

**Oregon State University
College of Engineering
School of Civil & Construction Engineering
O.H. Hinsdale Wave Research Laboratory**

Site Safety Plan

Pedro Lomónaco

Director, O.H. Hinsdale Wave Research Laboratory

Tim Maddux

Faculty Research Associate
Facility Safety Coordinator

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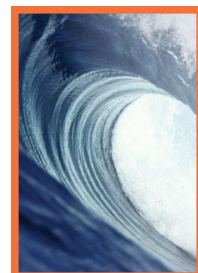


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Chapter 1 – Administrative Safety Plan Elements

Management Statement

This document describes the comprehensive and proactive safety plan in use at the O.H. Hinsdale Wave Research Laboratory (HWRL) at Oregon State University (OSU). The plan is built upon the principles of involvement, identification, rules, and training.

The facility adheres to the policy guidelines as set forth by the University and maintained by University Environmental Health and Safety (EHS). The University safety policy and procedure manual is located here:

<http://fa.oregonstate.edu/saf-manual>

In addition to any University policies and procedures, this plan outlines policies and procedures specific to the facility.

Safety Policy

The facility adheres to the University safety policy as described below. The policy requires everyone to follow safe working practices and procedures. It states:

Effective management of health and safety at Oregon State University is fundamental to delivering excellence in research and teaching. Health and safety should be a concern to everyone since our mutual efforts and vigilance are necessary to eliminate incidents that result in personal injury and loss of property. The majority of injuries and property loss are costly and preventable. Through the dedicated efforts of everyone involved, we can maintain a safe and healthy environment while accomplishing the mission of the University.

Oregon State University will make reasonable efforts to provide a safe and healthful working environment for all employees, students and others who may utilize the University's facilities and grounds. All University departments/units will develop and implement safety policies and procedures that promote an injury free environment.

Anyone engaged in University related activities must exercise personal responsibility and care to prevent injury and illness to themselves and others who may be affected by their acts or omissions. No person shall intentionally interfere with or misuse anything provided by the University in the interests of health and safety. Individuals are required to have the proper training for the safe operation and use of university facilities, equipment and supplies as well as animal handling. Faculty and staff administrators will

be held accountable for fulfilling their safety responsibilities. Flagrant disregard of the University safety policies and procedures may result in disciplinary action.

Priority should be given to safe working conditions and job safety practices in the planning, budgeting, direction and implementation of University activities.

The OSU Health and Safety Policy should be read in conjunction with SAF 103: OSU Safety Program and other safety policies contained in the OSU Safety (SAF) Policy and Procedure Manual.

Accident Analysis, Investigation, and Record Keeping

The University is to be alerted of all reportable accidents. All accident records are permanently stored at the facility. University accident investigation policies and procedures are described here:

<http://fa.oregonstate.edu/saf-manual/200-workplace-safety/203-accident-investigation>

Accident investigation procedures including timelines are outlined here:

http://oregonstate.edu/ehs/sites/default/files/pdf/si/accident_incident_reporting_and_investigation_si.pdf

Additionally, all accidents, hazardous conditions, or potential hazards are reviewed during the safety portion of facility meetings. Discussion will cover what happened and what could have been done differently. Preventative measures and new training procedures will be implemented to prevent future accidents, hazardous conditions, or potential hazards.

Emergency Plan

The facility adheres to University policy and procedures for emergency planning. The policy and procedures for emergency response are located here:

<http://fa.oregonstate.edu/saf-manual/100-general-safety/102-emergency-response>

Also, the University policy and procedures for first aid and medical service are located here:

<http://fa.oregonstate.edu/saf-manual/200-workplace-safety/201-first-aid-and-medical-service>

Finally, the University emergency management plan is located here:

<http://apps.campusops.oregonstate.edu/emergency/files/EP-Plans/OSU-Master-Emergency-Management-Plan.pdf>

Employee Participation

The safety practices described in this plan apply to everyone working at the facility and/or using or operating facility equipment. Everyone must follow safe working practices and has the responsibility to comply with all University and facility policies, rules, and procedures. Everyone is alerted to activities that may present new safety concerns either via regular meetings or broadcasted messages such as email. Anyone who sees unsafe practices is authorized and expected to call for a work stoppage. Work will resume only when concerns are addressed and only with the explicit approval of facility staff or director.

