

APPENDIX A  
Activity Hazard Analysis

Note:

Activity Hazard Analysis will be prepared and  
inserted prior to the start of work

# APPENDIX B

## Forms

## Risk Mitigation Two-Week Look-Ahead Form

Safety plan for week ending: \_\_\_\_\_ Contractor: \_\_\_\_\_  
Project/ Location: \_\_\_\_\_ Meeting date: \_\_\_\_\_  
Plan Prepared by: \_\_\_\_\_ Dated: \_\_\_\_\_  
Next Two Weeks Scope of Work: \_\_\_\_\_

**Identified Risks/Exposures/Hazards:**

**Control Measures:**

**Additional Activity Hazards Analysis Required:**

**Subcontractors Mobilizing/Demobilizing:**

**Audit/Inspections Scheduled:**

**Competent Person Changes:**

**Planned Orientation/Training :**

**Recommendations/Comments/Concerns:**

**Note:** This information should be incorporated into the meeting minutes.

# SAFETY MEETING SIGN-IN SHEET

Safety Meeting Presenter: \_\_\_\_\_ Date: \_\_\_\_\_

\_\_\_\_\_

Current Weather Conditions:

Temperature (°F) = \_\_\_\_\_ Wind Direction = \_\_\_\_\_ Wind Speed = \_\_\_\_\_

Clear - Sunny - Cloudy - Rain - Snow Forecast = \_\_\_\_\_

\_\_\_\_\_

Current Site Conditions (circle as appropriate):

Dry - Wet - Muddy - Frozen - Snow Covered - Other (describe)

\_\_\_\_\_

1. Incidents or Injuries to report from Previous Day Activities (circle one): No – If Yes, explain below:

\_\_\_\_\_

\_\_\_\_\_

2. Safe and/or At-Risk Observations from Previous Day Activities:

\_\_\_\_\_

\_\_\_\_\_

3. Activities Taking Place Today:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

3. Anticipated Hazards:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

4. Engineering Controls-Work Practices-PPE to Protect Against Hazards:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

5. Additional Safety Topic or Comments:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



**Sevenson Environmental Services, Inc.**  
**Safety Observation Report (SOR)**

Date: _____	Time: _____
Person Submitting This Report: _____ Task: _____	
Observation: _____	
Action Taken:	
Immediate Corrective Action: _____	
Action to Prevent Recurrence: _____	
Indirect Cause: Lack of Planning? <input type="checkbox"/> Lack of Resources? <input type="checkbox"/> Lack of Training? <input type="checkbox"/>	
Further Action or Help Needed? _____	
Signature: _____	
SOR Closed by: _____	
Date: _____	
Means of Closure: _____	

Sevenson Environmental Services  
Safety Observation Report (SOR) Tracking Report

No.	Date	Submitted by	Item	Corrective Action Required	Corrective Action Taken	Responsible for Corrective Action	Estimated Date of Completion	Date Completed	Inspected By
001									
002									
003									
004									
005									
006									
007									
008									
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036									
037									
038									
039									
040									
041									
042									
043									
044									
045									
046									

\* HIGHLIGHTED CELLS SIGNIFY INCOMPLETE SORS.



# Safe Plan Of Action

Project No. \_\_\_\_\_

Job/Task \_\_\_\_\_ Work Area \_\_\_\_\_ Date \_\_\_\_\_

Steps of Task	Hazard/Reaction to Change	Safe Plan	Resources

**Team Members' Signatures**


The signature of the supervisor confirms the completion of the hazard assessment and Safe Plan of Action by the crew.

Supervisors Signature: \_\_\_\_\_

Date \_\_\_\_\_

Instructions: 1. Write name of job or task in space provided. 2. Conduct walk-through survey of work area. 3. Write the steps of the task in a safe sequence. 4. List all possible hazards involved in each step and reaction to change. 5. In the Safe Plan column, state actions that will be taken to prevent the hazards or injury from reaction to change. 6. In Resources column, list equipment, tools, etc. needed to do the job. 8. Ask each team member, who helped develop and will use this SPA, to sign in spaces provided. 9. Review the SPA at the end of the task for improvements.

Work shall stop when conditions change, the job changes, or a deficiency in the plan is discovered, and the current SPA will be modified or a new SPA created.



**Review checklist while completing front page of SPA. Check all that apply.**

A new SPA is required if the job scope or work conditions change.

Required Permits	Hazards	Safe Plan
<input type="checkbox"/> Confined Space	<input type="checkbox"/> Overhead Utilities	<input type="checkbox"/> Power de-energization required <input type="checkbox"/> Insulation blankets required <input type="checkbox"/> Wire watcher required
<input type="checkbox"/> Critical Lift		<input type="checkbox"/> Required clearance distance = _____ Ft. <input type="checkbox"/> Safe work zone marked
<input type="checkbox"/> Hot Work	<input type="checkbox"/> Crane or other Lifting Equipment	<input type="checkbox"/> Signalman assigned <input type="checkbox"/> Tag lines in use <input type="checkbox"/> Area around crane barricaded
<input type="checkbox"/> Lock Out/Tag Out		<input type="checkbox"/> Lifting equipment inspected <input type="checkbox"/> Personnel protected from overhead load
<input type="checkbox"/> Soil Disturbance (Over 12")	<input type="checkbox"/> Underground Utilities	<input type="checkbox"/> Reviewed as-builts <input type="checkbox"/> Subsurface surveys <input type="checkbox"/> Received dig permit
<input type="checkbox"/> Utility Clearance		<input type="checkbox"/> Required clearance distance = _____ Ft. <input type="checkbox"/> Safe work zone Marked
Required PPE		
<input type="checkbox"/> Hard Hat, Class C	<input type="checkbox"/> Electrical	<input type="checkbox"/> Lock Out/Tag Out/Try Out <input type="checkbox"/> Permit required? <input type="checkbox"/> Confirm that equipment is de-energized
<input type="checkbox"/> Hard Hat, Class E (Elect. Protect)	<input type="checkbox"/> Excavations	<input type="checkbox"/> Reviewed electrical safety procedures
<input type="checkbox"/> Ear Plugs/Ear Muffs		<input type="checkbox"/> Permits <input type="checkbox"/> Inspected prior to entering <input type="checkbox"/> Proper sloping/shoring
Eye Protection:	<input type="checkbox"/> Fire Hazard	<input type="checkbox"/> Barricades provided <input type="checkbox"/> Access/egress provided <input type="checkbox"/> Protection from accumulated water
<input type="checkbox"/> Safety Glasses		<input type="checkbox"/> Hot Work Permit <input type="checkbox"/> Fire Extinguishers <input type="checkbox"/> Fire watch
<input type="checkbox"/> Face Shield	<input type="checkbox"/> Vehicular Traffic or Heavy Equipment	<input type="checkbox"/> Adjacent area protected <input type="checkbox"/> Unnecessary flammable material removed
<input type="checkbox"/> Chemical Goggles		<input type="checkbox"/> Traffic Barricades <input type="checkbox"/> Cones <input type="checkbox"/> Signs <input type="checkbox"/> Flagmen <input type="checkbox"/> Lane closure
<input type="checkbox"/> Welding Hood	<input type="checkbox"/> Noise >85 dB	<input type="checkbox"/> Communication with equipment operator
Hand Protection:	<input type="checkbox"/> Hand & Power Tools:	Hearing protection is required: <input type="checkbox"/> Ear plugs <input type="checkbox"/> Ear Muffs <input type="checkbox"/> Both
<input type="checkbox"/> Cut Resistant Gloves		<input type="checkbox"/> Inspect general cond. <input type="checkbox"/> GFCI in use <input type="checkbox"/> Identified PPE required for each tool
<input type="checkbox"/> Welders Gloves	<input type="checkbox"/> Hand Hazards	<input type="checkbox"/> Reviewed safety requirements in operators manual(s) <input type="checkbox"/> Guarding OK
<input type="checkbox"/> Nitrile Gloves		List sharp tools, material, equipment: _____
<input type="checkbox"/> Surgical Gloves	<input type="checkbox"/> Manual Lifting	<input type="checkbox"/> PPE gloves, etc. <input type="checkbox"/> Protected sharp edges as necessary
<input type="checkbox"/> Rubber Gloves		<input type="checkbox"/> Reviewed proper lifting tech. <input type="checkbox"/> Identified material requiring lifting equipment
<input type="checkbox"/> Elect. Insulated Gloves	<input type="checkbox"/> Ladders	<input type="checkbox"/> Hand protection required <input type="checkbox"/> Back support belts
<input type="checkbox"/> Arm Sleeves		<input type="checkbox"/> Inspect general cond. before use <input type="checkbox"/> Ladder inspected with in last quarter
Foot Protection:	<input type="checkbox"/> Scaffolds	<input type="checkbox"/> Ladder tied off or held <input type="checkbox"/> Proper angle and placement <input type="checkbox"/> Reviewed ladder safety
<input type="checkbox"/> Sturdy Work Boots		<input type="checkbox"/> Inspect general condition before use <input type="checkbox"/> Tags in place <input type="checkbox"/> Properly secured
<input type="checkbox"/> Safety Toe Boots	<input type="checkbox"/> Slips, Trips Falls	<input type="checkbox"/> Toe boards used <input type="checkbox"/> Footings adequate <input type="checkbox"/> Materials properly stored on scaffold
<input type="checkbox"/> Rubber Boots		<input type="checkbox"/> Inspect for trip hazards <input type="checkbox"/> Hazards marked <input type="checkbox"/> Tools & material properly stored
<input type="checkbox"/> Rubber Boot Covers	<input type="checkbox"/> Pinch Points	<input type="checkbox"/> Extension cords properly secured <input type="checkbox"/> Work zone free of debris
<input type="checkbox"/> Dielectric Footwear		List potential pinch points: _____
Respiratory Protection:	<input type="checkbox"/> Working w/ Chemicals	<input type="checkbox"/> Working near operating equipment <input type="checkbox"/> Hand/Body positioning
<input type="checkbox"/> Dust Mask		<input type="checkbox"/> List specific chemicals involved and list hazards and precaution on front side.
<input type="checkbox"/> Air Purifying Respirator	<input type="checkbox"/> Asbestos or Lead Paint Potential	<input type="checkbox"/> Reviewed MSDS <input type="checkbox"/> Exposure Monitoring required <input type="checkbox"/> Have proper containers and labels.
<input type="checkbox"/> Supplied Air Respirator		<input type="checkbox"/> Identified proper PPE (respirators, clothing, gloves, etc.)
<input type="checkbox"/> SCBA	<input type="checkbox"/> Heat Stress Potential	<input type="checkbox"/> Areas to be worked may contain asbestos or lead paint <input type="checkbox"/> Asbestos controls incorporated
<input type="checkbox"/> Emergency Escape Respirator		<input type="checkbox"/> Lead based point controls in place <input type="checkbox"/> Exposure monitoring conducted.
Special Clothing:	<input type="checkbox"/> Cold Stress Potential	<input type="checkbox"/> Heat stress monitoring (>85°) <input type="checkbox"/> Liquids available <input type="checkbox"/> Cool down periods
<input type="checkbox"/> Tyvek ®		<input type="checkbox"/> Sun Screen <input type="checkbox"/> Reviewed Heat Stress symptoms
<input type="checkbox"/> Poly Coated Tyvek ®	<input type="checkbox"/> Environmental	<input type="checkbox"/> Proper clothing (i.e.. gloves, coat, coveralls) <input type="checkbox"/> Wind chill <32°
<input type="checkbox"/> Fire Resistant Coveralls		<input type="checkbox"/> Reviewed Cold Stress symptoms <input type="checkbox"/> Warm up periods
<input type="checkbox"/> Rain Suit	<input type="checkbox"/> Natural or Site Hazards	<input type="checkbox"/> Air emissions <input type="checkbox"/> Water discharge <input type="checkbox"/> Hazardous wastes <input type="checkbox"/> Other wastes
<input type="checkbox"/> Safety Vest		<input type="checkbox"/> Pollution prevention <input type="checkbox"/> Waste minimization
Fall Protection:	<input type="checkbox"/> Adjacent Work/Processes	<input type="checkbox"/> Weather <input type="checkbox"/> Terrain <input type="checkbox"/> Adjacent operations or processes <input type="checkbox"/> Biological hazards
<input type="checkbox"/> Harness		<input type="checkbox"/> Animals/reptiles/insects hazards
<input type="checkbox"/> Double Lanyard Required	<input type="checkbox"/> Barricades/covers	<input type="checkbox"/> Notified them of our presents <input type="checkbox"/> Other workers adjacent, above, or below.
<input type="checkbox"/> Anchorage Point Available		<input type="checkbox"/> Coordinated with adjacent supervisor/customer/operator <input type="checkbox"/> Need barriers between.
<input type="checkbox"/> Additional Anchorage Connector Needed e.g. Cross Arm Strap, etc.		<input type="checkbox"/> Caution barricade tape required <input type="checkbox"/> Danger barricade tape required <input type="checkbox"/> Rigid railing required
<input type="checkbox"/> Retractable Device Needed		<input type="checkbox"/> Covers over opening <input type="checkbox"/> Warning signs required
<input type="checkbox"/> Horizontal Life Line System Req'd.		<b>Additional Information:</b>
<input type="checkbox"/> Fall Clearance Distance Adequate		
<input type="checkbox"/> Fall Rescue/Retrieval Plan Set Up		

## Sevenson Environmental Services, Inc.

	MON	TUE	WED	THU	FRI	SAT	SUN
Equip Type _____ Equip. ID# _____ Week ending _____ Hours/Miles							
<b>ITEM(S)    INSPECTED</b>							
Falling Object Protective Structure (FOP)							
Roll-Over Protective Structure (ROP)							
Seat Belts							
Operator Seat Bar(s)							
Side Shields, Screens, or Cab							
Grab Handles							
Back-Up Alarm - Working							
Lights							
Guards							
Horn							
Anti-Skid Tread Steps Clear of Mud							
Safety Signs/Warning Labels							
Fire Extinguisher							
Oil Level (Full/ No Leaks)							
Operator=s Area Clear of Extra Materials							
Controls Function Properly							
Hydraulic System Level (Full/ No Leaks)							
Parking Brake							
Lift Arm and Bucket							
Tires/Tracks							
Steering							
Other:							
Other:							
Operators Initials							

**Instructions:** Inspect all applicable items at beginning of each shift. If item is found to be unsatisfactory report to SSHO or Superintendent immediately.

# Sevenson Environmental Services, Inc.

## Health and Safety Site Inspection Form

Inspector: \_\_\_\_\_

Inspection Date: \_\_\_\_\_

### Section 1: Project Description

Project Name: \_\_\_\_\_

Site Location: \_\_\_\_\_

Project Number: \_\_\_\_\_

Project Manager: \_\_\_\_\_

Consultant Name: \_\_\_\_\_

Superintendent: \_\_\_\_\_

Site Health and Safety Officer: \_\_\_\_\_

- Operations:
- |   |  |
|---|--|
| <input type="checkbox"/> Industrial Operations    | <input type="checkbox"/> Emergency Response            |
| <input type="checkbox"/> Remedial Operations      | <input type="checkbox"/> Excavation/Trenching/Shoring  |
| <input type="checkbox"/> Dewatering Operations    | <input type="checkbox"/> Confined Space Entry          |
| <input type="checkbox"/> Drum Handling Operations | <input type="checkbox"/> Thermal Desorption Operations |
| <input type="checkbox"/> Drilling Operations      | <input type="checkbox"/> Decontamination Operations    |
| <input type="checkbox"/> Other: _____             |  |

### Section 2: General Site Setup/Support Zone

#### A. Site Setup

- |   |                              |                             |                              |
|---|------------------------------|-----------------------------|------------------------------|
| 1. Are work zones clearly defined?  | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> N/A |
| 2. Are support trailers located to minimize exposure from a potential release?                        | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> N/A |
| 3. Are support trailers accessible for approach by emergency vehicles?                                | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> N/A |
| 4. Is the site properly secured during and after work hours?  | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> N/A |
| 5. Are adequate communications (telephones, radios) available on site?                                | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> N/A |
| 6. Is drinking water available?   | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> N/A |
| 7. Are adequate toilet facilities available on site?  | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> N/A |
| 8. Are eating and food storage areas clean and maintained?  | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> N/A |
| 9. Is there adequate lighting?  | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> N/A |
| 10. Are Lock-Out/Tag-Out Kits available on site?  | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> N/A |
| 11. Do affected site personnel have a 40 hour certificate?  | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> N/A |
| 12. Do Managers and/or Supervisors have a certificate for the 8 hours of additional training?         | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> N/A |
| 13. Have all site personnel received medical surveillance in the previous 12 months?                  | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> N/A |
| 14. Are disposal arrangements in place for spent PPE and decontamination wash waters?                 | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> N/A |
| 15. Is all of the emergency and first aid equipment that is identified in the HASP available on site? | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> N/A |

- |  |                              |                             |                              |
|--|------------------------------|-----------------------------|------------------------------|
| 16. Does the HSO conduct daily safety inspections which are documented to identify safety hazards and unsafe conditions? | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> N/A |
| 17. Are accident/injury investigation forms available?   | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> N/A |
| 18. Are all known safety hazards and unsafe conditions corrected?  | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> N/A |

