Near Experimental Hall Area Hazard Analysis
SLAC-I-030-30500-001
Building 950: Near Experimental Hall AHA

XFDSO approval (signature/date): 8/10/09 Zoe VanHoover
Area Manager approval (signature/date): Nel Tompkins 8/10/09 Hal Tompkins

Revision Record

<table>
<thead>
<tr>
<th>Revision</th>
<th>Date Revised</th>
<th>Section(s) Affected</th>
<th>Description of Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>R000</td>
<td>August 10, 2009</td>
<td>All</td>
<td>Original Release</td>
</tr>
</tbody>
</table>
# Building 950: Near Experimental Hall AHA

The purpose of this Area Hazard Analysis (AHA) is to inform anyone entering the area of potential hazards and to recommend controls and actions. Specific jobs and tasks that may be performed in this area are not considered in the AHA and are covered by the Activity Training and Authorization process.

<table>
<thead>
<tr>
<th>Processes / Equipment in Area</th>
<th>Hazards</th>
<th>Recommended Controls &amp; Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>General working environment</td>
<td>Emergency Response</td>
<td>• Know the locations of emergency egresses: there are two stairwells, plus an emergency egress route through the Dump Enclosure and X-Ray Tunnel.</td>
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<td></td>
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<td>• Know location of fire equipment, and safety equipment.</td>
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<td></td>
<td></td>
<td>• Signage: “Fire Extinguisher” signs above each fire extinguisher.</td>
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<td></td>
<td></td>
<td>• See the Near Experimental Hall Building Emergency Plan (SLAC-I-030-30400-001).</td>
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<tr>
<td></td>
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<td>• In the event of a fire alarm, evacuate the NEH.</td>
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<tr>
<td>Long exit distances and windowless corridors</td>
<td>Difficulty evacuating in the event of a fire</td>
<td>Limit the accumulation of unnecessary combustible materials in beamline areas.</td>
</tr>
<tr>
<td>Liquid cryogen dewar use</td>
<td>• Oxygen deficiency from uncontrolled release of nitrogen gas</td>
<td>• Do not bring cryogens into the LCLS NEH unless an ES&amp;H-approved procedure is in place, and all required postings and equipment are in place for the particular work planned.</td>
</tr>
<tr>
<td></td>
<td>• Frostbite</td>
<td>• Follow ES&amp;H-approved procedure for using cryogens, including posting the procedure at the entrance, checking the ventilation, and using ODM’s.</td>
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<tr>
<td></td>
<td>• Eye injury</td>
<td>• Use appropriate PPE. If using liquid nitrogen this includes eye protection, cryogenic gloves, long pants or apron, and closed-toe shoes.</td>
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<tr>
<td></td>
<td></td>
<td>• Do not accompany liquid cryogen dewars in the elevator. Use ES&amp;H-approved procedure for cryogen transport in the elevator.</td>
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<tr>
<td></td>
<td></td>
<td>• Ventilation is required for entry into any hutch containing a cryogen dewar. Check flags on ventilation ducts before entering.</td>
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<tr>
<td></td>
<td></td>
<td>• In the event of an oxygen deficiency alarm, evacuate the area and notify responders as specified in the ES&amp;H-approved procedure and postings.</td>
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<tr>
<td></td>
<td></td>
<td>• If you witness a catastrophic cryogen dewar failure, evacuate the NEH immediately, pulling the building fire alarm on the way out. Do not wait for the ODM alarm to sound.</td>
</tr>
</tbody>
</table>
## LCLS Near Experimental Hall Area Hazard Analysis (AHA)

| **Stairways** | **Injury from fall** | **Injury from trip on step** | **Don’t rush, pay attention, and use handrails** | **When carrying items keep one hand free to use the handrail and ensure that your view of the step is not obstructed.** | **If items are too large, heavy, or awkward to carry safely on the stairs, use the freight elevator to transport them.** |
| **Working surfaces and areas (general): tight spaces, low headroom, standing water, and protruding objects** | **Slips, trips, and falls over fixed and transient (pipes, hoses, water) hazards** | **Head bump in tight spaces or on protruding items** | **Remove trip hazards to keep designated aisles clear.** | **Clean up spills immediately.** | **Do not run. Keep eyes on path while walking.** | **Do not overexert yourself when working in tight spaces** | **Do not reach blindly under any equipment** | **Use bump caps or hard hats for areas with head bump hazards** | **Wearing open-toed shoes is not permitted in the NEH hutches.** |
| **Beam line data acquisition and control electronics** | **Electrical shock hazard** | **Only qualified personnel allowed to work on powered electrical chassis. Contact responsible group or Floor Coordinator for assistance** | **Power down motor drivers before disconnecting motor cables** | **Power down HV power supplies before disconnecting HV cables** | **Report water on the floor promptly** |
| **Experimental hutches** | **There is potential for exposure to radiation** | **Hutch areas are protected from access during x-ray operation by the HPS system.** | **Heed the HPS signs and lights: Do not attempt to open doors that have an illuminated or flashing magenta light above them.** | **Schedule work requiring hutch access for repair days or downtime via the Area Manager.** | **Do not tamper with or work on devices or shielding that is labeled as ‘Radiation Safety Items,’ ‘HPS’ or ‘PPS’ without proper authorization from the Experimental Facilities Division Safety Office (XFDSO) and Radiation Physics (RP). These devices are part of the radiation protection system.** | **If you experience the flashing radiation warning strobe and audible alert in the hutch, immediately push the nearest (illuminated and red) emergency off button, leave the Hutch, and notify the Floor Coordinator.** | **Do not evade the hutch search.** | **Only trained and qualified searchers may perform searches and operate the HPS system. Qualified workers and users must follow all relevant** |
### LCLS Near Experimental Hall Area Hazard Analysis (AHA)