The facility adheres to University policy and procedures for safety training, located here:

<http://fa.oregonstate.edu/saf-manual/200-workplace-safety/210-safety-training>

All OSU employees who work in labs, shops or support spaces are required to undergo a series of trainings in lab safety, lab hazard awareness, hazardous and universal waste, and hazard communication. The mandatory training modules are located here:

http://oregonstate.edu/ehs/training/lab_safety_training

<http://oregonstate.edu/ehs/lab-hazard-awareness-training-non-lab-personnel>

<http://oregonstate.edu/ehs/training/hazwaste>

<http://oregonstate.edu/ehs/hazard-communication-global-harmonizing-system>

Additionally, anyone planning to work at the facility must participate in a documented walk-through safety training session that requires the trainee to read and understand this document. All training documentation is signed and permanently stored at the facility.

Job Hazard Analysis

The University maintains a comprehensive job hazard analysis manual, located here:

<http://oregonstate.edu/ehs/sites/default/files/pdf/hazardanalysis.pdf>

Specific job hazards identified at the facility are as follows:

Hazard	Response
Overhead hazards including: LWF, cranes, forklifts, equipment, or scaffolding overhead	Hard hat required
Loud noises from power tools or equipment	Wear ear protection
Operating power tools, using aerosol sprays, any work that may produce chips	Wear eye protection
Entanglement w/ moving machinery or parts	No loose clothing, long hair tied back
Chemical exposure, ingestion or burns	MSDS sheets, hazardous storage, use PPE
Heavy equipment or crane accidents	Only trained and certified operators allowed
Drowning	Buddy system and rescue equipment
Temperature extremes	Heaters, water breaks, work stoppage
Electrocution hazard	GFI, inspections of electrical wiring

OSHA Action Plan

EHS will act as a liaison with all regulatory agencies inspecting University facilities. No special action is required of facility staff in the event of an inspection by an OSHA compliance officer. The main contact number for EHS is (541) 737-2273 and for University Public Safety is (541) 737-3010. For emergencies, call (541) 737-7000 or 911. The full list of EHS contacts is located here:

<http://oregonstate.edu/ehs/staff>

Remedial Action

Any identified safety hazard will receive immediate attention from facility staff. If necessary, all work will cease until the hazard has been remediated. All hazards and progress towards permanent remediation will be discussed and tracked in facility meetings.

Safety Rule Enforcement

It is recognized that most violations of safety policy and rules are inadvertent. In these cases, the offending worker will be warned and asked to correct the improper action. Any willful violation of the facility safety rules and policies or refusal to follow the directions of facility staff

will result in a suspension of the right to work within the facility. All violations will be discussed and tracked in facility meetings.

Safety Rules

The facility adheres to University policy and procedures for physical labor and material handling safety. The policy and procedures are located here:

http://oregonstate.edu/ehs/sites/default/files/pdf/si/physical_labor_safety_si046.pdf
http://oregonstate.edu/ehs/sites/default/files/pdf/si/material_handling_and_warehousing_si054.pdf

In addition, the facility has implemented the following safety rules:

- Documented safety training is required before working or operating any equipment
- Be aware of and follow all safety rules, signs, and instructions
- All accidents must be reported to your supervisor
- Any hazardous condition or potential hazard must be reported to your supervisor
- Anyone is expected to call a work stop if they have a safety concern
- No unescorted visitors or walk-ins for tours
- Closed toe shoes, secured hair and clothing required for anyone working on the lab floor
- Be aware of trip hazards and keep walkways clear
- Do not approach any crane, heavy machinery, or power tool use without operator clearance
- Mobile device usage prohibited while driving or operating tools or machinery
- Do not needlessly distract anyone operating tools, heavy machinery, or cranes
- Hard hats are required for all overhead hazards, including in LWF or during crane operations
- Do not place anything that might fall on someone atop the walls of the LWF
- Do not place anything that might fall on someone atop moveable roller scaffolding
- Eye and ear protection are required when working with any shop or power tools
- Eye protection required when or aerosol paints or chemicals are used
- Eye protection required during any work that may produce chips
- Use of any shop or power tools requires separate training
- Use of any heavy machinery requires separate training and documentation
- Operation of any crane requires separate training and documentation
- Operation of any wave maker requires separate training and documentation
- Do not climb on, around, or inside any wave maker when it is powered up
- Stay out of the LWF enclosure when the wave maker is powered up
- Stay out of the area behind the DWB when the wave maker is powered up

Self-Audits and Self-Inspections

The City of Corvallis Fire Department conducts an inspection and audit of the facility every two years. EHS conducts an annual overall safety audit of the facility. The facility hires outside contractors to conduct annual crane inspections. Facility staff conducts monthly self-inspections. All audit and inspection documentation is signed and permanently stored at the facility. Any issues discovered during audits and inspections are addressed as described in Remedial Action above.

