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LCLS Project Environment, Safety, and Health Plan

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LCLS PROJECT ENVIRONMENT, SAFETY, AND HEALTH PLAN

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1. SAFETY AND HEALTH POLICY

Environment, Safety and Health (ES&H) are preconditions in the planning and execution of work related to the Linac Coherent Light Source (LCLS) Project at the Stanford Linear Accelerator Center (SLAC). The management of the LCLS Project is committed to providing a safe work environment for LCLS workers, SLAC site-wide workers and protecting the public from hazards associated with the construction and operation of the LCLS. All work related to LCLS construction and subsequent operations will be performed in a manner that preserves the quality of the environment and prevents property damage.

The LCLS Project will comply with all applicable safety, health and environmental laws, regulations, and requirements. Furthermore, SLAC and LCLS Management are committed to the enforcement of these safety and health rules. They will ensure that procedures are established and enforced during the construction period of the LCLS to support the LCLS Project goal objective of Zero Accidents.

Environment, safety, and health policy statements specific to LCLS:

- Management is responsible for safety at the LCLS Project site.
- Management, supported by the SLAC safety organization, will provide consistent guidance and enforcement of a safety program that governs the activities of workers at the site.
- Incidents, whether they be personal injuries or other losses are unacceptable.
- Workers will be involved in the work of planning process, including the identification of hazards and controls.
- Working safely as a condition of employment, and disciplinary action policies for violations of safety rules will be enforced by management.
- Each worker is directly responsible for ensuring his or her own safety, and for creating a safe work environment.
- A strong program of independent audits, self assessments and surveillance will be employed to periodically evaluate the effectiveness of the safety program.
- Any incidents that result in personal injury or illness, significant damage to buildings or equipment, or impact of the environment, will be investigated by management.

It is the Project's policy to integrate safety into all aspects of work performed. A systematic approach will be followed to integrate safety into work planning and its execution. The basis of this program will be that of the Integrated Safety Management System contained in DOE Policy 450.4.

Approved: John Galayda
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Date: 7 MARCH 2006

2. INTRODUCTION

SLAC and LCLS have developed this plan for implementing the principles and functions of Integrated Safety and Environmental Management System (ISEMS). The Project Manager and each Subcontractor's line management shall share the common goal of eliminating conditions that are likely to result in injuries to employees and the down time associated with accidents. The requirements of the California Occupational Safety and Health Administration (Cal/OSHA), SLAC, and this safety plan establish the requirements and minimum standards that subcontractor Safety and Health programs on the LCLS project must meet or exceed.

2.1 GENERAL INFORMATION

- 2.1.1 The objective of this plan is to emphasize that the protection of people, the environment and property is of paramount importance to the success of this project. To accomplish this objective, the Project is committed to implementing the principles and functions of the Integrated Safety Management System described in the U.S. Department of Energy (DOE) Policy 450.4 and discussed in detail in Section 3 of this document.
- 2.1.2 The Project recognizes that Subcontractors may have their own specific safety requirements. It is each subcontractor's responsibility to identify to the Project how their programs will comply with the guidelines set forth in this plan before beginning to perform work on the project site.
- 2.1.3 While it is the responsibility of each individual to work safely, it is ultimately each Subcontractor's management's responsibility to see that safety and health policies and practices are followed and enforced. The Project expects each subcontractor's supervisory personnel to be actively involved in the promotion of the safety and health program they have agreed to implement on the Project.
- 2.1.4 The Project's goal is that of Zero Accidents. Each Subcontractor's line management is expected to promote this concept and develop, implement, and enforce a Safety and Health program that will result in a safe work environment. Safety is not to be compromised for production and must be considered an integral part of the work planning process.

2.2 GENERAL IMPLEMENTATION

- 2.2.1 No person shall be required or instructed to work in surroundings or under conditions that are unsafe or dangerous to his or her health.
- 2.2.2 The employer shall be responsible for initiating and maintaining a safety and health program that complies with the Cal/OSHA safety and health requirements.
- 2.2.3 Each employee is responsible for complying with applicable safety and occupational health requirements, wearing prescribed safety and health equipment, reporting unsafe conditions/activities, preventing avoidable accidents, and working in a safe manner.

- 2.2.4 Safety and health programs, documents, signs, and tags shall be communicated to employees in a language that they understand.
- 2.2.5 Worksites with non-English speaking workers shall have a person(s), fluent in the language(s) spoken and English, on site when work is being performed, to translate as needed.

2.3 DEFINITIONS

- 2.3.1 Subcontractor – Firms employed by SLAC, and their employees, to perform work.
- 2.3.2 Competent Person – is a person who is capable of identifying existing and predictable hazards and who has the authority to take prompt, corrective measures to eliminate hazards.
- 2.3.3 Authorized Person – A person selected, approved or assigned by their employer as being qualified to perform a specific duty or duties, or to be at a specific location(s) at the work place.
- 2.3.4 Serious Accident – is defined as an accident that results in lost work days, exposure to toxic substances or radiation beyond threshold limits, property damage over \$25K or a near miss that might have resulted in one of the aforementioned situations.

3. INTEGRATED SAFETY MANAGEMENT SYSTEM

The Project has adopted the concept of the Integrated Safety and Environmental Management System (ISEMS) as its overarching philosophy and approach to integrating safety systematically into work activities. ISEMS is an organized process whereby work is planned, performed, assessed, and systematically improved to promote the safe conduct of work. ISEMS is based on the fundamental principles and core functions discussed in DOE Policy, P 450.4. These concepts will be addressed in the balance of this section of the safety program.

3.1 PRINCIPLES OF INTEGRATED SAFETY MANAGEMENT SYSTEM

The fundamental principles described in DOE P 450.4, which are discussed below, are incorporated into LCLS Project processes to ensure that work is conducted safely, that suitable accident prevention measures are in place and that the environment and SLAC facilities are adequately preserved.

3.1.1 Worker and Line Management Responsibility for Safety

Line management is accountable for providing workers with the training and the authority necessary to establish and maintain safe operating methods commensurate with their assigned duties. Management expectations are to be clearly communicated to all personnel. Management is responsible for assuring that the tools necessary to perform the work safely are provided and to solicit feedback to continuously improve the safe execution of work.

Line managers are responsible for training, motivating, and enabling their workers to understand and comply with the Project's commitment to safety. They are also to ensure that work is executed as defined in the relevant work planning document. Line managers are also responsible, by personal example and by involving their workers, for providing a working environment in which everyone is involved in meeting the Project's commitment to safety.

Each individual on the LCLS site will be held accountable for their actions. Therefore, any individual who does not feel comfortable that they understand the work means and methods, or are not comfortable that they can execute the work safely are responsible for "Pausing" to evaluate their circumstances or bring their concern to their immediate supervisor.

3.1.2 Clear Lines of Authority

The Project organizational structure focuses on management and worker involvement, and is centered on work planning and execution. Clear and unambiguous roles and lines of responsibility, authority, and accountability at all organizational levels must be established. Environment, safety, and health (ES&H) responsibility will be integrated into the Project work activities, and interfaces for processes and organizations will be clearly established to provide for good understanding and communication.

3.1.3 Personnel Experience, Knowledge, and Skill

Each Subcontractor must commit to using a workforce on the Project that has the ability to do work safely and efficiently. Each individual associated with the Project shall possess the experience, knowledge, skills, and abilities necessary to discharge his or her responsibilities. Line managers must ensure that their workers are competent to safely accomplish the work through the hiring and training

processes. Line management must ensure that training and qualification requirements are flowed down to their personnel, and are responsible for their performance.

3.1.4 Balanced Priorities

The Project ensures a Zero Accident culture by allocating and monitoring resources to ensure that work is performed safely. Every employee has Stop work authority to be exercised when he or she believes the activity in which they are involved, or when they observe an activity, they consider is unsafe. Restart of work will be authorized by the individual who questioned the safety of the activity and/or by an individual of senior grade who declares that responsibility.

Specific job tasks are planned with appropriate worker involvement.

Work plans are to be followed to ensure safe operation, environmental compliance and protection of property.

3.1.5 Work and Associated Hazards

Before work is performed, hazards associated with the activity are evaluated and an agreed-upon set controls is established, which, if properly implemented, provides adequate assurance that the workers, the public, the environment and property are protected from adverse consequences.

3.1.6 Administrative and Engineering Controls

Administrative controls and engineering controls are essential elements of the ISEMS. Wherever feasible, engineered controls are designed into the Project, and administrative controls are used to supplement engineered controls as appropriate. These controls are established through the work planning process.

3.1.7 Authorization Agreement

The conditions and requirements to be satisfied for operations to be initiated and conducted are clearly established and agreed upon by the Project Manager and subcontractor.

3.2 CORE FUNCTIONS OF INTEGRATED SAFETY MANAGEMENT SYSTEM

DOE P 450.4 describes the core functions of an Integrated Safety Management System. The five core functions are not independent and not necessarily sequential. Rather, they are linked and interdependent such that outcomes during the accomplishment of one may affect others. In particular, identifying and implementing opportunities for improvement may arise at any stage of the work process. The five functions are Define the Scope of Work, Identify and Analyze Hazards, Develop and Implement Hazards Controls, Perform Work within Controls, and Provide Feedback and Continuous Improvement.

3.2.1 Define the Scope of the Work

Defining the scope of work entails identifying and defining **all** the steps, each task, needed to complete a particular job safely. Defining the scope of work is a critical element of the safety management system, since it sets the stage for the scope and depth of hazard identification and analysis.

3.2.2 Identify and Analyze Hazards associated with the Work

Hazard identification includes defining those hazards to workers or property expected to be encountered during the course of performing a particular task and those that are introduced from concurrent work tasks. A Job Safety Analysis (JSA) shall be performed for each task to address such hazards. As work evolves there is the potential that unexpected hazards may be encountered or the nature of the known hazards might change as work activities proceed. Should this occur the JSA shall be amended to incorporate the new conditions.

3.2.3 Develop and Implement Hazard Controls

The development and implementation of hazard controls includes identifying controls to prevent and mitigate hazards, establishing safe work limits and performing periodic hazard assessments.

3.2.4 Confirm Readiness and Perform Work Within Controls

Confirmation of readiness is an effort to verify that safety controls have been implemented before starting work. Performing work within controls entails adherence to work controls in a manner such that activities remain within the safety envelope. Readiness assessments are conducted at multiple levels from each worker assessing his readiness to start a task to that necessary to demonstrate Project readiness to the DOE and regulators.

3.2.5 Provide Feedback on Adequacy of Controls

Feedback and continuous improvement are based on the premise that all work activities can be planned, performed, assessed, and improved. Continuous improvement entails proactive focusing on problem prevention and performance improvement to prevent unsafe practices from occurring. The capability to prevent minor problems from becoming major risks or events relies heavily on feedback from workers; observations from those not directly involved with the work, and adequate records to assess trends in performance.

3.3 ROLES AND RESPONSIBILITIES FOR INTEGRATED SAFETY MANAGEMENT SYSTEM IMPLEMENTATION

3.3.1 Senior Management

The LCLS Project Director has the overall responsibility for assuring a safe workplace and for maintaining safe operations. The Project Director ensures implementation by conveying to line management their responsibilities for integration of safety performance into all work activities, and confirms management responsibility for integration of safety performance into all work activities. The Project Director also has responsibility for evaluating the progress and health of the ISEMS and adjusting resources as necessary based on feedback of ISEMS implementation. This promotes continuous improvement in safety performance, and communicates the importance to the Project success. Although the Project Director retains overall responsibility for assuring that the LCLS provides a safe workplace for the construction phase of the project he has assigned the authority for the implementation of this program to the Conventional Facilities Manager. The LCLS Conventional Facilities Manager will implement this program with the aid of his LCLS Project Engineers, LCLS ESH Coordinator and other resources he enlists to do so.

3.3.2 Line Organizations

Each Subcontractor's Field Managers and Supervisors constitute the focus of "line manager responsibility" for the protection of workers, the public, the environment and property within the ISEMS framework for all work conducted by their assigned employees, and visitors in their assigned operating facilities.

Line managers provide the primary operating interface for employees and visitors. Within the framework of the ISEMS, they contribute to work planning, pre-job communication of hazards and controls, work monitoring, and evaluation of results.

Effective integration of support from ES&H professionals into line activities is essential to achieving excellence in ISEMS. Line management is responsible for defining and providing an adequate level of subject matter expert support, either from its own staff, or from external sources, as appropriate for the particular line organization and ES&H discipline involved.

3.3.3 LCLS ES&H Coordinator

As noted above, effective integration of ES&H into line activities is needed for success of the ISEMS. The LCLS ESH Coordinator is responsible for providing overall policy and guidance on ES&H issues, and for working with the line organizations to make available necessary and agreed-upon input from ES&H professionals and other support. SLAC ES&H personnel will be enlisted to assist the project in ensuring the standards, requirements, and ES&H policies are effectively translated into suitable controls for work activities. The LCLS ES&H Coordinator will also regularly assess the effectiveness with which ISEMS is being applied. He will also coordinate the ESH assessments conducted by individuals other than the subcontractors.

3.3.4 Workers

All employees and on-site subcontractors are responsible for becoming knowledgeable of and maintaining awareness of the hazards associated with their work, for contributing to the formulation of hazard controls, and for conducting their work safely in accordance with those controls. They are encouraged to identify ES&H issues in their workplace, to work with their management to provide input for improvements and to resolve concerns, and to exercise stop-work authority in cases of imminent danger to health and safety of workers or the public, or threat to the environment or property.

4. PROJECT SAFETY PLAN

4.1 GENERAL

The safety requirements defined for this Project are based on anticipated work activities. Future work activities may require the development of additional safety procedures or clarification of existing policies and procedures.

It is the responsibility of each employee to work in a safe manner. However, it is ultimately the Subcontractor's line management's responsibility to see that all safety and health rules and practices are followed. Safety is never to be sacrificed for production. The safety goal for this Project is to eliminate the actions that cause accidents or illness, or adverse effects on the environment.

Each Subcontractor has the explicit responsibility to perform work in accordance with this plan. Subcontractors' line managers are accountable for fulfilling the responsibilities listed in this section, in addition to compliance with their own company requirements and attending meetings to discuss or resolve safety issues. A Subcontractor with 40 or more total employees on-site must have a dedicated safety representative assigned to the site full time to carry out the duties described below. A Subcontractor with fewer than 40 employees onsite must delegate these duties to an on-site supervisor who will be referred to as a safety **designee**.

4.2 EMERGENCY SERVICES AND EQUIPMENT

If a serious or life-threatening injury occurs, SLAC will provide emergency ambulance and fire fighting services. When using a SLAC facility phone dial 9-911, if using a privately owned cell phone dial 911, or pull a fire alarm box to notify SLAC for emergency response.

In the event of a less-serious injury, subcontract employees will be sent to their own physicians, otherwise the SLAC emergency response service will transport an injured individual to the nearest hospital. In addition to the injury recordkeeping required by Cal/OSHA, each subcontractor shall inform the LCLS ESH Coordinator of any injury requiring First-Aid and all more serious occupational injuries and illnesses within one hour of the classification of the injury.

4.3 ORIENTATION

LCLS shall provide its subcontractors with a Project Safety Orientation which contains information they need to know to recognize hazards and rules specific to the SLAC site. Contractors who retain subcontractors are expected to conduct the safety orientation for their respective subcontractors, unless the LCLS agrees to perform the orientation on their behalf. A Safety Orientation is required before an employee can receive a SLAC ID. A SLAC ID is required to perform work on site. The following information is contained in the SLAC orientation:

- a) General site description
- b) Project and site safety rules
- c) Emergency reporting procedures and use of 911
- d) Emergency response and medical services
- e) Emergency evacuation assembly point and evacuation procedures

Visitors must be escorted while on the site. If there is some reason that they will not be escorted they must also attend the safety orientation.

All employees will complete an Orientation Acknowledgment form at the end of the orientation. A copy will be submitted to the Project in order for the employee to obtain an ID badge.

4.4 SITE ACCESS

To gain access to any LCLS construction site workers and visitors must review the project site Area Hazards Analysis and complete an acknowledgment form that they have done so.

To perform work on an LCLS construction site the individual must have attended the project safety orientation, have a valid SLAC ID, and read and sign the JSA for the task to be performed.

4.5 SAFETY AUDITS & INSPECTIONS

The Project ES&H Coordinator or designee shall conduct a weekly inspection of the site.

SLAC and Department of Energy ES&H representatives will audit site safety activities periodically.

Subcontractor's are to conduct a weekly review of their areas and forward a copy of the report to the Project Manager's safety representative or designee.

Audits/Inspection and related abatement actions will be documented and maintained in the site safety file.

4.6 PROJECT SAFETY MEETINGS

Weekly coordination meetings will address safety. This will be the opportunity for individuals on the project to identify safety issues and concerns of a general nature. It is also the opportunity to coordinate the control of recognized hazards and promote safety awareness.

Subcontractor's are to conduct weekly toolbox safety meetings and forward copies of these to the Project Manager along with a Safety Meeting Record Form which documents the following:

- a) Time and date of meeting
- b) Attendees
- c) Topics/Comments
- d) Assignments – Party responsible/date corrected (if applicable)
- e) Person conducting the meeting

4.7 ACCIDENT/INCIDENT INVESTIGATIONS AND REPORTING

All incidents, involving illness/injury (first aid/recordable), property damage, hazardous material spills, accidents involving company vehicles, or other "near miss" incidents that could have resulted in a serious accident must be immediately reported to the Project Manager. Such incidents must be

investigated by the Subcontractor's safety representative or designee and documented on a Project Incident Investigation Report (Appendix B).

Accident investigations must be initiated as soon as possible after the incident occurs. The report must be completed and submitted to the Project Manager within 24 hours of the incident. The Project reserves the right to conduct an independent investigation of any incident.