**B. Health and Safety Plan**

- |  |                              |                             |                              |
|--|------------------------------|-----------------------------|------------------------------|
| 1. Is a HASP accessible to all employees?  | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> N/A |
| 2. Has the HASP been briefed to employees on site?   | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> N/A |
| 3. Are the MSDS's available for review by employees on site?                                 | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> N/A |
| 4. Is there a designated HSO on site?  | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> N/A |
| 5. Are employees aware and understand the results of exposure?                               | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> N/A |
| 6. Is the air monitoring plan in place?  | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> N/A |
| 7. Are air monitoring devices properly used, calibrated and maintained?                      | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> N/A |
| 8. Are air monitoring results logged and available for review?                               | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> N/A |
| 9. Does the HASP include the following:  |                              |                             |                              |
| • Site Characterization, description of existing conditions.                                 | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> N/A |
| • Personnel training requirements.   | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> N/A |
| • A written PPE program describing the types and usage.                                      | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> N/A |
| • Listing of PPE required for each site task.  | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> N/A |
| • Is there a hazard/risk analysis for all site activities?                                   | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> N/A |
| • Are the frequency and types of air monitoring presented?                                   | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> N/A |
| • Are both personnel and equipment decontamination procedures presented?                     | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> N/A |
| • Is an emergency response plan presented?   | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> N/A |
| • Are the medical surveillance requirements presented?                                       | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> N/A |
| • Has the nearest medical assistance been identified?  | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> N/A |
| • Is there a discussion of site control measures (i.e., fencing, security, work zones)?      | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> N/A |
| • Description of confined space entry procedures (if this work will occur).                  | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> N/A |
| • Has a spill containment program been included?   | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> N/A |
| • Are Health and Safety Operating Guidelines (HSOGs) available for all pertinent activities? | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> N/A |
| • Are the programs and procedures presented in the HASP being followed?                      | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> N/A |
| • Have site personnel received training with all HSOGs?                                      | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> N/A |

**C. Site Posters**

- |   |                              |                             |                              |
|---|------------------------------|-----------------------------|------------------------------|
| 1. Are the following documents posted in a prominent and accessible area? |                              |                             |                              |
| <input type="checkbox"/> Department of Labor 5 – 1 Poster                 | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> N/A |
| <input type="checkbox"/> OSHA 300   | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> N/A |

**D. Emergency Plans**

- |   |                              |                             |                              |
|---|------------------------------|-----------------------------|------------------------------|
| 1. Are emergency telephone numbers posted and verified? | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> N/A |
| 2. Have emergency escape routes been designated?        | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> N/A |
| 3. Are employees familiar with the emergency signals?   | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> N/A |
| 4. Is the hospital route posted?                        | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> N/A |
| 5. Are employees familiar with emergency procedures?    | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> N/A |

6. Is the inventory of emergency response equipment and supplies adequate?  YES  NO  N/A

**E. Medical and First Aid**

1. Are First Aid Kits accessible and identified?  YES  NO  N/A  
 2. Are emergency eye washes available and in proper working order?  YES  NO  N/A  
 3. Are emergency showers available?  YES  NO  N/A  
 4. Are the First Aid Kits large enough for the number of people on site?  YES  NO  N/A  
 5. Are the First Aid Kits inspected after each use?  YES  NO  N/A  
 6. Are there First Aid/CPR trained personnel available?  YES  NO  N/A  
 7. Is a heat/cold stress monitoring program in place?  YES  NO  N/A

**F. Fire Protection**

1. Has a fire alarm been established?  YES  NO  N/A  
 2. Do employees know the location and use of all fire extinguishers on site?  YES  NO  N/A  
 3. Are fire extinguishers marked and inspected monthly?  YES  NO  N/A  
 4. Are combustible materials segregated from open flames?  YES  NO  N/A

**G. Fire Prevention**

1. Has a smoking policy been established?  YES  NO  N/A  
 2. Is smoking prohibited in flammable storage areas?  YES  NO  N/A  
 3. Are fire lanes established and maintained?  YES  NO  N/A  
 4. Are flammable dispensing systems grounded and bonded?  YES  NO  N/A  
 5. Are proper receptacles (i.e., safety cans, cabinets) available for the storage of flammables?  YES  NO  N/A  
 6. Are gasoline cans of the proper type (not plastic)?  YES  NO  N/A  
 7. Has the local fire department been contacted?  YES  NO  N/A  
 8. Is ground and bonding equipment available?  YES  NO  N/A  
 9. Are fuel tanks properly contained with a dike?  YES  NO  N/A  
 10. Is the dike capable of holding quantities being contained?  YES  NO  N/A

**Section 3: Work Areas/Contamination Reduction Zone/Exclusion Zone**

**H. Walking and Working Surfaces**

1. Are accessways, stairways, ramps, and ladders clean of ice, mud, snow, or debris?  YES  NO  N/A  
 2. Are ladders within maximum length requirements?  YES  NO  N/A  
 3. Are ladders properly barricaded if used in passageways, doors, or driveways?  YES  NO  N/A  
 4. Are broken or damaged ladders tagged and taken out of service?  YES  NO  N/A  
 5. Are metal ladders prohibited in electrical service areas?  YES  NO  N/A  
 6. Are stairways and floor openings guarded?  YES  NO  N/A  
 7. Are safety feet installed on straight and extension ladders?  YES  NO  N/A  
 8. Is general housekeeping up to our standards?  YES  NO  N/A  
 9. Are fall protection devices available on site?  YES  NO  N/A  
 10. Are fall protection devices properly used and maintained?  YES  NO  N/A

- 11. Are ladders secured when in use?  YES  NO  N/A
- 12. Is there a written Fall Protection Plan?  YES  NO  N/A
- 13. Have employees received training in Fall Protection?  YES  NO  N/A

**I. Materials Handling**

- 1. Are materials stacked and stored as to prevent sliding or collapsing?  YES  NO  N/A
- 2. Are flammables and combustibles stored in non-smoking areas?  YES  NO  N/A
- 3. Is machinery braced and lock-out/tag-out procedures in place?  YES  NO  N/A
- 4. Are tripping hazards labeled?  YES  NO  N/A
- 5. Are riders prohibited on materials handling equipment?  YES  NO  N/A
- 6. Are OSHA approved manlifts provided for the lifting of personnel?  YES  NO  N/A
- 7. Are all containers labeled as to contents?  YES  NO  N/A
- 8. Are flammable liquids stored in approved safety cans?  YES  NO  N/A
- 9. Are hoses secured and in good condition?  YES  NO  N/A
- 10. If powered industrial trucks or fork lifts including “off road” forklifts are used, have operators been certified?  YES  NO  N/A

**J. Hand and Power Tools**

- 1. Are defective hand and power tools tagged and taken out of service?  YES  NO  N/A
- 2. Is eye protection available and used when operating power tools?  YES  NO  N/A
- 3. Are guards and safety devices in place on power tools?  YES  NO  N/A
- 4. Are hand and power tools inspected before each use?  YES  NO  N/A
- 5. Are spark-resistant tools available?  YES  NO  N/A
- 6. Are extension cords in good repair?  YES  NO  N/A

**K. Slings and Chains**  N/A

- 1. Are damaged slings, chains, and rigging tagged and taken out of service?  YES  NO  N/A
- 2. Are slings inspected before each use?  YES  NO  N/A
- 3. Are slings padded or protected from sharp corners?  YES  NO  N/A
- 4. Do employees keep clear of suspended loads?  YES  NO  N/A

**L. Personal Protective Equipment (PPE)**

- 1. Have levels of PPE been established?  YES  NO  N/A
- 2. Do all employees know their level of protection?  YES  NO  N/A
- 3. Have respirator wearers been fit tested in the past year?  YES  NO  N/A
- 4. Are respirators used, decontaminated, inspected, and stored according to standard procedures?  YES  NO  N/A
- 5. Is defective PPE tagged?  YES  NO  N/A
- 6. Does compressed breathing air meet CGA Grade “D” minimum?  YES  NO  N/A
- 7. Are airlines monitored and protected?  YES  NO  N/A
- 8. Are there sufficient quantities of safety equipment and repair parts?  YES  NO  N/A
- 9. Is PPE and respiratory equipment properly used and maintained?  YES  NO  N/A
- 10. Is hearing protection available for high noise?  YES  NO  N/A
- 11. Is all PPE that has been used either disposed of or thoroughly cleaned prior to removal from any exclusion zone?  YES  NO  N/A
- 12. Is there an adequate supply of PPE available?  YES  NO  N/A
- 13. Are donning and doffing procedures identified?  YES  NO  N/A
- 14. If SCBAs are on site, are they being inspected at least monthly?  YES  NO  N/A



**M. Electrical**

- 1. Are warning signs exhibited on high voltage equipment (>250V)?  YES  NO  N/A
- 2. Is electrical equipment and wiring properly guarded?  YES  NO  N/A
- 3. Are electrical lines, extension cords, and cables guarded and maintained in good condition?  YES  NO  N/A
- 4. Are extension cords kept out of wet areas?  YES  NO  N/A
- 5. Is damaged electrical equipment tagged and taken out of service?  YES  NO  N/A
- 6. Have underground electrical lines and utilities been identified by proper authorities?  YES  NO  N/A
- 7. Are qualified electricians only allowed to work on electrical systems?  YES  NO  N/A
- 8. Is lock-out/tag-out procedures in place when working with electrical systems?  YES  NO  N/A
- 9. Are ground fault interrupter circuits used on all outdoor electrical hook-ups?  YES  NO  N/A
- 10. Have the CFCIs been tested?  YES  NO  N/A
- 11. Are there any open, exposed electrical panels on site?  YES  NO  N/A

**N. Compressed Gas Cylinders**  N/A

- 1. Are breathing air cylinders charged only to prescribed pressures?  YES  NO  N/A
- 2. Are like cylinders segregated in well ventilated areas?  YES  NO  N/A
- 3. Is smoking prohibited in cylinder storage areas?  YES  NO  N/A
- 4. Are cylinders stored securely and upright?  YES  NO  N/A
- 5. Are cylinders protected from snow, rain, etc.?  YES  NO  N/A
- 6. Are cylinder caps in place before cylinders are moved?  YES  NO  N/A
- 7. Are fuel gas and O2 cylinders stored a minimum of 20 feet apart?  YES  NO  N/A

**O. Scaffolding**  N/A

- 1. Is scaffolding placed on a flat, firm surface?  YES  NO  N/A
- 2. Are scaffolding planks free of mud, ice, grease, etc.?  YES  NO  N/A
- 3. Is scaffolding inspected before each use?  YES  NO  N/A
- 4. Are defective scaffolding parts taken out of service?  YES  NO  N/A
- 5. Does scaffold height exceed 4 times the width or base dimension?  YES  NO  N/A
- 6. Does scaffold planking overlap a minimum of 12 inches?  YES  NO  N/A
- 7. Does scaffold planking extend over end supports between 6 to 18 inches?  YES  NO  N/A
- 8. Are employees restricted from working on scaffold during storms and high winds?  YES  NO  N/A
- 9. Are all pins in place and wheels locked?  YES  NO  N/A

**P. Personnel Decontamination**  N/A

- 1. Are decontamination stations set-up on site?  YES  NO  N/A
- 2. Is a contamination reduction zone set-up on site?  YES  NO  N/A
- 3. Are waste receptacles available for contaminated PPE?  YES  NO  N/A
- 4. Are steps taken to contain liquids used for decon?  YES  NO  N/A
- 5. Have decontamination steps and procedures been covered by the HSO in site briefings?  YES  NO  N/A
- 6. Is all PPE and respiratory equipment cleaned daily?  YES  NO  N/A

**Q. Equipment Decontamination**  N/A

- 1. Has an equipment decon been established?  YES  NO  N/A
- 2. Is contaminated wash water properly contained and disposed of?  YES  NO  N/A
- 3. Are all pieces of equipment inspected for proper decontamination before leaving site?  YES  NO  N/A
- 4. Are all pieces of equipment being cleaned per HASP?  YES  NO  N/A

**R. Welding and Cutting**  N/A

- 1. Are fire extinguishers present at welding operations?  YES  NO  N/A
- 2. Are confined spaces such as tanks, tested prior to welding?  YES  NO  N/A
- 3. Are Hot Work Permits available?  YES  NO  N/A
- 4. Are proper gloves, helmets, aprons available for welding?  YES  NO  N/A
- 5. Are welding machines properly grounded?  YES  NO  N/A
- 6. Are spare oxygen and gas cylinders stored a minimum of 20 feet apart when not in use?  YES  NO  N/A
- 7. Are only trained personnel permitted to operate welding and cutting equipment?  YES  NO  N/A
- 8. Are welding screens available for use?  YES  NO  N/A

**S. Excavation, Trenching, and Shoring**  N/A

- 1. Are employee protection systems in place to protect employees?  YES  NO  N/A
- 2. Are guardrails or fences placed around excavations near pedestrian or vehicle thoroughfares?  YES  NO  N/A
- 3. Are utilities located and marked?  YES  NO  N/A
- 4. Are ladders used in trenches over 4 feet deep?  YES  NO  N/A
- 5. Is material excavated placed a minimum of 2 feet from the excavation?  YES  NO  N/A
- 6. Is a competent person designated for the excavation?  YES  NO  N/A

**T. Confined Spaces**  N/A

- 1. Have employees been trained in the hazards of CS?  YES  NO  N/A
- 2. Are CS entry permits available on site?  YES  NO  N/A
- 3. Is a CS rescue team (on or off site) available?  YES  NO  N/A
- 4. Are CS entry procedures being followed?  YES  NO  N/A

**Section 4: Equipment/Vehicles**

**U. Motor Vehicles**

- 1. Are vehicles inspected before each use?  YES  NO  N/A
- 2. Are persons licensed/certified for the equipment they operate?  YES  NO  N/A
- 3. Are unsafe vehicles tagged and reported to supervision?  YES  NO  N/A
- 4. Are vehicles shut down before fueling?  YES  NO  N/A
- 5. When backing vehicles, are spotters provided?  YES  NO  N/A
- 6. Is safety equipment on vehicles?  YES  NO  N/A
- 7. Are loads secure on vehicles?  YES  NO  N/A

## V. Heavy Equipment

- |  |                              |                             |                              |
|--|------------------------------|-----------------------------|------------------------------|
| 1. Is heavy equipment inspected before each use?   | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> N/A |
| 2. Is defective equipment tagged and taken out of service?   | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> N/A |
| 3. Are project roads and structures inspected for load capacities and proper clearances?   | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> N/A |
| 4. Is heavy equipment shut down for fueling and maintenance?   | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> N/A |
| 5. Are back-up alarms installed and working on equipment?  | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> N/A |
| 6. Have Operators been properly trained to operate the equipment they are using?   | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> N/A |
| 7. Are riders prohibited on heavy equipment?   | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> N/A |
| 8. Are guards and safety devices in place and used?  | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> N/A |
| 9. Are barriers set up to prevent personnel from entering the area within the swing radius of track equipment?   | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> N/A |
| 10. If not, are warning signs posted on both sides and the rear of track equipment warning employees to stay out of the swing radius and have site personnel been trained to stay out of the swing radius areas? | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> N/A |
| 11. Are annual inspection reports for all cranes available on site?  | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> N/A |



# Sevenson Environmental Services, Inc.

## Health and Safety Inspection Summary Form

Inspection Date: \_\_\_\_\_ Inspector: \_\_\_\_\_

Site: \_\_\_\_\_

Project Manager: \_\_\_\_\_

Health and Safety Officer: \_\_\_\_\_

Superintendent: \_\_\_\_\_

OPERATIONS REVIEWED:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Corrective Measures Required?

Yes

No

If Yes, please briefly describe issues and suggested corrective measure(s). See completed Site Inspection Form for details.

\_\_\_\_\_  
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\_\_\_\_\_  
Date Prepared

\_\_\_\_\_  
Inspector Signature

Job No. \_\_\_\_\_  
 Job Address \_\_\_\_\_  
 \_\_\_\_\_



**Sevenson  
 Environmental  
 Services, Inc.**

## Report of Accident, Injury, or Illness

**Instructions:** Please print. Fill in all blanks. When completed, return this form to Sharon Lee at the main office.

Name \_\_\_\_\_ Sex: \_\_\_\_\_ Age: \_\_\_\_\_

Social Security Number \_\_\_\_\_ Birth Date: \_\_\_\_\_

Address \_\_\_\_\_ Phone Number \_\_\_\_\_

Marital Status  Single  Married  Separated  Divorced  Widowed

# of Dependents \_\_\_\_\_ Date of Accident \_\_\_\_\_ Time \_\_\_\_\_ AM/PM

Date Employee notified employer: \_\_\_\_\_ Who was notified: \_\_\_\_\_

Employment Start Date:	Wage Rate:
Occupation:	Average Hours Worked:
Date Last Worked:	Average Days Per Week:
Time Shift Began:	Was worker paid for day of injury?
Name of Witness:	Did salary continue?

Describe how the accident happened:

What was employee doing when injured?

Describe the injury in detail and indicate part of body affected:

Name of object or substance that directly injured the employee:

Date & Time medical attention was sought:
Name, address and phone number of hospital or doctor:
Was employee involved in any other incidents/accidents? If yes, describe:
Any history of work accidents, absenteeism, and/or disciplinary problems:
Substance abuse test administered: ___ Yes, ___ No – if no, why not?
Medical release obtained:
Corrective Action Taken:

Supervisor \_\_\_\_\_ Date \_\_\_\_\_

Safety Officer \_\_\_\_\_ Date \_\_\_\_\_

Comments: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**Report of Accident, Injury, or Illness**

APPENDIX C  
Hazard Communication Program



**HAZARD  
COMMUNICATION  
PROGRAM**

Sevenson Environmental Services, Inc.  
2749 Lockport Road  
Niagara Falls, NY 14305

**HAZARD COMMUNICATION PROGRAM  
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## INTRODUCTION

It's as true as ever! The bottom line for progress in health and safety problems is awareness. That means employers and employees must be aware of potential hazards before they can work safely.

A new standard, the Hazard Communication Standard, has been introduced into the workplace as a means to further communicate information about potential hazards. Specifically, this standard promotes awareness about chemical hazards. So if you work with or around hazardous substances, this important standard affects **YOU**.

The following guidelines are intended as a training tool to explain the Hazard Communication Standard - What it is and how it is implemented in the workplace. These guidelines can be used as an introduction to the standard and also as an ongoing reference to be used as necessary.

Included are:

- , a self-quiz to test your knowledge of the Hazard Communication Standard;
- , a section-by-section breakdown of a Material Safety Data Sheet (MSDS);
- , an example of a substance warning label;
- , a glossary of common technical terms; and
- , an explanation of the responsibilities of the chemical manufacturer, the employer, and the employee.

