

VORTEX
companies

CIVIL INFRASTRUCTURE SOLUTIONS



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CIVIL INFRASTRUCTURE SOLUTIONS

PROGRAM OVERVIEW



SAFETY PROGRAM OVERVIEW

This comprehensive safety & health training program has been developed to address specific safety concerns of the Vortex Companies and to provide guidance for the performance of individual job tasks within the framework of appropriate Occupational Safety & Health Administration (OSHA) standards.

Safety demands a commitment from all personnel within the Vortex Companies. As an employer, we have an obligation to ensure that all our employees are afforded the protection of an appropriate safety & health program.

This program contains policies and procedures to deal with common jobsite place hazards, specific job-related hazards, and potential hazards that may arise.

Hazard assessment, project pre-planning, and engineering controls, where feasible, will be the preferred method of providing a safe jobsite. Hazards that remain will be minimized or eliminated through training which provides employees the ability to recognize jobsite hazards and understand the proper procedural and/or personal protective equipment requirements.

Each employee is encouraged to contact their supervisor immediately should a safety or health risk exist so that corrective action may be taken to eliminate the hazard entirely or deal with the hazard in a safe manner through modified work procedures, PPE, and/or other appropriate action.

On all jobsites, at least one person will be designated a “competent person” by virtue of experience or training. This person will have the ability to identify work related hazards, know the corrective procedures, and have the responsibility, ability and authority to stop work if the jobsite cannot be made safe.

Brad Jones, the Manager of Safety and Compliance for the Vortex Companies, or a designated competent person will make routine and random jobsite inspections to both identify new hazards and to monitor the effectiveness of our safety & health program.

In the final analysis, the success of the safety effort by the Vortex Companies depends on all employees, from senior management to the newest hire, demonstrating a commitment to safety by working in a safe manner. Safe job performance is how our safety effort is ultimately measured.



CIVIL INFRASTRUCTURE SOLUTIONS

ABRASIVE BLASTING



Vortex Companies

Procedure Name	Environmental, Health & Safety Manual – Abrasive Blasting
Applicability	VORTEX Companies – Employees & Subcontractors
Policy Revised	04.11.14

Purpose

The purpose of this program is to provide safe guidelines for the operation and maintenance of abrasive blasting equipment and their related components.

Scope

This program covers all employees involved in abrasive blasting jobs performed by the company. Whenever hazardous substances such as dusts, fumes, mists, vapors, or gases exist or are produced, their concentrations shall not exceed the limits specified in 1926.55(a) (Gases, Vapors, Fumes, Dusts and Mists). When ventilation is used as an engineering control method, the system shall be installed and operated according to the requirements of 1926.57 (Ventilation).

Key Responsibilities

Supervisors

- Be aware of potentially hazardous conditions that may arise during the blasting process prior to starting any blasting job and must take measures to protect employees.
- Ensure that all employees are trained on related safety topics.
- Understand the importance of regularly scheduled maintenance for continued safe operation of blast equipment. Ensure that all employees comply with this policy and all other related policies.

Blast Employees

- Be familiar with the safe operating functions of blasting equipment to be used on a job.
- Comply with all company policies.
- Have knowledge of hazards associated with respirable silica.
- Understand they are prohibited from using compressed air for cleaning unless the pressure is reduced to less than 30 pounds per square inch and be equipped with effective chip guarding and proper PPE.

Procedure

General

Abrasives and the surface coatings on the materials blasted are shattered and pulverized during blasting operations and the dust formed will contain particles of respirable size. The composition and toxicity of the dust from these sources shall be considered in making an evaluation of the potential hazards.

Dust shall not be permitted to accumulate on the floor or on ledges outside of an abrasive blasting enclosure. Dust spills shall be cleaned up promptly. Aisles and walkways shall be kept clear of steel shot or similar abrasives which may create a slipping hazard.



Equipment Handling

Follow these guidelines when moving blasting equipment to prevent back strains and crushing injuries:

- Use a forklift, crane or other type of lifting device for transporting a blast machine; always use a lifting device when the machine contains abrasive.
- Never manually move a blast machine where abrasive has been spilled on hard surfaces or on a wet or slippery surface.
- Never attempt to manually move a blast machine containing abrasive.
- Always disconnect hoses from machines to avoid interference during moving.