An incident investigation committee appointed by the LCLS Project Director will investigate all major incidents. This includes, but not limited to, any incident resulting in a lost-time injury, fatality, damage to property or equipment or a "near-miss" that could have resulted in a major incident. The committee will review the incident scene, interview all involved or witnessing parties, review all facts pertaining to the accident, and file a report of the findings and conclusions as well as recommended measures to prevent re-occurrence to the Project Manager. The committee will be comprised of, but not limited to:

- the person(s) involved in the incident,
- the first-line supervisor of the person(s) involved in the incident,
- the superintendent of the employing Subcontractor,
- the safety representative or designee of the employing Subcontractor,
- the safety representative or designee of the Subcontractor, and
- the Project ESH Coordinator or designee.

Information on the cause of the accident and corrective actions to be taken will be communicated to site personnel through postings, safety meetings or tool-box talks. The anonymity of persons involved in the accident or who provided information during the investigation will be maintained.

Corrective actions identified by the accident investigation will be followed up on. A corrective action tracking record shall be defined following the completion of the accident investigation. Documentation of completed corrective actions will be maintained in the site safety files.

4.8 SITE HAZCOM PROGRAM

A HazCom program shall be prepared for the site and include an inventory and Material Safety Data Sheet (MSDS) for hazardous materials used on the project.

LCLS and subcontractor personnel shall be provided with HazCom training. Subcontractors shall be responsible to implement their site HazCom Program and conduct associated training.

Copies of Contractor MSDS are to be maintained at the workplace where the material is located.

4.9 DRUG FREE WORK ENVIRONMENT

4.9.1 Introduction

SLAC and the Project are committed to providing a safe workplace for the workers assigned to the Project, promoting high standards of employee health, and fostering productivity that satisfies their Quality expectations. Consistent with the intent and spirit of this commitment, the Project has established a substance abuse testing specification for the Project with the goal of maintaining a work environment that is free from the effects of the use of illegal drugs and alcohol.

This specification is not intended as a substitute for the Subcontractor's complete written substance abuse policy. Normally, such policies include other important features, including, but not limited to, an employee education and awareness program, a supervisor-training program, and an employee assistance program.

4.9.2 Program Requirements

All Subcontractors must have and enforce a written Substance Abuse Program incorporating the testing requirements, term, and conditions set forth in this plan. This plan is applicable to all employees, current and prospective, in order to be eligible to perform work at the project site. The Subcontractor must comply with this plan. Suppliers, vendors, and visitors are subject to confirmation of their abstinence from the possession or use of substances indicated in this plan. A copy of the substance abuse program must be submitted to the Project for approval prior to commencement of work on the project site.

The Substance Abuse Program must apply to the employees of the Subcontractors and subcontractors' of any tier working on the project site. This includes workers, new hires, replacement workers, and supervisory personnel. No employee or prospective employee of a Subcontractor shall be permitted to work on the project site unless such employee has submitted to testing as required by this plan and unless the results of such testing are negative as hereinafter defined. Subcontractor must provide the Project with a Monthly Summary Report of the Substance Abuse Program compliance.

All Contractors must train their respective employees in methods that will allow them to recognize substance abusers. Supervisory employees of the Subcontractor or its subcontractor shall be trained to take action, and to confront a substance abuser in a manner consistent with generally accepted safety training procedures.

The costs of implementing the Substance Abuse Program shall be borne by each respective Subcontractor affected by this plan.

The Project reserves the right to audit any substance abuse program required by this plan to verify compliance results within 24 hours of the Project's notification of intent to audit. The Project shall have free right of access to all relevant records of the subcontractor and their subcontractor's and suppliers for this purpose, provided such record disclosures are within the scope of guidelines pertaining to confidentiality of employee records.

The Contractors' pre-engagement employees who receive a positive test result shall immediately leave the project site. Transportation of employees receiving a positive test result is the direct responsibility of the employing Subcontractor. Furthermore, pre-engagement employees receiving a positive test result shall not be permitted to return to the project site earlier than 90 days from the date of the positive test. At that time the employee may begin the process outlined by this specification again.

If a current employee testing positive qualifies and successfully completes the Subcontractor assessment/substance abuse treatment program, a program approved by the Project, the employee will be exempt from the 90-day requirement if said employee agrees to the following:

- Submit to substance abuse testing as described in this specification and receive a negative test result; and
- Agree to random substance abuse testing not to exceed one test per 500 work hours over a 3-year period from the date of return to the project site.

4.9.3 Testing Requirements

The Project requires:

- pre-engagement drug and alcohol testing;
- drug testing for reasonable suspicion of illegal drug use;
- post accident / incident drug and alcohol testing; and
- drug testing following discovery of illegal or unauthorized drugs or paraphernalia.
- All drug testing must be conducted by a National Institute of Drug Abuse certified laboratory with test results interpreted by a licensed medical review officer.
- The initial screen tests for alcohol shall be performed by using either a saliva test or a Breathalyzer test comparable to the type used by state or local law enforcement officials. Furthermore, alcohol confirmatory tests shall be performed by using either a blood alcohol test or a Breathalyzer test comparable to the type used by state or local law enforcement officials.

Substance abuse testing shall be conducted in accordance with specified requirements found in 10 CFR 707. Initially, the substances that will be screened will consist of the National Institute of Drug Abuse (NIDA) 5. However, the project reserves the right to expand the test panel to include the following substances should the need be established:

10 PANEL TEST PLUS ALCOHOL

	Threshold limits	
	<i>Initial Limit</i>	<i>GC/MS Confirmation Limit</i>
Alcohol	0.04%	0.04%
Amphetamines	300 ng/ml	300ng/ml
Cocaine metabolites	300 ng/ml	150 ng/ml
Marijuana metabolites	20 ng/ml	10 ng/ml
Opiate metabolites	300 ng/ml	150 ng/ml
Phencyclidine	25 ng/ml	25 ng/ml
Barbiturates	300 ng/ml	100 ng/ml
Benzodiazepines	300 ng/ml	100 ng/ml
Methadone	300 ng/ml	100 ng/ml
Methaqualone	300 ng/ml	200 ng/ml
Propoxyphene	300 ng/ml	200 ng/ml

4.9.4 Definitions

Positive Tests: Test results that indicate the presence of legal or illegal substances at or above the threshold limit as set forth in this plan.

Negative Tests: Test results indicating that legal or illegal substance are at levels below the threshold limits is set forth in this plan.

Pre-engagement Testing: Testing for all substances other than alcohol as set forth in this plan conducted by Subcontractors or its lower-tier subcontractors for their employees or prospective employees within 120 days prior to their appearance on the project site.

For Cause Testing: Testing for all substances set forth in this plan conducted by the respective Subcontractor for their employees whose behavior on the project site causes either the Project Manager/Project personnel or the respective Subcontractor supervisory personnel to reasonably conclude that such behavior may result from substance abuse.

Post-Accident / Incident Testing: Testing for all substances set forth in this plan conducted by the respective Subcontractor for their employees involved in an injury producing accident or a “near miss” in which injury is avoided or in events resulting in damage to property as determined by the Project Manager/ Project personnel or the respective Subcontractor supervisory personnel.

4.10 DISCIPLINARY POLICY

The purpose of this policy is to state the Project’s position on administering equitable and consistent discipline of unsatisfactory conduct on the jobsite. This policy ensures fair treatment of all employees in making certain that disciplinary actions are prompt, uniform and impartial. The primary purpose of any disciplinary plan is to correct the problem, prevent recurrence and prepare the employee for satisfactory service in the future.

We recognize that employees on the whole normally govern their activities while at work in the same high standards of conduct that they use for their personal affairs. But we recognize that errors in judgment may occur and when they do we wish to address them in a fair, impartial and consistent manner. By using progressive discipline, it is our hope that most employee problems can be corrected in the early stages, thus benefiting both the employee and the Project. Open and clear communications between the employee and the supervisor promotes understanding, and is the key to preclude the need for any disciplinary action.

Disciplinary action may call for any four of the following steps: Verbal warning, written warning, temporary suspension from the Project site, and denial of access to the Project site for a period of one year or more, depending on the severity of the problem and the number occurrences.

All disciplinary actions are based upon incident free time periods (rolling date). After an active employee has gone for a time period of one-year (365-days) without a reoccurrence of any progressive disciplinary action, all prior disciplinary action records will be removed from their personnel file. Records associated with terminations will not be purged from the files.

All disciplinary actions resulting in suspension or termination will automatically be reviewed within twenty-four (24) hours by the appropriate Business Agent (if applicable), the subcontractor’s representative, Project Manager, and the LCLS Project ESH Coordinator.

Employees terminated for safety violations will not be eligible for re-employment on the Project for twelve (12) months. Employees terminated for a second time for a safety violation are ineligible for re-employment.

Appendix B provides the five (5) categories of offenses that require some form of disciplinary action in order to ensure corrective job performance, with only Class V offenses being characterized as the most serious and for which immediate termination will result.

4.11 EQUIPMENT AND MACHINERY

Subcontractor employees shall be trained in the operation, inspection, and maintenance of the equipment; and the safety features and procedures to be utilized during operation, inspection, and maintenance of the equipment. This training shall be based on the equipment operating manual and the hazard analysis for the activity.

Before any machinery or mechanized equipment is placed in use, it shall be inspected and tested by a competent person and certified to be in safe operating condition. Inspections and tests shall be in accordance with manufacturer's recommendations and shall be documented. Records of tests and inspections shall be maintained at the site by the subcontractor, and shall be made available upon request, and shall become part of the official project file.

All machinery and equipment shall be inspected daily (when in use) to ensure safe operating conditions. The Subcontractor shall designate competent persons to conduct the daily inspections and tests. Tests shall be made at the beginning of each shift during which the equipment is to be used to determine that the brakes and operating systems are in proper working condition and that all required safety devices are in place and functional.

Whenever any machinery or equipment is found to be unsafe, or whenever a deficiency which affects the safe operation of equipment is observed, the equipment shall be immediately taken out of service and its use prohibited until unsafe conditions have been corrected. A tag indicating that the equipment shall not be operated, and that the tag shall not be removed, shall be placed in a conspicuous location on the equipment.

Machinery and mechanized equipment shall be operated only by designated qualified personnel. Machinery and equipment shall not be operated in a manner that will endanger persons or property nor shall the safe operating speeds or loads be exceeded. Utilize equipment only for the purpose for which it was designed and in accordance with the manufacturer's instruction and recommendations. Modifications, extensions, replacement parts, or repairs of equipment shall maintain at least the same factor of safety as the original equipment. Modifications shall be authorized in writing by the manufacturer.

4.12 EVACUATION OF THE WORK AREA

Subcontractor shall observe and participate in notices to evacuate the work area. Evacuation notices may be a drill or an actual event. Evacuate to the assembly point identified in the orientation/JSA. Before evacuating the work area, shut down or make safe equipment or processes which could become a safety or fire hazard if left unattended.

4.13 PERSONAL PROTECTIVE EQUIPMENT

The Subcontractor is responsible for assuring that their personnel have appropriate personal protective equipment (PPE) for all operations/tasks where they are exposed to hazardous conditions or where there is the need for using such equipment to reduce the hazards to the employees.

PPE and safety equipment shall be tested, inspected, and maintained in serviceable and sanitary condition as recommended by the manufacturer. Regulations governing the use, selection, and maintenance of PPE are described in Cal/OSHA Title 8 § 1514.

Users of PPE and Safety equipment shall be trained in the use, limitations, inspection, testing, and maintenance of the equipment.

Basic Eye Protection—Employees must wear ANSI Z87 approved safety glasses with side shields 100% of the time while in the construction areas, including entering and leaving the site.

Contact Lenses—Wearers of contact lenses must also wear appropriate eye and face protection devices in a hazardous environment. It should be recognized that dusty and/or chemical environments might represent an additional hazard to contact lens wearers. Hazardous environments include, but are not limited to, those in which a respirator may be required or where welding is being performed.

Goggles—If the task requires an employee to wear goggles, basic eye protection should not be worn since a good seal cannot be obtained.

Face Shield—When Subcontractor's employees are exposed to flying particles, splashes, mists, etc., they must wear an approved face shield as well as basic eye protection (since a face shield provides only protection to the face and eyes from direct impact objects).

Welding Shield—When welding, both basic eye protection and hard hats must be worn with a welding shield. This is to protect employees from popping hot slag when the shield is raised and from overhead work exposures. If welding goggles are worn basic eye protection is not required while welding.

Head Protection—All persons working in or visiting hard hat areas shall be provided with and required to wear protective headgear. Hard hat areas are those with potential of head injury: all construction areas are considered hard hat areas.

Hearing Protection—The safety representative or designee will monitor work areas to identify and post high noise areas as required by Cal/OSHA Title 8 § 5095 and provide appropriate hearing protection.

Foot Protection—Subcontractor personnel must wear leather ANSI Z41 protective work shoes or boots. No one is permitted to wear sneakers, tennis shoes or athletic shoes of any type, sandals, high heels, or thongs on the project site.

Clothing—Employees are to report to work properly attired. The Project's requirements include:

- Clothing in good repair. (Frayed or tattered clothing can be hazardous to employees and will not be permitted);
- No tank tops or sleeveless shirts. (Shirts must have at least 4" sleeves and tails be tucked in at all times);
- Long pants only. (No short pants, cutoffs, sweat pants, etc.);
- If working around moving machinery, no neckties, gauntlet type gloves and/or baggy, loose or ragged clothing;
- No loose, dangling jewelry. (Jewelry such as rings, watchbands, necklaces, earrings and the like can cause or contribute to accidents);
- Shoulder length or longer hair must be tied back and put under the hard hat or worn in a hair net. (This will keep it from impeding vision, becoming entangled in machinery, or preventing the use of personal protective equipment).

4.14 PROTECTION OF WORK AREAS

Subcontractor must ensure that the work areas and storage areas are conspicuously flagged and barricaded, as needed, prior to initiation of work.

Subcontractor must furnish, post, erect, and install safety devices, equipment, signs, barricades, flagging, and any other item necessary to give adequate warning and caution of hazards, and to provide instructions and directions to workers and the public.

4.15 WORKING AND STORAGE AREAS

Housekeeping is a general indicator of a Subcontractor's performance on-site, including safety performance. Each Subcontractor has the responsibility to maintain their area of operations, and those of their lower-tier subcontractors, in an orderly condition free of materials that could create slip/trip or fire hazards. All requirements of Cal/OSHA Title 8 § 1513 must be met. In addition, the Subcontractor's Supervisors shall ensure a daily walkdown of their work area is conducted, that any deficiencies are immediately corrected, and the condition of the site is reported to the Subcontractor's Field Manager.

All materials and equipment in storage, laydown, staging, or work areas must be properly secured so that they are stable and secure against sliding or collapse. All materials storage and loading/unloading areas must be established a safe distance from walkways, aisles, and traffic areas to avoid personnel injury should materials slide or collapse.

4.16 HAZARDOUS MATERIALS AND HAZARDOUS WASTE

- All Subcontractors will provide to the Project Manager a list of hazardous materials that will be used on the project site.
- All hazardous wastes produced by the Subcontractor must be packaged, transported, and disposed of following Project policy which will be defined on a case-by-case basis.
- All hazardous materials must be properly labeled and stored until removed from the project site following Project policy.
- Hazardous materials or hazardous wastes stored in 30-gallon or 55-gallon drums are to be placed on spill containment pads.
- Report all accidental releases of a hazardous material or hazardous waste promptly to the Project Manager and determine if the release is a reportable quantity. If the release is of a reportable quantity, the Project Manager will notify the appropriate regulatory agency.
- The responsible Subcontractor will do proper cleanup of accidental releases of hazardous materials and waste. Cleanup is to be done by properly trained personnel and the waste is to be managed following project policy.
- Depending on the hazardous materials spilled, the Project Manager may require the responsible Subcontractor to hire a certified laboratory to take an appropriate number of soil samples to test at their laboratory. A copy of the results is to be given to the Project Manager.
- Subcontractor must inspect their hazardous material and waste storage areas at least weekly to ensure they are properly maintained.

- The Subcontractor will randomly audit the labeling and storage of hazardous material and waste and the disposal of hazardous waste to verify that all subcontractors, at any tier, are fulfilling their roles as responsible parties.

4.17 JOB SAFETY ANALYSIS

A Job Safety Analysis (JSA) shall be developed for each work task to be performed on site. The JSA shall identify the task and the steps necessary to complete the task, the hazards associated with each step of the task, and the means to protect the workers performing the task from those hazards.

Supervisors and employees are responsible for developing the Job Safety Analysis of their work activities. The supervisor is also responsible for:

- Ensuring that hazard analyses are developed and reviewed by the employee before work begins.
- Ensuring that employees are trained in the process of developing a hazard analysis.
- Seeking advice of the safety officer or designee as appropriate.

The completed and approved Job Safety Analysis shall be reviewed with all personnel involved in the task. This can be done as a tool-box talk or job preparation meeting. The JSA shall be updated whenever there are changes in the work plan, changes in material used, or a new crew or subcontractor is assigned to conduct the work. JSA worksheet/guidelines are presented in Appendix D.

5. CONTRACTOR SITE SAFETY ACTIVITIES

5.1 RESPONSIBILITIES

Subcontractors are responsible for carrying out all activities safely and maintaining a safe and healthy work environment. Subcontractor's Managers and Supervisors are responsible for training, control, and the conduct of personnel on their crew.

Contractor's responsibilities include, but are not limited to:

- Conducting task-specific safety training,
- Conducting daily safety inspections and taking corrective action where necessary,
- Conducting toolbox safety meetings,
- Keeping the Project Manager apprised of any safety-related problems that have or may develop,
- Investigate all accidents and incidents, and submit reports to the Project Manager, and
- Appointing a Competent Person as Site Safety Representative responsible for administration of its site safety activities.

