through the USCG or in cases of moorings without permanent surface expressions, positions of the moorings would be communicated to the USCG. Surface buoys would be marked per USCG requirements, with all required lights and markings, with locations appearing in the NM and LNM. Surface buoys would be marked with contact information, which will be included in the NM and LNM with suggested voluntary areas to avoid around moorings (see Table 2-13 of the SSEA and Tables 4 and 7 of the SER).

A summary of the USCG permit requirements and actions to be taken to reduce negative interactions between fisheries and proposed OOI moorings are as follows:

- o Ocean Leadership will submit USCG Private Aids to Navigation (PATON) applications for the Endurance Washington Line, Endurance Oregon Line In-shore moorings, and Pioneer moorings in advance of deployment. Existing PATONs will be updated as operational mooring turns are completed.
- o Ocean Leadership will work with the USCG to develop guidance (to appear in NM, LNM, or NOAA chart annotations) regarding the suggested voluntary “areas to avoid” for Pioneer Array moorings to reduce any potential risk of gear entanglement.

The NM and LNM details will be provided to NOAA so that the Pioneer and Endurance array mooring locations can be updated on the NOAA electronic charts.

- o Ocean Leadership will give advance notice to the USCG of glider/AUV deployments, operating area, instructions if found, and a point of contact.
- o Ocean Leadership is proposing a 0.5-nm voluntary area to avoid around all Pioneer Array mooring sites and the offshore and shelf mooring sites of the Endurance Array, and a 0.2-nm avoidance area around the inshore mooring sites of the Endurance Array. These avoidance areas would reduce the risk of gear entanglement and damage to OOI moorings and sensors.

8 Acronyms and Definitions

8.1 Acronyms

ANSI	American National Standards Institutes
CCB	Change Control Board
CFR	Code of Federal Regulations
CGSN	Coastal/Global Scale Nodes
CI	Cyberinfrastructure
COTR	Contracting Officer Technical Representative
DOT	Department of Transportation
EHS	Environmental Health and Safety
EHSP	Environmental Health and Safety Plan
EPA	Environmental Protection Agency
EPE	Education and Public Engagement
FONSI	Finding of No Significant Impact
IO	Implementing Organization
LNM	Local Notice to Mariners

Environmental Health and Safety Plan

NEC	National Electrical Code
NFPA	National Fire Protection Association
NM	Notice to Mariners
NSF	National Science Foundation
OFCC	Oregon Fishermen's' Cable Committee
OL	Ocean Leadership
OMM	Operations & Maintenance Manager
OOI	Ocean Observatories Initiative
OOT	Observatory Operations Team
OSHA	Occupational Safety and Health Administration
OSSE	Operational Site Support Equipment
OSU	Oregon State University
PATON	Private Aid to Navigation
PM	Project Manager
PPE	Personal Protective Equipment
RSN	Regional Scale Nodes
SER	Supplemental Environmental Report
SIO	Scripps Institution of Oceanography
SPM	Senior Project Manager
SR	Safety Reviewers
SSEA	Site-Specific Environmental Assessment
UBC	Uniform Building Code
UCSD	University of California, San Diego
UNOLS	University-National Oceanographic Laboratory System
UW	University of Washington
WHOI	Woods Hole Oceanographic Institution

8.2 Definitions

Common definitions presently supported by an Environmental Health and Safety System.

Environmental Health and Safety Program Plan - A description of the planned tasks and activities to be used by the contractor to implement the required system safety program. This description includes organizational responsibilities, resources, methods of accomplishment, milestones, depth of effort, and integration with other program engineering and management activities and related systems.

Hazard Probability - The aggregate probability of occurrence of the individual events that create a specific hazard.

Hazard Severity - An assessment of the consequences of the worst credible mishap that could be caused by a specific hazard.

Hazardous Material - Anything that due to its chemical, physical, or biological nature causes safety, public health, or environmental concerns that result in an elevated level of effort to manage.

Mishap - An unplanned event or series of events resulting in death, injury, occupational illness, or damage to or loss of equipment or property, or damage to the environment.

Safety - Freedom from those conditions that can cause death, injury, occupational illness, or damage to or loss of equipment or property, or damage to the environment.

Safety Reviewers – a group comprised of the OOI SPM, OMM and Senior Systems Engineer. At the IO level it's the PM, OMM, Responsible Engineer and Safety Representative.

Subsystem - An element of a system that, in itself, may constitute a system.

System - A composite, at any level of complexity, of personnel, procedures, materials, tools, equipment, facilities, and software. The elements of this composite entity are used together in the intended

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operational or support environment to perform a given task or achieve a specific purpose, support, or mission requirement.

System Safety - The application of engineering and management principles, criteria, and techniques to optimize all aspects of safety within the constraints of operational effectiveness, time, and cost throughout all phases of the system life cycle.

System Safety Engineering - An engineering discipline requiring specialized professional knowledge and skills in applying scientific and engineering principles, criteria, and techniques to identify and eliminate hazards, in order to reduce the associated hazard.

System Safety Management - A management discipline that defines system safety program requirements and ensures the planning, implementation and accomplishment of system safety tasks and activities consistent with the overall program requirements.

