

G•UB•MK
CONSTRUCTORS

***SAFETY &
WORK REQUIREMENTS
HANDBOOK***

February 2009

G•UB•MK
EMPLOYEE CERTIFICATION

1. *As noted below, I certify that I have received a copy of the G•UB•MK Safety & Work Requirements Handbook and recognize that it is my responsibility to understand and to comply with the requirements.*
2. *I certify that I have received and understand the Work Rules for TVA Fossil and Hydro Facilities contained herein and agree that my work conduct will be in compliance with these rules. I also understand that I am required to abide by any additional site-specific work rules. I understand that failure to comply with these rules will result in disciplinary action, including termination.*
3. *I certify that I have received and understand the Employers Safety Enforcement Policy and Guidelines contained herein. I understand that failure to comply with safety procedures, policies and rules will result in disciplinary action including termination.*
4. *I certify that I have received and understand the Employers Substance Abuse Program contained herein.*
5. *I certify that I have received, understand and agree to abide by the TVA Security Rules and Regulations for TVA plant sites. I understand that failure to comply with these rules and regulations will result in disciplinary action, including termination.*

Employee Name: _____

Employee SS#: _____

Employee Signature: _____

Date: _____

FOREWORD

Size limitations do not permit every possible work situation to be addressed in this Handbook. However, good judgment on your part and the proper attitude toward safety and work will go a long way toward preventing injuries and illnesses.

Should you have any questions concerning the safety rules contained in this handbook or if you are uncertain about how to do a job safely, ask your supervisor.

It is critical that every employee realizes that our work must be performed safely. Any injury is unacceptable.

The Safety Department is available to answer your questions.

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TABLE OF CONTENTS

	Page
1. General Information	8
2. Work Rules for TVA Fossil and Hydro Facilities... 10	
3. Administration Information	
3.1 Separation of Employment	14
3.2 Time Keeping	15
3.3 Attendance Requirements.....	16
3.4 TVA Smoking Policy.....	18
3.5 Policy on Equal Employment Opportunity	18
3.6 Sexual Harassment Policy.....	19
3.7 Minority and Female Referral Program.....	20
3.8 Invitation to Self-Identify Physical and Mental Disabilities	20
4. Project Safety Rules	21
General Requirements	
4.1 General.....	22
4.2 Personal Protective Equipment and Clothing 26	
4.3 Clearances.....	28
4.4 Confined Space Entry	29
4.5 Material Handling	32
4.6 Barricades, Signs & Markings.....	33
4.7 Vehicular Operations	35
4.8 Tools, Scaffolds & Ladders.....	36
4.9 Fire Prevention	43
4.10 Housekeeping/Orderliness	43

4.11	<i>Elevators</i>	44
4.12	<i>Electrical Hazards</i>	45
4.13	<i>Switchyards</i>	45
4.14	<i>Hand and Power Tools</i>	46
4.15	<i>Pneumatic Tools</i>	47
4.16	<i>Power Actuated Tools</i>	48
4.17	<i>Hazardous Chemicals</i>	49
4.18	<i>Asbestos</i>	50
4.19	<i>Fly Ash</i>	51
4.20	<i>Lead</i>	52
4.21	<i>Lift Truck Operations</i>	52
4.22	<i>Cranes & Hoisting Equipment</i>	54
4.23	<i>Overhead and Gantry Cranes</i>	57
4.24	<i>Crawler and Truck Cranes</i>	58
4.25	<i>Slings</i>	59
4.26	<i>Mechanized Heavy Equipment</i>	61
4.27	<i>Mechanized Heavy Equipment and Maintenance</i>	61
4.28	<i>Marine Operations</i>	62
4.29	<i>Metal Working</i>	62
4.30	<i>Woodworking</i>	65
4.31	<i>Welding and Cutting</i>	67
4.32	<i>Pressurized Systems and Cylinders</i>	70
4.33	<i>Compressed Gas Cylinders</i>	70
4.34	<i>Excavations</i>	72
4.35	<i>Abrasive Blasting</i>	73
4.36	<i>Spray Painting</i>	74
4.37	<i>Working Above or Near Water</i>	75
5.	<i>Corrective Disciplinary Actions</i>	76
6.	<i>Safety Enforcement Policy & Guidelines</i>	78
7.	<i>Substance Abuse Program</i>	80
8.	<i>TVA Plant Security Rules & Regulations</i>	85

LIST OF APPENDICES

	Page
(A) EYE AND FACE PROTECTION SELECTION GUIDE	88
(B) REQUIRED SHADES FOR FILTER LENSES AND GLASSES	89
(C) RESPIRATOR SECTION GUIDE	90
(D-1) MOBILE CRANE HAND SIGNALS	91
(D-2) OVERHEAD CRANE HAND SIGNALS	95
(D-4) MARINE OPERATIONS HAND SIGNALS	97
(E) WIRE ROPE U-BOLTS CLIPS	100
(F) ACCEPTABLE & UNACCEPTABLE RIGGING PRACTICE	101
(G-1) WIRE ROPE SLINGS (FIBER CORE) - RATED CAPACITIES	103
(G-2) WIRE ROPE SLINGS (IWRC) - RATED CAPACITIES	104
(H) KNOTS AND HITCHES	105
(I) SCALERS HITCH (PIGTAIL)	106

(J)	INTERPRETATIONS	107
(K)	CLEARANCES	109
(L)	ELECTRICAL WORKING DISTANCES	112
(M)	CONFINED SPACES	113
(N)	METRIC SYSTEM CONVERSION TABLES	114
(O)	UNITS OF MEASURE	116
(P)	MINIMUM SIZE FILLET WELD/MINIMUM EDGE DISTANCE, INCHES	118
(Q)	STRUCTURAL SHAPES	119
(R)	BOLTS AND NUTS	120
(S)	WEIGHT OF STEEL PIPE	121
(T)	WEIGHT OF STEEL TUBING	123
(U)	WEIGHT OF FLAT PLATE STEEL/WEIGHT OF SELECTED EQUIPMENT	126
(V)	OCCUPATIONAL INJURIES AND ILLNESS	127

1. GENERAL INFORMATION

Welcome to G•UB•MK Constructors. We make every effort to provide a safe, clean and productive working environment for our employees. We expect each employee to assist us in maintaining a high standard of safety, sanitation and production, and to provide the highest quality of workmanship to our customer by observing all safety rules, work rules and administrative policies and procedures. The following principles shall be followed consistently in all of the work:

- 1. All employees work as a TEAM – Teamwork and cooperation are required.*
- 2. All injuries are preventable. Each employee will assist us in maintaining a high standard of safety observing all safety rules, procedures and processes. And assure that each employee works safely and contributes to the safety of the crew.*
- 3. All injuries must be reported immediately to your supervisor.*
- 4. Trilateral One Voice on Safety. The Trilateral Safety Alliance (TLSA) is to leverage safety and health improvements from Tennessee Valley Authority (TVA), Tennessee Valley Trades and Labor Council (TVTLC) and TVA Partner Contractors for craft employees.
 - A. The ultimate goal of this committee is to create a work environment in which all employees take ownership of safety without fear of retribution, eliminate at-risk behaviors, and achieve ZERO accident performance.*
 - B. Employees must own their safety and intervene if they see an unsafe act or condition.*
 - C. Employees are given the authority and responsibility, without fear of reprimand or retaliation, to immediately stop any work activity that could present a danger to themselves or their co-workers and immediately contact your supervisor.**

5. *Environmental awareness is each employee's responsibility. We expect no environmental non-compliances of any type.*
6. *Quality requirements will be met consistently; the first time.*
7. *Work rules and administrative procedures will be observed without the necessity of reminders.*
8. *The supervisor and the crew know the plan and they work the plan.*
9. *Consistent high performance is required and expected by all.*
10. *We are guests in TVA's plants and facilities – know the TVA expectations and rules and abide by them.*
11. *Work with pride, integrity, intensity and above all, safety.*

Workmanship

1. *Thoroughly understand the requirements of each specific work task. If drawings, specifications or instructions are incomplete or not clear, ask your supervisor. Do not proceed with that part of the task without a specific response.*
2. *Use your skills and craftsmanship to do "Right Things Right".*
3. *Promptly notify your supervisor of any defect in workmanship whether existing, yours or found in other new work.*
4. *Make excellence in safety, environmental compliance, and craftsmanship personal values.*
5. *Look for ways to do the job better and to always be receptive to suggestions from others.*
6. *Encourage your fellow workers in achieving excellence in their work and to commend their efforts toward high quality.*

7. *Recommend to my supervisor ways to improve work processes and prevent problems.*
8. *Be vigilant to follow debris control procedures in all work.*

2. WORK RULES FOR TVA FOSSIL AND HYDRO FACILITIES

The following work rules are applicable to all contractors performing work at TVA's Fossil and Hydro facilities. These guidelines are promulgated by the joint Industrial and Employee Relations team of TVA and the major contracting partners to maintain a consistent policy of work rules and disciplinary actions on TVA work projects. It is the employees' responsibility to honor these work rules and regulations. Violation of these rules, additional rules promulgated by the Partners, or TVA plant rules will be cause for disciplinary action up to and including discharge. The following work rules are not all inclusive and represent only the basic work rules and range of accepted disciplinary actions.

WORK RULES RANGE OF DISCIPLINARY ACTIONS

WW - Written Warning

S - Suspension

D - Discharge

(Refer to Section (5) of the Handbook for further definition)

NOTE: *The range of discipline is not to be interpreted as progressive. The type of discipline exercised will depend on the circumstances and seriousness of the Safety violations.*

	<u>WW</u>	<u>S</u>	<u>D</u>
1. <i>Violation of Safety Rules and Regulations</i>	X	X	X
2. <i>Violation of TVA Project Work Rules or Site Security Regulations</i>	X	X	X
3. <i>Unsafe working practices, horseplay or practical jokes.</i>	X	X	X
4. <i>Misuse or damage of tools, equipment or facilities</i>	X	X	X
5. <i>Sexual or racial harassment</i>	X	X	X
6. <i>Absenteeism, late starts, early quits</i>	X	X	X
7. <i>Unsatisfactory work</i>	X	X	X
8. <i>Loafing or wasting time</i>	X	X	X
9. <i>Violation of housekeeping rules and practices</i>	X	X	X

	<u>WW</u>	<u>S</u>	<u>D</u>
10. Smoking, eating or drinking at other than authorized time or place	X	X	X
11. Unauthorized reading materials or radios	X	X	X
12. Theft of/or unauthorized possession of property	X	X	X
13. Insubordination	X	X	X
14. Intimidation, threats or interfering with other personnel	X	X	X
15. Leaving project or assigned work area w/o supervisor's authorization		X	X
16. Refusal to accept work assignment		X	X
17. Fighting		X	X
18. Sleeping during working hours		X	X
19. Gambling & lotteries		X	X

	<u>WW</u>	<u>S</u>	<u>D</u>
20. <i>Picking up or leaving another employee's time card, badge or other identification</i>		X	X
21. <i>Falsification of security, personnel or any work related document</i>		X	X
22. <i>Possession, consumption or being under the influence of alcohol, illegal or nonprescription drugs</i>		X	X
23. <i>Possession of firearms or other weapons, ammunition, explosives or incendiaries</i>		X	X

3. ADMINISTRATIVE INFORMATION

3.1 SEPARATION OF EMPLOYMENT

There are three (3) categories by which an employee can be separated from employment:

1 – Reduction-In-Force (RIF) Layoff

2 – Voluntary Quit

3 – Termination for Cause

Reduction-In-Force (RIF) Layoff

Employees laid off will be selected impartially by management allowing for input from supervision. Selections for layoff will be made on a basis of qualification, performance, ability, attendance, attitude and the requirements of the job in accordance with the PMMA.

Voluntary Quit

Employees who voluntarily “Quit” or are terminated as “Quit” will be placed on an Employment Restriction List and will not be eligible for employment on any TVA project site for 60 days in accordance with the PMMA/CPA.

Termination for Cause

Should an employee be terminated for cause, the employee will be placed on an Employment Restriction List and will not be eligible for employment on any TVA project for 90 days in accordance with the PMMA/CPA. After 90 days, the employee may be considered for rehire on a case by case basis. EXCEPTION – Employees who violate the Substance Abuse Program; refer to Section 7 of this Handbook.

1. *TVA's central clock will be used as official time. Where an electronic time keeping system is not used, the timekeeper's clock will be the official time. Any plant clocks, guard shack clocks are informational only and are not to be used as the official time.*
2. *Starting and quitting and lunch period times will be determined by each site in accordance with the PMMA/CPA.*

Employees who are late will be docked in 15 minute intervals. All employees arriving late are required to sign in with the payroll office or site supervision. Failure to sign in will result in disciplinary action to employees.

3. *Employees who leave early will have their time docked by 15 minute intervals. Employees leaving early are required to sign out.*
4. *Employees leaving the site for lunch are required to sign in/out. Employees leaving early or arriving late from lunch will be docked in 15 minute intervals.*
5. *A supervisor will periodically, in addition to any timekeepers, be assigned to monitor the gate during lunch and quitting times. TVA may also monitor the gates.*

3.3 ATTENDANCE REQUIREMENTS

- 1. *Prompt and regular attendance on the job by every employee is a requirement and vital to the successful completion of the work. Every employee is expected to begin work at the start of their scheduled shift and to complete their assigned work shift according to the work rules and the duties and responsibilities of their job.***
- 2. *All employees who are late or absent are responsible for notifying the Office Manager or designated individual, no later than at the start of the scheduled shift by phone. If the employee does not call in it is automatically an unapproved absence. A late employee's time will not start until the Office Manager or designated individual, signs the employee in. No exceptions. Employees will be docked as noted in the Employee Handbook, section 3.2, Time Keeping***
- 3. *Absences are not considered excused unless written authorization is obtained from the Site Manager or the designated representative.***
- 4. *Excused Absences are: (reference LRS-54)***
 - *A worker who notifies the employer of his/her intended absence in writing to seek personal health care services prior to the start of his/her scheduled shift and returns to the job site with a written doctor's excuse for the absence.***
 - *A worker who notifies the employer at least 24 hours in advance, in writing of his/her intention to be late, absent, or quit early because of requirements to serve on a jury, participate in a National Guard or military reserve activity, or other such similar requirements, and returns to the job site with a written excuse from the institution that required his/her absence from work.***

- **A worker who notifies the employer prior to the start of his/her shift of his/her intended absence due to an immediate family member's need for assistance in seeking health care services, or due to a family member's death, and who returns to the job site with a written doctor's note that said family member was treated as described, or in the case of a family member's death, provide the supporting documentation.**
 - **A worker who receives written authorization from the contractor's designated representative at least 24 hours in advance of his/her intended absence for time to take care of personal business. During outage periods and other critical work periods personal business other than that stated above will not be approved.**
5. **The definition of an unexcused absence is defined to include any unexcused days absent, any unexcused late arrival, or any unexcused early check-out.**
 6. **Employees with unapproved absences will lose overtime pay until the hours missed are made up, per LRS-54. Any employee who exceeds the amount of unexcused absences listed below will be terminated.**

Non-Nuclear		Nuclear	
<u>Job Duration</u>	<u>Unexcused Absence</u>	<u>Job Duration</u>	<u>Unexcused Absence</u>
1 to 2 weeks	1 allowed	1 to 6 weeks	1 allowed
3 to 4 weeks	2 allowed	7 to 12 weeks	2 allowed
5 to 12 weeks	3 allowed		

Note: An additional one (1) occurrence will be allowed for each continuous month

Note: An additional one (1) occurrence will be allowed for every second continuous month

7. **Employees with (3) consecutive work days off, without approval, will automatically be terminated for absenteeism, except if on the job less than 2 weeks, an employee with (2) days off, without approval, will automatically be terminated for absenteeism.**

3.4 TVA SMOKING POLICY

TVA smoking policy PROHIBITS SMOKING OF ANY TOBACCO PRODUCT as follows:

- *In all TVA owned or leased space.*
- *In all TVA owned or leased vehicles.*
- *At all TVA sponsored functions that occur in enclosed spaces.*
- *Certain outdoor areas are to be TVA designated as smoke-free zones.*

Employees shall use approved rest and lunch breaks to smoke outside of prohibited areas provided that the rest and lunch break shall not be extended to accommodate smoking.

Employees who are in violation of this policy are subject to disciplinary action including termination.

3.5 POLICY ON EQUAL EMPLOYMENT OPPORTUNITY

We do not discriminate against any person in the employment relationship. It is our policy to ensure that all applicants are considered for employment, without regard to race, color, religion, sex, age, national origin, handicap or status as disabled or Vietnam era veteran. Management and supervisory personnel and their designated representatives have primary responsibility for enforcement of this policy and ensuring that no person, capable and qualified to perform the work required, is discriminated against in hiring, tenure, discharge, promotion, pay or other conditions of employment

because of race, color, religion, sex, age, national origin, handicap or status as disabled or Vietnam era veteran.

Employees having concerns regarding these policies or regulations are requested to contact G-UB-MK Operations Manager or Program Director.

3.6 SEXUAL HARASSMENT POLICY

As part of our equal employment policy, there shall be no discrimination in the employer-employee relationship on the basis of sex. Sexual discrimination is interpreted to include harassment, coercion, intimidation, improper gestures, lewd language or offensive behavior of any kind.

We will not tolerate sex-based discrimination. Supervisors are responsible for assuring that they and their employees comply with this policy.

The text of federal laws and regulations prohibiting sexual harassment are found in Section 703 of Title VII of the Civil Rights Act of 1964, 29CFR Section 1604.11 of the regulations thereof, as well as 41 Chapter 60-20, of Executive Order 11246.

Employees having concerns regarding the policy or regulations are requested to contact G-UB-MK Operations Manager or Program Director.

3.7 MINORITY AND FEMALE REFERRAL PROGRAM

As an Equal Opportunity Employer, we are committed to seeking qualified candidates for employment in the construction trades. If you know of any such individuals who might be interested in an apprentice or journeyman level position, have them contact the site/area office.

3.8 INVITATION TO SELF-IDENTIFY PHYSICAL AND MENTAL DISABILITIES

Any employee who is disabled may voluntarily inform the Site/Area Manager of any physical or mental disability, and may suggest methods of reasonable accommodation. This information is confidential and will only be used to evaluate reasonable accommodation alternatives to permit you to perform the essential functions of the job in a safe and efficient manner. Refusal to volunteer this information will not subject any employee to any adverse treatment or penalty.

Any employee who believes that he/she is having difficulty in continuing to meet the performance requirements of the job due to physical or mental disability is encouraged to advise the G•UB•MK Operations Manager, Resource Manager, or Program Director regarding the nature of the disability, and any suggested reasonable accommodations.

G•UB•MK is a government contractor subject to Section 503 of the Rehabilitation Act of 1973 and Section 402 of the Vietnam-Era Veterans Readjustment Assistance Act of

1974, which require government contractors to take affirmative action to employ and advance in employment qualified disabled individuals, a disabled veteran and veterans of the Vietnam Era. If you are Disabled, a Disabled Veteran or a Vietnam Era Veteran covered under these Acts and would like to be considered under these Acts and would like to be considered under the Affirmative Action Program, please inform the Site/Area Manager.

This information is voluntary, shall be kept confidential, and will only be used for affirmative action purposes. Refusal to volunteer this information will not subject an applicant to adverse treatment or penalty.

4.0 PROJECT SAFETY RULES

We believe that clean and safe conditions are absolutely essential for the welfare of all of our employees, as well as for the promotion of construction efficiency and progress.

Each of us must maintain a strong personal desire to think and act safely, and to develop a complete understanding of the safe way to do each task.

Attendance at daily crew briefings, compliance with these Safety Rules and OSHA safety regulations as they apply to your work are conditions of your employment on this project.

We shall, when deemed appropriate, establish additional health and safety rules.