Air Compressors

Air compressors must be located in a well-ventilated area. It must be able to contain large volumes of clean, toxicant-free air. This means the compressor must be placed up wind from the blasting operation and out of the range of dust and flying abrasives.

- Due to the high pressure that air compressors create, precautions must be taken to prevent unleashing of strong forces that can cause serious bodily injury.
- Air for abrasive blasting respirators must be free of harmful quantities of dust, mists, or noxious gases and must be inspected daily, prior to use and comply with CFR 1910.134(I) (Respiratory Protection).
- Never adjust the pressure setting on a compressor above the blast equipment maximum working pressure rating. The maximum working pressure rating is indicated on the manufacturer's metal identification plate.

Blast Pot

Position blast pots and/or compressors on level ground. Machines operate best when they sit on level surfaces.

- For communication purposes place blast pot between the compressor and the surface to be blasted. This will enable the pot tender and operator to make visual contact.
- All couplings and pipefitting on the blast pot, compressor and hoses must be airtight.
- Blast pots must be inspected daily prior to use.

Hoses and Connectors

- Couplings must have safety wires in place and be secure as required by federal safety regulations. The operator shall be responsible to ensure that each coupling has safety wires in place.
- Whip checks must be installed at bull hose connections.
- Operator should hold onto the blast hose until the air pressure from the nozzle drops off to zero.
- Do not use hoses with soft spots.
- Never use tape to repair a blown-out hose.
- Immediately replace a hose if a blowout or leak occurs.
- Hose ends must come into contact with coupling gaskets to prevent leaks and to maintain static electricity conductivity.

Nozzles and Remote Controls

- Blast nozzles shall be bonded and grounded to prevent the buildup of static charges. Where flammable or explosive dust mixtures may be present, the abrasive blasting enclosure, the ducts, and the dust collector shall be constructed with loose panels or explosion venting areas, located on sides away from any occupied area, to provide pressure relief in case of explosion following the principles set forth in the National Fire Protection Association Explosion Venting Guide. NFPA 68-1954.
- Organic abrasives which are combustible shall be used only in automatic systems.



- Blast cleaning nozzles shall be equipped with an operating valve which must be held open manually. A support shall be provided on which the nozzle may be mounted when it is not in use.
- All blast machines must be equipped with remote control systems to start and stop the blasting process.
- Never tape, strap, or tie down an air actuated remote control lever or choke electric remote control switch.
- If there is the slightest delay in reaction time of the handle lever or lever lock to open, check for dust and dirt build-up around pivot pins before resuming blasting. Also, test the tension on the lever springs, and replace them immediately if they do not respond rapidly.
- Substituting component pieces with other manufacturer's parts is not allowed.
- Inspect blast nozzles for wear and cracks on the inner liner. When a nozzle orifice is worn 1/16" larger than its original size, it should be replaced.
- Check nozzles and nozzle holders for deterioration of thread form. Threads on nozzles and their companion holders must not be cross-threaded, worn or distorted.
- Hoses that are being tied and lifted to blasting operations being conducted above grade, i.e., scaffolds, shall be depressurized to prevent accidental start-up.

Operator Signals

- On the jobsite, voice communication is often impossible. Even shouts cannot be heard over the noise of compressors and blasting. In addition, the operator's head will be enclosed in the helmet, which blocks out sound and limits vision. For these reasons, an industry wide standard set of hand and sound signals has been developed.
- Signals may be visual hand movements, flashing light, pulls on a rope or sounds made by banging a hammer or using a horn or electric buzzer.
- Every operator must become familiar with the signals to be used on the jobsite.

Respirator Use

- A specific work-site procedure shall be developed where respirators or CE blasting hoods/helmets are required to protect the health of the operator. The procedure shall comply with CFR 1926.103 (Respiratory Protection).
- Equipment for the protection of eyes, face and body shall be supplied to the operator when the respirator design does not provide such protection and to any other personnel working in the vicinity of abrasive blasting operations. This equipment shall conform to the requirements of 1926.102 (Eye and Face Protection).
- Protection shall be provided to any other personnel working in the vicinity of abrasive blasting operations.