## POLICY STATEMENT

In order to conduct our business, Severson must use certain chemicals that require specific precautions to be taken to protect our employee's health. It is the policy of Severson, in compliance with the OSHA Hazard Communication Standard, Title 29 Code of Federal Regulations 1910.1200, to communicate any relevant information regarding hazardous chemicals to potentially exposed employees, as well as to implement appropriate measures to safeguard employee safety and health. The goal of the program shall be to minimize the possibility of employee illness or injury arising from the exposure to hazardous chemicals.

It will be the responsibility of management and supervisors to ensure that adequate information is obtained and disseminated to the appropriate employees. It will be the employees responsibility to follow the recommended practices outlined in product labels, Material Safety Data Sheets (MSDS), company operating procedures, and company-provided training.

This Hazard Communication Program is intended to supplement our existing safety and health program. Current safety and health policies remain in effect.

The effectiveness of this program, as with all of our programs, depends upon the active support and involvement of all personnel.

Paul Hitcho, Ph.D., CIH  
Director of Occupational  
Health and Safety

## EMPLOYEE INFORMATION/TRAINING

All employees who are or may be exposed to hazardous materials will be trained according to the requirements of the Hazard Communication Standard, HCS. The training will include the following elements:

### A. Employee Information

Employees shall be informed about the hazardous chemicals and suspected hazards of substances to which they are exposed in the normal course of their work including:

1. Information on the operations in their work area where hazardous chemicals are present.
2. The location and availability of the Written Hazard Communication Program, including a list of hazardous chemicals and MSDS's.

### B. Employee Training

All employees exposed to hazardous chemicals, including production employees, supervisors, and lab personnel, will be trained according to the following program:

1. Initial training for all employees will be conducted.
2. After the initial training, any necessary training required by the introduction of new hazardous chemicals and training for new employees will be conducted by the supervisor of the applicable department.
3. Subjects to be included in the Employee Training Program will include the following:
  - a) Methods and observations that may be used to detect the release of hazardous chemicals, such as employee monitoring, visual sightings, or odors of hazardous chemicals when released.
  - b) The measures which employees can take to protect themselves from exposure to hazardous chemicals (such as personal protective equipment and emergency procedures).
  - c) The physical and health hazards of the chemicals in the work area.

- d) An explanation of the labeling system, Material Safety and Data Sheets, and how employees can obtain and use information on hazardous chemicals.
- e) The methods used to inform employees of the hazards of non-routine tasks.

All new employees will be trained before being exposed to any hazardous chemicals, or situations. Retraining will occur as needed when new hazards become recognized, or when employees become exposed to new hazards as a result of transfer, process changes, or new chemical introductions.

## MULTI-EMPLOYER JOBSITES

It is the policy of Severson to adequately apprise other contractors regarding the hazardous substances which their employees may be exposed to during the course of the day to day activities. Contractors whose employees may be exposed to hazardous substances used by Severson employees will be given access to this Hazard Communication Program. This will provide all relevant chemical information necessary to protect their employees.

Contractors should be informed of conditions existing on-site which necessitate special precautionary measures through weekly meetings.

Other on-site employers working among Severson employees are also required to adhere to the provisions of the Hazard Communication Standard. They shall make available copies of MSDS's for all hazardous materials used by their employees which can be reviewed by Severson employees. MSDS's will be provided within a reasonable time period after such a request.

## SELF-QUIZ

Test your knowledge of the Hazard Communication Standard and the Right to Know Law by taking the following quiz. And when you've finished reading this booklet, re-test yourself. If you still have questions, ask your supervisor.

- |    | YES   | NO    |   |
|----|-------|-------|---|
| 1. | _____ | _____ | Do you know the basic purpose of OSHA's Hazard Communication Standard, The Right to Know?                               |
| 2. | _____ | _____ | Do you know what your organizations's responsibilities are concerning the disclosure of hazardous material information? |
| 3. | _____ | _____ | Do you know who is responsible for determining potential substance hazards?   |
| 4. | _____ | _____ | Do you know what information must be contained on the substance warning label?  |
| 5. | _____ | _____ | Do you know what a MSDS is and what information it contains?  |
| 6. | _____ | _____ | Do you know the difference between a physical hazard and a health hazard?   |



## HAZARD COMMUNICATION PROGRAM

### I INVENTORY

- a. This section applies to any Hazardous Substance which is known to be present in the workplace in such a manner that employees may be exposed under normal conditions of use or in a foreseeable emergency.
- b. A written inventory of all the hazardous chemicals used or stored by Severson is kept at our main office.

c. **What is a Hazardous Chemical?**

Virtually all chemical hazards fall into one or more of the four categories. There are not strict boundaries between these four categories and most chemicals will fit into more than just one category. For example, flammable paint thinners can also be toxic.

**Flammable:** Includes materials that will burn. Usually, they are liquids that give off vapors that can ignite, but could also be gases, dusts and solid materials.

**Corrosive:** These materials can damage or burn your eyes or skin on contact and damage your lungs if inhaled. These are the acids, caustics, and some cleaners you may use.

**Toxic:** These include materials which are poisonous to the body. They can be any form; solid, liquid or gas.

**Reactive:** Includes materials that can react sometimes violently, when mixed with certain other materials. The reaction can release toxic vapors and gases. They can also produce heat or oxygen which can create a serious fire problem or explosion.

### II WARNING LABELS

Severson will ensure that each container of hazardous chemical in the workplace will be labeled with the following information:

- a. Identity of the hazard.

- b. Appropriate hazard warning or physical hazard.
- c. Health hazard.
- d. Manufacturers name and address.
- e. C.A.S. No. (Chemical Abstract Service)

**NOTE:** OSHA - 29CFR-19.10.1200 Labeling (F) (7)

The employer is not required to label portable containers into which hazardous chemicals are transferred from labeled containers and are intended only for immediate use.

Sevenson adheres to the policy that all manufacturer's labels will be left on the containers and that all containers will be labeled.

### **III MATERIAL SAFETY DATA SHEET (MSDS)**

It's up to Sevenson to obtain or develop a MSDS for all hazardous chemicals used in the workplace. The MSDS is a form that provides more detailed information about a chemical than the label. It is accessible upon request to employees through the employer. The MSDS file exists both on a computerized data system and in hard copies. The MSDS file is maintained by the Health and Safety Director and is available for review at any time from the Safety Director. All material received on site must have a MSDS prior to the use of this material.

**Sevenson's procedures** - If a MSDS is not received with the material, then the procedures for obtaining a MSDS are as follows:

- Step 1 - A letter will be sent at any time an item is received and a MSDS does not accompany it.
- Step 2 - If after 30 days, a MSDS has not been received, a follow up request will be sent.
- Step 3 - If after an additional 30 days from the follow up letter a MSDS has not been received, the company will report to OSHA in an attempt to receive the proper information.

Below is a sample letter form requesting a MSDS:

Sevenson Environmental Services, Inc.  
2749 Lockport Road  
Niagara Falls, NY 14305

Dear Sir:

The Occupational Safety and Health Administration (OSHA) Hazard Communication Standard (29 CFR 1910.1200) requires that employers be provided Material Safety Data Sheets (MSDS) for all hazardous substances used in their facility, and that these sheets be made available to all employees potentially exposed to these hazardous substances.

In an effort to comply with these regulations, we ask your cooperation in providing us with a Material Safety Data Sheet on [product name] no later than [date]. Delays in receiving the MSDS information may prevent use of your product.

Please consider this letter as a standing request to your company for any information concerning the safety and health aspects of using this product that may become known in the future.

Your cooperation is greatly appreciated. Thank you for your timely response to this request. If you have any questions concerning this matter, please contact myself at the above address.

Sincerely,  
**SEVENSON ENVIRONMENTAL SERVICES, INC.**

Paul J. Hitcho, Ph.D., CIH  
Director of Occupational Health and Safety

The Safety Director will review all incoming MSDS for completeness and accuracy and make the information directly available to employees. Employees will be advised of precautionary measures in using the product.

The following is a comprehensive outline of the guidelines used to check for MSDS completeness:

1. Do we have MSDS for the hazardous chemicals used?
2. Is the MSDS in English?
3. Does the MSDS contain at least the following information?
  - a) The identity on the label?
  - b) The chemical and common name for single substance hazardous chemicals?
  - c) For mixtures tested as a whole:  
  
The chemical and common names of all ingredients which contribute to the hazards?
  - d) For mixtures tested as a whole:  
  
The chemical and common names of all ingredients which are health hazards or carcinogens?
  - e) The chemical and common names of all ingredients which have been determined to present a physical hazard when present in a mixture?
4. Does the MSDS contain the physical and chemical characteristics of the hazardous chemical (vapor pressure, flash point, etc.)?
5. Does the MSDS contain the physical hazards of the hazardous chemical, including the potential for fire, explosion, and reactivity?
6. Does the MSDS contain the health hazards of the hazardous chemical (including signs and symptoms, medical conditions aggravated)?
7. Does the MSDS contain the primary routes of entry?

8. Does the MSDS contain the OSHA PEL, the ACGIH TLV, and other exposure limits (including ceiling and other short-term limits)?
9. Does the MSDS contain the information on carcinogen listings (i.e. OSHA regulated carcinogens, those indicated in the national Toxicology (NTP) annual report, and those listed by the International Agency for Research on Carcinogens (IARC))?
10. Does the MSDS contain generally applicable procedures and precautions for safe handling and use of the chemical (hygienic practices or personal protective equipment)?
11. Does the MSDS contain generally applicable control (engineering controls, work practices, or personal protective equipment)?
12. Does the MSDS contain date of preparation or last change? Is this the current MSDS?
13. Does the MSDS contain the name, address, and telephone number of a responsible party?
14. Are all sections of the MSDS completed?

An example of an MSDS in its entirety is shown in the following pages.

**Explanation:**

**PRODUCT NAME & IDENTIFICATION**

**Chemical Manufacturer's Name** - this may list one or more alternate manufacturers or importers, the address and emergency telephone number.

**Name of Product** - generally the trade name, which is an adopted name that is given by a manufacturer to distinguish it as produced by him and that it may be protected as a trademark.

**Chemical Name** - lists the name of the chemical. (In some cases this may be listed as a "Trade Secret" but the remainder of the MSDS should be filled out).

Make a special note that you may come across a MSDS or a label that does not list the chemical name. Sometimes that's allowed. A manufacturer, importer, or employer may withhold the chemical identity if it is a trade secret. However, it must be stated clearly that the chemical is a trade secret and the hazardous nature of the chemical **MUST** still be listed, both on the label and the MSDS.

**IV EMPLOYEE TRAINING PROGRAM**

A. **Health Hazards & Emergency First Aid**

a. **Health Hazard**

This section is a quick summary of the possible health hazards associated with exposure to the chemicals.

b. **Emergency First Aid**

This section explains which type of first aid is to be applied in case of inhalation-absorption-ingestion.

B. **Fire, Explosion & Reactivity**

a. **Extinguishing Agent**

This explains what type extinguisher is to be used in case of fire. ABC-WATER-FOAM-etc.

b. **Flash Point**

Minimum temperature at which a liquid gives off sufficient vapor to form, with air, an ignitable mixture.

c. **Reactivity**

Reactives are materials which can change violently when combined with certain other materials or conditions. There are very few reactives in use by the construction trades. But knowing the hazard will help you when you do come in contact with them.

Oxidizers add oxygen to any situation where burning is occurring, and make the fire more intense and more difficult to put out. Some reactives explode or give off gas and heat in air or on contact with water.

Many substances can act like reactives when mixed with incompatible materials. Acids and bases react strongly with each other, giving off heat, often enough to cause boiling and splattering of the mixture. The Material Safety Data Sheet should tell you what materials may be incompatible with the

chemical you are working with and what other materials to avoid.

## **EXAMPLES**

The most common reactive mixture in construction is found in gas welding or brazing. Acetylene gas mixes with oxygen gas to provide an extremely powerful reaction in the form of a very intense flame.

Oxidizers, though, are the most commonly found in the reactive class. Most oxidizers are also corrosive, so keeping them away from the skin and eyes is necessary.

### **C. Protective Equipment**

#### **a. Personal Protection**

This section explains what type of personal protection is required when working with various chemicals.

#### **Example:**

- , vapor canister respirator
- , supplied - air hose & mask
- , rubber gloves
- , rubber apron

Degree of exposure is always a consideration in the determination of exactly which of the personal protective equipment items shown is necessary for each particular operation. Consult Safety Director for further guidance on this.

This section also lists requirements for ventilation and names the specific types of ventilation needed.

### **D. Handling and Storage**

This section describes proper handling and storage procedure for the chemical.

#### **Example:**

## **Safe Handling and Use of Flammables**

The important points for using flammables safely and reducing the amount of flammable vapor in the air and limiting sources of ignition are:

- , Don't Smoke - Eliminate all sources of flames or ignition.
- , Keep work containers of flammable materials as small as possible.
- , Reduce surface area of all containers.
- , Clean up spills promptly.
- , Store flammable soaked rags in covered protective containers
- , Bond and ground all containers when dispensing.
- , Use explosion proof wiring and equipment.

Safe handling of flammables may require personal protective equipment. Repeated contact with flammables on skin can remove the fatty protective layer and lead to irritation. Some flammables are also toxic and may require the use of a respirator. Also, avoid splashes on the skin and into the eyes.

## **Safe Storage of Flammables**

Flammables, especially solvents, should be stored in the right container, unbreakable and specially designed for flammable liquids. It should have flame arresters and have a spring loaded cover. If storage is inside, small amounts can be kept in specially designed flammables cabinets. Larger amounts should be stored in specially designed storage rooms which have devices and controls to minimize the risk of fire or explosion.

Care should be taken to provide storage of flammables away from oxidizers and corrosives. Oxidizers may ignite an otherwise non-flammable mixture. Corrosives may destroy the atmosphere. Concentrated vapors of flammables may sink to the floor and travel some distance to a source of ignition, with the flashback traveling back to the source containers.

## **Emergencies: Spills and Leaks**

Small leaks should be cleaned up quickly. If it is possible to limit the leak by closing a valve, shutting down the equipment, or moving the container, it should be done. Turn off electrical equipment which may provide a source of ignition. If the leak is large, or your skin, eyes or clothes are contaminated, leave the area immediately. Wash eyes, skin and clothes with lots of water to remove the material.



Get to fresh air. Notify your foreman or contractor as soon as it is safe to do so. Unless you have special training and the proper protective equipment, do not try to clean up a large leak.

### **Storage and Handling**

Reactives should be stored away from other types of materials. Many, such as lithium, require conditions for storage, which necessitate separate rooms or facilities for storage.

Read the MSDS carefully when you see the word oxidizer or reactive. Note what chemicals are incompatible with the materials that you are using and avoid situations where they might become mixed.

Be sure to use any protective clothing or respiratory protection required by the MSDS or the process documentation. Many reactives are toxic, corrosive, or both. Protect yourself against the health hazards as well as the physical hazards of reactives.

### **Emergencies**

If it is practical, shut down any electrical equipment. If possible, stop the spill or leak from continuing, but if there is doubt, leave the area and notify your foreman or contractor.

Do not try to neutralize the material or clean up the spill unless you have appropriate protective equipment and have been properly trained in how to do so safely.

## **E. Exposure Limits**

### **Toxic**

Any material can be hazardous under the wrong conditions. The degree of the hazard depends on the dose. Even a substance as necessary to life as salt can cause problems when too much is present; drinking saltwater is eventually fatal. Small amounts of most materials may cause mild symptoms which disappear once the person is removed from the exposure. Larger doses can cause more severe illness, and extremely large doses can cause irreversible illness and even death.

Each person responds differently to hazardous materials. In the United States OSHA

Permissible Exposure Limits are intended to protect the average person from the harmful effects of chemical exposures over a working lifetime. OSHA's definition of Toxic or Highly Toxic materials applies to only a very few potent poisons seldom used by construction trades. We will use the more common definition of toxic: any material which can cause illness or injury.

### **Acute and Chronic Effects**

Toxic materials can poison the body and cause harmful effects. There is a difference between the acute effect and chronic effect of exposure to toxic chemical hazards. Acute effects are usually due to a sudden overexposure to large quantities or concentrations of a material. The acute effects, for example, a firefighter overcome by smoke, will usually disappear after the exposure ends. Sometimes, supportive medical treatment is needed, but the body usually returns to normal.

Chronic toxic effects aren't easy to recognize. They are often the result of low levels of exposure over a long period of time. Typically, they effect one or more of the body's organ systems. If the problem is identified, the effect can often be reduced. If the exposure to a toxic material is stopped, healing of the organ or organ system can return the body to normal. Because of the slow and subtle nature of some diseases caused by exposure, irreversible damage can be caused by a long-term exposure to a chemical hard. Asbestosis is a disease common to older insulation workers, and is an example of a debilitating chronic disease resulting from a long-term exposure to asbestos fibers in the air.

### **Routes of Entry**

Remember earlier we said that if a material couldn't get in or on your body, it probably wouldn't hurt you? To better understand what this really means, lets cover the tree common ways that chemicals can enter your body.

1. **Inhalation** - Whenever you are doing a job that uses a toxic material, you need to be careful not to breathe too much of that material. This is the most common way that chemicals get into the bloodstream. As we breathe the material, which is probably a vapor, gas or fume mixed with the air, it enters our lungs. It is then easily transferred into our blood and taken throughout the body. To prevent this from happening, good ventilation is very important. Open doors and windows, or set up a fan that directs the air away from you. Respirators may also be necessary to protect you. Be sure you choose the correct one and know how to use it. Air filtration respirators take

the toxic material out of the air you breathe, while air supplied respirators provide you with clean air from a tank or other source. If you think you need a respirator, check with your foreman or contractor and read the label or MSDS.

