Department of Energy
Washington, DC 20585

September 3, 2009

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mr. Thad M. Corbett
Vice President
Pacific Underground Construction, Inc.
1817 Stone Avenue
San Jose, California 95125

WEA-2009-02 (FNOV)

Dear Mr. Corbett:

Pursuant to section 234C of the Atomic Energy Act, as amended, 42 U.S.C. § 2282c, and the Department of Energy's (DOE) regulations at 10 C.F.R. Part 851, *Worker Safety and Health Program*, DOE is issuing this Final Notice of Violation (FNOV) to Pacific Underground Construction, Inc. (PUC). The FNOV finds PUC liable for violating DOE's worker safety and health requirements. The FNOV is based upon the Office of Enforcement's July 23, 2008, Investigation Report and a careful and thorough review of all evidence presented to DOE by PUC, including your response to the Preliminary Notice of Violation (PNOV). For reasons set forth in the enclosed FNOV, DOE finds no basis for modification of the PNOV.

Pursuant to 10 C.F.R. § 851.44(a), PUC may petition DOE's Office of Hearings and Appeals for review of the enclosed FNOV. PUC's petition must adhere to the procedural requirements established in Subpart G of 10 C.F.R. Part 1003, *Office of Hearings and Appeals Procedural Regulations*. If PUC does not petition the Office of Hearings and Appeals for review within 30 calendar days of receipt of this FNOV, PUC relinquishes any right to appeal any matter therein, and the FNOV will become a final order as provided by 10 C.F.R. § 851.43(c).

Sincerely,

John S. Boulden III
Acting Director
Office of Enforcement
Office of Health, Safety and Security

Enclosure

cc: William Brinkman, SC-1
Paul Golan, SSO
Richard Azzaro, DNFSB

Enclosure

Final Notice of Violation

Pacific Underground Construction, Inc.
SLAC National Accelerator Laboratory

WEA-2009-02

The Department of Energy (DOE) conducted an investigation into the facts and circumstances surrounding the September 13, 2007, polyvinyl chloride (PVC) pipe explosion that occurred in Sector 30 of the linear accelerator facility at the SLAC National Accelerator Laboratory (SLAC). The investigation identified multiple violations of DOE worker safety and health requirements by Pacific Underground Construction, Inc. (PUC).

On April 3, 2009, DOE issued a Preliminary Notice of Violation (PNOV) to PUC with a proposed civil penalty of $42,000 for one Severity Level I violation of 10 C.F.R. Part 851, *Worker Safety and Health Program*. DOE received PUC's reply to the PNOV on May 1, 2009. PUC denied the violation claiming that: (1) During the bidding process in March and April 2007, Stanford University failed to inform PUC that Part 851 "should be incorporated" as part of the Invitation to Bid; (2) PUC lacked familiarity and expertise to identify, evaluate, and control exposures associated with the cutting or welding activities of its subcontractor, Western Allied Mechanical, Inc. (Western Allied) and Stanford University was responsible for the contents of Western Allied's site-specific safety plan (SSSP) and job safety analysis (JSA); (3) PUC lacked expertise in welding/cutting fire control measures and expected Western Allied or Stanford University to assume responsibility; (4) the pressure gauge installation project that caused the pipe explosion was outside PUC's "reasonable scope of expertise;" and (5) the proposed penalty of $42,000 poses a significant financial impact on PUC.

DOE thoroughly considered PUC's reply and finds that none of the reasons stated in the reply to the PNOV justify a rescission of the violation or mitigation of the proposed penalty. Since the inception of Part 851 enforcement on February 9, 2007, contractors, including subcontractors, have been responsible for the safety and health of both their employees and any lower tier subcontractor employees that conduct activities at DOE covered workplaces. Actions by PUC provide evidence of PUC's acceptance of responsibility for complying with Part 851 requirements including: (1) article 7 of the Stanford University-PUC contract, signed on May 18, 2007, which specifically cites this responsibility; and (2) the Subcontractor Site Specific Health & Safety Plan Form, signed by PUC and submitted to Stanford University before commencement of the underground utilities upgrade work. PUC should have fully considered any lack of expertise needed to comply with Part 851 and provide effective oversight of Western Allied's cutting, welding, and pressure gauge installation activities before entering into a contractual agreement with Stanford University for the full scope of the cooling tower water pipe replacement work.