<table>
<thead>
<tr>
<th>Topic</th>
<th>Details</th>
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</table>
| Vacuum Systems | • Electrical shock hazard from ion pumps  
• Burns from hot heater tapes  
• Fiberglass exposure from heater tapes  
• Possible implosion debris  
• Only qualified personnel allowed to work on ion pumps  
• Be aware of your surroundings, variac racks and/or funny odors could indicate bake outs  
• Don’t unwrap foil from heater tapes unless necessary.  
• Exercise care around ion pump feedthrus and viewports.  
• Keep viewports covered when not in use. |
| Lead shielding | • Exposure to hazardous material  
• Contamination of equipment and environment  
• Label the shielding as a Radiation Safety Item  
• Paint the lead  
• Only handle lead with appropriate work planning and controls in place. See ES&H manual chapter 20. |
| Pressurized gases and liquids in supply lines: helium, argon, nitrogen, CO2, air, water. | Bodily injury from flying material or other physical insult while working on tubing and fittings.  
• Use proper PPE (eye protection, gloves, etc.) when working on tubing and fittings for compressed gases and water lines.  
• Do not work on compressed air lines unless authorized. Always close valves to de-energize line before starting work. |
| Welding | • Burn injury  
• Eye injury  
• Fire hazard  
• SLAC requires Hot Work Permit  
• Use PPE appropriate to task  
• Use flash curtain to minimize exposure to others |
| High power Class 4 laser in the Laser Hall. | • eye injury  
• skin injury  
• startle hazard  
• The Laser Hall Standard Operating Procedure (SOP) document describes the laser hazards, procedures, safety controls and training requirements for operation of this laser  
• The Laser Hall can be in one of 3 laser operation modes as described in the Laser Hall SOP: Laser Off, Laser Hall Green Operation, or Normal Operation  
• Entry display for laser operation mode: An electronic display sign at the Laser Hall entry indicates the Laser Operation mode. The sign will indicate which of the 3 operation modes exists and will also indicate ~every 15 seconds that the engineered laser safety system is active and ok (LSS ACTIVE and OK displayed). Prior to entry, non-laser personnel must verify that the electronic display indicates Laser Off, and that the "LSS ACTIVE and OK" is also displayed  
• Non-QLOs may only enter the Laser Hall with the LSS in Laser Hall Green Operation mode, or Normal Operation mode if escorted by a QLO as described in the SOP. |

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| Hutch 1 low power alignment laser: The AMO instrument has a Class 2 reference laser | • temporary flashblindness  
• startle hazard | • When in use a laser warning sign will be posted at the Hutch entry door and an alignment laser operator will be present. |
|---|---|---|
| High power Class 4 laser can be transported from the Laser Hall to Hutch 1 | • eye injury  
• skin injury  
• startle hazard | • The Hutch 1 Standard Operating Procedure (SOP) document describes the laser hazards, procedures, safety controls and training requirements for operation of this laser  
• Hutch 1 can be in one of 3 laser operation modes as described in the Hutch 1 SOP: Laser Off, Class 1 or Class 4.  
• Entry display for laser operation mode: An electronic display sign at the Hutch 1 entry indicates the Laser Operation mode. The sign will indicate which of the 3 operation modes exists and will also indicate every 15 seconds that the engineered laser safety system is active and ok (LSS ACTIVE and OK displayed). Prior to entry, non-laser personnel must verify that the electronic display indicates Laser Off or Class 1 and that the "LSS ACTIVE and OK" is also displayed  
• Class 4 mode: Only Qualified Laser Operators (QLOs) may work in the hutch  
• Laser Off: Laser beam is blocked from entering the Hutch by two redundant laser safety shutters in the Laser Hall above; safe for non-laser personnel to enter  
• Class 1 mode: Laser beam may be present in the Hutch inside the Class 1 enclosure around the laser table and blocked from exiting the enclosure by two redundant laser safety shutters; safe for non-laser personnel to enter  
• CoHE in Laser Off and Class 1 modes: the engineered laser safety system acts as a machine guard for the laser hazard and LOTO is not required for work by non-QLOs done outside the envelope of the laser safety system (i.e. outside of the table enclosure); LOTO capability is provided if needed, using the table enclosure as an energy isolation device with associated lockout points and an ELP.  
• laser safety devices are labeled with explicit instructions that must be followed  
• If you are not a QLO, and experience the flashing laser safety system strobe and audible alert, immediately push the nearest emergency off button, leave the Laser Hall, and notify the Floor Coordinator.  
• Training: QLOs must receive training as described in the SOP. |
## LCLS Near Experimental Hall Area Hazard Analysis (AHA)