2. **Ingestion** - Some chemicals can hurt you if you accidentally eat or swallow them. Good personal habits often stop this route of entry. Washing hands before you eat and keeping your clothes clean are good practices. Check the MSDS or label for emergency and first aid procedures, and see a doctor if necessary.
3. **Skin Absorption** - This is a hazard with some materials. They have the ability to pass through unprotected skin into the bloodstream. Wearing proper gloves and other skin or face protection will reduce the chance for this route of entry to cause you harm. The label and MSDS both will tell you if gloves or other equipment is recommended. Remember that not all gloves are alike, nor will they protect you from all materials. Use the right ones.

### Examples of Toxic Materials

1. **Solvents** - Solvents are among the most common toxic materials in the workplace. Many processes, mixing and cleaning, use or give off solvent vapors. They are also used as thinners in paints and adhesives. Solvents vary in their toxicity from practically non-toxic materials such as the alcohols, ketones, halogenated solvents, to the very toxic such as dimethyl acetamide, methyl acrylate and other materials. Some solvents are also flammable or reactive.

The government and health professionals evaluate the hazards of materials, and decide upon exposure limits. These levels are called Threshold Limit Values (TLV). TLV's are usually stated in parts per million or milligrams per cubic meter, and represent a mixture of the material with the air we breathe over a period of time. The TLV is expressed as a time weighted average (TWA) and indicates the limit of exposure that you should have over a period of time (eight hour work day, 40 hour work week). The TLV should not be exceeded. The TLV can be found for each material on the MSDS.

The following table provides a "Rough Guide" to the toxicity of solvents or

other toxic materials you may work with. Check the glues, solvents or cleaners you use against this table. So you don't get confused, the more hazardous chemicals have the **lowest** TLV's while the safer ones usually have **high** values listed:

Mildly Toxic	500 - 1000 ppm
Moderately Toxic	50-500 ppm
Toxic	1-50 ppm
Highly Toxic	less than 1 ppm

Solvents can all cause irritations to eyes and skin in high concentrations. Most will dissolve the protective layer of oils on the skin and leave it looking white in the small cracks. They should never be used to clean the skin; if there is a problem with contamination, some form of glove or barrier cream should be used to protect the skin. The early signs of overexposure often include headaches, dizziness, and nausea, but there are many other causes of these symptoms.

2. **Metals and other particulate solids** - can be toxic and are usually given off when welding or grinding. Some, like gypsum dust are only nuisance dusts. Others, like zinc fume, can cause flu-like symptoms. Others, like asbestos have been linked to cancer or other chronic diseases. Dusts can irritate the skin and be ingested along with food, drinks, or smoking materials if they aren't washed off the hands and removed from clothing. They may even be carried home to the family and cause problems there.
3. **Lubricants, coolants and machine oils** - are not that common in construction, but are used when cutting, turning or milling metals. There are three types: petroleum based (straight oils), water based, and synthetic fluids which contain no oils. Many cutting oils contain additives to inhibit corrosion, prevent bacterial growth and permit high temperature operation. The fumes and mist from cutting operations can be irritating to the eyes and lungs. Skin exposure can result in acne-like conditions and can cause other problems. Avoid breathing mist and fumes and use gloves and aprons to minimize contact with the materials.
4. **Gases** - present a range of problems. Some, like nitrogen, are simple

asphyxiants - they prevent the body from getting enough oxygen by displacing it from the airstream. Some are chemically hazardous, like carbon monoxide, or nitrous oxide, which cause poisoning of the body systems. Some are very toxic, like many of the gases used in the semiconductor industry. These gases, which include silane, chlorosilane, arsine, phosphine, and others are very toxic - a few concentrated breaths can be fatal. Some are also very reactive. Silane burns when exposed to air, and these hazards must be dealt with using carefully designed engineering controls. Other gases, like hydrogen and natural gas are explosive and must be treated with great care. All compressed gas cylinders should be secured by chains or stands at all times, and only the proper fittings should be used.

5. **Plastics, epoxies, and polymers** - are a growing group of industrial chemicals. Materials such as polystyrene, polypropylene, acrylates, polyacrylates, vinyls, and polyurethanes are used for making a wide variety of products. Although most of these materials are not toxic in their final form, where they are being molded, extruded, vacuum formed, or laid up, there can be significant hazards. Isocyanates used in polyurethane production are strong lung sensitizers. Where the material is cut or molded at high temperature, the monomer materials which can be quite toxic, can be released. The products of partial thermal decomposition or burning can be very hazardous.
6. **Sensitizers** - are a special class of materials that present a unique hazard. These are materials such as epoxy systems and isocyanates that react with the body's immune system. On the first exposure, which may be rather high, some mild irritation may be experienced. In future small exposures, severe immune reactions, hives, asthma-like symptoms and other symptoms can be disabling and even fatal.
7. **Carcinogens, mutagens, and teratogens:** A mutagen is a material which causes a change in the genetic makeup of a cell. Substances which cause cancer are called carcinogens. Those which change the reproductive cells and can cause changes in the offspring are called teratogens. Although the body may be able to deactivate or remove some of these materials, a control strategy which minimizes worker exposure is essential when working with these materials.

8. **Reproductive hazards:** Some materials can cause problems in reproduction, either by interfering in the capability for reproduction, such as DBCP, or through being toxic to fetuses in the womb. Dimethyl acetamide is a material which is more toxic to developing fetuses than to the mother. Fortunately, few materials in construction fit this hazard category.

### **Safe Handling**

In general, minimizing contact with toxic materials will minimize the toxic effect. For hundreds of years, scientists noted that “The dose makes the poison.” Use controls, such as ventilation, to draw contaminants away from the workplace air. Use respiratory protection to minimize the inhaled dose. Use goggles, gloves, aprons and other protective gear to keep the material off the skin, out of the eyes and away from the body. Although the body can get rid of a certain amount of most toxic chemicals, and the standards are there to maintain the level below that point, you can minimize your exposure by proper understanding of the routes of entry and methods of control.

## **V. TRAINING AND LEARNING**

### **A. TRAINING COURSE OUTLINE**

1. Course Introduction
  - A. Chemical Hazard Recognition
  - B. Sources of Information on Chemical Hazards
  - C. Control of Chemical Hazards

### **II. Chemical Hazard Recognition**

Employees shall be instructed of the health hazards of each hazardous chemical in their workplace.

#### **A. Types of Hazards**

1. Physical Hazards - employees shall be instructed on the fire

hazard of hazardous chemicals in their workplace.

- a. Combustible liquid
- b. Compressed Gas
- c. Explosive
- d. Flammable
- e. Oxidizer
- f. Pyrophoric
- g. Unstable or Reactive

2. Health Hazards

a. Acute Hazards

- i. Corrosive
- ii. Highly toxic
- ii Toxic
- iv Irritant
- iv. Sensitizer

b. Chronic Hazards

- i. Carcinogens
- ii. Mutagens
- iii. Teratogens and Reproductive Toxins
- iv. Hepatoxins
- v. Nephrotoxins
- vi. Neurotoxins
- vii. Other toxic effects

Employees shall be instructed on how to protect themselves when exposed to hazardous chemicals. They will also be instructed on the type and use of personal protective equipment required when using a particular hazardous chemical.

B. Routes of Entry

- 1. Ingestion
- 2. Inhalation
- 3. Skin Absorption

C. Symptoms of Exposure to Hazardous Substances

1. Acute Exposure
  - a. Short term exposure period
  - b. Usually high concentrations
  - c. Immediate health effect
  
2. Chronic Exposure
  - a. Long term exposure period
  - b. Usually low concentrations
  - c. Long term health effects
  
3. Types of Reaction to Acute and Chronic and Exposures
  - a. Chronic lung disease-silica, cotton dust
  - b. Anesthetics-solvent vapors
  - c. Irritants-formaldehyde, acids
  - d. Chronic liver damage-carbon tetrachloride
  - e. Sensitizers-reactive dyes
  - f. Cutaneous Hazards-ketones, chlorinated compound
  - g. Eye hazards-methanol, acids

D. Relationship of Dose to Risk

1. Toxicity of Chemical
  
2. Concentration of Chemical
  
3. Mode of Exposure and Exposure Time
  
4. The Greatest Risk is Posed by Toxic Substances That are:
  - a. Highly toxic
  - b. Present in high concentrations and
  - c. To which employees are exposed to several hours per day/day after day

E. Exposure Standard



1. OSHA Permissible Exposure Limits
  - a. 8-hour time weighted averages
  - b. 15 minute ceiling
  - c. Legally binding
  
2. ACGIH Threshold Limit Values
  - a. 8-hour time weighted averages
  - b. Instantaneous ceiling
  - c. Not legally binding
  
3. Other Relevant Standards or Criteria
  - a. NIOSH Criteria Documents
  - b. ANSI Standards
  - c. EPA Health Assessment Documents
  
4. Common Features of Exposure Limits
  - a. Units-very small amounts
    - i. ppm, ppb, ppt
    - ii. mg/m<sup>3</sup>, ug/m<sup>3</sup>
  - b. Not “safe” limits but exposure to concentration below levels is generally low risk

### III Sources of Information on Chemical Hazards

- A. Summary of HCS
  1. Hazard Determination-performed by Manufacturer
  2. MSDS
  3. Labeling
  4. Training Requirements
  5. Written Hazard Communication Program
  6. List of Hazardous Substances in Workplace

- B. Contents of an MSDS
1. Manufacturer's Address and Phone Number
  2. Hazardous Ingredients/Identity
  3. OSHA, PEL, ACGIH, TLV, other Recommended Limits
  4. Physical/Chemical Characteristics
    - a. Boiling point
    - b. Vapor pressure
    - c. Vapor density
    - d. Solubility in water
    - e. Specific gravity
    - f. Melting point
    - g. Evaporation rate
    - h. Appearance and odor
  5. Fire and Explosion Hazard Data
    - a. Flash Point
    - b. Flammable limits
    - c. Explosive levels
    - d. Extinguishing media
    - e. Special fire fighting procedures
    - f. Unusual fire and explosion hazards
  6. Reactivity Data
    - a. Stability
    - b. Conditions to avoid
  7. Health Hazard Data
    - a. Routes of entry
    - b. Acute and chronic hazards, including carcinogen
    - c. Signs and symptoms of exposure
    - d. Medical conditions aggravated by exposure
    - e. Emergency first aid procedures
  8. Precautions for Safe Handling and Use

- a. Steps to be taken in handling and storage
- b. Waste disposal method
- c. Precautions to be taken in handling and storing
- d. Other precautions

9. Control Measures

- a. Ventilation
  - i. Local exhaust, special
  - ii. Mechanical other
- b. Sealed systems
- c. Other engineering controls
- d. Respiratory protection
- e. Protective gloves
- f. Other protective clothing or equipment
- g. Eye protection
- h. Workplace practices, industrial hygiene procedures

C. Labeling

1. Labels Tell You

- a. What the principal hazards are
- b. What precautions you should take
- c. Emergency first aid procedures

2. Labels Provide This Information by

- a. Words
- b. Symbols
- c. Numbers
- d. Colors
- e. Combinations

D. Recognizing Hazardous Chemicals are Present

- 1. Appearance or Odor of Hazardous Chemicals
- 2. Physical or Health Effects
- 3. Monitoring

4. Inventory Control

- IV Control of Chemical Hazards

- A. Chemical Hazards are Controlled by Various Methods

1. Engineering Control, e.g. ventilation
2. Workplace Practices, e.g. grounding containers of flammable substances
3. Personal Protective Devices
  - a. Gloves, shoes
  - b. Safety glasses
  - c. Protective clothing
  - d. Dust masks
  - e. Respirators

- B. Safe Handling of Hazardous Chemicals

1. Storage Practices
2. Reactivity Considerations
3. Proper Containers
4. Spill Prevention
5. Spill Cleanup Procedures
6. Personal Protective Equipment

## **B. LEARNING**

Knowing that we have an inventory of hazardous materials, MSDS's on file, warning labels on the containers can improve our safety. But learning to recognize the hazards on the job and how to protect ourselves is really what this training section is really all about.

We share the responsibility for safety and health with our employees, and we also share the training responsibility.

But we can have all the training in the world and if we don't learn anything or practice what we've learned, the entire system can be a failure. Take this program as an example. It contains most of the important points you need to know. But if you don't take the time to learn it, how will you know when you face a material that is hazardous or what to do to protect yourself when you use it?

Learning, not training, is really what this part of the system is all about. Be concerned and ask questions. **THE SYSTEM DOES WORK!**

If there are any questions pertaining to this manual, call Paul Hitcho, Ph.D., CIH, Director of Occupational Health and Safety.

APPENDIX D  
Trenching and Shoring Plan

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LIST OF ATTACHMENTS

ATTACHMENT A      DAILY EXCAVATION CHECKLIST



## **1.0 INTRODUCTION**

This procedure provides the minimum requirements for safe work practices during excavation and trenching operations. This procedure is intended to assure compliance with the Occupational Safety and Health Act (OSHA) standards for these activities (29 CFR 1926, Subpart P).

This procedure applies to all excavation and trenching operations conducted by Participant personnel. Subcontractors working for a Participant must also adhere to this procedure unless they have their own standard operating procedure that complies with the OSHA regulations.

### **1.1 DEFINITIONS**

The following definitions apply specifically to excavation and trenching operations.

Competent Person:	A worker who is trained (National Underground Contractors Association or equivalent) and capable of identifying existing and predictable hazards of excavations. Such workers must have the authority to shut down operations if new hazards are identified.
Registered Professional Engineer:	A person who is registered as a Professional Engineer (PE) in the state where the work is to be performed. OSHA recommends using civil engineers or those with licenses in a related discipline and experience in the design and use of slopping and shoring systems. PE qualifications must be documented in writing.
Excavation:	Any man-made cut, cavity, trench, or depression in an earth surface, formed by dirt or rock removal. This includes landfills and piping trenches and openings caused by underground storage tank removal.
Cave-In:	Soil or rock falling into an excavation from the sides; soil or rock falling out from under a trench or support system. Cave-ins are usually sudden movements that can trap, bury, or crush workers in the excavation.

Benching:	A method of protecting workers from cave-ins by excavating the sides of an excavation to form a series of horizontal levels or steps.
Shoring:	Wooden, metal, or hydraulic bracing systems that support the sides of an excavation to prevent cave-ins.
Sloping:	Flattening the sides of an excavation at an angle to maintain stability and prevent cave-ins. Sloping angles are stated as the horizontal distance back from the foot of the slope, versus the vertical height of the slope. For example, 1.5 feet horizontal to 1 foot vertical (1.5:1). Slopes may also be stated as the number of degrees in the angle formed by the slope. A 1.5:1 slope is also a 34° angle. The larger the angle, the steeper the slope. A vertical wall is a 90° angle.

## **2.0 RESPONSIBILITIES**

### **2.1 RESPONSIBILITIES OF THE PROJECT MANAGER (PM)**

It is the PM's responsibility to communicate to the Project Coordinator (PC) and/or the Site Supervisor that project activities will need to comply with the OSHA standards for excavation activities.

### **2.2 RESPONSIBILITIES OF THE PC AND/OR SITE SUPERVISOR**

It is the responsibility of the PC and/or Site Supervisor to implement the following components of this Excavation and Trenching Activities HSOG. The PC and/or Site Supervisor shall ensure the following occur:

- i) all excavations are completed in accordance with this HSOG;
- ii) the proper protective materials and equipment are available to complete the excavation and/or trenching procedures;
- iii) all inspections of the excavation as required are completed; and
- iv) any subcontractor's Excavation and Trenching standard operating procedures shall be submitted to Severson's Manager of Health and Safety or a designated representative for review prior to initiating excavation activities.

## **3.0 REQUIREMENTS**

### **3.1 PRE-PLANNING**

Excavation and trenching operations require pre-planning to determine whether sloping or shoring systems are required, and to develop appropriate designs for such systems. A Daily Excavation Checklist (Attachment A) will be completed daily to evaluate trenching conditions.

### **3.2 BURIED UTILITIES**

The estimated location of all underground installations must be determined before digging begins. The local Underground Facilities Protective Organization (UFPO) or utility companies must be contacted and requested to locate such underground public utilities at least 4 business days prior to the start of work. Property owners and facility operators must also be contacted prior to project startup, to locate underground private utilities and installations. Ground-penetrating radar or other equipment may be useful in locating such utilities.

When excavations approach the estimated location of the underground utilities, exact locations must be determined by hand shoveling, poking wood or brass rods into the ground, or some other means of safely identifying and uncovering them.

All underground installations must be protected, supported, or removed in order to prevent injuries and damage during excavation. Where utilities or underground installations will be removed, they must be drained, flushed, blocked and blanked, de-energized, and locked out and tagged prior to removal.

### **3.3 ABOVEGROUND STRUCTURE AND LANDSCAPING**

If there are any nearby buildings, walls, sidewalks, tress, or roads that may be threatened or undermined by the excavation, where the stability of any of these items may be endangered by the excavation, they must be removed or supported by adequate shoring, bracing, or underpinning.

Excavations may not go below the base of footings, foundations, or retaining walls, unless they are adequately supported or a PE has determined that they will not be affected by the soil removal (see definition of PE above).

### **3.4 PERSONNEL ENTRY INTO EXCAVATIONS**

Personnel required to enter or work in the excavation at any time must be protected from the hazards of cave-ins. This requires the use of sloping and/or shoring systems that comply with State and Federal OSHA standards.

### **3.5 MAXIMUM EXCAVATION DEPTHS**

Excavations less than 5 feet deep do not require sloping or shoring IF a "competent person" examines the ground and finds no indication of a potential cave-in (see the definition of "competent person" above).

Excavations deeper than 5 feet in depth must be subjected to soil classification, regardless of whether workers enter the hole or not. Sloping and/or shoring systems for such excavations must be approved by a PE who is licensed in the state where the work will take place.

### **3.6 PERSONNEL ENTRANCE AND EXIT LADDERS/RAMPS**

Where personnel must enter excavations greater than 4 feet deep, ladders, stairs, or ramps (when allowed by law) must be provided so that workers are not required to travel more than 25 feet to reach an exit.