4.1 General

- 1. All injuries shall be reported to your supervisor immediately.**
- 2. All employees shall use 100% fall protection when working from any work surface in excess of 4 feet in height.**
- 3. You shall wear the required PPE at all times on this project.**
- 4. Sturdy work shoes or boots in good condition are required. Athletic shoes and sandals are prohibited.**
- 5. When your hair length constitutes a hazard (entanglement in machinery, restriction of vision, ignition of the hair, interference with protective equipment, etc.) it must be shortened, bound at the back of the neck, or restrained with a head cover.**
- 6. Shirts are required to be worn at all times. Tee-shirts with a 4 inch sleeve is the minimum allowed.**
- 7. Report all unsafe conditions and practices to your supervisor.**
- 8. Each employee must be alert at all times to conditions and work processes in your area and surrounding areas, and with the presence of other workers and equipment, so that you can foresee and avoid possible dangers.**

9. ***Learn to lift properly, so as to avoid strain.***
10. ***Strict adherence to the TVA clearance procedure is mandatory. Do not operate any equipment without the proper operating permit.***
Employees will be required to successfully complete the TVA Clearance Procedure Training.
11. ***Only authorized and properly trained and supervised personnel are permitted to operate any equipment, vehicle, valve, electrical switch, or similar machinery.***
12. ***Unless authorized, do not attempt to repair or tamper with equipment that is not functioning properly. Report all malfunctions to your supervisor.***
13. ***Keep all machinery guards, guardrails, and other protective devices in place.***
14. ***All floor openings and holes will be properly barricaded or covered and marked.***
15. ***No employee shall cross any radiation barrier, identified as a yellow and magenta rope or danger barrier, identified by red tape.***
16. ***All work areas will be maintained in an orderly manner and good housekeeping practices followed at all times. All waste, debris, and rubbish will be cleaned up daily.***
17. ***Discard and/or store oily rags, waste and similar combustible material in approved metal containers.***
18. ***The use of pocket knives is prohibited.***
19. ***Work gloves as specified are required for daily use.***

20. *All electrical cords, welding leads or air hose shall not be laid across walkways, stairways, or access ways. They shall be placed overhead when possible.*
21. *Store and use compressed gas cylinders in a secure and upright position.*
22. *All cutting torch hoses and regulators will be disconnected from the compressed gas bottles at the end of each shift.*
23. *Cutting torches or open flames shall not be used for comfort heating.*
24. *Compressed air is not to be directed at clothing, work areas, or any part of anyone's body.*
25. *Misuse of tools, equipment, or the use of make-shift tools is prohibited.*
26. *Jumping on or off equipment or vehicles, either moving or stationary is prohibited.*
27. *Riding loads, slings, the headache ball, crane hook, or other material hoisting equipment is prohibited.*
28. *Keep clear of all moving equipment. Be alert to avoid swinging or suspend loads.*
29. *Know the emergency telephone number for reporting emergencies at your work location such as fires or medical emergencies. Utilize established plant procedures for reporting emergencies. When*

reporting an emergency identify yourself, give the location of the fire and the material or equipment involved, and stay on the line until you are released by the person receiving your call unless you are in a hazardous situation.

- 30. The unauthorized use or removal of any fire protection device or other emergency equipment from its designated location is prohibited.**
- 31. Do not go to the scene of a fire or medical emergency unless assigned the responsibility to respond.**
- 32. Take 2 Rule when you arrive at the physical work location. Take 2 minutes to familiarize yourself with the work environment and identify any hazards.**

4.2 PERSONAL PROTECTIVE EQUIPMENT AND CLOTHING

- 1. The following approved personal protective equipment is required to be worn in designated areas or as directed by supervision. (This equipment is not required when you are in lunchrooms, offices, restroom, assembly rooms, or other non-work areas)**

NOTE: Items a and b shall be worn during all work activities.

- a. Hard-hats - Hard-hats and suspensions shall not be altered.**
 - b. Industrial safety glasses with side shields. Use additional eye protection (face shields, goggles, welding hoods) for operations such as welding, cutting, grinding, and inside the boiler.**
 - c. Designated protective equipment (protective suits, aprons, gloves, boots, chemical splash goggles, face shields, etc.) to prevent contact with toxic contaminants and corrosive and irritating substances.**
 - d. Respiratory protective equipment. If a job requires a respirator to be worn, your face must be kept clean shaven, a medical questionnaire will be performed, you will be trained and, in most cases be fit tested with the type respirator you are to wear.**
 - e. Earplugs and/or earmuffs.**
 - f. U.S. Coast Guard approved flotation devices where guardrails or other fall prevention devices are not provided when work is performed over or near water.**
- 2. You shall be protected by continuous or 100% fall protection when working from any unguarded work surface such as roofs, tops of duct work, excavation, and unguarded work surfaces in excess of 4 feet. Fall protection**

shall consist of standard guardrail, complete scaffolds, secured ladders, floor hole covers, ladder cages, safety nets, full-body harness and lifeline and positioning device system.

- 3. You also shall wear a full-body harness attached to a lanyard or lifeline when working in hoppers, bins, or confined spaces; on steep slopes; on structural steel, boatswains chairs, or loose material when there is a potential of being buried; and from open-sided floors or wall openings with a drop of 4 feet or greater, while working from baskets of articulating boom lifts and/or similar equipment. Floats and suspended scaffolds require full-body harnesses.**
- 4. Wear appropriate work clothing for the specific job tasks. It is recommended that cotton be worn for work because it cools better and has better protective characteristics in a fire. At a minimum, wear full length trousers, shirts with 4 inch minimum sleeves, or coveralls. Footwear shall be designed for industrial work exposures and constructed of substantial materials. Open toed shoes, sandals, and non-industrial athletic-type shoes are not permitted to be worn. (See Appendix J, Interpretation #1)**
- 5. Wear reflectorized orange vests when performing work which exposes you to moving traffic.**

4.3 CLEARANCES (See Appendix K)

- 1. Do not perform work on or near exposed energized parts of electrical equipment or circuits, mechanical equipment, pressure systems, or other devices and areas that require a clearance to control the hazards unless working under a clearance procedure. Clearance tags are not to be altered or removed except under established procedures by authorized employees.*
- 2. Use numbered identification discs to identify temporary safety grounds in conjunction with a hold order clearance procedure. This is handled through the shift supervisors, senior switchboard operators or Fossil/Electric Operator- Fossil, senior operators-hydro. The discs are placed and removed by authorized persons only.*
- 3. Use only approved grounding devices.*
- 4. Ensure that work to be completed on de-energized grounded circuits is performed with a ground between any source of energy and the work.*
- 5. Ground switches are not permitted to be used for safety grounds.*
- 6. Use only approved and tested insulated hot sticks, gloves, etc.*
- 7. Each work group will check clearance points daily before work begins.*

4.4. CONFINED SPACE ENTRY (See Appendix M)

- 1. Before personnel are permitted to enter any confined space, the atmosphere within the confined space shall be tested by a qualified person using appropriate instruments and a confined space permit issued.**
- 2. All changes or modifications to personal protective equipment, ventilation, and other equipment used within a confined space must have the approval of the supervisor.**
- 3. Personnel entering a confined space and attendant will receive training in confined space entry.**
- 4. Frequent and/or continuous testing and monitoring of the confined space atmosphere shall be carried out if hazardous environmental conditions could develop during the work period.**
- 5. Tests of the confined space atmosphere shall be conducted at the beginning of the shift, after a lunch period and after other periods of not working in the confined space.**
- 6. Toxic material shall not be heated in a confined space.**
- 7. A person showing symptoms of exposure to a hazardous environment shall be immediately removed from the confined space, and given medical assistance.**

8. *If a person is incapacitated as a result of exposure to a hazardous environment, preplanned rescue operations shall start immediately.*
9. *An attendant must be in place before any confined space entry operations begin.*
10. *Radio contact or other means of communication will be utilized between the rescue crew and the attendant.*
11. *A copy of the completed form and Confined Space Entry Checklist shall be posted at each entrance to a confined space before employees are permitted to work in the confined space. All personnel entering a confined space shall log in and out with the attendant.*
12. *Where flammable gases or vapors may be present (coating materials for example), explosion-proof equipment shall be used and remain operable.*
13. *When welding, cutting, or heating operations are performed in a confined space, ventilation will remain in operation and appropriate respiratory protection used.*
14. *Portable electrical tools, equipment, and lighting used in conductive confined spaces shall be operated at a maximum of 32 volts or supplied through a ground fault circuit interrupter.*
15. *Welding and cutting torches shall not be taken into a confined space until ready for use and not until the lower explosive limit is acceptable.*

16. *Torches shall be removed immediately after use, during lunch breaks, and at the end of the shift.*
17. *Compressed gas cylinders, except those for breathing apparatus, shall not be taken into confined spaces.*
18. *All combustibles in the vicinity of welding or cutting must be removed or covered with fire retardant blankets.*
19. *Approved types of fire extinguishers shall be maintained in the vicinity of all welding or cutting operations in confined spaces.*
20. *Warning signs or devices shall remain posted near the entrance to confined spaces to keep unauthorized personnel out.*
21. *Catalytic heaters or other fuel-burning heating equipment shall not be used in confined spaces.*
22. *Where the environment in a confined space can be immediately hazardous, a full body harness with an attached lifeline shall be worn. A written rescue procedure shall be developed and attached to the confined space entry checklist.*
23. *An attendant shall be assigned to maintain communication with persons in the confined space with either voice or visual contact.*
24. *The attendant shall not be diverted from his/her attention with the person within the confined space.*

4.5 MATERIAL HANDLING

- 1. Always determine the approximate weight of the load to be handled and select the proper lifting devices and equipment prior to attempting a lift.*
- 2. Always get help when the load is too heavy or bulky for one person.*
- 3. Always stand clear of the load so that if it swings, slips, spills, or falls, no one will be struck. Do not stand in a position where you could be caught between the load and a fixed object.*
- 4. Working under a suspended load at any time unless approved by supervision is prohibited.*
- 5. Riding on loads being hoisted or transported is prohibited.*
- 6. Flagmen, observers, or watchmen assigned to protect personnel doing maintenance work are not allowed to engage in conversation or other activities which could interfere with their assignment.*
- 7. When stacking materials, build a solid foundation and do not stack material high enough to create a hazard. In storing pipe or rods or other materials that may roll, use sufficient chocks at the base of the material.*
- 8. Keep hands and feet clear of pinch points when handling materials.*

9. *Exits, aisles, roadways and other means of access to the following types of equipment will be maintained free and clear of material, equipment and vehicles so as not to obstruct the safe means of access, egress and travel. Eye wash fountains, emergency showers, fire fighting equipment, electrical panels, switch boxes, stretchers, etc.*
10. *Remove or bend all nails from used lumber prior to discarding or storing.*
11. *All loose or light materials stored on roofs or open floors will be secured against displacement.*
12. *Place all scrap lumber, waste material, and rubbish in safe, designated locations or construction debris containers for removal and disposal.*
13. *Do not throw waste material and rubbish from upper levels without approved safeguards such as management approval, flagging the lower level and providing a watch person.*
14. *When available, use disposal chutes for removal of trash and debris from upper levels.*
15. *All materials to be transported must be loaded in a secured manner to eliminate tipping, rolling, shifting or spilling.*

4.6 BARRICADES, SIGNS, AND MARKINGS

1. *Use warning signs to provide adequate warning of*

hazards to employees and the public. Signs must be removed promptly when the hazards no longer exist.

- 2. Entering hazardous areas, identified by signs, barricades, colored tapes, ropes, or chains is not permitted unless authorization is granted by supervision.*
- 3. Use danger signs where an immediate hazard exists. The standard danger signs are black, white, and red.*
- 4. Use caution signs or warn against potential hazards. The predominating color is yellow.*
- 5. Use appropriate barrier tapes, ropes, or chains to warn of temporary hazardous conditions or areas. The following barrier colors denote the type of hazard:*

WHITE AND RED-Immediate hazard exists.

YELLOW OR YELLOW AND BLACK-
Designation of caution and marking physical hazards such as: striking against, falling, tripping and "caught in/on/between" and asbestos.

ORANGE OR ORANGE WITH LEGEND-
Electrical hazards.

YELLOW AND MAGENTA-Radiation Hazard.

- 6. Floor and wall openings will be guarded by guardrails.*

4.7 VEHICULAR OPERATIONS

- 1. Possession of a valid driver license and authorization as a G•UB•MK approved driver is required to operate a TVA or G•UB•MK owned, leased, or rented motor vehicle.**
- 2. Operation of TVA vehicles in accordance with TVA requirements and with state or local community traffic laws is an employee responsibility.**
- 3. Operation of TVA vehicles while under the influence of alcoholic beverages or drugs is prohibited and is subject to immediate termination.**
- 4. Promptly report any vehicular accident to TVA Public Safety Services and your supervisor. If the accident occurs off TVA property, it is required that it be reported to the state or local law enforcement authorities and your supervisor. Complete form TVA 255 and all accident reporting forms required by state and local authorities.**
- 5. Wear seat belts when operating or riding in a vehicle on TVA premises or on TVA authorized business outside the confines of TVA reservation.**
- 6. Getting on or off any equipment while it is in motion is prohibited.**
- 7. Riding on equipment is limited to operators of the equipment unless proper seating is provided**

for each passenger. (See Appendix J, Interpretation #2)

4.8 TOOLS, SCAFFOLD, AND LADDERS

- 1. All tools and equipment are to be maintained in serviceable condition. Any defective tool or piece of equipment will be removed from service and tagged out until repaired.*
- 2. Only use electrical hand tools that have their metal case grounded and are equipped with three conductor service cords and plugs, or double-insulated tools.*
- 3. Use 120 volt lighting systems equipped with ground-fault circuit interrupters (GFCI) or 32V or less lighting systems in all conductive environments. Electrical hand tools which are not double insulated and are used in conductive environments must be provided with ground-fault circuit interrupters (GFCI).*
- 4. Do not use electrical tools where there is a hazard of igniting flammable vapors, dusts, or gases.*
- 5. Extension cords cannot be spliced unless they are #12 wire or larger and suitable for rough or hard service.*
- 6. The use of improperly spliced extension cords is not permitted. Splices and taps are to be made using approved methods to provide current carrying capacity, mechanical strength, and insulation equivalent to the cord being spliced.*

Splicing must be accomplished by qualified individuals.

- 7. Do not use extension cords and tool service cords to lift or lower tools or other equipment.**
- 8. Hanging extension cords over nails or sharp corners is prohibited. Secure with nonconductive materials. Do not secure with wire or welding rods.**
- 9. Route temporary wiring by elevating or guarding to prevent accidental contact or damage.**
- 10. Do not use portable lamps or light stringers that are not equipped with approved bulb guards.**
- 11. Do not use a light stringer with exposed empty light sockets or broken bulbs.**
- 12. Do not use 120 volt light stringers or portable hand lights in conductive environments without GFCI's.**
- 13. Do not use extension cords that have the plug ground lugs removed or when the lugs bypass the receptacle.**
- 14. Elevate or cover extension cords that must cross a road or passageway from damage by motor vehicles or equipment.**
- 15. Use of ladders for any means other than their intended purpose or the use of defective ladders is prohibited.**

- 16. Work only from scaffolds that have been approved by a competent person and display a current signed scaffold permit/tag. (See Appendix J, Interpretation #3)**
- 17. Employees will be trained in safe use of ladders and scaffolding.**
- 18. Comply with all provisions noted on the scaffold permit, such as using alternative fall protection devices when standard guardrails cannot be installed.**
- 19. Do not load scaffolds beyond their rated capacity, which will be posted on each scaffold.**
- 20. Maintain scaffolds, platforms, runways, floors, etc., free of ice, snow, grease, mud, or any other material or equipment which will render them unsafe.**
- 21. Do not climb the cross braces or end supports of scaffolds. Use an approved ladder or stairway for access or egress.**
- 22. Do not jump on or off scaffolds.**
- 23. Do not drop tools or equipment on or off scaffold.**
- 24. Report unsafe or damaged scaffolding to your supervisor immediately so it can be inspected and corrected.**
- 25. Lean-to and prop-scaffolds are prohibited.**

- 26. Altering or attempting to move a scaffold while it is in use is prohibited.**
- 27. Do not use synthetic or natural fiber rope, wire rope, chain, or other similarly flexible material as guard rails.**
- 28. Do not work or walk under scaffold that does not have wire mesh screen installed between the top guardrail and the toe board.**
- 29. The supporting scaffold members shall be placed on fixed base plates or adjustable base plates located on a firm, rigid, smooth foundation of a nature that will prevent lateral and vertical movement. Use of unstable objects, such as loose bricks, concrete blocks, barrels, or boxes is prohibited.**
- 30. Ensure top guard rails are between 38 and 45 inches high and that mid rails and toe boards are included on scaffolds or platforms where there is a fall hazard, or the height is greater than 4 feet.**
- 31. Scaffolds and platforms are to be erected to the specifications in OSHA Standard 29 CFR 1926.451, ANSI 10.8, and the Health & Safety Manual.**
- 32. Use of 3/4" plywood as a scaffold deck is permitted with a maximum unsupported width of 18".**
- 33. Ensure metal scaffolds and towers are erected in accordance with the manufacturer's specifications and the load limits recommended are not exceeded.**

- 34. Position metal scaffolds so that they will not come in contact with energized electrical conductors.**
- 35. Plumb and level all scaffolds and towers. Use rolling scaffolds only on firm, level, and clean surfaces.**
- 36. Securely fasten all braces used in metal scaffolds.**
- 37. Cleat or secure scaffold planking at both ends to prevent movement.**
- 38. Use positive wheel locking device to prevent all rolling scaffolds from accidentally moving while the scaffold is in use.**
- 39. Move all rolling scaffolds by applying force to the base only.**
- 40. Do not allow the height of the work platform of free-standing scaffold towers to exceed four times the smallest base dimension.**
- 41. Riding on rolling scaffolds while they are being moved is prohibited.**
- 42. Before getting on a suspended scaffold, attach a lanyard from your full-body harness to your independent life line by means of a rope grab. The life line must be secured to an independent anchorage above.**
- 43. Ensure wire or fiber rope used to support scaffolds is capable of supporting at least six times the maximum intended load.**

- 44. Wire rope used to support scaffolds shall be insulated.**
- 45. Do not use step ladders as straight ladders. Legs must be fully extended and braces locked.**
- 46. Straight or extension ladders are to be provided with safety feet and must be tied off or held when in use.**
- 47. Ladders will be placed on a pitch of 1 to 4. For every one foot of vertical height there is 4 feet of horizontal separation.**
- 48. Make certain that straight or extension ladders extend at least 3 feet above the landing.**
- 49. When using ladders that are placed near doorways; block, lock or guard the door.**
- 50. Face the ladder and use both hands when ascending and descending ladders.**
- 51. Carry tools up and down a ladder in a tool holder or raise them with a hand line or hoist.**
- 52. Clean mud or grease from shoes before climbing ladders.**
- 53. Do not stand on the top 3 rungs of a ladder, the top step, or straddle a stepladder.**
- 54. Only one person at a time is permitted to work from a ladder.**

55. *Fall protection is required when working from a ladder greater than 4 feet in height above the work surface. DO NOT tie off to ladder.*
56. *Metal ladders are not to be used in locations where they may come in contact with electrical conductors, except for special work performed in 500-kV yards. This special work will be approved by the Safety Director prior to beginning work.*
57. *General purpose metal ladders are not to be used for electrical work.*
58. *Boxes, chairs, barrels, etc., are not to be used as a base for a ladder, or to access elevations.*
59. *Use a ladder safety climbing device when it is provided.*
60. *Do not use a fixed ladder from which there is a fall potential of over 20 feet unless it is equipped with an approved cage or a ladder safety climbing device.*
61. *Do not use a fixed ladder which is greater than 30 feet in length unless the ladder is provided with a cage and off-sets and rest platforms at least every 30 feet or is equipped with a ladder safety climbing device.*
62. *Employees will receive training on the safe use of ladders.*

4.9 FIRE PREVENTION

- 1. Do not move, tamper with, or use fire extinguishers for purposes other than to fight fires.*
- 2. Smoking is prohibited in all areas where flammable, combustible, or other hazardous materials are stored or used.*
- 3. Place all rags, waste, etc., soiled by combustible or flammable materials in tightly closed designated metal containers.*
- 4. Temporary heating devices may be used only if they have been approved by supervision.*
- 5. Use approved type safety containers with flashback arrestors when handling flammable liquids in hand-held containers. Containers must be labeled as to their contents.*
- 6. Shut down, bond and ground equipment using flammable or combustible liquid fuel during refueling operations.*
- 7. Smoking, open flames, exposed electrical heating elements, or other sources of ignition are not allowed in areas or rooms where painting or other hazardous compounds are used or stored.*

4.10 HOUSEKEEPING/ORDERLINESS

- 1. Maintain all aisles, stairs, walk ways, work areas and other means of access and egress in a neat and*

orderly condition. Keep materials, tools, and other equipment properly stored and neatly arranged. Air hoses, electrical cords, and welding leads are to be elevated or protected to eliminate tripping hazards and prevent damage.