5.2 SUBCONTRACTOR'S SAFETY AND HEALTH PROGRAM

- 5.2.1 A written Injury and Illness Prevention Plan relevant to the work to be performed, written in English by the Prime Contractor, for the specific work and hazards of the contract and implementing in detail the pertinent requirements of this Safety Program must be submitted after contract award for review and approval by the Project Manager. This document is a prerequisite for approval to start work on site. Each Subcontractor is solely responsible for carrying out their safety and health program.
- 5.2.2 The Contractor shall address each of the elements/subelements in the outline contained in Appendix A in the order that they are provided in the manual. If by the nature of the work an item is not applicable, the Contractor will so state and provide a justification for why that element/sub-element is not applicable.
- 5.2.3 The IIPP will be developed by qualified personnel.
- 5.2.4 Subcontractor's IIPP will be job specific and will include work to be performed by sub tier subcontractors and measures to be taken by the Subcontractor to control hazards associated with materials, services, or equipment provided by suppliers.
- 5.2.5 Job Safety Analysis will define the activities being performed and identify the sequences of work, the specific hazards anticipated, site conditions, equipment, materials, and the control measures to be implemented to eliminate or reduce each hazard to an acceptable level of risk.
- 5.2.6 The names of the competent/qualified person(s) required for a particular activity (i.e., excavations, scaffolding, fall protections, other activities as specified by Cal/OSHA and this program will be identified and included in the JSA. Proof of their competency/

qualification must be submitted to the Project Manager for acceptance prior to the start of that work activity.

- 5.2.7 The JSA will be reviewed and modified as necessary to address changing site conditions, operations, or change of competent/qualified person(s).
- 5.2.8 In developing the JSA, supervisors should draw upon the knowledge and experience of employees in that activity and the project ESH coordinators.
- 5.2.9 The Project Manager or his/her designated representative may immediately stop activity when the activity, if not stopped, would place the employee or other person in imminent danger of serious injury or loss of life. See Federal Acquisition Regulation (FAR) Clause 52.236-13(d)¹ (See footnote below),
- 5.2.10 The Subcontractor shall employ a competent person on the project to function as the Site Safety Coordinator. The Site Safety Coordinator will manage the Subcontractor's IIPP. (This may be a collateral duty responsibility unless specified differently in the contract.). The person(s), as a minimum, must have completed the 30-hour OSHA Construction safety class or an equivalent course applicable to the work to be performed and given by qualified instructors. Such training shall have been within the last three (3) years. The Site safety Coordinator shall be on-site when work is being performed and shall be responsible for enforcing and implementing the Subcontractor's Safety and Health Program in accordance with the accepted IIPP.
- 5.2.11 The Prime SubContractor is responsible for assuring sub tier subcontractors compliance with the safety and occupational health requirements contained in this program.

5.3 CONTRACTOR SAFETY REPRESENTATIVE

Dedicated Safety Representative. A full time dedicated safety representative is an individual (1) scheduled to be onsite during work hours and (2) assigned to exclusively carry out safety-related

¹ 52.236-13 -- Accident Prevention.

(a) The Contractor shall provide and maintain work environments and procedures which will --

- (1) Safeguard the public and Government personnel, property, materials, supplies, and equipment exposed to Contractor operations and activities;
- (2) Avoid interruptions of Government operations and delays in project completion dates; and
- (3) Control costs in the performance of this contract.

(b) For these purposes on contracts for construction or dismantling, demolition, or removal of improvements, the Contractor shall --

- (1) Provide appropriate safety barricades, signs, and signal lights;
- (2) Comply with the standards issued by the Secretary of Labor at 29 CFR Part 1926 and 29 CFR Part 1910; and

(d) Whenever the Contracting Officer becomes aware of any noncompliance with these requirements or any condition which poses a serious or imminent danger to the health or safety of the public or Government personnel, the Contracting Officer shall notify the Contractor orally, with written confirmation, and request immediate initiation of corrective action. This notice, when delivered to the Contractor or the Contractor's representative at the work site, shall be deemed sufficient notice of the noncompliance and that corrective action is required. After receiving the notice, the Contractor shall immediately take corrective action. If the Contractor fails or refuses to promptly take corrective action, the Contracting Officer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. The Contractor shall not be entitled to any equitable adjustment of the contract price or extension of the performance schedule on any stop work order issued under this clause.

5.3 CONTRACTOR SAFETY REPRESENTATIVE

Dedicated Safety Representative. A full time dedicated safety representative is an individual (1) scheduled to be onsite during work hours and (2) assigned to exclusively carry out safety-related duties. Specifically, the dedicated safety representative shall not have other responsibilities that may take his or her attention from the expected safety duties. The individual is required to have 2 years or more of construction safety experience and comply with one of the following;

- Hold a current CSP (Certified Safety Professional) designation, or
- Hold a current CSHT (Certified Safety and Health Technician) designation, or
- Have completed the OSHA 30- hour Construction Safety and Health course within the past 24 months, or
- Have completed the OSHA 500 course within the past 24 months

Safety Designee. A safety designee is an individual who, in addition to other project-related duties, is responsible for performing safety-related duties. As a minimum, this individual is required to have completed the OSHA 30-hour course within the past 24 months.

5.4 ON-SITE SAFETY REPRESENTATIVE OR DESIGNEE

The qualifications of the dedicated safety representative or of the safety designee must be submitted for review and acceptance by the Project Manager, prior to the assignment of this person to the project site. Acceptance shall depend upon:

- prior applicable construction experience,
- prior history of on-site safety functions, and
- safety training.

The safety representative shall perform the following functions and maintain records of having executed these functions.

5.4.1 Employee Safety Orientation and Training

- Conduct orientation sessions for employees new to the project site, prior to their beginning work.
- Participate in weekly toolbox safety meetings and assist field supervisors, as requested, with meetings.
- Instruct supervisors on safety rules and regulations.
- Instruct employees in the proper use and care of personal protective equipment.
- Instruct employees concerning special procedures (e.g., lockout, excavation, confined space entry, etc.) as required by Cal/OSHA and this Plan.
- Conduct or arrange for appropriate training

5.4.2 Recordkeeping

- Complete Cal/OSHA, state, federal, company, and Project-specific reports.
- Complete accident investigation reports.
- Complete inspection reports and maintain copies of any reports developed by his subcontractors.
- Maintain training documentation.

5.4.3 Safety Standards, Rules, and Regulations

- Authority to stop work.
- Authority to take immediate corrective action.
- Implement, maintain, and update, as required, conditions and project site-specific safety policies and procedures.
- Interpret and implement site-specific safety policies and procedures.

5.5 CONTRACTOR SAFETY MEETINGS

Weekly coordination meetings shall be held by the subcontractor's lead person to coordinate related activities among each craft/subcontractor and facilitate any necessary safety training.

Weekly Tool Box Safety Meetings shall be held by each Subcontractor Supervisor with their crew, using prepared safety topics or address items applicable to current job conditions.

Safety meetings should be documented and distributed according with Paragraph 4.6

5.6 SAFETY AND HEALTH BULLETIN BOARD

The Contractor shall erect and maintain a safety and health bulletin board in an area commonly accessed by workers.

The bulletin board shall be maintained current, in clear view of onsite workers; and protected against the elements and unauthorized removal. It shall contain at least the following safety and health information:

- a. Map denoting the route to the nearest emergency care facility.
- b. Emergency phone numbers.
- c. Copy of the most up-to-date Injury and Illness Prevention Plan (IIPP) shall be mounted on or adjacent to the bulletin board or state the location, which will be accessible on the site by all workers.
- d. Copy of current activity Area Hazards Analysis (AHA) shall be mounted on or adjacent to the bulletin board or state the location, which will be accessible on the site by all workers.
- e. Occupational Safety and Health Administration (OSHA) Form 300A shall be posted in accordance with OSHA requirements and mounted on or adjacent to the bulletin board or state the location, which will be accessible on the site by all workers.

5.7 CONTRACTOR PROGRAM AUDITS AND INSPECTIONS

The Subcontractor Site Safety Representative shall conduct a documented weekly inspection of their work area. A copy of the audit/inspection will be given to the Project Manager.

6. PROJECT SAFETY GUIDELINES

6.1 FIRE PROTECTION

- 6.1.2 Maintain proper fire extinguishers readily accessible for use in all work areas.
- 6.1.3 Inspect fire extinguishers monthly.
- 6.1.4 Recharge used fire extinguishers promptly.
- 6.1.5 Keep combustible and flammable materials away from ignition sources.
- 6.1.6 Maintain clear access to/of fire apparatus, aisles, traffic lanes and exits.
- 6.1.7 Know the location of fire exits.
- 6.1.8 Prohibit the re-fueling of equipment while it is running.

6.2 HOUSEKEEPING

Maintain work areas and walkways clear of obstructions, and the accumulation of tripping hazards, slipping hazards, protruding nails and combustibles debris. *Trash and debris shall be removed from the work area on a daily basis.*

6.3 WELDING, CUTTING, AND HOT WORK

- 6.13.7 Work involving burning, welding, grinding, or similar operations that is capable of initiating fires or explosion shall be conducted in accordance with Cal/OSHA Title 8 Subchapter 4, Article 32 and Subchapter 7 Articles 80 through 88 and NFPA 51B. A copy of the SLAC Hot Work Permit shall remain in the work area until the authorizing person verifies that the work is complete and that no fire hazard exists. Appendix Q is an example of a hot work permit.
- 6.13.8 All hot work operations shall be coordinated with the Facility Manager/ Project Manager, or designee.
- 6.13.9 Welders and burners shall wear protective clothing which meet requirements of ANSI Z49.1. The selected clothing shall be specified in the JSA for hotwork activities. Protective clothing requirements shall be determined and noted on each hotwork permit issued during this project. Fire watchers who may be exposed to the same hotwork hazards as the welders and burners shall also wear the selected protective clothing.
- 6.13.10 A fire watch must be designated if any of the following conditions exist:
 - A significant amount of combustible material is closer than 35 ft to the point of operations;
 - A significant amount of combustible material is more than 35 ft away, but could be easily ignited by sparks;
 - Hot work is conducted in areas where the employee must wear multiple layers of clothing and respiratory protection.

6.3.6 The fire watch shall be instructed to:

- Remain present in direct line of sight to the work area and perform no other activities other than fire watch duties;
- Be alert for any condition that could lead to a fire;
- Guard passers-by from welding hazards;
- Interrupt the work when a hazardous condition develops and deal with the situation appropriately;
- Ensure that appropriate fire extinguishing equipment is readily available and know how the equipment is to be used;
- Remain on the scene for at least thirty minutes after completion of hot work to detect and report a fire resulting from stored heat.

6.4 COMPRESSED GAS CYLINDERS

All compressed gas cylinders shall be transported, handled, used, and stored in accordance with Cal/OSHA Title 8, Subchapter 4 Article 32 and Subchapter 7, Articles 80 through 88.

General Requirements

- Ensure that these containers are not defective or leaking any product.
- Prescribed stamped markings on the container shall be located on the shoulder of the cylinder.
- The labels applied by the gas manufacturer or authorized supplier/vendor to identify the container contents shall not be defaced or removed.
- Containers may be painted by the gas suppliers to permit the suppliers to help recognize their contents and to segregate them more readily in their handling operations. However, the primary identifier is the container label. Color shall not be used to exclusively identify container content.
- Containers not bearing a legibly written, stamped, or stenciled identification of the contents shall not be used.
- Compressed gas cylinders shall not be used as rollers, supports, or for any purpose other than to contain and use the content as received.
- The container valve shall be kept closed at all times (charged or empty), except when the container is in use.

Transporting Cylinders

- Compressed gas containers shall not be rolled in the horizontal position or dragged. A suitable hand truck, forklift, or similar material handling device should be used with the container properly secured to the device.
- Containers shall not be lifted by using the container cap or magnets. In cases where hand trucks are designed to lift containers using the cap, the containers shall not be lifted higher than 6 inches or for longer than it takes to properly position the container on the hand truck.

- Ropes, chains, or slings shall not be used to suspend containers unless provisions have been made on the container for appropriate lifting attachments, such as lugs. Where appropriate lifting attachments have not been provided on the container, suitable cradles or platforms to hold the containers shall be used for lifting with the containers being adequately secured.

Storage

- Containers are not to be stored near readily ignitable substances, such as gasoline, oil, or scrap material.
- All compressed gas cylinders shall be stored and used valve end up. The cylinders shall be secured to prevent instability.
- Valve protection caps should always be in place and hand tight, except when cylinders are in use or connected for use.

6.5 CONFINED SPACE

6.5.1 A Confined Space means a space that:

- is large enough and so configured that an employee can bodily enter and perform assigned work; and
- has limited or restricted means for entry or exit for example, tanks, vessels, silos, storage bins, hoppers, vaults, and pits are spaces that may have limited means of entry; and
- is not designed for continuous employee occupancy.

6.5.2 A Permit-Required Confined Space is a confined space that has one or more of the following characteristics:

- contains or has the potential to contain a hazardous atmosphere;
- contains a material that has the potential of engulfing an entrant;
- has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section; or
- contains any other recognized serious safety or health hazard.

6.5.3 For entry into non-permit spaces a job safety analysis, work guideline, or a standard operating procedure is required. Entry into a permit-required space requires a confined space permit (see Appendix E).

6.5.4 Operations involving a confined space entry require an evaluation of work by the Subcontractor and the Project Manager's ES&H Representative to classify the space as Permit-Required or Non-permit. Retrieval equipment shall be provided to facilitate non-entry rescue for all Permit-required spaces unless evaluation of the Permit-required confined space determines that the use of retrieval equipment creates greater health and safety hazards. In this case, rescue services shall be notified that entry into the confined space will be necessary to perform rescue operations.

6.6 ELECTRICAL SAFETY

- 6.6.1 Conduct electrical installation and maintenance operations in accordance with requirements in Cal/OSHA Title 8, Subchapter 5 and the National Electrical Code and NFPA 70E.
- 6.6.2 Ensure electrical work is performed by qualified persons as defined in Cal/OSHA Title 8 and 2300(b).
- 6.6.3 Provide a ground fault circuit interrupter for cord sets, receptacles, and electrical tools including plug and cord connections to generators and equipment for employee use.
- 6.6.4 All unfinished circuits are to be tested for energy, capped with wire nuts, and pushed into the box by an electrician. All employees are to be instructed that any wires not capped are assumed to be live, and are to be reported to an electrician.
- 6.6.5 Provide three-wire extension cords, continuous length without splices, and designed for hard or extra-hard use. Protect electrical extension cords from pinch points, sharp edges, pedestrian or vehicle traffic, or other potentially damaging configurations. Do not fasten extension cords with staples, hang with nails, or suspend on wires. Arrange extension cords in a manner that avoids creating tripping hazards.
- 6.6.6 Notify the Project Manager prior to any work being done near overhead lines. Overhead lines shall be de-energized and grounded or other protective measures (guarding, isolating, insulating, etc.) shall be provided, before work is performed in the vicinity of overhead lines. This will be accomplished by SLAC Electrical Power Operations Group
- 6.6.7 Any vehicle operated in proximity to overhead lines shall maintain the following minimum distance:
- Ten feet (305 cm) for voltage of 50 kV or below;
 - Ten feet (305 cm) plus 4 inches (10 cm) per 10 kV for voltage greater than 50 kV
 - Four feet (122 cm) for vehicles in transit, with its structure lowered for voltages 50 kV or below, with clearance increased 4 inches (10 cm) for every 10 kV over that voltage.
- 6.6.8 **Live parts to which an employee might be exposed shall be put into an electrically safe work condition before an employee works on or near them, unless the deenergizing introduces additional or increased hazards or is infeasible due to equipment design or operational limitations.** Energized parts that operate at less than 50 volts to ground and containing less than 10 Joules of stored electrical energy are not required to be deenergized if there will be no increased exposure to electrical burns or to explosion due to electric arcs.
- 6.6.9 The hazard analysis is utilized to ensure workers understand their role in the work to be performed, as well as what others involved in that project or task will be doing. Supervisory approval for “working on or near” or “working hot” shall be given in the Permit (Appendixes F and G). **“Working on or near” or “working hot” requires approval by the Subcontractor Supervisor, LCLS Conventional Facilities Manager, LCLS Electrical Safety Officer, and LCLS ESH Coordinator. Subcontractor shall follow the guidelines presented in Appendixes G, H, I, J, K, L, and M for determining approach boundaries and PPE. These Appendixes were derived from NFPA 70E, Standard for Electrical Safety Requirements for Employee Workplaces.**

6.7 TUNNELING

Underground construction shall comply with applicable laws and regulations.

The LCLS tunneling will be in the Ladera Sandstone formation. This formation can be efficiently excavated by mechanical means (ie road header), and should pose no unusual excavation problems or safety issues.

Tunneling Construction plans shall include;

- Access and egress
- Check-in/check-out
- Safety instruction
- Oncoming shift notification
- Communications
- Emergency provisions
- Hazardous classifications
- Air quality and monitoring
- Ventilation
- Illumination
- Fire presentation and control
- Welding, cutting and hot work
- Ground support
- Drilling
- Haulage
- Electrical safety

6.8 ELEVATED WORK/FALL PROTECTION

6.8.1 Each Subcontractor must provide appropriate 100 % fall protection for its employees working in a location where they are higher than six feet above the work surface. **This includes all steel erection activities**. This fall protection must comply with Cal/OSHA Title 8, Subchapter 4, Article 24. The Subcontractor's Field Manager must fully evaluate the work conditions and environmental factors (including seasonal weather changes) before selecting the appropriate fall protection system (active, passive or a combination of measures, as appropriate). Such evaluation is to be included in the JSA for the task. Fall protection planning should also include the need for a rescue plan depending on the environment in which the work is to be performed.

6.8.2 Employees shall be trained in the selection and safe use of fall protection systems before the equipment is used. This can be accomplished in a safety meeting or pre-job briefing.

Types of Fall Protection Systems

- Personal fall arrest system (PFAS): a means used to arrest an employee in a fall from a work level. It consists of an anchorage, connectors, and a body harness and will include a lanyard, deceleration device, lifeline, or a combination of these. Anchorage shall be capable of sustaining static loads, applied in the directions permitted by the PFAS, of at least 5,000 lbs per user attached.
- Restraint: The full body harness is used as a component of a restraint system to prevent the user from reaching a fall hazard. Anchorage must support a minimum of 3,000 lbs. per person attached.
- Work Positioning: The full body harness is used as a component of a work positioning system to support the user at a work position. Anchorage must support at least 3,000 lbs per person attached.
- Warning line system is a barrier erected to warn employees that they are approaching an unprotected edge. It also designates an area in which work may not take place without the use of a guardrail, personal fall arrest system, or a safety net to protect employees.
- Guardrail system is a barrier erected to prevent employees from falling to lower levels and must meet all applicable regulations.
- *Controlled access zone* is an area in which certain work (e.g., overhead brick laying) may not take place without the use of guardrail, personal fall arrest or safety net systems and access to the zone is controlled.
- *Safety monitoring system* is a system in which a competent person is responsible for recognizing and warning employees of fall hazards.
- *Safety net system* can be used when workplaces are more than 25 feet above the ground, water surface or other surfaces where the use of ladders, scaffolds, catch platforms, temporary floors, safety lines, or a safety harness is impractical.

