
University of California, San Diego

Englekirk Structural Engineering
Center (ESEC)

Site Safety Manual

REVISION HISTORY

Revision	Change Description	Approval List	Release Date
B	Original	MD	January 2007
C	Edit	MD	March 2007
D	Edit	MD	August 2007
E	Edit	MD	October 2007
F	Edit/Additions	MD	May 2009
G	Edit/Additions	MD	May 2009
H	Edit/Additions	MD	July 2009
I	Edit/Additions	MD	August 2009
J	Edit/Additions	MD	April 2010
K	Edit/Additions	AG	Sept 2010
L	Edit/Additions	PG	January 2013

Approval List

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**NOTICE: EMPLOYEES ARE RESPONSIBLE FOR FOLLOWING THE
CORRECT AND CURRENT REVISION OF THE DOCUMENT**

Englekirk Structural Engineering Center Commitment to Safety

The University of California San Diego and Englekirk Structural Engineering Center are committed to achieving excellence in providing a healthy and safe working environment, and to supporting environmentally sound practices in the conduct of University activities. It is University policy to comply with all applicable health, safety, and environmental protection laws, regulations and requirements.

NEES-UCSD Health and Safety

Safety and health at the NEES facility in San Diego are integrated into daily activities. They are important responsibilities of all employees at all levels.

We will maintain a safety and health program conforming to the best practices of organizations of this type. To be successful, such a program must embody the proper attitudes toward injury and illness prevention on the part of department heads, principals, supervisors and employees. A well functioning health and safety program requires collaboration among management and employees, as well as among employees and their co-workers. Only through a synergetic effort can an effective health and safety program thrive.

The health and safety of every employee is a high priority. Management accepts responsibility for providing a safe working environment and employees are expected to take responsibility for performing work in accordance with safe standards and practices. Health and safety will only be achieved through teamwork. Everyone must join together in promoting health and safety and take every reasonable measure to assure safe working conditions exist within the company.

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Table of Contents

1.	Introduction to ESEC Manual	8
1.1	General Description	8
1.2	Purpose of Manual.....	8
2.	Responsible Parties	8
2.1	Frequency.....	8
2.2	References	9
3.	OSHA Action Plan	10
4.	Injury Illness Prevention Program (IIPP) at ESEC.....	11
4.1	Injury and Illness Prevention Program (IIPP) UCSD	11
4.1.1	Introduction	11
4.1.2	Goals	12
4.1.3	Statutory Authority.....	12
4.1.4	Responsibility.....	12
4.1.5	Compliance	13
4.1.6	Hazard Identification	14
4.1.7	Accident Investigations.....	15
4.1.8	Injury, Illness, Automobile Accident Reporting	15
4.1.9	Hazard Mitigation	17
4.1.10	Training.....	17
4.1.11	Communication	18
4.1.12	Documentation.....	20
5.	ESEC Site Safety Requirements	21
5.1	General Site Safety Rules	21
5.2	Machinery and Vehicles.....	24
5.3	Fork Lifts.....	25
5.4	Powered Work Platforms.....	28
6.	Lockout/Blockout Policy	30
6.1	Purpose	30
6.2	Scope.....	30

6.3	Responsibility	30
6.4	Authorization	30
6.5	Procedures	30
6.6	Special Provisions.....	31
6.7	Lockout/Tagout for Hydraulic lines at ESEC.....	32
7.	Machine Shop and Tool Training.....	32
7.1	Introduction	32
7.2	Responsibilities	32
7.3	Personal Protective Equipment	32
7.4	Clothes and Hair.....	32
7.5	Controls.....	32
8.	Use of Tools and Equipment	33
8.1	Purpose	33
8.2	Training Records.....	33
8.3	Common Sense of Tool Use	33
8.4	The Right Tool for the Right Job.....	33
8.5	Hand Tools	34
8.6	Hand Tool Training.....	34
8.6.1	Screwdrivers	34
8.6.2	Wrenches.....	35
8.6.3	Hammers/Chisels.....	35
8.6.4	Nails	36
8.6.5	Come-a-Long.....	36
8.6.6	Hammer/Smack-Wrench	37
8.6.7	Ladders	37
8.6.8	Scaffolds.....	38
8.7	Electric Power Tools.....	39
8.7.1	Electric Extension Cords	39
8.7.2	Table, Radial, and Miter Saw	40
8.7.3	Stationary Sander	41
8.7.4	Abrasive Saw.....	41

8.7.5	Stationary Grinder	42
8.7.5.1	Changing/Facing Grinder Wheel	42
8.7.6	14" Band Saw	43
8.7.7	Drill Press	43
8.7.8	Portable Electric Tools	44
8.7.9	Circular Saw	45
8.7.9.1	Preventing Saw Kickback	46
8.7.10	Reciprocating Saw	47
8.7.11	Jig Saw	48
8.7.12	Portable Band Saw	49
8.7.13	Percussion Tools	51
8.7.14	Portable Drill.....	52
8.7.15	Pneumatic Nail Gun.....	53
8.8	Dywidag Systems Safety and Operating Instructions	54
9.	Personal Protective Equipment.....	56
10.	Hazard Communication.....	57
10.1	Storage/Disposal of Hazardous Waste.....	57
11.	Emergency Action Plan.....	60
11.1	Emergency Guide	63
12.	Natural Hazards.....	64
13.	Facility Specific Safety Requirements.....	64
13.1	Blast Simulator-Technical Support Working Group (TSWG).....	65
13.1.1	Blast Simulator Specific Safety	65
13.2	Large High Performance Outdoor Shake Table (LHPOST).....	65
	Network for Earthquake Engineering Simulation (NEES).....	65
	National Science Foundation (NSF)	65
13.2.1	LHPOST Specific Safety	66
13.3	Soil Foundation Structure Interaction (SFSI) California Department of Transportation and Port of Los Angeles Soil Pit	66
13.3.1	Safety Procedures for Working on Soil Pit Set-up.....	66
14.	Appendix A	68
15.	Appendix B	70

15.1	Hazard Identification Form	70
15.2	UCSD Accident Investigation Report.....	71
15.3	Employee Safety Recommendation Form	72
15.4	Supervisor’s Safety Meeting	73
15.5	New Laboratory Worker Checklist	74
15.6	UCSD Office Safety Inspection	75
15.7	Shop and Studio Safety Inspection Checklist	77
15.8	Supplemental Hazard assessment and Correction	81
15.9	Job Hazard Analysis.....	82
15.10	Hazard Assessment and Correction Worksheet	85
15.11	Unsafe Conditions Recommendations	86
15.12	Employee Safety Review.....	88
15.13	Hot Work Permit Checklist	90
15.14	Daily Stationary Scaffold Inspection Checklist.....	91
15.15	Fall Protection Inspection Checklist.....	92

1. Introduction to ESEC Manual

1.1 General Description

These safe practice rules are intended for use in all laboratory activities. Furthermore, general safety orders as per California Code of Regulations, Title 8 and UCSD policies are enforced in the laboratory. All employees are expected to adhere to applicable CAL/OSHA Standards outlined in California Code of Regulations, Title 8 and UCSD policies.

ESEC staff is required to follow all Cal/OSHA and UCSD rules and regulations with appropriate action taken for noncompliance as listed in the “Compliance” section of the IIPP Program in this manual.

The term “employee/staff/personnel” used in this document refers to any individuals working in the laboratory.

1.2 Purpose of Manual

The purpose of the Site Safety Manual is to help researchers, employees, and students recognize, evaluate, and control hazards in their laboratory.

2. Responsible Parties

While safety is a concerted effort of all staff; Englekirk Center does employ a fulltime Safety Officer who reports directly to management. A hierarchy of staff responsible for safety is as follows:

Benson Shing- Lab Director

Paul Greco -Senior Development Engineer

Alex Sherman-Safety Officer/Development Technician

Development Technician Staff, Electronics Staff, and Administrative Staff

2.1 Frequency

These practices are to be performed at all times while at ESEC.

Annual Site Safety Audits will be conducted by Environment, Health & Safety Department as well as ESEC staff; additionally ESEC staff will conduct monthly Site Safety Audits using forms from the Injury and Illness Prevention Program.

Annual training is performed through EH&S as well as Englekirk Center staff in areas such as Hazardous Waste Handling, Pollution Prevention, Ergonomics, Tool Training and Fall Protection.

Additional training of staff, as needed, in areas such as OSHA Compliance, Rigging and Lifting Safety, and Safe Hydraulics Maintenance performed by independent companies.

ESEC also employs a full time Safety Coordinator who reports to management on safety issues and reports to and works with EH&S on safety compliance.

2.2 References

California Code of Regulations, Title 8

UCSD electronic documents accessible on [Blink website](#).

Power Tool Institute, Inc. <http://www.powertoolinstitute.com/who.html>

3. Cal/OSHA Action Plan

The California Occupational Safety and Health Act (Cal/OSHA) will have safety inspections that are performed by the California Division of Industrial Safety without advance notice. When applicable, all inspections must be conducted in a manner compatible with University operations.

If contacted by Cal/OSHA personnel UCSD staff shall immediately contact UCSD-ESEC Management at x43528 or x46686 **and** Environment Health & Safety for instructions: Bruce Bowers x26676, Jon Schmidt x43782, or Kriston Morris x46027.

4. Injury Illness Prevention Program (IIPP) at ESEC

UCSD and Englekirk Center are committed to maintaining a safe working environment. An effective Safety Plan incorporates training of employees to increase their awareness of the role everyone shares in providing a safe workplace. All employees are required to complete a UCSD EH&S IIPP course within 90 days of employment. Records of completion are stored digitally (accessible by each employee) and a hard copy is kept on file with the Site Safety Coordinator in the North trailer. For further information see the **Injury Illness Prevention Program** section 4.1 in this manual and **Injury Illness Prevention Program** in Appendix A.

Annual training is performed through EH&S as well as Englekirk Center staff in areas such as Hazardous Waste Handling, Pollution Prevention, Ergonomics, Tool Training and Fall Protection. Additional training of staff as needed in areas such as OSHA Compliance, Rigging and Lifting Safety, and Safe Hydraulics Maintenance training performed by independent companies. Records of training completion are stored digitally (UCSD training accessible by each employee) and/or a hard copy is kept on file with the Site Safety Coordinator in the North trailer.

An important aspect of the Injury Illness Prevention Program is periodic Safety Audits. Annual Safety Audits are conducted by the Environment, Health & Safety Department as well as annual Safety Audits conducted by Englekirk Center staff to ensure safety standards are adhered to as well as address any new safety concerns. ESEC staff will utilize inspection forms from the **Injury an Illness Prevention Program** section 15.7 in Appendix B. For further information also see **Self Safety Audit** in Appendix A.

4.1 Injury and Illness Prevention Program (IIPP) UCSD

4.1.1 Introduction

In order to maintain a safe and healthful work environment at UCSD, the Office of Environment, Health and Safety (EH&S) has developed this overall **Injury and Illness Prevention Program** for all employees to follow. This document describes the goals, statutory authority, and the responsibilities of all employees and students under the Program. It addresses Compliance, Hazard Identification, Accident Investigation, Hazard Mitigation, Training, Hazard Communication, and Program Documentation. By making employee safety a high priority for every UCSD employee we can reduce injuries and illnesses, increase productivity, and promote a safer and healthier environment for all individuals at UCSD.

4.1.2 Goals

Diligent implementation of this program will reap many benefits for UCSD. Most notably it will:

1. Protect the health and safety of employees. Decrease the potential risk of disease, illness, injury and harmful exposures to UCSD personnel.
2. Reduce workers' compensation claims and costs.
3. Improve efficiency by reducing the time spent replacing or reassigning injured employees, as well as reduce the need to find and train replacement employees.
4. Improve employee morale and efficiency as employees see that their safety is important to management.
5. Minimize the potential for penalties assessed by various enforcement agencies by maintaining compliance with health and safety codes.

4.1.3 Statutory Authority

California Labor Code Section 6401.7.

California Code of Regulations Title 8, Sections 1509 and 3203

4.1.4 Responsibility

The ultimate responsibility for establishing and maintaining effective environmental, health, and safety policies specific to campus facilities and operations rests with the Chancellor. General policies that govern the activities and responsibilities of the environment, health, and safety program are established under his final authority.

It is the responsibility of Deans, Directors, Department Chairs, Department Heads, Principal Investigators, managers, and supervisors to develop procedures that ensure effective compliance with the Injury and Illness Prevention Program (IIPP), as well as other university health and safety policies related to operations under their control.

Supervisors, including **managers** and **Principal Investigators**, are responsible for enforcement of this Program among the employees or students under their direction by carrying out the various duties outlined herein, setting acceptable safety policies and procedures for each employee to follow, and ensuring that employees receive the general safety training offered by EH&S (or equivalent). Each manager and supervisor must also ensure that appropriate job specific safety training is received, and that safety responsibilities are clearly outlined in the job descriptions which govern the employees under their direction. Supervising others also carries the responsibility for knowing how to safely accomplish the tasks assigned each employee, for purchasing appropriate personal protective equipment, and for evaluating employee compliance.

Immediate responsibility for workplace health and safety rests with each individual employee and/or student. **Employees** and **students** are responsible for following the established work procedures and safety guidelines in their area, as well as those identified in this Program and in the UCSD [General Chemical Safety Guidelines](#). Employees and students are also responsible for using the personal protective equipment issued to protect them from identified hazards, and for reporting any unsafe conditions to their supervisors.

Environment, Health & Safety is responsible for developing and managing this Injury and Illness Prevention Program. Additional responsibilities include providing consultation to the UCSD community on matters of health and safety; monitoring and advising personnel using radiation, carcinogens and other hazardous materials; interpreting external regulations and recommending appropriate compliance strategies.

4.1.5 Compliance

Compliance with this Injury and Illness Prevention Program will be achieved in the following manner:

1. Managers and supervisors will set positive examples for working safely and require that all staff under their direction work safely.
2. Managers and supervisors will use all disciplinary procedures available to them to ensure that employees follow established safety policies and procedures. Performance evaluations, verbal counseling, written warnings and other forms of disciplinary action are available.
3. Managers and supervisors will identify the resources necessary to provide a safe work environment for their employees and include them in budget requests.
4. Managers and supervisors will establish appropriate means of recognition for employees who demonstrate safe work practices.
5. Supervisors in the building maintenance divisions must also enforce the Code of Safe Practices sent as an addendum to this Program, and post a copy on their employee bulletin boards.

UCSD has developed this comprehensive Injury and Illness Prevention Program to enhance the health and safety of its faculty, staff, and students. Each department is responsible for implementing the Program as outlined in the following pages.

4.1.6 Hazard Identification

A health and safety inspection program is essential in order to reduce unsafe conditions that may expose faculty, staff, students and visitors to incidents that could result in personal injuries or property damage. **It is the responsibility of each department to ensure that appropriate, systematic safety inspections are conducted periodically.**

A. Scheduled Safety Inspections:

Upon initial implementation of this Program, inspections of all work areas will be conducted. All inspections will be documented using the attached forms (or equivalent) with appropriate abatement of any hazards detected.

Thereafter, safety inspections will be conducted at the frequency described below:

1. Office environments - Annual inspections of all office areas will be conducted to detect and eliminate any hazardous conditions that may exist. The attached Office Safety Inspection form (or equivalent) will be used.
2. Shops, cafeterias, warehouses, stores, docks, etc. - Semi-annual inspections of all potentially hazardous areas will be conducted to detect and eliminate any hazardous conditions that may exist. The attached Facility Safety Inspection form (or equivalent) will be used.
3. Laboratories - Semi-annual inspections of all laboratories will be conducted to detect and eliminate any hazardous conditions that may exist. In addition, all guidelines in the [General Chemical Safety Guidelines](#) will be followed.
4. Medical clinics - Semi-annual inspections of all medical clinic areas will be conducted to detect and eliminate any hazardous conditions that may exist. The attached Medical Clinics Inspection form (or equivalent) will be used.

B. Unscheduled Safety Inspections:

1. Additional safety inspections will be conducted whenever new equipment or changes in procedures that present new hazards are introduced into the workplace.
2. Environment, Health & Safety will conduct periodic unscheduled safety inspections of all potentially hazardous areas to assist in the maintenance of a safe and healthful workplace.

3. Safety reviews will be conducted when occupational accidents occur to identify and correct hazards that may have contributed to the accident.
4. Environment, Health & Safety is available for consultation and assistance in conducting these various hazard assessments.

4.1.7 Accident Investigations

Supervisors will investigate all accidents, injuries, occupational illnesses, and near-miss incidents to identify the causal factors or attendant hazards. Appropriate repairs or procedural changes will be implemented promptly to mitigate the hazards implicated in these events.

Use the Accident Investigation form to record pertinent information and retain a copy to serve as proper documentation, section 15.2 in Appendix B.

Serious occupational injuries, illnesses or exposures to hazardous substances, as defined by Cal/OSHA, must be reported to EH&S no later than eight hours after they become known to the supervisor. These include injuries that cause permanent disfigurement or require hospitalization for a period in excess of 24 hours. EH&S will contact Cal/OSHA, if necessary. An accident investigation will be conducted by EH&S in conjunction with a representative from the injured employee's department.

4.1.8 Injury, Illness, Automobile Accident Reporting

In the event of a medical emergency alert coworkers and call 9-1-1.