4.11 ELEVATORS

- 1. Using the emergency switch to stop an elevator or to hold the elevator doors open for other than an emergency situation is prohibited.*
- 2. Attempting to leave a stalled elevator car is not permitted. Signal by means of the emergency alarm or the telephone and wait for assistance.*
- 3. Do not carry passengers or freight in an elevator while repairs, adjustments, or inspections are being made.*
- 4. Only authorized repairmen are allowed to perform maintenance on elevators.*
- 5. Do not attempt to enter or leave the elevator car until it is level with the floor landing.*
- 6. Use handles or straps to open or close manually operated doors or gates.*
- 7. Exceeding the posted capacity of elevators is prohibited.*
- 8. Flammable liquids and gases are not to be transported on personnel elevators. Freight elevators or stairs will be used. Personnel elevators are to be used with management approval only.*

9. Abuse of elevators by writing on walls, damaging telephones, and causing the elevator to stop at floors unnecessarily is prohibited.

4.12 ELECTRICAL HAZARDS

1. Designated personnel must install orange barrier tape or orange tape with a legend to designate danger areas when work is being done near energized equipment.
2. Specific supervisory authorization is required before crossing orange barrier tape.

4.13 SWITCHYARDS

1. Access to switchyards is limited to authorized personnel.
2. All equipment is to be considered energized unless properly cleared, tagged, and grounded.
3. Maintain a safe distance from exposed energized conductors when working on equipment or systems, handling material, or moving equipment.

NOTE: Do not approach or take un-insulated tools or equipment closer than applicable distances specified in Appendix L.

4. Any employee working in the switchyard must use insulated tools and equipment as directed by supervision. Inspect these protective devices before use and maintain them in a safe condition.

5. *Use only switch sticks that are in good condition and have been stored in a dry location when not in use.*
6. *Ensure switch sticks are inspected before each use and have been approved and tested as specified in plant test procedures.*
7. *Long objects are to be carried through an energized switchyard in a horizontal position. Carrying such objects on your shoulders is prohibited.*
8. *When working above ground level while in a 500-kV structure, wear conductive sole shoes.*
9. *Cranes, forklifts, bucket and ladder trucks are required to be grounded while in use in switchyards, transformer yards, or in proximity to overhead high voltage lines.*

4.14 HAND AND POWER TOOLS

1. *When work is being performed above walking and working surfaces, place hand tools in holders and/or secure them against displacement.*
2. *Do not throw tools from one location to another or drop them to lower levels.*
3. *Disconnect the power supply before changing accessories to portable power tools. This includes both electric and air.*
4. *Do not place portable power saws in an inverted position and use them as table saws.*

5. *When using a hand-held powered circular saw with a blade diameter greater than 2 inches, a constant pressure switch is required that will shut off the power when the pressure is released.*
6. *When using other rotating or reciprocating portable power tools, use a constant pressure switch that will shut off the power when the pressure is released by the operator unless the tool is equipped with a lock-on control that may be turned off by a single motion of the same finger(s) that turn it on.*
7. *Keep tools in good repair and use them only for the purpose for which they were designed.*

4.15 PNEUMATIC TOOLS

1. *Use safety clips or retainers on pneumatic tools, if the tool is designed to accommodate these features, to secure the tool in place.*
2. *Use safety pins or wire on Chicago-type airline connections to keep them from uncoupling.*
3. *Shut the pressure off and bleed the air from the line before disconnecting portable power tools unless the service airline is equipped with a quick disconnect coupling which automatically shuts the air flow off when it is disconnected.*
4. *Pressure ratings for air hose and hose connections are not to be exceeded. Defective hose must be removed from service.*

5. *Do not lay hose over ladders, stairways, scaffolds, or walkways in such a manner as to create a tripping hazard.*
6. *A relief valve is required at all source of supply when an air hose with an inside diameter of 1/2 inch or greater is used.*
7. *When changing accessories on portable power tools, shut the pressure supply off and bleed the pressure from the supply line or disconnect the power tool from the air supply.*

4.16 POWDER ACTUATED TOOLS

1. *Only authorized employees may use powder actuated tools. A permit or license is required to be carried on the workers person at all times.*
2. *The use of powder actuated tools is prohibited in explosive or flammable atmospheres.*
3. *The tool operator and helpers shall wear approved safety glasses and a face shield when using powder actuated tools.*
4. *Keep powder actuated tools and the charges under control at all times to prevent unauthorized possession or use.*
5. *Do not drive pins or fasteners into soft materials unless the material is backed by a substance that will prevent the pin or fastener from passing completely through and creating a flying missile hazard on the other side. (Unless the tool is designed to prevent the free-flight of the pin or fastener)*

6. *Periodically inspect and clean powder actuated tools. A complete functional test must be performed after any repairs. Inspect before usage.*
7. *As a minimum, the manufacturer's instructions are to be followed.*

4.17 HAZARDOUS CHEMICALS

1. *Identify the hazards and follow special precautions recommended by the manufacturer and any additional instructions specified by supervision when working with hazardous chemicals such as solvents, acids, and caustics.*
2. *Use only approved labeled containers for handling and storing hazardous materials.*
3. *Check the nearest emergency showers and eye wash fountains for proper operation prior to handling hazardous chemicals or performing maintenance on equipment involving hazardous chemicals.*
4. *Avoid skin contact when using chemicals, solvents, acids, or caustics.*
5. *If hazardous chemicals come in contact with skin or eyes, flush the area affected thoroughly with large quantities of water for 15 minutes. Seek medical attention as soon as possible after flushing.*
6. *Wash hands prior to eating or handling gum, tobacco, medication or other items to be taken orally if you*

have handled chemicals, poisons, acids, caustics, or solvents.

- 7. Chemicals must only be used where adequate ventilation is provided. Smoking, welding, open flames, or other sources of ignition are not permitted around flammable or combustible materials.*
- 8. Aerosol cans and other chemicals must be stored in accordance with manufacturer's recommendation.*
- 9. Contact the plant environmental engineer for instructions for disposal (for long-term storage) of chemicals and containers.*

NOTE: OSHA Standard 29 CFR 1910.1200 Hazard Communications, Health & Safety Manuals, Hazard Communications and Material Safety Data Sheets (MSDS) may be reviewed in the Site Manager's office (fossil) and in the Area Manager's office (hydro).

4.18 ASBESTOS

- 1. Only TVA Asbestos Contractors will be involved in asbestos abatement or intentionally exposed to airborne asbestos fibers. Asbestos abatement will be performed under separate contract.*
- 2. When a possible hazard is identified, warn all workers of the possible hazard, and bring it to the attention of supervision.*

3. *Asbestos work areas, in which the airborne concentration of asbestos can exceed the permissible exposure limit, shall be established as regulated areas. These areas are identified by warning barriers of yellow or red and black rope, tape, or chain, and standard asbestos warning signs placed at all access locations. Barriers shall not be crossed and all posted signs and instructions shall be strictly adhered to. No person other than those employees involved in asbestos abatement will enter regulated asbestos areas.*

4.19 FLY ASH

1. *Fly ash may contain heavy metals such as arsenic and silica above the OSHA permissible exposure level (PEL).*
2. *All work areas that may contain fly ash will be tested by an industrial hygienist to determine employee exposure.*
3. *Employees will be required to wear a respirator with (P100) filter and protective clothing when working in fly ash unless testing determines exposure to heavy metals is below the OSHA PEL.*
4. *No employee shall smoke, eat, chew, or place anything in the mouth while working in an area containing fly ash without thoroughly washing hands and face.*

4.20 LEAD

- 1. No employee shall be exposed to lead above the OSHA permissible exposure level (PEL) until it is determined that lead exposure is below the OSHA PEL, all employees will wear respirators and protective clothing.*
- 2. Employees exposed to lead will have blood sampling before start of work and at the completion of the work to determine lead exposure.*
- 3. No employee shall smoke, eat, chew, or place anything in the mouth while working in an area containing a lead exposure without thoroughly washing hands and face.*

4.21 LIFT TRUCK OPERATIONS

- 1. Only trained and authorized employees are to operate lift trucks.*
- 2. Check the lift truck before placing it in service. If a defect is found or develops during operation, report these conditions immediately to supervision.*
- 3. Never drive or transport loads with a lift truck while the forks are higher than necessary to clear the road surface.*
- 4. Observe regular traffic rules such as: keep to the right; do not tailgate; keep the truck under control; avoid sharp turns, etc.*

5. *Persons other than the operator are not permitted to ride on lift trucks. Operators are required to wear seat belts.*
6. *Do not operate lift trucks near the edge of unprotected loading docks, ramps, and platforms.*
7. *Keep all extremities (head, arms, feet, legs) inside the cab of the lift truck.*
8. *Do not allow anyone under the forks or load while operating the lift truck.*
9. *Shut off the engine and maintain a 50 foot distance from sources of ignition when refueling. Clean up spilled fuel immediately.*
10. *A lift truck used as a personnel elevator or a work platform must have a properly designed safety platform securely attached to the forks. Do not move the lift truck forward or reverse while people are on the platform. Contact the safety manager prior to using a fork lift as a personal hoist.*
11. *Bridge plates are to be properly placed and secured if traveling into trucks or rail cars from a loading dock or platform. Ensure that the truck or car wheels are chocked.*
12. *Always back down a ramp or incline with a load. Never turn sideways on an incline.*
13. *Always tilt the load against the backrest before moving the lift truck.*

14. *Do not overload the lift truck.*
15. *Do not handle double-tiered loads unless they are secured together.*
16. *When making overhead lifts, use a lift truck that has a substantial overhead guard installed.*
17. *When a lift truck is left unattended, load engaging means (forks) must be fully lowered, controls neutralized, power shut off and the brakes set. Block the wheel if the truck is parked on an incline.*
18. *Do not operate a lift truck on any grating floor unless the floor area is known to be structurally adequate to support the lift truck and load.*
19. *Any added or modified lifting equipment is to be load tested and the safe working load is to be permanently marked on the piece of equipment.*
20. *Excessive speed and sharp turns will cause rollover and must be avoided.*
21. *The maximum lifting capacity shall be posted on the forklift so it is visible to the operator.*

4.22 CRANES AND HOISTING EQUIPMENT

1. *Only authorized employees are to operate cranes and other hoisting equipment.*
2. *Assure the required daily checks have been completed before the crane is used.*

3. *Do not exceed the rated load capacity of a crane. Any overload conditions are for testing purposes only and then only when authorized by supervision.*
4. *Assure the load is properly rigged, centered and tag line attached before the lift is made.*
5. *Do not attempt to make a lift unless the hoist rope and rigging is free of kinks and twists.*
6. *Assure that the slings and load clear all obstacles when making a lift.*
7. *Center the hook over the load in such a manner as to prevent swinging.*
8. *Avoid making sudden directional changes during a hoisting operation.*
9. *Do not make side pull.*
10. *Do not make a lift or travel while anyone is on the load or hook. Exception-employees may be hoisted by a crane if in a properly designed cage or basket designed for that purpose with the lifting bridle secured by a shackle or attached by a closed hook which cannot open due to load position in the hook.*
11. *Do not carry loads over people unless approved by supervision and people are warned.*
12. *Test the crane brakes each time a load approaching the rated load is handled.*

13. *Lowering the load below the point where less than two full wraps of rope remain on the hoisting drum is prohibited.*
14. *Leaving your position at the controls while a load is suspended is prohibited.*
15. *Do not use limit switches as operating controls.*
16. *Give and accept only standard hand signals for all lifts. (See Appendices D-1 and D-2)*
17. *Report unsafe conditions on cranes to your supervisor.*
18. *Keep the crane cab/operating area clean.*
19. *Set loads on blocks so the slings can be removed by hand.*
20. *Do not lift oxygen, acetylene, or other compressed gas cylinders except in approved carriers.*
21. *Secure short lengths of pipe, steel, wood blocks, extra slings and other loose articles to prevent them from falling while a load is being hoisted.*
22. *Take direction only from a specifically designated supervisor when making a joint lift with another crane.*
23. *Accept signals from only one qualified signal man except in the event of an emergency. An emergency stop signal may be given by anyone.*

24. *Radio or telephone communications will be used when the distance between operator and signal man is too great to clearly see hand signals, or their vision is obstructed.*
25. *The operator and supervisor will determine when hand signals can no longer be used safely. If at any time during a lift the operator is uncertain of the signal or has a safety concern, the lift will be halted and the issue resolved.*
26. *When operating hoisting equipment the operator will not become involved in any activity that could be distracting, such as a conversation with another person.*
27. *Critical lifts will require a written lift plan.*

4.23 OVERHEAD AND GANTRY CRANES

1. *Board or leave cranes only at designated locations where safe access is provided.*
2. *Perform daily inspections and checks before putting crane in service.*
3. *Dropping or throwing objects from the crane is prohibited.*
4. *Test limit switches at the start of each shift that the crane is operated.*
5. *Assure the controls are in neutral position before closing the main power switch.*
6. *Do not deliberately bump into rail stops or another crane.*

7. *Maintain a clear unobstructed path for the operator of floor operated overhead cranes.*
8. *Do not leave the pendant or operating ropes of floor operated cranes hanging in passageways.*

4.24 CRAWLER AND TRUCK CRANES

1. *Perform daily inspections and checks before putting crane in service.*
2. *Set up the crane on a firm level surface.*
3. *Barricade the accessible areas within the swing radius of the rear of the rotating superstructure.*
4. *A minimum safe distance of 10 feet will be maintained between equipment or load and exposed energized conductors of 50 kV or less. For each 1 kV above 50 kV, an additional clearance of 0.4 inch is required.*
5. *Use cribbing to support outriggers to prevent shifting or toppling under load in soft or loose soil.*
6. *Become familiar with and use the load charts provided in the crane.*
7. *When in transit, carry the boom in line with the direction of motion.*
8. *Outriggers will be fully extended at all times. If outriggers cannot be extended, load capacity for lifting on rubber will be issued.*

4.25 SLINGS

- 1. Determine the weight of the object to be lifted and select slings with the proper lifting capacity. (See Appendices G-1 and G-2)**
- 2. Inspect all rigging equipment prior to use.**
- 3. Remove all damaged rigging and hoisting equipment from service and tag out until repaired or destroyed.**
- 4. Store slings properly to prevent damage.**
- 5. Use softeners between the sling and sharp, unyielding surfaces of the load to be lifted.**
- 6. Wire rope slings must not be bent sharper than eight times their diameter.**
- 7. Remove wire rope slings from service and tag them when any of the following conditions are present:**
 - a. Ten randomly distributed broken wires in one rope lay, or five broken wires in one strand in one rope lay.**
 - b. Wear or scraping of one-third the original diameter of the outside individual wires.**
 - c. Kinking, crushing, bird caging or any other damage resulting in distortion of the wire rope structure.**
 - d. Evidence of heat damage.**
 - e. End attachments that are cracked, deformed or worn.**
 - f. Hooks that have been opened more than 15**

percent of the normal throat opening measured at the narrowest point or twisted more than 10 degrees from the plane of the unbent hook.

- g. Corrosion of the rope or end attachments.*
- 8. Removing running rope from hoisting and load carrying service and tag them out when any of the following conditions exists:**
- a. There are six or more randomly distributed broken wires in one rope lay or three or more broken wires in one strand in one rope lay.*
 - b. Any evidence of wire breaks in the valleys between strands.*
 - c. Corroded or broken wires at end connections.*
 - d. Corroded, cracked, bent, or improperly applied end connections.*
 - e. Severe kinking, crushing, cutting, or unstranding.*
 - f. Rope diameter is reduced by more than: 3/64 inch for rope diameters up to 3/4 inch, 1/16 inch for rope diameters of 7/8 inch to 1-1/8 inch, 3/32 inch for rope diameters of 1-1/4 inch to 1-1/2 inch.*
- 9. "J-Hook" wire rope clips are preferred over U-bolts. Wire rope clips using U-bolts must be installed with the "U" shaped portion of the U-bolt in contact with the dead or short end of the rope. U-bolt nuts will be retightened immediately after initial load carrying use and at frequent intervals thereafter. (See Appendix E)**

4.26 MECHANIZED HEAVY EQUIPMENT (DOZERS, TRACTORS, SCRAPERS, ETC.)

- 1. Only trained and authorized employees are to operate heavy equipment.*
- 2. Daily inspections by the operator will be made to assure the equipment is in safe operating condition.*
- 3. Any equipment found to be unsafe shall be removed from service and reported to supervision.*
- 4. Before moving heavy equipment, determinations of road terrain conditions and overhead structures will be made in advance to assure that clearances and load capacities are not exceeded.*
- 5. Riding on equipment is limited to operators of the equipment unless proper seating is provided for each passenger. (See Appendix J, Interpretation #2)*
- 6. Do not operate equipment in excess of safe speeds or loads.*
- 7. Hearing protection shall be worn by all heavy equipment operators.*

4.27 MECHANIZED HEAVY EQUIPMENT MAINTENANCE

- 1. Shut down and place in a safe configuration all equipment before it is repaired or lubricated.*

2. *Heavy equipment or parts which are suspended or held apart by use of slings, hoists, or jacks are to be substantially blocked or cribbed before working underneath or between them. (Any unusual work situations contrary to this rule shall be reviewed and cleared through supervision).*
3. *Lower bulldozer scraper blades and loader buckets to the ground when not in use.*
4. *Shut down mechanized equipment before and during fueling operations.*

4.28 MARINE OPERATIONS

1. *Operators and deckhands shall pass the appropriate screening examinations before being assigned to work on towboats/barges.*
2. *Operators and deckhands will wear appropriate footwear with non-slip soles.*
3. *A serviceable, commercial-grade, U.S. Coast Guard approved work vest will be worn, completely tied, zipped, or snapped to provide adequate protection when working towboats and barges.*

4.29 METAL WORKING

1. *Operating machinery without authorization by supervision is prohibited.*
2. *The floor area around machines is to be maintained clear and free from grease, oil, scrap, and trash.*

3. *Keep machinery free of tools, rags, and scrap.*
4. *Know the operating capabilities of the machines used and never exceed those limits.*
5. *Before operating shears, make certain that all guards are in place and everyone is in the clear.*
6. *Keep fingers out of the area of cutting edges and other exposed moving parts.*
7. *Use a brush, push stick or other suitable means to remove chips, dust or other material from machines.*
8. *Where the work must be held in position it must be securely bolted or clamped to the table, or held in a vise or jig. Do not try to hold it by hand.*
9. *Shut off the power before setting up work on equipment such as shears, lathes, drill presses, etc.*
10. *Remove the chuck key from the chuck of a lathe or drill press immediately after its use.*
11. *Callipering or gauging is not to be attempted while the lathe or milling machine is in operation unless the device is designed for such use.*
12. *Machinery requiring cutting oils and lubricants such as pipe threading machines must be placed inside secondary containment.*
13. *Do not use a bench or floor stand grinder when any of the following conditions exist:*

- a. *Guard(s) are not installed.*
 - b. *Grinder not securely anchored.*
 - c. *If the work rest exceeds 1/8" distance from the wheel.*
 - d. *If the adjustable tongue exceeds 1/4" distance from the wheel.*
 - e. *If excess wear is evident on the grinding wheel.*
 - f. *If the wheel is chipped, cracked, out of round, or otherwise defective.*
14. *Do not use portable grinders without guards installed.*
15. *Before mounting a grinding wheel on a grinder, check the operating speed marked on the grinder and the rated safe speed of the grinding wheel. Grinding wheels are not to be mounted on grinders that operate in excess of the rated safe speed of the grinding wheel.*
16. *Adjusting the work rest or tongue guard while the grinding wheel is in motion is prohibited.*
17. *Inspect grinding wheels and discs on portable grinders before use for any cracks, damage, or wheels out of round or balance. Where any defect is evident, the wheel or disc must be removed from service immediately.*
18. *Check the grinding wheel mounting flanges for equal sizes and correct diameters. Flanges are to be at least 1/4 diameter of the wheel diameter.*
19. *Do not stand directly in front of any grinder when first starting it up.*

20. *Allow the wheel to develop its full speed before beginning work.*
21. *Never force grinding stock into the wheel of a fixed grinder or a portable grinder into the work to the point where the motor slows noticeably or the work becomes excessively hot.*
22. *Ensure the wheel is properly dressed at all times.*
23. *Do not grind on the side of the wheel unless the wheel is specifically designed for this purpose.*
24. *Store grinding wheels in a safe place designated for that purpose.*
25. *Machines will be shut off when unattended.*

4.30 WOODWORKING

1. *Operating machinery without authorization by supervision is prohibited.*
2. *Never repair, adjust, or clean machines while they are in operation.*
3. *Knives, blades, etc., are to be changed by trained persons only.*
4. *Attempting to repair stationary equipment or to replace saw blades, bits, etc., is not allowed unless the machines are de-energized and tagged out to prevent accidental startup. Exception-if the START control is of the type which cannot be energized by accidental contact (recessed or guarded push-button*

or toggle switch) and is in the immediate vicinity and under the control of the person doing the work, tag out is not necessary.