6.9 EXCAVATION/PENETRATION

- 6.9.1 The SLAC Excavation/Penetration permit process must be applied where the potential for contact with the facility utilities exists.
- 6.9.2 Prior to excavation/penetration, the estimated location of utility installations (e.g., sewer, telephone, water, fuel, electric lines) underground and in walls, floors, etc. shall be determined and protected from damage or displacement. The LCLS Project Manager shall be contacted to locate the installations. Before excavation/ penetration, the Project Manager Field Representative will provide the subcontractor with an Excavation/Penetration Permit (Appendix O). The permit shall be posted at the work site.
- 6.9.3 For penetrating activities (including installation of fasteners less than 2") where the subsurface elements are unknown, the following requirements will be performed:
- assuring GFCI protection on electrically-operated equipment/tools;
 - connecting non-double insulated electrically operated equipment/tools with an insulated #8 AWG or larger copper conductor;

- connecting non-electrically operated coring/cutting machines to ground with an insulated #8 AWG or larger copper conductor;
- requiring appropriately rated electrically insulated gloves;
- investigate/survey for identification of subsurface elements.

Excavation/penetration work activities excluded from the permit process are as follows:

6.9.4 Excavation Activities

- Maintenance replacements of the same location, depth, and size as the items being replaced (i.e., sign posts, bollards, poles, asphalt milling, etc.)
- Soil borrow areas pre-designated by Project Manager
- Earth/rock excavations 12 inches or less in depth with surface area not in excess of 25 square feet, using hand-held tools excluding jackhammers.

6.9.5 Penetration Activities

- Work associated with the installation of fasteners 2 inches or less in embedded depth to concrete floors, walls, and ceilings.
- Penetration of hollow-core walls and ceilings.
- Penetration of masonry walls.
- Penetration of soil borrow areas pre-designated by Project Manager.
- Penetration of pavements and sidewalks not in excess of their thickness.

6.10 FLAMMABLE AND COMBUSTIBLE LIQUIDS

- 6.10.1 Subcontractor shall comply with applicable sections of Cal/OSHA Title 8, Subchapter 4, Article 36 Fire Protection and Prevention Regulations.
- 6.10.2 Only approved containers and portable tanks shall be used for storage and handling of flammable and combustible liquids. Approved safety cans or Department of Transportation approved containers shall be used for the handling and use of flammable liquids in quantities of 5 gallons or less (this does not apply to those liquids which are extremely hard to pour, which may be handled in original containers). For quantities of 1 gallon or less, the original container may be used, for storage, use and handling of flammable liquids.
- 6.10.3 Containers of flammable and combustible liquids shall be tightly capped when not in actual use.
- 6.10.4 Flammable liquids may be used only where there are no open flames or other sources of ignition within 50 feet of the operation, unless conditions warrant greater clearance.
- 6.10.5 All sources of ignition shall be prohibited in areas where flammable and combustible liquids are stored, handled, and processed. Suitable No Smoking Or Open Flame signs shall be posted in all such areas.

- 6.10.6 Areas where flammable or combustible liquids are transferred at one time, in quantities greater than five gallons from one tank or container, shall be separated from other operations by 25 feet distance or by construction having a fire rating of at least one hour.
- 6.10.7 A fire extinguisher, rated not less than 10B, shall be provided within 50 feet of wherever more than five gallons of flammable or combustible liquids are being used on the job site. This does not apply to the integral fuel tanks of motor vehicles.
- 6.10.8 The Project/SLAC will provide fire fighting services. Subcontractor employees must use a facility phone to dial 9-911 or pull a fire alarm box to notify SLAC for emergency response.

6.11 HAND AND POWER TOOLS

- 6.11.1 Hand and power tools shall be used, inspected, and maintained in accordance with Cal/OSHA Title 8, Subchapter 4, Articles 27 & 28 and the manufacturer's instructions and shall be used only for the purpose for which designed.
- 6.11.2 Power tools designed to accommodate guards shall be equipped with such guards when in use. Reciprocating, rotating, and moving parts of equipment shall be guarded if exposed to contact by employees or otherwise create a hazard.
- 6.11.3 Tools and equipment showing evidence of safety hazards shall not be brought on site. Should hazards become evident after work is initiated, remove the tool from use, clearly indicate the tool is not to be used, and take the tool from the site at the end of the work shift.

6.12 HAZARD COMMUNICATION

- 6.12.1 Subcontractor must demonstrate compliance with a written hazard communication program as required by Cal/OSHA Title 8 § 5194 including employee information and training, provisions for labeling, and availability of MSDSs as a section of the IIPP.
- 6.12.2 Subcontractor shall maintain MSDSs for hazardous chemicals brought onsite and shall supply information regarding hazardous chemicals to the Project representative prior to initiation of activities that may potentially expose Project personnel to a hazard at the job location.
- 6.12.3 The Project Manager shall provide the Subcontractor MSDSs and any information about any chemical hazards to which the Subcontractor employees may be exposed from Project operations.
- 6.12.4 Subcontractor shall remove all unused chemicals or materials brought to the site at the completion of the job.

6.13 HOISTING AND RIGGING

- 6.13.1 Perform hoisting and rigging activities in accordance with Cal/OSHA Title 8, Subchapter 4, Article 14, and ANSI B30 and B56 Series. Provide for review by Project ES&H Representatives, documents of certification that Subcontractor's hoisting and rigging equipment meets the requirements in these documents. If an inspection certificate expires

while the equipment is on site, re-inspect the equipment and update the inspection certificate before continuing work activities.

- 6.13.2 Equipment operators/riggers, including alternates, shall be qualified to perform their assigned functions. Qualifications shall include physical, knowledge, and skills proficiency based on job function.
- 6.13.3 All operations that require hoisting and rigging shall have a JSA and /or an appropriate safety checklist completed prior to beginning work to ensure safety and compliance.
- 6.13.4 Classify each lift as ordinary or critical.
- 6.13.4.1 **Critical Lift** - A lift will be considered critical when any one of the following conditions exists:
- The load item is unique and, if damaged, would be: (1) irreplaceable; or (2) not repairable and is vital to a system, facility, or project operation;
 - The cost to replace or repair the load item or the delay in operations of having the load item damage would have a negative impact on facility, organizational, or DOE budgets to the extent that it would affect program commitments.
 - When a lift involves more than one crane or other motorized lifting device lifting a common load
 - The lift exceeds 75% capacity of crane
 - The load requires exceptional care in handling because of size, weight, close-tolerance installation, high susceptibility to damage, or other unusual factors
 - All lifts over 50 tons
 - Collision, upset, or dropping could result in significant release of hazardous material or other undesirable conditions
- 6.13.4.1.1 There are other conditions which **might** constitute a critical lift and should be evaluated by the Subcontractor. Such conditions include:
- Lifts that are made where the load could fall on pipelines or vessels containing flammable gases or liquids
 - Lifts in tight spaces
 - Lifts involving nonrigid objects like tank shells
 - Lifts with lifting points below the center of gravity of the load
- 6.13.4.1.2 The Critical Lift Plan/Permit (Appendix O) must be developed by the subcontractor in conjunction with its safety and health plan and obtain reviews/approval from the following personnel:
- Subcontractor Lift Supervisor
 - Subcontractor Safety and Health Representative/Designee

- Operators performing the lift
- Project Engineer
- Project Manager
- Project ES&H Coordinator

6.13.4.1.3 Required attachments to the Critical lift plan include:

- Crane operator certification must be issued through a Certified Competent Person and must be up-to-date. All operator certifications must be attached to the plan or be on file.
- Type, size, capacity, engineered designs, and manufacturer of shackles, hooks, jacks, rollers, come-a-longs, spreader bars and slings
- Type, size, capacity rating, manufacturer, capacity certificates, and inspection reports for all cranes and other lifting equipment
- Lift geometry and free body diagrams to illustrate the individual tensions of each sling involved in the lift, and any shift of weight when the load is lifted
- A complete rigging diagram must be attached to the critical lift plan. The rigging diagram must include the entire rigging process and the following minimum information when it applies:
 - Type and capacity of lifting equipment
 - Crane boom length, radius, and location of outriggers
 - A plot of the path of travel including all vertical and horizontal clearances from such items as adjacent equipment, power lines, and other encumbrances or hazards
 - Location, size and capabilities of lifting lugs, slings, and other rigging accessories as well as the method of attachment
 - Position of load in relation to the boom to show hook clearance and distance between the boom and the load
 - Description, size, capacity, and location of miscellaneous equipment such as dollies, jacks, hand wrenches, rollers, etc.
 - Location of mats and cribbing used before, during, and after the lift
 - Location and orientation of equipment
 - Location of underground lines (utility lines, electrical duct banks, cables, etc.), abandoned vessels and tanks, and foundations

6.13.4.1.4 Critical lift permits must be submitted to the Project Manager/Engineer nominally two (2) working days prior to making the lift.

6.13.4.2 **Ordinary Lift Plans** (JSA) must be reviewed and approved by the subcontractor's field supervisor and safety and health representative.

6.14 LOCKOUT/TAGOUT

- 6.14.1 LOTO procedures must be strictly followed when it is necessary to work on any equipment that may release any form of hazardous energy including, but not limited to, electrical, rotational, mechanical, chemical, hydraulic, or pneumatic energy, while the equipment is shut down.
- 6.14.2 LOTO is required whenever servicing, maintenance, or modification is being performed on equipment in which the unexpected energization or startup of the equipment, or the release of stored energy, could cause injury to people or damage to equipment. All sources of hazardous energy must be shut off and secured. LOTO must be performed by each person who works on the equipment.
- 6.14.3 SLAC will perform a lockout/tagout of all facility controlled electrical systems. Subcontractors must provide at least two (2) working days advance notice to the Project field representative of electrical systems requiring lockout/tagout. Following the initial isolation and lockout/tagout by the Laboratory, a representative of the Subcontractor shall satisfy themselves that a proper verification was conducted and overlock with their personal locks. These locks shall be identified with the Subcontractor employee's name and a unique employee identification number (a tag can be used to provide identifying information).
- 6.14.4 Upon completion of work, Subcontractor employees shall remove all personal locks and notify the Project field representative. The removal of the Project lock(s) shall not precede the removal of the Subcontractor's lock(s).
- 6.14.5 Hazardous energy sources introduced by the Subcontractor must be controlled through the use of Subcontractor's hazardous energy control procedure. The procedure/JSA must include/address the following:
- Assess energy type and magnitude:
The authorized employee must assess the type, magnitude, and hazards of the energy to be controlled.
 - Determine methods of control:
The authorized employee must determine the appropriate methods of controlling the hazardous energy; e.g., disconnect switch or valve. **Note: push buttons, selector switches, interlock circuits, and other control type devices are not energy-isolating devices.**
 - Notify all affected personnel:
The authorized employee must notify all affected employees of the impending shutdown, the reasons for it, and anticipated duration of shutdown.
 - Shutdown:
The authorized employee must verify that it is safe to shut down the equipment.
 - Perform normal equipment shutdown:
The authorized employee must turn off or shut down the equipment using established methods for that equipment.
 - Isolate and lock out energy sources:
The authorized employee must operate the energy-isolating device and affix his/her LOTO lock to this device. The lock must be affixed so as to hold the energy-isolating

device in an off or safe position that physically prohibits normal operation of the energy-isolating device. Where more than one authorized employee is involved in the job and a Group LOTO procedure is not used each authorized employee must affix his/her personal lock using a multiple lock hasp.

- Enter required information on tag:
The tag is used to provide identifying information. The authorized employee must complete all appropriate information on the tag. If the placement of the tag would compromise safety by obscuring indicator lights or controls, the tag may be located as close as is safely possible to the device, in a position that will be immediately obvious to anyone attempting to operate the device. Where more than one authorized employee is involved in the job, and a Group LOTO procedure is not used each authorized employee must affix his/her own personal tag on a multiple lock hasp.
- Releasing stored energy:
The authorized employee must completely release or otherwise control any stored energy. In the case of stored mechanical energy, vent valves, spring releases, blocking devices, or equipment repositioning (as appropriate) must be utilized. In the case of stored electrical energy, approved grounding wands or discharge devices must be used.
- Verification of LOTO Application procedure:
Attempt to restart the equipment. The authorized employee must physically attempt to operate the energy-isolating device and attempt to restart the equipment using the normal equipment controls (e.g., start buttons or computer software controls).

If the equipment is electrical, the authorized employee must additionally test potential electrical energy sources using appropriate instruments or testers. The authorized employee shall use test equipment to verify that the circuit elements and equipment parts are de-energized, and shall also determine if any energized condition exists as a result of inadvertently induced voltage or unrelated voltage back-feed even though specific parts of the circuit have been de-energized and presumed to be safe. If the authorized employee is not qualified to test the energy being isolated, he/she must ensure that a qualified person tests the energy. If the circuit to be tested is over 600 volts, nominal, the test equipment must be checked for proper operation before and immediately after this test. Note: All test equipment must be checked for proper operation regardless of the voltage. Circuits over 600 volts may require special test equipment.

Although electrical LOTO verification/Testing is only properly performed on de-energized equipment, there can be occasional surprises (e.g. multiple feeds or sources, or stored electrical energy) and such verification may indeed be on or near unexpectedly energized (live) electrical parts. The qualified worker must approach the hazard with the assumption that the system is energized until it is verified to be de-energized, and as such must follow the guidelines presented in Appendixes G, H, I, J, K, L, and M for determining approach boundaries and PPE. These Appendixes were derived from NFPA 70E, Standard for Electrical Safety Requirements for Employee Workplaces. The “working on or near” or “working hot” Permit (Appendix G) is not required for LOTO verification/testing.

- Release from LOTO:
Before LOTO devices are removed and energy is restored to the equipment, the authorized employee must:

- Verify that it is safe to reenergize. The authorized employee must verify that the work for which the LOTO was applied has been completed and that it is safe to reenergize equipment. The authorized employee must check the work area to ensure that all tools and personnel are at a safe distance from the equipment.
- Remove all isolating and grounding devices. The authorized employee must check the equipment to ensure that any removed guards are reinstalled.
- Remove lock and tag, reset the energy-isolating device, and return the machinery to service. The authorized employee must notify all affected employees that the equipment is back in service.

6.15 RESPIRATORY PROTECTION

6.15.1 The Subcontractor will determine which respirator type or class will offer adequate protection based on:

- the respiratory hazard(s) to which the worker may be exposed;
- the workplace and user factors that have the potential to affect respirator performance and reliability;
- his or her informed professional judgment;
- the scientific literature

6.15.2 The Subcontractor shall provide respirators in accordance with the following:

- If subcontractor employees are required to wear negative or positive pressure, tight-fitting respirators, they shall have been medically evaluated
- Ensure respirator wearers have completed the respirator quantitative fit testing and respirator training.
- Provide respirators and cartridge type specified to protect worker from exposure to identified or suspected hazards as specified in the JSA.
- Provide breathing air, if required. Submit data to Project Field Representative demonstrating the compressed breathing air quality supplied to the air respiratory protections systems meet the ANSI/CGA G7.1, Commodity Specification for Air, requirements.
- Provide optical corrections for appropriate respirators where necessary.
- All respirators shall be NIOSH- certified.

6.16 SANITATION

6.16.1. Employers shall establish and maintain basic sanitation provisions for all employees in all places of employment as specified in the following paragraphs.

6.16.2. Drinking Water

- 6.16.2.1. An adequate supply of drinking water shall be provided in all places of employment. Cool water shall be provided during hot weather.
- 6.16.2.2. Only approved potable water systems shall be used for the distribution of drinking water.
- 6.16.2.3. Drinking water shall be dispensed by means that prevent contamination between the consumer and the source.
- 6.16.2.4. Portable drinking water dispensers shall be designed, constructed, and serviced to ensure sanitary conditions; shall be capable of being closed; and shall have a tap. Containers shall be clearly marked as “**DRINKING WATER**” and shall not be used for other purposes. Water shall not be dipped from containers.
- 6.16.2.5. Use of a common cup (a cup shared by more than one worker) is prohibited without the cup being sanitized between uses. Employees shall use cups when drinking from portable water coolers/containers. Unused disposable cups shall be kept in sanitary containers and a waste receptacle shall be provided for used cups.
- 6.16.3. Toilets
 - 6.16.3.1. When sanitary sewers are not available, one of the following facilities: chemical toilets, recirculating toilets, combustion toilets, or other toilet systems as approved by State/local governments.
 - 6.16.3.2. Provisions shall be made to assure that at least one toilet facility is available.
 - 6.16.3.3. Each water closet shall occupy a separate compartment with a door that can lock from the inside and walls or partitions, between fixtures, of sufficient height to assure privacy.
 - 6.16.3.4. Provisions for routinely servicing and cleaning all toilets and disposing of the sewage shall be established before placing toilet facilities into operation. The method of sewage disposal and location selected shall be in accordance with Federal, State, and local health regulations.

6.17 SCAFFOLDING

All scaffolds and platforms must meet the following requirements:

- 6.17.1 General Requirements
 - a. Cal/OSHA requires that scaffolds are to be erected, moved, altered, and dismantled only under the supervision and direction of a qualified Competent Person experienced in scaffold erection and maintenance. The scaffolding Competent Person shall not have other responsibilities that could take his or her attention from the scaffolding work. Each working level or platform of scaffolds must be completely decked and have handrails, midrails, and toeboards installed. If for some reason, a platform or working level cannot be equipped with standard handrails or completely decked, safety harnesses must be worn and properly tied off in compliance with the established fall protection requirements.
 - b. Chain guardrails on scaffolding are not allowed.
 - c. Scaffolds that will be higher than 30 ft and a working load exceeding 50 lb ft² requires a licensed professional engineer to complete sealed and signed design drawings, including load calculations. Examples are scaffolds erected for plasterers, masons, or any other trades who routinely store material on the platform.

