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2025 DOE LASER WORKER SURVEY

Summary and Analysis

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U.S. DEPARTMENT of ENERGY | NNSA National Nuclear Security Administration

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WHY A CONDUCT A WORKER SURVEY?

- Identify Program Strengths and Weaknesses
- Identify Opportunities for Improvement and Efficiency
- Worker Feedback and Participation
- Identify Patterns and Trends
- 2025 Survey Builds upon surveys performed in 2015, 2018 and 2020
- Provides a source of useful laser safety metrics across the DOE Complex

THE SURVEY

- Survey Format: Survey created using commercial software - Survey Monkey®
- Survey team built upon the survey conducted in 2020.
  - The survey was compiled, edited, and distributed to the DOE Complex in May 2025.
  - 39 questions, consisting of multiple-choice responses, with some text responses.
    - Survey responses were anonymized by the software.
- Survey link was distributed to Laser Safety Officers (LSOs) affiliated with the EFCOG Laser Safety Community of Practice (CoP) with instructions to distribute to laser users, support staff, and relevant managers.
  - Estimated 15-20 minutes to complete, regarded as a minimal burden upon workforce.
  - Easy to answer, with numerous test runs and revisions made by development team.
  - Data was aggregated, with a final report provided to the team.
  - Most questions had options to write in comments. Software has ability for site selection. LSOs received a report with anonymized responses specific to their site.

THE SURVEY

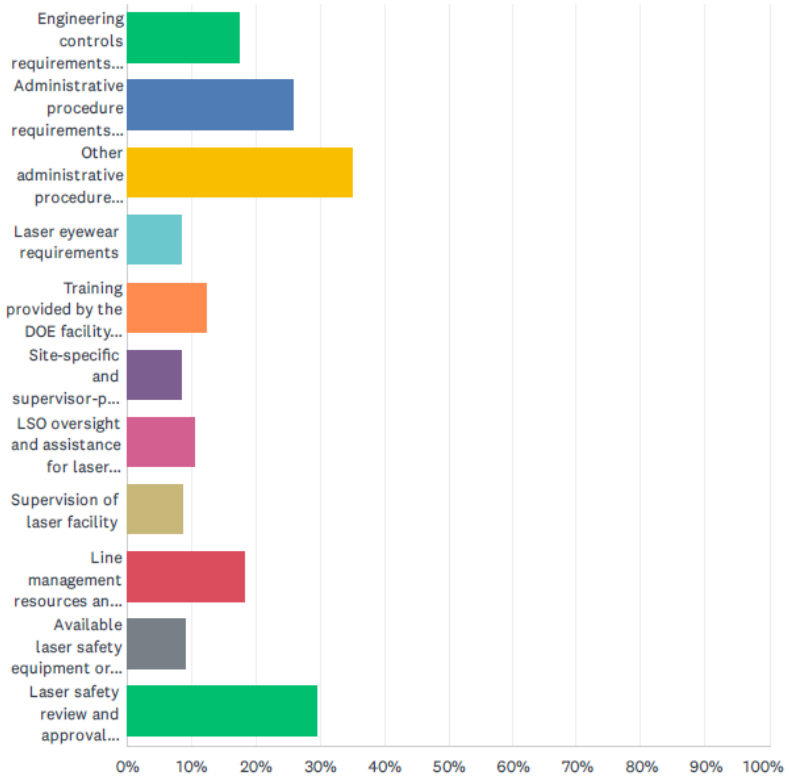
- 1002 Responses received from across the DOE complex*
- Largest participants:
  - SNL - 39%
  - LLNL -16%
  - SLAC - 12%
  - LBNL - 6%

**Ames Laboratory, Argonne National Laboratory (ANL), Brookhaven National Laboratory (BNL), Fermi National Accelerator Laboratory (FNAL), Idaho National Laboratory (INL), Kansas City Plant Laboratory for Laser Energetics (LLE) at U. of Rochester, Los Alamos National Laboratory (LANL), Lawrence Berkeley National Laboratory (LBNL), Lawrence Livermore National Laboratory (LLNL), National Energy Technology Laboratory (NETL), National Renewable Energy Laboratory (NREL), Nevada National Security Site (NNSS), Oak Ridge National Laboratory (ORNL), Pacific Northwest National Laboratory (PNNL), Princeton Plasma Physics Laboratory (PPPL), Sandia National Laboratories – Livermore, Sandia National Laboratories - Albuquerque , National Accelerator Laboratory (SLAC) Thomas Jefferson National Accelerator Facility (JLAB), Y-12 Plant.*