Safety Staffing

EHS oversees the University safety committee that includes this facility. The Facility Safety Coordinator is responsible for this document, for working as primary point of contact with EHS, and for maintaining, updating, and storing all signed documentation. These include:

- Required safety training documentation for any worker
- All audit and inspection documentation
- OSU vehicle authorization documentation
- Heavy machinery training documentation
- Crane training documentation
- Wave maker training documentation
- Safety incident or accident documentation

Chapter 2 – Universal OSHA-Mandated Plan Elements

Blood Borne Pathogens

No research work or instructional training with human blood products occurs at this facility. For cases where there is potential for human blood contact, University policy and exposure control is located here:

<http://oregonstate.edu/ehs/bloodborne-pathogen-program>

All emergency first aid kits include personal protective equipment (PPE). Anyone planning to work at the facility must participate in a documented walk-through safety training session. This training includes the use and locations of first aid kits and PPE. In the event of an emergency, everyone will use PPE and immediately summon emergency personnel by calling University Campus Emergency at (541) 737-7000. Any further instructions involving PPE will be under the direction of the dispatcher and emergency personnel.

Chemicals

The University maintains a written communication plan for industrial and laboratory hazardous chemicals, with links to the site-specific chemical inventory system. University policies, training and chemical inventory can be accessed from this location:

<http://oregonstate.edu/ehs/chemical>

All OSU employees who work in labs, shops or support spaces are required to undergo a series of trainings in lab safety, lab hazard awareness, hazardous and universal waste, and hazard communication. The mandatory training modules are located here:

http://oregonstate.edu/ehs/training/lab_safety_training

<http://oregonstate.edu/ehs/lab-hazard-awareness-training-non-lab-personnel>

<http://oregonstate.edu/ehs/training/hazwaste>

<http://oregonstate.edu/ehs/hazard-communication-global-harmonizing-system>

Fire and Life Safety

The facility adheres to University policy and procedures for fire and life safety. The policy and procedures are located here:

<http://fa.oregonstate.edu/saf-manual/100-general-safety/107-fire-and-life-safety-program>

Additionally, the facility has posted safety maps denoting first aid stations, exit routes, fire extinguisher locations, and special hazard areas. A copy of the map is included in the appendices. The City of Corvallis Fire Department conducts an inspection of the facility every two years.

Lockout/Tagout

The facility adheres to University policy and procedures for lockout/tagout and the control of hazardous energy. The policy and procedures are located here:

http://oregonstate.edu/ehs/sites/default/files/pdf/si/energy_control_loto_si.pdf

Nobody will inspect, repair or perform maintenance on any facility electrical systems. If service on the building electrical system is required, facility staff will contact electricians who are responsible for lockout/tagout procedures during service.

All facility staff will be trained in lockout/tagout procedures as described in the University lockout/tagout safety instruction. The instruction is located here:

http://oregonstate.edu/ehs/sites/default/files/pdf/si/energy_control_loto_si032.pdf

These procedures will be followed prior to anyone working in or near the vicinity of wave maker equipment. Additionally, the facility has emergency stop switches on wave maker control equipment that are engaged when needed for personnel safety in those situations.

Personal Protective Equipment (PPE)

The facility adheres to University policy and procedures for personal protective equipment (PPE). The policy and procedures are located here:

<http://fa.oregonstate.edu/saf-manual/200-workplace-safety/202-personal-protective-equipment>

Additionally, EHS guidelines for PPE are located here:

<http://oregonstate.edu/ehs/PPE>

The use of PPE specific to the facility is outlined in the Job Hazard Analysis and Safety Rules sections above. Use of PPE is required for everyone when it would be reasonable to do so in order to prevent injury or illness. In addition, everyone must follow the direction of facility staff in stopping work and putting on PPE.

Anyone planning to work at the facility must participate in a documented walk-through safety training session that includes PPE and its location. The location of PPE is also indicated on the facility map and included in the appendices. All training documentation is signed and permanently stored at the facility.

Chapter 3 – Conditional OSHA-Mandated Plan Elements

Compressed Gases

The facility adheres to University policy and procedures for handling compressed gas cylinders. The policy and procedures are located here:

http://oregonstate.edu/ehs/sites/default/files/pdf/si/gas_cylinder_safety_si022.pdf

All compressed gas cylinders at the facility are properly identified, capped, and secured, and this is verified as part of the monthly documented safety self-inspection as described in Self-Audits and Self-Inspections above.

Confined Spaces

No permit requiring spaces are present at the facility.