What to Do if a Work-Related Injury or Illness Occurs

If you are injured or develop a job-related illness as a result of your UCSD employment, follow the procedures below.

1. **Notify your supervisor when an injury or illness occurs.**
 - a. Notify your supervisor immediately if you experience a work-related injury or illness.
 - b. Employee or supervisor: Follow the steps below to report the injury or illness to the Workers' Compensation Office.
2. **Report injury or illness to the UCSD Workers' Compensation Office.**

- a. Print an Employee Injury Incident Report form ([PDF](#)) ([Word](#)). PDF link: <http://www-ehs.ucsd.edu/riskmgmt/forms/EIR.pdf> Word link: <http://www-ehs.ucsd.edu/riskmgmt/forms/EIR.doc>
- b. Complete the information according to instructions on the form.

Note: Both the employee and the supervisor have a section of the form to complete. If the employee is unable to complete his or her section, the supervisor must complete it for the employee.

3. **Immediately fax** the completed sections of the form to the Workers' Compensation Office: (858) 534-5202.

Important: Supervisors must report all work-related deaths, catastrophes, and serious injuries or illnesses within 8 hours to the UCSD Workers' Compensation Office. Reporting delays could result in Cal/OSHA fines.

A serious injury or illness is one that requires inpatient hospitalization, or in which an employee suffers a loss of any member of the body or suffers any serious degree of permanent disfigurement.

4. **If necessary, seek medical treatment.**
 - o **24-hour walk-in service:**
 - [Thornton Hospital](#) Emergency Room, (858) 657-7600
 - [UCSD Medical Center](#) (Hillcrest) Emergency Room, (619) 543-6400
 - o **By appointment only:**
 - UCSD Center for Occupational & Environmental Medicine, (619) 471-9210

See Injury and Illness Prevention Program in Appendix A for web links and additional information.

Automobile Accident

If you are involved in an auto accident involving a UCSD vehicle: Complete the Vehicle Accident/ Incident Reporting Packet contained in the glove compartment of the UCSD vehicle. Or, to order a Vehicle Accident/ Incident Reporting Packet, contact Risk Management, (858) 534-3820, or Fleet Services, (858) 534-3485. Return the completed packet to Fleet Services, Mail Code 0033.

See **Vehicle Accident** in Appendix A.

4.1.9 Hazard Mitigation

All hazards identified will be promptly investigated and alternate procedures implemented as indicated. The university recognizes that hazards range from imminent dangers to hazards of relatively low risk. Corrective actions or plans, including suitable timetables for completion, are the responsibility of the department. EH&S consultation is available to determine appropriate abatement actions. The attached Hazard Identification form, section 15.1, can be used to document identified hazards and the resulting action taken to abate them.

For serious hazards that present an imminent danger to life or limb, immediate action will be taken to mitigate the hazard. The Department Chair/Head, EH&S, and all affected employees will be notified of the hazard. If the hazard cannot be immediately abated, all personnel will be removed from the affected area. Access to the area will be controlled until the safety of personnel can be assured.

If continued use of the area or equipment must be maintained, then affected personnel will be provided with the proper training, protective equipment, or other safeguards deemed necessary to protect them from the hazard.

Serious concealed dangers will be reported to Environment, Health & Safety at (858) 534-3660, in accordance with UCSD PPM 516-7.3. If the serious concealed danger cannot be abated within 15 days, then it will also be made known to all affected employees in writing.

Environment, Health & Safety is available for consultation and assistance on matters involving hazard mitigation and for deciding what constitutes a "serious concealed danger." All external reporting requirements will be directed to EH&S.

4.1.10 Training

Effective dissemination of safety information lies at the very heart of a successful Injury and Illness Prevention Program. All employees must be trained in general safe work practices. In addition, specific instruction with respect to hazards unique to each employee's job assignment will be provided.

A. General Safe Work Practices:

At a minimum, all employees will be trained in the following:

1. Fire safety, evacuation and emergency procedures
2. Earthquake preparedness
3. Campus emergency management
4. Safe computer workstation use (if applicable)
5. Hazard communication and awareness
(use of Material Safety Data Sheets)

Attendance at one of the regularly scheduled general Injury & Illness Prevention Program or Laboratory Safety for Professionals/IIPP classes will meet this requirement.

B. Specific Safe Work Practices:

In addition to this general training, **each employee will be instructed how to protect themselves from the hazards specific to their individual job duties.** At a minimum, this entails how to use workplace equipment, safe handling of hazardous materials, and use of personal protective equipment. Training must be completed before beginning to work on assigned equipment, **and whenever new hazards or changes in procedures are implemented.**

Managers are responsible for providing supervisors with the training necessary to familiarize themselves with the safety and health hazards their employees are exposed to.

It is the responsibility of each supervisor to know the hazards related to his/her employee's job tasks, and ensure they receive appropriate training.

1. Supervisors will ensure that all employees receive general and job-specific training prior to initial or new job assignments.
2. Supervisors will ensure that employees are trained whenever new substances, processes, procedures or equipment are introduced to the workplace that may create new hazards. Training must also be given when new or previously unrecognized hazards are brought to a supervisor's attention.
3. All training will be documented and kept in department files. The attached Employee Training Checklist form (or equivalent) can be used for this purpose.

4.1.11 Communication

Effective two-way communication that involves employee input on matters of workplace safety is essential to maintaining an effective Injury and Illness Prevention Program. To foster better safety communication the following guidelines will be implemented:

The department will use an employee bulletin board for posting information on safety in a location accessible to all employees. If a fire exit corridor location is chosen, the bulletin board should be enclosed

behind glass. Changes in protocol, safety bulletins, accident statistics, training announcements, and other safety information will be posted as they become available.

Managers and supervisors will provide time at periodic staff meetings **(building maintenance personnel must meet at least every 10 working days)** to discuss safety topics. Status reports will be given on safety inspections, hazard mitigation projects, and accident investigation results, as well as feedback to previous employee suggestions. Employees will be encouraged to participate and give suggestions without fear of reprisal. The attached Supervisor's Safety Meeting form (or equivalent) should be used to document attendance and topics covered.

The department will use Material Safety Data Sheets as one form of employer to employee communication. Additional communication methods include:

Posters	Meetings
Newsletters	Bulletins
General Chemical Safety Guidelines	Manuals
Operator Manuals	Warning Labels
Code of Safe Practices	
Standard Operating Procedures	

Employees are encouraged to bring to the University's attention any potential health or safety hazard that may exist in the work area. A mechanism for anonymous employee input, such as a suggestion box or mail station for safety suggestions, hazard identification, complaints, etc., which is accessible to all employees will be implemented. The attached Employee Safety Recommendation form section 15.3 (or equivalent) can be used for this purpose. These forms may also be sent directly to EH&S for follow-up (Mail Code 0920).

Employees are advised that there are no reprisals for expressing a concern, comment, suggestion, or complaint about a safety matter and that adherence to safe work practices and proper use of personal protective equipment are integral parts of workplace safety.

Supervisors will follow up all suggestions and investigate the concerns brought up through these communication methods, utilizing EH&S assistance if needed. Feedback to the employees is critical, and must be provided for effective two-way communication.

Compliance will be reinforced by appropriate comments on performance evaluations.

Non-compliance will be addressed by:

- An immediate discussion between the supervisor and the employee who is discovered working in an unsafe manner
- Appropriate disciplinary action up to dismissal

The department will pursue readily understandable health and safety communications for dissemination to all affected employees.

4.1.12 Documentation

Many standards and regulations of Cal/OSHA contain requirements for the maintenance and retention of records for occupational injuries and illnesses, medical surveillance, exposure monitoring, inspections, and other activities relevant to occupational health and safety. To comply with these regulations, as well as to demonstrate that the critical elements of this Injury and Illness Prevention Program are being implemented, **the following records will be kept on file in the department** for at least the length of time indicated below:

1. Copies of all IIPP Safety Inspection forms. Retain 5 years.
2. Copies of all Hazard Identification forms. Retain 5 years.
3. Copies of all Accident Investigation forms. Retain 5 years.
4. Copies of all Employee training documents. Retain for duration of each individual's employment. [Enrollment Central](#) provides access to an employee's training history, listing courses **registered for and completed via** Enrollment Central.
5. Copies of all safety postings and safety meeting agendas. Retain 5 years.
6. Copies of the Annual Accident Statistic Summaries. Retain 5 years.
7. Copies of employee exposure records, registered carcinogen records, or other required employee health and safety records. Retain 30 years or for the duration of each individual's employment if greater than 30 years.

The department will ensure that these records are kept in their files, and present them to Cal/OSHA or other regulatory agency representatives if requested. Review of these records will be conducted by EH&S during routine inspections to measure compliance with the Program.

A safe and healthy workplace must be the goal of everyone at UCSD, with responsibility shared by management and staff alike. If you have any questions regarding this Injury and Illness Prevention Program, please contact Environment, Health and Safety at (858) 534-3660, ehsweb@ucsd.edu.

Resources: (Also See Appendix A & B)

- [Injury & Illness Prevention Program Training](#)
- [IIPP Forms](#) (also found in Appendix B)
- [Enrollment Central](#) (for training history of programs completed via Enrollment Central)
- [Material Safety Data Sheets \(MSDS\)](#)
- [EH&S Safety Training Manager](#)

5. ESEC Site Safety Requirements

5.1 General Site Safety Rules

1. All persons shall follow these safe practice rules; render every possible aid to safe operations and report all unsafe conditions or practices to their supervisor.
2. Supervisors shall insist on employees observing and following all safe practice rules and shall take such action as is necessary to obtain compliance.
3. All employees shall be given frequent accident prevention instructions. Safety practices shall be discussed at least every 10 working days, safety meeting minutes will be kept on file with the Site Safety Coordinator in the North trailer.
4. Horseplay, scuffling and other acts that tend to have an adverse affect on employee health or safety shall be prohibited.
5. Work shall be well planned and supervised to prevent injuries in the handling of materials and in working with equipment.
6. A **Job Hazard/Site Analysis** shall be performed prior to work taking place and updated as needed during work progress. UCSD EH&S Department guidelines observed for Integrated Safety and Environmental Management, see Appendix B section 15.9 and **Job Hazard Analysis** in Appendix A.
7. No one shall knowingly be permitted or required to work while the employee's ability or alertness is so impaired by fatigue, illness or other causes that it might unnecessarily expose the employee or others to injury.
8. Cal-OSHA standards for **Heat Stress** will be observed and discussed during summer months in our safety meetings every 10 working days. See UCSD EH&S Department guidelines for **Heat Stress** in Appendix A.

9. All employees must wear hard hats and steel toed shoes while working. Visitors must wear hard hats and closed-toed shoes at all times while on the premises.
10. Employees shall not enter manholes, underground vaults, chambers, tanks, or similar places that receive little ventilation, unless it has been determined by the employee's supervisor that it is safe to enter and Confined Space Entry Log has been completed.
11. Employees shall be instructed to insure that all machinery guards and other protective devices are in proper places and adjusted. They shall report deficiencies promptly to their supervisor. See **Tool Training** sections 7 & 8 in this document.
12. Workers shall not handle or tamper with any electrical equipment, machinery, air or water lines in a manner not within the scope of their duties, unless they have received proper instructions from their supervisor or designee.
13. All injuries shall be reported promptly to the supervisor so that arrangements can be made for medical or first aid treatment. See section 15.2 in Appendix B as well as **Injury or Illness Reporting** in Appendix A.
14. When lifting heavy objects up to 50# or more, use the large muscles of the leg instead of the back muscles which are much smaller. Keep your back straight and hold the load close to your body. See UCSD EH&S Department guidelines for **Lift and Carry** also **Manual Lifting** in Appendix A.
15. Materials, tools, or other objects shall not be thrown from buildings or structures until proper precautions are taken to protect others from the falling objects.
16. Employees shall cleanse hands thoroughly after handling hazardous materials and follow precautions listed on the corresponding **Material Safety Data Sheet**. Use the following Internet link to access current Material Safety Data Sheets. ([MSDS LINK](#)) See **MSDS** in Appendix A.
17. Appropriate **Personal Protective Equipment** (PPE) will be used according to USCD EH&S Department guidelines see section 9 and **Personal Protective Equipment** in Appendix A.
18. Staff shall practice proper precautions for exposure to **Blood Borne Pathogens** as outlined by UCSD EH&S Department, see **Blood Borne Pathogens** in Appendix A.

In the event human body fluids require clean up due to an injury, only trained personnel are allowed to clean up spills with approved clean up kits. If no trained personnel are present, secure the area and notify the University EH&S department for instructions.

You are responsible for keeping your immediate work area clean and sanitary. If you become aware of needs beyond general housekeeping, report your concern to your supervisor.

All equipment and working surfaces must be cleaned and decontaminated using sanitizing cleanser after contact with blood or other potentially infectious materials.

If you get blood or other potentially infectious materials in your eyes, nose, mouth, or on broken skin:

- Immediately flood the exposed area with water and clean any wound with soap and water or a skin disinfectant if available.
- Report this immediately to your employer.
- Seek immediate medical attention and notify UCSD EH&S Biosafety at (858) 534-5366.

19. Gasoline shall not be used for cleaning purposes.

20. No burning, welding or other source of ignition shall be applied to any enclosed space, until it has first been determined that no possibility of explosion exists. Welding operations are performed outdoors by certified welders. Staff shall complete a Hot Work Permit Checklist prior to performing welding or burning operations. Staff welding certifications are kept on site with the Department Safety Coordinator in the North Trailer. See **Hot Work Permit Checklist** section 15.3 Appendix B as well as Fire/Life Safety in Appendix A.

21. **Storage of Flammable materials** is stored in Flammables Cabinets away from possible ignition sources and shall be in accordance with UCSD EH&S Department guidelines please see **Flammable Storage** in Appendix A.

22. **Compressed gasses** shall be shall be handled and stored properly with oxygen being stored a minimum of 20 feet away from fuel gas. Storage and handling of compressed gasses shall be practiced as outlined by UCSD EH&S Department, see **Compressed Gasses** in Appendix A.

23. Any damage to scaffolds, false-work, ladders, or supporting structures shall be immediately reported to the supervisor. Do not use damaged supporting structures. See **Ladders** in the **Tool Training** section 8.6.7 as well as **Elevated Work** in Appendix A.

Scaffolding use shall conform to CCR Title 8, Chapter 4, Subchapter 4. Construction Safety Orders Article 21, Scaffolds §1637. Scaffolding erection shall be performed by competent staff or authorized contractor.

A daily inspection of erected scaffolding shall be conducted by the site safety officer or other competent staff, records shall be kept on site with the safety officer in the North trailer.

See **Scaffold** in Tool Training section 8.6.8, and the **Daily Scaffold Inspection Checklist** section 15.14 in Appendix B, and California Code of Regulations, Title 8 for Scaffold standards at www.dir.ca.gov.

24. Ground straps must be applied to the receiving can for any transfer of flammable solvents into metal containers.
25. Maintain all work areas as clean and dry as possible. Wipe up spills promptly.
26. All **electrical** work must be performed in compliance with the Electrical Safety Orders, Title 8, California Code of Regulations and shall be conducted by competent electrician.
27. **Fall protection** shall be used in accordance with CCR Title 8, Chapter 4, Subchapter 4. Construction Safety Orders Article 24 Fall Protection. ESEC mandates the use of fall protection when working on surfaces above 6 feet and when using a Power work platform (manlift). Annual fall protection training is provided by the Department Safety Coordinator (or other competent staff) and recorded in Fall Protection training log held on site with the Site Safety Coordinator in the North trailer. See **Fall Protection Inspection Checklist** section 15.15.

5.2 Machinery and Vehicles

1. Only licensed authorized staff shall operate machinery or equipment. Operators are required to receive outside training and use appropriate PPE's
2. Lab staff is required to obtain a **forklift** operator's license prior to operating lift equipment. See **Forklift** section 5.3 for safe operating rules. (A copy of all issued licenses is kept on file with the Department Safety Coordinator in the North trailer).
3. Lab staff are the only operators approved for the use of overhead/mobile **crane** equipment. Staff is responsible for all rigging and lifting operations. Mobile crane operators shall be licensed to use, UCSD owned and maintained, Large Hydraulic mobile crane at Englekirk Center. Licensure shall be attained by the National Commission for the

Certification of Crane Operators and a copy shall be kept on site with the Department Safety Coordinator in the North trailer.

4. Mobile crane use shall be in compliance with OSHA Standards outlined in 29 CFR 1910.180.
5. **Powered Work Platforms** shall be in compliance with CAL/OSHA Title 8 Regulations Chapter 4, Subchapter 7, Article 24. A safety harness is required when operating the Power Work Platform. See **Powered Work Platforms** section 5.4 for Operating Conditions.
6. Employees operating UCSD vehicles are required to follow UCSD **Vehicle Driver Responsibilities** and all applicable California State Laws. Department vehicles will be maintained according to manufacturers' recommendations at the UCSD Fleet Services. See **Vehicle Driver Responsibilities** in Appendix A.
7. Loose or frayed clothing, long hair, dangling ties, loose jewelry, finger rings, etc., shall not be worn around moving machinery or other sources of entanglement.
8. Shields and work rests must be in place on all grinding wheels during use.
9. Machinery shall not be serviced, repaired or adjusted while in operation, nor shall lubricating of moving parts be attempted, except on equipment that is designed or fitted with safeguards to protect the person performing the work.
10. Lockout procedures shall be followed before repairing, adjusting or servicing equipment powered by hazardous energy sources.
11. Employees shall not work under vehicles supported by jacks or chain hoists without protective blocking that will prevent injury if jacks or hoists should fail.
12. Air hoses shall not be disconnected at compressors until the hose line has been bled.