- 5. Machines must be shut off when unattended.*
- 6. Keep aisles clear and maintain good housekeeping standards. Clean up chips, sawdust, and scrap, and place them in proper containers.*
- 7. A push block must be used for pushing material into wood cutting machines. Keep hands and body out of line of cutting blades.*
- 8. Do not attempt to feed material that is too small to hold firmly into powered woodworking equipment.*
- 9. Never apply excessive force against blades.*
- 10. Do not use radial arm or swing saws if the blade will travel beyond the edge of the table. Radial arm saws will be equipped with an automatic return.*
- 11. Adjust anti-kickback fingers (both sides) and the splitter before ripping materials on a radial or table saw.*
- 12. Blade guards are required for radial, cross-cut table saws and ripsaws.*
- 13. Chain saws shall be equipped with anti-kick back chain brake, chain catcher, tip guard, and bumper spikes. Personnel using a chain saw shall wear Kevlar-padded chain saw pants or chaps, high cuff*

gloves, hearing protection, and mono goggles.

- 14. Employees are not to use a chain saw above shoulder height or allow the top corner of the cutting bar to touch wood.*

4.31 WELDING AND CUTTING

- 1. Only authorized employees are to perform welding and cutting operations.*
- 2. Prior to starting a job, check with your supervisor to see if a cutting and welding permit is required.*
- 3. Do not perform welding, cutting, or hot work on used drums, barrels, tanks, containers, or inside confined spaces prior to venting and testing the atmosphere. Clean and purge when necessary.*
- 4. Inspect all welding equipment before use. Remove defective equipment from service and tag it out until repaired or replaced.*
- 5. Protect or remove combustible material from any welding and cutting area.*
- 6. When the job application permits, use protective screens when other employees are exposed to the welding arc.*
- 7. Use non-combustible material to cover openings when cutting or welding over grated flooring.*

8. *Suspend welding cables and hoses overhead or arrange them so they will not cause a hazard.*
9. *When welding or cutting, shirt collars must be fastened, and sleeves rolled down and fastened. Wear trousers without cuffs along with footwear designed for industrial work exposures.*
10. *Approved eye protection must be worn in conjunction with industrial safety glasses when performing welding and cutting operations. (See Appendices A and B)*
11. *Ground the non-current carrying metal parts of electrically-driven welding machines.*
12. *Hearing protection shall be worn when arc gouging.*
13. *Neither terminal of the welding generator is to be bonded/grounded to the frame of the welding machine.*
14. *Do not use pipe lines containing pressure or flammable gases, flammable liquids, or conduits carrying electrical conductors for a welding ground return circuit.*
15. *Welders are not to handle the electrode holders from two different machines at the same time.*
16. *Do not coil or loop welding cable around parts of your body while it is energized.*
17. *Electrode holders will not be dipped in liquids to cool them.*

18. *Do not leave electrode holders unattended with an electrode (welding rod) left in it.*
19. *Wearing rings, metal wristbands, or other jewelry while welding is prohibited.*
20. *Special precaution will be taken when welding on wet or damp surfaces. See your supervisor for protective requirements.*
21. *Do not use welding leads that have a splice within 10 feet of the electrode holder.*
22. *Keep compressed gas cylinders beyond the range of sparks, hot slag, or flame.*
23. *Close the torch valves and shut off the gas supply whenever work is suspended.*
24. *Remove the torch and hose from confined spaces whenever work is suspended during lunch breaks and at the end of the shift. When torch and hose removal is not practicable, the cylinder valves will be closed and the regulators backed off and torch turned off to prevent any gas flow. Close cylinder and torch valves for lunch breaks.*
25. *Use only appropriate tools to ignite torches. Do not use open flames or matches.*
26. *Do not take compressed gas cylinders into confined spaces.*
27. *Bleed torch prior to disconnecting gauges.*

28. *Flash back protection device shall be installed between the torch and regulator.*

4.32 PRESSURIZED SYSTEMS AND CYLINDERS

1. *Inspect pressurized equipment and systems for damage before they are placed in service and after major repairs or modification.*
2. *Do not pressurize a non-pressure rated vessel with plant air, a compressed gas cylinder, or other sources. Use liquid at atmospheric pressure to test for leaks.*
3. *Atmospheric tanks, low pressure tanks and pressure vessels are designed and manufactured in accordance with acceptable standards and therefore may not be pressurized above the designed pressure of the vessel.*

4.33 COMPRESSED GAS CYLINDERS

1. *Do not use compressed gas cylinders if the contents are not identified by a label.*
2. *Store cylinders in well-ventilated locations.*
3. *Store cylinders containing the same gas together. Store in designated areas only. Oxygen cylinders in storage must be separated from fuel gas cylinders or combustible materials (especially oil and grease) by a minimum distance of 20 feet or by a noncombustible barrier at least 5 feet high which has a fire-resistant rating of at least one-half hour.*

4. *Smoking within 50 feet of designated flammable gas or oxygen storage facilities is not allowed.*
5. *Protect cylinders from extreme temperature, physical damage, and electric current.*
6. *Close cylinder valves and place valve caps on the cylinders when they are in storage, in transit or not connected for use.*
7. *Secure all compressed gas cylinders to a fixed structure or in portable racks or hand trucks.*
8. *Compressed gas cylinders transported by crane, hoist, or derrick shall be transported in cradles, nets, or skip pans, and never by slings, chains, or magnets.*
9. *Always store oxygen, acetylene, and other fuel gas cylinders in an upright position. Keep acetylene cylinders upright at all times except for short periods of time i.e., if necessary during transportation to a job.*
10. *Have a valve wrench or wheel ready to operate when a cylinder is in use.*
11. *Leaking cylinders must be moved, using appropriate precautions, to an isolated location out of doors.*
12. *Using oxygen as a substitute for compressed air is not allowed. Compressed gases of any kind are not to be used as a substitute for compressed air unless it is used in a system designated for such use.*

13. *Keep oil or grease away from oxygen cylinders and fittings.*
14. *Avoid storing compressed gas cylinder in high heat areas including summertime sun if possible.*

4.34 EXCAVATIONS

1. *Before starting any excavation determine if there are any underground utilities in the area which could be damaged.*
2. *Excavations 5-feet deep or more, unless in solid rock, must be shored, sheeted and braced, or sloped to such an angle that the soil is at rest (angle of repose). Support systems will be designated by a professional engineer.*
3. *Use ladders, steps, or ramps as a means of entrance and exit in excavations more than 4-feet deep. Ladders must extend a minimum of 36 inches above the top landing for mounting and dismounting.*
4. *No more than 25 feet of lateral travel in an excavation 4 feet deep or more is allowed without a means of exit.*
5. *You must consider vibrations from machinery and equipment when determining the angle at which the soil will be at rest.*
6. *Store and retain all excavated materials at least 2 feet or more away from the edge of the excavation. Keep equipment at least 2 feet away from the edge of the excavation.*

7. *Daily inspections of excavations will be made by a competent person. If evidence of possible cave-ins or slides is apparent, all work in the excavation is to cease until the necessary precautions have been taken to safeguard the employees.*
8. *Warning devices, such as signs, lights, and adequate barricades will be installed around unattended excavations.*
9. *Excavations 4 feet or greater could be considered a confined space requiring a permit and atmosphere testing before employees are allowed to enter.*

4.35 ABRASIVE BLASTING

1. *Use sandblasting equipment (hopper, hoses, nozzles, etc.) that is electrically bonded and grounded through the sandblasting equipment.*
2. *Employees transferring sand or working near sandblasting where there are particles of sand flying will wear approved goggles and respiratory protection.*
3. *Use adequate ventilation in enclosed areas.*
4. *Install suitable warning signs before sandblasting.*
5. *Unauthorized personnel are not to enter a sandblasting area.*

6. *Use a nozzle equipped with a "deadman" type control lever.*
7. *Removal of lead-based coatings shall be done in accordance with OSHA Standard 19 CFR 1926.62, Lead, and Health & Safety Manual, which are available for review at the Site Manager's office (fossil) and Area Manager's office (hydro). Determine that sandblasting head has sufficient protection for lead based coatings.*
8. *Air compressors used for breathing air shall be approved before use. Air will be analyzed frequently for carbon monoxide or an inline alarm system installed.*

4.36 SPRAY PAINTING

1. *Obey all NO SMOKING rules and any other warning or caution signs.*
2. *The total amount of flammable paints, thinners, etc., is not to exceed a one day supply in the immediate vicinity of the paint spray operation.*
3. *Store and dispense bulk flammable or combustible materials only in designated areas, apart from the spraying operations. Electrically bond and ground the containers before pouring flammable coatings, solvents and thinners from one container to another. (See Appendix J, Interpretation #6)*
4. *Keep containers of coating materials and solvents tightly closed when not in use.*

5. Promptly clean up all spills of coating materials, solvents, and thinners.
6. Only place waste material in the special containers provided for such material.
7. Check for adequate ventilation in spray booths or when spraying operations are conducted indoors or in confined spaces.
8. Before operating airless high pressure painting equipment, ground the spray gun and the object to be painted, unless equipment is designed to be operated at other than ground potential.
9. Always make sure that the fluid pressure has been released from the hose before disconnecting the gun or removing the spray nozzle from the spray equipment.
10. Always follow the manufacturer's recommendations when cleaning spraying equipment.
11. Pointing a spray gun at any part of your body or at anyone else is prohibited.

4.37 WORKING ABOVE OR NEAR WATER

1. No employee shall work above water or near water without wearing an U.S. Coast Guard flotation device.
2. A life ring with a minimum of 90 feet of rope shall be located in the immediate work area so no more than 100 feet lateral travel is required.

3. *A rescue skiff shall be immediately available to perform an immediate rescue.*
4. *Work above water shall require fall protection of all employees, no matter what height.*

5. CORRECTIVE DISCIPLINARY ACTIONS

G•UB•MK endorses the concept of fair dealing in conjunction with administering corrective disciplinary actions. Disciplinary action is not intended to "punish", but rather to "correct", so the inappropriate behavior of the employee is not repeated. It is our approach to give constructive criticism to let employees know that improvement is expected and the time frame for this improvement to be made.

In most instances, corrective disciplinary action will be the result of a violation of Work Rules, Safety Rules and/or policies and procedures. It is imperative that every employee know these rules and policies, since violation of these rules is considered extremely serious and a detriment to the job and to the safety and welfare of all employees.

ENFORCEMENT POLICY

Disciplinary actions include written warnings, disciplinary suspension, and discharge. The type of discipline exercised will depend on the circumstances and seriousness of the offense.

Written Warning

This is an official statement to the employee setting forth the details for which the employee is being issued a warning and the specific corrective action(s) expected.

When a written warning is issued a Written Notification of Unsafe Act and/or Unsatisfactory Performance Form will be completed and placed in the employee's personnel file.

Disciplinary Suspension/Disciplinary Discharge

A disciplinary suspension, without pay, may be given for improper work related behavior that requires more severe disciplinary action than a written warning, but does not warrant a discharge for cause.

When suspending or discharging an employee, the appropriate supervisor will meet with the employee and his union representative (steward) and explain the reason(s) for the suspension or discharge.

When an employee is suspended or discharged for cause a Record of Disciplinary Suspension or Discharge Form will be completed and placed in the employee's personnel file.

Disciplinary Interviews

Employees will be given the opportunity to have union representation (Steward, Jobsite Representative) present during a disciplinary interview meeting.

6. SAFETY ENFORCEMENT POLICY AND GUIDELINES

Our policy is that every Site/Area Manger, Superintendent, and Foreman is responsible for the strict enforcement of safety procedures, practices and rules. Employees do not have the right to violate these procedures, practices and rules at any time. We expect that prompt action to correct any violations will be taken and further, that disciplinary action will be followed.

- 1. Unsafe acts and/or practices not considered immediately dangerous to life and health, such as failure to wear appropriate safety eye wear, hard hats and hearing protection, etc., will result in disciplinary action.*

(Note: The type of discipline exercised will depend on the circumstances and seriousness of the safety violation.)

2. Unsafe acts and/or practices considered to be IMMEDIATELY DANGEROUS TO LIFE AND HEALTH will result in immediate termination of employment without prior warning or reprimand. Such acts consisting of, but not limited to the following:

- **Failure to use appropriate fall protection while working from an elevation (including roofs, ducts and similar areas without railings) four feet or more above the ground or floor surface.**
- **Failure to wear required respiratory equipment.**
- **Employees who are determined to be under the influence of drugs or alcohol.**
- **Fighting**
- **Entering confined space without first testing the atmosphere and/or failing to fully obey an entry permit.**
- **Entering a radiation restricted area barricaded by yellow or magenta rope or tape.**
- **Failure to comply fully with hot work permits.**
- **Riding equipment not designed for transporting employees. (Cranes, loads, forklifts, bulldozers, etc.)**

- *Unsafe and/or reckless operation of motorized equipment. (Cranes, trucks, sedans, forklifts, bulldozers, etc.)*
- *Failure to follow the requirements of the Clearance Procedure.*
- *Failure to wear life vests when working over, adjacent to, or in water.*
- *Failure to cover or barricade openings.*

7. SUBSTANCE ABUSE PROGRAM POLICY

Prohibit the possession, sale, use, purchase, distribution or presence in the body of controlled substances or alcohol beverages by employees on TVA property, premises, facilities or work places. Fitness for Duty: Employees must report for duty in the appropriate mental and physical condition necessary to perform work in a safe, competent manner, free of controlled substances and alcohol. Employees reasonably suspected of possession, use, sale or purchase of controlled substances and/or alcoholic beverages while on TVA property will be suspended without pay pending the results of chemical screens and alcohol tests.

PURPOSE

The purpose of this Program is to establish a drug and alcohol free work place that contributes to a safe, healthy work environment. This Program is established consistent with the provisions of Article II, H, of the Project Maintenance and Modifications Agreement (PMMA) and

the Construction Project Agreement (CPA) and with the provisions of the TVA Partners' Contract Agreements with TVA. This Program applies to all employees of TVA Partners. Designated subcontractors will be required to have a program with similar major provisions.

GENERAL

Substance Abuse and Mental Health Service Administration (SAMHSA) National Institute on Drug Abuse (NIDA) certified laboratory will perform all chemical screens specimens and a certified Electronic Breath Alcohol Tester for alcohol tests.

PROGRAM

ORIENTATION AND POST HIRE SCREENING

- *Everyone will be tested before hire and annually thereafter.*
- *You will receive orientation in the policies and procedures of the Substance Abuse Program.*
- *You will be requested to sign the Substance Abuse Program Statement of Understanding. Refusal to sign will result in a permanent ban from TVA.*
- *You will be requested to sign a chemical screening consent form. Refusal to sign will result in a permanent ban from TVA.*

- *If test is negative, you will be hired or allowed to continue work. If the test is non-negative you will be removed from the site until confirmation of the test.*
- *If test is positive, you will not be hired or if already an employee, you will be terminated.*

SCREENING BASED UPON REASONABLE SUSPICION/ ACCIDENTS/MEDICAL TREATMENT

- *Employees whose performance or behavior causes management to question their fitness for duty may be required to take a drug and/or alcohol test.*
- *Basic guidelines for reasonable suspicion include, but are not limited to:*
- *Extreme or sudden changes in personality, demeanor, or interactions with other employees.*
- *Regular or recurrent attendance problems and/or tardiness.*
- *Involvement in an accident involving TVA equipment or vehicles; a work injury or "near misses" in which injury or property damages is narrowly avoided.*

- *Employees required to take a drug and/or alcohol test will be suspended pending the test results. If test results are negative, the employee is reinstated, with pay for the suspended time per G•UB•MK/TVA Policy. If the results are positive, the employee will be terminated.*

RANDOM SCREENING

Random drug testing may be conducted without prior notice.

- *A minimum rate of 10% of all employees (craft and staff) on the payroll list at any fossil location, or all hydro locations within an area or other work location will be subject to random testing.*
- *Random selections will be by computer draw.*

ALCOHOL TESTING

- *Alcohol testing will be done only for reasonable suspicion. Testing for alcohol shall be done by means of a breath analyzer or alcohol blood test.*
- *The testing limit for alcohol will be 0.04 percent content (BAC) by volume. Test results at 0.04 BAC or above will result in termination.*

CONFIRMATION OF POSITIVE RESULTS

All initial positive tests will automatically have a confirmatory test conducted and if still positive, reviewed by the Medical Review Officer before being considered positive.

CONFIDENTIALITY

- *All drug screen information and test results are confidential and shall not be communicated to any outside individual without the prior written consent of the employee. Results will be released to a government agency that has a legitimate "need-to-know".*
- *Information will be divulged to internal company management personnel on a strict need-to-know basis.*

TERMINATION AND ELIGIBILITY FOR RE-EMPLOYMENT

- *Employees who test positive for drugs or alcohol or refuse to sign the required recognition and/or consent forms will be terminated and not eligible for rehire as follows:*
- *First Occurrence – 3 year rehiring restriction.*
- *Second Occurrence – Permanent ban on rehiring.*
- *Refusal to take a drug test will be treated as a positive test result.*
- *Tampering with a drug test will result in permanent ban.*
- *An employee who has previously tested positive and becomes eligible for rehire may be hired on a probationary basis. Employees seeking reinstatement*

will remain in probation status for a period of two (2) years and will be subject to routine, periodic, and intermittent testing following their return to work. Employees will be required to sign the Conditional Employment Agreement upon return to work. Refusal to sign will result in termination.