Appendix A-1: OOI Hazard Report Form

OOI System Hazard Report	No.	OOI-XXX
System or Location		Phase
Subsystem	Hazard Group	Date
Hazard Title		
Applicable Safety Requirements	Hazard Category: Catastrophic Critical	
Description of Hazard:		
Hazard Causes:		
Hazard Controls:		
Safety Verification Methods:		
Status of Verification:		

OOI Hazard Report Form (continued)

System Hazard Report Continuation Sheet		No.
System		Phase
Hazard Title: Hazard Causes: Hazard Controls: Safety Verification Methods: Status of Verification:		
Approval by Design Organization/Project Mgr.	Design Org.	Project Mgr.
Review I		
Review II		
Review III		

Appendix B-1: Example IO Accident/Incident Investigation Form

To be completely filled out by the supervisor and employee who were involved, and signed by both. An initial accident/incident or near-miss report must be routed to the Program Manager within 24 hours of occurrence for processing. A final report is due within 7 days of the event. Separate paper may be used for continuation of any field and is encouraged.

Injured Employee's Name: _____ Department: _____ Shift: _____
 Job Title: _____
 Supervisor: _____
 Date of Injury: _____ Time of Injury: _____
 Location where accident/incident occurred: _____
 Did employee stop working? Yes/No _____
 Did employee return to work? Yes/No. _____ If Yes; Date: _____

Specific activities employee was engaged in:

Equipment, Chemical, Materials, Machinery, Tools employee was using:

List all steps leading up to the accident/incident occurrence:

Part of the body affected:
 Type (category) of Injury (sprain/strain; laceration; contusion; concussion; elec. shock; eye injury etc.):
 Name(s) of Witnesses:

Supervisor Check One Only	
<input type="checkbox"/> No Medical Treatment	Advise the employee to update HR & Safety if future treatment is sought.
<input type="checkbox"/> Treated within (EMT; First Aid)	
<input type="checkbox"/> Treated by Clinic; Hospital; Physician	
Date of Treatment: Name and Location of Doctor and/or Hospital:	

Was this accident/incident caused by an unsafe practice? Yes/No
 If yes, describe the unsafe practice:

Did an unsafe condition or tool cause this accident/incident? Yes/No
 If yes, describe the unsafe condition:

Supervisor has visited the scene of event: (Initial)

What procedure was directing this activity?

Describe & identify the document by referencing its identification number:

Does the procedure or document need to be changed? Yes/No
 If Yes, describe recommended change:

Were all safety guards in place? Yes/No

Was the employee made aware of the safety hazards of the job? Yes/No

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Was prior training for this task adequate? Yes/No
 If no, explain why:

If Personal Protective Equipment is required or recommended, was it worn? Yes/No
 If no, explain why:

List other possible causal factors that contributed to this accident/incident (temperature; weather; lighting; body mechanics; fatigue, etc.):

What recommendation(s) does the injured person have for how this injury/illness could have been avoided?

CORRECTIVE ACTIONS		
State Immediate Actions to Eliminate Hazards		Completion Date
Identify Long Term Corrective Actions/System Improvements	Estimated Completion Date	Actual Completion Date

Employee Signature: Date:

Supervisor Signature: Date:

State how all corrective actions will be tracked to completion:

Manager Signature: Date:

Verification of Corrective Action Closer (Employee Manager)

Status Report - Follow-Up comments from Employee Manager [Include picture if able] {Lessons Learned? Injury-History?}	Date of Follow-Up	Employee Mgr. initials

Signature below verifies that the accident/incident investigation is closed.

Manager: Date of Closure:

Appendix C-1: Inspection Check List for Chartering Non-UNOLS Vessels

Vessel Name:	
Owner:	
Address and Contact Information:	
Operator:	
Address and Contact Information:	
Licenses held:	
Vessel Type and General Description:	
Length Overall:	
Displacement:	
Tonnage [GT/GRT/NT] :	
Draft:	
Radio Call Sign	
Number of Passengers/Scientists that can be carried:	
Charterer – PI and Institution	
Dates of planned charter:	
Area of operations:	
Type of operations or activities planned:	
Number in planned science party:	

Life Saving Equipment:

____ PFDs

____ Immersion Suits

____ Inflatable Life Rafts

____ Life Ring Buoys

____ Rescue Boats

____ Water Lights/Strobes

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Exterior Decks and Equipment:

- Anchors and Associated Equipment
- Watertight Doors and Hatch Comings
- Freeing Ports
- Deck Vents
- Cargo and Weight Handling Equipment (Safe Work Load posted & tested, 46CFR189.35 requirements, Appendix A requirements if appropriate).
- Deck Surfaces Non-Skid
- Life Lines and Safety Chains

Fire Fighting Equipment:

- Fixed and Portable Fire Extinguishers Inspection Dates Current?
- Smoke and Fire Detectors
- Fire Stations and Hoses
- Self Contained Breathing Apparatus
- Fire and Damage Control Locker
- Emergency Stations Bill

Engineering:

- Gas Engines. Check flame arrestor, vents, gas hoses, no sparking devices in bilges.
- Diesel Engines. Check oil and exhaust leaks, starting system, maintenance, hours since last overhaul.
- Inspect overall cleanliness and condition of power sources.
- Check emergency lights.
- Check bilge and ballast systems and pumps.
- Check fueling system and pumps.
- Check refrigeration systems.
- Check fire pump.
- Check engine room fire suppression capability.
- Check all manifolds for saltwater, fuel, etc.
- Check condition of switchboards, wiring and auxiliary generators.

Structural:

- Tank Inspections/Record of Inspections

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Miscellaneous:

- First Aid Kits and Medical Supplies
- Damage Control Equipment
- Emergency Steering
- General Appearance and Cleanliness
- Oil Pollution Placard and other required notices are posted.
- Sanitary System Operations
- Assess vessel's overall stability
- Assess vessel's overall ability to perform charter mission. Include laboratory and deck space, berthing and feeding capability, scientific equipment and winches, etc.