Department of Energy
Washington, DC 20585

November 20, 2014

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Dr. Chi-Chang Kao
Laboratory Director
SLAC National Accelerator Laboratory
Stanford University
2575 Sand Hill Road
Menlo Park, California 94025-7015

WEA-2014-05

Dear Dr. Kao:

This letter refers to the Department of Energy's (DOE) investigation into the facts and circumstances associated with the implementation of worker safety and health program requirements related to laser and electron beam equipment at SLAC National Accelerator Laboratory (SLAC) and a series of events from 2011 through 2013. The results of the investigation were provided to Stanford University (Stanford) in an investigation report dated May 20, 2014. DOE convened an enforcement conference on August 27, 2014, with you and members of your staff to discuss the report's findings and SLAC's corrective action plan. A summary of the conference and list of attendees is enclosed.

DOE considers the potential for serious injuries associated with the subject energetic beam operations and the associated violations to be safety significant. At least one of the incidents could have resulted in ocular injury, and collectively they reveal weaknesses in the implementation of conduct-of-operations principles necessary for safe operation of laser systems and energetic beam equipment. DOE's evaluation of the circumstances concluded that SLAC did not fully implement worker safety and health program provisions related to hazard identification and assessment; hazard prevention and abatement; training and information; and occupational medicine.

Based on an evaluation of the evidence in this matter, DOE has concluded that violations of 10 C.F.R. Part 851, *Worker Safety and Health Program*, by SLAC have occurred. Accordingly, DOE is issuing the enclosed Preliminary Notice of Violation (PNOV), which cites one Severity Level I violation and three Severity Level II violations. DOE administered a contract fee reduction in fiscal year 2013 pursuant to the Performance Based Fee clause under contract number DE-AC02-76SF00515 between DOE and Stanford. A $250,000 portion of this fee reduction was for unacceptable safety performance associated with a series of laser related

incidents and near misses. The cited incidents cover the events described in the enclosed PNOV. Therefore, in accordance with 10 C.F.R. § 851.5(c), DOE proposes no civil penalty for the violations identified in the PNOV.

DOE acknowledges SLAC's response to the events and subsequent corrective actions to address the potential violations and prevent recurrence. DOE has concluded that SLAC's corrective action plan appears to adequately address the violations cited in this PNOV. DOE further recognizes SLAC's progress in implementing a broad, proactive effort to address energetic beam hazards to avoid potential worker injuries.

Pursuant to 10 C.F.R. § 851.42, *Preliminary Notice of Violation*, you are obligated to submit a written reply within 30 calendar days of receipt of the enclosed PNOV, and to follow the instructions specified in the PNOV when preparing your response. If no reply is submitted within 30 days, in accordance with 10 C.F.R. § 851.42(d), you relinquish any right to appeal any matter in the PNOV, and the PNOV will constitute a final order.

After reviewing your response to the PNOV, including any proposed additional corrective actions entered into DOE's Noncompliance Tracking System, DOE will determine whether further action is necessary to ensure compliance with worker safety and health requirements. DOE will continue to monitor the completion of corrective actions until these matters are fully resolved.

Sincerely,

Steven C. Simonson
Director
Office of Enforcement
Office of Enterprise Assessments

Enclosures: Preliminary Notice of Violation (WEA-2014-05)
Enforcement Conference Summary and List of Attendees

cc: Paul Golan, SLAC Site Office Manager
Marc Weibel, SLAC Enforcement Coordinator

Enclosure 1

Preliminary Notice of Violation

Stanford University
SLAC National Accelerator Laboratory

WEA-2014-05

A U.S. Department of Energy (DOE) investigation into the facts and circumstances associated with deficiencies in worker safety and health program (WSHP) program implementation revealed by laser and energetic beam events that occurred from May 25, 2011, through February 28, 2013, at the SLAC National Accelerator Laboratory (SLAC) in Menlo Park, California, identified multiple violations of DOE worker safety and health requirements by Stanford University (Stanford). DOE provided Stanford an investigation report dated May 20, 2014, and convened an enforcement conference on August 27, 2014, with Stanford representatives to discuss the report's findings and Stanford's response. A summary of the conference and list of attendees is enclosed.