5.3 Fork Lifts

Operation of forklifts and other powered industrial trucks is restricted to trained and licensed personnel.

A training program consists of the following elements and materials:

- a. Operating instructions, warnings and precautions for type of truck
- b. Similarities and differences to automobiles
- c. Control and instrumentation location and use
- d. Engine or motor operation
- e. Steering and maneuvering
- f. Visibility
- g. Fork and attachment limitations and use
- h. Vehicle capacity
- i. Vehicle stability
- j. Vehicle inspection and maintenance
- k. Refueling or charging batteries
- l. Operating limitations
- m. Other operating instructions, warnings or precautions listed in the operator's manual

Workplace-Related Topics

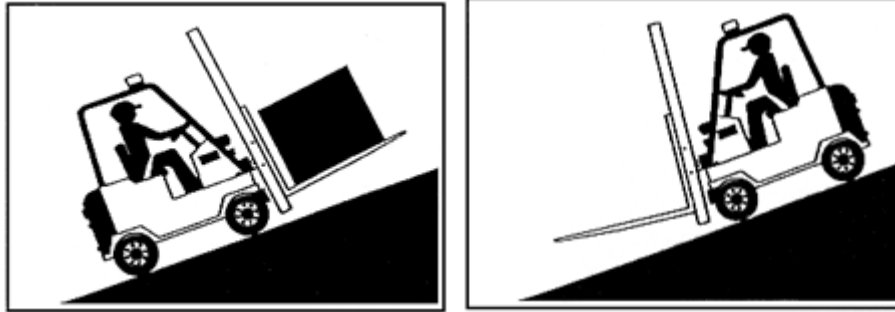
- n. Surface conditions where truck is used
- o. Load composition and stability
- p. Load stacking, unstacking and transport
- q. Pedestrian traffic
- r. Narrow aisle and restricted area operation
- s. Operation in hazardous locations
- t. Ramp and sloped surface operation
- u. Unique or potentially hazardous conditions
- v. Operating the vehicle in closed environments

Note: Because powered industrial trucks are manufactured by different companies with various models available, the training must be specific to the operating characteristics of the specific powered industrial truck the employee will be using.

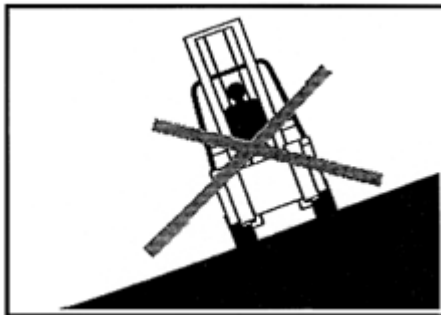
The following rules apply to all use of forklifts and other Powered Industrial Trucks (PITs) at the Lab:

- Do not operate any forklift or PIT unless you have operator training.
- Do not operate any forklift or PIT until a daily inspection has been performed.
- Estimate the weight of the rated load to assure that you do not exceed the rated load capacity of PITs.
- Always ensure the load is against the backrest.
- Follow all safety rules regarding speed, parking, loading, unloading, and moving loads. Operators should use extreme caution when operating on ramps, grades, or inclines.

- Always drive an unloaded forklift with the forks on the downhill side. Drive down forward and back up.



- Never turn a forklift sideways on a ramp.



- Check the floor loading limit before a PIT enters an area. The floor must safely support the forklift, the load, and all materials that are already in the area.
- Drive material-moving equipment forward going up a ramp and backward going down a ramp. **Note: Pallet jacks should not be used on ramps**, unless the load is securely strapped to the pallet **and** the pallet is strapped to the pallet jack platform.
- Never allow traffic or personnel to pass under a raised load, nor allow a load to pass over personnel or traffic.
- Do not allow passengers to be carried on any PIT unless it is specifically equipped by the manufacturer to carry passengers.
- Never leave an elevated load unattended. Lower the forks to the floor, set the brake, and turn off the PIT before leaving the PIT unattended.
- Keep traffic lanes and loading areas clear and appropriately marked.
- Store materials in work rooms or designated storage areas only. Do not use hallways, fan lofts, or boiler and equipment rooms as storage areas.

- Do not allow exits, passageways, or access to equipment to become obstructed by either stored materials or materials and equipment in use.
- Arrange stored materials safely to prevent tipping, falling, collapsing, rolling, spreading, or any other unsafe motion.
- Modifications of PITs and addition of equipment to PITs may only be performed by the PIT manufacturer or by qualified PIT mechanics with the approval of the manufacturer.
- Do not use front-end attachments other than factory-installed attachments; make sure that the truck is equipped with a plate that identifies the attachments, shows the approximate weight of the truck with attachments, and shows the lifting capacity of the truck with attachments at maximum lift elevation with the load laterally centered.
- All forklift trucks must carry fire extinguishers, usually 2-1/2lbs ABC, regardless of their location classification.
- Only trained operators shall replace LPG tanks on forklift trucks or charge batteries. Battery **changing** may be performed only by trained and authorized PIT service personnel

5.4 Powered Work Platforms

Powered work platforms have a telescoping or extensible boom with a personnel platform attached.

Operating Conditions

Extensible boom work platforms must be operated under the following conditions:

- Two operators must be present at all times. One operator must be present on the work platform and the other stationed on the ground to assist in the operation and perform any emergency duties.
- All operators and approved users are required to understand and know how to use the emergency auxiliary power and emergency 'come-down' procedures.
- All units must be inspected prior to each shift's use and must not be operated if found to be unsafe.
- All personnel occupying the work platform must wear an approved safety harness and lanyard properly attached to the equipment.

- Outriggers, if provided, must be used as recommended by the manufacturer.
- Unless recommended for such use by the manufacturer, no extensible boom work platforms are to be used on an inclined surface. No unit may be used on an incline over 5% or in winds over 25 mph.
- All units must have upper and lower control devices.
- Units equipped with outriggers must not be relocated while personnel are on the work platform in an elevated position and must not elevate personnel without the stability of outriggers.

Identification

The following must be displayed on all work platforms in a permanent manner:

- Special warnings, cautions, or restrictions necessary for safe operation.
- Make, model, and manufacturer's name and address.
- Rated work load capacity.
- Maximum platform height.
- Instructions to study operating manual.
- Chart, schematic, or scale showing capacities of all combinations in their operating positions and cautions or restrictions, or both, regarding operation of all alternate configurations or combinations of alternate configurations.

Inspections

- *Daily Inspection:* All units must be inspected prior to each shift's use. Inspections must include all items recommended by the manufacturer's manual.
- *Preventive Maintenance:* All units must receive preventive maintenance at intervals no longer than recommended in the manufacturer's manual.

6. Lockout/Blockout Policy

6.1 Purpose

This policy establishes specific written procedures for the protection of personnel from injury due to unexpected energizing of equipment during service, operation, and repair. This will be accomplished by isolating the energy source serving the equipment in question, and apply a lockout / blockout device to the equipment and/or energy isolating control device. Multiple energy sources will require isolation and lockout/ blockout of each source individually.

6.2 Scope

This policy applies to all operations and maintenance activities involving hazardous machinery and/or energy sources (electrical, hydraulic, pneumatic, mechanical, thermal, chemical, nuclear, etc.). In this context, hazardous implies the ability to kill or injure personnel in the affected area.

6.3 Responsibility

Supervisors will provide all necessary equipment for performing the operation or maintenance duties safely, as well as all safety locks, keys, tags, and training to ensure the safety of employees. Supervisors will survey all hazardous energy sources, and implement this procedure for lockout / blockout at each location. Supervisors will periodically inspect for compliance with this policy, enforce its provisions, and maintain the necessary documentation of training, lock issue, etc. Employees will be responsible for knowing and following the procedures contained in this policy.

ESEC staff are required to use a Key in/out log for any lockout procedures. Keys, locks, and log records are kept in a locked cabinet in the control room accessible by ESEC staff only.

6.4 Authorization

California Code of Regulations Title 8, Section 3314
Code of Federal Regulations Title 29, Section 1910.147

6.5 Procedures

1. Prior to performing maintenance or service on equipment energized by a hazardous energy source that can endanger personnel, the energy isolating mechanism or mechanisms must be identified. After turning off all operational controls, the energy source or sources must then be isolated (disengage power at a breaker or disconnect switch, close shut-off valve, etc.) by an authorized employee knowledgeable in the specific hazards of the equipment being serviced. Note: Push buttons, selector switches, and other control-circuit type devices are not energy isolating devices.
2. If a lock can be applied to the energy-isolating device in the closed position, the authorized employee who will perform the maintenance or be exposed to the danger must apply one. In addition, a sturdy, prominent tag that states "Danger – Do Not Operate" must also be applied to the energy-

- isolating device. The tag must also identify the department, employee, and date the lockout was initiated. If a lock cannot be applied, then the tag described above will suffice. However, take any other feasible precautions to afford protection that approaches lockout level. A second tag must also be applied to the equipment being serviced in a position that is immediately obvious to personnel who might attempt to operate the equipment.
3. Locks must be sturdy with individual keys. Sharing of keys is not allowed. A spare key is acceptable if stored in a supervisor's area for emergency use only. In addition, the locks must be conspicuous, easily recognized between all service personnel as lockout / blockout devices, and used for no other purpose.
 4. Any stored energy in the equipment being serviced must be safely discharged and all moving parts returned to a safe resting position. Use appropriate blocks if a hazard still exists from equipment cycling or gravity.
 5. Test the effectiveness of the lockout by attempting to operate the equipment while de-energized.
 6. After maintenance is complete, clear all personnel and tools from the hazardous area and verify that all operational controls are in the off position. The lock and/or tag on the energy-isolating device can then be removed, but **only by the employee who applied them**. For shift changes or other unique applications, adopt an official method for transferring responsibility for lock removal to the incoming employee.
 7. Engage energizing device or devices for normal operation.

6.6 Special Provisions

1. For complex systems, use a written checklist to ensure proper steps are taken for lockout, clearance, and startup. **ESEC does not have personnel shift changes or multi-departmental work being performed on our system and therefore does not operate a complex system.**
2. For work involving more than one employee, use a hasp or other device that can accept numerous locks – one from each individual performing work on the equipment. Energizing is not allowed until each employee removes his or her particular lock.
3. For work involving outside contractors working with UCSD employees, inform a responsible employee from each firm about this policy and require its application.
4. For equipment that must be serviced while energized, a written procedure must be adopted that affords effective protection to the personnel performing the work. Supervisors must supply any special tools required to ensure this protection.
5. The only exception to this policy is for equipment that has no stored energy, and can be de-energized from one point source that is under the direct control of the employee performing the repairs (i.e., an electrical cord that can be unplugged and kept at an employee's feet during repair).

Address questions about this policy to UCSD Environment, Health & Safety, General Safety Division, (858) 534-3660.

6.7 Lockout/Tagout for Hydraulic lines at ESEC

1. In the event that hydraulic hoses need to be disconnected, the main electrical source for the hydraulic pumps will be locked and tagged with appropriate person(s) signing tags. Additionally, inline valves may be closed, locked, and tagged with appropriate person(s) signing tags. Locks and keys will be signed out.
2. The person(s) signing Tags will be responsible for assuring the hydraulic hoses are reconnected and in working order before the locks and tags are removed.
3. A “Key-in/out” log will be maintained and kept in the control room.

7. Machine Shop and Tool Training

7.1 Introduction

- a. All employees will be provided with proper shop safety information such as tool training, personal protective equipment, etc. from lab personnel.
- b. Standard operating procedures for machine and equipment will be trained by competent laboratory personnel.
- c. All machine maintenance will be conducted by competent laboratory personnel.

7.2 Responsibilities

- a. If you don't know how to do something, ASK!
- b. Do not leave machines running unattended.
- c. Operators need to inspect their machines before using them to make sure all guards are in place, all emergency stop devices work properly, and the machine is in generally safe condition.
- d. Do not slow down the machines by touching it.

7.3 Personal Protective Equipment

- a. All personnel must wear safety glasses when operating machines.
- b. Hearing protection (ear muffs or ear plugs) is available.

7.4 Clothes and Hair

- a. Anyone with long hair or a long beard, tie it up before operating machinery.
- b. No loose clothing, ties, scarves, etc. when working the shop area.
- c. Loose jewelry must be removed before operating machinery.

7.5 Controls

a. All machine guards must be installed and functioning properly.

8. Use of Tools and Equipment

8.1 Purpose

The purpose of tool training is to instruct staff in the safe use of shop tools, identify hazards of specific tools, and create safety awareness during tool use.

8.2 Training Records

The Department Safety Coordinator at Englekirk Center will keep and maintain training records for all employees who use shop tools, located in the North Trailer.

8.3 Common Sense of Tool Use

In all aspects of work employees should practice common sense, perhaps more so when hand and power tools are involved.

Common sense on the job is irreplaceable.

Points to Consider

- Always wear the proper personal protective equipment.
- Don't over exert yourself – get help with heavy tasks.
- Don't over extend yourself when on ladders – and risk losing your balance.
- Always use the proper tool for the job.
- Concentrate on your work.
- Look for unsafe acts or unsafe working conditions – and then report them.
- Watch out for others – remember you are part of a team.
- Ask the following questions before you begin to work:
 - Are the conditions safe to do the work?
 - Are the methods we are going to use safe?
 - Does everyone know what to do?
 - Does everyone know how to do it?
 - Can I fall, get struck by, get caught between or under, or get electrocuted on this job?

8.4 The Right Tool for the Right Job

One way to get injured on the job is using the wrong tool for the job. Two important points to remember when using hand tools is the selection of the tool for the job and the use of the tool for the job.

Some key points to remember:

- *Misuse Resulting From:*
 - Ignorance.
 - Poor attitudes.
 - Production demands.
- *General Points:*
 - Keep your tools clean and in good condition.

- Choose the right tool for a specific job.
- Never use a tool not designed for the job you are doing.
- Never carry tools in your pockets.
- When chipping or cutting, wear eye protection.
- Be wary of the effect of your actions on others nearby workers.
- Use a pulling motion to operate hand tools rather than a pushing method.
- Never leave hand tools in areas where they may be kicked off onto lower levels or where they may be a tripping hazard.
- Never improvise.
- Don't adapt or use "cheaters."
- Never remove an electrical cord by jerking it; pull it away from power by the plug.
- Always be sure that power tools are electrically safe

8.5 Hand Tools

All too frequently, hand tools are used improperly or when they are defective. Since we use hand tools continually, it is important they be used properly.

General Hand Tool Rules

- Always use the right tool for the right job.
- Use only tools in good condition.
- Keep tools sharpened.
- Store tools properly.
- When chipping, always wear safety glasses.
- Never throw tools to co-workers.
- Never use a tool in such a way that you will be injured if it slips.

8.6 Hand Tool Training

8.6.1 Screwdrivers

The screwdriver is one of the most commonly misused hand tools. While it is designed to tighten or loosen screws, you can also find it being used as a pry bar, punch or chisel. When that happens, the screwdriver can slip. When it slips, it can cause an injury or ruins the tool.

Proper Care

- The handle should be tight, smooth and not slippery.
- The shank should be true and straight.
- The bit should be flat, with the end at a right angle with the shank.
- Keep the bit square edged.
- When sharpening, be use not to remove the bit temper.
- Keep the bit and handle clear and free of grease and oil.

Proper Use

- Always use the proper size bit to fit the screw head.
- Keep the bit square to the screw head.
- Never use pliers on a screwdriver; if possible, use a vise.
- Never use as a pry, chisel, punch or lever.
- Use only a standard screwdriver on a standard screw; Phillips head on a Phillips head screw.
- Select the right length for the job; don't try to improvise.
- Always use a screwdriver with an insulated handle for electrical work.

8.6.2 Wrenches

Proper Care

- Inspect on a regular basis
- Replace sprung jaws, cages and faces
- Replace all bent handles
- Keep the jaws sharp
- Keep the wrench clean and free of grease and oil.

Proper Use

- Always use the proper size wrench for the job.
- Never use a shim to make a wrong size wrench fit a nut.
- Never use a piece of pipe on the handle to increase your leverage. (Slip hazard.)
- Don't use a wrench as a substitute for a hammer.
- Don't pound on a wrench to try to loosen a frozen bolt. Use penetrating oil.
- Always pull a wrench toward you—never push away. (Slip hazard.)
- See that the wrench jaws are sharp and can bite the nut.

8.6.3 Hammers/Chisels

One of the most common causes of hand injuries is from the improper use of hammers and chisels. Both are responsible for a high number of eye injuries as a result of flying nails, metal or concrete chips.

Chisel Use

- Never use a chisel with a mushroomed head.
- Always wear eye protection.
- Hold the chisel between the thumb and forefingers – don't make a fist around the chisel.
- Do not grip a chisel if your hands are numb.
- If another worker is nearby, place yourself between the other worker and the chipping area.
- Always use sharp chisels.