### **3.7 VEHICLE TRAFFIC**

Personnel exposed to vehicle traffic must wear high-visibility warning vests. Measures must be put in place to route traffic away from or safely around excavations. This includes placing traffic barriers, traffic cones, and high-visibility warning signs.

Vehicle traffic and heavy equipment can create vibration that may make the excavation unstable. Where such hazards exist, sloping and shoring systems must be designed to withstand these vibrations.

### **3.8 OXYGEN DEFICIENCY AND HAZARDOUS ATMOSPHERES**

All excavations greater than 4 feet deep will be monitored continuously for oxygen deficiency and any hazardous atmospheres (such as methane, hydrogen sulfide, or volatile organic compounds) if there is any risk of these accumulating in the excavation. If a hazardous atmosphere is present, ventilation or other control systems must be used to remove the hazard. In addition, where ventilation is used, air monitoring must be continuous to verify that the excavation remains safe for workers to enter.

Emergency rescue equipment and a safety standby person must be present at the excavation whenever hazardous atmospheres exist or could reasonably.

### **3.9 WATER TABLE DEPTHS AND WATER ACCUMULATION IN EXCAVATIONS**

The height of the local water table must be determined if there is any possibility of water entering or accumulating in the excavation and if there is any possibility of rain or snowfall occurring during excavation operations.

If rain or snow falls or water enters the excavation between work shifts, the excavation must be thoroughly inspected and certified safe by the "competent person" on site before anyone re-enters the hole.

Personnel are not permitted to work in excavations where water is accumulating or has accumulated UNLESS the water is continuously pumped out and the sloping or shoring system has been designed to withstand exposure to water without cave-ins.

### **3.10 SPOILS PILES, EQUIPMENT, AND TOOL STORAGE**

Small equipment, tool storage, shoring supplies, and spoils piles must be placed at least 2 feet away from the top edge of the excavation. In addition, heavy equipment and vehicles must be positioned at least 2 feet away from the top edge of the excavation.

### **3.11 EQUIPMENT OPERATOR VISIBILITY DURING EXCAVATION ACTIVITIES**

Assess whether heavy equipment operators will be able to clearly see the excavation edge while working. When equipment operators do not have a clear and direct view of the edge, barricades, stop logs, or hand signals must be used to warn them of their positions.

### **3.12 PERSONNEL WORKING ON EXCAVATION FACE**

If personnel will be working on the excavation face at more than one level, they must be protected from falling rock or soil that may be generated by others working at levels above them. Protective barricades will be necessary at intervals along the face to provide this protection. The excavation face may also be scraped to remove loose materials.

Personnel are prohibited from working, standing, or traveling below loads being lifted or moved. Such loads include the buckets of excavators, backhoes, and loaders. Drivers of vehicles that are being loaded must remain in the vehicle cabs during loading.

### **3.13 PERSONNEL AND EQUIPMENT CROSSOVER POINTS**

Where personnel or equipment will be required to cross over the excavation, walkways, or bridges with standard 42-inch high guardrails, midrails, and 6-inch high toeboards must be provided across the excavation. These bridges must be strong enough to withstand the weight of people, objects, and vehicles traveling across them.

## **4.0 SOIL TYPES**

OSHA classifies soils into one of three types: A, B, or C. OSHA sloping and shoring requirements are based on the types of soil present at each work site.

Note that the definitions of these soil types are specific to compliance with OSHA excavation and trenching regulations. These definitions do not necessarily match terms used in geology or engineering soil studies.

### **4.1 TYPE A SOILS**

Type A soils are defined as cohesive. They stick together easily and resist breaking apart under pressure. Clay, silty clay, sandy clay, and clay loam are examples of cohesive soils.

Type A soils must have an unconfined compressive strength greater than or equal to 1.5 tons per square foot.

Soil cannot be classified as Type A if it is fissured, subject to vibration, or if it has been previously disturbed or backfilled.

### **4.2 TYPE B SOILS**

Type B soils include cohesive soil that has an unconfined compressive strength between 0.5 and 1.5 tons per square foot. Soil that has an unconfined compressive strength greater than 1.5 tons per square foot and is fissured or subject to vibration is also classified as Type B.

Some other soils that are granular and exhibit poor cohesion may be included as Type B materials. Angular gravel (similar to crushed rock), silt, silty loam, and sandy loam are examples of these materials.

#### **4.3 TYPE C SOILS**

Type C soils include cohesive soil that has an unconfined compressive strength less than 0.5 tons per square foot. Loose granular soils such as gravel, sand, and loamy sand are also classified as Type C.

### **5.0 OSHA SOIL CLASSIFICATION PROCEDURES**

Soil classification must be done in accordance with methods described in the OSHA excavation standard. Visual examination will be followed by at least one manual test until the material is classified as Type A, B, or C.

A large chunk of soil, about the size of a backhoe bucket, should be used to make the classification. Samples must be collected in an undisturbed area before excavation begins.

It may be necessary to examine multiple samples to address the possibility of layering or multiple soil types in the proposed excavation or trench. If layers are present, each layer must be classified separately.

#### **5.1 VISUAL EXAMINATION**

Is the material entirely solid rock without cracks or fissures?

YES: Type A. Verify this by testing the unconfined compressive strength as described in Section 5.2, below.

Is the material submerged under water, saturated with water, or seeping water?

YES: Type C

Does the excavated soil remain in clumps?

NO: Type C

YES: Perform manual testing as described in Section 5.2, below.

## 5.2 MANUAL TESTING

Test the material for its unconfined compressive strength by one or both of the following methods.

### Method A:

Can a thumb be pressed into the soil several inches with very little effort?

YES: Type C. Compressive strength is less than 0.5 tons per square foot (tsf)

NO: Is the material fissured, cracked, or subject to vibration?

YES: Type C

NO: Type A or B

If the material is fissured, cracked, subject to vibration, previously disturbed, or backfilled, it drops a level in the hierarchy of stability.

### Method B (most accurate):

Press a pocket penetrometer into a ball of soil.

Less than 0.5 tsf, Type C

Between 0.5 and 1.5 tsf, Type B

Greater than 1.5 tsf, Type A

If the material is fissured, cracked, subject to vibration, previously disturbed, or backfilled, it drops a level in the hierarchy of stability.

To confirm the decision to classify soil as Type B or C, perform a plasticity test. Roll a lump of soil into a rope that is no more than 1/8 inch thick and is at least 2 inches long. Does the rope break when it is lifted into the air by one end?

YES: Type C

NO: Type B



### **5.3      DOCUMENTATION**

Soil classifications must be documented in writing. This may be done as part of the site's daily operating logs. Documentation must include, as a minimum:

- i)      date and time of sample collection and testing;
- ii)     location of soil sample collection;
- iii)    physical condition and description of sample and any layering observed;
- iv)    methods used for classifying soil types;
- v)     results of soil classification; and
- vi)    name of the "competent person" who performed the soil classification.

## **6.0      LAYERED SOILS**

In situations where different soil layers are present, each layer must be classified separately as Type A, B, or C. Where unstable soil is present underneath a stable soil layer, the sloping or shoring system for the entire excavation must meet the requirements for the most unstable soil. For example: if Type C soil is present under a layer of Type B, the entire excavation or trench must use the sloping or shoring requirements for Type C soil.

If Type B soil is present under Type C, the lower layer may be sloped or shored to meet Type B requirements and the upper layer to meet Type C.

## **7.0      SELECTION AND DESIGN OF SLOPING SYSTEMS**

Sloping systems must be selected to meet the requirements of Appendix B of the OSHA excavation standard 29 CFR 1926, Subpart P. This appendix provides detailed diagrams and specifications for the allowable angle of sloped excavations and trenches based on the types of soil present.

Sloping designs for excavations greater than 20 feet deep must be prepared by a PE. OSHA allows four options for sloping excavations less than 20 feet deep.

## **7.1 ONE AND ONE-HALF TO ONE SLOPING**

Excavations may be sloped to a 34° angle or flatter without classifying the soil types or consulting a PE. This angle is equal to cutting the excavation back 1.5 feet horizontally for every 1 foot of depth.

This option may be impractical if the excavation is very deep or if the area around the excavation is restricted. Using the flattest slope, without classifying soil types, may result in removing substantially more soil than necessary. For example, a 10-foot deep hole would require removal of at least 2,250 cubic feet using 1.5:1 slope. If the soil is classified as Type B, with an allowable slope of 1:1; less than half as much soil (about 1,000 cubic feet) must be removed. This can provide significant savings in man-hours and disposal costs for contaminated soils.

## **7.2 STEEPER SLOPES**

If soils are classified as Type A, B or C, in accordance with the OSHA standard, steeper sloping angles may be possible. In excavations less than 20 feet deep, Type A soils may be sloped at 0.5 foot horizontal to 1 foot vertical and Type B soils at 1 foot horizontal to 1 foot vertical. Type C soils must still use the 1.5 feet horizontal to 1 foot vertical slope.

## **7.3 ALTERNATIVE SLOPING DESIGNS BY PES**

If soils are classified as Type A, B, or C, an alternative sloping system may be designed by a PE, based on other tabulated data or previous work experience. Where an alternative sloping system is used, at least one written copy of the design must be kept at the job site while the slope is being constructed. This copy must include the data or other information used to develop the design, a description of the soil classification procedure and results, the specified measurements for sloping, and the name of the PE who developed and approved the design.

## **7.4 BENCHING**

Benching is a method of protecting personnel from cave-ins by cutting a series of horizontal levels or steps in the sides of an excavation. Benching may only be used when soils have been classified as Type A or B according to the OSHA excavation standard. The benching design must meet the requirements of Appendix B of the standard. Any alternative benching systems must be approved by a PE with the same written documentation as described in Section 6.3.

## **8.0 SELECTION AND DESIGN OF SHORING SYSTEMS**

Shoring systems must be selected to meet the requirements of Appendix C or D of the OSHA excavation standard 29 CFR 1926, Subpart P. This appendix provides detailed specifications for the strength, physical size, and number of timbers or other structural materials used to build shoring systems.

Shoring systems for excavations greater than 20 feet deep must be designed by a PE. OSHA allows similar options to those described for sloping, when selecting shoring for excavations less than 20 feet deep.

### **8.1 WOOD AND ALUMINUM SHORING SPECIFICATIONS**

If soils are classified as Type A, B, or C in accordance with the standard, a wood, steel, or aluminum shoring system may be selected from Appendices C or D of the OSHA excavation standard 29 CFR 1926, Subpart P.

Note that lumber used to construct shoring must be new, previously unused, and free of knots or cracks.

The size of wooden timbers listed in Appendix C of 29 CFR 1926, Subpart P, is the actual size of the lumber, NOT the nominal size that is usually quoted when pre-cut timbers are sold. Timbers used for shoring systems must usually be special ordered from a lumber yard or sawmill in the exact sizes listed in Appendix C of the OSHA excavation standard.

### **8.2 PRE-MANUFACTURED SHORING SYSTEMS**

After classifying the soil types, OSHA also allows the employer to use pre-manufactured shoring systems. This involves using the manufacturer's specifications to determine which shoring system will be used. The manufacturer must approve any design changes in writing before there is any deviation from their original recommendations.

A written copy of the manufacturer's specifications and any approved changes, must be kept at the job site while the shoring is constructed.

### **8.3 ALTERNATIVE SHORING SYSTEMS DESIGNED BY A PE**

If soils are classified as Type A, B, or C, an alternative shoring system may be designed by a PE, based on any other tabulated data or previous work experience.

Where an alternative shoring system is used, at least one written copy of the design must be kept at the job site while the shoring is being constructed.

This copy must include the data or other information used to develop the design, a description of the soil classification procedure and results, the specified measurements for shoring, and the name of the PE who developed and approved the design.

#### **8.4 SHORING INSTALLATION AND REMOVAL**

Shoring systems must be installed from the top down as excavation or trenching progresses. Removal must take place from the bottom up, with the hole being backfilled as the shoring is removed.

Workers may not enter the excavation until adequate shoring is in place to prevent a cave-in. Workers will not remain in the excavation during removal of shoring unless an alternate means of support is provided to prevent cave-ins.

### **9.0 TRENCH SHIELDS**

Trench shields are structures designed to prevent workers from being injured in a cave-in. These devices are reinforced metal boxes that are placed inside trenches using a crane or excavator. The boxes may be stacked or placed side by side in order to fill the depth and width of a trench.

The top of the trench shield must extend at least 18 inches above the top of the excavation.

Workers are to remain within the trench shield at all times in the excavation. Trench shields will not prevent cave-ins. They do not support the walls of the trench. They only protect workers inside the box, if the trench caves in. An arm or leg outside the trench shield may be torn off or crushed by falling soil if a cave-in occurs.

All personnel will leave the excavation or trench while the trench shield is moved or repositioned.

Stacked trench shields must be bolted together and ladders must be provided for workers to enter and exit the boxes. The ladders must be placed inside the trench shield and must extend at least 3 feet above the top of the shield. Workers must have no more than 25 feet of travel to reach one of the ladders in an emergency.

## **10.0 COMPETENT PERSON INSPECTIONS**

When personnel enter excavations, the excavations must be inspected at the start of each work shift by a "competent person" (see the definition of "competent person" above).

Inspections must include checking for any evidence of damage, defects, or loose parts in the shoring system. Personnel may not enter the excavation until any such problems have been corrected.

Inspections must also include looking for any evidence of possible cave-ins, hazardous atmospheres, water accumulation, undermining, or material breaking off the sides of the excavation. Any changes or new hazards must be addressed before workers enter the excavation.

Inspections must be repeated after rain or snowfall, after freezing or thawing, and after any other hazard-increasing occurrence.

When a new hazard is identified while workers are in the excavation, all exposed personnel must be evacuated from the excavation until the situation is corrected.

Daily inspections will be documented in writing in the site's daily operating logs.

## **11.0 BARRICADES AND WARNING SIGNS**

Unattended excavations, and those in remote areas, require barricades or covers with warning signs to prevent persons and equipment from falling into them. Large excavations may require temporary fencing to prevent unauthorized access. Barriers with flashing warning lights will be used when excavations are left open after dark.

**ATTACHMENT A**  
**DAILY EXCAVATION CHECKLIST**

Location of Excavation: \_\_\_\_\_

Name of Qualified Person: \_\_\_\_\_

Date of Inspection: \_\_\_\_\_ Miss Dig Ticket No.: \_\_\_\_\_

Soil Type:             Stiff Clay             Firm Clay             Dry Granular  
                          Wet Granular         Saturated Granular     Running

Hydrostatic Conditions:  Dry                     Wet                     Saturated

Weather Conditions:  Sunny                     Overcast                     Rain

Penetrometer Test Results: (tons per square foot)     >2.5     2.5     1.5     1.0     <1.0

Angle of Repose: (width and height) \_\_\_\_\_

Unsupported Wall Height: (measurement required) \_\_\_\_\_

Protection Required:             Trench Box                     Shoring                     Sheeting

Personal Protection Requirements: (list) \_\_\_\_\_

\_\_\_\_\_  
Egress/Ingress: (identify) \_\_\_\_\_

Ladders/Ramps Location: \_\_\_\_\_

Location of Spoils: \_\_\_\_\_

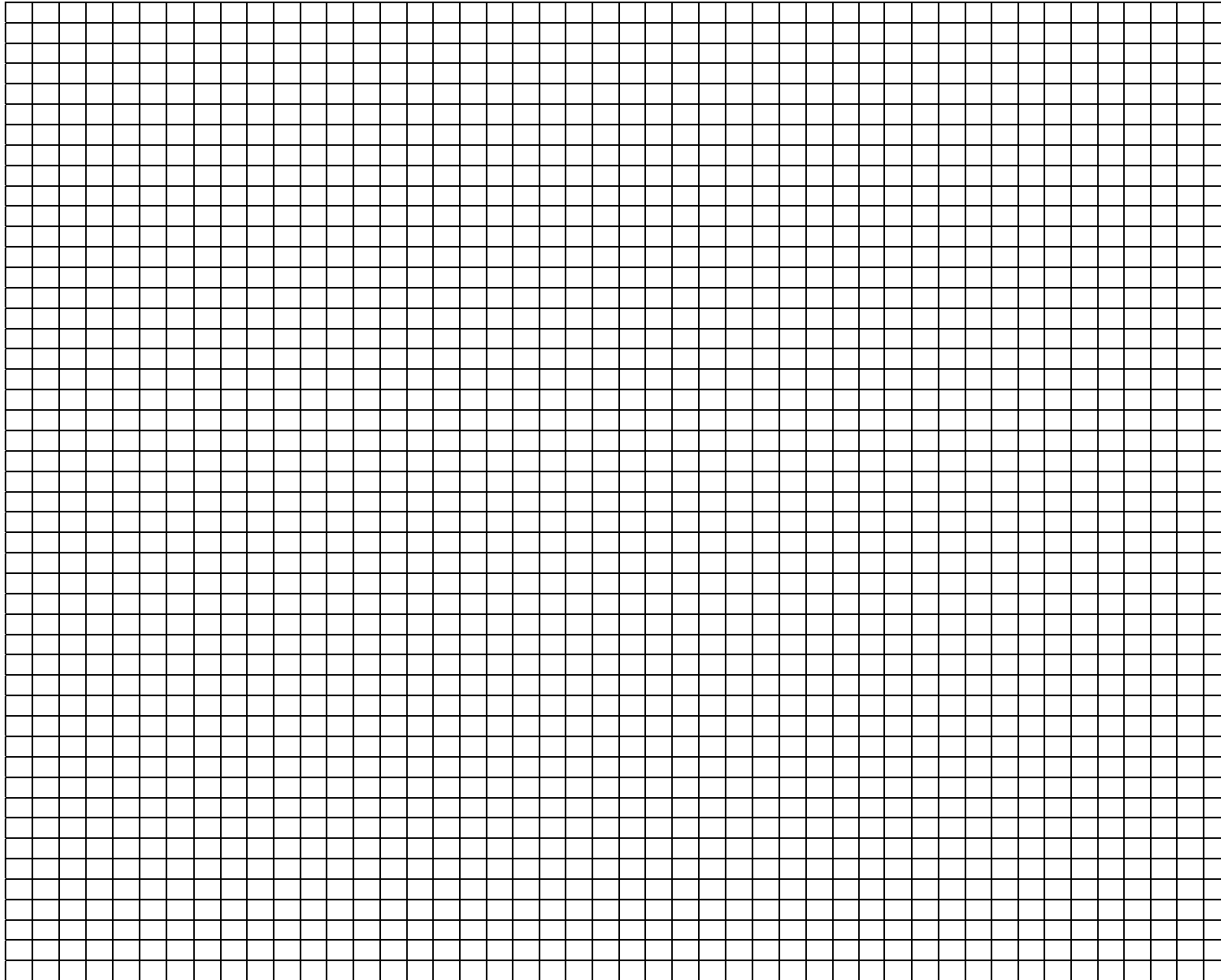
Location of Overhead Lines: \_\_\_\_\_

Name of Spotter for Overhead Lines: \_\_\_\_\_

Sketch excavation plan on reverse side and retain in file for 3 years.