Pursuant to section 234C of the Atomic Energy Act of 1954, as amended, and 10 C.F.R. Part 851 (Part 851), *Worker Safety and Health Program*, DOE hereby issues this Preliminary Notice of Violation (PNOV) to Stanford. The violations included deficiencies in hazard identification and assessment; hazard prevention and abatement; training and information; and occupational medicine. DOE has categorized the violations as one Severity Level I violation and three Severity Level II violations. As explained in 10 C.F.R. Part 851, Appendix B, *General Statement of Enforcement Policy*, § VI(b)(1), "[a] Severity Level I violation is a serious violation. A serious violation shall be deemed to exist in a place of employment if there is a potential that death or serious physical harm could result from a condition which exists, or from one or more practices, means, methods, operations, or processes which have been adopted or are in use, in such place of employment." Section VI(b)(2) states, "[a] Severity Level II violation is an other-than-serious violation. An other-than-serious violation occurs where the most serious injury or illness that would potentially result from a hazardous condition cannot reasonably be predicted to cause death or serious physical harm to employees but does have a direct relationship to their safety and health."

Title 10 C.F.R. § 851.5(b) states that "[a] contractor that violates any requirement of this part may be subject to a reduction in fees or other payments under a contract with DOE, pursuant to the contract's *Conditional Payment of Fee* clause, or other contract clause providing for such reductions." DOE administered a contract fee reduction in fiscal year 2013 pursuant to the Performance Based Fee clause under contract number DE-AC02-76SF00515 between DOE and Stanford. A $250,000 portion of this fee reduction was for unacceptable safety performance associated with a series of laser related incidents and near misses. The cited incidents cover the events described in this PNOV. Therefore, in accordance with 10 C.F.R. § 851.5(c), DOE proposes no civil penalty for the violations identified in this PNOV.

As required by 10 C.F.R. § 851.42(b) and consistent with Part 851, Appendix B, the violations are listed below. If this PNOV becomes a final order, then Stanford may be required to post a copy of this PNOV in accordance with 10 C.F.R. § 851.42(e).

I. VIOLATIONS

A. Hazard Identification and Assessment

Title 10 C.F.R. § 851.10, *General requirements*, subsection (a), states that "[w]ith respect to a covered workplace for which a contractor is responsible, the contractor must: . . . (2) [e]nsure that work is performed in accordance with: (i) [a]ll applicable requirements of [10 C.F.R. Part 851]; and (ii) [w]ith the worker safety and health program for that workplace."

Title 10 C.F.R. § 851.21, *Hazard identification and assessment*, subsection (a), states that "[c]ontractors must establish procedures to identify existing and potential workplace hazards and assess the risk of associated worker injury and illness. Procedures must include methods to: (1) [a]ssess worker exposure to chemical, physical, biological, or safety workplace hazards through appropriate workplace monitoring; . . . (4) [a]nalyze designs of new facilities and modifications to existing facilities and equipment for potential workplace hazards; (5) [e]valuate operations, procedures, and facilities to identify workplace hazards; (6) [p]erform routine job activity-level hazard analyses; . . . [and] (8) [c]onsider interactions between workplace hazards and other hazards such as radiological hazards." In accordance with paragraph (c) of the same section, "[c]ontractors must perform [these activities] initially to obtain baseline information and as often thereafter as necessary to ensure compliance with the requirements [of 10 C.F.R. Part 851, subpart C]."

Title 10 C.F.R. § 851.26, *Recordkeeping and reporting*, subsection (a), *Recordkeeping*, states that "[c]ontractors must: (1) (e)stablish and maintain complete and accurate records of all hazard inventory information, hazard assessments, exposure measurements, and exposure controls."

Title 10 C.F.R. § 851.26, subsection (b), *Reporting and investigation*, states that "[c]ontractors must: . . . (2) [a]nalyze related data for trends and lessons learned."

The *SLAC Worker Safety and Health Program*, with revisions dated May 24, 2011, May 29, 2012, and May 21, 2013, describes the program that was in place during the referenced events and lists the implementing procedures that SLAC uses to achieve compliance with 10 C.F.R. Part 851. The SLAC WSHP invokes the following SLAC implementing procedures and regulatory requirements:

- *Environmental Safety and Health (ESH) Manual*, Chapter 2, *Work Planning and Control*
- ESH Manual, Chapter 3, *Medical*
- ESH Manual, Chapter 10, *Laser Safety*
- ESH Manual, Chapter 24, *Training*
- American National Standards Institute (ANSI) Z136.1, *Safe Use of Lasers*, (2007)

Contrary to these requirements, Stanford failed to establish and implement a process to identify and assess energetic beam hazards consistent with the applicable requirements and procedures invoked by the approved SLAC WSHP. Specific examples include the following:

1. Stanford did not establish a formalized means to track and follow-up on non-laser safety findings from its laser lab assessment program to ensure the identified hazards were abated.