- d. Supported scaffolds with a height to base width (including outrigger supports, if used) ratio of more than four to one (4:1) shall be restrained from tipping by guying, tying, bracing, or equivalent means.
- e. Contact the Project Manager if any special scaffolding issues arise.
- f. Scaffolds must be inspected prior to each shift and tagged for the workers. Tagging must designate the requirements of the user and the conditions of the scaffold.

6.17.2 Rolling Scaffolds

- a) No one is to ride on a rolling scaffold while it is being moved.
- b) All materials and tools must be secured prior to moving a rolling scaffold.
- c) No rolling scaffolds will be utilized to support other scaffolds.

6.18.2 Scaffold Planking

Paint or stamp scaffold planks within 12" of each end or edge to denote use for scaffold decking only. Use only 2" × 10" or 2" × 12" scaffold grade material for scaffold planking.

6.17.3 Scaffold Tagging

The scaffold tagging procedures are as follows:

- The crew that erects the scaffold must complete and attach the appropriate scaffold tag.
- The scaffold tag must be placed at eye level on or near the access ladder so it is easy to locate and plainly visible.
- A Competent Person needs to ensure that the scaffold is erected properly and the tag attached is proper and completely filled out.
- If the scaffold needs to be altered in any way, the person who signed the tag must be contacted to authorize the change and re-tag if necessary.
- An untagged scaffold must not be used.
- A Competent Person must inspect it prior to each shift.
- Tagging System procedure:
 - A **green tag** is completed and attached by the erecting crew to scaffolds that have complete handrails, midrails, toeboards, and decking.
 - A **yellow tag** is completed and attached to scaffolds that cannot be erected with all the components complete. The yellow tag allows the erecting crew to note what portion of the scaffold is incomplete and cautions the user. A yellow tag also informs the user fall protection is required.
 - A **red tag** means the scaffold is being dismantled, not yet completely erected or for some reason not safe and shall not be used.

6.18 CONVEYORS

- 6.18.1 Conveyor systems shall be constructed and installed in accordance with the manufacturer's recommendations.

- 6.18.2 Inspection, maintenance, and repair.
- a. Inspection, maintenance, and repairs shall be performed in accordance with the manufacturer's recommendations by qualified personnel.
 - b. No maintenance shall be performed when a conveyor is in operation except for the following:
 - 1) If lubrication is to be done while the conveyor is in motion, lubrication points shall be easily accessible and safe for lubrication. Only trained personnel who are aware of the hazards of the conveyor in motion shall be allowed to lubricate a conveyor that is operating; and
 - 2) When adjustments or maintenance is required while the conveyor is in operation, only trained personnel who are aware of the hazards shall be permitted to make the adjustment or maintenance.
 - c. Lockout and tagout procedures shall be used.
 - d. Safe access shall be provided to permit inspection, lubrication, repair, and maintenance activities.
- 6.18.3 Safety devices.
- a. On all conveyors where reversing or runaway are potential hazards or the effects of gravity create a potential for hazardous uncontrolled lowering, anti-runaway devices, brakes, backstops, or other safeguards shall be installed to protect persons from injury and property from damage.
 - b. Conveyor systems shall be equipped with an audible warning signal to be sounded immediately before starting of the conveyor.
 - c. All conveyors shall be equipped with emergency stopping devices along their full length.
 - d. Safety devices shall be arranged to operate in such a manner that if power failure or a failure of the device occurs a hazardous condition would not result.
- 6.18.4 All exposed moving machinery parts that present a hazard shall be mechanically or electrically guarded or guarded by location.
- a. Nip and shear points shall be guarded.
 - b. Take-up mechanisms may be guarded as an entity by placing standard railings or fencing, and warning signs, around the area in lieu of guarding each nip and shear point.
 - c. In the case of a trolley conveyor when mechanical or electrical guarding would render the conveyor unusable, prominent and legible warnings shall be posted in the area or on the equipment and, where feasible, areas barricaded or lines marked on the ground to indicate the hazard area.
 - d. Guards shall be provided at points where personnel could contact cables, chains, belts, and runaways of exposed bucket conveyors.
 - e. Unless guarded by location, those sections of chain conveyors that cannot be enclosed without impairing the function shall be provided with warning signs or personnel barriers.
 - f. Trolley conveyors shall be provided with spill guards, pan guards, or the equivalent if there is a potential for material to fall off the conveyor and endanger personnel or equipment.
 - g. At transfer, loading, and discharge points, unconfined and uncontrolled free fall of material that may result from flooding, ricocheting, overloading, trajectory, leakage, or a combination thereof, shall be prevented if the material would create a hazard to personnel.
 - h. At all points along the conveyor, except at points where loads are removed from or placed on a conveyor or where a conveyor discharges to or receives material from another conveyor, provisions shall be made to eliminate the possibility of loads or material being dislodged from the conveyor.

- 6.18.5 Access.
- a. Crossovers or underpasses with safeguards shall be provided for passage over or under all conveyors: crossing over or under conveyors is prohibited except where safe passageways are provided.
 - b. Whenever conveyors pass adjacent to, or over, work areas, roadways, highways, railroads, or other public passageways, protective guards shall be installed. The guards shall be designed to catch and hold any load or material that may fall off or become dislodged from the system.
 - c. Where conveyors are operated in tunnels, pits, and similar enclosures, ample room shall be provided to allow safe access way and operating space for all personnel.
- 6.18.6 Emergency stop devices.
- a. Unless the design, construction, and operation of a conveyor is clearly non-hazardous to personnel, emergency stop buttons, pull cords, limit switches, or similar emergency devices shall be provided at the following locations for remotely or automatically controlled conveyors or conveyors where operator stations are not manned or are beyond voice and visual contact from drive areas:
 - (1) Loading arms,
 - (2) Transfer points, and
 - (3) Other potentially hazardous locations on the conveyor path not guarded by location or guards.
 - b. All emergency stop devices shall be easily identifiable and readily accessible.
 - c. Emergency stop devices shall act directly on the control of the conveyor concerned and shall not depend on the stopping of any other equipment.
 - d. Emergency stop devices shall be installed so that they cannot be overridden from other locations.
- 6.18.7 Gates and switches.
- a. Power-positioned gate and switch sections shall be provided with devices that will prevent these sections from falling in case of power failure.
 - b. Means shall be provided on all gates and switch sections to prevent conveyed material from discharging into the open area created by lifting of the gate or switch.
- 6.18.8 Counterweights.
- a. When counterweights are supported by belts, cables, chains, or similar means, the weights shall be confined in an enclosure to prevent the presence of personnel beneath the counterweight, or the arrangement shall provide a means to restrain the falling weight in case of failure of the normal counterweight support.
 - b. When counterweights are attached to lever arms they shall be securely fastened.
- 6.18.9 When two or more conveying systems are interfaced, special attention shall be given to the interfaced area to ensure the presence of adequate guarding and safety devices.
- 6.18.10 Conveyor controls shall be arranged so that in case of an emergency stop, manual reset or restart is required at the location where the emergency stop was initiated to resume conveyor operations.
- 6.18.11 Control stations shall be arranged and located so that the operation of the equipment is visible from them.
- 6.18.12 Controls shall be clearly marked or labeled to indicate the function controlled.

6.18.13 Hoppers and chutes.

- a. All openings to the hopper and chutes shall be guarded to prevent persons from accidentally stepping into them. If guards are not practical, warning signs shall be posted.
- b. Dump hoppers having the hopper flush with the floor and which by their use cannot be guarded shall be equipped with grating having a maximum opening of 2 in (5 cm) and heavy enough to withstand any load which may be imposed on it. If the openings in the grating are larger or if no grating is provided, temporary railing shall be placed around ground level hoppers when dumping operation are not in progress. During dumping operation, warning signs shall be placed in conspicuous locations warning personnel of an open pit.

6.18.14 Mobile conveyors.

- a. Mobile conveyors shall be provided with brakes or other position locking devices for each degree of motion where movement would present a hazard.
- b. Mobile conveyors shall be designed to be stationary against runaway and stable against overturning under normal conditions of operation.
- c. When an operator is required on a mobile conveyor, a platform or cab shall be provided for his/her protection.

6.18.15 Portable conveyors.

- a. The raising and lowering mechanism for the boom of a portable conveyor shall be provided with a safety device that will hold the boom at any rated angle of inclination.
- b. Portable conveyors shall be stable so that the conveyor will not topple when used with the manufacturer's rating and in a manner in which it was intended or when being moved.

6.18.16 Screw Conveyors.

- a. Screw conveyors shall not be operated unless the conveyor housing completely encloses the conveyor moving elements and power transmission guards are in place, except that if the conveyor must have an open housing as a condition of use, the entire conveyor shall then be guarded by railing, fence, or by location.
- b. Feed openings for shovel, front-end loader, or other manual or mechanical equipment shall be constructed in such a way that the conveyor screw is covered by grating. If the nature of the material is such that grating cannot be used, then the exposed section of the conveyor shall be guarded by a railing and warning signs shall be posted.

6.18.17 Operation.

- a. Conveyor equipment shall be used to convey only those materials for which it was designed and within the rated capacities and speeds.
- b. Flight and apron conveyors shall be "jogged" or hand run through at least one complete revolution at installation to check design clearances prior to running under automatic power.
- c. A conveyor that could cause injury when started shall not be started until all personnel in the area are alerted by a signal or by a designated person that the conveyor is about to start.
- d. When a conveyor that could cause injury when started is automatically controlled or must be controlled from a remote location, an audible warning device shall be provided. The device shall be clearly audible at all points along the conveyor where personnel may be present.
 - 1) The warning device shall be activated by the controller device that starts the conveyor and shall continue for a period of time before the conveyor starts. A flashing light or similar visual warning shall be used with the audible device when conditions limit the effectiveness of the audible device.

- 2) If a conveyor system is not exposed to the public, and if function of the system would be seriously hindered or adversely affected by the required time delay or where the intent of the warning may be misinterpreted, clear, concise, and legible warning signs shall be provided and indicate that the system may be started at any time, that danger exists, and that personnel must keep clear. These warnings signs shall be provided along the conveyor at areas that are not guarded or protected by their location.
- e. Before restarting a conveyor that has been stopped because of an emergency, an inspection of the conveyor shall be conducted and the cause of the emergency stop determined.
- f. Only trained personnel shall be permitted to operate a conveyor. Training shall include instruction in operation under normal conditions and in emergencies.
- g. The area around loading and unloading points shall be kept clear of obstructions that could create a hazard.
- h. Riding on conveyors is prohibited.
- i. Personnel working with or near a conveyor shall be:
 - 1) Instructed as to the location and operation of pertinent stopping devices, and
 - 2) Alerted of the potential hazard of entanglement in conveyors caused by such items as loose clothing and jewelry and long hair.
- j. Only trained personnel shall track a conveyor belt that must be done while the conveyor is operating.
- k. Applying a belt dressing or other foreign material to a rotating drive pulley or conveyor belt shall be avoided.
- l. Flight and apron conveyors handling sticky materials that tend to build up shall be cleaned as often as required for safe operation.

7. ENVIRONMENTAL PROTECTION AND WASTE MANAGEMENT

This section provides environmental protection and waste management requirements for on-site construction activities.

7.1 Storm Water Pollution Prevention and Control

- 7.1.1 Prior to mobilization to the site, perform an inspection of equipment containing liquid systems including, but not limited to, bulldozers, backhoes, bobcats, drill rigs, trucks, hoists, and cranes, to ensure no leaks exist. Verify hoses, tubing, and hydraulic lines are in good operating condition. Make all necessary repairs before delivery of equipment or vehicles to the construction site.
- 7.1.2 Perform daily inspections to ensure continued good operating condition of equipment and promptly repair all deficiencies.
- 7.1.3 Store all materials indoors or otherwise protected from weather.
- 7.1.4 For outdoor painting operations, minimize overspray, and use tarps/vacuums/enclosures to contain sandblasting waste and paint chips from paint removal operations.
- 7.1.5 Petroleum products stored in quantities greater than 500 gallons shall be appropriately labeled and have secondary containment capable of preventing any release to a drainage system or the environment.
- 7.1.6 Do not allow liquids, including but not limited to, gasoline, diesel fuel, lubricating oil, or antifreeze to enter the storm sewer systems, waterways, drainage ditches, or the ground.
- 7.1.7 Use due caution when operating oil-bearing equipment near aquatic resources. Where necessary, implement appropriate control measures, including but not limited to the use of physical barriers (plastic or tarps, berms, etc.) and or absorbent materials to prevent leaks or spills from entering waterways.
- 7.1.8 Maintain a 25-foot minimum buffer zone from streams, be aware of storm drain inlets, and cover or contain debris stored outside.
- 7.1.9 Flushing empty concrete trucks or dumping excess concrete is prohibited. Transport excess concrete back to the batch plant. The truck chute may be washed at the work site. Flush the truck chute at designated on site location. The LCLS Conventional Facilities Manager will designate the location. Solidified cement waste from truck chute cleaning is solid waste and shall be cleaned up and transported to the Landfill.
- 7.1.10 Conduct all pipeline sterilization, flushing, hydro-testing, etc. in a manner protective of the environment. The LCLS Conventional Facilities Manager will designate the approved discharge location(s).
- 7.1.11 Water used to sterilize or flush pipelines cannot be released directly to the environment due to possible high concentration of chlorine. The LCLS Conventional Facilities Manager will determine the appropriate storage/treatment and will designate the approved discharge location.
- 7.1.12 Unless otherwise directed by the LCLS Conventional Facilities Manager, all chlorinated or treated water shall be discharged through a treatment/detention basin and monitored for chlorine levels, other contaminants when applicable, and standard water quality

indicators. The treatment/detention basin may consist of a field-constructed structure or portable tank.

- 7.1.13 Storm water accumulated in excavated areas, chlorinated rinse water, and chlorinated water used to sterilize/flush pipelines shall not be directly discharged, or otherwise allowed to enter the storm systems, waterways, or drainage ditches without written approval from the LCLS Conventional Facilities Manager.

7.2 Erosion Prevention and Sediment Control

- 7.2.1 Manage excavated soil and spoil material in a manner protective of the environment. Cover stockpiled material to prevent erosion and/or install appropriate sediment controls. Use due caution during excavation or any other soil management in the vicinity of sanitary or storm systems, waterways, or drainage ditches.
- 7.2.2 All erosion prevention measures and sediment controls (silt fence, straw bales, catch basins, etc.) shall be in place and approved by the LCLS Conventional Facilities Manager prior to beginning excavations, road building, etc. Sediment barriers such as silt fence and straw bales shall be entrenched and of sturdy construction.
- 7.2.3 Perform inspection of erosion and sediment controls on a weekly schedule, prior to expected storm events and after each heavy rainfall event. Document each inspection.
- 7.2.4 Where appropriate, provide temporary or permanent modifications to surface terrain gradient (soil or crushed stone berms, sediment retention basins, etc.) in order to minimize the flow of storm water into or out of excavated or otherwise disturbed areas.
- 7.2.5 All erosion and sediment control measures shall be maintained throughout the course of the project and removed at completion of project and appropriate measures taken to return the area to its previous state. Maintenance shall include but not be limited to removal of accumulated sediment, repairs and or replacement of storm damaged or otherwise deteriorated structures.
- 7.2.6 All disturbed areas shall be stabilized as soon as practicable by appropriate means, including but not limited to the use of mulch or other temporary cover, seeding with vegetative ground cover, etc.

7.3 Spill Prevention and Control

- 7.3.1 Report all spills promptly to the Project Manager. If the release is of a reportable quantity, the Project Manager will notify the appropriate regulatory agency.
- 7.3.2 The responsible Subcontractor will perform proper cleanup of accidental releases of materials. Cleanup is to be done by properly trained personnel. Hazardous waste from the cleanup must be packaged, transported, and disposed of by a licensed entity. The Project Manager must be given a copy of the hauler's manifest.
- 7.3.3 Depending on the materials spilled, the Project Manager may require the responsible Subcontractor to hire a certified laboratory to take an appropriate number of soil samples to test at their laboratory. A copy of the results is to be given to the Project Manager.

- 7.3.4 For inside work, provide a spill kit, prevent spills to floor drains and do not discharge waste into any SLAC systems without approval.
- 7.3.5 For outside work, provide a spill kit, inspect equipment for leaks, and repair leaking equipment in a timely manner.

7.4 Construction Waste Management

- 7.4.1 Waste Minimization principals shall be incorporated in construction activities to ensure the greatest environmental benefits and minimize future liability for the waste that is generated.
- 7.4.2 All work will be performed in a manner that maximizes salvage and recycling and waste disposal to landfills shall be minimized.
- 7.4.3 Characterization methods and procedures will be employed by all parties to the contract to ensure that the characteristics of the waste are known and adequately recorded during all stages of the waste management process.
- 7.4.4 Subcontractor will be responsible for properly handling and disposing of all wastes generated.
- 7.4.5 Subcontractor will follow Project policy regarding containers and/or transport vehicles for excess property for salvage, universal waste, sanitary/industrial waste, and construction/demolition debris.

APPENDIX A: OUTLINE FOR AN INJURY AND ILLNESS PREVENTION PLAN

An IIPP is, in essence, a safety and health policy and program document. The following areas are typically addressed in an IIPP, but a plan shall be job-specific and shall also address any unusual or unique aspects of the project or activity for which it is written.

The APP shall interface with the employer's overall safety and health program. Any portions of the overall safety and health program that are referenced in the APP shall be included as appropriate.

1. SIGNATURE SHEET. Title, signature, and phone number of the following:

- a. Plan preparer (qualified person such as corporate safety staff person, QC).
- b. Plan must be approved, by company/corporate officers authorized to obligate the company (e.g., owner, company president, regional vice president, etc.).
- c. Plan concurrence (e.g., Chief of Operations, Corporate Chief of Safety, Corporate Industrial Hygienist, project manager or superintendent, project safety professional, project QC) (provide concurrence of other applicable corporate and project personnel (Contractor)).