In recognition of the potential for serious physical harm from PUC's abdication of its regulatory and contractual responsibility, DOE believes that a significant civil penalty is warranted. In weighing the imposition of a penalty, DOE considered the role of the other contractors involved, the size of PUC's company, the economic impact of a penalty, and PUC's corrective actions to prevent recurrence. Based on evaluation of these factors, DOE consolidated PUC's multiple violations into one Severity Level I violation and then reduced the base civil penalty value of $70,000 accordingly.

For the foregoing reasons, DOE believes that the enforcement action against PUC should remain unchanged. Pursuant to 10 C.F.R. § 851.43(b), DOE now issues this Final Notice of Violation (FNOV) to PUC with a civil penalty of $42,000 for one Severity Level I violation of DOE's worker safety and health regulations as set forth below.

Final Violation

I. Construction Safety

Title 10 C.F.R. § 851.24, *Functional areas*, requires that "[c]ontractors must have a structured approach to their worker safety and health program which at a minimum, include provisions for … construction safety" and that "[c]ontractors must comply with the applicable standards and provisions in Appendix A of this part, entitled 'Worker Safety and Health Functional Areas'."

Appendix A, Section 1, *Construction Safety*, states that "[f]or each separately definable construction activity (e.g., excavations, foundations, structural steel, roofing), the construction contractor must: [p]repare and have approved by the construction manager an activity hazard analysis prior to commencement of affected work. Such analyses must: [i]dentify foreseeable hazards and planned protective measures…." This section further states that the construction contractor must "[e]nsure workers are aware of foreseeable hazards and the protective measures described within the activity analysis prior to beginning work on the affected activity."

Appendix A, section 1(d), states that "[t]he construction contractor must prepare a written construction project safety and health plan to implement the requirements of this section and obtain approval of the plan by the construction manager prior to commencement of any work covered by the plan. In the plan, the contractor must designate the individual(s) responsible for on-site implementation of the plan, specify qualifications for those individuals, and provide a list of those project activities for which subsequent hazard analyses are to be performed."

Contrary to these requirements, PUC, as a construction contractor, failed to ensure that its subcontractor, Western Allied, developed a construction project safety and health plan and activity hazard analysis to effectively implement the requirements of appendix A, section 1. The SSSP and JSA prepared by Western Allied did not adequately identify and assess the hazards associated with the piping replacement work being conducted in Sector 30 or establish controls necessary to eliminate or abate those hazards to protect workers. Specific examples are listed below:

A. The "Sub Contractor Site Specific Health & Safety Plan Form" for the "SLAC Underground Utilities Upgrade" project prepared by Western Allied as its SSSP did not identify any project activities for which subsequent hazard analyses would be performed. The form contained only generic information regarding the scope of work to be performed and the associated hazards and hazard controls that would be implemented relative to the work. The form also did not specify the qualifications of the individual designated as responsible for oversight and implementation of daily operations conducted under the plan.

B. The JSA prepared by Western Allied for the piping replacement work, "CTW Piping Replacement – Sectors 21 thru 30," dated September 4, 2007, did not identify foreseeable hazards and appropriate protective measures associated with the work to be performed. PUC representatives, including the project foreman, periodically reviewed the JSA as evidenced by their signatures on the JSA as part of daily sign in expectations. PUC's reviews failed to ascertain the following:

1. The JSA identified "solvents & cements" as potential hazards and "PVC solvent/cement" as a hazardous material that would be used at the job site. The JSA failed to identify the following properties and precautions for use of those materials as identified on (1) the material safety data sheet (MSDS) for IPS Weld-On solvent cement for PVC plastic pipe, dated April 2007; (2) the MSDS for IPS Weld-On adhesive primer for plastic, dated June 2007; and (3) the IPS Weld-On PVC 2711 plastic pipe cement product label:

   - A flammability rating of 3
   - Keep away from heat, sparks, open flame, and other sources of ignition
   - Vapors may ignite explosively
   - Use with adequate ventilation.

2. The JSA listed "cutting and torching of bolts" as a phase of work/job step and "static electricity and sparks" as potential hazards. The analysis failed to consider the potentially explosive conditions created by the combination of ignitable vapors from the PVC primer and cement, an enclosed space (i.e., sealed piping system), and the application of heat to the carbon steel piping attached to the PVC piping. The work documents and SSSPs for the project did not identify the need to install a pressure gauge in the piping system so that required pressure testing could be performed. The JSA did not identify the task of cutting into and welding on the newly installed carbon steel piping to install a pressure gauge.