2. Stanford did not analyze data resulting from the initial and annual laser safety reviews in a structured manner to effectively identify trends and lessons learned, and to proactively address similar deficiencies site wide.

Collectively, these noncompliances constitute a Severity Level II violation.

B. Hazard Prevention and Abatement

Title 10 C.F.R. § 851.22, *Hazard prevention and abatement*, subsection (a), states that "[c]ontractors must establish and implement a hazard prevention and abatement process to ensure that all identified and potential hazards are prevented or abated in a timely manner." This subsection also requires that "(1) [f]or hazards identified either in the facility design or during the development of procedures, controls must be incorporated in the appropriate facility design or procedure" and "(2) [f]or existing hazards identified in the workplace, contractors must: . . . (iii) [p]rotect workers from dangerous safety and health conditions."

Title 10 C.F.R. § 851.22, subsection (b) states: "[c]ontractors must select hazard controls based on the following hierarchy: (1) [e]limination or substitution of the hazards where feasible and appropriate; (2) [e]ngineering controls where feasible and appropriate; (3) [w]ork practice and administrative controls that limit worker exposures; and (4) [p]ersonal protective equipment."

Title 10 C.F.R. § 851.23, *Safety and Health Standards*, subsection (a) states that "[c]ontractors must comply with the following safety and health standards that are applicable to the hazards at their covered workplace: . . . (11) ANSI Z136.1, 'Safe Use of Lasers' *(2000)*."

Contrary to these requirements, Stanford failed to establish and implement a process to prevent and abate energetic beam hazards consistent with the applicable requirements and procedures invoked by the approved SLAC WSHP and the hierarchy of controls. Specific examples include the following:

1. Engineering and Administrative Controls

   a. Stanford did not maintain the configuration of the Photon Ultrafast Laser Science and Engineering (PULSE) Lab Ti:Sapphire laser safety shutter to prevent exposure of unprotected personnel to a Class IV laser. On May 24, 2011, SLAC personnel

removed the safety shutter from its functional position in order to position an optic in the laser beam path without obtaining prior approval from the laser safety officer (LSO) or the system laser safety officer (SLSO) in accordance with SLAC operating procedures.

b. Stanford did not return the PULSE Lab Ti:Sapphire laser safety shutter to the original location in the beam path for its intended purpose as an engineering control on May 24, 2011; nor conduct a zero energy verification of shutter function. Presuming that the preceding controls were in place, a Stanford employee did not wear laser protective eyewear for initial entry on the following day.

c. Stanford did not conduct verification of shutter status and operation for the Evolution 30 Coherent Laser in the portable enclosure, Far Experimental Hall – Hutch 5, following an extended period during which the laser was inoperative, to permit laser eyewear removal in accordance with provisions in the SLAC ESH Manual Chapter 10, *Laser Safety*, *Core Laser Safety Practices*.

d. Stanford did not maintain the safety shutters for the Evolution 30 Coherent Laser in operable condition in accordance with ANSI Z136.1, Section 4.1 and Section 4.3.8.

e. Stanford did not implement appropriate engineering and administrative controls, in accordance with 10 C.F.R. § 851.22, during the troubleshooting task on the B1/B2 beam bending magnets that affected Personal Protection System functionality at the Beam Switch Yard in that the task actions caused the beam to divert in an unintended direction.

f. Contrary to the requirements of 10 C.F.R. § 851.22(b)(3) to provide administrative controls that limit worker exposures, Stanford did not adjust the scheduling of dissimilar tasks that occurred concurrently in the Linac Coherent Light Source (LCLS) Sector 20 Injector Laser Room on May 30, 2012, and that failure contributed to the qualified laser operator's (QLO) ocular exposure to diffuse laser light..

g. Stanford released work to proceed without communicating unique area hazards, notifying affected personnel, or coordinating work to avoid conflict and minimize risk during the troubleshooting task on the B1/B2 beam bending magnets in the Beam Switch Yard on February 14, 2013. Furthermore, Stanford did not complete a Radiation Safety Work Control Form to address the troubleshooting task on the B1/B2 beam bending magnets.