Hammer Use

- Use the right type of hammer for the job.
- Only use hammers in good condition.
- Use only hammers to drive objects.
- Always grip the hammer close to the end and grip it tightly.
- Whenever possible, wear eye protection, and ear protection.
- Always concentrate on the striking point.
- Strike blows as squarely as possible.
- Be sure there is an unobstructed back swing.
- Don't strike blows with the side of the hammer.
- Never strike a hammer or tempered tool with another hammer.
- Always keep your hammer free of grease and oil.
- Never allow someone else to hold a nail or chisel while striking it.

8.6.4 Nails

You would think that nails are not a very important subject. However, many minor injuries on the job are a result of punctures, scrapes, and cuts resulting from nails that were not properly removed from lumber and other debris.

Driving Nails:

- Be sure your hammer is in good condition.
- Always hit the nail squarely, especially on the first blow.
- Always hit with the blow's 90 degrees to the nail head.
- Make sure the back swing is unobstructed; claws can hurt.
- Be consistent—"groove" your swing.
- Concentrate on the head of the nail.

Pulling Nails:

- Always pull or bend nails when stripping.
- Use the right pulling device for the job.
- If needed, use a block of wood as a fulcrum. It will make the job much easier.
- Keep scrap materials in neat piles and out of walkways.

8.6.5 Come-a-Long

Come-a-Long is a common name for a ratcheting cable winch, used to pull or hoist heavy objects.

Proper Care

- The cables should be free of kinks and frays, remove from service if cable is frayed.

Proper Use

- Be sure you use within rated load.
- Be sure to secure the ends to something which will also carry the intended load.

8.6.6 Hammer/Smack-Wrench/Striking-Wrench

A hammer-wrench or smack-wrench is a wrench that is designed to be hit by a mallet or sledgehammer to achieve greater clamping force than a hand wrench would provide.

Proper Use

- Be sure you have the right size wrench.
- Assure no one or thing will be in your swing radius, especially if you miss with the hammer.
- Always wear safety glasses and ear protection.

8.6.7 Ladders

Injuries in the workplace because of ladder are commonplace. Falls from ladders can be as painful as a fall from a roof; about a third of all reported falls are falls from ladders. (*) Many of the fall related injuries result from the improper use or the use of a defective ladder.

Step/extension ladders are made to access/egress upper levels, not to be used as work platforms. The following safe work rules should be observed when working with ladders.

(*) 1993-94 Study: 238 of 705 falls based on an OSHA study.

Inspection

- Look for missing or loose cleats at the bottom.
- Look for loose or missing screws, bolts or nails on job made ladders
- Look for cracked, broken, split, dented or badly worn rungs, cleats or side rails.
- Splinters on wood ladders.
- Corrosion on metal ladders.

Proper Ladder Use

- Always use the right ladder for the right job.
- Don't set your ladder in a walkway or door opening.
- Keep the area at the top and bottom of the ladder clear of tool cords, tools, material and garbage.
- Always set the ladder on solid footing.
- Use a twenty-five percent (25%) angle on the slope of the ladder.
- When using extension ladders, the three (3) top rungs must extend beyond the landing platform. (Or the top of an extension ladder must be 36" (3 feet) above the landing.

- Don't lean to the side when on a ladder or you may tip over.
- Do not carry tools or materials on a ladder. Use both hands when climbing a ladder to grab onto the side rails. If it is necessary to move material or tools up a ladder, first climb up, then pull up the work with a hand line.
- Only one person on a ladder at a time (*unless the ladder is double cleated*).
- Always secure the top of the ladder to prevent it from sliding.
- Never lean a step ladder; always fully open a step ladder.
- Always face the ladder.
- Always tie off the ladder; that way it stays where you put it.

8.6.8 Scaffolds

Scaffolds allow for greater personnel mobility than ladders. They provide access to materials and tools directly where the work is being performed.

A **Daily Stationary Scaffold Inspection Checklist** is required before using erected scaffolding; see **Daily Stationary Scaffold Inspection Checklist** section 15.14 in Appendix B.

Safe Use

- Follow the manufacturer's instructions when erecting the scaffold.
- Do not work on scaffolds outside during stormy or windy weather.
- Do not climb on scaffolds that wobble or lean to one side.
- Initially inspect the scaffold prior to mounting it. Do not use a scaffold if any pulley, block, hook or fitting is visibly worn, cracked, rusted or otherwise damaged.
- Do not use any scaffold tagged "Out of Service".
- Do not use unstable objects such as barrels, boxes, loose brick or concrete blocks to support scaffolds or planks.
- Do not work on platforms or scaffolds unless they are fully planked.
- Do not use a scaffold unless guardrails and all flooring are in place.
- Level the scaffold after each move. Do not extend adjusting leg screws more than 12 inches.
- Do not walk or work beneath a scaffold unless a wire mesh has been installed between the midrail and the toeboard or planking.
- Use your safety belts and lanyards when working on scaffolding at a height of 10 feet or more above ground level. Attach the lanyard to a secure member of the scaffold.
- Do not climb the cross braces for access to the scaffold. Use the ladder.
- Do not jump from, to, or between scaffolding.
- Do not slide down cables, ropes or guys used for bracing.
- Keep both feet on the decking. Do not sit or climb on the guardrails.
- Do not lean out from the scaffold. Do not rock the scaffold.

- Keep the scaffold free of scraps, loose tools, tangled lines and other obstructions.
- Do not throw anything "overboard" unless a spotter is available. Use the debris chutes or lower things by hoist or by hand.
- Do not move a mobile scaffold if anyone is on the scaffold.
- Chock the wheels of the rolling scaffold, using the wheel blocks, and also lock the wheels by using your foot to depress the wheel-lock, before using the scaffold.

8.7 Electric Power Tools

Electric power tools come in all shapes and sizes and are designed to do almost anything. The following rules should be remembered when using electrical power tools:

Inspect for the following:

- Be sure the cord is properly grounded and double insulated
- Broken or defective cords
- Defective terminal connections
- Defective plugs
- Defective or loose switches
- Brushes that spark excessively
- Never use a tool unless the guards are in place and in working order.

Before using the tool:

- Remove the chuck or adjusting key
- Firmly secure the work
- Be sure you have firm footing

Always use proper personal protective equipment and remove dangerous items:

- Do NOT wear gloves when operating machinery with rotating parts.
- Always wear safety glasses or goggles
- Do not wear loose clothing/jewelry
- Never adjust the tool when it is plugged in.
- Disconnect the tool when finished or when not using.
- Maintain good housekeeping.
- Avoid working in wet areas whenever possible. When you do, wear insulating materials such as rubber gloves or a rubber vest.

8.7.1 Electric Extension Cords

Extension cords need to be continuous with double insulation.

Inspect for the following:

- Broken or defective cords
- Defective terminal connections

- Defective plugs
- Spliced or taped cuts in any part of the insulation
- **If any defects are found; remove from service.**

8.7.2 Table, Radial, and Miter Saw

We all recognize how important our hands are to our employability. Table, Radial, and Miter saws are the surest and cleanest way to lose a finger or a hand. Much of this is a result of getting used to operating a saw and then losing respect for it. That is why it is so important that we review the common safety rules pertaining to the operation of a stationary saw.

Two common types of saws: Table saw; radial arm /miter saw.

General Operating Rules:

- Never operate without all guards in place, especially the blade guard, fence & miter guard.
- Be sure you stand in the correct position—always allow for kick back.
- Maintain good footing.
- Never allow other workers to work or rest when they are exposed to kick back.
- Maintain good housekeeping in the saw area.
- Never use your hands to run lumber through the blade or to clean off sawdust. Get a push-stick and a brush.
- Do NOT wear gloves when operating saws, the blade may grab the glove and pull your hand into the blades cutting radius.
- Never use a saw with a dull blade. (Note: When you go to change a blade, make sure the power is disconnected and you control the switch.)
- Don't crowd (i.e., pinch) a blade especially when cross-cutting.
- Don't wear loose clothing around a saw.
- Always wear eye protection.
- Be wary of warped lumber.
- Look for nails, screws or other contaminants if re-using wood.
- Be wary of "fly back" (also called kick back) when ripping.
- Keep the blade set so it just barely makes the desired cut.
- Keep your material supported, plan ahead for the support of the cut pieces.

Saw Blade Rules

- Always keep the blade sharp.
- Use the right blade for the materials being cut.
- Never change blades while the saw is plugged in.

8.7.3 Stationary Sander

The stationary sander is used to grind or sand wood and metal. It has a belt sander as well as a disc sander; each grinding surface is capable of pulling your work into itself if you are not careful. Each grinding surface is also capable of pulling *you* into the grinding surface if you are not careful.

General Safety Rules

- Do not wear gloves when operating rotating machinery.
- When grinding steel keep clear any flammable material such as solvents, paper, and rags; the sander does produce sparks which could easily start a fire.
- Use only grounded or double-insulated tools.
- Use only extension cords that are in good condition.
- Make sure there is an assured grounding program or ground fault interrupter (GFI) being used.
- Make sure all work areas are as dry as possible.
- Never do maintenance work on the sander while it is plugged in.
- Always remain alert.

Guard Rules

- Make sure all guards are operable before use.

8.7.4 Abrasive Saw

An abrasive saw is primarily used in cutting ferrous and non-ferrous metals. Special precautions are needed when cutting metal versus wood.

General Safety Rules

- Use only grounded or double-insulated tools.
- Use only extension cords that are in good condition.
- Make sure there is an assured grounding program or ground fault interrupter (GFI) being used.
- Make sure all work areas are as dry as possible.
- Never do maintenance work on the saw while it is plugged in.
- Make sure your material is clamped and supported at both ends to prevent kick up if a cut piece should fall.
- Always remain alert.
- Do NOT use the side of the blade as a grinder.
- Check the blade for damage prior to use.
- Keep clear any flammable material such as solvents, paper, and rags; the saw does produce sparks which may easily start a fire.

Guard Rules

- Make sure all guards are operable before use.
- Do not use the saw if it has a defective guard.
- Never block any of the guards open.

8.7.5 Stationary Grinder

The stationary grinder is used to grind metal. It has a turning wheel capable of pulling you and/or your work piece into itself. Damaged grinder wheels may shatter and cause serious injury

General Safety Rules

- Wear Safety glasses.
- Do not wear gloves when operating rotating machinery.
- Do not use the side of the grinder wheel; it is not designed for this purpose.
- Keep clear any flammable material such as solvents, paper, and rags; the grinder does produce sparks which may easily start a fire.
- Use only grounded or double-insulated tools.
- Make sure there is an assured grounding program or ground fault interrupter (GFI) being used.
- Make sure all work areas are as dry as possible.
- Never do maintenance work on the saw while it is plugged in.
- Always remain alert.

Guard Rules

- Make sure all guards are operable before use.
- The proper spacing of the tool rest shall not exceed 1/8 inch, and the spacing of the tongue guard shall not exceed 1/4 inch.
- There shall not be any alterations made to manufacturers' guards which would result in less protection or malfunction.

8.7.5.1 Changing/Facing Grinder Wheel

Changing the wheel

- Be sure to unplug the machine when changing the grinder wheel.
- Immediately before mounting the wheel, inspect for damage and PERFORM A RING TEST on the wheel.

Steps to perform a ring test:

1. Visually inspect wheel for damage
 2. Hold wheel by the arbor and lightly tap side of wheel with non-metallic object, such as a screwdriver handle. You should hear a "ringing" sound if the wheel is *not* cracked or damaged.
-If you hear a dead sound the *wheel should not be used.*
- Check spindle speed before mounting wheel to be certain it does not exceed maximum operating speed marked on wheel.

Facing the wheel

Use the facing tool to even the grinding surface to eliminate grooves which would increase the allowable gap of the tool rest.

8.7.6 14" Band Saw

Band saws may be used to cut wood or metals; however you need to be sure of the type of blade installed *before* you make a cut.

General Safety Rules

- Wear Safety glasses.
- Do not wear gloves when operating rotating machinery.
- Use only grounded or double-insulated tools.
- Use only extension cords that are in good condition.
- Make sure there is an assured grounding program or ground fault interrupter (GFI) being used.
- Make sure all work areas are as dry as possible.
- Never do maintenance work on the saw while it is plugged in.
- Always remain alert.

Guard Rules

- Make sure all guards are operable before use.
- Do not use the saw if it has a defective guard.
- Never block any of the guards open.
- Drive wheels shall be fully encased.
- All portions of the blade shall be fully enclosed, except for the working portion between the blade guides and the table.

8.7.7 Drill Press

A drill press makes drilling much easier, especially in metal. It is also a powerful piece of machinery that requires extra care when operating.

General Safety Rules

- Always wear safety goggles or safety glasses with side shields complying with current national standard, and a full face shield when needed.
- Wear hearing protection during extended periods of operation.
- Do not wear gloves, loose clothing, jewelry or any dangling objects that may catch in rotating parts or accessories. Tie back long hair.
- Remove material or debris from the area that might be ignited by hot chips.
- Make certain the chuck key is removed before starting the tool. The key can be thrown at high velocity if not removed. (i.e. always remove and stow "chuck-key")
- Be sure belt guards are installed and functioning properly.

- Never hold the work-piece by hand. To prevent the work-piece and backup material from spinning, set them against the left side of the drill support column. Secure the work-piece with a clamp or the appropriate fixture if it is too short to reach the column.
- Carefully set the drill press speed appropriate for both the type of material and bit size you are using.

Operating Safety Rules

- Do not touch the bit or chips. Drill bits and cuttings are hot immediately after drilling.
- If something goes wrong, never attempt to correct a problem with the drill operating. Shut it off and unplug it if possible.
- Never reach around or under the working head, or grab the chuck to stop a drill press. This can result in hand puncture or other serious injury.
- Always shut off, unplug if possible, and lock the press if a lock is available, and store the key.
- Use a vacuum, brush or rake to remove cuttings.
- Remove burrs and chips from a drilled hole. When making deep holes, clean out the hole frequently.
- Lubricate drill bit when drilling metal.
- Reduce the drilling pressure when the drill begins to break through the workpiece. This action prevents drill from pulling into the work and breaking.
- Keep drill bits clean and sharp. Dull drills are a common cause of breakage.
- Keep floor around the drill press free of oil and grease.
- Keep the working surface clean of scraps, tools and materials.
- Keep guards in place and in good working order.

8.7.8 Portable Electric Tools

The use of portable electric power tools is one of the most common occurrences on a construction project today. It is important to remember that electricity always seeks a path of least resistance and often that is through a defective cord into the worker's body. This is especially true if the worker is exposed to wet weather or has been sweating.

The following safety rules discuss the safe use of portable electric tools:

- Use only equipment that is in good condition.
- Be sure the tool is properly grounded.
- Always report the following:
 - Defective or broken cords;
 - Bad connections to power terminals;
 - Defective or broken plugs;

- Defective or loose switches;
- Brushes causing sparks.
- Never overstrain the tool thus overloading the motor.
- Never use an un-insulated tool without a grounding plug.
- Avoid working in wet areas unless a ground fault interrupter circuit is used.
- Never use a tool in the presence of flammable vapors or gases unless it is designed for such use.

8.7.9 Circular Saw

The circular saw is one of the most common power tools found in residential construction. It is also one of the most abused being tossed around, kicked out of the way, but depended on to get the job done.

General Safety Rules

- Use only grounded or double-insulated tools.
- Use only extension cords that are in good condition.
- Make sure there is an assured grounding program or ground fault interrupter (GFI) being used. (See Electrical section for more information.)
- Make sure all work areas are as dry as possible.
- Never do maintenance work on the saw while it is plugged in.
- Never ever use your leg as a sawhorse.
- Always remain alert.

Guard Rules

- Make sure all guards are operable before use.
- Do not use the saw if it has a defective guard.
- Never block any of the guards open.
- Always check before setting the saw down to be sure that the blade guard does not jam open.

Saw Blade Rules

- Always keep the blade sharp. Dull blades cause binding, stalling and possible kickback. Dull blades also waste power and reduce motor and switch life.
- Use the right blade for the materials being cut. Check this carefully: Does it have the proper size and shape arbor hole? Is the speed marked on the blade at least as high as the no load RPM on the saw's nameplate?
- Never change blades while the saw is plugged in.

Operating Safety Rules

- Before starting a circular saw be sure the power cord and extension cord are out of the blade path and are sufficiently long to freely complete the cut. A sudden jerk or pulling on the cord can cause loss of control of the saw and a serious accident.
- For maximum control, hold the saw firmly with both hands after securing the work-piece. Clamp work-pieces. Check frequently to be sure clamps remain secure.
- Never hold a work-piece in your hand or across your leg when sawing.
- Avoid cutting small pieces of material that can't be properly secured, and material on which the base of the saw (shoe) cannot properly rest.
- When making a "blind" cut (you can't see behind what is being cut), be sure that hidden electrical wiring, water pipes or any mechanical hazards are not in the blade path. If wires are present, they must be disconnected at the power source by a qualified person or avoided. Contact with live wires could cause lethal shock or fire. Water pipes should be drained and capped. Always hold the tool by the insulated grasping surfaces.
- Set blade depth to no more than 1/8 in. to 1/4 in. greater than the ¼ in. thickness of the material being cut.
- When you start your saw allow the blade to reach full speed before the work-piece is contacted.
- Be alert to the possibility of the blade binding and kickback occurring, (see "Preventing Portable Circular Saw Kickback").
- If a fence or guard board is used, be certain the blade is kept parallel with it.
- NEVER overreach!
- Crowded, cluttered conditions that can cause tripping or loss of balance are particularly dangerous.
- When making a partial cut, or if power is interrupted, release the trigger immediately and don't remove the saw until the blade has come to a complete stop.
- Never reach under the saw or workpiece.
- Portable circular saws are not designed for cutting logs, or roots, trimming trees or shrubs. These are very hazardous practices.
- Switch the tool off after a cut is completed, and keep the saw away from your body until the blade stops.
- Unplug, clean and store the tool in a safe, dry place after use.