Crane and Hoist Safety

The facility has a 6-ton gantry crane over the LWF, a 7.5-ton bridge crane over the DWB, and a 20-ton bridge crane over the structures lab on the west side of the LWF. The facility adheres to University policy and procedures for crane and hoist safety for all cranes. The policy and procedures are located here:

http://oregonstate.edu/ehs/sites/default/files/pdf/si/crane_and_hoist_safety_si050.pdf

Prior to operating any cranes at the facility, everyone must participate in documented crane training. Everyone is notified of this requirement as part of the mandatory walk-through safety training session described in the Employee Participation and Safety Rules sections above. All training documentation is signed and permanently stored at the facility.

An operations manual specific to the LWF gantry crane has been developed and is permanently housed at the facility. A copy of the CMAA Overhead Crane Manual is also permanently housed at the facility. Familiarity with both manuals and compliance with the procedures therein is required as part of the documented crane training.

Facility cranes are inspected monthly and annually, as described in Self-Audits and Self-Inspections above. Prior to and after lifting operations, lifting straps are inspected for wear as well as monthly as part of the self-inspection audit. Slings will be stored and maintained in good condition.

Drowning

An observer must be present whenever anyone enters a filled Large Wave Flume (LWF) or Directional Wave Basin (DWB). The observer will be expected to devote full attention to the person in the water and the observer must be capable of a water rescue if necessary. Rescue hooks and flotation devices are provided along both the LWF and DWB at locations marked on the facility map. Everyone is notified of these locations as part of the mandatory walk-through safety training session described in the Employee Participation and Safety Rules sections above.

Elevated Work

The facility adheres to University policy and procedures for elevated work surfaces. The policy and procedures are located here:

http://oregonstate.edu/ehs/sites/default/files/pdf/si/elevated_work_surfaces_si.pdf

The facility provides personal fall protection equipment as mandated by these policy and procedures. Prior to start of elevated work, facility staff will inspect all fall protection lifelines, harnesses, and lanyards.

Excavation

Not applicable to the facility.

Explosives

Not applicable to the facility.

Flammables and Hazardous Materials Storage

The facility adheres to University policy and procedures for flammable and hazardous materials handling, storage, and disposal. The policy and procedures for hazardous materials communication and disposal are located here:

<http://fa.oregonstate.edu/saf-manual/100-general-safety/105-hazard-communication>
<http://fa.oregonstate.edu/saf-manual/300-laboratory-safety/301-hazardous-waste-disposal>

The University policy and procedures for right-to-know are located here:

<http://oregonstate.edu/ehs/sd0001>

University instructions for handling hazardous wastes are located here:

<http://oregonstate.edu/ehs/sd0012>

All waste materials generated from facility operations are handled through EHS, per University policy. Disposal of waste procedures are detailed here:

http://oregonstate.edu/ehs/sites/default/files/waste-hazardous_disposal_si008.pdf

The University handbook entitled Working Safely with Hazardous Materials is located here:

<http://oregonstate.edu/ehs/sites/default/files/pdf/osuhazcombook.pdf>

The facility provides two flammable and chemical storage cabinets for flammable and hazardous materials. It also provides multiple oily waste cans and a covered oily waste disposal drum for regular EHS pickup.

All OSU employees who work in labs, shops or support spaces are required to undergo a series of trainings in lab safety, lab hazard awareness, hazardous and universal waste, and hazard communication. The mandatory training modules are located here:

http://oregonstate.edu/ehs/training/lab_safety_training

<http://oregonstate.edu/ehs/lab-hazard-awareness-training-non-lab-personnel>

<http://oregonstate.edu/ehs/training/hazwaste>

<http://oregonstate.edu/ehs/hazard-communication-global-harmonizing-system>

Forklifts and Heavy Equipment

The facility adheres to University policy and procedures for forklifts (lift trucks) and heavy equipment. The policy and procedures for forklift operations safety are located here:

<http://oregonstate.edu/ehs/forklifts>

The facility owns and maintains four different forklifts or pieces of heavy equipment:

- Nissan 5000lb lift truck, model PHO2A25V

- Wacker-Neusson loader, model 280L
- Yale lift truck, model GLP100MGNSBE093
- Ingersoll Rand shooting boom forklift, model VR-1056C

Prior to operating any forklifts or heavy equipment at the facility, everyone must participate in documented forklift and heavy equipment training. Everyone is notified of this requirement as part of the mandatory walk-through safety training session described in the Employee Participation and Safety Rules sections above. All training documentation is signed and permanently stored at the facility.

In the case of rented equipment, operation and safety manuals are reviewed prior to any use. Only people authorized and trained by facility staff may operate rental equipment.

Language Barrier

All facility personnel are fluent in English.