# EXCAVATION SITE PLAN

# LOCATION



### ABOVE GROUND CONSIDERATIONS

- Building Overhangs
- Electrical Lines
- Canopies
- Tree Overhangs
- Traffic Lights
- Street Lights

### GROUND LEVEL CONSIDERATIONS

- Buildings
- Manholes
- Trees
- Hydrant
- PIVs
- Parking Lots
- D-Islands
- Curbs
- Ditches/Drains
- Towers
- Shrubs
- Fences
- Signs
- Lamp Posts
- Guard Posts
- Gate Arms
- TV Cameras
- Walls

### BELOW GROUND CONSIDERATIONS

#### Site Prints

- Site Lightings
- Comm. Duct Bank
- 13.2 kV Electricity
- Fire Line
- Water
- Natural Gas
- Lawn Irrigation
- Chilled Water
- Steam
- Sanitary

#### Building Prints

- Fuel Lines
- Electricity for Gate Arms
- Electricity for TV Cameras
- UST (Tanks)

APPENDIX E  
Respiratory Protection Program



## **RESPIRATORY PROTECTION PROGRAM**

This respiratory protection program has been written to comply with the applicable OSHA regulations and contract specifications, to provide the basis for the administration of the respirator program, and to serve as a training tool for the affected workers. Specifics of the program such as brands of respirators used, cartridges or filters, and type of monitoring equipment will be provided upon mobilization.

Since respiratory protection, in many instances, will be the primary method for protecting a worker's health, it is SES's policy that all portions of this program be followed and that any deficiencies in the administration and enforcement of this program will be immediately corrected.

The overall responsibility for documenting and administering the respirator program rests with the Project Manager. This responsibility will be delegated to the Senior Site Safety Officer. The Site Safety Officer will be responsible for the purchasing, maintenance, cleaning, and "refresher" training of personnel. The Certified Industrial Hygienist will be responsible for the preparation and evaluation of this program.

The type of respirators that will be used will be selected on the basis of either legally mandated requirements or on the professional judgment of the Certified Industrial Hygienist. OSHA standard 1910.134 and the contract specifications are explicit in the types of respirators that are permitted to be worn when contaminants are handled. Those requirements are based on the airborne concentration of the various types of contaminants. Since monitoring is a requirement of the OSHA standard and contract specifications, sufficient data will be generated to determine the proper type of respiratory protection. The type of respirators to be worn will be chosen from the following types:

1. Half mask air purifying equipped with high efficiency particulate, organic vapor, and acid gas cartridges.
2. Full face air purifying equipped with high efficiency particulate, organic vapor, and acid gas cartridges.
3. Powered air purifying respirator equipped with high efficiency particulate filters.
4. Full face piece supplied-air respirator operated in the pressure demand mode.

It is important that a worker understands the proper use and limitations of the various respirators. Therefore, all workers who are required to wear respirators will undergo a training program that consists of:

1. Nature of the hazards
2. Explanation of why other control methods are not feasible

3. Explanation of the selection criteria for the respirators that are to be used
4. Limitations
5. Inspection
6. Proper donning and wearing
7. Positive and negative pressure fit tests
8. Maintenance
9. Emergency situations

In addition, all respirator users will be given a qualitative fit test.

All respirators will be cleaned and disinfected at the end of each day's use. The following procedure will be used:

1. Cartridges, filters, and canisters will be removed and discarded.
2. Wash respirator in warm water (approx. 120°F) and cleaner/disinfectant solution.
3. Rinse in clean, warm water and then in a 50% isopropyl alcohol solution.
4. Air dry or use a hair dryer.
5. Inspect all parts of respirator and replace any that are missing or defective.
6. Place face piece in plastic bag.
7. Immediately before use insert new cartridges.

All respirators will be stored in a separate plastic bag and stored in the decontamination trailer.

It will be the responsibility of the site safety officer to assure that all respirators have been properly inspected and maintained.

The inspection will consist of:

1. Tightness of connections.
2. Condition of face piece, straps, connecting tubes, and canisters.
3. Condition of exhalation and inhalation valves.

4. Pliability and flexibility of rubber parts.
5. Condition of lenses of full face piece respirators.
6. Charge of compressed air cylinder of self contained breathing apparatus.
7. Proper functioning of regulators and warning devices.

As outlined in the air monitoring section of the health and safety plan, personal air samples will be taken to determine the extent of worker exposure. The results of this sampling will be reviewed and evaluated and the proper type of respiratory protection will then be determined by the CIH.

As the work progresses, the type and extent of the health hazards will become more fully documented. Also there is the potential for the development of new hazards. Therefore, this respiratory protection program will be continually evaluated by the on-site safety and health personnel in consultation with the CIH.

All personnel who will be required to wear respirators must participate in the medical surveillance program outlined in the health and safety plan. A certificate stating that the employee is physically able to wear a respirator will be obtained and made available to the owner's representative.

All respiratory protective equipment used on this project will be approved by the National Institute for Occupational Safety and Health.

Air Supplied Breathing Apparatus Standards contains specific requirements for supplied air systems.

### **Respirator Fit**

An employee wearing a respirator can be protected against airborne contaminants only if there is successful sealing of the respirator on his or her face. All employees may not obtain a successful fit for a specific respirator, since facial dimensions vary considerably from person to person. A half face piece must contact a rather complex facial surface and the possibility of leakage is greater than in the case of the full face piece. Studies have shown that temples on glasses, absence of dentures, full beards, handlebar mustaches or wide sideburns can reduce respirator performance by as much as 25 percent.

The respirator face piece-to-face seal will be tested each time the employee enters a contaminated atmosphere. Most respirator manufacturers provide instructions for wearing and leak testing and these instructions will be followed. The training program will cover these procedures. Face piece-to-face fit tests include the following:

- A. Positive Pressure Test - close or "block off" the exhalation valve and exhale gently into the face piece. If a slight positive pressure is built up with no apparent outward leakage around the seal, then the facepiece-to-

face seal is satisfactory. Note that this test only applies to those respirators which have an exhalation valve which can be blocked (the exhalation valve cover may have to be removed for the test).

- B. Negative Pressure Test - Close the inlet opening or hose of the respirator facepiece with the hand(s), tape or other means, inhale gently so that the facepiece collapses slightly and hold the breath for ten seconds. If the facepiece remains slightly collapsed and no inward leakage occurs, then the facepiece-to-face seal is probably satisfactory.
- C. The respirator fit test will be performed according to the Qualitative Fit Test (QLFT) protocols as outlined in Appendix D of OSHA Standard 1910.1025, which is detailed below. Positive and negative pressure tests will be performed by the employee before each wearing of his respirator.

The isoamyl acetate protocol is as follows:

a. **Odor Threshold Screening**

1. Three 1-liter glass jars with metal lids (e.g. Mason or Bell jars) are required.
2. Odor-free water (e.g. distilled or spring water) at approximately 25EC will be used for the solutions.
3. The isoamyl acetate (IAA) (also known as isopentyl acetate) stock solution is prepared by adding 1 cc of pure IAA to 800 cc of odor-free water in a 1-liter jar and shaking for 30 seconds. This solution will be prepared new at least weekly.
4. The screening test will be conducted in a room separate from the room used for actual fit testing. The two rooms will be well ventilated but may not be connected to the same recirculating ventilation system.
5. The odor test solution is prepared in a second jar by placing 0.4 cc of the stock solution into 500 cc of odor-free water using a clean dropper or pipette. Shake for 30 seconds and allow to stand for two to three minutes so that the IAA concentration above the liquid may reach equilibrium. This solution may be used for only one day.
6. A test blank is prepared in a third jar by adding 500 cc of odor-free water.
7. The odor test and test blank jars will be labeled 1 and 2 for jar identification. If the labels are put on the lids they can be periodically dried off and switched to avoid people thinking the same jar always has

the IAA.

8. The following instructions will be typed on a card and placed on the table in front of the two test jars (i.e. 1 and 2);

"The purpose of this test is to determine if you can smell banana oil at a low concentration. The two bottles in front of you contain water. One of these bottles also contains a small amount of banana oil. Be sure the covers are on tight, then shake each bottle for two seconds. Unscrew the lid of each bottle, one at a time, and sniff at the mouth of the bottle. Indicate to the test conductor which bottle contains banana oil."

9. The mixtures used in the IAA odor detection test will be prepared in an area separate from where the test is performed, in order to prevent olfactory fatigue in the subject.
10. If the test subject is unable to correctly identify the jar containing the odor test solution, the IAA QLFT may not be used.
11. If the test subject correctly identifies the jar containing the odor test solution, he may proceed to respirator selection and fit testing.

**b. Respirator Selection**

1. The test subject will be allowed to select the most comfortable respirator from a large array of various sizes and manufacturers that include at least three sizes of elastomeric half facepieces and units of at least two manufacturers.
2. The selection process will be conducted in a room separate from where the fit test will take place.
3. The test subject should understand that he is being asked to select the respirator which provides the most comfortable fit for him. Each respirator represents a different size and shape and, if fit properly, will provide adequate protection.
4. The test subject holds each facepiece up to his face and eliminates those which are obviously not giving a comfortable fit. Normally, selection will begin with a half-facepiece and if a fit cannot be found here, the subject will be asked to go to the full face piece respirators. (A small percentage of users will no be able to wear any half-facepiece respirator).
5. The more comfortable face pieces are recorded; the most comfortable mask is donned and worn at least five minutes to assess comfort. Assistance in assessing comfort can be given by discussing the points in

#6 below. If the test subject is not familiar with using a particular respirator, he will be directed to don the mask several times and to adjust the straps each time, so that he becomes adept at setting proper tension on the straps.

6. Assessment of comfort will include reviewing the following points with the test subject:

- C Chin properly placed
- C Positioning of mask on nose
- C Strap tension
- C Fit across nose bridge
- C Room for safety glasses
- C Distance from nose to chin
- C Room to talk
- C Tendency to slip
- C Cheeks filled out
- C Self-observation in mirror
- C Adequate time for assessment

7. The test subject will conduct the conventional negative and positive pressure fit checks (e.g. see ANSI Z88.2-1980). Before conducting the negative or positive-pressure checks, the subject will be told to "seat" his mask by rapidly moving the head side-to-side and up and down, taking a few deep breaths.

8. The test subject is now ready for fit testing.

9. After passing the fit test, the test subject will be questioned again regarding the comfort of the respirator. If it has become uncomfortable, another model of respirator will be tried.

10. The employee will be given the opportunity to select a different facepiece and be retested if during the first two weeks of on-the-job wear the chosen facepiece becomes unacceptably uncomfortable.

c. **Fit Test**

1. The fit test chamber will be substantially similar to a clear 55 gallon drum liner suspended inverted over a two foot diameter frame, so that the top of chamber is about six inches above the test subject's head. The inside top center of the chamber will have a small hook attached.

2. Each respirator used for the fitting and fit testing will be equipped with organic vapor cartridges to offer protection against organic vapors. The cartridges or masks will be changed at least weekly.

3. After selecting, donning, and properly adjusting a respirator himself, the test subject will wear it to the fit testing room. This room will be separate from the room used for odor threshold screening and respirator selection, and will be well ventilated, as by an exhaust fan or lab hook, to prevent general room contamination.
4. A copy of the following test exercises and rainbow (or equally effective) passage will be taped to the inside of the test chamber:

### **Test Exercises**

- i. Normal breathing.
- ii. Deep breathing. Be certain breaths are deep and regular.
- iii. Turning head from side-to-side. Be certain movement is complete. Alert the test subject not to bump the respirator on the shoulders. Have the test subject inhale when his head is at either side.
- iv. Nodding head up and down. Be certain motions are complete and made about every second. Alert the test subject not to bump the respirator on the chest. Have the test subject inhale when his head is in the fully up position.
- v. Talking. Talk aloud and slowly for several minutes. The following paragraph is called the Rainbow Passage. Reading it will result in a wide range of facial movements, and thus be useful to satisfy this requirement.

### **Rainbow Passage**

When the sunlight strikes raindrops in the air, they act like a prism and form a rainbow. The rainbow is a division of white light into many beautiful colors. These take the shape of a long round arch, with its path high above, and its two ends apparently beyond the horizon. There is, according to legend, a boiling pot of gold at one end. People look, but no one ever finds it. When a man looks for something beyond reach, his friends say he is looking for the pot of gold at the end of the rainbow.

- vi. Normal breathing.
5. Each test subject will wear his respirator for at least ten minutes before starting the fit test.
6. Upon entering the test chamber, the test subject will be given a six inch by five inch piece of paper towel or other porous absorbent single ply material, folded in half and wetted with three-quarters of one cc of pure IAA. The test subject will hang the wet towel on the hook at the top of the chamber.
7. Allow two minutes for the IAA test concentration to be reached before starting the fit-test exercises. This would be an appropriate time to talk with the test subject, to explain the fit test, the importance of his

cooperation, the purpose for the head exercises, or to demonstrate some of the exercises.

8. Each exercise described in No. 4 above will be performed for at least one minute.
9. If at any time during the test, the subject detects the banana-like odor of IAA, he will quickly exit from the test chamber and leave the test area to avoid olfactory fatigue.
10. Upon returning to the selection room, the subject will remove the respirator, repeat the odor sensitivity test, select and put on another respirator, return to the test chamber, etc. The process continues until a respirator that fits well has been found. Should the odor sensitivity test be failed, the subject will wait about five minutes before retesting. Odor sensitivity will usually have returned by this time.
11. If a person cannot be fitted with the selection of half-facepiece respirators, include full facepiece models in the selection process.
12. When the test subject leaves the chamber he will remove the saturated towel, returning it to the conductor. To keep the area from becoming contaminated, the used towels will be kept in a self-sealing bag. There should be no significant IAA concentration buildup in the test chamber from subsequent tests.
13. Persons who have successfully passed this fit test may be assigned the use of the tested respirator in atmospheres with up to ten times the PEL of airborne lead. In other works this IAA protocol may be used to assign a protection factor no higher than ten.



## APPENDIX F

### Lockout/Tagout Program

# LOCKOUT/TAGOUT PLAN

## **Purpose**

This procedure establishes the minimum requirements for the lockout of energy isolating devices whenever maintenance or servicing is done on machines or equipment. It will be used to ensure that the machine or equipment is stopped, isolated from all potentially hazardous energy sources and locked out before employees perform any servicing or maintenance where the unexpected energization or start-up of the machine or equipment or release of stored energy could cause injury.

## **Compliance with this Program**

All employees are required to comply with the restrictions and limitations imposed upon them during the use of lockout. The authorized employees are required to perform the lockout in accordance with this procedure. All employees, upon observing a machine or piece of equipment which is locked out to perform servicing or maintenance will not attempt to start, energize, or use that machine or equipment. Any employee found violating this procedure will be subject to discipline including written warning, suspension, or dismissal from the company.

## **Sequence of Lockout**

1. Notify all affected employees that servicing or maintenance is required on a machine or equipment and that the machine or equipment must be shut down and locked out to perform the servicing or maintenance. It is the responsibility of the equipment operator to notify all affected supervision and employees when a piece of equipment is to be repaired.
2. The authorized employee will refer to the company procedure to identify the type and magnitude of the energy that the machine or equipment utilizes, will understand the hazards of the energy, and will know the methods to control the energy.
3. If the machine or equipment is operating, shut it down by the normal stopping procedure (depress the stop button, open switch, close valve, etc.).
4. De-activate the energy isolating device(s).
5. Lock out the energy isolating device(s) with assigned individual lock(s).
6. Stored or residual energy (such as that in capacitors, springs, elevated machine members, rotating flywheels, hydraulic systems, and air, gas, steam, or water pressure, etc.) must be dissipated or restrained by methods such as grounding, repositioning, blocking, bleeding down, etc.

7. Ensure that the equipment is disconnected from the energy source(s) by first checking that no personnel are exposed, then verify the isolation of the equipment by operating the push button or other normal operating control(s) or by testing to make certain the equipment will not operate.

Caution: Return operating control(s) to neutral or "off" position after verifying the isolation of the equipment.

8. The machine or equipment is now locked out.

### **Restoring Equipment to Service**

When the servicing or maintenance is completed and the machine or equipment is ready to return to normal operating condition, the following steps will be taken.

1. Check the machine or equipment and the immediate area around the machine to ensure that nonessential items have been removed and that the machine or equipment components are operationally intact.
2. Check the work area to ensure that all employees have been safely positioned or removed from the area.
3. Verify that the controls are in neutral.
4. Remove the lockout devices and reenergize the machine or equipment.

Note: The removal of some forms of blocking may require re-energization of the machine before safe removal.

5. Notify affected employees that the servicing or maintenance is completed and the machine or equipment is ready for use.