8.7.9.1 Preventing Saw Kickback

Kickback is a sudden reaction to a pinched blade, causing an uncontrolled portable tool to lift up and out of the workpiece toward the operator. Kickback is the result of tool misuse and/or incorrect operating procedures or conditions.

Take these specific precautions to help prevent kickback when using any type of circular saw:

- Keep saw blades sharp. A sharp blade will tend to cut its way out of a pinching condition.
- Make sure the blade has adequate set in the teeth. Tooth set provides clearance between the sides of the blade and the work-piece, thus minimizing the probability of binding. Some saw blades have hollow groundsides instead of tooth set to provide clearance.
- Keep saw blades clean. A buildup of pitch or sap on the surface of the saw blade increases the thickness of the blade and also increases the friction on the blade surface. These conditions cause an increase in the likelihood of a kickback.
- Be very cautious of wood stock that is pitchy, knotty or warped. These are most likely to create pinching conditions and possible kickback.
- Always hold the saw firmly with both hands.
- Release the switch immediately if the blade binds or the saw stalls.
- Support large panels so they will not pinch the blade. Use a straight edge as a guide for ripping.
- Never remove the saw from a cut while the blade is rotating.
- Never use a bent, broken or warped saw blade. The probability of binding and resultant kickback is greatly increased by these conditions.
- Overheating a saw blade can cause it to warp and result in a kickback. Buildup of sap on the blades, insufficient set, dullness, and unguided cuts, can all cause an over heated blade and kickback.
- Never set a blade deeper than is required to cut the work-piece 1/8 in. to 1/4 in. greater than the ¼ckness of the stock is sufficient. This minimizes the amount of saw blade surface exposed and reduces the probability and severity if any kickback does occur.
- Minimize blade pinching by placing the saw shoe on the clamped, supported portion of the work-piece and allowing the cut off piece to fall away freely.

8.7.10 Reciprocating Saw

The versatility of the reciprocating saw, in cutting metal, pipe, wood and other materials have made it a widely used tool. By design, it is a simple tool to handle. Its few demands for safe use, however, are very important.

General Safety Rules

- Blades can break. Always wear safety goggles or safety glasses with side shields complying with current national standard, and a

full-face shield when needed. Use a dust mask in dusty work conditions. Wear hearing protection during extended periods of operation.

- Do not wear loose clothing, jewelry or any dangling objects that may catch in moving parts or accessories. Tie back long hair.
- Use sharp blades. Dull blades can produce excessive heat, make sawing difficult, result in forcing the tool, and possibly cause an accident.

Operating Safety Rules

- Without exception, use the blade specifically recommended for the job being done. Check your owner/operators manual carefully concerning this.
- Position yourself to maintain full control of the tool, and avoid cutting above shoulder height.
- To minimize blade flexing and provide a smooth cut, use the shortest blade that will do the job.
- The work-piece must be clamped securely, and the shoe of the saw held firmly against the work to prevent operator injury and blade breakage.
- When plunge cutting, use a blade designed for that purpose. Maintain firm contact between the saw's shoe and the material being cut.
- When making a "blind" cut (you can't see behind what is being cut), be sure that hidden electrical wiring, or water pipes are not in the path of the cut. If wires are present, they must be disconnected at their power source by a qualified person or avoided, to prevent the possibility of lethal shock or fire. Water pipes must be drained and capped.
- Always hold the tool by the insulated gripping surfaces.
- When making anything other than a through cut, allow the tool to come to a complete stop before removing the blade from the work-piece. This prevents breakage of the blade, and possible loss of tool control.
- Remember that the blade and blade clamp may be hot immediately after cutting. Avoid contact until they have cooled.

You expose yourself to unnecessary hazards if these or any manufacturers' instructions are not followed.

8.7.11 Jig Saw

Portable jig/saber saws are light weight and generally easy to handle. For this reason, carelessness can easily enter the picture.

General Safety Rules

- Always wear safety goggles or safety glasses with side shields complying with current national standard, and a full-face shield when needed. Use a dust mask in dusty work conditions. Wear hearing protection during extended periods of operation.
- Do not wear loose clothing, jewelry or any dangling objects that may catch in moving parts or accessories. Tie back long hair.
- The tool should be unplugged before checking or installing blades or accessories.

Operating Safety Rules

- Check carefully that the blades are adequately secured in position before plugging in. Make sure the cord is out of your way and not in the line of cut.
- Firmly position the tool's base plate/shoe on the workpiece before turning on the tool.
- Keep your hands and fingers well clear of moving parts.
- After making partial cuts, turn the tool off and remove the blade from the workpiece only after the blade has fully stopped.
- Know what is behind a cut before you make it. Be sure that hidden electrical wiring, water pipes, hazardous objects of any kind are not in the path of the cut. If wires are present, they must be disconnected by a qualified person at their power source to prevent the possibility of lethal shock. Water pipes must be drained and capped. Always hold the tool by the insulated grasping surfaces.
- When plunge (pocket) cutting, use a blade designed for that purpose and follow the manufacturer's recommended procedures.
- Maintain firm contact between the base and the material being cut, throughout cutting procedures.
- Remember that the blade and blade clamp may be hot immediately after cutting. Keep your hands away until cooled down.
- Never overreach. It can be hazardous with small tools.
- Do not leave saws unattended — unplug and secure the tool immediately after use. It is the type of tool that children can readily pick up and cause injury.

8.7.12 Portable Band Saw

The portable band saw is used to cut various metals though its capacities are limited. Be sure you can complete the cut before you begin.

General Safety Rules

- Use only blades that are 1,140 mm (44-7/8") long; 13 mm (1/2") wide; and 0.5 mm (0.020") thick.
- Check the blade carefully for cracks or damage before operation. Replace cracked or damaged blade immediately.

- Secure the work-piece firmly. When cutting a bundle of work-pieces, be sure that all the work-pieces are secured together firmly before cutting.
- Cutting work-pieces covered with oil can cause the blade to come off unexpectedly. Wipe off all excess oil from work-pieces before cutting.
- Never use cutting oil as a cutting lubricant, Use only Makita cutting wax.
- Do not wear gloves during operation.
- Hold the tool firmly with both hands.
- When cutting metal, be cautious of hot flying chips.
- Do not leave the tool running unattended.
- Do not touch the blade of the work-piece immediately after operation; they may be extremely hot and could burn your skin.

Installing or Removing Blade

- Always be sure that the tool is switched off and unplugged before installing or removing the blade.
- Oil on the blade can cause the blade to slip or come off unexpectedly. Wipe off all excess oil with a cloth before installing the blade.
- Use caution when handling the blades so that the sharp teeth do not cut you.
- Insert the blade between the bearings of one blade guide first and then into the other blade guide. The blade back should contact the bearings in the lower portion of the blade guides.
- Position the blade around the wheels and insert the other side of the blade within the blade guard until the blade back contacts the bottom of the blade guard.
- Hold the blade in place and turn the blade-tightening lever counterclockwise until it hits against the protrusion on the frame. This places proper tension on the blade. Make sure that the blade is correctly positioned within the blade guard and around the wheels.
- Start and stop the tool two or three times to make sure that the blade runs properly on the wheels.
- CAUTION: While making sure the blade runs on the wheels properly, keep your body away from the blade area.
- To remove the blade, follow the installation procedures in reverse.
- CAUTION: When turning the blade-tightening lever clockwise to release the tension on the blade, the blade may come off unexpectedly. Be careful.

Operating Safety Rules

- CAUTION: Never use cutting oil or apply excessive amount of wax to the blade. It may cause the blade to slip or come off unexpectedly.
- When cutting cast iron, do not use any cutting lubricant.
- It is important to keep at least two teeth in the cut.
- Turn the tool on and wait until the blade attains full speed. Gently lower blade into the cut. The weight of the tool or slightly pressing the tool down will supply adequate pressure for the cutting. Do not force the tool.
- As you reach the end of a cut, release pressure and, without actually raising the tool, lift it slightly so that it will not fall against the work-piece.
- CAUTION: Applying excessive pressure to the tool or twisting the tool may cause bevel cutting or damage the blade.

8.7.13 Percussion Tools

Hammers, Rotary Hammer and Hammer Drills: This family of tools is primarily associated with masonry applications as varied as chipping, drilling, anchor setting and breaking of pavement. They range from pistol grip types to large demolition hammers.

General Safety Rules

- Normal operating modes include hammering, hammering with rotary motion and rotation or drilling only. Many models incorporate a varied combination of the above modes.
- Capacity is normally rated in maximum diameter displayed on the nameplate. Do not attempt to use a bit larger than that which is specified unless otherwise recommended in the owner/operators manual.
- Before operating, compare the date on the nameplate with the voltage source and be sure that the voltage and frequency are compatible.
- Always wear safety goggles or safety glasses with side shields complying with current national standard, and a full-face shield when needed. Use a dust mask in dusty work conditions. Wear hearing protection during extended periods of operation.
- Do not wear gloves, loose clothing, jewelry or any dangling objects that may catch in rotating parts or accessories. Tie back long hair.

Operating Safety Rules

- For maximum control and to resist torque caused by unexpected stalls, use the auxiliary handles provided with the tool.
- Do not tamper with clutches on those models that provide them. Have the clutch settings checked at the manufacturer's service facility at the intervals recommended in the owner/operators manual.

- Check for subsurface hazards such as electrical conductors or water lines before drilling or breaking blindly into a surface. If wires are present, they must be disconnected at the power source by a qualified person, or be certain they are avoided to prevent the possibility of lethal shock or fire. Water pipes must be drained and capped. Always hold the tool by the insulated grasping surfaces.
- Do not force the tool. Percussion tools are designed to hit with a predetermined force. Added pressure by the operator only causes operator fatigue, excessive bit wear and reduced control.
- Keep the operators work area clear of debris.
- Always provide firm footing.

8.7.14 Portable Drill

Available in a wide variety of types and capacities, portable power drills are undoubtedly the most used power tools in the world. Because of their handiness and application to a very wide range of jobs, drills often receive very heavy usage. For this reason your safety demands that you carefully check capacity limitations and accessory recommendations of your drill. See the owner/operators manual.

General Safety Rules

- Be sure the trigger switch actuates properly. It should turn the tool “on” and return to the “off” position after release.
- If equipped with a lock-on, be sure it releases freely.
- Check carefully for loose power cord connections and frays or damage to the cord. Replace damaged tool and extension cords immediately.
- Be sure the chuck is tightly secured to the spindle. This is especially important on reversible type drills.
- Tighten the drill bit securely as prescribed by the owner/operators manual. The chuck key must be removed from the chuck before starting the drill. A flying key can be an injury inflicting missile.
- Check auxiliary handles, if part of the tool. Be sure they are securely installed. Always use the auxiliary drill handle when provided. It gives you more control of the drill, especially if stalled conditions occur. Grasp the drill firmly by insulated surfaces.
- Always wear safety goggles or safety glasses with side shields complying with current national standard, and a full face shield when needed. Use a dust mask in dusty work conditions. Wear hearing protection during extended periods of operation.
- Do not wear gloves, loose clothing, jewelry or any dangling objects that may catch in rotating parts or accessories. Tie back long hair.

Operating Safety Rules

- Always hold or brace the tool securely. Brace against stationary objects for maximum control. If drilling in a clockwise (forward) direction, brace the drill to prevent a counter clockwise reaction.
- Don't force a drill — apply enough pressure to keep the drill bit cutting smoothly. If the drill slows down, relieve the pressure. Forcing the drill can cause the motor to overheat, damage the bit, and reduce operator control.
- If the drill binds in the work, release the trigger immediately—unplug the drill from the power source, and then remove the bit from the workpiece. If you suspect that the drill operation you are performing can potentially bind, then under no circumstances should you actuate any switch “lock-on” that may be available to you.
- Never attempt to free a jammed bit by starting and stopping the drill. As you approach hole-breakthrough, grip or brace the drill firmly, reduce pressure and allow the bit to pass through the hold easily.
- Always have firm footing when drilling. Brace or position yourself very carefully when working on ladders and scaffolding. Be sure of your balance and control before you start the job.
- Unplug the tool before changing bits, accessories or attachments.
- And remember — when drilling blindly (you can't see behind what is being cut), check carefully for possible electrical wiring or pipes in your path. If wires are present, they must be disconnected at their power source by a qualified person or avoided to prevent possibility of lethal shock. Water pipes must be avoided or always capped. Always hold the tool by the insulated grasping surfaces, if provided.
- Remove materials or debris from the area that might be ignited by hot chips.

8.7.15 Pneumatic Nail Gun

The most popular nailing device used in light and heavy construction is the pneumatic nail gun. It uses the force from compressed air to drive nails through hard surfaces.

General Safety Rules for Nail Gun Use

- Always wear safety glasses.
- Never use a nail gun with the nose guard safety spring missing.
- Never rest the gun against any part of your body, or try to climb a ladder with the gun cradled against your body.
- Do not hold the trigger down unless you're purposefully firing the tool. This is especially important when descending ladders.
- Keep people out of range of fire. Exercise extreme caution when using an air tool around another worker.
- Never point the tool at anyone. Treat the tool like a firearm. Never assume the tool is empty.

- Disconnect the air hose before clearing a jam or making adjustments.
- Do not fire the tool unless the nose is firmly pressed against a work piece.
- Use only compressed air to power the tool, not bottled gas. Do not exceed the manufacturer's specified air pressure for the tool.
- Keep your free hand safely out of the way of the tool.
- Do not operate the tool around flammables.
- Nail top to bottom when nailing wall sheathing in a vertical position.
- Nail from the eaves to the ridge when nailing roof sheathing, this way you will not back off the edge of the roof.
- Move forward, not backward, when nailing horizontal areas.
- Secure the hose when working on scaffolding, to prevent the weight of the hose from dragging the tool off the scaffold if you set the tool down.
- Other risks to guard against while using a nail gun include being hit by one of the nail gun's attachments or fastener used with the tool, and being hit by flying wood chips and nails.

8.8 Dywidag Systems Safety and Operating Instructions

Post Tensioning Jacks

WARNING: Read all safety and operating instructions and warnings before starting any work or operation. NEVER stand or allow anyone to stand directly behind, or above, or below a jack when stressing operations are under way.

1. Equipment Covered Here:

- a. Jack: 1 – 3/4" Stressing System
- b. Pump TC PE554 115 volt single phase, 30 amps.
- c. Hoses: 19,000 psi bursting pressure
- d. Pressure Gauges: 10,000 psi, 100 psi gradations

2. Safety Instructions

1. Observe all relevant Cal/OSHA standards e.g. use of protective clothing and devices, grounding of electrical equipment, control of work area, etc.
2. All system components must be in good working condition prior to use. Inspect daily for signs of wear or damage. Do not use if grippers are worn excessively, hoses are cracked, pressure gauge is inoperable, or other defects are observed.
3. After inspection, test-run system (see Operating Instructions) to insure that all components are in proper working order.
4. Stressing operations must be under the direct control of a superintendent experienced in such operations.

5. Operators must wear proper personal protective equipment (hard hats, safety glasses, shoes, gloves and long sleeves, etc.) while operating equipment.
6. Stressing unit should be securely tethered to the structure at all times. In the event a tendon breaks during the stressing operation, the tether will prevent the unit from falling.
7. Operating personnel must keep feet from becoming entangled in the hydraulic hoses while stressing.
8. No one should be allowed to stand behind, directly above, or below the jack when stressing operations are under way.
9. Never exceed the maximum allowable stressing pressure. (Check Calibrations accompanying equipment).
10. Make certain jack is in the fully closed position when moving from tendon to tendon. Do not activate pump while moving the jack.
11. Do not attempt to service the equipment beyond that described in the operating instructions. All other servicing should be referred to qualified DSI service personnel.