Manual Lifting

Any load more than 50 lbs. should be mechanically lifted whenever possible. Additional guidelines and resources for proper manual handling of materials are available here:

<http://oregonstate.edu/ehs/ergonomics-material-handling>

Also, additional guidelines on workspaces and ergonomics are available here:

<http://oregonstate.edu/ehs/ergonomics>

Mechanical Lifting

Mechanical lifting is conducted at the facility using either overhead bridge and gantry cranes or forklifts and heavy machinery. The facility adheres to University policy and procedures for both, as previously described under Crane and Hoist Safety or under Forklift and Heavy Machinery Safety.

Prior to operating any cranes, forklifts or heavy equipment at the facility, everyone must participate in the applicable documented training. Everyone is notified of this requirement as part of the mandatory walk-through safety training session described in the Employee Participation and Safety Rules sections above. All training documentation is signed and permanently stored at the facility.

Machine Guarding

Prior to operation of any powered tool or machine, the applicable machine guarding will be checked to ensure that it is intact, in place, adjusted and functioning properly. For more details, see the Power Tools and Shop section below.

Noise Exposure

The facility adheres to University policy and procedures for noise exposure. The policy and procedures for the hearing conservation program and noise control plan are located here:

http://oregonstate.edu/ehs/sites/default/files/pdf/si/hearing_conservation_si044.pdf

The facility is not exposed to sound levels in excess of 85 dBA in normal working conditions. If noisy tools or equipment is operated, hearing protection is recommended and is collocated at the facility with other PPE. Hearing PPE at the facility consists of foam ear plugs and ear muffs. Additionally, doors between the two wings of the facility can be closed to isolate noise.

Powered Platforms and Vehicle-Mounted Work Platforms

No powered platforms are owned by the facility. In the case of rented equipment, operation and safety manuals are reviewed prior to any use. Only people authorized and trained by facility staff may operate rental equipment.

The facility has a vehicle-mounted work platform that can be lifted by the equipment described in the Forklifts and Heavy Equipment section above.

Use of any powered platform or vehicle-mounted work platform requires adherence to University policy and procedures for elevated work surfaces, as described in the Elevated Work section above.

Power Tools and Shop

Prior to operating any power tools or shop tools at the facility, everyone must participate in the applicable training. Separate training is required on each specific tool. Everyone is notified of this requirement as part of the mandatory walk-through safety training session described in the Employee Participation and Safety Rules sections above. All training documentation is signed and permanently stored at the facility.

Shop tools are inspected as part of the monthly safety self-inspection described in the Self-Audits and Self-Inspections section above. All audit and inspection documentation is signed and permanently stored at the facility.

For reference, the University shop safety information page is located here:

<http://oregonstate.edu/ehs/LP-L-shop>

The following is a list of fixed power tools at the facility:

Fixed power tools	
Manufacturer	Description
Briggs & Stratton	Generator
Clausing	Drill press
Core Cut	Concrete Saw
Dayton	Air compressor
Delta	Drill press, band saw, bench grinder
DeWalt	Cabinet table saw, Compound miter saws (chop saws)
Fisher	Kiln
Grizzle	Cabinet table saw
Lincoln, Miller	Welders
Milwaukee	Chop saw
Powermatic	Band saw, drill press
Rod Chomper	Rebar cutter & bender
Safety Speed Cut	Vertical panel saw
Spyglass	Band saw
Thermal Dynamics	Plasma cutter
Tippman	Air driven die cutter
Wilton	Band saw and mill drill

The following is a list of handheld or mobile / movable power tools at the facility:

Handheld / mobile power tools	
Manufacturer	Description
Black & Decker, Bosch	Corded drills
Bosch	Cordless drills, hammer drill, sander
Campbell-Hausfield	Air compressor, air ratchet
Dewalt	Belt sander, circular saw, corded drill, cordless drills
Dewalt	Impact drivers, grinders, jigsaw, reciprocating saw
Dremel	Grinder/engraver, band saw, reciprocating saw
Hilti	Hammer drill
Husky	Air driven sander
Husqvarna	Circular saw
Ingersoll Rand, NAPA, Jet	Air driven impact wrenches
Kett	Power shear (sheet metal cutter)
Makita	Vibrating cutter
Metabo	Grinders, sanders
Miller	Floor cutting saw
Milwaukee	Corded drills, die grinder, engravers
Milwaukee	Hammer drill, jigsaw, reciprocating saw, sander
Porter Cable	Round head framing nailer, router, belt sander
Porter Cable	Deep cut band saw, grinder, worm drive circular saw
Senco	Screw gun
Simpson	Air driven caulk gun
Skil	Circular saw
Sure-Clean NW	Pressure washer

Radiation

Not applicable to the facility.