2. Personal Protective Equipment

a. Stanford did not implement effective measures in accordance with ANSI Z136.1, section 4.6.2.1, to ensure that personal protective equipment (PPE) eyewear was used by the QLO who experienced ocular exposure to diffuse laser light in the LCLS Sector 20 Injector Laser Room on May 30, 2012, when he walked from a computer area into the Nominal Hazard Zone workspace.

b. Stanford did not require the use of skin protection for dermal ultraviolet (UV) light exposure from the unit 2 laser operating in the LCLS Sector 20 Injector Laser Room for the second worker who was manipulating the UV beam.

c. Stanford did not ensure that the QLO who entered the PULSE Lab on May 25, 2011, and discovered the presence of the Ti:Sapphire laser beam, which indicated the laser was operating as an unprotected Class IV device, left the lab to obtain the appropriate PPE before attempting to locate and block the beam source.

Collectively, these noncompliances constitute a Severity Level I violation.

C. Training and Information

Title 10 C.F.R. § 851.25, *Training and Information*, subsection (a) states that "[c]ontractors must develop and implement a worker safety and health training and information program to ensure that all workers exposed or potentially exposed to hazards are provided with the training and information on that hazard in order to perform their duties in a safe and healthful manner."

Title 10 C.F.R. § 851.25, subsection (b) states that "[t]he contractor must provide: . . . (3) [a]dditional training when safety and health information or a change in workplace conditions indicates that a new or increased hazard exists."

Contrary to these requirements, Stanford failed to establish clear understanding of training consistent with the applicable requirements and procedures invoked by the approved SLAC WSHP and implementing procedures. Specifically, Stanford did not ensure that the SLSO and QLO had a clear understanding of respective task duties, nature of the responsibilities to be transferred, and requirements related to these responsibilities in the PULSE Lab on May 24, 2011, during the SLSO's absence from the area.

This noncompliance constitutes a Severity Level II violation.

D. Occupational Medicine

Title 10 C.F.R. § 851, Appendix A, *Worker Safety and Health Functional Areas*, Section 8, *Occupational Medicine*, subsection (a) states that: "[c]ontractors must establish and provide comprehensive medical services to workers employed at a covered work place who: (1) [w]ork on a DOE site for more than 30 days in a 12-month period; or (2) [a]re enrolled for any length of time in a medical or exposure monitoring program required by this rule and/or any other applicable Federal, State, or local regulation or other obligation." In accordance with paragraph (h) of the same section, "[t]he occupational medicine provider must monitor ill and injured workers to facilitate their rehabilitation and safe return to work and to minimize lost time and its associated costs."

Stanford did not provide post-event examinations in the form of an updated ocular baseline evaluation, or otherwise provide documentation of the decision not to perform such an evaluation, for the workers exposed to, and with possible adverse effects from, diffuse laser light in PULSE and Hutch 5, consistent with the applicable requirements and procedures invoked by the approved SLAC WSHP.

This noncompliance constitute a Severity Level II violation.

II. REPLY

Pursuant to 10 C.F.R. § 851.42(b)(4), Stanford is hereby obligated, within 30 calendar days of receipt of this PNOV, to submit a written reply. The reply should be clearly marked as a "Reply to the Preliminary Notice of Violation."

If Stanford chooses not to contest the violations set forth in this PNOV, then the reply should clearly state that Stanford waives the right to contest any aspect of this PNOV and this PNOV will constitute a final order upon the filing of the reply.

If Stanford disagrees with any aspect of this PNOV, then as applicable and in accordance with 10 C.F.R. § 851.42(c)(1), the reply must: (1) state any facts, explanations, and arguments that support a denial of an alleged violation; and (2) discuss the relevant authorities that support the position asserted, including rulings, regulations, interpretations, and previous decisions issued by DOE. In addition, 10 C.F.R. § 851.42(c)(2) requires that the reply include copies of all relevant documents.

Please send the appropriate reply by overnight carrier to the following address:

Director, Office of Enforcement
Attention: Office of the Docketing Clerk, EA-10
U.S. Department of Energy
19901 Germantown Road
Germantown, MD 20874-1290

A copy of the reply should also be sent to the Manager of the SLAC Site Office.

Pursuant to 10 C.F.R. § 851.42(d), if Stanford does not submit a written reply within 30 calendar days of receipt of this PNOV, Stanford relinquishes any right to appeal any matter in this PNOV, including the proposed remedy, and this PNOV will constitute a final order.

III. CORRECTIVE ACTIONS

Corrective actions that have been or will be taken to avoid further violations should be delineated, with target and completion dates, in DOE's Noncompliance Tracking System.

Steven C. Simonson
Director
Office of Enforcement
Office of Enterprise Assessments

Washington, DC
This 20th day of November 2014