3. Operating Instructions

a. Preparation

1. Proper and complete connection of the hydraulic lines is vital to the safe operation of the equipment. Connect hydraulic hoses from pump stress port to jack stress port, from pump return port to jack return port and from the pump seating port to ram seating port. Fully engage all fittings hand tight.
WARNING: Improper or incomplete coupling of hydraulic hoses may cause injury or death to personnel, or severe damage to equipment.
2. Visually inspect concrete around the anchor. It should be free of voids.
3. Be sure the jack is equipped for the bar size to be stressed. Check the wrench sleeve for fit over the hex or anchor nut. Be sure the pull rod, pull rod nut, and coupler are the correct size and in good condition.
4. Check that oil level in pump is adequate.
5. Connect the hydraulic pump to 115V AC 60HZ 30 amp power source. Extension cords should be 3 wires, 12 gauge minimum with a maximum length of 50 ft. Further distances will damage the pump motor and will interfere with stressing.
6. Proper lifting equipment must be available prior to commencing.
7. Lift equipment by lifting harness only. Never use hydraulic lines for moving, carrying or adjusting of equipment.
8. When installing or removing a DSI Bar two trained staff members must be present. Often times the bar could be holding a lever. One staff member should be watching the structure being tied down to make sure it fits properly or is stable while uninstalling the bar.

b. Bleeding the Jack (See stressing for operation of Jack)

1. Tilt jack so rear fitting is higher than front (approximately 30 degrees) and facing up.
2. Advance ram until piston is fully extended. When piston is fully extended, the gauge pressure will rise sharply. (DO NOT EXCEED 500 PSI).

c. Stressing

1. Put pump motor switch in "Remote" position.
2. Place pump valve handle in return position, position B.
3. Depress pendant switch and return piston fully.
4. Hand tighten anchor nut to bar until plate is contracted. Failure to do so can damage the internal components of the jack.
5. Be sure bar extension beyond anchor nut is at least $\frac{1}{2}$ coupler length plus 1 inch.
6. Engage pull rod coupler $\frac{1}{2}$ its length on pull rod, using the proper size Allen wrench tighten set screw.
7. Engage pull rod and coupler fully onto the bar.
WARNING: To avoid serious accidents, pull rod coupler must be fully engaged.
8. Place pump valve in Stress position; position A, close check valve on stressing line (if installed).
9. Extend piston between $\frac{1}{4}$ " and $\frac{1}{2}$ ".
10. Place jack over bar, nut, pull rod coupler and pull rod. Jack wrench sleeve must slide over hex on anchor and bearing nose must be flat on bearing plate.
11. Install pull not until in contact the ball plate on rear of the jack.
12. Depress remote pendant switch on pump and stress tendon to desired load. Never exceed the maximum gauges pressures (refer to calibration report for max pressure).
13. Measure total bar elongation between bearing plate and any fixed reference point on bar before and after stressing.
14. Use ratchet handle to tighten nut to plate. DO NOT use "cheater" bar.
CAUTION: Tightening of anchor nut with ratchet should be performed while ram is in motion.
15. Switch valve to Position B. and slowly open the check valve. Once the pressure on the gauge is zero, activate the pump retracting the ram.

WARNING: NEVER EXCEED 500 PSI IN RETRACT.

9. Personal Protective Equipment

Personal Protective Equipment (PPE) is provided for staff and visitors of Englekirk Center. Staff is expected to use appropriate PPE during their daily work.

Personal Protective Equipment shall be used according to UCSD EH&S guidelines see **Personal Protective Equipment** in Appendix A.

10. Hazard Communication

Hazard Communication at Englekirk Center is used to inform staff, students and others engaged in work at the facility of the possible chemical hazards which they may encounter. An ongoing Hazardous Materials list is kept on file with the Department Safety Coordinator in the North trailer. A binder of Material Safety Data Sheets is kept in the Pump House at the East entrance as well as on file with the Department Safety Coordinator in the North trailer. Hazard Communication and Hazardous Materials Storage/Handling shall conform to UCSD EH&S guidelines see **Hazard Communication** in Appendix A.

10.1 Storage/Disposal of Hazardous Waste

How to Store and Dispose of Hazardous Chemical Waste

Summary: Follow these guidelines for selecting containers and safely storing hazardous chemical waste until it's collected by Environment, Health & Safety (EH&S).

Are you in the right place? These guidelines are for hazardous **chemical** waste only.

- If your waste is **radioactive**, see [How to Store and Dispose of Radioactive Waste](#).
- If your waste is **biohazardous**, see [How to Package and Dispose of Biohazardous and Medical Waste](#).

Select a topic:

- [Hazardous or extremely hazardous?](#)
- [Storage area](#)
- [Labeling](#)
- [Containers](#)
- [Liquids](#)
- [Dry solids](#)
- [Empty containers](#)
- [Unknowns](#)
- [Time and quantity limits](#)

What to do/How to do it

Determine if you have “hazardous” or “extremely hazardous” material. Guidelines are different for hazardous and extremely hazardous chemical waste.

- **Check the list** of [Known Hazardous and Extremely Hazardous Wastes](#) for your material.
- If your material is listed as **hazardous**, use the guidelines on this page.
- If your material is listed as **extremely hazardous**, proceed to [How to Store and Dispose of Extremely Hazardous Chemical Waste](#).

Designate a hazardous waste storage area.

- Hazardous waste sign
- **Select an area** that is:
 - Near where the waste is generated
 - Under the control of lab personnel
 - Out of the way of normal lab activities
- **Label the area** with a “Danger – Hazardous Waste” sign.



Request signs from [EH&S Environmental Management Facility](#), (858) 534-2753.

- **Make the area easily accessible and recognizable** to EH&S waste technicians.
- **Note:** Fume hoods may be used to **temporarily** store small quantities of waste materials, but should not serve as designated waste storage areas.
- Select appropriate containers.**
- **Chemical compatibility:**
 - Choose a container chemically compatible with the material it will hold. Chemicals must not react with, weaken, or dissolve the container or lid.
 - Follow these basic compatibility guidelines:
 - Acids or bases: Do not store in metal.
 - Hydrofluoric acid: Do not store in glass.
 - Gasoline (solvents): Do not store or transport in lightweight polyethylene containers such as milk jugs.
 - Read [Chemical Compatibility Guidelines](#) for more detailed information.
- **Caps and closure:**
 - Use waste containers with leak-proof, screw-on caps so contents can't leak if a container tips over. Corks, parafilm, and beakers are not acceptable.
 - If necessary, transfer waste material to a container that can be securely closed. Label the new container.
 - **Keep waste containers closed** except when adding waste.
 - Wipe down containers prior to your scheduled collection date.
- **Size:**
 - Choose appropriately sized containers. Store smaller quantities in smaller containers. It's not cost effective to dispose of 50 milliliters of material in a 4 liter container.
- **Secondary containment:**
 - Always place your container in a secondary container to:
 - Capture spills and leaks from the primary container
 - Segregate incompatible hazardous wastes, such as acids and bases
 - A secondary container must be chemically compatible and able to hold 110% of the volume of waste stored in the primary container(s). Lab trays and dishpans are frequently used for secondary containment.
 - EH&S provides free secondary containers for 20-liter (5-gallon) waste containers. Request these secondary containers from the [EH&S Environmental Management Facility](#), (858) 534-2753.
- Label every waste container with a hazardous waste tag.**
- **Attach a completed [hazardous waste tag](#)** to the container **before** you begin using the container to accumulate and store waste.
- **Cross out** all other labels on the container. (Don't obliterate the original product label; waste technicians need to see what the container held before it was designated as a waste receptacle.)
- Read about liquid waste requirements.**
- **Do not overfill** liquid waste containers. Leave a sizable amount of head space in the container to allow for expansion and safe transportation — 10% head space is a good rule of thumb.
- **Do not mix solids with liquid waste.** Containers found to contain solids during processing by EH&S hazardous waste technicians will be returned to the generator for separation. See guidelines for [solid](#) chemical waste below.
- **Liquid-filled small containers** such as vials and Eppendorf tubes:
 - Double-bag containers in [clear plastic bags](#) to allow visual inspection by EH&S waste technicians.
 - Containers bagged together must contain liquids or liquid mixtures with the **same chemical constituents**.
 - Seal each bag individually.
 - Accurately list the bag's contents and chemical constituents on the [hazardous waste tag](#).
- **Organic solvents:**
 - Halogenated and non-halogenated organic solvents may be mixed together in the same waste container. Contact the [EH&S Environmental Management Facility](#), (858) 534-2753, if you want to pour other chemical constituents in the same waste container.
 - **Do not combine organic solvents with toxic metal waste!**
 - Contact the [EH&S Environmental Management Facility](#), (858) 534-2753, if you're using toxic metal compounds. Examples of metals include arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver, copper, nickel, and zinc.
- **Oils:** EH&S sends waste petroleum oils to be recycled.

- Accumulate recyclable oil separately from oils contaminated with solvents, halogens, laboratory chemicals, or fuels.
- Oils containing traces of mercury, lead, or other regulated metals are excluded from the recycling program. Notify EH&S on the [hazardous waste tag](#) if your oil waste may contain these materials.
- ☑ **Read about requirements for dry, solid waste.**
 - Chemically contaminated solid waste includes three categories that are packaged differently for disposal: lab trash, dry chemicals, and sharps and piercing objects.
 - **Lab trash:** Examples include absorbent paper products, Kim Wipes, gloves, benchcoat, and other lab supplies. Follow these guidelines:
 - **Double-bag the waste** in [clear plastic bags](#) to allow visual inspection by EH&S waste technicians. If contents cannot be visually inspected, EH&S cannot collect the bag.
 - Seal each bag individually.
 - Accurately list the bag's contents and chemical constituents on the [hazardous waste tag](#).
 - **Dry chemicals:**
 - Dispose of solid reagent chemicals in the manufacturer's container.
 - Label the container with a [hazardous waste tag](#).
 - **Sharps and piercing objects:** Sharps are items capable of puncturing, piercing, or tearing regular waste bags. Examples include pipettes, pipette tips, and broken glass. Sharps require special packaging.
 - Read [How to Dispose of Sharps and Piercing Objects](#) for details.
- ☑ **What to do with empty containers** that once held hazardous chemicals.
 - Disposal of these containers depends on the container's size, what it's made of, and the hazardous material it once contained.
 - Read [How to Dispose of Empty Hazardous Materials Containers](#) for details.
- ☑ **Follow these guidelines for "unknowns"** or unidentified chemical waste.
 - Unknown or unidentified chemicals are considered hazardous waste. Processing and disposal of unknowns is particularly expensive because they must be handled with great care and caution. Please make every effort to avoid "unknowns" by diligently labeling and dating inventory.
 - **Once found, ask others** working in the area if they know what the material is.
 - If the material **can be identified:**
 - Label it with a [hazardous waste tag](#).
 - If the material **can't be identified:**
 - Label it with a [hazardous waste tag](#).
 - Write "Unknown" on the tag.
 - Write on the waste tag any known information. Include:
 - Type of lab that material was found in (chemistry, organic or inorganic, biology, DNA research, etc.)
 - Where the material was discovered in the lab (under a fume hood with other organics, on a shelf with inorganics or salts, etc.)
 - Age of the material
 - [Request](#) a hazardous waste collection.
 - Contact the [EH&S Environmental Management Facility](#), (858) 534-2753, if you need assistance with unknowns.
- ☑ **Storage time and quantity limits** before waste must be collected.
 - Keep UCSD in compliance. Request a hazardous waste collection **before** time or quantity limits are reached.
 - **Time:** All hazardous waste must be collected **within 90 days** from when waste is first put into containers.
 - **Quantity:** Up to 55 gallons of any individual hazardous waste may be stored before it must be collected.
 - **When 55 gallons or more** of hazardous waste accumulates, the waste must be collected within three days.
 - Read [How to Request a Hazardous Waste Collection](#) for details.

If you are a UCSD employee and have questions, contact the [EH&S Environmental Management Facility](#), (858) 534-2753.

Notice: Disposal of hazardous waste using sinks, intentional evaporation, or as regular trash is against the law. Campus laboratories must abide by strict state and federal waste disposal requirements. You may be held liable for violations of applicable laws.

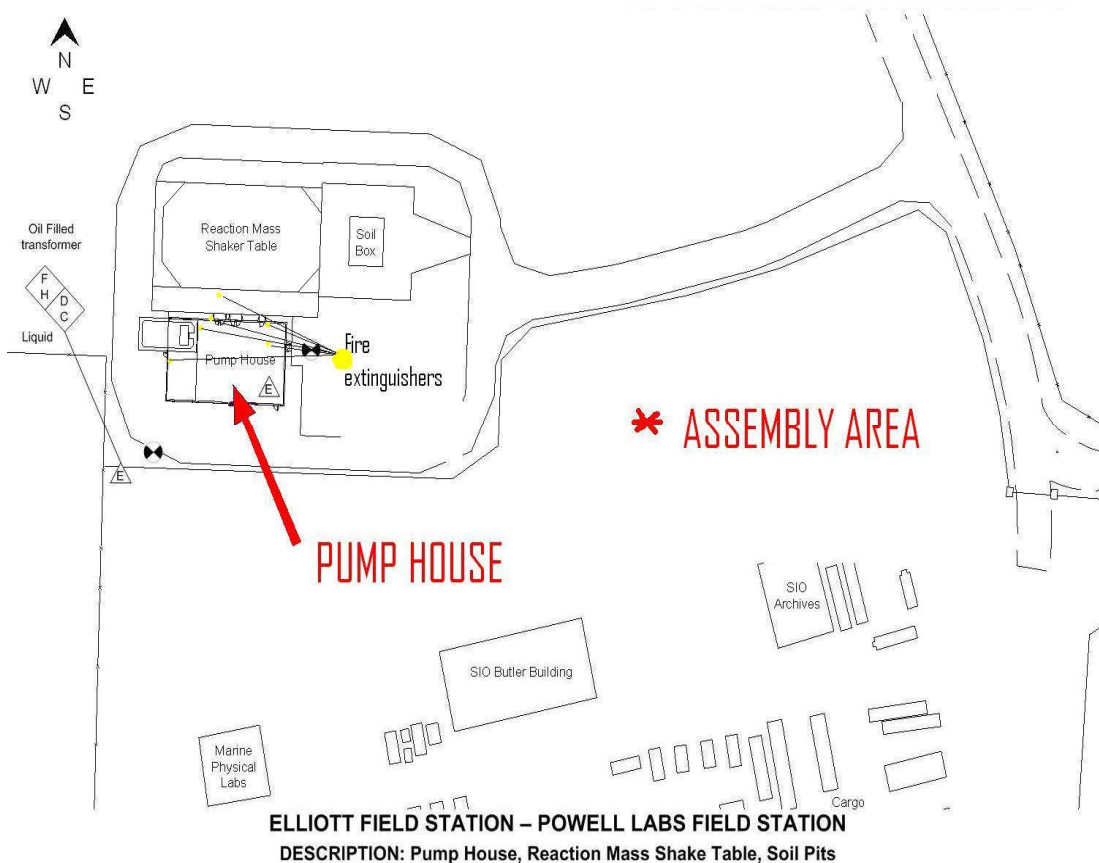
How to Store and Dispose of Hazardous Chemical Waste reproduced from the following Internet link:

http://blink.ucsd.edu/Blink/External/Topics/How_To/0,1260,13036,00.html

Contact the Department Safety Coordinator (858-688-0307) or Environment, Health & Safety department (858-534-3660), or access the web link above for further information.

11. Emergency Action Plan

Control Building/Pump House



Emergency Phone Numbers

Fire 911
Police..... 911
Medical 911
Thornton Emergency Room 77600
Poison Control Center 800-876-4766
UCSD Emergency Status Phone No.888-308-8273

Calmly state:

- Your name
- Building and room location of emergency
- Nature of the emergency: fire, chemical spill, etc.
- Injuries?
- Hazards present which may affect responding emergency personnel
- A phone number near the scene where you can be reached

Building Evacuation

- Quickly move to the outside of the building using the nearest door marked with an EXIT sign.
- Close and secure all doors as you leave. Take your keys with you.
- Be certain all persons in the area are evacuated immediately.
- Help those who need special assistance—disabled, small children, etc.
- Report immediately to the designated assembly area (see map above) to do a headcount.
- Wait for instructions from emergency response personnel.

Fire Procedures

IN CASE OF SMALL FIRE

- Call 911.
- IF YOU HAVE BEEN TRAINED to use a fire extinguisher, while keeping an exit available behind you, bring the extinguisher within six feet of the fire.
- Pull the pin located in the extinguisher's handle, aim the nozzle at the base of the fire.
- Squeeze the handles and sweep from side to side at the base of the fire until it is out.

IN CASE OF LARGE FIRE

- Pull the fire alarm and call Campus Police at 911. Alert people in the area to begin evacuation using the stairs--not the elevators.
- Close door to confine the fire.
- Move to your designated assembly area upwind from the building.
- Have persons knowledgeable about the incident and location assist emergency personnel.

Earthquakes

DURING HEAVY SHAKING

- Get under a desk, table, door arch or stairwell. If none are available, move against an interior wall and cover your head with your arms. Remain under cover until the movement subsides.
- Stay away from large windows, shelving systems or tall room partitions.
- After shaking has stopped, survey your immediate area for trapped or injured persons and ruptured utilities. Evacuate the building using the stairs—not the elevators. Move to your designated assembly area and await further instructions from emergency personnel.

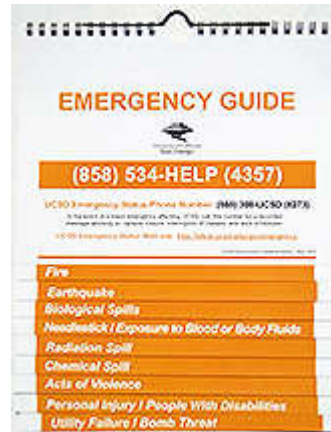
ESEC also utilizes UCSD's **Emergency Guide** see Emergency Guide in Appendix A.

