# BLUE - Don’t Overlook Secondary Hazards

**Lesson ID:** LL-2008-LLNL-05 (LLNL-AR-406016) *(Source: User Submitted)*

**Originating Organization or Contracting Company:** Lawrence Livermore National Laboratory

**Date:** 8/18/2008

**Statement:** Operations need to be reviewed with a "questioning attitude" to identify all potential hazards, not just the most apparent. Those individuals responsible for reviewing or approving work activities should ask "what if" questions for all possible operating modes and scenarios. Furthermore, operations should be evaluated to determine if there is a potential to affect other workers and not just personnel directly involved in the operation. Whenever changes occur to a facility, room, operation or process, hazards need to be reassessed.

**Discussion:** On May 7, 2008, two workers reported viewing diffuse laser light from a Class IV laser operation that was being conducted in an adjacent room. The workers were using an electron beam transport tube to align detectors in one room (Figure 1), while laser technicians were conducting laser alignment in the other room (Figure 2).

**Figure 1. Workers looked into this end of electron beam tube and saw diffuse laser light.**

**Figure 2. Adjacent room. Yellow tape shows pathway of diffuse laser light toward the electron beam tube (not shown). The laser is located beyond the stack of white bricks. Note modification of laser beam tube (cutout between red tape).**

The laser technicians thought that the two rooms were isolated and that the laser operation could not impact anyone but those personnel directly involved with the laser alignment.

Measurements of the available laser light and the results of eye examinations revealed that no eye damage was sustained to either worker. As a result of the incident, the openings between the two rooms were sealed and operations were evaluated to determine if other adjacent locations could be affected by operations.

**Analysis:** A management review concluded that several causes related to insufficient hazards analysis contributed to the incident.

1) The potential for laser light to be viewed from adjacent rooms was not fully evaluated. The primary hazard in the room was radiation from accelerator operations; the laser operation was a secondary hazard. While controls were adequate to protect nearby workers from the radiation, hazards from the laser were considered primarily for impacts upon those workers directly involved with its operation.

2) Over the course of several years, the configuration of both the accelerator and the laser systems had changed significantly. This allowed workers in the other room to peer down the electron beam transport tube and see the laser operation (a section of both the electron beam and laser beam tubes had been removed at different times).

3) Only one experimental work group knew of openings between the two rooms; personnel involved with the laser operation were not aware of those openings. The need for additional communication was further illustrated by the fact that the affected workers were listed on the Integration Work Sheet (IWS) for the laser operation due to their need for access to diagnostic equipment in shared space but information on the openings was never fully discussed or evaluated.

**Actions:** 1) All operations need to be fully analyzed for hazards. The analysis needs to focus on ALL potential hazards, not just the most apparent. Furthermore, operations should be evaluated to determine if there is a potential to affect other workers and not just personnel directly involved in the operation.

2) Whenever changes occur to a facility, room, operation or process, hazards need to be reassessed. In this case, several seemingly insignificant configuration changes were made that individually had no effect on those systems, but cumulatively contributed to allowing the laser light to be viewed by workers in an adjacent room.

3) Work activities need to be evaluated, both at the start of operations and periodically thereafter, by all potentially affected work groups, to provide ample opportunities for information sharing. The more people involved with the

evaluation, the more thorough it can be. In this instance, discussing the laser operation with all individuals listed on the IWS may have provided sufficient identification of the openings between the two rooms and allowed for consideration of all hazards.

4) Operations need to be reviewed with a "questioning attitude" to identify all potential hazards. Those individuals responsible for reviewing or approving work activities should ask "what if" questions for all possible operating modes and scenarios. Before commencing work, the worst-case scenario should be considered.

**Savings:** N/A

**Keywords:** ACCELERATORS, communication, EQUIPMENT MODIFICATIONS, LASERS, SECONDARY HAZARDS

**Hazard(s):** Barriers & Delay Mechanisms, Communications, Facilities & Equipment, Lasers, Personal Injury / Exposure - Other

**ISM Code(s):** Analyze Hazards, Develop / Implement Controls, Feedback and Improvement

**Work Function(s):** Conduct of Operations - Configuration Management, Conduct of Operations - Work Control, Conduct of Operations - Work Planning, Laboratory Experimentation

**References:** ORPS Report NA--LSO-LLNL-LLNL-2008-0015

**Priority Descriptor:** Blue / Information