TVA SECURITY RULES AND REGULATIONS

Employees are required to abide by the TVA rules and regulations and policy requirements regarding use and/or possession of alcohol and drugs and searches when employed on TVA property and premises.

8. TVA PLANT SECURITY RULES AND REGULATIONS

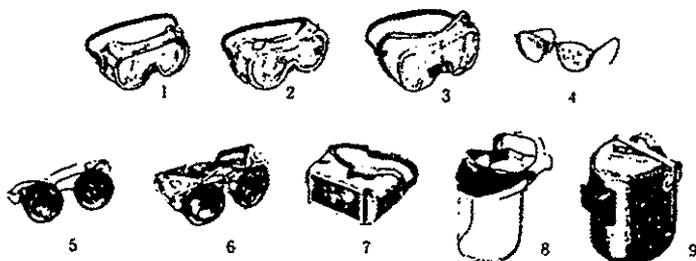
- 1. No firearms, explosives, alcoholic beverages, or illegal drugs are permitted on the plant site.*
- 2. All persons, packages, and vehicles are subject to being searched. Routine unannounced electronic checks and searches by the Public Safety Service will be conducted.*
- 3. Any employee found intoxicated or under the influence of alcoholic beverages or other drugs which may impede the ability to work safely will be suspended while an investigation is made to determine possible justification for more severe administrative or criminal action.*

- 4. Employees will not be allowed access to the controlled employee's parking area except during shift change, during an emergency, or after clearing with Public Safety. In an emergency situation, access will be cleared through the Public Safety Service. Employees shall enter and leave the project only through designated portals.**
- 5. No TVA materials or equipment will be taken from the plant site without written authorization.**
- 6. All vehicles leaving the plant protected area will be inspected by a Public Safety Officer.**
- 7. Vehicles which regularly enter and leave the protected area will be issued a distinctive decal or other identification. All other vehicles and their occupants must be registered with the Public Safety Service upon entering and leaving the protected area. All vehicles in the protected area must display a decal or a visitor's pass.**
- 8. A list of all privately or contractor owned tools will be given to the Public Safety Service before these tools are permitted into the protected area. No privately owned tools will be taken from the protected area of the plant unless inspected by a Public Safety Officer. Special provisions may be made for contractors and subcontractors furnishing their own tools and equipment.**
- 9. Project traffic regulations are to be observed at all times. All posted speed limits may be controlled by radar.**

**VIOLATIONS OF THE ABOVE REQUIREMENTS
OR REGULATIONS MAY RESULT IN SEVERE
DISCIPLINARY ACTIONS, INCLUDING
TERMINATION. ANY EMPLOYEE VIOLATING
JOB SECURITY MAY BE SUSPENDED WHILE
AN INVESTIGATION IS MADE TO DETERMINE
ADMINISTRATIVE OR CRIMINAL ACTION. EACH
EMPLOYEE SHALL COOPERATE WITH AND
ASSIST THE TVA PUBLIC SAFETY OFFICERS IN
CARRYING OUT THEIR DUTIES AND
RESPONSIBILITIES FOR THE SAFETY AND
SECURITY ON THE PROJECT AND EMPLOYEE.
VIOLATIONS OF OTHER RULES AND
REGULATIONS NOT COVERED ABOVE WILL BE
HANDLED UNDER THE APPROPRIATE
PROCEDURES.**

APPENDIX A

EYE AND FACE PROTECTION



- | | |
|---|--|
| <p>1. GOGGLES, Flexible Fitting,
Regular Ventilation</p> <p>2. GOGGLES, Flexible Fitting,
Hooded Ventilation</p> <p>3. GOGGLES, Cushioned Fitting,
Rigid Body</p> <p>4.* SAFETY GLASSES</p> <p>5.* WELDING GOGGLES, Eyecup
Type, Tinted Lenses</p> <p>CHIPPING GOGGLES, Eyecup
Type, Clear Safety Lenses
(Not illus.)</p> | <p>6.* WELDING GOGGLES, Coverspec
Type, Tinted Lenses</p> <p>CHIPPING GOGGLES, Coverspec
Type, Clear Safety Lenses
(Not illus.)</p> <p>7.* WELDING GOGGLES, Coverspec
Type, Tinted Plate Lens</p> <p>8. FACE SHIELD (Available with
Plastic or Mesh Window)</p> <p>9.* WELDING HELMETS</p> |
|---|--|

*Refer to appendix B. Required Shades for Filter Lenses and Glasses.

APPLICATIONS		
OPERATION	HAZARDS	RECOMMENDED PROTECTORS
Acetylene-Burning Acetylene-Cutting Acetylene-Welding	Sparks, Harmful Rays, Molten Metal, Flying Particles	5, 6, or 7
Chemical Handling	Splash, Acid Burns, Fumes	2, 8 (For severe exposure add 8 over 2)
Chipping	Flying Particles	1, 3, 4, 5, or 6
Electrical Welding	Sparks, Intense Rays Molten Metal	9 in combination with 4, in tinted lenses.
Grinding	Flying Particles	1, 3, or 4 (4 in combination with 8)
Laboratory	Chemical Splash	2 (8 when in combination with 4)
Machining	Flying Particles	1, 3, 4, or 8
Spot Welding	Flying Particles, Sparks	1, 3, 4, or 8

APPENDIX B

REQUIRED SHADES FOR FILTER LENSES AND GLASSES

Shade selection guide for lenses and glasses

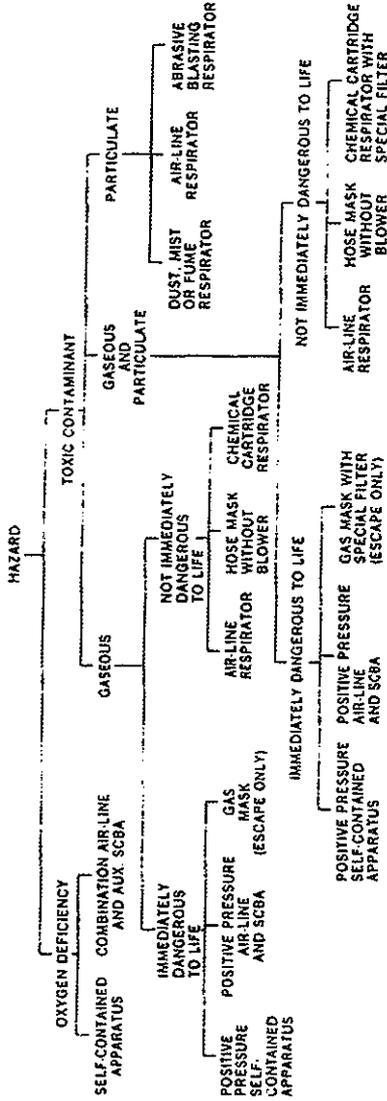
Operation

Shade No.

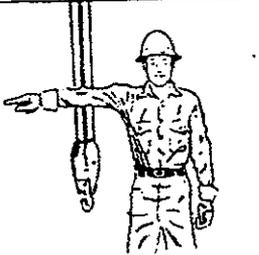
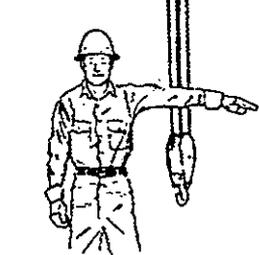
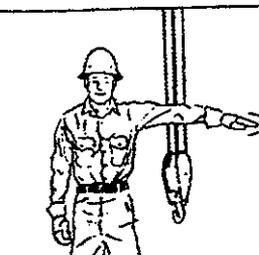
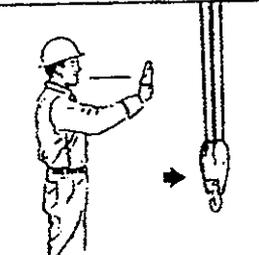
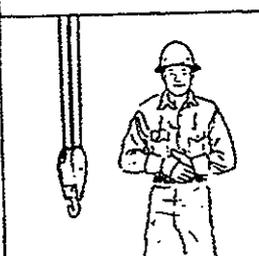
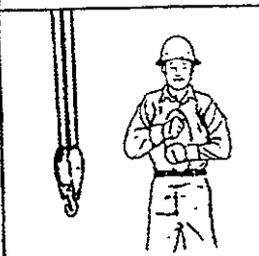
Atomic hydrogen welding-----	10-14
Carbon Arc welding-----	14
Shielded metal arc	
1/16, 3/32, 1/8, 5/32" diameter electrodes -----	10
3/16, 7/32, 1/4" diameter electrodes-----	12
5/16, 3/8" diameter electrodes-----	14
Inert-gas metal-arc welding (nonferrous):	
1/16, 3/32, 1/8, 5/32" diameter electrodes -----	11
Inert-gas metal-arc welding (ferrous):	
1/16, 3/32, 1/8, 5/32" diameter electrodes -----	12
Gas Welding	
Heavy - 1/2" and over-----	6 or 8
Medium - 1/8 to 1/2"-----	5 or 6
Light - up to 1/8"-----	4 or 5
Cutting	
Heavy - 6" or over-----	5 or 6
Medium - 1 to 6"-----	4 or 5
Light - up to 1/8"-----	3 or 4
Torch Brazing-----	3 or 4

Note: In gas welding or oxygen cutting where the torch produces a high intensity yellow light, a filter or lens that absorbs the yellow or sodium light should be used.

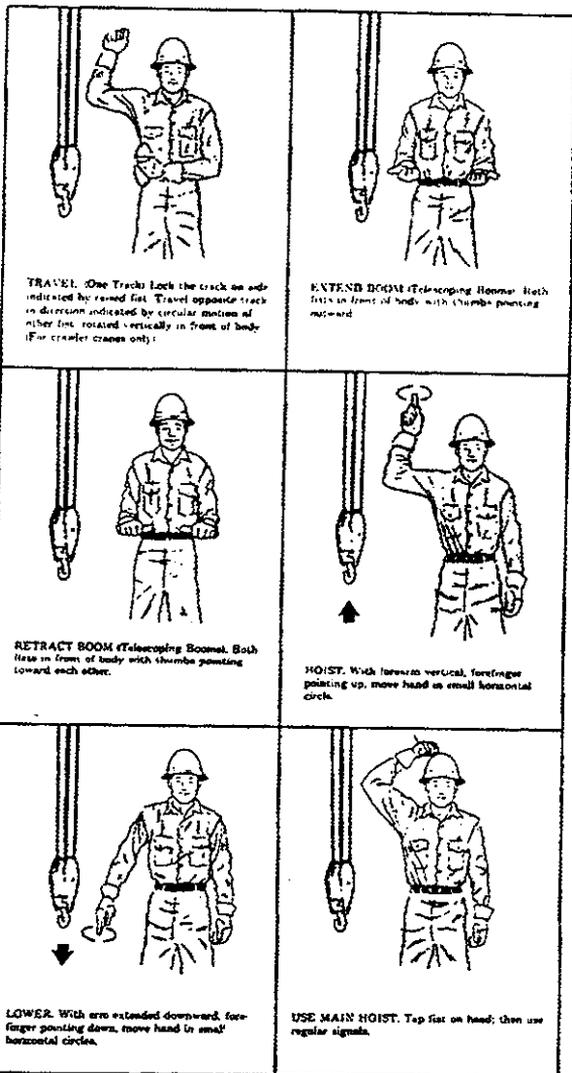
APPENDIX C RESPIRATOR SELECTION



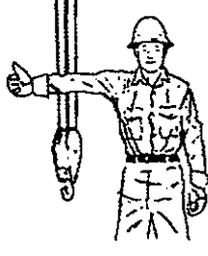
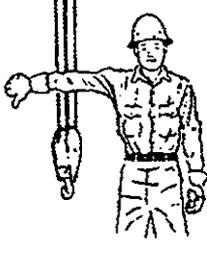
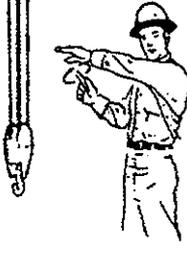
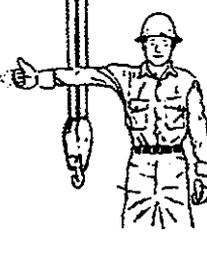
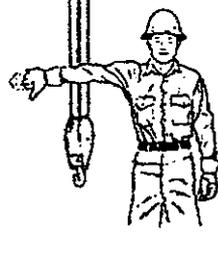
APPENDIX D-1 MOBILE CRANE HAND SIGNALS

	
<p>SWING Arm extended palm with finger in direction of swing of boom</p>	<p>STOP Arm extended, palm down, hold position rigidly</p>
	
<p>EMERGENCY STOP Arm extended, palm down, move hand rapidly right and left</p>	<p>TRAVEL Arm extended forward, hand open and slightly raised, make pushing motion in direction of travel</p>
	
<p>DOG EVERYTHING Clasp hands in front of body</p>	<p>TRAVEL (Both Tracked) Use both fists in front of body, making a circular motion about each other, indicating direction of travel: forward or backward. (For crawler cranes only.)</p>

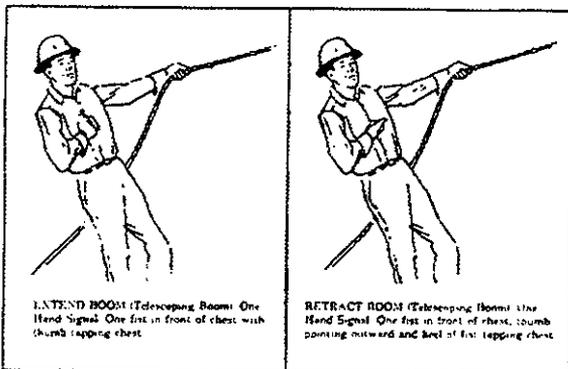
APPENDIX D-1 MOBILE CRANE HAND SIGNALS (CONTINUED)



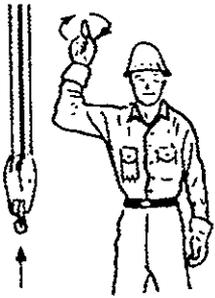
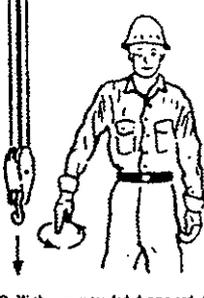
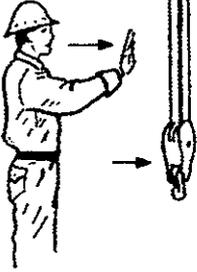
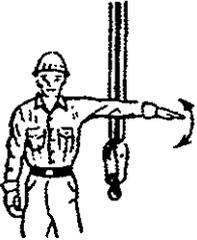
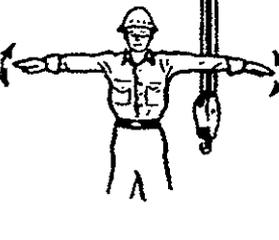
APPENDIX D-1 MOBILE CRANE HAND SIGNALS (CONTINUED)

 <p>USE WHISTLE. Whistle: Hoist. Tap elbow with one hand, then use regular signal.</p>	 <p>RAISE BOOM. Arm extended, fingers closed, thumb pointing upward.</p>
 <p>LOWER BOOM. Arm extended, fingers closed, thumb pointing downward.</p>	 <p>MOVE SLOWLY. Use one hand to give any motion signal and place other hand motionless in front of hand giving the motion signal. Hoist slowly shown as example!</p>
 <p>RAISE THE BOOM AND LOWER THE LOAD. With arm extended, thumb pointing up, flex fingers in and out as long as load movement is desired.</p>	 <p>LOWER THE BOOM AND RAISE THE LOAD. With arm extended, thumb pointing down, flex fingers in and out as long as load movement is desired.</p>

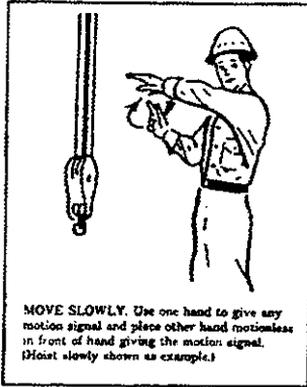
APPENDIX D-1
MOBILE CRANE HAND SIGNALS (CONTINUED)



APPENDIX D-2 OVERHEAD CRANE HAND SIGNALS

	
<p>HOIST. With forearm vertical, forefinger pointing up, move hand in small horizontal circle.</p>	<p>LOWER. With arm extended downward, forefinger pointing down, move hand in small horizontal circles.</p>
	
<p>BRIDGE TRAVEL. Arm extended forward, hand open and slightly raised, make pushing motion in direction of travel.</p>	<p>TROLLEY TRAVEL. Palm up, fingers closed, thumb pointing in direction of motion, jerk hand horizontally.</p>
	
<p>STOP. Arm extended, palm down, move arm back and forth.</p>	<p>EMERGENCY STOP. Both arms extended, palms down, move arms back and forth.</p>

**APPENDIX D-2
OVERHEAD CRANE HAND SIGNALS (CONTINUED)**



APPENDIX D-3 MARINE OPERATION HAND SIGNALS

HAND SIGNALS

Along with much of the terminology that originated on the river, so has a set of hand signals. Learn these signals well. They are absolutely necessary while working on the tow, riding the head, and for the safety of your fellow crew members.

 <p>CUT ENGINES</p> <p>Drop arms from shoulder height to cross position.</p>	 <p>STRAIGHT AHEAD</p> <p>Face direction of travel. Rotate arms forward.</p>
 <p>BACK UP PORT</p> <p>Face direction of travel. Point right hand. Rotate left arm.</p>	 <p>FULL ASTERN</p> <p>Face direction of travel. Rotate both arms</p>

**APPENDIX D-3
MARINE OPERATION HAND SIGNALS (CONTINUED)**

 <p align="center">STARBOARD</p> <p>Face direction of travel. Point right hand to starboard.</p>	 <p align="center">ALL CLEAR</p> <p>Raise extended arms directly overhead when clear.</p>
 <p align="center">BACK UP STARBOARD</p> <p>Face direction of travel. Point left hand to left. Rotate right hand.</p>	 <p align="center">CLEAR STARBOARD</p> <p>Watch obstruction. Raise right hand above head when clear.</p>
 <p align="center">FORWARD PORT</p> <p>Face direction of travel. Point left hand. Rotate right arm.</p>	 <p align="center">DISTRESS</p> <p>Raise and lower both arms. Palms forward.</p>

**APPENDIX D-3
MARINE OPERATION HAND SIGNALS (CONTINUED)**



PORT

Face direction of travel. Point left hand to port side.



TAKE OFF LINES

Face direction of travel. Raise arms to shoulder height, palms up.



FORWARD STARBOARD

Face direction of travel. Point right hand. Rotate left arm.

APPENDIX E WIRE ROPE U-BOLT CLIPS

Application of Wire Rope U-Bolt Clips

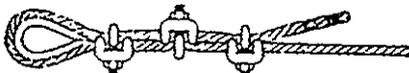
CROSBY TYPE



1. **CORRECT METHOD**—U-Bolts of clips on short end of rope. (No distortion on live end of rope.)



2. **WRONG METHOD**—U-Bolts on live end of rope. (This will cause mashed spots on live end of rope.)



3. **WRONG METHOD**—Staggered clips: two correct and one wrong. (This will cause a mashed spot in live end of rope due to wrong position of center clip.)
4. After rope is in service and is under tension, tighten clips to take up decrease in rope diameter.

