FALL PROTECTION GUIDELINE

Approval:

Signature on file  9/9/09
Chair, Institution Safety Committee Date

Signature on file  9/9/09
Environmental Health & Safety Director Date
1.0 Purpose and Scope

Falls are a leading cause of fatalities and disabling injuries. In accordance with OSHA, all WHOI personnel must be protected from fall hazards whenever 6 feet or more above a lower level for construction activities and 4 feet or more above a lower level for non-construction related activities. Examples of tasks or locations that may require fall protection include: roof work, excavations, holes, above/near dangerous equipment, above/near tanks, tower/mast climbing, etc. In addition, this guideline includes requirements for stairs and stair railings. This guideline applies to all WHOI personnel and contractors and does not apply to marine operations that are addressed by applicable U.S. Coast Guard Regulations.

2.0 Responsibilities

EH&S Office:
- Provides general fall protection training.
- Provides an adequate supply of fall protection equipment for most applications, including: harnesses, lanyards, life lines, and rigging equipment. This equipment can be signed out and borrowed.

Facilities Director or Designee:
- Ensures that stairs and railings are designed and constructed in accordance with applicable codes and standards.

Supervisors and Personnel:
- Attend fall protection training if you or your personnel may be exposed to falls and/or are required to implement OSHA-mandated fall protection.
- Inspect and properly use OSHA-compliant fall protection equipment.
- Plan for emergencies, including rescue and retrieval of personnel that may be suspended in a harness.

3.0 Fall Protection Systems

Fall protection can generally be provided through the use of one or more of the following methods: guardrail systems, personnel fall arrest systems, positioning device systems, warning line systems, and safety monitoring systems.

3.1 Guardrail Systems

When a guardrail system is used to protect personnel from falls, the system must meet the following:

- Top rail must be 42” plus or minus 3” above the walking/working level
- A mid rail must be installed midway (approx 21”) between the walking surface and the top rail
- A toe board at least 3 ½ inches high must be used if there is potential for material to fall to the lower level
- The top rail must be able to withstand a force of at least 200 lbs applied in any direction

![Diagram of guardrail system with specifications:]

- Top Rail: Shall be 42 inches (plus or minus 3 inches) above walking/working surface and support a 200 lb force
- Mid Rail: Generally installed 21 inches between top rail and walking surface. Must support a 150 lb force
- Toe Boards: Shall be 3.5 inches high and support a 50 lb force.
3.1.1 All wall openings with a drop of greater than four feet (six feet for construction) or where a person could fall into dangerous equipment/material shall be protected by an approved barrier such as a guardrail.

3.1.2 Every open-sided floor or platform 4 feet or more above adjacent floor or ground level shall be protected by a guardrail system on all open sides except where there is entrance to a ramp, stairway, or fixed ladder.

3.2 Personal Fall Arrest Systems

A personal fall arrest system consists of an OSHA-compliant anchorage, connectors and a full body harness. Personnel using personal fall arrest systems must:

- Inspect all components for wear or damage prior to each use.
- Locate the attachment point of the body harness near the center of the wearers back near shoulder level.
- Rig the system so that the worker cannot free fall more than 6 feet, or contact the lower level.
- Must be secured to an anchorage that can support at least 5,000 lbs.

NOTE: OSHA reports that potentially fatal suspension trauma (blood flow severely restricted) can occur within minutes while a victim is suspended from a harness and waiting to be rescued. All personnel that wear harnesses shall ensure they are equipped with a step relief device that will help prevent suspension trauma and enhance blood circulation.

NOTE: Body belts are not allowed to be used as part of a personal fall arrest system.

The personal fall arrest equipment must be OSHA-compliant, including:

- Dee-rings and snap-hooks must have a minimum tensile strength of 5,000 lbs.
- Lanyards and vertical lifelines must have a minimum breaking strength of 5,000 lbs.
- Self-retracting lifelines and lanyards that limit free fall to 2 feet or less must have a minimum 3,000 lb capacity, devices that do not limit the free-fall to 2 feet must have a minimum 5,000 lb capacity.
- Anchorages must be capable of supporting at least 5,000 lbs per person attached.

3.3 Positioning Device Systems

A positioning device is a full body harness that is rigged to allow a worker to be supported on an elevated surface while working with both hands free. Positioning device systems must be OSHA-compliant, including:

- Be rigged such that the worker cannot fall more than 2 feet.
- Be secured to an anchorage that can support at least 3,000 lbs.
- Snap hooks, Dee-rings, and other connectors must meet the same criteria as personal fall arrest systems.

3.4 Warning Line System

A warning line system is a barrier erected on a roof or elevated structure to warn personnel that they are approaching an unprotected roof side or edge. The warning line system designates an area in which work may take place without the use of guardrail systems or personal fall arrest systems.