APPENDIX G  
Fall Protection Program

# FALL PROTECTION PROGRAM

The purpose of this procedure is to prevent injury to a worker due to a fall from a higher to a lower level. This procedure will be implemented at a height greater than 6 feet above the adjacent surface. The acceptable means of providing access to elevated work are ladders, scaffolding, and mobile manlift baskets.

The purpose of this program is to prevent injuries due to falls from elevated work surfaces and to comply with OSHA fall protection standards in 29 CFR 1926, Subpart M.

This program is to be implemented when employees are working at heights greater than 6 feet.

## Definitions

**Competent Person** - A person possessing the skills, knowledge, experience, and judgment to perform assigned tasks or activities satisfactorily.

**Dangerous Equipment** - Dangerous equipment means equipment, which, as a result of form or function, may be hazardous to employees who fall onto or into such equipment. Examples include tanks, degreasing units, machinery, and electrical equipment.

**Guardrail System** - A means of fall protection consisting of a toprail (42"  $\pm$ 3") above the walking / working level; midrail installed at one half the height of the toprail; and a bottomrail or toeboard at least 3 1/2" in height.

**Hole** - Hole means a gap or void 2 inches or more in its least dimension, in a floor, roof, or other walking/working surfaces.

**Opening** - An opening means a gap or void 30 inches or more high and 18 inches or more wide through which employees can fall to a lower level.

**Personal Fall Arrest System** - A personal fall system consisting of an anchorage, connectors, body harness, and may include a lanyard, deceleration device, lifeline, or suitable combination of these. Body belts are not permitted in personal fall arrest systems on this project.

**Safety Monitoring System** - A means of fall protection consisting of a competent person to act as the safety monitor and warn an employee of a fall hazard.

**Safety Net System** - A means of fall protection in which a net is placed under the walking / working surface as close as possible but not greater than 30 feet below it.

**Walking / Working Surface** - A walking / working surface is any surface, whether horizontal or vertical, on which an employee walks or works, including but not limited to floors, roofs, ramps, bridges, runways, formwork and concrete reinforcing steel, but not including ladders, vehicles, or trailers on which employees must be to perform their job duties.

**Warning Line System** - A means of fall protection in which a warning line consisting of ropes, wires, or chains and stanchion are placed 6 feet from the edge of a roof.

# FALL PROTECTION PROGRAM

## Responsibilities

Site supervisors have the responsibility to ensure that fall protection is provided as required by this program and site safety plans for this operation.

The Project Health and Safety Manager (PHSM) will audit implementation of this program as part of the field inspections.

The Site Health and Safety Officer (SHSO) is responsible for providing fall protection training for all site personnel and monitoring compliance with this program.

## System Characteristics

### *Guardrail System*

- Toprail- 42"  $\pm$ 3" above walking / working surface
- Midrail-  $\frac{1}{2}$  height of toprail
- Toeboard - 3  $\frac{1}{2}$  " in height
- Must withstand a force of 200 pounds
- When used in hoisting area, a chain, gate, or removable guardrail section must be placed across the access opening when hoisting operations are not taking place.
- When used to protect holes, they must be erected on all unprotected sides or edges of the hole.
- When used on ramps or runways, they must be erected on all open sides.

### *Personal Fall Arrest*

- Body harness and shock absorbing lanyard must be used.
- Only locking type of snaphooks are to be used.
- Lanyards and vertical lifelines must have a minimum breaking strength of 5,000 pounds.
- Anchorage for the system must be capable of supporting 5,000 pounds per employee attached.
- Attachment point of the body harness must be in the center of the wearer's back or above the wearer's head.

# FALL PROTECTION PROGRAM

- Systems and components, which were subject to impact loading, must be removed from service and not used unless inspected and deemed satisfactory by a competent person.
- Must be inspected prior to each use.

## *Safety Monitoring*

- Competent person who must recognize fall hazards and verbally warn employees when they approach such hazard.
- Must not have any other responsibilities.

## *Safety Net*

- Fall from walking / working surface to net must be unobstructed.
- Nets must be drop tested using a 400 pound bag of sand.
- Net openings must not be greater than 36 square inches.

## *Warning Line*

- Must be erected around all sides six feet from edge.
- Wire, rope, or chain must be flagged every 6 feet with high visibility material.
- Height must be between 34 and 39 inches.
- Must be capable of resisting 16 pounds of pressure without tipping over.

## **Training**

### *General*

All site personnel who might be exposed to fall hazards on the jobsite shall receive training by a competent person. The training shall be conducted at the time of the site orientation. The competent person must meet the applicable sections of 1926.503(a)(2).

The training must include:

- Nature of fall hazards in work area.
- Correct procedures for erecting, maintaining, disassembling, and inspecting the fall protection system to be used.

# FALL PROTECTION PROGRAM

- The use and operation of the system to be used.
- The relevant standards.

## *Retraining*

Retraining shall be conducted when changes occur in the workplace which present a new fall hazard, when fall protection systems or equipment is changed, or when it appears that the employee has not retained the requisite understanding or skill regarding the fall hazards or protective measures.

## *Certification of Training*

Certification of training or retraining shall include the name of the employee, the date of the training, the content of the training, and the signature of the person who conducted the training.

Training certification shall be maintained as part of the project file.

## **Ladders**

- All ladders must be equipped with non-slip ladders shoes.
- Extension ladders must not be taken apart and used separately.
- Ladders must be inspected before each use.
- Secure the top part of the ladder by tying off to a solid support.
- The top of the ladder shall extend 3 feet above the elevated surface.
- Only one person at a time is permitted on the ladder.
- A ladder must be placed so that the horizontal distance from the base of the vertical plane is 1/4 of the ladder length.
- If possible, avoid placing ladders against pipelines. If need to, make certain the pipe can support the weight of the ladder and you.
- Ladder footing must be firm and level.
- Wear a full body harness and shock absorbing lanyard when working on a ladder 6 feet above the surface.
- Ladders should be constructed of wood or fiberglass.



# FALL PROTECTION PROGRAM

## Scaffolds

- Scaffolds shall be placed upon a sound and rigid surface.
- A standard guardrail consisting of a top rail - 42 inches high, midrail, and toe board shall be used. Supports shall be at intervals of 10 feet or less.
- A scaffold must support at least 4 times its intended load.
- All planking and platforms must be overlapped a minimum of 12 inches.
- An access ladder must be provided.
- Scaffold planks shall extend over their end supports not less than 6 inches or more than 18.
- The legs of the scaffold must be straight and rigid.
- No work on scaffolds is permitted during storms or high winds.
- Area around the scaffold must be barricaded and signed stating - *Danger - Overhead Work.*

## Manlifts

- When traveling, the boom must be in proper travel position with the engine in front and the operator facing the controls.
- Only trained personnel are permitted to operate the manlift.
- Personnel and load limits are not to be exceeded.
- Do not operate within 10 feet of a power line.

## Harness

- Full body harnesses with shock absorbing lanyards are required.
- Must be worn when working in a manlift or manbucket.
- Must be worn where there is no railing or other forms of protection.

APPENDIX H  
Confined Space Program

# CONFINED SPACE ENTRY PROGRAM

## Purpose

The purpose of this procedure is to protect the health and safety of personnel working within confined spaces and to comply with all applicable regulations.

## Definitions

**Attendant** - a trained individual stationed outside a permit space who monitors the authorized entrants and performs all attendant's duties assigned in the facility permit space program.

**Authorized Entrant** - an individual who is authorized by facility management to enter a permit space.

**Blanking or Blinding** - the absolute closure of a pipe, line, or duct by the fastening of a solid plate (such as a spectacle blind or a skillet blind) that completely covers the bore and that is capable of withstanding the maximum pressure of the pipe, line, or duct with no leakage beyond the plate.

**Certified** - Written authorization by facility management for an individual to perform certain function(s) for which she/he has achieved certification. To become certified, an individual must satisfactorily complete all certification requirements as specified by facility management, such as but not limited to: participating in all required lectures and/or training; and attaining qualification in the required examination(s), drill(s), and/or field evaluation(s).

**Confined Space** - a space that:

- (1) Is large enough and so configured that an employee can bodily enter and perform assigned work; and
- (2) Has limited or restricted means for entry or exit (for example, tanks, vessels, silos, storage bins, hoppers, vaults, and pits); and
- (3) Is not designed for continuous human occupancy.

Examples of spaces that may meet the above criteria:

- boilers
- tanks
- vessels
- ventilation ducts
- silos
- hoppers
- pits
- storage bins
- vaults
- sewers
- tunnels
- exhaust ducts
- pipelines
- trenches

**Non-Permit Confined Space** - a confined space that does not contain or, respect to atmospheric

hazards, have the potential to contain any hazard capable of causing death or serious physical harm. (Examples of spaces which could be considered as non-permit required spaces include water tanks, vessels that contained silica sand, brine tanks, pits, trenches, and diked areas.)

**Permit-Required Confined Space (Permit Space)** - a confined space that has one or more of the following characteristics.

- (1) Contains or has a potential to contain a hazardous atmosphere: flammable, toxic, and/or oxygen deficient;
- (2) Contains a material that has the potential for engulfing an entrant;
- (3) Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section; or
- (4) Contains any other recognized serious safety or health hazard.

**Double Block and Bleed** - a method used to isolate a confined space from a line, duct or pipe by physically locking closed two in-line valves on a system and locking open a "vented to atmosphere" valve between them.

**Engulfment** - the surrounding and effective capture of a person by a liquid or finely divided (flowable) solid substance that can be aspirated to cause death by filling or plugging the respiratory system or that can exert enough force on the body to cause death by strangulation, constriction, or crushing.

**Entry** - the action by which a person passes through an opening into a permit-required confined space. Entry includes ensuing work activities in that space and is considered to have occurred as soon as any part of the entrant's body breaks the plane of an opening into the space.

**Entry Supervisor (Permit Issuer)** - the person, certified by management, responsible for:

- determining if acceptable entry conditions are present at a permit space where entry is planned;
- authorizing entry, and
- overseeing entry operations, and
- terminating entry as required by this procedure.

**Hazardous Atmosphere** - an atmosphere that may expose personnel to the risk of death, incapacitation, impairment of ability to self-rescue (that is, escape unaided from a permit space), injury, or acute illness from one or more of the following causes:

- (1) Flammable gas, vapor, or mist in excess of 10% of its lower flammable limit

(LFL);

- (2) Airborne combustible dust at a concentration that meets or exceeds its LFL;  
Note: This concentration may be approximated as a condition in which the dust obscures vision at a distance of 5 feet (1.52 m) or less.
- (3) Atmospheric oxygen concentration below 19.5% or above 23%.
- (4) Atmospheric concentration of any substance for which a dose or a permissible exposure limit is published in Subpart G, Occupational Health and Environmental Control, or in Subpart Z, Toxic and Hazardous Substances, and which could result in employee exposure in excess of its dose or permissible exposure limit.
- (5) Any other atmospheric condition that is immediately dangerous to life or health.

**Immediately Dangerous to Life or Health (IDLH)** - any condition that poses an immediate or delayed threat to life or that would cause irreversible adverse health effects or that would interfere with an individual's ability to escape unaided from a permit space.

Note: Some materials - hydrogen fluoride gas and cadmium vapor, for example - may produce immediate transient effects that, even if severe, may pass without medical attention, but are followed by sudden, possibly fatal collapse 12-72 hours after exposure. The victim "feels normal" from recovery from transient effects until collapse. Such materials in hazardous quantities are considered to be "immediately" dangerous to life or health.

**Inerting** - the process by which a permit space is removed from service and completely protected against the release of energy and material into the space by such means as: blanking or blinding; misaligning or removing sections of lines, pipes, or ducts; a double block and bleed system; lockout or tagout of all sources of energy; or blocking or disconnecting all mechanical linkages.

**Oxygen Deficient Atmosphere** - an atmosphere containing less than 19.5% oxygen by volume.

**Oxygen Enriched Atmosphere** - an atmosphere containing more than 23% oxygen by volume.

**Prohibited Condition** - any condition in a permit space that is not allowed by the permit during the period when entry is authorized.

**Rescue Services** - a defined group of trained individuals designated to rescue employees from confined spaces.

**Retrieval System** - the equipment (including a retrieval line, chest or full-body harness, wristlets, if appropriate, and a lifting device or anchor used for non-entry rescue of persons from permit spaces.

**Testing** - the process by which the hazards that may confront entrants or a permit space are identified and evaluated. Testing includes specifying the tests that are to be performed in the confined space.

### **General Requirements**

- An evaluation will be made at all job sites by the Health and Safety Officer if there are any permit required confined spaces.
- If these spaces are found, all employees will be notified at the initial site specific training.
- If the following conditions are met, then a less stringent entry procedure can be followed:
  - The only hazard is an actual or potentially hazardous atmosphere.
  - Forced air ventilation is sufficient to maintain safe entry.
  - Sufficient monitoring and inspection data are available.
- Classification of a non-permit confined space.
  - Has no actual or potential hazardous atmospheres.
  - Documentation that no hazardous atmospheres exist.
- Permit required confined space require:
  - Isolating the space - lock out/tag out, line breaking (follow procedures in Corporate Health and Safety Program); blanking or blinding, double blocks and bleeds, and disconnecting all mechanical linkages.
  - Purging, flushing, inerting or ventilating.
  - Verifying that conditions are acceptable for entry throughout the duration of an authorized entry.
- Preparation for entry.
  - Equipment needed include - air monitoring instrumentation, air moving equipment, communication, personnel protective equipment, illumination, barriers to protect entrants from external hazards, retrieval systems, and rescue and emergency equipment.
- Confined space entry permits.
  - No person will enter a confined space until a confined space entry permit has

been completed.

- Figure 1 shows a sample permit.
  - Only personnel trained and certified as entry supervisors may issue the permit.
  - A copy of the permit must be posted until the permit is canceled.
  - Permit will be valid for the period required to complete the assigned task or for 24 hours whichever is less.
- Testing of the atmosphere.
    - Tests for a flammable atmosphere, oxygen deficiency, and vapor concentration (if applicable) will be conducted.
    - Oxygen content between 19.5 and 23%, Lower Flammability Level <1%, and vapor concentration less than the OSHA exposure level are acceptable for entry.
    - Sufficient tests must be taken through a cross-section of the confined space to accurately characterize the environment.
    - Test results and the tester's signature must be recorded on the permit form.
    - Instrumentation must be tested and zeroed before each daily use and calibrated according to manufacturer's specifications.
- Attendants.
    - An authorized attendant will be stationed at each confined space.
    - The attendant will not enter the space unless he is relieved, trained and equipped for rescue operations, and a second rescuer arrives to assist.
- Training.
    - All affected personnel must receive annual training.
    - Documentation include signature of the trainee, dates of training, signature of trainer, lesson plan, and verification of each trainee's understanding.
    - Authorized entrants will receive training in:
      - Recognition of hazards.
      - Need to maintain contact with attendants.

- Proper use of personal protective equipment.
  - Need to evacuate space if ordered by the attendant, O<sub>2</sub>/LFL alarm indicates a hazard, entrant detects a prohibited condition, or the entrant recognizes a warning sign and/or symptoms of exposure to a dangerous situation.
  - All aspects of the permit.
  - Use of the test equipment.
- Attendants will receive training in:
- All aspects of the permit.
  - Requirement to remain outside confined space.
  - Recognition of hazards.
  - Requirement to maintain visual or verbal contact with entrants.
  - Alerting rescue personnel.
  - Use of test equipment.
- Entry supervisors will receive training in:
- Determination that the space has been isolated.
  - Determination that permit is complete and correct.
  - Determination that all procedures are in effect before entry.
  - Cancellation of permit.
- Rescue services will receive training in:
- Use of personal protective equipment and confined space rescue equipment.
  - Methods and procedures to rescue personnel.
- Contractor entry procedures:
- Since we are a contractor at many facilities, we must be informed by the supervising engineer of:
    - The existence of the confined spaces and the facilities program.
    - Rationale for the designation of permit confined spaces.
    - Precautions and procedures while working in or near a confined space.
    - Debriefing at conclusion of entry.