Number of Crosby or Safety Clips and Distance
Between Clips Needed for Safety

Diameter of Rope (Inches)	Number of Clips	Distance Between Clips
1/4 - 3/8	3	2-1/4"
7/16 - 5/8	3	3-1/4"
3/4 - 1-1/8	4	6-3/4"
1-1/4 - 1-1/2	5	9"
1-5/8 - 1-3/4	6	10-1/2"
2" and over	7	6 times diam. of cable

APPENDIX F RIGGING

Good and Bad Rigging Practices

USE OF CHOKERS



Bad—Because of cutting action of eye splice on running line



Bad—Bolt on running line can work loose



Good
No cutting action on running lines

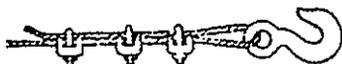


Good

EYE SPLICES



Bad Practice—
Wire rope knot with clip.
Efficiency 50% or less



Bad Practice—Thimble should be used to increase strength of eye and reduce wear on rope

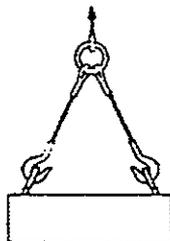


Good Practice—
Note use of thimble in eye splice

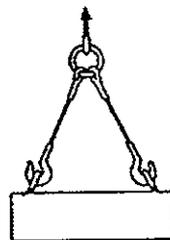


Good Practice—
Use of thimble in eye splice

HOOK SLINGS



Bad Practice
Hook openings should be turned out

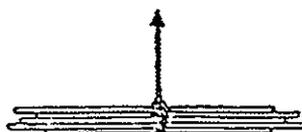


Good Practice—
Hooks are turned out

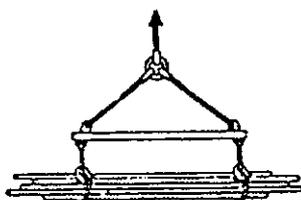
APPENDIX F RIGGING (CONTINUED)

Good and Bad Rigging Practices

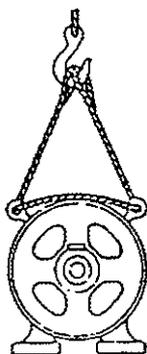
Double slings shall be used when hoisting two or more pieces of material over 12 feet long



Wrong—Load over
12' long



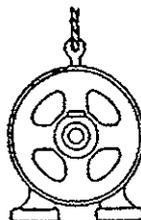
Right—Load over
12' long



Bad Practice—Lifting on
eye bolts from an angle
reduces safe loads as
much as 90%

EYE BOLTS

Vertical lift
on eyebolt is
good practice



HOISTING STRUCTURAL STEEL



Bad Practice—
Can bend flanges
and cut rope



Good Practice—
Use space blocks
and pad corners

SUSPENDING NEEDLE BEAMS OR SCAFFOLDS



Bad Practice—
Steel can cut
rope



Good Practice—
Sharp corners
padded

APPENDIX G-1 RATED CAPACITIES FOR SINGLE LEG SLINGS

6 X 19 AND 6 X 37 CLASSIFICATION IMPROVED PLOW
STEEL GRADE ROPE WITH FIBER CORE (CF)

Rope Die (Inch) Constr.		Rated Capacities, Tons (2,000 lb) Choker						Vertical Basket*		
		HT	MS	S	HT	MS	S	HT	MS	S
1/4	6 x 19	0.49	0.51	0.55	0.37	0.38	0.41	0.99	1.0	1.1
5/16	6 x 19	0.76	0.79	0.85	0.57	0.59	0.64	1.5	1.6	1.7
3/8	6 x 19	1.1	1.1	1.2	0.80	0.85	0.91	2.1	2.2	2.4
7/16	6 x 19	1.4	1.5	1.6	1.1	1.1	1.2	2.9	3.0	3.3
1/2	6 x 19	1.8	2.0	2.1	1.4	1.5	1.6	3.7	3.9	4.3
9/16	6 x 19	2.3	2.5	2.7	1.7	1.9	2.0	4.6	5.0	5.4
5/8	6 x 19	2.8	3.1	3.3	2.1	2.3	2.5	5.6	6.2	6.7
3/4	6 x 19	3.9	4.4	4.8	2.9	3.3	3.6	7.8	8.8	9.5
7/8	6 x 19	5.1	5.9	6.4	3.9	4.5	4.8	10.0	12.0	13.0
1	6 x 19	6.7	7.7	8.4	5.0	5.8	6.3	13.0	15.0	17.0
1-1/8	6 x 19	8.4	9.5	10.0	6.3	7.1	7.9	17.0	19.0	21.0
1-1/4	6 x 37	9.8	11.0	12.0	7.4	8.3	9.2	20.0	22.0	25.0
1-3/8	6 x 37	12.0	13.0	15.0	8.9	10.0	11.0	24.0	27.0	30.0
1-1/2	6 x 37	14.0	16.0	17.0	10.0	12.0	13.0	28.0	32.0	35.0
1-5/8	6 x 37	16.0	18.0	21.0	12.0	14.0	15.0	33.0	37.0	41.0
1-3/4	6 x 37	19.0	21.0	24.0	14.0	16.0	18.0	38.0	43.0	48.0
2	6 x 37	25.0	28.0	31.0	18.0	21.0	23.0	49.0	55.0	62.0

and for MS and S slings is
20 or greater where:

D = Diameter of curvature
around which the body
of the sling is bent.

d = Diameter of rope.

MS = Mechanical Splice
S = Swaged or Zinc Poured

*These values only apply
when the D/d ratio for HT
slings is 10 or greater

HT = Hand Tucked Splice
and Hidden Tuck Splice

For hidden tuck splice
(WRC) use values in
HT columns.

APPENDIX G-1 RATED CAPACITIES FOR SINGLE LEG SLINGS

6 X 19 AND 6 X 37 CLASSIFICATION IMPROVED PLOW STEEL
GRADE ROPE WITH INDEPENDENT WIRE ROPE CORE (WRC)

Rope Dia (Inches)	Constr	Rated Capacities, Tons (2,000 lb)						Vertical Basket*		
		Vertical			Choker			HT	MS	S
		HT	MS	S	HT	MS	S			
1/4	6 x 19	0.63	0.66	0.59	0.40	0.42	0.44	1.0	1.1	1.2
5/16	6 x 19	0.81	0.87	0.92	0.61	0.65	0.69	1.6	1.7	1.8
3/8	6 x 19	1.1	1.2	1.3	0.86	0.93	0.98	2.3	2.5	2.6
7/16	6 x 19	1.5	1.7	1.8	1.2	1.3	1.3	3.1	3.4	3.5
1/2	6 x 19	2.0	2.2	2.3	1.5	1.6	1.7	3.9	4.4	4.6
9/16	6 x 19	2.5	2.7	2.9	1.8	2.1	2.2	4.9	5.5	5.8
5/8	6 x 19	3.0	3.4	3.6	2.2	2.5	2.7	6.0	6.8	7.2
3/4	6 x 19	4.2	4.9	5.1	3.1	3.6	3.8	8.4	9.7	10.0
7/8	6 x 19	5.5	6.6	6.9	4.1	4.9	5.2	11.0	13.0	14.0
1	6 x 19	7.2	8.5	9.0	5.4	6.4	6.7	14.0	17.0	18.0
1-1/8	6 x 19	9.0	10.0	11.0	6.8	7.8	8.5	18.0	21.0	23.0
1-1/4	6 x 37	10.0	12.0	13.0	7.9	9.2	9.9	21.0	24.0	26.0
1-3/8	6 x 37	13.0	15.0	16.0	9.6	11.0	12.0	25.0	29.0	32.0
1-1/2	6 x 37	15.0	17.0	19.0	11.0	13.0	14.0	30.0	35.0	38.0
1-5/8	6 x 37	18.0	20.0	22.0	13.0	15.0	17.0	35.0	41.0	44.0
1-3/4	6 x 37	20.0	24.0	26.0	15.0	18.0	19.0	41.0	47.0	51.0
2	6 x 37	26.0	30.0	33.0	20.0	23.0	25.0	53.0	61.0	66.0

HT = Hand Tucked Splice
For hidden tuck splice
(WRC) use Table I
values in HT columns.

S = Swaged or Zinc Poured
Socket

MS = Mechanical Splice

for MS and S slings is 20 or
greater where:

D = Diameter of curvature
around which the body
of the sling is bent.

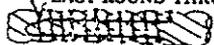
*These values only apply
when the D/d ratio for HT
slings is 10 or greater and

d = Diameter of rope.

APPENDIX H

KNOTS AND HITCHES

END LAST ROUND THRU LOOP



WHIPPING—STEP 1 START
ROUNDS OPENED TO CLARIFY



WHIPPING—STEP 2 TO CENTER



WHIPPING CORRECT PROCEDURE



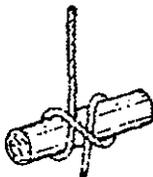
SQUARE KNOT



SHEET BEND



BOWLINE



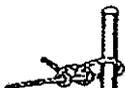
CLOVE HITCH



ROLLING HITCH



RUNNING
BOWLINE



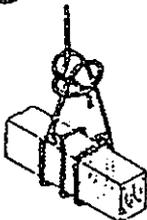
TWO HALF
HITCHES



ROUND TURN AND
TWO HALF HITCHES

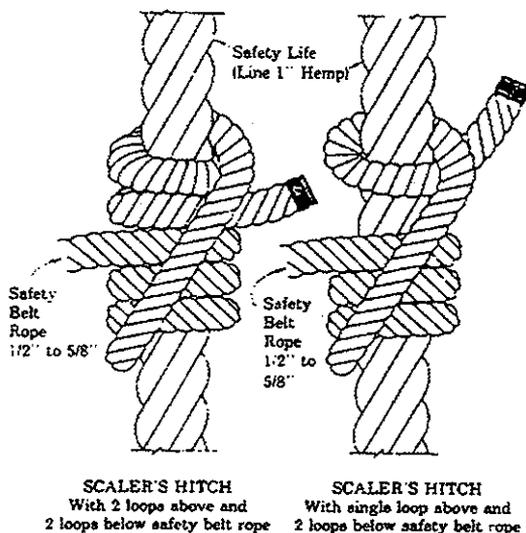


TIMBER HITCH
AND
HALF HITCH



SCAFFOLD
HITCH

APPENDIX I SCALER'S HITCH (PIGTAIL)



NOTE

Due to the significant reduction in the strength of the lifeline/lanyard (in some cases, as much as 70 percent reduction), the sliding-hitch knot should not be used for lifeline/lanyard connections except in emergency situations where no other available system is practical. The "one-on-one" sliding hitch knot should never be used because it is unreliable in stopping a fall. The "two-and-two" or "three-and-three" know (preferable), may be used in emergency situations; however, care should be taken to limit free fall distance to a minimum because of reduced lifeline/lanyard strength.

APPENDIX J

Interpretation #1

"Footwear shall be designed for industrial work exposures and constructed of substantial materials."

Industrial work exposures relates to any activity arising out of the work environment in contrast to social or recreational events. Shoes designed for recreational activities do not meet these criteria.

Substantial materials means a strong, durable material that would be expected to provide protection against abrasions, heat, flame, chemical irritants, oils, and limited impact forces. Leather is the most common material that meets these criteria. Soles made of rubber or other materials that are resistant to oils and chemicals are preferable. Shoes made from cloth, canvas, etc. do not meet these protective criteria.

"Shoes without heels" Wedge-type shoes may be worn by employees that are not required to climb ladders. Supervisory approval is required.

Employees are not permitted to wear open toed shoes, sandals, or athletic type shoes. Office workers that do not enter an industrial work environment are excluded.

Interpretation #2

A passenger can be approved for a limited time by site management to ride certain heavy equipment for special purposes. The passenger will be designated by the supervisor for the subject equipment. Special work plans to be used will be discussed thoroughly with the employees assigned as operators and passengers.

APPENDIX J cont'd

Interpretation #3

Commercially manufactured scaffold only one frame (buck) high will not require a permit. When the second frame (buck) is added, a permit will be required. All wooden site-built scaffolds or work platforms over four feet high will require a permit.

Interpretation #4

The downstream pressure of air at the discharge end of a nozzle, cleaning lance, or opening of a pipe shall remain at a pressure below 30 psi for all operating conditions. This requirement is necessary in order to prevent a back pressure buildup if the nozzle is obstructed or dead ended.

To modify an air lance to meet the above requirements, drill a series of small holes in the pipe or lance directly behind the nozzle to relieve the pressure in case the nozzle is obstructed. There is no intent to restrict the diameter of the nozzle orifice or the volume (CFM) flowing from it.

Interpretation #5

OSHA Standard 29 CFR 1926.152 states, "Whenever flammable or combustible liquids are transferred from one container to another, both containers shall be effectively bonded and grounded to prevent discharge sparks of static electricity."

Interpretation #6

Entering radiation boundaries as identified by flashing lights, signs, and colored tapes and ropes (yellow and magenta) is not permitted unless authorization is granted by the lead radiographer and he lowers the boundary. Intentional crossings could result in immediate termination.

APPENDIX K CLEARANCES

NOTE: *This is a portion of Clearance Procedure. This procedure may be reviewed in the Site Manager's office (fossil) or the Area Manager's office (hydro).*

Clearances can be issued only by plant shift supervisors and senior switchboard operators or fossil/electrical operators-Fossil, senior operators-Hydro. Issuance of clearances can be made only to authorized persons whose names appear on the plant's official clearance list.

CLEARANCE PROCEDURE TAGS

1. Hold Order (Red Tag)

A hold order tag is red and it is used as a master tag for the clearance. It is installed on the main control point to isolate equipment from all sources of energy and permit work to be performed safely. It also serves to protect the equipment itself from damage. A hold order tag must never be placed on any equipment which is energized or in service. Equipment must never be energized or placed in service until after the hold order tag has been released and the tag removed. A single hold order tag is used on any given clearance while additional clearance boundaries are identified by hold notice tags. Regardless of the presence of tags, all equipment must be considered energized unless it is known to be within the limits of a clearance which has been issued and not released.

APPENDIX K Cont'd

2. Hold Notice (White Tag)

The hold notice tag is white and it is used in conjunction with the hold order tag to identify the boundaries of the clearance. It always bears the same number as the hold order tag. Any number of notice tags may be used as required to complete a clearance.

3. Caution Order (Yellow Tag)

The caution order tag is yellow and it is attached to equipment, switches, or controls where hazardous or abnormal conditions exist. This tag calls attention to the existence of unusual circumstances and informs the employee of the special circumstances involved.

4. Operating Permit (Blue Tag)

The operating permit tag is blue and it is attached to equipment or controls when the equipment is to be operated by any person other than its operator. The equipment operator may not operate equipment except by instruction of the person holding the operating permit. The operating permit does not authorize persons other than the operator to operate equipment from a switchboard. It does authorize the operator to operate equipment from a switchboard only under direction of the person holding the operating permit.

The operating permit does not signify that the equipment tagged is de-energized. In case it is necessary for the equipment to be de-energized for work on the equipment, the standard hold order clearance must be issued.

5. Construction Order (Green Tag)

The construction tag is green and it is attached to the controls of equipment which is under construction and has not been placed in operation or which has been removed from operation. This equipment is located near or in the vicinity of equipment under the jurisdiction of the operating organization. The basic purpose of the construction order is to assure full cooperation and coordination between construction and operating groups. This tag never serves as a hold order! Construction orders are not to be considered as protecting anyone performing work on new equipment.

**APPENDIX L
ELECTRICAL MAINTENANCE
WORKING DISTANCES**

Alternating Current-Minimum Distances

Voltage range Kilovolt and clear hot	Min. working (phase to phase) stick distance
---	---

2.1 to 15	2 ft. 0 in.
15.1 to 35	2 ft. 4 in.
35.1 to 46	2 ft. 6 in.
46.1 to 72.5	3 ft. 0 in.
72.6 to 121	3 ft. 4 in.
138 to 145	3 ft. 6 in.
161 to 169	3 ft. 8 in.
230 to 242	5 ft. 0 in.
345 to 362	*7 ft. 0 in.
500 to 552	*11 ft. 0 in.
700 to 765	*15 ft. 0 in.

NOTE: These distances do not pertain to cranes or other mobile equipment. *For 345-362kV., 500-552 kV., and 700-765 kV., the minimum working distance and the minimum clear hot stick distance may be reduced provided that such distances are not less than the shortest distance between the energized part and a grounded surface.

APPENDIX M CONFINED SPACES

The definition of a confined space is any space having a limited means of egress, which is subject to the accumulation of toxic or flammable contaminants or has the potential for an oxygen deficient atmosphere (less than 19.5%). Confined spaces include, but are not limited to, tanks, vessels, bins, coal bunkers, pen stocks, compartments of vessels, barges or floats, transformers, ducts, sewers, underground vaults, open pits or excavations more than four (4) feet deep.

A confined space entry permit is required before entering a confined space.

Oxygen deficiency occurs in confined spaces where the level of oxygen has been reduced below the limit to support life. Some of the more common causes of this problem are oxidation of metals, combustion, displacement by other gases, and bacterial action.

Toxic gases, vapors, fumes, dust; flammable or combustible gases may exist in dangerous concentrations within confined spaces where chemicals or flammable substances have been used or stored. Dangerous concentrations within a confined space may also result from activities such as de-scaling, washing, welding, cutting, or painting.

APPENDIX N METRIC SYSTEM CONVERSION TABLES

USEFUL INFORMATION

The unit of the metric system is the meter, equivalent of 39.37 inches. The other primary units are the square meter for area, the cubic meter for volume, and the liter for liquid measure.