II. Fire Protection

Title 10 C.F.R. § 851.23, *Safety and health standards*, requires compliance with 29 C.F.R. Part 1926, *Safety and Health Regulations for Construction*. Section 1926.352(i) states that "[d]rums, containers, or hollow structures which have contained toxic or flammable substances shall, before welding, cutting, or heating is undertaken on them, either be filled with water or thoroughly cleaned of such substances and ventilated and tested."

Title 10 C.F.R. § 851.24, *Functional areas,* requires that "[c]ontractors must have a structured approach to their worker safety and health program which at a minimum, include provisions for … fire protection" and that "[c]ontractors must comply with the applicable standards and provisions in Appendix A of this part, entitled 'Worker Safety and Health Functional Areas'." Appendix A, Section 2, *Fire Protection*, states that "[c]ontractors must implement a comprehensive fire safety and emergency response program to protect workers commensurate with the nature of the work that is performed," and that "[a]n acceptable fire protection program … includes meeting applicable building codes and National Fire Protection Association [NFPA] codes and standards."

National Fire Protection Association (NFPA) 51B, *Standard for Fire Prevention During Welding, Cutting, and Other Hot Work*, 2003 edition, establishes the following provisions:

- Section 4.1.6 states that "[m]anagement shall ensure that all individuals involved in the hot work operations, including contractors, are familiar with the provisions of [NFPA 51B]."

- Section 4.1.6.2 states that "[i]ndividuals involved in hot work operations shall have an awareness of the inherent risks involved…."

- Section 4.1.7 states that "[m]anagement shall advise all contractors about site-specific flammable materials, hazardous processes or conditions, or other potential fire hazards."

- Section 5.1.1 states that "[h]ot work shall be permitted only in areas that are or have been made fire safe."

- Section 5.2(4) states that "[h]ot work shall not be permitted…[i]n the presence of uncleaned or improperly prepared drums, tanks, or other containers and equipment that have previously contained materials that could develop explosive atmospheres."

Section 1.1.2 of NFPA 51B requires compliance with American National Standards Institute (ANSI) Z49.1, *Safety in Welding, Cutting, and Allied Processes*. ANSI Z49.1, 2005 edition, establishes the following provisions:

- Section 3.2.1.2 states that "[m]anagement shall assure that hazards and safety precautions are communicated to and understood by workers prior to the start of work."

- Section 3.2.1.3 states that "[m]anagement shall assure that the individual is aware of the hazards involved and familiar with the provisions of [ANSI Z49.1]."

- Section 3.2.1.5 states that "[m]anagement shall select contractors to perform welding…who have an awareness of the risks involved" and that "[m]anagement shall advise contractors about flammable materials or hazardous conditions that are specific to the job site."

Contrary to these requirements, PUC failed to ensure that appropriate welding and cutting fire safety control measures were implemented during the replacement of the old transite piping system in Sector 30 of the linear accelerator facility. While PUC may claim lack of expertise in

fire protection measures, it failed to ensure that Western Allied had the appropriate expertise to anticipate the hazards associated with the piping replacement work being conducted at SLAC. PUC failed to ensure that Western Allied employees were adequately trained in and familiar with applicable regulatory requirements and hazard controls for performing hot work safely. The hot work measures that PUC neglected to address with Western Allied were basic safety provisions; in fact, NFPA 51B was originally published in 1962. Specific examples are listed below:

A. PUC failed to ensure that required work control measures, such as purging or cleaning the pipes and monitoring for vapor buildup, were implemented to protect workers from the flammable and explosion hazards associated with performing hot work on a system containing ignitable vapors.

B. PUC failed to ensure that Western Allied employees were familiar with the provisions of NFPA 51B and ANSI Z49.1. Western Allied employees interviewed during the Office of Enforcement's investigation were not familiar with these standards or the requirements contained therein.

C. PUC failed to ensure that Western Allied was cognizant of the potential flammable and explosion hazards associated with performing hot work on piping that could contain ignitable vapors. PUC also failed to confirm that Western Allied had established provisions and undertook measures to ensure employee protection from such hazards. While Western Allied employees had previously performed pipefitting work with carbon steel at SLAC, the welder performing the hot work on September 13, 2007, had no experience working with a piping configuration comprised of different materials (ductile iron, PVC, and steel), such as the one used in the underground utilities upgrade in Sector 30 of the linear accelerator facility.