THE SURVEY

Q34 Identify areas that UNREASONABLY impact meeting technical goals or schedule goals, and for which improvements should be made. (can select more than one; add comments, as appropriate, to help identify possible improvements.)

Answered: 419 Skipped: 583



ANSWER CHOICES	RESPONSES	
Engineering controls requirements (e.g., safety interlock systems, non-interlocked enclosures, permanent barriers)	17.42%	73
Administrative procedure requirements in SOP documents	26.01%	109
Other administrative procedure requirements (e.g., Work Planning and Control processes, signs and labels)	35.08%	147
Laser eyewear requirements	8.59%	36
Training provided by the DOE facility's laser safety program	12.41%	52
Site-specific and supervisor-provided training (On-the-Job Training)	8.59%	36
LSO oversight and assistance for laser safety	10.74%	45
Supervision of laser facility	8.83%	37
Line management resources and assistance for laser safety (either budget or personnel)	18.38%	77
Available laser safety equipment or laser facility configuration	9.07%	38
Laser safety review and approval process	29.59%	124
Total Respondents: 419		

#	ADDITIONAL COMMENTS:	DATE
1	Having more personnel authorized to approve for example JSAs for a temporary laser configuration would help to meet schedule goals.	7/30/2025 5:24 PM
2	Laser training does not transfer between DoE facilities	7/30/2025 11:35 AM
3	Class schedule can impact users qualification as laser workers	7/30/2025 9:17 AM
4	None of these unreasonably impact goals.	7/29/2025 8:37 PM
5	N/A	7/29/2025 12:24 PM
6	I had very little training on the laser, I taught myself by reading the operating manual and	7/29/2025 12:19 PM

TARGET AUDIENCE: LASER WORKERS

- 64% of respondents work in Research and Development (R&D) environments.
  - Over 50% operate and align Class 3B and 4 Lasers
- 82% of respondents were employees; the remainder students, postdocs and support staff.
  - 89% of responses were from employees who work at a single DOE facility
- Skill Level of respondents:
  - 32% of participants more than 10 years of experience working with lasers
  - 19% 5-10 years
  - Responses skewed towards early-career workers

RESULTS: AREAS OF STRENGTH

- Programs are Highly Regarded
  - Overall, laser safety programs are highly regarded and appreciated. Laser Safety Professionals are respected and valued. Local safety culture is integral to overall safety.
- Management/Laser Safety Officer (LSO) Oversight
  - Workers are confident in the abilities of Management and LSOs to provide a safe work environment and enable work.
- Equipment and Resources
  - Workers are confident that existing equipment including PPE, engineering controls (e.g., Interlocks) and facility configuration are adequate.
  - Laser Eyewear and PPE in general are seen as a strength and highly regarded.
- Workers do not feel that they will be penalized for speaking up, strong work ethics and work culture is perceived by workers.

RESULTS: AREAS FOR IMPROVEMENT

- Administrative Burden
  - Administrative tasks were cited as a major issue, with programs encumbered by excessive documentation, bureaucracy, and delays in approval.
  - Administrative tasks, while seen as necessary by workers, are viewed as the primary cause of work delays, lost time, and a financial burden.
  - Comments repeatedly asked for more streamlined approvals, clearer and concise procedures, and less duplication in training and documentation.
  - Standard Operating Procedures (SOPs):
    - Frequently mentioned as a major source of delays, both in approval process and implementation.
    - SOPs are viewed as too long and hard to use.