Prefixes

Micro	One millionth	Deca	Ten
Milli	One one-thousandth	Hecto	One hundred
Centi	One hundredth	Kilo	One thousand
Deci	One tenth	Myria	Ten thousands
Meter		Mega	One million

METRIC MEASUREMENTS

Inch	= .0254 meters	Meter	= 3.28 ft.
Foot	= .305 meters	Meter	= 1.09 yds.
Yard	= .914 meters	Kilometer	= .621 miles
Mile	= 1.609 kilometers	Kilometer	= 3,280 ft.
Sq. In.	= 6.46 sq. cms.	Sq. Cm.	= .156 sq. in.
Sq. Ft.	= .0929 sq. meters	Sq. Meter	= 10.76 sq. ft.
Sq. Yd.	= .936 sq. meters	Sq. Meter	= 1.196 sq. yds.
Cu. In.	= 16.387 cu. cms.	Cu. Cm.	= .061 cu. in.
Cu. Ft.	= .0283 cu. meters	Cu. Meter.	= 35.31 cu. ft.
Cu. Yd.	= .765 cu. meters	Cu. Meter.	= 1.308 cu. yds.
Meter	= 39.37 inches	Gallon	= 3.78 liters

Conversion

Inches	X	.0254	= Meters
Feet	X	.305	= Meters
Yards	X	.914	= Meters
Miles	X	1.609	= Meters
Miles	X	1.609	= Kilometers
Millimeters	X	.03937	= Inches
Centimeters	X	.3937	= Inches
Meters	X	39.37	= Inches
Meters	X	3.281	= Feet
Meters	X	1.094	= Yards
Kilometers	X	.621	= Miles
Sq. Centimeters	X	.155	= Square Inches
Sq. Meters	X	10.764	= Square Feet
Sq. Meters	X	1.196	= Square Yards
Cubic Centimeters	X	.061	= Cubic Inches
Cubic Inches	X	16.2	= Cubic Centimeters
Liters	X	.2642	= Gallons
Gallons	X	3.78	= Liters
Cubic Meters	X	1.308	= Cubic Yards
Cubic Yards	X	.765	= Cubic Meters

APPENDIX N
USEFUL INFORMATION (CONTINUED)
EQUIVALENTS OF AN INCH

Equivalent		Fractions of an Inch					
M.M.	Mil	Decimal	64th	32nd	16th	8th	4th
0.397	15.625	.015625	1	--	--	--	--
0.794	31.250	.031250	2	1	--	--	--
1.191	46.875	.046875	3	--	--	--	--
1.59	62.500	.062500	4	2	1	--	--
1.984	78.125	.078125	5	--	--	--	--
2.381	93.750	.093750	6	3	--	--	--
2.778	109.375	.109375	7	--	--	--	--
3.175	125.000	.125000	8	4	2	1	--
3.572	140.625	.140625	9	--	--	--	--
3.966	156.250	.156250	10	6	--	--	--
4.369	171.875	.171875	11	--	--	--	--
4.762	187.500	.187500	12	6	3	--	--
5.159	203.125	.203125	13	--	--	--	--
5.556	218.750	.218750	14	7	--	--	--
5.953	234.375	.234375	15	--	--	--	--
6.350	250.000	.250000	16	8	4	2	1
6.747	265.625	.265625	17	--	--	--	--
7.144	281.250	.281250	18	9	--	--	--
7.541	296.875	.296875	19	--	--	--	--
7.938	312.500	.312500	20	10	5	--	--
8.335	328.125	.328125	21	--	--	--	--
8.732	343.750	.343750	22	11	--	--	--
9.129	359.375	.359375	23	--	--	--	--
9.524	375.000	.375000	24	12	6	3	--
9.921	390.625	.390625	25	--	--	--	--
10.318	406.250	.406250	26	13	--	--	--
10.716	421.875	.421875	27	--	--	--	--
11.112	437.500	.437500	27	14	7	--	--
11.509	453.125	.453125	29	--	--	--	--
11.906	468.750	.468750	30	16	--	--	--
12.303	484.375	.484375	31	--	--	--	--
12.700	500.000	.500000	32	16	8	4	2
13.097	515.625	.515625	33	--	--	--	--
13.494	531.250	.531250	34	17	--	--	--
13.891	546.875	.546875	36	--	--	--	--
14.288	562.500	.562500	36	18	9	--	--
14.685	578.125	.578125	37	--	--	--	--
15.082	593.750	.593750	38	19	--	--	--
15.479	609.375	.609375	39	--	--	--	--
15.876	625.000	.625000	40	20	10	5	--
16.273	640.625	.640625	41	--	--	--	--
16.670	656.250	.656250	42	21	--	--	--
17.067	671.875	.671875	43	--	--	--	--
17.464	687.500	.687500	44	22	11	--	--
17.861	703.125	.703125	46	--	--	--	--
18.258	718.750	.718750	46	23	--	--	--
18.655	734.375	.734375	47	--	--	--	--
19.048	750.000	.750000	48	24	12	6	3
19.445	765.625	.765625	49	--	--	--	--
19.842	781.250	.781250	50	25	--	--	--
20.239	796.875	.796875	51	--	--	--	--
20.636	812.500	.812500	52	26	13	--	--
21.033	828.125	.828125	53	--	--	--	--
21.430	843.750	.843750	54	27	--	--	--
21.827	859.375	.859375	55	--	--	--	--
22.224	875.000	.875000	56	28	14	7	--
22.621	890.625	.890625	57	--	--	--	--
23.018	906.250	.906250	58	29	--	--	--
23.415	921.875	.921875	59	--	--	--	--
23.812	937.500	.937500	60	30	15	--	--
24.209	953.125	.953125	61	--	--	--	--
24.606	968.750	.968750	62	31	--	--	--
25.003	984.375	.984375	63	--	--	--	--
25.400	1000.000	1.000000	64	32	16	8	4

APPENDIX O

UNITS OF MEASURE

USEFUL INFORMATION

Length

1 centimeter	= 0.3937 inches	= 0.0328 feet
1 meter	= 39.37 inches	= 1.0936 yards
1 kilometer	= 0.62137 miles	= 3280 feet
1 inch	= 2.54 centimeters	
1 foot	= 0.3048 meters	
1 mil	= 0.001 inch	

Square Measure

1 sq. cm.	= 0.1550 sq. in.	
1 sq. meter	= 1.196 sq. yd.	= 10.761 sq. ft.
1 sq. kilometer	= 0.386 sq. miles	
1 sq. inch	= 6.452 sq. centimeters	
1 sq. foot	= 929.03 sq. cm.	= 0.092903 sq. meters
1 sq. yard	= 0.8361 sq. meters	
1 sq. mile	= 2.59 sq. kilometers	
1 circular mil	= 0.7854 sq. mils	
1 sq. inch	= 1,000,000 sq. mils	

Cubic Measure

1 cu. centimeter	= 0.081 cu. inch	1 cu. in. = 16.39 cu. cm.
1 cu. meter	= 1.308 cu. yards	= 35.316 cu. ft.
1 gallon (U.S.)	= 231 cubic inches	
1 cu. ft.	= 7.48 gallons	1 liter = 1000 cu. centimeters

Time

1 day	= 86,400 seconds	1 year = 8760 hours (approx.)
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Velocity

1 ft/sec	= 0.3048 meters/sec	1 meter/sec = 3.281 ft/sec
1 ft/minute	= 0.00508 meters/sec	1 meter/sec = 196.9 ft/min
1 mile/hr	= 0.4470 meters/sec	1 meter/sec = 2.237 mi/hr
1 kilometer/hr	= 0.2778 meters/sec	1 meter/sec = 3.60 km/hr

Acceleration

1 ft/sec/sec	= 0.3048 meters/sec/sec
1 mile/hr/sec	= 0.4470 meters/sec/sec
1 kilometer/hr/sec	= 0.2778 meters/sec/sec
Standard gravitation	= 9.806 meters/sec/sec
"	= 980.6 cm/sec/sec
"	= 32.3 ft/sec/sec

Mass

1 slug	= 32.2 pounds mass	= 14.606 kilograms
1 pound mass	= 453.6 grams	

Force

1 pound force	= 1 slug x 1 foot/sec/sec
1 dyne	= 1 gram x 1 centimeter/sec/sec
1 newton	= 1 kilogram x 1 meter/sec/sec
1 pound force	= 4.452 newton
1 gram force	= 980.6 dynes
1 newton	= 100,000 dynes = 0.224 pounds force

APPENDIX O

UNITS OF MEASURE (CONTINUED)

USEFUL INFORMATION

Pressure

1 atmosphere	= 14.69 pounds/sq. in.	= 29.92 in. of Hg.
"	= 76 cm of HG	= 33.9 ft of water
1 in. Hg.	= 0.491 pounds/sq. inch	
Water pressure		
pounds/sq. inch	= head in ft. x 0.434	

Torque

Torque is the product of force and perpendicular distance

1 lb-perp-ft	= 1.356 newton-perp-meter	= 1.356 joule/radian
1 lb-perp-ft	= 1.356×10^7 dynes-perp-centimeter	
1 lb-perp-ft	= 1.383×10^4 grams-perp-centimeter	
1 lb-perp-ft	= 192 ounce-perp-inches	

Work and Energy—Mechanical

1 erg	= 1 dyne x 1 centimeter
1 joule	= 1 newton x 1 meter = 10^6 dynes x 10^2 cm = 10^7 ergs
1 ft lb	= 1 pound force x 1 foot = 1.356 joules

Work and Energy—Heat Equivalent

Btu raises 1 pound of water 1°F

1 gram calorie	raises 1 gram of water 1°C
1 Btu	= 252 gram calories = 778 ft lb = 1055 joules
1 gram calorie	= 0.003964 Btu = 4.184 joules
1 horsepower hour	= 2544 Btu

Work and Energy—Electrical Equivalent

1 joule	= 1 watt x 1 second = 1 amp (dc) x 1 volt (dc) x 1 sec
W (joules)	= $1/2 L$ (henries x I (amperes) ²)
W (joules)	= $1/2 C$ (farads) x E (volts) ²
1 kilowatt hour	= 3,600,000 joules

Power

1 watt	= 1 joule/sec
1 horsepower	= 550 ft lb/sec = 746 watts
1 watt	= 3.412 Btu/hr = 0.239 gram calorie/sec
P watts	= R (ohms) x I (amperes) ²
	E (volts) ²
P watt	= R (ohms)

Angles

1 circle	= 2π radians = 360 degrees
1 radian	= 57.3 degrees 1 degree = 0.01745 radians

Geometric Figures

Circle, area of	= $D^2 \times 0.7854 = r^2$	r = radius
Circle, circumference of	= D or $2r$	
Sphere, area of	= $D^2 = 4r^2$	D = Diameter
Sphere, volume of	= $D^3 \times 0.5236 = 4/3 r^3$	
Triangle, area of	= $1/2$ altitude x base	
Cone, volume of	= area of base x $1/3$ altitude	
Trapezoid, area of	= $1/2$ (sum of parallel sides) x altitude	
Pyramid, volume of	= area of base x $1/3$ of altitude	

Miscellaneous Constants

e	= 3.14169
e	= 2.71828
Log X	= 2.30259 $\log_{10} X$
Electronic charge	= 4.8×10^{-10} e.s.u. = 1.60×10^{-20} c.m.u.
Mass units	= 1.07×10^3 x Mov = 6.71×10^2 ergs
Speed of light	= 3×10^8 meters/sec
Speed of sound (in air at sea level)	= 1100 ft/sec

APPENDIX P MINIMUM SIZE FILLET WELD

MINIMUM SIZE FILLET WELD

Material Thickness of Thicker Part Joined (Inches)	Minimum* Size of Fillet Weld (Inches)
To 1/2 inclusive	1/8
Over 1/2 to 1/2	3/16
Over 1/2 to 3/4	1/4
Over 3/4	5/16

* Leg dimension of fillet welds.

MINIMUM EDGE DISTANCE, INCHES

MINIMUM EDGE DISTANCE, INCHES
(CENTER OF STANDARD HOLE* TO EDGE OF CONNECTED PART)

Nominal Rivet or Bolt Diameter (Inches)	At Sheared Edges	At Rolled Edges of Plates, Shapes or Bars or Gas Cut Edges ^b
1/2	3/8	3/4
5/8	1 1/8	3/4
3/4	1 1/4	1
7/8	1 1/2 ^c	1 1/8
1	1 3/4 ^c	1 1/4
1 1/4	2	1 1/2
1 1/2	2 1/4	1 3/4
Over 1 1/2	1 3/4 X Diameter	1 1/4 X Diameter

* For oversized or slotted holes, see Sect. 1.16.5.4.
^b All edge distances in this column may be reduced 1/8 in. when the hole is at a point where stress does not exceed 25% of the maximum allowed stress in the element.
^c These may be 1 1/4 in. at the ends of beam connection angles.

APPENDIX Q STRUCTURAL SHAPES

Dimensions of Shapes

There is a definite sequence to the method used to indicate the type, depth, weight and length of the various shapes. For beams and columns (W, S, M shapes) the first letter is the symbol, followed by the depth in inches, the weight per foot in pounds, finally the overall length, (or depth in millimeters, weight per meter in kilograms and length in millimeters).

Eg: W 14 x 26 x 14'3"
(W 360 x 39 x 4343)

Channel (C shape) will have the symbol, the width, the weight, followed by the length.

Eg: C 12 x 20.7 x 8'9"
(C 310 x 31 x 2667)

Structural Symbols

The symbols used to indicate the various types of structural shapes are indicated in illustration #277.

	W SHAPE (WIDE FLANGE BEAM OR COLUMN)	WF
	S SHAPE (STANDARD BEAMS)	I
	C OR MC SHAPE (CHANNEL S)	C
	L SHAPE (EQUAL OR UNEQUAL LEG ANGLES)	L
	T SHAPE (STRUCTURAL TEES)	T
	W SHAPE (LIGHT BEAM)	LB
	M SHAPE (JUNIOR BEAM)	JB
	Z SHAPE (SPECIAL ZEES)	Z

Illustration #277 — Structural Symbols

APPENDIX R BOLTS AND NUTS

Diameter	No. of Threads per Inch	Diameter at Root of Thread	Diameter of Tap Drill	Area in Sq. Inches		Tensile Strength At Stress of 6000 Pounds per Sq. Inch	Dimensions of Nuts and Bolt Heads				
				Of Bolt	At Root of Thread						
1/4	20	0.185	3/64	0.049	0.026	160	1/2	0.578	0.707	3/4	1/4
1/4	18	0.240	3/4	0.076	0.045	270	1 1/2	0.686	0.840	5/16	1 1/4
1/4	16	0.294	5/16	0.110	0.068	410	1 3/4	0.794	0.972	3/8	1 1/2
3/8	14	0.345	3/4	0.150	0.093	560	2 1/2	0.902	1.105	1/2	2 1/4
1/2	13	0.400	7/8	0.196	0.126	760	3 1/2	1.011	1.237	5/8	3 1/4
1/2	12	0.454	1 1/8	0.248	0.162	1,000	4 1/2	1.119	1.370	3/4	4 1/4
3/4	11	0.507	1 1/2	0.307	0.202	1,210	5 1/2	1.227	1.502	7/8	5 1/4
3/4	10	0.620	1 3/4	0.442	0.302	1,810	6 1/2	1.444	1.768	1 1/4	6 1/4
1	9	0.731	2	0.601	0.419	2,520	7 1/2	1.660	2.033	1 1/2	7 1/4
1	8	0.838	2 1/4	0.785	0.551	3,300	8 1/2	1.877	2.298	1 3/4	8 1/4
1 1/8	7	0.939	2 3/4	0.994	0.694	4,160	9 1/2	2.093	2.563	1 7/8	9 1/4
1 1/8	7	1.064	3	1.227	0.893	5,350	10	2.310	2.828	1 3/4	10 1/4
1 1/2	6	1.158	3 1/2	1.485	1.057	6,340	11 1/2	2.527	3.093	1 3/4	11 1/4
1 1/2	6	1.283	4	1.767	1.295	7,770	12 1/2	2.743	3.358	1 3/4	11 1/4
1 3/8	5 1/2	1.389	4 1/2	2.074	1.515	9,090	13 1/2	2.960	3.623	1 3/4	12 1/4
1 3/8	5	1.490	5	2.405	1.746	10,470	14 1/2	3.176	3.889	1 3/4	12 1/4
1 3/8	5	1.615	5 1/2	2.761	2.051	12,300	15 1/2	3.393	4.154	1 3/4	12 1/4
2	4 1/2	1.711	6	3.142	2.302	13,800	16 1/2	3.609	4.419	2	13 1/4
2 1/4	4 1/2	1.961	6 1/2	3.976	3.023	18,100	17 1/2	4.043	4.949	2 1/4	14 1/4
2 1/4	4	2.175	7 1/2	4.909	3.719	22,300	18 1/2	4.476	5.479	2 1/2	14 1/4
2 1/2	4	2.425	8 1/2	5.940	4.620	27,700	19 1/2	4.909	6.010	2 1/2	15 1/4
3	3 1/2	2.629	9 1/2	7.069	5.428	32,500	20 1/2	5.342	6.540	3	16 1/4
3 1/4	3 1/2	2.879	10 1/2	8.296	6.510	39,000	21 1/2	5.775	7.070	3 1/4	17 1/4
3 1/4	3 1/2	3.100	11 1/2	9.621	7.548	45,300	22 1/2	6.208	7.600	3 1/2	17 1/4
3 1/2	3	3.317	12 1/2	11.045	8.641	51,800	23 1/2	6.641	8.131	3 1/2	17 1/4
4	3	3.567	13 1/2	12.566	9.963	59,700	24 1/2	7.074	8.661	4	18 1/4
4 1/4	2 1/2	3.798	14 1/2	14.186	11.340	68,000	25 1/2	7.508	9.191	4 1/4	18 1/4
4 1/4	2 1/2	4.038	15 1/2	15.904	12.750	76,500	26 1/2	7.941	9.721	4 1/4	18 1/4
4 1/2	2 1/2	4.255	16 1/2	17.721	14.215	85,500	27 1/2	8.374	10.252	4 1/2	18 1/4
5	2 1/2	4.480	17 1/2	19.635	15.760	94,000	28 1/2	8.807	10.782	5	19 1/4
5 1/4	2 1/2	4.730	18 1/2	21.648	17.570	105,500	29 1/2	9.240	11.312	5 1/4	19 1/4
5 1/4	2 1/2	4.953	19 1/2	23.758	19.260	116,000	30 1/2	9.673	11.842	5 1/4	19 1/4
5 1/2	2 1/2	5.203	20 1/2	25.967	21.250	127,000	31 1/2	10.106	12.373	5 1/2	19 1/4
6	2 1/2	5.423	21 1/2	28.274	23.090	138,000	32 1/2	10.539	12.903	6	19 1/4

APPENDIX S WEIGHT OF STEEL PIPE

Nominal Pipe Size	Wall	Class	Sched- ule	Wt./Ft.	Nominal Pipe Size	Wall	Class	Sched- ule	Wt./Ft.	
2"	.154"	STD	40	3.65	8"	.219"			19.64	
	.218"	XH	80	5.02		.250"	20	22.36		
	.341"		160	7.46		.277"	30	24.70		
	.436"	XXH		9.03		.322"	STD 40	28.55		
2½"				4.53		.375"			33.04	
	.156"	STD	40	5.79		.406"			35.66	
	.203"	XH	80	7.66		.438"	XH		38.30	
	.276"		160	10.01		.500"	100	43.39		
	.375"	XXH		13.70		.594"	120	50.93		
3"	.552"			17.79		.812"	140	67.79		
	.125"			4.51		.875"	XXH 160	72.42		
	.141"			5.06		.906"		74.71		
	.156"			5.57	9"	.347"	STD		33.91	
	.188"			6.63		.500"	XH		48.73	
	.216"	STD	40	7.58		.875"	XXH		81.77	
	.281"			9.67		10"	.188"			21.15
	.300"	XH	80	10.25			.219"			24.60
	.436"		160	14.31			.250"			28.14
	.600"	XXH		18.58	.278"				31.20	
3½"	.188"			7.65	.307"				34.24	
	.203"			8.23	.365"		STD 40		40.48	
	.226"	STD	40	9.11	.406"			44.66		
	.281"			11.17	.438"			48.24		
	.318"	XH	80	12.51	.500"	XH 60		54.74		
	.637"	XXH		22.85	.562"			61.15		
	4"	.141"			6.56	.594"			64.40	
		.156"			7.24	.687"	80		73.83	
		.188"			8.64	.719"	100		77.00	
		.219"			10.00	.844"	120		89.27	
.237"		STD	40	10.79	1.000"	140		104.13		
.250"				11.36	1.125"	160		115.65		
.281"				12.67	1.438"			143.01		
.337"		XH	80	14.98	11"	.375"	STD		45.56	
.438"			120	18.98		.500"	XH		60.08	
.531"			160	22.52		12"	.188"			25.16
.674"	XXH		27.54	.219"					29.28	
4½"	.247"	STD		12.54	.250"		20		33.38	
	.355"	XH		17.61	.281"				37.45	
	5"	.188"			10.76		.312"			41.51
		.258"	STD	40	14.62		.330"	30		43.77
		.375"	XH	80	20.76		.375"	STD 40		49.56
		.500"		120	27.04		.406"			53.56
.625"			160	32.96	.500"		XH 60		65.42	
.750"		XXH		38.55	.562"				73.22	
6"	.125"			8.69	.688"	80		88.57		
	.156"			10.78	.750"	100		96.12		
	.188"			12.89	.844"	120		107.29		
	.219"			14.97	1.000"	140		125.49		
	.250"			17.02	1.125"	160		139.68		
	.280"	STD	40	18.97	1.312"			160.33		
	.312"			21.04	1.438"			173.73		
	.330"			22.19	1.625"			193.07		
	.344"			23.08	14"	.250"			36.71	
	.375"			25.03		.281"	10		41.21	
.432"	XH	80	28.57	.312"		20		45.68		
.562"		120	36.42	.344"				50.14		
.719"		160	45.34	.375"		STD 30		54.57		
.864"	XXH		53.16	.438"		40		63.37		
7"	.301"	STD		23.54		.500"	XH		72.09	
	.500"	XH		38.06		.562"			80.66	
	.875"	XXH		63.08		.594"	60		85.01	
						.688"			97.81	
					.750"	80		106.13		
					.844"	100		118.59		
					.938"	120		130.79		
					1.094"	140		150.76		
				1.250"	160		170.22			
				1.406"			189.15			
				1.656"			218.31			