Remote Operations

Not applicable to the facility.

Respirators

The facility adheres to University policy and procedures for respiratory protection, located here:

<http://oregonstate.edu/ehs/SD0020>

Should the facility and EHS determine that respiratory protection is required for a specific activity, EHS will oversee medical clearance, training and fit test, per the above policy and procedures. Voluntary use of filtering facepiece respirators (dust masks) is only permitted in the absence of hazardous materials. Dust mask use requires the completion of appropriate forms found in the above policy and procedures.

Scaffolding

The facility adheres to University policy and procedures for elevated work surfaces, as described in Elevated Work above. Additionally, facility scaffolding must be checked and assembled only by facility staff.

Temperature Stress

The facility adheres to University policy and procedures for heat stress, located here:

http://oregonstate.edu/ehs/sites/default/files/pdf/si/heat_stress_si092.pdf

There are no documented temperature extremes at the facility. While the facility does maintain a reasonable level of indoor temperature-controlled space, much of the work at the facility is in a covered but non-temperature-controlled environment without heating, ventilation, and air conditioning.

Should anyone experience temperature stress, they should immediately cease the activity and seek proper remediation by reporting to facility staff. Any facility staff member can immediately stop all research and operational activity if temperature stress to personnel is observed. Activity cannot resume until facility staff have evaluated the situation and put controls in place to prevent excess exposure.

OR-OSHA guidelines for recognizing and dealing with hypothermia are located here:

<http://osha.oregon.gov/OSHAPubs/3336.pdf>

Vehicle Exposure

The facility adheres to University policy and procedures for vehicle exposure. The policy and procedures for vehicle safety are located here:

<http://fa.oregonstate.edu/saf-manual/200-workplace-safety/206-vehicle-safety>

Anyone who drives a University-owned vehicle must meet the OSU Motor Pool and OSU Business Services guidelines. The guidelines are located here:

<http://transportation.oregonstate.edu/motorpool/drivers>

Drivers of University-owned vehicles must drive responsibly. OSU Motor Pool may suspend driving privileges for failing to meet those responsibilities, or for other safety reasons.

Anyone who drives a University-owned vehicle must submit a driver's authorization form through OSU Motor Pool. The form is located here:

<http://transportation.oregonstate.edu/motorpool/drivers/driver-authorization>

Welding

The facility adheres to University policy and procedures for welding and burning, located here:

http://oregonstate.edu/ehs/sites/default/files/pdf/si/welding_and_burning_si057.pdf

The facility owns and maintains welders from Lincoln and Miller.

Chapter 4 – Other Plan Elements

General Environmental Waste

All environmental wastes generated at the facility are handled by EHS.

Large Wave Flume or Directional Wave Basin Water Contamination

Contamination of the basin water with hydraulic fluid or other foreign substances requires cleanup of the water prior to drainage. An environmental cleanup firm will be contracted for cleanup services as deemed necessary. EHS has final authority over the suitability of water quality for drainage.

Water being drained from the basin or flume must meet the regulatory standard for chlorine (< 0.1 mg/L). The facility measures chlorine concentration prior to discharge. If levels are too high, a combination of chemical dechlorination and aeration is undertaken. Chlorine discharge levels are periodically sampled and analyzed by EHS.

Large Wave Flume or Directional Wave Basin Wave Maker Operation

Prior to operating any forklifts or heavy equipment at the facility, everyone must participate in documented forklift and heavy equipment training. Everyone is notified of this requirement as part of the mandatory walk-through safety training session described in the Employee Participation and Safety Rules sections above. All training documentation is signed and permanently stored at the facility.

Appendix A – Self-inspection Checklist

O.H. Hinsdale Wave Research Laboratory
Self-inspection and Maintenance Checklist
Signature and Date: _____