2. BACKGROUND INFORMATION. List the following:

- a. Contractor;
- b. Contract number;
- c. Project name;
- d. Brief project description, description of work to be performed, and location (map);
- e. Contractor accident experience (provide information such as experience modification rate (EMR), OSHA 300 Forms, corporate safety trend analyses); and
- f. Listing of phases of work and hazardous activities requiring JSA's.

3. STATEMENT OF SAFETY AND HEALTH POLICY. Provide a copy of your current corporate/company Safety and Health Policy Statement. NOTE: In addition to the corporate/company policy statement, your corporate/company safety program may provide a significant portion of the information required by the JSAs.

4. RESPONSIBILITIES AND LINES OF AUTHORITIES.

- a. Identification and accountability of personnel responsible for safety - at both corporate and project level.
- b. Lines of authority.

5. SUBCONTRACTORS AND SUPPLIERS. Provide the following:

- a. Identification of subcontractors and suppliers (if known);
- b. Means for controlling and coordinating subcontractors and suppliers; and
- c. Safety responsibilities of subcontractors and suppliers.

6. TRAINING.

- 3) List subjects to be discussed with employees in safety orientation.
- 4) List mandatory training and certifications that are applicable to this project (e.g., explosive actuated tools, confined space entry, crane operator, diver, vehicle operator, HAZWOPER training and certification, PPE) and any requirements for periodic retraining/recertification.
- 5) Identify requirements for emergency response training.
- 6) Outline requirements (who attends, when given, who will conduct, etc.) for supervisory and employee safety meetings.

7. SAFETY AND HEALTH INSPECTIONS. Provide details on:

- a. Who will conduct safety inspections (e.g., PM, safety professional, QC, supervisors, employees), proof of inspector's training/qualifications, when inspections will be conducted, how the inspections will be recorded, deficiency tracking system, follow-up procedures, etc. The names of competent and/or qualified person(s) and proof of competency/qualification to meet specific OSHA competent/qualified person(s) requirements must be attached.
- b. Any external inspections/certifications that may be required.

8. SAFETY AND HEALTH EXPECTATIONS, INCENTIVE PROGRAMS, AND COMPLIANCE.

- a. The company's written safety program goals, objectives, and accident experience goals for this contract should be provided.
- b. A brief description of the company's safety incentive programs (if any) should be provided.
- c. Policies and procedures regarding noncompliance with safety requirements (to include disciplinary actions for violation of safety requirements) should be identified.
- d. Provide written company procedures for holding managers and supervisors accountable for safety.

9. ACCIDENT REPORTING. The Contractor shall identify who, how, and when the following will be completed:

- a. Exposure data (man-hours worked);
- b. Accident investigations, reports, and logs;
- c. Immediate notification of major accidents.

10. MEDICAL SUPPORT. Outline on-site medical support and offsite medical arrangements including rescue and medical duties for those employees who are to perform them, and the name(s) of onsite Contractor personnel trained in first aid and CPR.

11. PERSONAL PROTECTIVE EQUIPMENT. Outline procedures (who, when, how) for conducting hazard assessments and written certifications for use of PPE. Outline procedures to be followed to assure the proper use, selection, and maintenance of personal protective and life saving equipment (e.g., protective footwear, protective gloves, hard hats, safety glasses, hearing protection, body harnesses, lanyards).

12. PLANS (PROGRAMS, PROCEDURES) REQUIRED BY THE SAFETY MANUAL (as applicable).

- a. Layout plans
- b. Emergency response plans:
 1. Procedures and tests
 2. Spill plans
 3. Firefighting plan
 4. Posting of emergency telephone numbers
 5. Wild land fire prevention plan
- c. Hazard communication program. Provide the location of MSDS, records of SubContractor employee training, and inventory of hazardous materials (including approximate quantities and a site map) that will be brought onto Government property by the SubContractor and sub tier subcontractors.
- d. Respiratory protection plan
- e. Health hazard control program

- f. Lead abatement plan
- g. Asbestos abatement plan
- h. Abrasive blasting
- i. Confined space
- j. Hazardous energy control plan
- k. Critical lift procedures
- l. Access and haul road plan
- m. Demolition plan (engineering and asbestos surveys)
- n. Emergency rescue (tunneling)
- o. Underground construction fire prevention and protection plan
- p. Formwork and shoring erection and removal plans
- q. Jacking plan (lift) slab plans
- r. Plan for prevention of alcohol and drug abuse (Defense Federal Acquisition Regulation Supplement (DFARS) Subpart 252.223-7004)
- s. Fall protection plan
- t. Steel erection plan
- u. Night operations lighting plan
- v. Site sanitation plan
- w. Fire Prevention Plan

13. CONTRACTOR INFORMATION. The Contractor shall provide information on how they will meet the requirements of applicable Sections of this manual in the IIPP. As a minimum, excavations, scaffolding, medical and first-aid requirements, sanitation, PPE, fire prevention, machinery and mechanized equipment, electrical safety, public safety requirements; and chemical, physical agent, and biological occupational exposure prevention requirements shall be addressed as applicable.

14. SITE-SPECIFIC HAZARDS AND CONTROLS. Detailed site specific hazards and controls shall be provided in the AHA for each area of the operation.

APPENDIX B: DISCIPLINARY ACTIONS BY OFFENSE CLASS AND OCCURRENCE

OFFENSE	FIRST	SECOND	THIRD
<p>Class I</p> <ul style="list-style-type: none"> • Creating or contributing to unsanitary conditions due to poor housekeeping • Posting or removing notices on bulletin boards without permission • Eating in unauthorized areas • Failure to report the use of prescription drugs • Unauthorized soliciting of contributions on LCLS Project • Smoking in unauthorized areas (Note: This may be upgraded to a Class V offense if in a hazardous area) <p>For Fourth Offense, next step in Progressive Disciplinary Policy is 30-day suspension, followed by Access Denial for the Fifth Offense within a 365-day time period.</p>	Verbal reprimand	Written reprimand	3-day suspension
<p>Class II</p> <ul style="list-style-type: none"> • Unauthorized use of equipment, tools, or machinery • Failure to observe traffic and parking rules on the SALC site • Horseplay <p>For Fourth Offense within a 365-day time period, next step is Access Denial.</p>	Written reprimand	3-day suspension	30-day suspension
<p>Class III</p> <ul style="list-style-type: none"> • Gambling on SLAC site • Disregard for safety rules (other than those mentioned elsewhere) • Failure to report an injury or accident 	3-day suspension	30-day suspension	Access denied to site
<p>Class IV</p> <ul style="list-style-type: none"> • Threatening or intimidating other employees or supervisors • Intentionally punching another employee's timecard, dropping brass, or using another ID badge 	30-day suspension	Access denied to site	
<p>Class V</p> <ul style="list-style-type: none"> • Any violation of safety procedures that contribute to the potential for loss of life or limb (see Note 1 for examples) • Possession of weapons or firearms on company property, including site parking areas • Possession of drugs, alcohol, and related paraphernalia on company property, including site parking areas • Any other violations of the Drug Free Work Place policy • Theft of property from company, client or other employees • Assault on a supervisor or other employee 	Access denied to site		
<p>Note 1: Examples of Safety Violations</p> <ul style="list-style-type: none"> • Failure to comply with 100% fall protection policy • Violation of confined space entry procedures • Violation of First Break procedure (Opening a gas or other process line) 			

NOTE: This policy is designed to set minimum standards and is not meant to supercede a subcontractor's policy or policies which may be more stringent.

LCLS Progressive Discipline Policy

Acknowledgement:

I have read and understand the Project policy on discipline. I further understand that not following the company or client's rules and regulations will result in disciplinary action up to and including denial of Project site access.

Print Name

Signature

Date

Witness

Date

APPENDIX C: INCIDENT INVESTIGATION REPORT

Page 1 of 2

PART 1

Date of Incident:	Time of Incident:	Date of Investigation:
Company:		Contract Number:
Location of Incident:		
Describe what the employee was doing at the time of the incident:		
Did injury result? Yes / No ____. If No proceed to Part 3	If yes SSN(s) Proceed to Part 2	<input type="checkbox"/> Employee Name(s) <input type="checkbox"/> <input type="checkbox"/>

PART 2

Body part(s) affected:		
Disposition: Employee Sent to	<input type="checkbox"/> Doctor <input type="checkbox"/> Emergency Room <input type="checkbox"/> Personal Physician <input type="checkbox"/> On-Site Medical Station <input type="checkbox"/> Other	<input type="checkbox"/> Employee refused treatment Result impression <input type="checkbox"/> 1 st Aid Only <input type="checkbox"/> Medical Recordable <input type="checkbox"/> Lost Time or Restricted Duty
Type of Injury:		
Employee Supervisor:		
Witnesses:		
Circle the Number Identifying Contributing Factors:		
1. Absent/Improper Guarding 2. Defective Equipment 3. Weather/Temperature 4. Inappropriate PPE 5. Inadequate Housekeeping 6. Slippery/Uneven Walking Surface 7. Improper Layout of Work Area 8. Inadequate Ventilation 9. Inadequate Lighting or Noise Control 10. Improper Storage or Placement of Materials 11. Insect/Animals in Work Area 12. No At Risk Condition Identified 13. Other	14. Operating Without Authority 15. Improper Use of Equipment 16. Inadequate Procedures 17. Use of Defective Equipment/Tools 18. PPE Not Used 19. Inadequate Training 20. Improper Position or Posture 21. Horseplay 22. Altercation 23. No At Risk Act Identified 24. Other _____ _____	

PART 3

How Did The Incident Occur?		
What Object or Substance was Involved?		
Any Previous or Similar Incidents?	Project Specific:	Company Wide:
What Factors Contributed to the Incident		

Was an SPA/JSA developed for the task being performed? Yes/No ____, If yes, attach a copy.

What **corrective actions** are being taken to prevent recurrence? Also list the person responsible for implementing and the target completion date for each item.

Supervisor/Investigation Team Members: _____
Name(s)
Signature(s)/Date

Reviewed by: _____
Subcontractor Safety Representative/Date
Program Safety Manager/Date

APPENDIX D: JOB SAFETY ANALYSIS WORKSHEET (JSA)

Job Safety Analysis	JOB TITLE		Date:	NEW
	Page of JSA No.			REVISED
ORGANIZATION:	ANALYSIS BY:	REVIEWED BY:	APPROVED BY:	
Scope (Description) of Work				
REQUIRED AND/OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT				
Phase of Work/Basic Job Steps	Safety Concerns/Potential Hazards		Recommended Action or Safety Procedures	

Job Safety Analysis	JOB TITLE Page of JSA No.		Date: NEW REVISED
ORGANIZATION:	ANALYSIS BY:	REVIEWED BY:	APPROVED BY:
Scope (Description) of Work			
REQUIRED AND/OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT - Hard-hat, safety glasses, work boots, work clothes required			
Phase of Work/Basic Job Steps	Safety Concerns/Potential Hazards	Recommended Action or Safety Procedures	
Excavation of 7 foot trench using backhoe or similar equipment	General physical hazards (manual lifting, slips, fall, contact with moving equipment, work near trench margin)	Establish a safety zone radius the length of the fully extended excavator arm. Only authorized and necessary personnel in the safety zone. Functional back-up alarm on excavator. Work gloves required for material handling. No one-person lifting over 55 pounds, proper lifting technique.	
	Trenching physical hazards	No trench entry permitted by personnel without proper shoring, guarding, or slope construction. Soils stored 14 feet from trench edge.	
Excavation of 7 foot trench using backhoe or similar equipment (continued)	Fire	Flammables stored in safety cans with flame arresters. Fire extinguisher \geq 20AB 25 to 50 feet from outside flammables storage. Ignition sources prohibited in fuel storage or handling areas. Fuel storage areas must be marked with "No Smoking or Open Flame" signs. Bonding (metal to metal contact) during pouring. Gasoline powered equipment will be shut down during filling.	
	Electrical shock	Maintain clearance from overhead and buried electrical utilities. Verify that no utilities have been installed in the immediate vicinity of the trenching. Notify CM of location and depth to dig.	
	Exposure to chemicals	None anticipated. Wash face and hands prior to taking anything by mouth.	
	Biological hazards	Notify On-site Medical Provider of any severe allergies to insect stings. PPE (boots, work clothes, taped pant legs). Insect repellent, as necessary.	

APPENDIX D: JOB SAFETY ANALYSIS WORKSHEET (JSA)

JOB SAFETY ANALYSIS (JSA)

STEP 1.

Identify jobs posing the greatest accident risk.

STEP 2.

Prioritize selected jobs into four (4) main areas.

1. Jobs with high accident frequency
2. Jobs with lower frequency but higher severity
3. Jobs with serious injury potential
4. New jobs with no accident history

STEP 3.

Conduct job analysis

1. Use either the direct observation method or the discussion method.
2. For best results observe and discuss job using an experienced employee in that job.

STEP 4.

You need an understanding of the types of accidents possible in your workplace and you must review the records of the past accidents.

There are six (6) categories of accidents:

1. Struck (By or against)
2. Contact (abrasion, electric shock, etc.)
3. Caught (in, on, between, under)
4. Fall (from elevation or same level)
5. Over exertion (stress or strain)
6. Exposure (exposed to gases, fumes, mists, etc.)

STEP 5.

Develop recommended safe work procedures. Use complete JSA to conduct the daily pre-task briefing prior to the start of work. Each employee is expected to sign-off that they have understood the information in the JSA and their assigned task.

APPENDIX E: CONFINED SPACE ENTRY PERMIT

Confined Space Entry Permit – Part I

SLAC CONFINED SPACE ENTRY PERMIT

(see instructions - over)

Number:

**POST PERMIT AT JOB SITE UNTIL JOB IS COMPLETED
IN CASE OF EMERGENCY, CALL 9-911**

Location and description of confined space	
Purpose of entry	
Division authorizing work	Date of entry
Other permits required (hot work, line breaking, other)	Time of entry
Entry supervisor (print)	Expiration date and time
	Entrants
Attendants (print)	
Known and potential hazards in space	
Describe acceptable entry conditions	
Precautions (Check and explain where required)	Operational and protective equipment (Check and explain where required)
<input type="checkbox"/> Pre-entry briefing on specific hazards and control methods	<input type="checkbox"/> Ladder
<input type="checkbox"/> Notify contractors of permit and hazard conditions	<input type="checkbox"/> Full body harness
<input type="checkbox"/> Verify adequate confined space training	<input type="checkbox"/> Lifeline
<input type="checkbox"/> Notification to affected depts/persons of service interruption	<input type="checkbox"/> Tripod/hoist
<input type="checkbox"/> LOTO and verification of zero energy	<input type="checkbox"/> Area security (warning signs, barricades)
<input type="checkbox"/> Lines blocked or broken	<input type="checkbox"/> Ventilation fan or blower
<input type="checkbox"/> Air flush (preliminary or continuous)	<input type="checkbox"/> Fire extinguisher
<input type="checkbox"/> Communication method (radio, voice signals, visual hand signals, verbal)	<input type="checkbox"/> SCBA
<input type="checkbox"/> Lighting (hazardous location rated or standard)	<input type="checkbox"/> Coveralls
<input type="checkbox"/> Drain space	<input type="checkbox"/> Eye/face protection
<input type="checkbox"/> Other (specify)	<input type="checkbox"/> Footwear
Rescue Procedures and Equipment <input type="checkbox"/> Non-entry rescue procedures and equipment in place (Attendant will extract entrant without entering space) OR <input type="checkbox"/> Entry rescue service and equipment ready to effect a timely rescue (considering hazards in space) <input type="checkbox"/> How will entry rescue service be summoned? <input type="checkbox"/> List rescue equipment:	<input type="checkbox"/> Gloves (impervious, chemical, leather, nitrile)
	<input type="checkbox"/> Air purifying respirator (specify cartridge type)
	<input type="checkbox"/> Head protection
	<input type="checkbox"/> Fall protection equipment
	<input type="checkbox"/> PIC
	<input type="checkbox"/> Radiation dosimeter(s)
	<input type="checkbox"/> Other (specify)
Notes:	Notes:

Permit-Required Confined Space Authorization – Part II

Air monitoring device	Sequence or serial number	Date due for calibration	Pre-use spot check performed by	Notes

Air monitoring data

Attendant or sampling required (continuously or every _____ minutes)

Time	Sampled by	Air sampling required for: (check and complete where applicable)					Notes
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
		O ₂ : 19.5–22.5%	< 10% LEL/LFL	< 25 ppm CO	< 10 ppm H ₂ S	Stratification	Other

Entrant IN/OUT record	Time IN	Time OUT	Time IN	Time OUT	Notes
Name					
Name					
Name					

Work Authorization

Building/area/facility manager or designee (print) _____ Date _____ Time _____

Permit authorization (must be signed before entry)

Competent Entry Supervisor's signature _____ Date _____ Time _____
 (Signature certifies that precautions and equipment are in place, atmospheric testing shows air acceptable for entry, permit is complete)

Permit cancellation (must be signed after work is completed)

Competent Entry Supervisor's signature _____ Date _____ Time _____

**POST PERMIT AT JOB SITE UNTIL JOB IS COMPLETED
 IN CASE OF EMERGENCY, CALL 9-911**

Instructions:

A confined space entry permit must be completed for all Permit Required Confined Space (PRCS) entries.

Permit numbering scheme: Building number - space number - mmddyy

Example: 081-03-121305

- 1) Contact a SLAC competent entry supervisor prior to entry to assist in space preparation and permit completion.
- 2) Review the existing confined space profile (available online).
- 3) Complete the entry permit.
- 4) Prepare the space for entry according to the permit.
- 5) The competent entry supervisor must review the permit for accuracy and completeness, determine if acceptable entry conditions are present, authorize entry, and oversee entry operations and termination.
- 6) The building/area/facility manager responsible for the confined space (the confined space "owner" also reviews the permit and authorizes the work with a signature.
- 7) Verify that qualified and trained rescue services are equipped and ready to perform a timely rescue, considering the hazards potentially present in the permit space.