## **TRAINING OUTLINE FOR CONFINED SPACE ENTRANTS**

### **I. GENERAL HAZARDS OF WORKING IN CONFINED SPACES**



- A. Toxic Substances - Routes of Entry
  - 1. Inhalation
  - 2. Skin Absorption
  - 3. Ingestion
- B. Oxygen Deficiency - Oxygen 19.5 - 23%
- C. % LFL Not Greater than 10%
- D. Noise
- E. Equipment Hazards
  - 1. Sharp Edges
  - 2. Head Knockers
- F. Temperature Extremes
  - 1. Heat Stress
  - 2. Cold Stress
- G. Claustrophobia
- H. Fall Protection Within Space and at Access Opening
- I. Chemical Exposures
  - Introducing Chemicals and Contaminants (Solvents, Cleaners, Maintenance Activities, etc.)
    - 1. Caustic
    - 2. Acid
    - 3. Organics
    - 4. Welding/cutting fumes
- J. Disturbing Sludge or Vessel Surfaces
  - 1. Sludge can generate chemical vapors and gas
  - 2. Vessel surfaces can collect and then release atmospheric contaminants
- K. Toxicology (Examples)

- Methylene Chloride
- Hydrofluoric Acid
- Phenol

L. IDLH Atmospheres

M. Radiation (Ionizing and Non-Ionizing)

N. Dust/Mists

1. Proper respiratory protection
2. Dust explosion hazard

O. Ventilation

P. Hyperventilation

## II. SPECIFIC HAZARDS AT THE FACILITY

## III. REASONS FOR, PROPER USE OF, AND LIMITATIONS OF PPE IN CONFINED SPACES

1. Respiratory protection
2. Gloves
3. Chemical suits
4. Harness and lifeline
5. Hard hat
6. Goggles
7. Face shield
8. Boots/Safety toed shoes

## IV. PERMIT SYSTEM

1. Explanation of permit
2. Duties of entry supervisor
3. Duration of permit
4. Cancellation of permit

## V. ATTENDANT DUTIES

## VI. CONFINED SPACE RESCUE

1. Rescue plan
2. Rescue equipment
3. Rescue team

4. Entrant responsibilities

VII. RECOGNITION OF POTENTIAL OVEREXPOSURE

A. Self

B. Others

# SEVENSON ENVIRONMENTAL CONFINED SPACE ENTRY PERMIT

Date \_\_\_\_\_ Time of Issue \_\_\_\_\_ Length of Permit \_\_\_\_\_  
 Location \_\_\_\_\_ Equipment ID \_\_\_\_\_  
 Purpose of Entry & Description of Work \_\_\_\_\_

Authorized Entrant(s) \_\_\_\_\_  
 Will "HOT" Work be authorized for this Entry? \_\_\_ No \_\_\_ Yes (describe : ) \_\_\_\_\_

## HAZARD IDENTIFICATION

Indicate ALL potential Hazards of this Permit Space:

	YES	NO	N/A
a. Contains or may contain a hazardous atmosphere	___	___	___
b. Contains a material for potential engulfment	___	___	___
c. Has an internal configuration for potential entrapment If "Yes", describe _____	___	___	___
d. Contains the following recognized serious safety or health hazards: _____			

## PRE-ENTRY PREPARATION

	YES	N/A	Done			Removed		
			Date	Time	By	Date	Time	By
1. Lines broken and/or blanked:								
Line Contents								
Location								
a.								
b.								
c.								
2. Drain or at a workable level								
3. Purge - flush and vent								
4. Force air to bottom & vent								
5. Lock out power feeds:								
Equip/Location of Lock out								
a.								
b.								
c.								
6. Shut-off heating systems								
7. Other:								

## TEST TO BE TAKEN

	P.E.L.	Time		Results	Results	Results
		Tester				
		Yes	N/A			
% of Oxygen	19.5% to 21%					
Temperature	110EF/43EC					
% of LEL:	Any % over 10					
Hydrogen Sulfide	10 ppm					
Carbon Monoxide	35 ppm					
V.O.C.'S						

PREVENTION OF UNAUTHORIZED ENTRY		
	YES	NO
1. Have Worker(s) to enter been trained for this specific entry?	_____	_____
2. Have Attendants been trained for this specific space?	_____	_____
3. Post "WORKER IN CONFINED SPACE" Sign	_____	_____
4. Set-up the following additional barriers: _____ _____		
MANDATORY SAFETY EQUIPMENT REQUIRED		
	YES	N/A
1. Fire Extinguisher	_____	_____
2. Retrieval Lines	_____	_____
3. Respirator	_____	_____
4. Goggles	_____	_____
5. Hearing Protection	_____	_____
6. Protective Clothing	_____	_____
7. Special Boots or Shoes	_____	_____
8. Gloves	_____	_____
9. Other Safety Equipment Required _____		
COMMUNICATION PROCEDURES AND EQUIPMENT TO BE USED FOR THIS ENTRY		
(Verify that chosen equipment is in place and operation.)		
	Verified by:	
1. _____	_____	
2. _____	_____	
RESCUE EQUIPMENT TO BE PROVIDED ON-SITE		
	YES	N/A
a. Two chest harnesses or two wristlets	_____	_____
b. Two five minute supplied air escape respirators	_____	_____
c. One 30 minute S.C.B.A.	_____	_____
d. One emergency siren	_____	_____
e. Other necessary Rescue Equipment	_____	_____
IN CASE OF EMERGENCY		
	Phone Number or Ext.	
Rescue Service		
1. _____	_____	
2. _____	_____	
3. _____	_____	

**Authorizer** must sign below AFTER all the above actions are fully understood and conditions necessary for SAFE entry have been met.

**Authorizer of Entry** \_\_\_\_\_  
Signature
Date
Time

Upon completion of the entry covered by this Permit, and after all entrants have exited the Permit space, **Authorizer** must sign below.

**Canceled by** \_\_\_\_\_  
Signature
Date
Time

APPENDIX I  
Critical Lift Program

# Critical Lift Program

A critical lift is a non-routine crane lift that requires detailed planning and additional procedures and precautions. Critical lifts include:

- Lifts made when the load weight is 75% or more of the rated capacity of the crane.
- Loads that require the load to be lifted, swung, or placed out of the operator's view.
- Lifts involving non-routine or technically difficult rigging arrangements.
- Hoisting personnel with the crane.
- The load is unique and, if damaged, would be irreplaceable or not easily repaired and is vital to the operation of the system.
- The cost to replace or repair the load or the delay in operations would have a negative impact on the operation of the system.

After a critical lift has been determined by the Superintendent (Jim Atkins), he will ensure that a pre lift plan is developed which contains the following:

- Identification of the items to be lifted, the weight, dimensions, and center of gravity of the load, and any hazardous or toxic materials which may be present.
- Identification of the crane and its rated capacity.
- Rigging sketches which may include:
  - Identification and rated capacity of slings, lifting bars, rigging, accessories, and below the hook lifting devices.
  - Load-indicating devices.
  - Load vectors.
  - Lifting points.
  - Sling angles.
  - Boom and swing angles.
  - Methods of attachment.
  - Crane orientation.
  - Other factors affecting equipment capacity.
- Only qualified and experienced operators who have been trained will be assigned to make the lift.
- Only designated, qualified signalers will give signals to the operator. However, the operator will obey a STOP signal at all times, no matter who gives the signal.
- The procedure and rigging sketches will be reviewed and approved by the Superintendent and the Safety Manager.

# Critical Lift Program

- A pre-lift meeting will be held with the affected personnel, and the plan and procedures will be reviewed. Any questions will also be resolved at this time.
- After the conclusion of the pre-lift meeting, the lift will be accomplished.



**Sevenson Environmental Services, Inc.**  
**CRITICAL LIFT PLAN**

Pre –Lift Checklist

	Yes	No	
1. Crane operator meets company qualification requirements?	<input type="checkbox"/>	<input type="checkbox"/>	
2. Lift Calculations and rigging plan completed?	<input type="checkbox"/>	<input type="checkbox"/>	
3. Are all required approvals/permits signed?	<input type="checkbox"/>	<input type="checkbox"/>	
4. Crane inspections up to date (Annual/Monthly/Daily)?	<input type="checkbox"/>	<input type="checkbox"/>	
5. Weather conditions and wind speed acceptable?	<input type="checkbox"/>	<input type="checkbox"/>	
6. Has the stability of the ground been assured?	<input type="checkbox"/>	<input type="checkbox"/>	
7. Matting and/or outrigger pads inspected and approved?	<input type="checkbox"/>	<input type="checkbox"/>	
8. Electrical equipment and power lines at required distance?	<input type="checkbox"/>	<input type="checkbox"/>	
9. Rigging inspected for defects?	<input type="checkbox"/>	<input type="checkbox"/>	
10. Engineering lifting lugs fabricated and installed correctly?	<input type="checkbox"/>	<input type="checkbox"/>	
11. Connecting/disconnecting means been developed?	<input type="checkbox"/>	<input type="checkbox"/>	
12. Have the safety precautions been reviewed?	<input type="checkbox"/>	<input type="checkbox"/>	
13. Is survey equipment required?	<input type="checkbox"/>	<input type="checkbox"/>	
14. The total lifted weight is below 95% capacity?	<input type="checkbox"/>	<input type="checkbox"/>	
15. Signal person(s) assigned?	<input type="checkbox"/>	<input type="checkbox"/>	
16. Safe Plan of Action (SPA) completed?	<input type="checkbox"/>	<input type="checkbox"/>	
17. Pre-lift meeting/Activity Hazard Analysis held?	<input type="checkbox"/>	<input type="checkbox"/>	
18. Hoist area and load path cleared of non-essential personnel?	<input type="checkbox"/>	<input type="checkbox"/>	
19. Crane set up per the lift plan (radius, configuration, etc.)?	<input type="checkbox"/>	<input type="checkbox"/>	
20. Rigging equipment and tag line(s) installed per plan?	<input type="checkbox"/>	<input type="checkbox"/>	
<b>Personnel Completing Check List</b>			
Print	Signature	Title	Date

**Sevenson Environmental Services, Inc.**  
**CRITICAL LIFT PLAN**

Lift Identification	
Job Number:	Location:
Lift Supervisor Name:	
Date of Lift:	Time:
Lift Description:	
Approvals (Signatures Required)	
Site Manager:	Date:
Project Manager (if over 50 tons):	Date:
Lift Supervisor:	Date:
Rigging Superintendent:	Date:
Qualified Person:	Date:
Operator(s):	Date:
If engineering Designs Are Used	
Drawing Numbers:	
Attachments (Insert Page Numbers)	
1. Operator Certifications	
2. Capacity Certificates and Inspection Reports for all Lifting Equipment	
3. Inspection Reports for all Rigging Equipment	
4. Insurance Certificates	
5. Applicable capacity charts and chart notes for lifting equipment	
6. Load and Capacity Calculations	
7. Rigging Diagram(s)	
8. Lift Geometry and Free Body Diagram(s)	
9. Other:	
10 Other:	

# Sevenson Environmental Services, Inc.

## CRITICAL LIFT PLAN

### Critical Lift Load and Capacity Calculations

Page 1 of 4

Lift Description: _____					
<b>Section A</b>					
<b>Weight of Load (Equipment) – Live Load</b>					
1. Load/Equipment condition		New: <input type="checkbox"/>		Used: <input type="checkbox"/>	
2. Weight of Load/Equipment Empty				Lbs	
3. Weight of Attachments				Lbs	
a. Platforms and Ladders				Lbs	
b. Piping and Accessories				Lbs	
c. Liquids Inside				Lbs	
d. Dirt and Debris				Lbs	
e. Internal Trays or Liners				Lbs	
f. Other:				Lbs	
g. Other:				Lbs	
4. Total Amount of Load/Equipment Weight (A2 through A3g)				Lbs	
<b>Section B</b>					
<b>Total Lifted Weight (Weight of Load/Equipment + Rigging + (Main) Crane Deductions)</b>					
1.	Load/Equipment weight plus contingency*	%	7.	Weight of Jib Erected	Lbs
2.	Amount of Equipment Weight	Lbs	7a.	Weight of Jib Stowed	Lbs
3.	Weight of Headache Ball	Lbs	8.	Weight of Jib Headache Ball	Lbs
4.	Weight of Main Block	Lbs	9.	Weight of Cable (Load Fail)	Lbs
5.	Weight of Spreader Bar	Lbs	10.	Auxiliary Boom Head	Lbs
6.	Weight of Slings and Shackles	Lbs	11.	Other:	Lbs
* Use 100% plus some percentage (example +10%) to multiply times number in Section A4 to allow for contingency to compute Section B2.					
<b>TOTAL LIFTED WEIGHT</b>				Lbs	
<b>(Sum B2 through B11)</b>					
Source of Load Weight (A2):					
(Name Plate, Drawings, Calculated, Weight Ticket, Etc.)					
<b>Weight and Calculations</b>					
Print Name		Signature		Date	
By:					
Verified By:					
(See Page 2)					

# Sevenson Environmental Services, Inc.

## CRITICAL LIFT PLAN

### Critical Lift Load and Capacity Calculations

Page 2 of 4

Section C Capacities of the (Main) Crane				
1. Make and Model of Crane:				
2. Counter Weight Size:		Type of Boom:		
3. Lifting Arrangement				
a.	Max. Radius During Lift	Feet		
b.	Length of Boom	Feet		
c.	Angle of Boom at Pick	Degree		
d.	Angle of Boom at Set	Degree		
Rated Capacity Under Most Severe Conditions				
1.	Over Rear	Lbs		
2.	Over Front	Lbs		
3.	Over Side	Lbs		
f.	Rated Capacity for Lift Radius, Crane Configuration, and Orientation (over front, side, or rear)			Lbs
4. Jib				
a.	Is the Jib to be used	Yes <input type="checkbox"/> No <input type="checkbox"/>		
b.	Length of Jib	Feet		
c.	Jib Angle	Degree		
d.	Rated Jib Capacity for Lift Radius, Crane Configuration, and Orientation (over front, side, or rear)		Lbs	
5. Load Line/Fall Cable				
a.	Is Main Block to be used	Yes <input type="checkbox"/> No <input type="checkbox"/>		
b.	Number of Parts of Cable			
c.	Size of Cable	Inches		
d.	Maximum Capacity for Lift Radius, Crane Configuration, and Orientation (over front, side, or rear)		Lbs	
Section D Percent of Cranes Capacity				
1.	$\frac{\text{Total Lifted Weight}}{\text{Rated Capacity}} * 100$		%	
Section E Size of Slings				
1. Sling Selection				
a.	Type of Arrangement	(Spreader, Vertical Slings, etc.)		
b.	Number of Slings to Hook	Capacity	Lbs	
c.	Sling Size	Inches		
d.	Sling Length	Feet		
e.	Sling Capacity (at angle used)	Lbs		
f.	Number of Slings to Load	#		
g.	Total Rigging Capacity (E1e x E1f)			Lbs
Comments: _____				
Sketch of rigging arrangements available Yes <input type="checkbox"/> No <input type="checkbox"/> See page:				
(See Page 3)				

# Sevenson Environmental Services, Inc.

## CRITICAL LIFT PLAN

### Critical Lift Load and Capacity Calculations

Page 3 of 4

Section F		
Total Lifted Weight to be Lifted by Tailing Crane		
1. Percent of Total Equipment Weight **	%	(** Generally 50+% based on CG and movement during up righting)
2. Amount of Equipment Weight (A4 x F1)	Lbs	
3. Weight of Headache Ball	Lbs	
4. Weight of Block	Lbs	
5. Weight of Lifting Bar	Lbs	
6. Weight of Slings and Shackles	Lbs	
7. Weight of Jib Erected	Lbs	
8. Weight of Jib Headache Ball	Lbs	
9. Weight of Cable Load (Load Fall)	Lbs	
10. Auxiliary Boom Head	Lbs	
11. Other	Lbs	
12. Total Weight of Load/Equipment Lifted by Tailing Crane (F2 through F11)	Lbs	
Source of Load Weight:		
(Name Plate, Drawings, Calculated, Scale Ticket)		
Weight and Calculations		
Print Name	Signature	Date
By:		
Verified By:		
Section G		
Capacities for Tailing Crane Based on Configuration		
1. Make and Model of Crane:		
2. Counter Weight Size:	Type of Boom:	
3. Lifting Arrangement		
a. Max. Radius During Lift	Feet	
b. Length of Boom	Feet	
c. Angle of Boom at Pick	Degree	
d. Angle of Boom at Set	Degree	
Rated Capacity Under Most Severe Conditions		
1. Over Rear	Lbs	
2. Over Front	Lbs	
3. Over Side	Lbs	
f. Rated Capacity for Lift Radius, Crane Configuration, and Orientation (over front, side, or rear)		Lbs
4. Jib		
a. Is the Jib to be used	Yes <input type="checkbox"/> No <input type="checkbox"/>	
b. Length of Jib	Feet	
c. Jib Angle	Degree	
d. Rated Jib Capacity for Lift Radius, Crane Configuration, and Orientation (over front, side, or rear)		Lbs
5. Cable		
a. Number of Parts	#	
b. Size of Cable	Inches	
c. Maximum Capacity	Lbs	
(See Page 4)		

# Sevenson Environmental Services, Inc.

## CRITICAL LIFT PLAN

### Critical Lift Load and Capacity Calculations

Page 4 of 4

Section H				
Percent of Cranes Capacity Tailing Crane				
1.	$\frac{\text{Total Lifted Weight}}{\text{Rated Capacity}} * 100$		%	
Section I				
Size of Slings for Tailing Crane				
1. Sling Selection				
a.	Type of Arrangement	(Spreader, Vertical Slings, etc.)		
b.	Number of Slings to Hook	Capacity	Lbs	
c.	Sling Size	Inches		
d.	Sling Length	Feet		
e.	Sling Capacity (at angle used)	Lbs		
f.	Number of Slings to Load	#		
g.	Total Rigging Capacity (Ie x If)	Lbs		
<div style="display: flex;"> <div style="width: 10%; padding-right: 5px;">Comments:</div> <div style="border-bottom: 1px solid black; flex-grow: 1;"></div> </div> <div style="display: flex;"> <div style="width: 10%; padding-right: 5px;"></div> <div style="border-bottom: 1px solid black; flex-grow: 1;"></div> </div> <div style="display: flex;"> <div style="width: 10%; padding-right: 5px;"></div> <div style="border-bottom: 1px solid black; flex-grow: 1;"></div> </div> <div style="display: flex;"> <div style="width: 10%; padding-right: 5px;"></div> <div style="border-bottom: 1px solid black; flex-grow: 1;"></div> </div> <div style="display: flex;"> <div style="width: 10%; padding-right: 5px;"></div> <div style="border-bottom: 1px solid black; flex-grow: 1;"></div> </div> <div style="display: flex;"> <div style="width: 10%; padding-right: 5px;"></div> <div style="border-bottom: 1px solid black; flex-grow: 1;"></div> </div> <div style="display: flex;"> <div style="width: 10%; padding-right: 5px;"></div> <div style="border-bottom: 1px solid black; flex-grow: 1;"></div> </div> <div style="display: flex;"> <div style="width: 10%; padding-right: 5px;"></div> <div style="border-bottom: 1px solid black; flex-grow: 1;"></div> </div> <div style="display: flex;"> <div style="width: 10%; padding-right: 5px;"></div> <div style="border-bottom: 1px solid black; flex-grow: 1;"></div> </div> <div style="display: flex;"> <div style="width: 10%; padding-right: 5px;"></div> <div style="border-bottom: 1px solid black; flex-grow: 1;"></div> </div> <div style="display: flex;"> <div style="width: 10%; padding-right: 5px;"></div> <div style="border-bottom: 1px solid black; flex-grow: 1;"></div> </div>				
<div style="display: flex; justify-content: space-between;"> <span>Sketch of rigging arrangements available</span> <span>Yes <input type="checkbox"/></span> <span>No <input type="checkbox"/></span> <span>See page:</span> </div>				