#	Action	Description
General		
1		Are first aid and protective gear storage accessible and fully stocked?
2		Are pool rescue hooks and lifeguard floats functional and accessible?
3		Are work areas adequately lit?
4		Is the rack and pallet accessible with all contents stored properly and safely?
5		Are all ladders clean and undamaged with no broken steps, rungs, cleats or rails?
Large Wave Flume		
6		Are fenced areas around the wave maker accessible and secured?
7		Is there pressure on board seals and is the sump water level low?
8		Are oil levels in the HPUs normal? Are the systems free of oil leaks?
9		Are fastener or structural members free of any signs of failure?
10		Are linear bearing rails free of corrosion or damage?
11		Has the wave maker been free of unusual noises? Is it operating normally?
12		Are the oil drain pumps tested & operating? Are their reservoirs low and filters clean?
13		Did you lubricate all 8 wave maker bearings with the board in motion?
Directional Wave Basin		
14		Are fastener or structural members free of any signs of failure?
15		Has the wave maker been free of unusual noises? Is it operating normally?
Machine Shop		
16		Is the shop area clean and adequately lit?
17		Are tools and extension cords maintained, operational, and stored safely?
Heavy Machinery and Cranes		
18		Did the forklifts pass a documented inspection?
19		Are the loader and shooting-boom lift stored properly?
20		Are the DWB and LWF cranes operating normally and stored properly?
21		Are crane hooks free of deformation or cracks and cables free of deformation or wear?
22		Is the LWF gantry crane power cord intact and yellow marked area clear?
23		Has the LWF cart been moved at least once a week for the past month?
Compressed Gas Cylinders, Chemicals & Hazardous Materials		
24		Are all flammables in provided locker, with old/unused items sent for disposal?
25		Are paint cans in provided locker/shelves, with old/unused items sent for disposal?
26		Are compressed gas cylinders properly stored, capped, and chained?
Operations		
27		Are straps and lift cables inspected after use and stored properly?
28		Are all extension cords and powered equipment free from splash risk or submersion?
29		Are all orange power outlets free of non-instrumentation equipment?
Last revised on February 14, 2017		

Appendix B – Training Documentation



FACILITY SAFETY BRIEFING

Documented training required before working or operating any equipment ☐

Separate training required for cranes, heavy machinery, shop tools, wavemakers ☐

Be aware of and follow all safety rules, signs and instructions ☐

Facility map and emergency procedures reviewed ☐

Report all accidents and potential hazards to your supervisor ☐

Anyone with a safety concern is expected to call a stop to work ☐

Building hours; security; no unescorted visitors or walk-ins for tours ☐

General environmental awareness

- Focus on the job at hand; proper personal mechanics ☐
- Closed-toe shoes required to work on lab floor ☐
- Secured hair and clothing required to work on lab floor ☐
- Be aware of trip hazards; keep walkways clear ☐
- Do not approach crane/machinery/tool use without operator clearance ☐

Limited access areas

- Entry areas requires special permission, permits, or lockout/tagout ☐
- Do not climb on, around, or inside any wave maker when it is on ☐
- Stay out of Large Wave Flume enclosure when wavemaker on ☐
- Stay out of area behind Directional Wave Basin when wavemaker on ☐

Personal protective equipment and first aid

- Location and use and resupply ☐
- Hard hats required for all overhead hazards ☐
- Hard hats required when in Large Wave Flume or for cranes ☐
- Eye and ear protection required when working with shop/power tools ☐
- Eye protection required when aerosols are used or if chips may fly ☐

Hazardous or flammable materials handling, storage and disposal ☐

No distractions, such as mobile devices

- Do not use mobile devices while driving vehicles ☐
- Do not use mobile devices while using power tools or shop tools ☐
- Do not use mobile devices while operating heavy machinery or cranes ☐
- No unnecessary conversations with crane/machinery/tool operators ☐

Trainee name: _____

Supervisor name: _____

Trainee signature: _____

Date: _____



Crane and hoist training

Crane operator manual read and understood ☐

Safety

- No cell or mobile device usage by operator ☐
- Do not needlessly distract the operator ☐
- Hard hats required while crane is in use ☐
- Never get under the load; never ride a load or hook ☐

Pre-operation inspection

- Check hook for signs of deformation or cracks ☐
- Check hoist chain or cable for signs of deformation or excessive wear ☐
- Check for correct operation of hoist, trolley, bridge ☐
- Check rigging for wear before use ☐

Rigging

- Ropes, straps, cables, rings, and shackles ☐
- Check load ratings and inspect for wear before use ☐
- Remove any damaged rigging from service ☐
- Store all rigging and equipment after use ☐

Controls

- Interlocks and stop button ☐
- Variable speed controls ☐
- Hoist, trolley, and bridge motions and limits ☐
- Tie-down apparatus for Large Wave Flume gantry crane ☐
- Storage of hook and remote when not used ☐

Operations

- Know locations and proper use of emergency power disconnects ☐
- Determine load weight; pick only one load ☐
- Use only proper and rated rigging ☐
- Use rigging wear or cut protection on corners/angles/edges ☐
- Know picking types and angles and effects on rating ☐
- Operate at safe travel/pick speeds, use tag lines ☐
- Keep hoist line plumb and keep hook above the load center of gravity ☐
- Use proper hand signals for hoisting operations ☐
- Watch yourself, your load, and bystanders ☐