11.1 Emergency Guide

Summary: The Emergency Guide contains standard emergency response procedures for UCSD.

The Emergency Guide contains essential phone numbers and "what to do in case of..." information for UCSD employees and students.

- [Fire](#)
- [Earthquake](#)
- [Biological spill](#)
- [Needlestick / Exposure to blood or body fluids](#)
- [Radiation spill](#)
- [Chemical spill](#)
- [Acts of violence](#)
- [Personal injury](#)
- [Evacuation considerations for people with disabilities](#)
- [Utility failure](#)
- [Bomb threat](#)



Emergency response resources:

- [Emergencies and emergency planning](#)
- [Essential Phone Numbers \(Environment, Health and Safety\)](#)
- [How to Report a Crime or Emergency](#)

Questions about emergency preparedness at UCSD? Contact [Continuity & Emergency Services](#), (858) 534-1064 or 534-3823.

Questions about production and distribution of the Emergency Guide? Contact [Environment, Health & Safety](#), (858) 534-9745.

12. Natural Hazards

Due to the location of ESEC, we are at risk of contact with venomous snakes and spiders. If bitten by a venomous snake or spider seek immediate medical attention and have a coworker try to make a positive identification. Below you will find steps to take until medical attention is provided.

Avoid snakes:

1. If a rattlesnake is found indoors, call 911 for assistance
2. Stay alert when walking near canyons or undeveloped land
3. If you see a snake, do not disturb it. Move away quickly
4. If you hear a rattlesnake, stand still until you are sure of its location, then move away quickly.
5. Never step or reach into an area you cannot see.

Rattlesnake bites:

1. **Remain calm.**
2. **Call 911** and get the victim to the hospital immediately.
3. **Immobilize the bitten limb.** Do not apply a tourniquet or constriction band and do not attempt to cut the wound or suck out the venom. Do not apply ice to the wound.
4. **Wash the skin over the bite** with soap and water. Cover the wound.

If bitten by a black widow spider:

1. Make a positive identification if possible. If the bite is on an arm or a leg, tie a snug bandage above the bite to help slow or halt the venom's spread. Ensure that the bandage is not so tight as to cut off circulation
2. Use a cold cloth or a cloth filled with ice at the location of the bite
3. Seek medical attention immediately

For more information, contact:

- **Emergencies**
EH&S: (858) 534-3660 weekdays, 8 a.m. – 4:30 p.m.
Campus Police: (858) 534-4375
- **Non-emergencies (typical response time: 1 working day)**
Campus and SIO facilities: (ehspest@ucsd.edu)
Medical Center facilities: (jhickman@ucsd.edu)

13. Facility Specific Safety Requirements

General safety during testing at all test facilities at Englekirk Center

All employees and visitors shall be removed to a designated safe viewing area while tests are performed. All tests shall be conducted by competent staff. All General Site Safety rules will be observed; in addition, facility specific safety procedures will be observed as outlined below.

13.1 Blast Simulator-Technical Support Working Group (TSWG)

The TSWG Blast Simulator is a unique test device that incorporates high pressure hydraulic oil and high pressure nitrogen to generate high velocity, high impact test conditions. The test machine incorporates unique procedures to insure safety to laboratory personnel and to laboratory visitors.

13.1.1 Blast Simulator Specific Safety

The following procedures are basic in nature with concise and specific **Standard Operating Procedures** kept digitally at the Englekirk Center on the W: drive in **Site Documentation** folder.

1. Testing and maintenance

- A. Safety Procedures
 - a. Identify and mark debris fields based on potential projectiles, such as concrete, breakaway bolts, and instrumentation
 - b. Establish and clearly mark personnel and visitor viewing areas
 - c. Use radio communications between control room, viewing areas, and personnel in load rig/specimen area
 - d. Monitor safety cameras around test equipment and debris fields
- B. Charge Nitrogen Accumulators with Compressed Nitrogen
 - a. Inspect Nitrogen tank and connections for damage
 - b. Notify personnel that system will begin charging
 - c. At terminal, monitor pressures and advise personnel
- C. Emergency Shutdown
 - a. Emergency Stop Button Locations
 - 1. On the Control Desk
 - 2. In the pit
 - 3. On the mezzanine
 - 4. On the HPS Front Panel
 - 5. Notify personnel and viewers once safe to approach
 - a. Advise of system status and residual pressure
 - b. Advise of continuation of hazard potential and safety equipment requirements

13.2 Large High Performance Outdoor Shake Table (LHPOST) Network for Earthquake Engineering Simulation (NEES) National Science Foundation (NSF)

13.2.1 LHPOST Specific Safety

The following procedures are basic in nature with concise and specific **Standard Operating Procedures** kept digitally at the Englekirk Center on the W: drive in **Site Documentation** folder.

1. Before test

- A. General inspection and walk around.
 - a. ensure there are no persons in the pit (**no one** allowed below grade when hydraulic pressure is at high pressure).
 - b. ensure table will be unobstructed in its stroke pattern, both above and below table.

2. During test

- A. Monitor tub cameras for presence of people and hydraulic leaks.
- B. Monitor visitor activity (e.g. delivery men, observers, cleaning crew) to safeguard against entrance into pump house or dangerous areas around the shake table.
- C. Put up 'Danger Do Not Enter/Authorized Personnel Only' sign. No one is allowed to enter into pump house pit area while hydraulic pump are in high-pressure mode.

3. After test

- A. If experiment is stopped due to an unexpected incident, prohibit access of unauthorized personnel to the pump house and/or dangerous areas around the shake table indefinitely.
- B. If experiment concludes successfully prohibit access of unauthorized personnel to: the pump house and/or dangerous areas around the shake table until pumps are off, a walk around above and below the table have been performed, spilled oil has been wiped up and the area around the table is generally safe.

4. Maintenance

- A. Maintenance shall only be done when the high-pressure hydraulics are shut off.
- B. Charging Nitrogen Accumulators with Compressed Nitrogen
 - a. Inspect Nitrogen tank and connections for damage
 - b. Notify personnel that system will begin charging
 - c. Carry an Oxygen sensor to monitor for oxygen deficiency

13.3 Soil Foundation Structure Interaction (SFSI) California Department of Transportation and Port of Los Angeles Soil Pit

13.3.1 Safety Procedures for Working on Soil Pit Set-up

This portion of the facility is not currently active; however, the following procedures are basic in nature with concise and specific

Standard Operating Procedures kept digitally at the Englekirk Center on the W: drive in Site Documentation folder.

1. Safety procedures pertaining to excavations will be followed according to:
California Code of Regulations, Title 8 and UCSD policies
For more information contact the Department Safety

14. Appendix A

<u>Title</u>	<u>Map to link</u>
Blood Born Pathogens	Go to http://blink.ucsd.edu/ L Safety tab L Research Safety link L Biosafety link L Blood Born Pathogen
Compressed Gases	Go to http://blink.ucsd.edu/ L Safety tab L Research Safety link L Lab & Chemical Safety Link L Standard operating procedure section L Compressed Gas
Elevated work, Ladder and Lift Safety	Go to http://blink.ucsd.edu/ L Safety tab L Trades Safety link L Resources link L Ladders and Lifts section L Ladders and Lifts Safety
Emergency Guide	Go to http://blink.ucsd.edu/ L Safety tab L Research Safety link L Lab & Chemical Safety Link L Emergency preparedness and response section L UCSD Emergency Guide
Fire/Life Safety	Go to http://blink.ucsd.edu/ L Safety tab L Safety Resources link L Fire/Life Safety
Flammable Storage	Go to http://blink.ucsd.edu/ L Safety tab L Safety Resources link L Fire/Life Safety L Flammables Storage section L Flammable and Combustible liquids Overview
Hazard Communication	Go to http://blink.ucsd.edu/ L Safety tab L Research Safety link L Lab & Chemical Safety Link L Managing Safety section L Hazard Communication Program
Heat Stress	Go to http://blink.ucsd.edu/ L Safety tab L Safety Training link L Menu link L General Safety section L Heat Illness Prevention
Injury Illness Prevention Program	Go to http://blink.ucsd.edu/ L Safety tab L Safety Resources link L Injury and Illness Prevention
Injury or Illness Reporting	Go to http://blink.ucsd.edu/ L Safety tab L Safety Resources link L Accident Reporting
Job Hazard Analysis	Go to http://blink.ucsd.edu/ L Safety tab L Safety Resources link L Injury and Illness Prevention L IIPP Document (PDF or WORD) L Section I and IIPP section of this manual ALSO: Go to http://blink.ucsd.edu/ L Safety tab L Trades Safety link L Resources link L Hazard Awareness section L Integrated Safety and Environment Management Overview
Lift and Carry	Go to http://blink.ucsd.edu/ L Safety tab L Ergonomics link L Healthy Back link L How to Safely Lift and Carry
Lockout/Tagout	Go to http://blink.ucsd.edu/ L Safety tab L Trades Safety link L Resources link L Lockout/Blockout section L Lockout/Blockout
Manual Lifting/Ergonomics	Go to http://blink.ucsd.edu/ L Safety tab L Ergonomics link L Menu
MSDS	Go to http://blink.ucsd.edu/ L Safety tab L MSDS link L MSDS Sources link L ChemQuik link
Personal Protective Equipment	Go to http://blink.ucsd.edu/ L Safety tab L Trades Safety link L Occupational Health link L Personal Protective Equipment
Self Safety Audit	Go to http://blink.ucsd.edu/ L Safety tab L Safety Resources link L Injury and Illness Prevention L IIPP Background section IIPP Documents click PDF or WORD link L UCSD OFFICE SAFETY INSPECTION and SHOPS & STUDIO SAFETY INSPECTION CHECKLIST sections and IIPP section of this manual

<u>Title</u>	<u>Map to link</u>
Vehicle Accident	Go to http://blink.ucsd.edu/ L Facilities tab L Facilities Resources L Facilities Management link L Vehicles and driving section L UCSD Vehicle Accident/incident Reporting
Vehicle Driver Responsibility	Go to http://blink.ucsd.edu/ L Safety tab L Safety Training link L Menu link L Risk Management section L UCSD Vehicles Driver Responsibility Training

15. Appendix B

15.1 Hazard Identification Form

University of California, San Diego

Inspection Location _____

Department _____

Supervisor _____ Phone _____

Identification

Mitigation

Description of Hazard	Date Observed	Abatement Action Taken	Date Abated

15.2 UCSD Accident Investigation Report

In accordance with the UCSD Injury & Illness Prevention Program (IIPP), supervisors are responsible for investigating all injuries sustained by employees working under their direction.

Department _____ **Investigation Date** _____

Person Conducting Investigation/Phone _____

Date of Accident/Injury/Illness _____

Name of Injured Employee/Phone _____

Describe the Injury/Illness _____

Location of Incident _____

Describe what happened _____

Names/Phones of Witnesses _____

What Workplace Condition/Practice/Equipment contributed to the incident?

What Corrective Actions have been taken to Prevent Re-occurrence? _____

What Additional Actions are still needed to Prevent Re-occurrence? (consider training, personal protective equipment, and written procedures)

Person Responsible for Corrective Actions _____

Date Corrective Actions were implemented _____

Signature of Person Investigating this Incident _____

15.3 Employee Safety Recommendation Form

University of California, San Diego

Location _____ Department _____

Supervisor _____ Date _____

<u>Identification of Safety or Health Hazard</u>
<u>Suggestion for Abatement of the Safety or Health Hazard</u>
1. Do Not Write Below This Line
2. <i>Date Complaint Investigated:</i>
3. <i>Investigated By:</i>
4. <i>Action Taken:</i>
5. <i>Date Action Was Reported to the Employee:</i>
6. <i>Comments:</i>

15.4 Supervisor's Safety Meeting

University of California, San Diego

Department _____ Date _____

Division _____ Supervisor _____

Employees Present:

Safety Topics Discussed:

Supervisor's Signature

Comments

15.5 New Laboratory Worker Checklist
UCSD NEW LABORATORY WORKERS CHECKLIST, _____ lab
(PI name)

Complete this form for all lab personnel. See <http://blink.ucsd.edu/go/labchemtrain> for information on training requirements.

For all lab workers:

- Attend Lab Safety Principles/IIPP training, date: _____
- Discuss any hazardous lab procedures

Radioactive materials users:

- Attend Basic Radiation Safety Seminar, date: _____
- Submit a Radioisotope User Enrollment form

Biohazard users:

- Discuss biohazard issues
- Attend required Biosafety classes:
Bloodborne Pathogens, Viral Vectors, BL3 Orientation, date(s) _____

Orientation to lab-specific safety procedures:

- Locations of:
 - o Fire extinguishers and pull stations
 - o Eye wash/douse showers
 - o First aid kits
 - o Hazardous materials spill kits
- Evacuation procedures, personnel lists, and gathering point
- Laboratory chemical storage locations
- Laboratory procedures for chemical safety information:
 - o MSDS access – www.ucmsds.com or other source
 - o Locations and type of written lab safety procedures, including any lab-required approvals
- Location and safe use procedures for engineering controls:
 - o Chemical fume hoods and biological safety cabinets
 - o Other engineering controls
- Laboratory procedures for personal protective equipment:
 - o Gloves
 - o Lab coats
 - o Eye protection
 - o Other
- Laboratory waste disposal practices, including locations and supplies

Area Safety Coordinator: _____

New worker: _____
(print name) (signature) (date)

15.6 UCSD Office Safety Inspection
 University of California, San Diego

Location _____ Date _____ Phone _____

Supervisor _____ Department _____

Inspector _____ Job title _____

Administration and training

- Yes No N/A 1. Are all safety records maintained in a centralized file for easy access? Are they current?
- Yes No N/A 2. Have all employees attended Injury & Illness Prevention Program training? If not, what percentage has attended?
- Yes No N/A 3. Does the department have a completed Emergency Action Plan? Are employees being trained on its contents?
- Yes No N/A 4. Are chemical products used in the office being purchased in small quantities? Are Material Safety Data Sheets needed?
- Yes No N/A 5. Are the Cal/OSHA information poster, Workers' Compensation bulletin, annual accident summary (must be posed during February, at a minimum), and Emergency Response Guide flipchart posted? Is Safety Briefs newsletter being received and posted?
- Yes No N/A 6. Are annual workplace inspections being performed and documented?

General safety

- Yes No N/A 7. Are exits, fire alarms, pullboxes, and sprinklers clearly marked and unobstructed?
- Yes No N/A 8. Are aisles and corridors unobstructed to allow unimpeded evacuations?
- Yes No N/A 9. Is a clearly identified, unobstructed, charged, currently inspected and tagged, wall-mounted fire extinguisher available within 75 feet of all work areas? For extinguisher service, contact PPS at (858) 534-0317.
- Yes No N/A 10. Are ergonomic issues being addressed for employees using computers?
- Yes No N/A 11. Is a fully stocked first-aid kit available? Is the location known to all employees in the area?
- Yes No N/A 12. Are cabinets, shelves, and furniture over five feet tall secured to prevent toppling during earthquakes?
- Yes No N/A 13. Are books and heavy items and equipment stored on low shelves and secured to prevent them from falling on people during earthquakes?
- Yes No N/A 14. Is the office kept clean of trash and recyclable materials promptly removed?

UCSD OFFICE SAFETY INSPECTION

Electrical safety

- Yes No N/A 15. Are plugs, cords, electrical panels, and receptacles in good condition? No exposed conductors or broken insulation?
- Yes No N/A 16. Are circuit breaker panels accessible and labeled?
- Yes No N/A 17. Are fused power strips being used in lieu of receptacle adapters?

-
- Are additional outlets needed in some areas?
- Yes No N/A 18. Is lighting adequate throughout the work environment?
- Yes No N/A 19. Are extension cords being used correctly? They must not run through walls, doors, ceiling, or prevent a trip hazard running across aisles. Extension cords are for temporary use only.
- Yes No N/A 20. Are portable electric heaters being used? If so, use a fused power strip if necessary, and locate the heater away from combustible materials.
- Yes No N/A 21. Is the paper cutter guard in place?