Warning line systems are only allowed on low sloped roofs (a slope equal to or less than 4 in 12 – vertical to horizontal).

Warning lines must be installed around all sides of the roof or elevated structure’s edge, and must be at least 6 feet from the roof/structure edge. Warning lines must be between 34 and 39 inches high, and flagged with high visibility markers. Lines must have a breaking strength of at least 500 lbs and the stations supporting the lines must support a horizontal load of at least 16 lbs.
3.5 Safety Monitoring System

This safety system consists of using a competent person who is responsible for recognizing and warning personnel of fall hazards. In order to use a safety monitoring system, it must be demonstrated that fall protection (such as a personal fall arrest system) is not feasible or will cause a greater hazard. This is very difficult to demonstrate and should only be used with approval from the EH&S Office. The competent person must:

- Be competent in recognizing fall hazards
- Be present on the same walking/working surface as the personnel
- Have no other duties that will distract him/her from the monitoring duties
- Be capable of detecting unsafe practices
- Is close enough to the personnel to communicate orally

4.0 Roofing Work

All personnel working on roofs with unprotected sides and edges 6 feet or more above lower levels must be protected by approved fall protection system, which may include:

- Guardrail systems
- Personal fall arrest systems
- A combination of warning line system and safety monitoring system
- Other methods approved by the EH&S Office, such as OSHA-compliant safety net systems
- On low-slope roofs, 50-feet or less in width, the use of only a safety monitoring system may be used

Roof skylights shall be adequately safeguarded to protect against fall-through hazards.

5.0 Aerial Lifts

All operators of areal lifts, such as scissor lifts and buckets, must wear a harness and be properly attached to the lift with a lanyard.

6.0 Inspection

All fall protection equipment will be visually inspected for defects prior to each use. If there is evidence of excessive equipment wear or deterioration or if mechanical malfunction is detected, the item will be removed from service and discarded or repaired in accordance with manufacturer’s instructions. Safety harnesses and/or lanyards that have been subjected to an impact load will be destroyed. Load testing will not be performed on fall protection equipment.

7.0 Two-Person Rule

Personnel requiring the use of fall protection equipment should employ the "Buddy System" or have an observer to render assistance if required. The observer/buddy must have reliable communication in case of emergencies.

8.0 Training

All WHOI personnel exposed to fall hazards must receive fall protection training.

9.0 Rescue and Retrieval

All personnel and supervisors involved with work that requires fall protection must plan for emergencies, including rescue and retrieval operations. If someone is suspended from a harness or otherwise needs to be rescued, immediately call 2911 or 508-289-2911 from cell phone. The caller should request immediate assistance from Falmouth Fire Rescue and WHOI’s Emergency Coordinators. As noted above, a victim
suspended from a harness can suffer from suspension trauma within minutes, which is a potentially fatal condition due to restricted blood circulation.

10.0 Stairs

Fixed industrial stairs shall be provided for access from one level to another where:

- Operations necessitate regular travel between levels and for access to operating platforms;
- Access to elevations is daily or at each shift for such purposes as gauging, inspection or regular maintenance;
- Such work may expose employees to acids, caustics, gases, or other harmful substances; or
- Carrying of tools or equipment by hand is normally required.

10.1 Design of Stairs

- Fixed stairways shall be designed and constructed to carry a load of five times the normal live load anticipated and a concentrated load of at least 1,000 pounds
- All treads shall be reasonably slip-resistant and the nosing shall be of nonslip finish.
- Stairs shall be designed in accordance with applicable codes and standards. Contact the Facilities Director or designee with questions about the design of stairs.

10.2 Design of Stair Railings

- Every flight of stairs having four or more risers shall be equipped with standard stair railings or standard handrails.
- A standard railing shall consist of top rail, intermediate rail (on open sides), and posts and be designed in accordance with applicable codes and standards. Contact the Facilities Director or designee with questions about the design of railings.
- Standard railings shall be provided on the open sides of all exposed stairways and stair platforms.
- On stairways less than 44 inches wide, at least one stair railing on open side is required. Standard railings shall be provided on the open sides of all exposed stairways and stair platforms. Handrails shall be provided on at least one side of closed stairways preferably on the right side descending.
- The top rail shall be smooth-surfaced throughout the length of the railing. The intermediate rail shall be approximately halfway between the top rail and the floor, platform, runway, or ramp.
- The ends of the rails shall not overhang the terminal posts except where such overhang does not constitute a projection hazard.
- The mounting of handrails shall be such that the completed structure is capable of withstanding a load of at least 200 pounds applied in any direction at any point on the rail.