Cranes

- Structures lab 20-ton bridge crane ☐
- Tsunami Wave Basin 7.5-ton bridge crane ☐
- Large Wave Flume 6-ton gantry crane ☐

Trainee name: _____

Supervisor name: _____

Trainee signature: _____

Date: _____



School of Civil and Construction Engineering Laboratories
Oregon State University, 3550 SW Jefferson Way, Corvallis, OR 97331
T 541-737-2875 | F 541-737-6974 | <http://wave.oregonstate.edu>

Heavy Machinery Training Checklist

Vehicles:

- ☐ Nissan 5000lb lift truck, model PHO2A25V
- ☐ Wacker-Neusson loader, model 280L
- ☐ Yale lift truck, model GLP100MGNSBE093
- ☐ Ingersoll Rand shooting boom forklift, model VR-1056C

Operations review:

- ☐ Data plate
- ☐ Safety features (horn, lights, parking brake, seatbelt, turn signals)
- ☐ Daily maintenance check and inspection
- ☐ Propane daily shutoff, storage, changing with leak test, and refilling
- ☐ Vehicle driving and steering
- ☐ Fork, boom, bucket controls
- ☐ Attachments and use

Demonstrates:

- ☐ Pre-operation check of the machinery
- ☐ Operation of the machinery including ignition, directional control, lift and tilt controls
- ☐ Proper driving skills, checking visibility and use of horn
- ☐ Correctly moves objects with load secured and centered
- ☐ Stacking loads
- ☐ Steering and maneuvering techniques
- ☐ Knowledge of load center and capacity
- ☐ Awareness of driving surface

Safety:

- ☐ Watch for pedestrians, stops and signals for them to pass when safe
- ☐ Looks behind prior to backing up
- ☐ Wears seatbelt
- ☐ Slows down and looks for pedestrians at corners, doors, and intersections
- ☐ Drives slow and deliberate
- ☐ No cell phone or mobile device use while driving

Trainee name: _____

Supervisor name: _____

Trainee signature: _____

Date: _____



Directional Wave Basin wave maker training

User's manual

- Read/review operator's safety practices (Section 2) ☐
- Read/review standard operating procedures (Section 6) ☐

Safety

- Emergency stop (ESTOP) buttons, interlocks, and resets ☐
- Do not run the wave maker when anyone is in the basin ☐
- Do not run the wave maker when anyone is behind the wave maker ☐
- Do not run the wave maker when anyone is on, around, or inside it ☐

Software interface

- OSU Tsunami Wave Generator ☐
- Wave Programs ☐
- Oscilloscope ☐
- Message Log ☐

Operations

- Operator checklist ☐
- Start-up sequence: ESTOP, 24V, reset buttons, 480V, drive enable ☐
- Retract and zero setpoints ☐
- Typical program modes (tsunami, Airy, displacement file) ☐
- Preview required first run of any files (displacement or wave height) ☐
- Shutdown sequence: drive disable, 480V off, 24V off, ESTOP ☐

Demonstration

- Observed trained operator running standard procedures ☐
- Demonstrates ability to run wave maker safely and correctly ☐

Trainee name: _____

Supervisor name: _____

Trainee signature: _____

Date: _____



Large Wave Flume wave maker training

User's manual

- Read/review operator safety practices (p. 15-24) ☐
- Read/review standard operating procedures (p. 101-112) ☐

Safety

- Emergency stop (ESTOP) buttons, interlocks, and resets ☐
- Do not run the wave maker when anyone is in the flume ☐
- Do not run the wave maker when anyone is in the pump enclosures ☐
- Do not run the wave maker when anyone is on, around, or inside it ☐

Software interface

- OSU.2D Wave Generation Controller ☐
- Waveboard Program ☐
- Oscilloscope ☐
- Interlock Status ☐
- Static Support ☐
- Waveboard Three-Variable and PID Servo Controller ☐
- Message Log ☐

Operations

- Operator checklist ☐
- Start-up: ESTOP, low pressure, warm-up, seal pressure, grease ☐
- Static support enable and gains ☐
- Retract and zero setpoints; 3-variable controller modes ☐
- Typical program modes (tsunami, Airy, tsunami file, displacement file) ☐
- Shutdown: zero board, disable static support, power off, ESTOP ☐

Demonstration

- Observed trained operator running standard procedures ☐
- Demonstrates ability to run wave maker safely and correctly ☐

Trainee name: _____

Supervisor name: _____

Trainee signature: _____

Date: _____

Appendix C – Facility Map