| High pressure bottled gases | • Earthquake hazard  
|                           | • Explosive depressurization  
|                           | • Eye injury  
|                           | • Flying objects  
|                           | • Compressed gas bottles to be stored upright and secured in two places.  
|                           | • Cylinders must be either fitted with a regulator or capped.  
|                           | • Use appropriate PPE (eye protection)  
|                           | • Only trained and authorized staff or users may exchange bottles  
|                           | • Chain components that can fly off  
| Power tools               | • Electrical shock hazard  
|                           | • Bodily injury  
|                           | • Inspect power cords before use  
|                           | • Use GFCI with all power tools  
|                           | • Apply force away from your body  
|                           | • Maintain tools in good working order and use the right tool for the job  
| Hazardous materials       | • Eye and skin injury  
|                           | • Inhalation and ingestion injury  
|                           | • Be familiar with hazards associated with each chemical you are handling and insure that appropriate MSDS is available  
|                           | • Use appropriate PPE and procedures for handling (cleaning, cleaving, or mounting) and disposal  
|                           | • In the work planning process, if a hazardous material must be transported by elevator, consider the hazard of being trapped in an unventilated elevator with the hazardous material. A procedure is available for elevator transport of materials that should not be accompanied by personnel in a closed elevator car.  
|                           | • Follow all requirements of the Safety Checklist while using hazardous materials at a beam line  
|                           | • No eating or drinking at work areas where chemicals are used  
|                           | • Label and store containers and samples properly  
| Heaters                   | Burns  
|                           | • Properly insulate hot surfaces where feasible  
|                           | • Be aware of your surroundings  
| Sharps                    | Lacerations and cuts  
|                           | • Use sharps containers for disposal  
|                           | • Use PPE where possible  
| Crane                     | Bodily injury from swinging or falling load  
|                           | • Crane operators must be trained (ES&H 280 series) and certified by SLAC on crane being used  

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| Elevator | Possibility of being trapped during power outage  
| Oxygen deficiency from release of oxygen displacing gas from a cryogen dewar in the enclosed elevator car  
| Injury from being struck by closing doors | Do not use elevator during a building evacuation.  
| Do not accompany liquid cryogen dewars in the elevator. Use ES&H approved procedure for cryogen transport in the elevator.  
| Elevator is for freight transport only.  
| Stand clear of closing doors when audible alert sounds. |
| Working on a ladder or elevated surface | Injury from fall  
| Being struck by falling object | SLAC requires Ladder Safety Training (ES&H 293) to use a ladder  
| Use the correct ladder for the job  
| Always inspect the ladder before each use  
| If working on elevated surfaces (more than four feet off the ground) use a fall protection harness and be trained in its use (Fall Protection/Authorized, ES&H 200) |
| Blind doorways/aisleways | Door-person collision or person/person collision  
| | Be aware of surroundings, do not rush, and open doors carefully.  
| Do not linger in the path of doors that may be opened unexpectedly. |
| Non-Permit Required Confined Spaces:  
| Sub-basement elevator pit | Potential atmospheric hazard if heavier-than-air gases are present in the vicinity.  
| | Confined-space entry and work are governed by rules to ensure worker safety the details of which are found in ES&H Manual Chapter 6. |
| Permit Required Confined Spaces:  
| Air handling units in basement level mechanical rooms #2 and #3 | Hi-velocity air, motorized damper  
| | Confined-space entry and work are governed by rules to ensure worker safety the details of which are found in ES&H Manual Chapter 6.  
| If hazards are LOTO, space can be temporarily declassified as a permit required confined space. |
| Construction Areas | Injury from falling objects, flying debris, or construction equipment.  
| Injury from contact with sharp, unfinished surfaces, uneven flooring, or other unfinished construction.  
| Equipment located in construction areas may not be seismically constrained. | Heed construction area postings and do not enter without proper training, work authorization and release, and PPE.  
| Training: Completion of course #375: ‘Construction Safety Orientation’ is required for unescorted access to construction areas.  
| Wear required PPE when in construction areas: steel toed boots, reflective vest, safety glasses, and hard hat are required for entry. Gloves must be worn when work is being done in construction areas. Gloves may be fingerless for delicate work. |