APPENDIX F: ELECTRICAL JOB BRIEFING AND PLANNING CHECKLIST

Appendix E Illustrates considerations for an Electrical Job Briefing Checklist.

Identify

- The hazards
- The voltage levels involved
- Any “foreign” (secondary source) voltage source
- Any unusual work conditions
- Number of people needed to do the job
- The shock protection boundaries
- The available incident energy
- Potential for arc flash (Conduct a flash-hazard analysis)
- Flash protection boundary

Ask

- Can the equipment be energized?
- Are backfeeds of the circuits to be worked on possible?
- Is a “standby person” required?

Check

- Job plans
- Single-line diagrams and vendor prints
- Status board
- Information on plant and vendor resources up to date
- Safety procedures
- Vendor information
- Individuals are familiar with the facility

Know

- What the job is
- Who else needs to know – Communicate!
- Who’s in charge

Think

- About the unexpected event... What if?
- Lock – Tag – Test – Try
- Test for voltage – FIRST
- Use the right tools and equipment, including PPE
- Install and remove grounds
- Install barriers and barricades
- What else?

Prepare for an emergency

- Is the standby person CPR trained?
- Is the required emergency equipment available? Where is it?
- Where is the nearest telephone?
- Is confined space rescue available?
- Are radio communications available?
- What is the exact work location?
- How is the equipment shut off in an emergency?
- Are the emergency telephone numbers known?
- Where is the fire alarm?
- Where is the fire extinguisher?

APPENDIX G: ENERGIZED ELECTRICAL WORK PERMIT

ENERGIZED ELECTRICAL WORK PERMIT

PART I: TO BE COMPLETED BY THE REQUESTER

Job/Work Order Number _____

(1) Description of circuit/equipment/job location: _____

(2) Description of work to be done: _____

(3) Results of the Shock Hazard Analysis: _____

Requester/Title _____

Date _____

PART II: TO BE COMPLETED BY THE ELECTRICALLY QUALIFIED PERSONS *DOING* THE WORK:

Check when complete

(1) Detailed job description procedure to be used in performing the above detailed work: _____

(2) Description of the Safe Work Practices to be employed: _____

(3) Results of the Shock Hazard Analysis: _____

(4) Determination of Shock Protection Boundaries: _____

(5) Results of the Flash Hazard Analysis: _____

(6) Determination of the Flash Protection Boundary: _____

(7) Necessary personal protective equipment to safely perform the assigned task: _____

(8) Means employed to restrict the access of unqualified persons from the work area: _____

(9) Evidence of completion of a Job Briefing including discussion of any job-related hazards: _____

(10) Do you agree the above described work can be done safely? Yes No (If *no*, return to requester)

Electrically Qualified Person(s)

Date

Electrically Qualified Person(s)

Date

PART III: APPROVAL(S) TO PERFORM THE WORK WHILE ELECTRICALLY ENERGIZED:

Subcontractor Supervisor

LCLS Electrical Safety Officer

Project Manager

APPENDIX H: APPROACH BOUNDARIES TO LIVE PARTS FOR SHOCK PROTECTION

(Derived from NFPA 70E)

Nominal System Voltage Range, Phase to phase	Limited Approach Boundary ¹			Restricted Approach Boundary ² Includes Inadvertent Movement	Prohibited Approach
	Exposed Movable Conductor Adder	Exposed Fixed Circuit Part Boundary ³	-----		
0 to 50	Not Specified	Not specified	Not Specified	Not specified	
51 to 300	10 ft 0 in	3 ft 6 in	Avoid Contact	Avoid Contact	
301 to 750	10 ft 0 in	3 ft 6 in	1 ft 0 in	0 ft 1 in	
751 to 15kV	10 ft 0 in	5 ft 0 in	2 ft 2 in	0 ft 7 in	
15.1kV to 36kV	10 ft 0 in	6 ft 0 in	2 ft 7 in	0 ft 10 in	
36.1kV to 46kV	10 ft 0 in	8 ft 0 in	2 ft 9 in	1 ft 5 in	
46.1kV to 72.5kV	10 ft 0 in	8 ft 0 in	3 ft 3 in	2 ft 1 in	
72.6kV to 121kV	10 ft 8 in	8 ft 0 in	3 ft 2 in	2 ft 8 in	
138kV to 145kV	11 ft 0 in	10 ft 0 in	3 ft 7 in	3 ft 1 in	
161kV to 169kV	11 ft 8 in	11 ft 8 in	4 ft 0 in	3 ft 6 in	
230kV to 242kV	13 ft 0 in	13 ft 0 in	5 ft 3 in	4 ft 9 in	
345kV to 362kV	15 ft 4 in	15 ft 4 in	8 ft 6 in	8 ft 0 in	
500kV to 550kV	19 ft 0 in	19 ft 0 in	11 ft 3 in	10 ft 9 in	
765kV to 800kV	23 ft 9 in	23 ft 9 in	14 ft 11 in	14 ft 5 in	

¹ Limited Approach Boundary - A shock protection boundary to be crossed by only qualified persons (at a distance from a live part) which is not to be crossed by unqualified persons unless escorted by a qualified person.

² Restricted Approach Boundary - A shock protection boundary to be crossed by only qualified persons (at a distance from a live part) which, due to its proximity to a shock hazard, requires the use of shock protection techniques and equipment when crossed.

³ Prohibited Approach Boundary - A shock protection boundary to be crossed by only qualified persons (at a distance from a live part) which, when crossed by a body part or object, requires the same protection as if direct contact is made with a live part.

APPENDIX I: WORK TASKS AND RELATED HAZARD CATEGORY

Task (Assumes Equipment is Energized, and Work Is Done Within the Flash Protection Boundary)	Hazard/Risk Category	V-rated Gloves	V-rated Tools
Equipment rated below 240 volts; i.e., 120/208 panels with <125KVA transformer in its immediate power supply– Note 7	0	-	-
Panelboards rated 240 V and below – Notes 1 and 3	0	-	-
Circuit breaker (CB) or fused switch operation with covers on	0	N	N
CB or fused switch operation with covers off	0	N	N
Work on energized parts, including voltage testing	1	Y	Y
Remove/install CBs or fused switches	1	Y	Y
Removal of bolted covers (to expose bare, energized parts)	1	N	N
Opening hinged covers (to expose bare, energized parts)	0	N	N
	-	-	-
Panelboards or Switchboards rated >240 V and up to 600 V (with molded case or insulated case circuit breakers) – Notes 1 and 3			
CB or fused switch operation with covers on	0	N	N
CB or fused switch operation with covers off	1	N	N
Work on energized parts, including voltage testing	2*	Y	Y
	-	-	-
600 V Class Motor Control Centers (MCCs) – Notes 2 (except as indicated) and 3			
CB or fused switch or starter operation with enclosure doors closed	0	N	N
Reading a panel meter while operating a meter switch	0	N	N
CB or fused switch or starter operation with enclosure doors open	1	N	N
Work on energized parts, including voltage testing	2*	Y	Y
Work on energized parts, including voltage testing	0	Y	Y
Work on control circuits with energized parts 120 V or below, exposed	2*	Y	Y
Work on control circuits with energized parts >120 V exposed	3	Y	N
Insertion or removal of individual starter “buckets” from MCC – Note 4	2*	Y	N
Application of safety grounds, after voltage test	2*	N	N
Removal of bolted covers (to expose bare, energized parts) – Note 4	1	N	N
Opening hinged covers (to expose bare, energized parts)	-	-	-
600 V Class Switchgear (with power circuit breakers or fused switches) – Notes 5 and 6	0	N	N

Task (Assumes Equipment is Energized, and Work Is Done Within the Flash Protection Boundary)	Hazard/Risk Category	V-rated Gloves	V-rated Tools
CB or fused switch operation with enclosure doors closed	1	N	N
CB or fused switch operation with enclosure doors open	2*	Y	Y
Work on energized parts, including voltage Testing	0	Y	Y
Work on control circuits with energized parts 120V or below, exposed	2*	Y	Y
Work on control circuits with energized parts >120V exposed	3	N	N
Insertion or removal (racking) of CBs from cubicles, doors open	2	N	N
Insertion or removal (racking) of CBs from cubicles, doors closed	2*	Y	N
Application of safety grounds, after voltage test	3	N	N
Removal of bolted covers (to expose bare, energized parts)	2	N	N
Opening hinged covers (to expose bare, energized parts)	-	-	-
Other 600 V Class (277 V through 600 V, nominal) Equipment – Note 2 (except as indicated) and 3	-	-	-
Lighting or small power transformers (600 V, maximum)	2*	N	N
Removal of bolted covers (to expose bare, energized parts)	1	N	N
Opening hinged covers (to expose bare, energized parts)	2*	Y	Y
Work on energized parts, including voltage testing	2*	Y	N
Application of safety grounds, after voltage test	-	-	-
Revenue meters (kW-hour, at primary voltage and current)	2*	Y	N
Insertion or removal	1	N	N
Cable trough or tray cover removal or installation	1	N	N
Miscellaneous equipment cover removal or installation	2*	Y	Y
Work on energized parts, including voltage testing	2	Y	N
Application of safety grounds, after voltage test	-	-	-
NEMA E2 (fused contactor) Motor Starters, 2.3 KV through 7.2 kV	0	N	N
Contactor operation with enclosure doors closed	0	N	N
Contactor operation with enclosure doors open	2*	N	N
Reading a panel meter while operating a meter switch	3	Y	Y
Work on energized parts, including voltage testing	0	Y	Y
Work on control circuits with energized parts 120 V or below, exposed	3	Y	Y
	3	N	N

Task (Assumes Equipment is Energized, and Work Is Done Within the Flash Protection Boundary)	Hazard/Risk Category	V-rated Gloves	V-rated Tools
Work on control circuits with energized parts >120V, exposed	2	N	N
Insertion or removal (racking) of starters from cubicles, doors open	3	Y	N
Insertion or removal (racking) of starters from cubicles, doors closed	4	N	N
Application of safety grounds after voltage test	3	N	N
Removal of bolted covers (to expose bare, energized parts)	2	N	N
Opening hinged covers (to expose bare, energized parts)	0	N	N
Metal Clad Switchgear, 1 kV and above	4	N	N
CB or fused switch operation with enclosure doors closed	4	Y	Y
Reading a panel meter while operating a meter switch	2	Y	Y
CB or fused switch operation with enclosure doors open	4	Y	Y
Work on energized parts, including voltage testing	4	Y	Y
Work on control circuits with energized parts 120 V or below, exposed	4	N	N
Work on control circuits with energized parts >120 V, or exposed	2	N	N
Insertion or removal (racking) of CBs from cubicles, doors open	4	Y	N
Insertion or removal (racking) of CBs from cubicles, doors closed	4	N	N
Application of safety grounds, after voltage test	3	N	N
Removal of bolted covers (to expose bare, energized parts)	4	N	N
Opening hinged covers (to expose bare, energized parts)	-	-	-
Opening voltage transformer or control power transformer compartments	2	N	N
	4	Y	Y
	4	N	N
	3	N	N
Other Equipment 1 kV and above	3	Y	Y
Metal clad load interrupter switches, fused or unfused	2	N	N
Switch operation, doors closed	4	Y	N
Work on energized parts, including voltage testing	2	Y	N
Removal of bolted covers (to expose bare, energized parts)			
Opening hinged covers (to expose bare, energized parts)			
Outdoor disconnect switch operation (hookstick operated)			

Task (Assumes Equipment is Energized, and Work Is Done Within the Flash Protection Boundary)	Hazard/Risk Category	V-rated Gloves	V-rated Tools
Outdoor disconnect switch operation (gang-operated, from grade) Insulated cable examination, in manhole or other confined space Insulated cable examination, in open area			

Legend:

V-rated Gloves are gloves rated and tested for the maximum line-to-line voltage upon which work will be done.

V-rated Tools are tools rated and tested for the maximum line-to-line voltage upon which work will be done.

2* means that a double-layer switching hood and hearing protection are required for this task in addition to the other Hazard/Risk Category 2 requirements of Table 4.

Y = yes (required)

N = no (not required)

Notes:

1. Maximum of 25 kA short circuit current available, 0.03 second (2 cycle) fault clearing time.
2. Maximum of 65 kA short circuit available, 0.03 second (2 cycle) fault clearing time.
3. For < 10 kA short circuit current available, the Hazard/Risk Category required may be reduced by one number.
4. 42 kA short circuit current available, 0.33 second (20 cycle) fault clearing time.
5. 35 kA short circuit current available, up to 0.5 second (30 cycle) fault clearing time.
6. For < 25 kA short circuit current available, the Hazard/Risk Category required may be reduced by one number.

APPENDIX J: PERSONAL PROTECTIVE CLOTHING AND EQUIPMENT MATRIX

Protective Clothing & Equipment	Protective Systems for Hazard/Risk Category						
	Hazard Risk Category Number (Note 3)	-1	0	1	2	3	4
Untreated Natural Fiber	-	-	-	-	-	-	-
a. T-shirt (short sleeve)	X			X	X	X	
b. Shirt (long sleeve)	X						
c. Pants (long)	X	X	X	X	X	X	
		(Note 4)	(Note 6)				
FR Clothing (Note 1)	-	-	-	-	-	-	-
a. Long Sleeve shirt		X	X	X	X		
				(Note 9)			
b. Pants		(Note 4)	(Note 6)	X	X	X	X
				(Note 9)			
c. Coverall		(Note 5)	(Note 7)	(Note 9)	X	(Note 5)	
d. Jacket, Parka, or rainwear		AN	AN	AN	AN	AN	
Fire Protective Equipment							
a. Flash Suit Jacket (2-layer)							X
b. Flash Suit Pants (2-layer)							X
c. Head Protection			X	X	X	X	X
1. Hard hat							
2. FR hard hat liner				AR	AR		
d. Eye protection							
1. Safety glasses	X	X	X	AL	AL	AL	AL
2. Safety goggles				AL	AL	AL	AL
e. Face and head protection							
1. Arc-rated face shield or flash shield hood			X				
			(Note 8)				
2. Flash suit hood					X	X	X
3. Hearing protection (ear canal inserts)				AR	X	X	X
				(Note 8)			
f. Hand Protection							
Leather gloves (Note 2)			AN	X	X	X	X
g. Foot Protection							
Leather work shoes			AN	X	X	X	X

Legend:

AN = As needed	AL = Select one in group	AR = As required	X = Minimum required
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Notes:

- See Table 4 Arc rating for a garment is expressed in cal/cm².
- If voltage-rated gloves are required, the leather protectors worn external to the rubber gloves satisfy this requirement.
- Hazard/Risk Category Number “-1” is only defined if determined by Notes 3 or 6 of Table 5.
- Regular weight (minimum 12 oz/yd² fabric weight), untreated, denim cotton blue jeans are acceptable in lieu of FR pants. The FR pants used for Hazard/Risk Category 1 shall have a minimum arc rating of 4.
- Alternate is to use FR coveralls (minimum arc rating of 4) instead of FR shirt and FR pants.
- If the FR pants have a minimum arc rating of 8, long pants of non-melting or untreated natural fiber are not required beneath the FR pants.
- Alternate is to use FR coveralls (minimum arc rating of 4) over non-melting or untreated natural fiber pants and T-shirt.
- A faceshield with a minimum arc rating of 8, with wrap-around guarding to protect not only the face, but also the forehead, ears, and neck (or, alternatively, a flash suit hood), is required.
- Alternate is to use two sets of FR coveralls (the inner with a minimum arc rating of 4 and outer coverall with a minimum arc rating of 5) over non-melting or untreated natural fiber clothing, instead of FR coveralls over FR shirt and FR pants over non-melting or untreated natural fiber clothing.

APPENDIX K: SIMPLIFIED, TWO CATEGORY, FLAME-RESISTANT (FR) CLOTHING SYSTEM

Use of Simplified Approach. The use of Table 4 is suggested as a simplified approach to assure adequate PPE for electrical workers within facilities with large and diverse electrical systems. The clothing listed in Table 4 fulfills the minimum FR clothing requirements of Table 3 and Table 6. The clothing systems listed in this table should be used with other PPE appropriate for the Hazard/Risk Category. See Table 6.

Table 4: Simplified, Two Category, Flame Resistant Clothing System

Clothing*	Applicable Tasks
<p>Everyday Work Clothing</p> <p>FR long-sleeve (minimum arc rating of 4) worn over an untreated cotton T-shirt with FR pants (minimum arc rating of 8)</p> <p><i>or</i></p> <p>FR coveralls (minimum arc rating of 4) worn over an untreated cotton T-shirt (or an untreated natural fiber long-sleeve shirt) with untreated natural fiber pants.</p>	<p>All Hazard/Risk Category 1 and 2 listed in Table 6</p> <p>On systems operating at less than 1,000 volts, these tasks include work on all equipment <i>except</i></p> <ul style="list-style-type: none"> • Insertion or removal of low-voltage motor starter “buckets,” • Insertion or removal of power circuit breakers from switchgear cubicle or • Removal of bolted covers from switchgear. <p>On systems 1,000 volts or greater, tasks also include the operation of switching devices <i>with equipment enclosure doors closed.</i></p>
<p>Electrical “Switching” Clothing</p> <p>Multilayer FR flash jacket and FR bib overalls worn over either FR overalls (minimum arc rating of 4) or FR long-sleeve shirt and FR pants (minimum arc rating of 4), worn over untreated natural fiber long-sleeve shirt and pants, worn over an untreated cotton T-shirt</p> <p><i>or</i></p> <p>Insulated FR overalls (with a minimum arc rating of 25, independent of other layers) worn over untreated natural fiber long-sleeve shirt with untreated denim cotton blue jeans (“regular weight”, minimum 12 oz/yd² fabric weight), worn over an untreated cotton T-shirt.</p>	<p>All Hazard/Risk Category 3 and 4 tasks listed in Table 6.</p> <p>On systems operating at 1,000 volts or greater, these tasks include work on exposed live parts of all equipment.</p> <p>On systems of less than 1,000 volts, tasks include insertion or removal of low-voltage motor starter MCC “buckets”, insertion or removal of plug-in devices into or from busaway, insertion or removal of power circuit breakers and removal of bolted covers from switchgear.</p>

* Note other PPE required for the specific tasks listed in Tables 5 and 6, which include arc-rated face shields or flash suit hoods, FR hardhat liners, safety glasses or safety goggles, hard hat, bearing protection, leather gloves, voltage-rated gloves, and voltage-rated tools.