RESULTS: AREAS FOR IMPROVEMENT

- Modernization
  - Updated equipment, including interlocks, support equipment, and facilities was cited. Cost of improvements was cited as a major issue.
- On the Job Training (OJT): Site-specific hands-on and supervisor-led training are viewed positively.
  - Quality of OJT varies widely and is heavily dependent on the skill of the local trainer and the quality of training materials.
  - Management support and work culture are critical.
  - Periodic refresher training is essential.

RESULTS: AREAS FOR IMPROVEMENT

- Peeking
  - Compliance with laser eyewear requirements is strong.
  - Peeking is still a relevant issue, with ~11% witnessing peeking within past 12 months.
  - Approximately 9% of respondents self-admitted to peeking.
- Reasons people peek hasn't changed since previous surveys.
- Contributing factors of eyewear leading to peeking:
  - Too dark for detailed vision, especially during alignment
  - Fogging
  - Fit over prescription eyewear
  - Ability to view monitors

RESULTS: AREAS FOR IMPROVEMENT

- Solutions identified for peeking:
  - Better eyewear – higher Visible Light Transmission (VLT), better fit
  - Use of cameras, IR or UV viewers, viewing cards
  - Remote operation
- Possible solution: Augmented Reality/Mixed Reality (AR/MR) Headsets.
  - Responders express strong desire for remote work/operation with 44% of responders believing it will be helpful.
  - Ongoing research and adaptation to secure environments and DOE Facilities is needed. AI and technology integration is essential.

- Additional PPE issues – Skin PPE (IR and UV) Consistent but situational and could use clarification and improvement.

RESULTS: AREAS FOR IMPROVEMENT

- Reporting culture:
  - Stronger for actual injuries (84%)
  - Near Misses lower than injuries (41%)
  - Hesitation in reporting Near Misses due to perceptions that reporting may result in a slow down or a work stoppage.
    - Need to shift from a punitive to a learning-focused environment to encourage reporting.

COMPARISON OF RESULTS: 2015-2025

Topic*	2015	2018	2020	2025
Engineering controls effectiveness	94.2%	95.6%	95.9%	73%
Eyewear effectiveness	89.8%	91.5%	93%	94%
Peeking during alignment	Low	Low	11.65%	11.64%
Eyewear usability issues	Present	Present	Persist	Persist
On-the-job / site-specific training effectiveness	93.3%	93.5%	94.2%	52%
SOP/documentation usability	Issues	Issues	Issues	Issues
Management/LSO oversight	87.4%	90.5%	89%	Consistent
Reporting culture (injuries vs near-misses)	High / Low	High / Low	78% / 31%	84% / 41%
Safe practices adherence	92.6%	92.2%	93.8%	Strong
Student/new-user onboarding	Strong	Strong	Strong	Strong
Interlocks / facility constraints	Challenges	Challenges	Challenges	Challenges

*Percentages for ‘strongly agree’ & ‘agree’ responses

CONCLUSIONS

- Survey demonstrates that laser safety programs across the DOE is viewed as strong and effective.
- Survey also identifies recurring themes where improvement is needed.
  - Behaviors: Laser Eyewear Peeking - Improvements needed through training, improved eyewear, cameras and workplace layout.
    - Augmented Reality/Mixed Reality (AR/MR) Headsets – possible solution to peeking.
  - Administrative Burden – major area for improvement. Opportunities to reduce bureaucracy, review/approval timelines, is viewed by workers as positive.
  - Laser Community is strong, but there is a need for continuing education and hands on work – e.g.: LLNL Laser Training Lab.
  - Mentorship is critical. Reduce “one-deep” positions through training, outreach, communities and laser safety committees.

THANK YOU

- Thanks to the team of laser safety professionals that assisted with the development of this Survey:
  - Michael Roth and Bryce Vlach, SNL/CA; Mendy Brown, SNL/NM; Michael Woods, SLAC; Jamie King and Hayden Johnson, LLNL; Brian Broocks, ANL; James Santucci, FNAL; Maksim Livshits, LANL; Karin Adams, INL.
- This presentation was completed with the assistance of DOE approved AI models. (Sandia M365 Copilot and LLNL Livchat).
- Future Surveys will be done at recurring intervals – 2028 Workshop or TBD.
- Thanks to all attendants for their interest in furthering laser safety.

QUESTIONS?