APPENDIX S WEIGHT OF STEEL PIPE (CONTINUED)

Nominal Pipe Size	Wall	Class	Sched-ule	Wt./Ft.	Nominal Pipe Size	Wall	Class	Sched-ule	Wt./Ft.		
16"	.203"		10	34.25	24"	.250"		10	63.41		
	.250"			47.05		.281"				71.25	
	.281"			47.22		.312"				79.06	
	.312"		20	52.36		.344"				86.55	
	.375"	STD	30	62.58		.375"	STD	20		94.62	
	.438"			72.72		.438"				110.10	
	.500"	XH	40	82.77		.500"	XH			125.49	
	.562"			92.66		.562"		30		140.80	
	.625"			102.63		.625"				156.03	
	.656"	60		107.54		.688"		40		171.17	
	.844"	80		136.58		.750"				186.24	
	1.031"	100		164.86		.938"				231.03	
	1.219"	120		192.40		.969"	60			238.29	
	1.438"	140		223.57		1.219"	80			296.58	
	1.594"	160		245.22		1.531"	100			367.39	
				1.812"	120			429.39			
				2.062"	140			483.12			
				2.344"	160			542.13			
18"	.250"		10	47.39	26"	.375"	STD		102.63		
	.281"			53.22		.438"				119.44	
	.312"		20	59.03		.500"	XH	20		136.17	
	.375"	STD	30	70.59		.562"				160.91	
	.438"			82.06		.593"				169.38	
	.500"	XH	40	93.45		.625"				202.25	
	.562"		60	104.76		.750"					
	.750"		80	138.17		30"	.281"			89.27	
	.938"		100	208.00			.375"	STD			118.65
	1.156"		120	244.14			.500"	XH	20		157.53
1.375"		140	274.22	36"	.375"		STD		142.68		
1.562"		160	308.50		.500"	XH	20		189.57		
1.781"											
20"	.250"		10		52.73						
	.281"				59.23						
	.312"				65.71						
	.344"			72.16							
	.375"	STD	20	78.60							
	.438"			91.41							
	.500"	XH	30	104.13							
	.594"		40	123.06							
	.625"			129.33							
	.688"			141.90							
	.756"			154.19							
	.812"	60		168.50							
	1.031"	80		208.92							
	1.281"	100		256.10							
	1.500"	120		296.37							
1.750"	140		341.09								
1.968"	160		379.00								
22"	.250"		10	58.07							
	.312"			72.38							
	.375"	STD	20	86.61							
	.438"			100.75							
	.500"	XH	30	114.81							
	.625"			142.68							
	.750"			170.21							
	.875"	60		197.42							
1.125"	80		250.82								

APPENDIX T WEIGHT OF STEEL TUBING

O.D.	Wt.	I.D.	Wt./Ft.	O.D.	Wt.	I.D.	Wt./Ft.	O.D.	Wt.	I.D.	Wt./Ft.
1 1/4"	0.86"	.157"	0.105	1"	1.20"	.180"	1.128	1 1/2"	.275"	.813"	4.780
	0.98"	.134"	0.118		1.34"	.227"	1.228				
1 1/2"	0.75"	.300"	0.127	1 1/4"	1.26"	.652"	1.408	1 3/4"	.180"	1.313"	3.447
	0.88"	.271"	0.171		1.88"	.823"	1.820		1.88"	1.248"	2.885
	0.98"	.298"	0.188		2.00"	.967"	1.937		2.00"	1.175"	3.821
	1.06"	.265"	0.218		2.20"	1.009"	2.000		2.20"	1.083"	4.033
2 1/4"	0.98"	.322"	0.228	1 1/2"	1.20"	.823"	1.708	1 1/2"	.275"	.813"	4.780
	0.85"	.308"	0.229		1.34"	.795"	1.330		1.50"	1.278"	2.512
	1.00"	.270"	0.283		1.50"	.751"	1.511		1.68"	1.212"	2.612
1 1/2"	0.58"	.284"	0.274	1 1/4"	1.00"	.647"	1.751	1 1/2"	.091"	1.562"	1.879
	0.72"	.254"	0.229		1.09"	.807"	1.883		1.09"	1.512"	1.910
	0.82"	.231"	0.270		1.20"	.885"	1.788		1.20"	1.482"	2.213
	0.90"	.217"	0.411	1 1/8"	1.20"	.813"	1.418		1.20"	1.436"	2.126
	1.00"	.202"	0.458		1.50"	.749"	1.881		1.50"	1.242"	3.281
	1.20"	.202"	0.487		1.75"	.687"	2.118		1.75"	1.290"	4.026
1 1/4"	0.83"	.433"	0.348	1 1/2"	1.20"	.823"	1.708	1 1/2"	.275"	.813"	4.780
	0.83"	.397"	0.475		1.34"	.795"	1.330		2.75"	1.154"	4.808
	0.90"	.373"	0.476		1.50"	.751"	1.511		3.00"	1.000"	3.507
	1.00"	.373"	0.588		1.75"	.687"	1.864				
1 1/8"	0.98"	.508"	0.251	1 1/4"	1.20"	.813"	1.569	1 1/2"	.158"	1.501"	2.180
	0.83"	.450"	0.480		1.34"	.788"	1.718		1.68"	1.433"	2.282
	0.90"	.435"	0.526		1.50"	.749"	1.881		1.88"	1.251"	2.727
	1.00"	.407"	0.601		1.75"	.687"	2.164		2.00"	1.312"	4.122
	1.20"	.383"	0.649		2.00"	.625"	2.504				
	1.50"	.312"	0.781	1 1/8"	1.20"	.813"	1.569	1 1/2"	.109"	1.657"	2.098
	1.88"	.249"	0.877		1.30"	1.010"	1.648		1.20"	1.620"	2.245
1 1/2"	0.85"	.588"	0.427		1.40"	.962"	1.827		1.30"	1.602"	2.487
	0.83"	.523"	0.528		1.58"	.938"	1.823		1.58"	1.563"	2.864
	0.90"	.470"	0.674		1.80"	.813"	2.122		1.80"	1.488"	3.287
	1.20"	.448"	0.720		2.00"	.750"	2.411		2.00"	1.432"	3.823
1 3/4"	0.83"	.620"	0.278		2.20"	.700"	2.610		2.20"	1.378"	4.184
	0.72"	.608"	0.591		2.50"	.625"	3.127		2.50"	1.278"	5.273
	0.80"	.580"	0.688	1 3/4"	1.20"	1.013"	1.629	1 1/2"	.275"	.813"	4.780
	0.90"	.532"	0.748		1.34"	1.045"	1.687		3.00"	1.188"	4.907
	1.00"	.481"	0.807		1.50"	1.000"	1.828				
	1.24"	.487"	0.882		1.75"	.921"	2.150				
	1.58"	.438"	0.980		2.00"	.813"	2.438				
	1.88"	.374"	1.178	1 1/2"	1.20"	1.128"	1.808				
	2.12"	.312"	1.212		1.34"	1.100"	1.776				
	2.50"	.250"	1.226		1.58"	1.083"	2.021				
2 1/8"	0.85"	.685"	0.291		1.80"	.990"	2.283				
	1.00"	.657"	0.392		2.00"	.913"	2.608				
	1.20"	.625"	0.560		2.20"	.813"	2.950				
	1.50"	.603"	0.702		2.50"	.751"	3.295				
	1.88"	.582"	0.888		3.00"	.625"	4.026				
	1.88"	.499"	1.278	1 1/2"	1.88"	1.083"	2.910				
	2.12"	.437"	1.524								
1 3/4"	0.95"	.748"	0.284	1 1/2"	0.95"	1.240"	1.428				
	1.20"	.646"	1.048		1.20"	1.200"	1.768				
	1.50"	.676"	1.202		1.34"	1.213"	1.955				
	1.88"	.582"	1.508		1.58"	1.188"	2.228				
					1.88"	1.161"	2.654				
					2.12"	1.082"	2.978				
					2.50"	1.000"	3.218				
					3.00"	.858"	3.658				
					3.75"	.750"	4.508				
					5.00"	.500"	6.340				

APPENDIX T WEIGHT OF STEEL TUBING (CONTINUED)

O.D.	Wall	I.D.	Wt./Ft.	O.D.	Wall	I.D.	Wt./Ft.	
1 1/4"	.049"	.152"	0.105	1 1/2"	.120"	.948"	1.369	
	.058"	.134"	0.118		.156"	.876"	1.719	
3/8"	.035"	.305"	0.127	1 3/4"	.188"	.812"	2.008	
	.049"	.277"	0.171		.219"	.750"	2.266	
	.058"	.259"	0.196		.250"	.688"	2.504	
7/16"	.065"	.245"	0.215	1 7/8"	.120"	1.010"	1.448	
	.058"	.322"	0.235		.134"	.922"	1.597	
	.065"	.308"	0.259		.156"	.938"	1.823	
1/2"	.109"	.220"	0.383	1 5/8"	.188"	.874"	2.132	
	.058"	.384"	0.274		.219"	.812"	2.411	
	.072"	.356"	0.329		.250"	.750"	2.670	
9/16"	.083"	.334"	0.370	1 1/2"	.281"	.688"	2.308	
	.095"	.310"	0.411		.313"	.624"	3.132	
	.109"	.282"	0.455		.375"	.500"	3.504	
1 1/8"	.120"	.260"	0.487	1 3/4"	.120"	1.073"	1.529	
	.065"	.433"	0.346		.134"	1.045"	1.687	
	.083"	.397"	0.425		.156"	1.001"	1.978	
5/8"	.095"	.373"	0.475	1 7/8"	.188"	.937"	2.259	
	.120"	.323"	0.568		.250"	.813"	2.638	
	.058"	.509"	0.351		1 5/8"	.120"	1.135"	1.608
.083"	.459"	0.480	.134"	1.107"		1.776		
.095"	.435"	0.538	.156"	1.063"		2.031		
1 1/16"	.109"	.407"	0.601	1 3/4"	.188"	.989"	2.433	
	.120"	.385"	0.647		.250"	.875"	3.004	
	.156"	.313"	0.781		.312"	.751"	3.550	
3/4"	.188"	.249"	0.877	1 7/8"	.375"	.625"	4.005	
	.065"	.558"	0.432		.500"	.375"	4.673	
	.063"	.522"	0.536		1 1/2"	.188"	1.062"	2.510
.109"	.470"	0.674	1 3/4"	.095"		1.310"	1.476	
.120"	.448"	0.728		.120"		1.260"	1.983	
1 1/4"	.072"	.606"		0.521	1 5/8"	.134"	1.232"	1.955
	.083"	.584"	0.591	.156"		1.188"	2.239	
	.095"	.560"	0.665	.188"		1.124"	2.634	
7/8"	.109"	.532"	0.746	1 7/8"	.219"	1.057"	2.996	
	.120"	.510"	0.807		.250"	1.000"	3.338	
	.134"	.482"	0.882		.281"	.938"	3.658	
1 1/8"	.156"	.438"	0.990	1 5/8"	.375"	.750"	4.506	
	.188"	.374"	1.128		.500"	.500"	5.340	
	.219"	.312"	1.242		1 3/4"	.156"	1.313"	2.447
.250"	.250"	1.335	.188"	1.249"		2.585		
1 3/8"	.095"	.685"	0.791	1 7/8"		.250"	1.125"	3.171
	.109"	.657"	0.892		.281"	1.063"	4.033	
	.120"	.635"	0.966		.313"	.999"	4.386	
1 1/2"	.134"	.607"	1.060	1 5/8"	.375"	.875"	5.006	
	.156"	.563"	1.198		1 3/4"	.120"	1.448"	2.010
	.188"	.499"	1.379			.156"	1.376"	2.952
.219"	.437"	1.534	.188"	1.312"		3.012		
1 3/4"	.095"	.748"	0.855	1 7/8"	.095"	1.560"	1.679	
	.120"	.698"	1.048		.109"	1.532"	1.910	
	.156"	.626"	1.203		.120"	1.510"	2.183	
1"	.188"	.562"	1.506	1 5/8"	.134"	1.482"	2.313	
	.120"	.760"	1.128		.156"	1.438"	2.656	
	.134"	.732"	1.229		.188"	1.374"	3.136	
1 1/8"	.156"	.688"	1.408	1 7/8"	.219"	1.312"	2.581	
	.188"	.624"	1.630		.250"	1.250"	4.005	
	.219"	.562"	1.827		.313"	1.124"	4.804	
1 1/4"	.239"	.500"	2.003	1 5/8"	.375"	1.000"	5.507	
	.281"	.438"	2.160		1 3/4"	.156"	1.501"	2.760
	.375"	.250"	2.503			.188"	1.437"	3.262
1 1/2"	.120"	.823"	1.209	1 7/8"		.219"	1.375"	3.727
	.134"	.795"	1.330		.250"	1.313"	4.172	
	.156"	.751"	1.511		1 5/8"	.109"	1.657"	2.056
.188"	.687"	1.757	.120"	1.635"		2.249		
.250"	.563"	2.171	.134"	1.607"		2.492		
1 3/8"	.109"	.907"	1.183	1 7/8"	.156"	1.563"	2.864	
	.120"	.885"	1.288		.188"	1.499"	3.387	
	.134"	.857"	1.418		.219"	1.437"	3.872	
1 1/2"	.156"	.813"	1.614	1 5/8"	.281"	1.313"	4.264	
	.188"	.749"	1.881		.313"	1.249"	5.223	
	.219"	.687"	2.119		.375"	1.175"	6.008	
1 3/4"	.250"	.625"	2.336	1 7/8"	.219"	1.500"	4.005	
	.281"	.563"	2.530		.250"	1.438"	4.507	

APPENDIX T

WEIGHT OF STEEL TUBING (CONTINUED)

O.D.	Wall	I.D.	Wt./Ft.	O.D.	Wall	I.D.	Wt./Ft.	
3 1/2"	.125"	3.500"	4.652	5 1/2"	.188"	4.999"	10.415	
	.188"	3.374"	7.152		.250"	4.875"	13.684	
	.250"	3.250"	9.345	5 1/2"	.120"	5.260"	6.895	
	.312"	3.125"	11.489		.188"	5.124"	10.668	
	.375"	3.000"	13.517		.219"	5.062"	12.252	
.438"	2.875"	15.493	.250"		5.000"	14.018		
.500"	2.750"	17.355	.313"		4.874"	17.329		
3 7/8"	.188"	3.499"	7.403	.375"	4.750"	20.526		
	.250"	3.375"	9.678	.500"	4.500"	26.700		
	.313"	3.249"	11.907	5 3/4"	.120"	5.510"	7.215	
4"	.125"	3.750"	4.973		.188"	5.374"	11.168	
	.188"	3.624"	7.654		.250"	5.250"	14.685	
	.219"	3.562"	8.843	.375"	5.000"	21.527		
	.250"	3.500"	10.013	.500"	4.750"	28.025		
	.281"	3.438"	11.161	6"	.120"	5.760"	7.536	
.313"	3.374"	12.325	.188"		5.624"	11.670		
.375"	3.250"	14.518	.250"		5.500"	15.353		
.500"	3.000"	18.690	.313"		5.374"	19.011		
.375"	3.250"	14.518	.375"		5.250"	22.528		
4 1/8"	.188"	3.749"	7.906	.500"	5.000"	29.370		
	.250"	3.625"	10.346	6 1/2"	.120"	6.010"	7.856	
	.313"	3.499"	12.743		.188"	5.874"	12.172	
.375"	3.375"	15.019	.250"		5.750"	16.020		
4 1/4"	.125"	4.000"	5.293	.375"	5.500"	23.529		
	.188"	3.874"	8.156	.500"	5.250"	30.705		
	.250"	3.750"	10.680	6 3/4"	.188"	6.124"	12.673	
	.313"	3.624"	13.161		.250"	6.000"	16.688	
	.375"	3.500"	15.519		.375"	5.750"	24.531	
.438"	3.374"	17.832	.500"		5.500"	32.040		
.500"	3.250"	20.025	6 7/8"		.250"	6.250"	17.355	
4 3/8"	.188"	3.999"		8.407	.375"	6.000"	25.532	
	.250"	3.875"		11.014	.500"	5.750"	33.375	
	.313"	3.749"	13.579	7"	.188"	6.624"	13.677	
.375"	3.625"	16.020	.250"		6.500"	18.023		
4 1/2"	.125"	4.250"	5.613		.312"	6.376"	22.354	
	.188"	4.124"	8.658		.375"	6.250"	26.533	
	.219"	4.062"	10.013		.500"	6.000"	34.710	
	.250"	4.000"	11.348	4 7/8"	.188"	4.249"	8.909	
	.313"	3.874"	13.996		.250"	4.125"	11.681	
.375"	3.750"	16.521	.313"		3.999"	14.414		
.500"	3.500"	21.360	.375"		3.875"	17.021		
4 7/8"	.120"	4.510"	5.934		4 3/4"	.120"	4.510"	5.934
	.188"	4.374"	9.160	.188"		4.374"	9.160	
	.250"	4.250"	12.015	.250"		4.250"	12.015	
	.312"	4.125"	14.832	.312"		4.125"	14.832	
	.375"	4.000"	17.522	.375"		4.000"	17.522	
5"	.500"	3.750"	22.695	5"	.120"	4.760"	6.254	
	5 1/8"	.120"	4.760"		6.254	.188"	4.624"	9.662
		.188"	4.624"		9.662	.219"	4.562"	11.182
		.250"	4.500"		12.683	.250"	4.500"	12.683
		.313"	4.374"		15.688	.313"	4.374"	15.688
.375"		4.250"	18.523	.375"	4.250"	18.523		
.500"	4.000"	24.030	.500"	4.000"	24.030			
5 1/4"	.120"	5.010"	6.575	5 1/4"	.188"	4.974"	10.164	
	.188"	4.874"	10.164		.250"	4.750"	13.350	
	.250"	4.750"	13.350		.313"	4.624"	16.504	
	.313"	4.624"	16.504		.375"	4.500"	19.524	
	.375"	4.500"	19.524		.500"	4.250"	25.365	
.500"	4.250"	25.365						

APPENDIX U
WEIGHT OF FLAT PLATE STEEL

2-1/2 pounds per square foot for each 1/16 inch of thickness.

For example:

1/16 inch thick - 2-1/2 lbs/sq ft

1/8 inch thick - 5 lbs/sq ft

3/16 inch thick - 7-1/2 lbs/sq ft

1/4 inch thick - 10 lbs/sq ft

NOTE: *Actual weight could be slightly higher due to mill tolerance*

WEIGHT OF SELECTED EQUIPMENT

Weight of stress machine
3500 lbs

Weight of welding machine
8 pack - 4500 lbs

(Add others you use)

APPENDIX V OCCUPATIONAL INJURY OR ILLNESS

If you suffered an occupational injury or illness, you will report it to your supervisor immediately and to the authorized first-aid facility on site for treatment and direction to an approved medical provider.

If you need medical treatment, you will be provided a panel of physicians. You can pick one of these physicians to treat you. If you do not seek treatment from one of the three physicians, your medical treatment may not be paid for by worker compensation.

As an employee, you are covered under the State Worker Compensation Benefits. You will receive worker compensation benefits for the state that the injury or illness occurred.

Payment for authorized medical treatment and prescriptions are not necessary. Should you receive a bill, forward it to your site office manager or Safety Department.

Zurich Insurance Company provides worker compensation coverage for all employees.

Employees that misrepresent preexisting physical or mental conditions or are under the influence of alcohol or illegal drugs may not receive worker compensation benefits per state law. Employees that file or attempt to file a fraudulent claim will be prosecuted to the full extent of the law.

