

Best Practice #166

Best Practice Title: Process for Safe, Efficient Laser Service Subcontractor Work

Facility: National Renewable Energy Laboratory (NREL)

Point of Contact: Matthew Dabney, PhD, NREL Laser Safety Officer, 303-887-4376, matthew.dabney@nrel.gov

Brief Description of Best Practice: The practice includes a questionnaire for the subcontractor to complete, development of a Safe Work Permit (SWP), a pre-job briefing and a post-job briefing.

First, a questionnaire (see Attachment) is emailed to the service subcontractor, which accomplishes the following:

- 1) verifies the technician has received appropriate laser safety training and, if required, Qualified Electrical Worker training
- 2) provides information regarding scope of work to be conducted
- 3) provides information used to develop a Safe Work Permit (SWP) in advance of the technician's visit
- 4) provides specifications on the Laser Protective Eyewear (LPE) to be worn by the technician
- 5) identifies if the technician will have access to energized electrical contacts when conducting work and/or if work will require administration of lockout/tagout (LOTO) procedures.

The service technician is required to provide an email response to the Laser Safety Officer (LSO) before arrival. The information in the questionnaire is then used to prepare a SWP in advance of the visit, which allows for time to obtain proper line manager authorization. The SWP details the scope of work, parameters and hazards associated with lasers to be serviced, and required controls.

Upon arrival, the service technician meets with the LSO or designee for a pre-job briefing prior to conducting any work on site. This typically takes 20-30 minutes. The following tasks occur during this meeting:

- 1) The service technician is provided a site-specific orientation, which summarizes emergency procedures, hazards and controls present in the work area, and OSHA requirements.
- 2) The service technician is asked to provide a verbal work plan and overview of their scope of work.
- 3) LPE is inspected by LSO to ensure it is in good condition and provides the appropriate optical density (OD) rating at the relevant wavelengths.
- 4) This interaction is used to assess the work practices and experience of the service technician.
- 5) The provisions of the SWP are reviewed by the LSO and the technician is asked to read and sign the permit.

After the SWP is signed, the service subcontractor is authorized and released to perform the service work under the direction of the laser system supervisor. Upon completion of the work the service technician meets with the LSO or designee for a

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post-job briefing. This last meeting discusses any issues, recommendations, or follow-up needed. It typically takes about 5 minutes.

Why the best practice was used: The questionnaire provides a means to communicate expectations for safe practices and required controls in advance of the visit, and provides pertinent information needed for the LSO to prepare a SWP. Without this advance communication, service technicians may arrive onsite without the proper knowledge base, safety training, PPE, and proper tools needed to complete their work. This may delay service and cost the laser system supervisor valuable man-hours and tool time.

What are the benefits of the best practice: This practice helps to ensure the service technician arrives on site prepared to conduct the work safely with the proper training and tools in hand, which provides a more efficient and safe process, and minimizes delays in conducting work. This practice also provides laser system supervisors with a predictable and consistent approach to bringing subcontractors on site to service their lasers

What problems/issues were associated with the best practice: No problems have been observed with this practice. This is largely due to the fact that the time impact to laser system supervisors is minor given that they are provided with the proper email/questionnaire template to send to the service vendors, and the vendor submits their responses directly to the LSO.

How the success of the Best Practice was measured: The success of this practice has not been measured quantitatively. However, the feedback provided by laser system supervisors is that the service technicians arrive more prepared and familiar with the safety requirements for performing the laser work. It also has increased interaction between laser operators, subcontractor laser technicians and the LSO, which is always beneficial.

Description of process experience using the Best Practice: This practice has streamlined the process of bringing subcontract service technicians on site to service lasers and has reduced delays in conducting work when technicians arrive on site unprepared to conduct work. Over time, questions have been added to the questionnaire to capture the equipment and tools required to conduct work safely (e.g. tools to view beam safely, non-reflective tools). The SWP has also evolved over time so that controls for alignment tasks are spelled out separately from other controls.

This practice supports an Integrated Safety Management System by serving as a tool in conducting hazard identification and control for work conducted by subcontracted laser service technicians.

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Attachment

Questionnaire for Service Subcontractor to Complete

The following questions and requirements are emailed to the service subcontractors prior to their visit:

- 1) Has the technician received laser safety training from their employer?
- 2) Has the technician been trained to the hazards of this specific system and associated lasers?
- 3) The technician will bring his/her own laser protective eyewear (LPE) to be worn when servicing your system. What is the optical density (OD) rating at the relevant wavelengths for the laser eyewear they plan to wear?
- 4) The technician will be expected to wear the LPE anytime the laser is powered and the laser beam is not fully enclosed inside a Class 1 enclosure.
- 5) The technician will need to bring a device or appropriate viewing card for use in locating the beam position.
- 6) All tools used by technician must be non-reflective (e.g. matte black).
- 7) Will the technician be performing any work that may involve exposure to potentially energized electrical components above 50 V? Examples may include, but not be limited to:
 - a. Removing covers that protect power supplies or other electrical components
 - b. Performing diagnostics on system while powered
 - c. Changing out flash lamps or fuses
 - d. Exposure to circuit boards
 - e. Exposure to any other electrical contacts
- 8) If technician may be performing work with potentially energized components does he/she have the following:
 - a. Proper personal protective equipment for electrical shock/arc flash hazards as applicable.
 - b. NFPA 70E training
 - c. LOTO training if LOTO will be required
 - d. Sufficient number of locks, tags, and lockout devices to perform LOTO if needed.
 - e. Means to perform zero-energy verification (e.g. volt meter)
 - f. Understanding of means to fully dissipate energy stored in capacitors

Please have the technician provide a list of all tasks they will perform during the service visit for inclusion in the Safe Work Permit.