APPENDIX L: GLOVE VOLTAGE REQUIREMENTS

Class Designation of Glove or Sleeve	Maximum AC Use Voltage rms, V	AC Retest Voltage rms, V	Maximum DC Use Voltage avg, V	DC Retest Voltage avg, V
00	500	2 500	750	10 000
0	1 000	5 000	1 500	20 000
1	7 500	10 000	11 250	40 000
2	17 000	20 000	25 500	50 000
3	25 500	30 000	39 750	60 000
4	36 000	40 000	54 000	70 000

APPENDIX M: PROTECTIVE CLOTHING CHARACTERISTICS

(Table derived from NFPA 70E)

Typical Protective Clothing Systems		
Hazard Risk Category	Clothing Description (Typical number of clothing layers is given in parentheses)	Required Minimum Arc Rating of PPE [(cal/cm ²) J/cm ²]
0	Non-melting, flammable materials (i.e., untreated cotton, wool, rayon, or silk, or blends of these materials, with a fabric weight at least 4.5 oz/yd ² (1)	
1	FR shirt and FR pants or FR overall (1)	4 (16.74)
2	FR shirt and FR pants or FR overall (1)	8 (33.47)
3	Cotton underwear – conventional short sleeve and brief/shorts, plus FR shirt and FR pants (1 or 2)	25 (104.6)
4	Cotton underwear plus FR shirt and FR pants plus FR coverall, or cotton underwear plus two FR coveralls (2 or 3) Cotton underwear plus FR shirt and FR pants plus multi-layer flash suit (3 or more)	40 (169.36)

NOTE: Arc rating is defined in Article 100 and can be either ATPV or E_{BT}. ATPV is defined in ASTM F 1959-99 as the incident energy on a fabric or material that results in sufficient heat transfer through the fabric or material to cause the onset of a second-degree burn based on the Stoll curve. E_{BT} is defined in ASTM F 1959-99 as the average of the five highest incident energy exposure values below the Stoll curve where the specimens do not exhibit breakopen. E_{BT} is reported when ATPV cannot be measured due to FR fabric breakopen.

APPENDIX N: VOLTAGE REQUIREMENTS FOR BLANKETS

Class Designation of Blankets	AC Use Voltage, rms, max ^A	A-C Retest Voltage max	DC Retest Voltage, max
0	1 000	5 000	20 000
1	7 500	10 000	40 000
2	17 000	20 000	50 000
3	26 500	30 000	60 000
4	36 000	40 000	70 000

^AThe maximum use voltage is based on the following equations:

Maximum a-c use voltage = 0.95 a-c maximum retest voltage – 2 000_v
Classes 1, 2, 3, and 4.

Maximum a-c use voltage = 0.95 d-c maximum retest voltage – 30 5000_v
Classes 1, 2, 3, and 4.

Maximum a-c use voltage = 0.95 d-c maximum retest voltage – 18 000_v
Class 0.

APPENDIX O: EXCAVATION/ PENETRATION PERMIT

SECTION A – Initiation	NUMBER
PROJECT/JOB TITLE	SUBCONTRACT NO.
REQUESTOR (<i>Name/Organization</i>)	PHONE
DESCRIPTION OF WORK	
LOCATION: (<i>Area/Building/Floor/Column</i>)	
DRAWING / SKETCH NUMBER(S)	

On the basis of information available, underground, embedded or hidden utilities marked “YES” in the table below are known to exist at or adjacent to the excavation/penetration covered by this permit. This listing may not be a complete description of all obstructions. Site utilities drawings are not complete and may contain inaccuracies. Those performing excavation penetration work must be alert to encountering uncharted or inaccurately charted underground obstructions. **STOP WORK IMMEDIATELY** and contact the permit issuer if obstructions other than those defined are encountered.

SECTION B – Review											
UTILITY	DISC	YES	INITIAL	UTILITY	DISC	YES	INITIAL	UTILITY	DISC	YES	INITIAL
1. SANITARY SEWERS	CV			6. CHILLED WATER	ME			11. PROCESS WASTE			
2. STORM DRAINS	CV			7. COOLING WATER	ME			12. NATURAL GAS			
3. ELECTRICAL	EE			8. POTABLE/FIREWATER	ME			13. CRYO CHASE			
4. GROUND GRID	EE			9. HOT WATER	ME			14. EXH DUCTWORK			
5. SANITARY WATER	CV			10. TOWER WATER	ME			15. OTHER (LIST)			
CIVIL AND SITE ENGINEERING REVIEW (CV)					REVIEWER			PHONE	DATE		
ELECTRICAL ENGINEERING REVIEW (EE)					REVIEWER			PHONE	DATE		
MECHANICAL/PIPING ENGINEERING REVIEW (ME)					REVIEWER			PHONE	DATE		

SECTION C – Approval			
PERMIT REVIEWED: IS ADDITIONAL KNOWN INFORMATION TO BE PROVIDED? <input type="checkbox"/> NO <input type="checkbox"/> YES IF YES, SPECIFY DETAILS:			
Project Manager	DATE		DATE

SECTION D – Issue			
PERMIT ISSUED TO:	SUBCONTRACTOR OTHER	SIGNATURE – Subcontractor’s Competent Individual	DATE
<input type="checkbox"/> E/PP and JSA have been reviewed with the subcontractor prior to execution of work. <input type="checkbox"/> Positive location of line is required before excavation.		SIGNATURE – Project Manager	DATE

SECTION E – Closeout			
Verification that work is complete and any changes are noted on a drawing or a sketch.	SIGNATURE - SUBCONTRACTOR	DATE	
Acknowledged/Filed	SIGNATURE – Project Manager	DATE	

Each section is discussed in more detail below.

Prior to initiating a Permit, the Requestor shall review the following list of exclusions:

Excavation Activities Exclusions

1. Soil borrow areas pre-designated by the Project Manager
2. Replacement of the same location, depth, and size as the items being replaced (i.e. sign posts, etc.)
3. Earth / rock excavations 12 inches or less in depth with surface area not in excess of 25 square feet, using hand held tools excluding jackhammers

Penetration Activities Exclusions

1. Penetration of masonry walls
2. Penetration of soil borrow area pre-designated by the Project Manager
3. Work associated with the installation of fasteners to floors, walls, and ceilings of new construction.
4. Penetration of dry wall partitions in new construction where JSA clearly requires use of circuit detector or conduit locator.

SECTION A — Initiation of the Excavation/Penetration Permit (E/PP)

The Requestor will:

- Complete Section A of the E/P Permit except for the E/PP number.
- Attach sketches or marked up drawings showing location of each excavation or penetration.
- Attach the JSA for the work activity resulting from a thorough field investigation.
- Forwards the E/P Permit and attachments to the Project Manager

The Project Manager/Designee will review and forward the E/PP to one of the Engineer/ Inspectors (E/I).

The Engineer/Inspector will record the unique E/PP number in Section A and record the E/PP in the Excavation/ Penetration Permit Log.

SECTION B — Review of the Excavation/Penetration Permit (E/PP)

Each E/I will perform the following in the appropriate block of Section B:

- Review the E/PP and check (✓) “YES” or write “NO” and initial the appropriate discipline block.
- Add necessary comments.
- Record name, phone number and date.

The E/I will attach marked up copies of reference drawings.

SECTION C — Approval of the Excavation/Penetration Permit (E/PP)

The Project Manager/Designee will review the E/PP and document review in Section C, sign and date.

The E/I will return the E/PP to the Requester.

SECTION D — Execution and Issue of the Excavation/Penetration Permit (E/PP)

The Project Manager/Designee will review the E/PP and JSA with the Subcontractor Supervision before field activities begin.

The Project Manager/Designee and Subcontractor will complete, sign and date Section D.

* Field conditions encountered that are different from those shown on this permit shall be documented.

SECTION E — Closeout of Excavation/Penetration Permit (E/PP)

The subcontractor shall return the E/PP to the Project Manager/Designee when the work is complete.

If any changes were made to underground electrical or mechanical features, a red lined mark-up drawing or sketch of the changes shall be attached to the E/PP.

The Project Manager/Designee will sign the E/PP to verify that the work is complete and any changes properly noted and that the E/PP is closed out.

NOTES

1. A meeting between the permit issuer and recipient to determine the need for surveys using detection equipment and/or personnel protective measures is required.
2. Lockout and tagout all energized utility systems that present hazards to workers. As first work activity under this permit, hand excavate at existing utilities until precise location is determined. Complete excavation around utility PRIOR to re-energizing system. Hand excavation is required within 5 feet of all cables not protected by ductbanks.
3. Permit EXPIRES 15 days from date signed by issuer and must be resubmitted if work is to continue. No renewals will be granted.
4. If there is to be excavation within 5 feet of any communication line or potential energy source, positive location of the line shall be conducted using the Metrotech Pipe and Cable locating system. The Project Manager Lockout/Tagout supervisor shall be contacted prior to hand excavating and the communication, electrical, or mechanical service shall be locked out and tagged out with a Project Manager's lock.
5. A copy of this E/PP shall be available for review at the work site at all times when work associated with this E/PP is being done.
6. Penetration permit is required for work associated with installation of fasteners in floors and walls or penetration of dry wall in construction turned over to Plant Operations.
7. Penetration permit is required for all core drilling.

APPENDIX P: CRITICAL LIFT PERMIT

CRITICAL LIFT PERMIT

Section I: Approvals and Documentation

A. Identification

Subcontract Number: _____ Location: _____

Lift Identification Name: _____

Date of Lift: _____ Time: _____

Lift Description: _____

B. Approvals (Signatures Required)

Subcontractor Field Manager/S&H: _____

Date

Subcontractor Lift Supervisor: _____

(This individual is to be present during the lift)

Date

Project Engineer: _____

Date

Project Manager: _____

Date

Operator: _____

Date

Project S&H: _____

Date

Date

C. Attachments

- _____ 1. Operator Certifications
- _____ 2. Capacity Certificates and Inspection Reports for all other Lifting Equipment
- _____ 3. Inspection Reports for all Rigging Equipment
- _____ 4. Rigging Diagram
- _____ 5. Free Body Diagram

APPENDIX P: CRITICAL LIFT PERMIT (PAGE 2 OF 5)

Section II: Pre-Lift Planning

A. Pre-Lift Checklist

		(Initials)	
		Yes	No
1.	Has an inventory of equipment been done?	_____	_____
2.	Have weather conditions been considered?	_____	_____
3.	Have the general safety precautions been reviewed?	_____	_____
4.	Have the electrical safety procedures been reviewed?	_____	_____
5.	Have the safe rigging practices been implemented?	_____	_____
6.	Have the safety precautions been reviewed?	_____	_____
7.	Has a method of attachment and handling been determined?	_____	_____
8.	Are all lifting lugs engineered to specifications?	_____	_____
9.	Has the matting been inspected and approved?	_____	_____
10.	Has the stability of the ground been assured?	_____	_____
11.	Is a tag line going to be used?	_____	_____
12.	Have disconnecting/connecting means been developed?	_____	_____
13.	Has the orientation of equipment been confirmed?	_____	_____
14.	Is survey equipment required?	_____	_____
15.	Is a Pre-Lift Meeting planned?	_____	_____
16.	Is a total weight below 95% of capacity?	_____	_____
17.	Are all required approvals signed?	_____	_____

APPENDIX P: CRITICAL LIFT PERMIT (PAGE 3 OF 5)

Section III — Load and Capacity Calculations

A. Weight of Equipment - Live Load

1. Equipment Condition	New ()	Used ()
2. Weight of Equipment Empty	_____	lbs.
3. Weight of Attachments:		
a. Platforms and Ladders	_____	lbs.
b. Piping and Accessories	_____	lbs.
c. Liquids Inside	_____	lbs.
d. Dirt and Debris	_____	lbs.
e. Internal Trays or Liners	_____	lbs.
4. Total Weight of Equipment	_____	lbs.

B. Total Load

Erection Crane

1. Percent of Equipment Weight	_____ %	7. Weight of Jib Erected	_____ lbs.
2. Amount of Equipment Weight	_____ lbs.	Stored	_____ lbs.
3. Weight of Headache Ball	_____ lbs.	8. Weight of Jib Headache Ball	_____ lbs.
4. Weight of Block	_____ lbs.	9. Weight of Cable (Load Fall)	_____ lbs.
5. Weight of Lifting Bar	_____ lbs.	10. Auxiliary Boom Head	_____ lbs.
6. Weight of Slings and Shackles	_____ lbs.	11. Other: _____	_____ lbs.

TOTAL WEIGHT _____ lbs.

Tailing Crane

1. Percent of Equipment Weight	_____ %	7. Weight of Jib Erected	_____ lbs.
2. Amount of Equipment Weight	_____ lbs.	Stored	_____ lbs.
3. Weight of Headache Ball	_____ lbs.	8. Weight of Jib Headache Ball	_____ lbs.
4. Weight of Block	_____ lbs.	9. Weight of Cable (Load Fall)	_____ lbs.
5. Weight of Lifting Bar	_____ lbs.	10. Auxiliary Boom Head	_____ lbs.
6. Weight of Slings and Shackles	_____ lbs.	11. Other: _____	_____ lbs.

TOTAL WEIGHT _____ lbs.

Source of Load Weight _____
 (Name Plate, Drawings, Calculated, Weighed)

Weights Verified By: _____

APPENDIX P: CRITICAL LIFT PERMIT (PAGE 4 OF 5)

C. Capacities of the Crane

Erection Crane Configuration

- 1. Type of Crane _____
- 2. Rated Capacity _____ Tons
- 3. Lifting Arrangement
 - a. Max. Radius During Lift _____ ft.
 - b. Length of Boom _____ ft.
 - c. Angle of Boom at Pick _____ deg.
 - d. Angle of Boom at Set _____ deg.
 - e. Rated Capacity Under Most Severe Conditions
 - 1. Over Rear _____ lbs.
 - 2. Over Front _____ lbs.
 - 3. Over Side _____ lbs.
 - f. Rated Capacity for Lift _____ lbs.
- 4. Jib
 - a. Is the Jib to be used? _____
 - b. Length of Jib _____ ft.
 - c. Jib Angle _____ deg.
 - d. Rated Jib Capacity _____ lbs.
- 5. Cable
 - a. Number of Parts _____
 - b. Size of Cable _____ inch.
 - c. Maximum Capacity _____ lbs.

D. Percent of Cranes Capacity

$$\frac{\text{Total Weight X 100}}{\text{Rated Capacity}} = \text{_____ \%}$$

E. Size of Slings

- 1. Sling Selection
 - a. Type of Arrangement _____
 - b. Number of Slings to Hook _____
 - c. Sling Size _____ inch.
 - d. Sling Length _____ ft.
 - e. Rated Capacity _____ lbs.

APPENDIX P: CRITICAL LIFT PERMIT (PAGE 5 OF 5)

C. Capacities of the Crane (continued)

Tailing Crane Configuration

- 1. Type of Crane _____
- 2. Rated Capacity _____ Tons
- 3. Lifting Arrangement
 - a. Max. Radius During Lift _____ ft.
 - b. Length of Boom _____ ft.
 - c. Angle of Boom at Pick _____ deg.
 - d. Angle of Boom at Set _____
 - e. Rated Capacity Under Most Severe Conditions
 - 1. Over Rear _____ lbs.
 - 2. Over Front _____ lbs.
 - 3. Over Side _____ lbs.
 - f. Rated Capacity for Lift _____ lbs.
- 4. Jib
 - a. Is the Jib to be used? _____
 - b. Length of Jib _____ ft.
 - c. Jib Angle _____ deg.
 - d. Rated Jib Capacity _____ lbs.
- 5. Cable
 - a. Number of Parts _____
 - b. Size of Cable _____ inch.
 - c... Maximum Capacity _____ lbs.

D. Percent of Cranes Capacity

$$\frac{\text{Total Weight X 100}}{\text{Rated Capacity}} = \text{_____ \%}$$

E. Sizing of Slings

- 1. Sling Selection
 - a. Type of Arrangement _____
 - b. Number of Slings to Hook _____
 - c. Sling Size _____ inch.
 - d. Sling Length _____ ft.
 - e. Rated Capacity _____ lbs.

APPENDIX Q: HOT WORK PERMIT

Side 1

Date _____
Building _____
Dept. _____ Floor _____
Work to be done _____

Special Precautions _____

Is Fire Watch Required? _____ Name _____

The location where this work is to be done has been examined, necessary precautions taken, and permission is granted for this work. (see other side).

Permit Expires _____

Signed _____
Permit Authorizing Individual

Time Started _____
Time Completed _____

FINAL CHECK

Work area and all adjacent areas to which sparks and heat might have spread (including floors above and below and on opposite side of wall(s) were inspected 30 minutes after the work was completed and were found firesafe.

Signed _____
Permit Authorizing Individual

Side 2

ATTENTION

Before approving any hot work permit, the PAI shall inspect the work area and confirm that precautions have been taken to prevent fire in accordance with NFPA 51B

PRECAUTIONS

- Sprinklers in service
- Hot work equipment in good repair

WITHIN 35 FT OF WORK

- Floors swept clean of combustibles
- Combustible floors wet down, covered with damp sand, metal, or other shields
- All wall and floor openings covered
- Covers suspended beneath work to collect sparks

WORK ON WALLS OR CEILINGS

- Construction noncombustible and without combustible covering
- Combustibles moved away from opposite side of wall

**WORK ON ENCLOSED EQUIPMENT
(tanks, containers, ducts, etc)**

- Equipment cleaned of all combustibles
- Containers purged of flammable vapors

FIRE WATCH

- To be provided during and 30 minutes after operation
- Supplied with a fully charged and operable fire extinguisher
- Trained in use of equipment and in sounding fire alarm

FINAL CHECK

- To be made 30 minutes after completion of any operation unless fire watch is provided

Signed _____
Permit Authorizing Individual (PAI)

