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Site Operations Manger Livingston <i>N/A</i>	Safety Audit of the LIGO Livingston Laboratory	Approved: <i>M. P. Zydowicz</i>
		Approved: <i>[Signature]</i>

Summary, Safety Audit of the LLO in January 2000

Bill Tyler, Mike Zydowicz, and Caz Scislowicz conducted a safety audit of the LIGO Livingston Observatory (LLO) on January 27, 2000. Gary Sanders and Gerry Stapfer accompanied the auditors on their walk-through of the facilities. The purpose of this audit is two fold: (1) To benchmark current conditions with the project's established goals in safety; and (2) To identify any potentially hazardous conditions and practices before they result in an incident.

To gain a good understanding of the management system in place, we engaged in staff discussions, toured the facilities, and conducted in-depth interviews with several staff members. We were impressed by the strength of internal controls in place throughout the organization, the very capable personnel, and the clearly defined line responsibility in safety exercised by all. Mark Cole and Gerry Stapfer as well as the rest of the staff are to be commended for their excellent work in creating a safety culture at LLO.

We wish to highlight several examples that illustrate the high level of safety awareness as practiced at LLO. (1) The administrative controls implemented as corrective actions after the laser incident (1/15/00) were appropriate and timely and should strengthen the laser safety program. (2) As part of visitor orientation, your commitment to spend the first five minutes with new individual is invaluable in promoting the safety culture of LLO. (3) We liked the effective way the sling and spreader bars were maintained and stored in the LVEA.

The observations enumerated below are minor discrepancies but once corrected will further strengthen your safety program.

Laser Safety

1. Evaluate the feasibility of installing engineering controls in the PSL enclosure i.e., closed circuit monitoring system, to detect stray beams.
2. Post laser safety record (cumulative hours or days of operation without incident).
3. Provide basic laser safety training to security personnel.
4. Re-install viewport covers on beam tube and HAM chambers.
5. Submit laser safety plan proposal to grant unescorted access privileges to Basic Trained Laser personnel who have a need to work in a Laser Controlled Area.
6. Periodically test operation of emergency laser shut down system.
7. Meet with local emergency response personnel to familiarize them with laser hazards and emergency controls (shut down).

Fire/Life Safety

1. Mount fire extinguishers and perform monthly inspection and annual recertification. Evaluate need of extinguisher in the electronic lab.
2. Conduct a routine inspection of exit signs for proper function. Review path of travel to determine need of additional exit sign between office area and LVEA.
3. Provide two-way communications (handy talkie) for unaccompanied personnel working at remote locations.

Material Handling

Post a list identifying those operators certified to work on a crane, manlift, and forklift.

Chemical/Waste Management

1. Provide secondary containment (plastic, chemically resistant trays) for containers of chemicals (bleach, solvents, waste) to catch any spillage.
2. Install a ground at the hazchem/waste storage facility and attach to dispensing drums. Also, label storage facility as a restricted access area.
3. Label waste containers in the labs with contents and date when accumulating waste.
4. Make sure that flammable storage cabinets are properly vented.
5. Document proper face velocity (air flow measurements) of 100 to 125 linear feet per minute for each fumehood.
6. Post appropriate signage on refrigerators (food or chemicals).
7. Provide training to employees on proper waste management practices. Contact the Caltech Safety Office for assistance.

Recommendations

1. Establish LIGO buddy system criteria. Caltech LIGO, in cooperation with LLO and LHO input, needs to review and articulate a policy.
2. Conduct ergonomic evaluations of workstations. Caltech's Workers Comp provider (Royal & Sunalliance) is able to provide such an evaluation.
3. Obtain cost estimate for installing an emergency generator to power fire pumps in the event of a power failure.

Conclusion

This audit has indeed verified that the observatory has complied with internal policies (safety plan), is in compliance with legal requirements, and is engaged in good, safe practices. Safety expectations are clearly communicated and employees are properly trained and have the requisite tools to practice and improve safety performance. Now, one additional step should be taken: a self-inspection program. Routine self-inspection allows for re-evaluation and assessment by the people closest to the work. They are most likely to be able to anticipate problem areas and implement common sense solutions. An adage in safety says, "What gets measured gets targeted for improvements."

A prompt response to an audit demonstrates to everyone that the organization cares about its employees and is serious about incident/accident prevention. A 30-day response time after receiving the written audit report is normally sufficient to prepare a corrective action plan. The Caltech Safety Office is available for assistance.