15.7 Shop and Studio Safety Inspection Checklist

UNIVERSITY OF CALIFORNIA, SAN DIEGO
 ENVIRONMENT, HEALTH & SAFETY

SHOPS & STUDIO SAFETY INSPECTION CHECKLIST

DEPARTMENT:	_____	DATE:	_____
LOCATION/SHOP:	_____	BLDG/RM NO:	_____
SUPERVISOR:	_____	PHONE/EMAIL:	_____
INSPECTOR:	_____	JOB TITLE:	_____

TRAINING:

		Y	N	N/A
13	Mandatory Training current/documented (IIPP, HAZCOM, EAP)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14	Shop specific safety training conducted/documented as required	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15	Training provided (site specific)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16	Confined Space Program in place where required	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17	Fall Protection Program in place where required	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18	Forklift Safety Training in place where appropriate	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19	Lockout/Tag Out program in place where required	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20	Inspection program for power tools/extension cords	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21	CPR training for required workers (Electrical Trades)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

WALKING/WORKING SURFACES:

		Y	N	N/A
24	Floors clean and dry	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25	Storage of materials/equipment not protruding and/or cluttered	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26	Trip hazards (electrical cords, debris) not present	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27	Soiled rags/trash disposed of daily	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
28	Stairs safe (secure rails, treads)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
29	Ladders safe (safe feet, inspected, tight rungs)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
30	Guard rails installed around floor openings, lofts and catwalks to prevent falls > 30"	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
31	Scaffolding- >5' have top/mid rails, toe-board, mud sills, wheels locked	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

ELECTRICAL:

		Y	N	N/A
34	All disconnects/breakers labeled - panels posted with Arc Flash warnings	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
35	36" minimum access clearance around circuit breaker panels	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
36	Energized/live parts of equipment are secured/not exposed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
37	Circuits grounded/Ground pins on plugs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
38	Electrical cords inspected (not frayed, damaged, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
39	Extension cords not used in place of fixed wiring	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

40	Plug/Multi tap adapters use banned	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
41	Explosion proof equipment used where needed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
42	GFCI's in use in wet areas (bathrooms, near sinks)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
43	Open slots in circuit breakers panels secured	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
44	Covers in place on receptacles, boxes, switches	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
45	Electrical hand tools grounded or double insulated	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
46	Electrical cords across walkways protected	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
47	Equipment approved, UL/FM listed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
48	Spray Painting operations inside approved spray paint booths (outlets, light fixtures)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

UNIVERSITY OF CALIFORNIA, SAN DIEGO
ENVIRONMENT, HEALTH & SAFETY

SHOPS & STUDIO SAFETY INSPECTION CHECKLIST

<u>MACHINE OPERATIONS:</u>		Y	N	N/A
56	Barrier guards on moving machinery parts	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
57	Rotating shafts guarded	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
58	Point-of-operation (POO) & Pinch points guarded	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
59	Fan blades adequately guarded (< 1/2" opening)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
60	Fixed machinery anchored to prevent movement	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
61	Anti-restart on woodworking machinery	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
62	Push-sticks provided	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
63	Lower portion of blades guarded	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
64	Belts/pulleys enclosed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
65	Bench grinders (1/8" tool rest, 1/4" tongue guard maximum clearances)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
66	Band saw blades guarded above guide rollers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
67	Jointer guards installed with auto return	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
68	Radial arm saw blade guard/head auto return doesn't extend past end of table	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
69	Safety zones around shop equipment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
70	Table saw-blade guard, splitter, anti-kickback	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
71	Abrasive wheels given "ring-test"	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
72	Shop equipment have lockable disconnect	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
73	Lockout/Tag Out used for equipment (maintenance/adjustments, repairs)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
74	Foot treadles guarded	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
75	On/Off switch accessible w/o reaching across Point of Operations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
76	Gas welding torches equipped with flashback arrestors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
77	Arc welders properly grounded	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
78	Air tanks >1.5 cubic ft (11.2 gal) capacity inspected/issued permit by Cal/OSHA	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
79	Compressed air nozzles have relief ports to safely vent when orifice is blocked	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

<u>HAZARDOUS MATERIALS:</u>		Y	N	N/A
82	Hazardous Materials inventory list available	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
83	Approved flammable lockers in use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
84	Maximum storage: Flammables 60 gal., combustible 120 gal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
85	Solvents >10-1 gallon containers stored in approved flammable lockers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
86	Compatible storage of hazardous materials	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
87	Manufacturer's label affixed/not defaced	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
88	Dispensing/secondary containers labeled	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
89	Material Safety Data Sheet (MSDS) available & accessible	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
90	Hazardous Waste properly disposed of	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
91	Only 1-day supply of flammable material kept outside flame locker	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
92	"No Smoking" signs posted & observed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
93	New/Initial hazardous materials purchases approved by EH&S	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
94	Ventilation equipment available & used when required	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
95	Proper storage/containment/separation of acids	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
96	Dispensing containers bonded to prevent static electricity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

UNIVERSITY OF CALIFORNIA, SAN DIEGO
ENVIRONMENT, HEALTH & SAFETY

SHOPS & STUDIO SAFETY INSPECTION CHECKLIST

<u>GENERAL SAFETY/ADMINISTRATION/TRAINING:</u>		Y	N	N/A
104	Required literature posted (Cal-OSHA, WC, Annual Injury & Illness Summary)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
105	Aisles (minimum 44" pathway)/Building exit corridors clear/unobstructed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
106	Eyewash/Deluge Showers available where required (flushed/checked weekly)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
107	Personal protective equipment used and stored properly	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
108	Appropriate fire extinguishers charged/mounted within 75' of all work stations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
109	Compressed gas cylinders properly stored and secured/capped	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
110	Oxygen and Acetylene cylinder storage (minimum 20' separation)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
111	Inspection performed of weight handling equipment (overhead cranes, hoists)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
112	Welding curtains used	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
113	Seismic securing of shelving equipment > 5'	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
114	Space heaters have auto-tip-over switch	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
115	Good personal hygiene practices maintained	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
116	Smoking in designated areas only (>25' from entrances, buildings, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
117	Approved first aid kit available and its location known to all employees	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
118	Unstable storage practices/equipment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
119	Employees practice safe manual lifting procedures/techniques	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

-
- 120 Hand trucks/carts available for moving heavy awkward items
121 Are awkward postures assumed during work tasks

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

ADDITIONAL FINDINGS:

15.8 Supplemental Hazard assessment and Correction

SCOPE: This section will outline the purpose and procedures of the hazard assessment and correction process which is used by the company.

GENERAL INFORMATION: A detailed analysis of each job to uncover hazards has several advantages. It can be used to identify areas of operations that may present hazards which can be eliminated prior to the occurrence of an injury or lost time incident. The job hazard assessment has several key requirements.

- To discover physical hazards and make decisions on how to abate the hazard.
- To uncover hazardous motions, positions, and actions which may lead to an incident.
- To detect unsafe materials being employed for the completion of a task.
- To detect necessary physical or mental skills for the operator to safely complete tasks.
- To assist in the selection of specialized equipment for the task.
- To detect weaknesses in the company training programs and improves them.

Four key analytical areas in job hazard analysis are:

- c. Analysis of tool, machine or equipment. - Involves a review of any tool or machine that is used by a number of people. (i.e. portable drill, power sander)
- d. Individual job assessment. - Most common of the four. Breaks job down into simple sub-routines which are the individually analyzed for hazards.
- e. Job classification assessment. - Rather than analyzing all work stations where employees are doing the same operation, a random sample of a few areas are used to represent the whole of the task.
- f. Department assessment. - This may be necessary when a department has “odd jobs” or incidental operations which may not lend themselves to a normal job hazard analysis. All scenarios must be considered when analyzing a potential hazard which does not normally occur in everyday operations.

15.9 Job Hazard Analysis

The job hazard analysis is the responsibility of the line supervisor.

Every job within his / her area should be analyzed for hazards on a continuous basis. Any change in operations should indicate to the supervisor that a new assessment should be completed. Accidents don't just happen; they can all be prevented if corrective measures are properly instituted in hazardous work areas.

INSTRUCTIONS FOR COMPLETION OF JOB HAZARD ANALYSIS

Use the following steps to complete a Job Hazard Analysis (JHA) for your area of responsibility. A complete JHA for a specific job should take about an hour. The more complex the job is, the longer the JHA will be. **Do not take any short cuts to finish a JHA quickly**, you may miss a critical element which could cause serious injury or death!

1. Identify the full range of jobs for which you are responsible.
 - a. List all machines, equipment (including manual material handling devices), electrical appliances, pressure vessels and heating elements. Include all chemicals and unusual products or conditions in the work area.
 - b. List all operations and processes performed in your area. Follow the flow of materials through the entire process and document all separate tasks.
 - c. List all personnel involved in operations and keep in mind those tasks with particularly high hazards inherent to its completion.
2. Prioritize the jobs. Some guidelines include:
 - a. High cost, high severity injury accidents.
 - b. Accident costs and injury rates (jobs known for high incidence of accidents).
 - c. Repetitive jobs (can become automatic and prone to fatigue or short cuts).
 - d. New jobs (do JHA prior to full operation of new machines).
 - e. Bottlenecks in material flow or where scrap piles develop.
 - f. Critical jobs which may affect entire operation if accident happened there.
 - g. Complaints from employees on safety issues in job task completion.
 - h. Seasonal or infrequent jobs (nobody is entirely proficient at task).
 - i. Manual materials handling operations (1/4 to 1/3 of all injuries).

When jobs contain two or more of the above criteria their potential for hazard increases and should become a high priority.

3. Utilize the Hazard Analysis and Correction Worksheet (HACW) provided in this section to complete the JHA. Direct observation of the job task is the best way to approach the JHA. This action enhances the employee's perception that management is concerned for their safety and they will show greater respect for the safety program as a whole.

Once the specific task and operator have been selected, follow these steps:

1. Have the employee fill out the "employee safety review ". (at the end of the HACW).
2. Be sure the employee is trained and knowledgeable at their job task.
3. Explain that the purpose of the JHA is to eliminate hazards and provide a safer workplace.
4. Observe the performance of the job.
 - a. Break down job into individual tasks in a progression to the final outcome.
 - b. Use action verbs in your job task descriptions (i.e...opens, pulls, climbs).
 - c. record **what** is done, **not how**.
5. Check your task breakdown with employee for completeness and get their agreement.

4. Use the information collected to identify all of the potential accident responsibilities and inherent hazards associated with each step and list them. Consider every possible mode of accident causation in this step including mechanical, electrical, biological and physical initiating factors. Complete the HACW sections which provide for the recommendation of safe work procedures and the development of solutions to hazards which have been uncovered. Remember to use action words and be as complete as possible in all descriptions. Attach additional paper if the space provided is not sufficient for complete explanation.

Your solutions should fall into one of four categories:

- a. Method Change - The implementation of a new or better method of task completion.
- b. Engineering Revisions - Modification of equipment or work area. Examples are guarding, ventilation, control relocation, and task automation.

-
- c. Personnel Requirements - Includes some human resource related issues. Examples are development of skills, retraining, scheduling, or personal protective equipment.
 - d. Process Changes - New equipment, materials, production scheduling and controls.

5. When finished with the HACW, act on the recommendations of the review to decrease the hazards identified. Send the original document to your local safety coordinator for approval and action on identified hazards beyond your abilities or authority. Retain a copy in your department record log. Keep the last three HACW's for each operator / job on file and review old copies for recommendations and actions pending before you replace them.

15.10 Hazard Assessment and Correction Worksheet

Department: _____
Supervisor Name: _____
Date: _____
Job \ Task \ Machine name: _____

1. Describe any accidents that have occurred on this job in the past.

2. Describe the job and the hazards present.

THE JOB (by step)

HAZARD (unsafe act / condition)

1)

2)

3)

4)

5)

6)

15.11 Unsafe Conditions Recommendations

- 1) _____

- 2) _____

- 3) _____

- 4) _____

- 5) _____

POTENTIAL UNSAFE ACTS

- 1) _____

- 2) _____

- 3) _____

- 4) _____

- 5) _____

- 6) _____

PERSONAL PROTECTIVE EQUIPMENT FOR THIS JOB

- 1) _____

- 2) _____

- 3) _____

- 4) _____

- 5) _____

- 6) _____

PHYSICAL REQUIREMENTS OF THE JOB

SPECIAL SKILLS NEEDED FOR TASK COMPLETION

TRAINING NEEDED FOR THIS JOB

RECCOMENDATIONS

COMMENTS

15.12 Employee Safety Review

1. What is your job?

2. Do you have minor injuries on your job?

3. Describe any accidents that have occurred on this job.

4. Your Job. (What do you do? Use action words please)

1)

2)

3)

4)

5)

5. Hazards of the job. (How can you hurt yourself?)

1)

2)

3)

4)

5)

6. Controls. (How can you avoid being injured?)

1)

2)

3)

4)

5)

Date: _____

Department: _____

Name: _____

How long at job? _____

(optional)

15.13 Hot Work Permit Checklist

This Hot Work Permit is required for any Temporary operation involving open flames or producing heat and/or sparks.

This includes; but is not limited to: brazing, cutting, grinding, soldering, torch-applied roofing, and welding.

Required Precautions Checklist:

1. Check that available sprinklers, hose streams and fire extinguishers are in service and operable.
2. Hot work equipment is in good working condition.

Requirements within 35 ft. (11m) of Hot Work:

1. Flammable liquid, dust, lint and oil deposits are removed.
2. Explosive atmosphere in the area is removed.
3. Floors are swept clean.
4. Combustible floors are wet down, covered with damp sand or fire-resistant sheets.
5. Remove other combustible material where possible. Otherwise, protect them with a FM Approved welding Pad blanket, curtain, fire-resistant tarpaulins or metal shields.
6. All wall and floor openings covered.
7. FM Approved welding pad, blankets and curtains are installed under and around work.
8. Protect or shut down ducts and conveyors that might carry sparks to distant combustible material.

Hot Work on Walls, Ceilings, or Roofs:

1. Construction is noncombustible and without combustible coverings or insulation.
2. Combustible material on the other side of walls, ceilings, and roofs are moved away.

Hot Work on Enclosed Equipment:

1. Enclosed equipment is cleaned of all combustible material.
2. Containers are purged of flammable liquids or vapors.
3. Pressurized vessels, piping, and equipment is removed from service, isolated and vented.

Fire Watch/ Hot Work Area Monitoring:

1. Fire watch will be provided during hot work operations and for 60 minutes after work including any break activity.
2. Fire watch is supplied with a sustainable fire extinguisher and where practical, a small charge fire hose.
3. Fire watch is trained in the use of equipment and sounding alarms.
4. Fire watch may be required in adjoining areas, above and below hot work activities.

Other Precautions Taken:

Welding curtains in use, proper ventilation, and proper PPE selection/use.

15.14 Daily Stationary Scaffold Inspection Checklist

If you answer "NO" to any of the below, action is required before scaffolding may be used. Assure all manufacturers recommendations are followed.

Project Name:	Project Location:		
Completed by:	Date:		
	YES	NO	ACTION/COMMENTS
Scaffold components and planking in safe condition for use and planks graded for scaffold use?			
Frame spacing and sill size capable of carrying intended loading?			
Competent person in charge of erection and to inspection?			
Sills properly placed and adequate sized?			
Screw jacks been used to level and plumb scaffold instead of unstable objects?			
Base plates and/or screw jacks in firm contact with sills and frame?			
Scaffold is level and plumb?			
Scaffold legs braced with braces properly attached?			
Guard railing in place on all open sides and ends?			
Overhead protection or wire screening been provided where necessary?			
Scaffold been tied to structure at least every 30' in length and 26' in height?			
Free standing towers been guyed or tied every 26' in height?			
Brackets, tube and clamp, and accessories been properly placed with nuts and bolts tightened?			
Scaffold free of makeshift devices or ladders to increase height?			
Planks have minimum 12" overlap and extend 6" beyond supports?			
Toe boards properly installed?			
Conditions such as power lines, wind loading, etc. controlled?			
Safe way to get on and off the scaffold without climbing on cross braces?			
Front face within 14 inches of the work or within three feet for outrigger scaffolds?			

15.15 Fall Protection Inspection Checklist

Employee: _____ Date: _____
 Harness Manufacturer: _____ Serial Number: _____

HARNESS			LANYARD (CONTINUED)			
ITEM	INSPECTION	YES/NO	ITEM	INSPECTION	YES/NO	
Labels	Present		Stitching	Cut/Broken		
	Legible			Pulled/Missing		
Webbing	Cuts/Frays		Connectors	Burned		
	Heat Damage			Cracked		
	Abraded			Missing Parts		
	Holes/Burns			Corroded		
	Chemical Damage			Sharp Edges		
	UV Damage/Faded			Bent/Damaged		
	Painted			Shock Abs	Cuts/Frays	
	Dirt/Grease				Heat Damage	
Stitching	Cut/Broken			Abraded		
	Pulled/Missing			Holes/Burns		
	Burned			Chemical Damage		
Rivets	Corroded			UV Damage/Faded		
	Missing			Stretched/Used		
	Loose			Service Date	Over 5 Years	
Buckles	Cracked		ANCHORAGE CONNECTORS			
	Missing Parts		Labels	Present		
	Welded			Legible		
	Corroded		Webbing	Cuts/Frays		
	Sharp Edges			Heat Damage		
	Bent/Damaged			Abraded		
		Holes/Burns				
D-Rings	Cracked			Chemical Damage		
	Welded			UV Damage/Faded		
	Bent			Stretched		
	Corroded			Painted		
	Sharp Edges			Dirt/Grease		
Grommets	Bent		Stitching	Cut/Broken		
	Loose			Pulled/Missing		
	Missing			Burned		
	Corroded			Cuts/Frays		
Back Pad	Missing		Wear Pad	Heat Damage		
	Damaged/Cut			Abraded		
Keepers	Missing			Holes/Burns		
	Damaged					
Service Date	Over 5 years		D-Rings	Cracked		
LANYARD				Bent		
Labels	Present			Corroded		
	Legible			Sharp Edges		
Webbing	Cuts/Frays		Service Date	Over 5 Years		
	Heat Damage			COMMENTS		
	Abraded					
	Holes/Burns					
	Chemical Damage					
	UV Damage/Faded					
	Stretched					
	Painted					
Dirt/Grease						

END.

Update January 2013
Paul Greco