III. General Requirements

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

The *SLAC Worker Safety and Health Program Description* (SLAC-I-720-0A21B-001-R000), dated February 2007, is applicable to all subcontractors at SLAC except those hired directly by DOE. That program description incorporates by reference the latest version of Chapter 42, *Subcontractor Construction Safety*, of the *SLAC Environment, Safety, and Health Manual*. The following refers to requirements in chapter 42 dated June 1, 2007.

- Section 5.1.2.4 states that "[s]ubcontractors are required to submit a site-specific safety plan (SSSP)" and that the SSSP must "[d]escribe the system used to ensure personnel will comply with safe and healthy work practices including [s]afety indoctrination and safety meetings, [w]orker training in hazard recognition, [d]isciplinary policy, and [d]escribe the system used to communicate with personnel, including notification of hazards."

- Section 5.1.2.5 states that "JSAs must be prepared and reviewed at the start of any on-site work and any new phase or task and will be reviewed daily."

- Section 5.1.3.3 requires that "subcontractors must perform daily inspections of activities and work sites relevant to the work being performed that day to ensure that the subcontractor is working within identified controls and has effectively controlled identified hazards...." This section further states that "[a]ll inspections, findings, and corrective measures must be documented and be available for review..." and that "[t]he daily inspection records must be kept at the job site." This section also states that "[t]he subcontractor's competent person will conduct regular inspections of the work place and maintain a log certifying compliance with accepted safe work conditions."

- Section 5.1.9.8 lists as a key responsibility for the subcontractor (i.e., PUC) "[t]akes primary responsibility for the safety of their personnel, their [subcontractors] (i.e., Western Allied), and their equipment."

Contrary to these requirements, PUC failed to execute its responsibilities for safe work performance and failed to ensure that Western Allied complied with SLAC's approved worker safety and health program and associated implementing procedures. Even if PUC lacked specific expertise in the pressure gauge installation activity that caused the explosion, PUC should have realized that this task represented an unanticipated change in work plan that warranted reevaluation to ensure that no new hazards would be introduced. Specific examples of PUC's deficient performance are listed below:

A. PUC did not document the results of safety inspections for the work performed by Western Allied. PUC also failed to ensure that Western Allied performed and documented safety inspections for work conducted in Sector 30 of the linear accelerator facility.

B. Pursuant to the general terms and conditions of its contract with Stanford University, PUC did not review the SSSP submitted by Western Allied to Stanford University for approval to ensure that it met the requirements of chapter 42, section 5.1.2.4 described above.

C. The JSA applicable to the utilities upgrade work performed by Western Allied did not identify the task of installing a pressure gauge in the carbon steel pipe. Although this task was reportedly discussed during a tailgate meeting on the day of the explosion, PUC failed to ensure that a new JSA was prepared, or the existing JSA was modified to reflect this new task's hazards and potential to cause serious physical harm to workers for whom PUC had assumed contractual responsibility.

Collectively, these deficiencies constitute a Severity Level I violation. As explained in 10 C.F.R. Part 851, appendix B, section 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."

Administrative Appeal

Pursuant to 10 C.F.R. §§ 851.43(b) and 851.44(a), PUC may petition DOE's Office of Hearings and Appeals for review of this FNOV within 30 calendar days of receipt of this FNOV. PUC's petition must conform with the procedural requirements set forth in 10 C.F.R. Part 1003, *Office of Hearings and Appeals Procedural Regulations*, Subpart G, 10 C.F.R. § 1003.70, et seq. If PUC does not petition the Office of Hearings and Appeals for review within 30 calendar days of receipt of this FNOV, PUC relinquishes any right to appeal any matter in the FNOV, and the FNOV, including the civil penalty assessed, will constitute a final order.

Civil Penalty Remittance

If PUC decides not to contest the FNOV, the penalty of $42,000 must be paid within 30 calendar days after receipt of this FNOV by check, draft, or money order payable to the Treasurer of the United States (Account 891099) and mailed to the Acting Director, Office of Enforcement, Attention: Office of the Docketing Clerk, U.S. Department of Energy, 19901 Germantown Road, Germantown, MD 20874-1290. This FNOV will constitute a final order upon the payment of the civil penalty.

John S. Boulden III
Acting Director
Office of Enforcement
Office of Health, Safety and Security

Washington, DC
this 3rd day of September 2009