Environmental Controls

- Organic abrasives which are combustible shall be used only in automatic systems. Where flammable or explosive dust mixtures may be present, the construction of the equipment, including the exhaust system and all electrical wiring, shall conform to the requirements of American National Standard Installation of Blower and Exhaust Systems for Dust, Stock, and Vapor Removal or Conveying, Z33.1-1961 (NFPA 91-1961), and Subpart S of 1926.57 (Ventilation).
- The work area must be inspected for exterior electrical power lines that may endanger operators.
- Operators should use care to avoid directly blasting power lines and insulators.
- Do not blast in atmospheres that contain flammable fumes.
- Take precautions at the work site to eliminate hazardous surface obstacles that may cause tripping hazards or interfere with worker mobility.
- Adequate ventilation must be provided for employees working within enclosures.
- Never operate compressor if hoses are frozen. When winter temperatures drop below freezing, check for ice prior to pressurizing hoses.
- Provide adequate drinking water for operators, especially during summer.



Personal Protective Equipment

- Secure hoses by tying them to scaffolding or personnel platforms, when working from elevations, to prevent injury from hoses falling on other personnel working below or near blasting area.
- Before using any blasting abrasive, check the SDS to find out the chemical composition of the abrasive material.
- Equipment for the protection of eyes, face and body shall be supplied to the operator when the respirator design does not provide such protection and to any other personnel working in the vicinity of abrasive blasting operations. This equipment shall conform to the requirements of 1926.102 (Eye and Face Protection).
- Ventilation systems and dust collectors may be necessary in enclosed conditions.
- Noise from abrasive blast nozzles can be loud enough to damage the hearing of blasters and others on the work site. Workers must not be exposed to noise levels exceeding 80 decibels as an eight-hour time weighted average (80 dBA TWA), therefore all blasters shall wear earplugs.
- Blaster must wear heavy-duty gloves and steel toe boots.
- Helmet lenses should be changed as soon as pitting or frosting takes place.



CIVIL INFRASTRUCTURE SOLUTIONS

ACCIDENT/INJURY INVESTIGATION



Vortex Companies

Procedure Name	Environmental, Health & Safety Manual – Accident/Injury Investigation
Applicability	VORTEX Companies – Employees & Subcontractors
Policy Revised	03.27.14

Purpose

The purpose of Accident Investigation is to prevent the same type of accident from reoccurring. An accident investigation will begin immediately after the medical crisis is resolved.

Scope

This program applies to all COMPANY projects and operations.

Roles and Responsibilities of Employees and Management

- The competent person/supervisor on the jobsite will complete an Incident Report Form as soon as feasible following an accident or injury.
- The Manager of Safety of compliance will review the Incident report and conduct an accident investigation. The Manager of Safety and Compliance may delegate the investigation to other management personnel who may be on scene.

First Report

All incidents must be reported to Safety and Compliance immediately upon notification, whether formally, or informally. Failure to report incidents immediately hinders the investigation process.

Accident/Injury Investigation

- The five questions that must be answered are:
 - Who?
 - What?
 - When?
 - Where?
 - Why?
- Simple accidents may be caused by many complex reasons. Example: a worker is using a claw hammer on working surface more than six feet above the ground. The hammer head breaks off and strikes a worker below who is not wearing a hard hat. Why did this accident happen? How can it be prevented? With just the facts presented, the fault would seem to rest with the worker who was struck by the falling object.
- The accident investigation may reveal other contributing factors by answering questions, such as:
 - Were hard hats required on the project, were they available, and was this policy enforced by the supervisors?
 - Were precautions taken to prevent objects from falling from above, such as a controlled access zone (CAZ)?
 - Did the worker inspect his hammer before use? Was he driving nails – the job for which a claw hammer is designed or pounding metal beams?
- Interview witnesses.



- Document the accident scene before any changes are made.
- Review all information (procedures, equipment manuals).
- Make documented observations on:
 - Pre-accident conditions
 - Accident sequence
 - Post-accident conditions
- Document the facts (i.e.: location, witness remarks, and contributing factors).
- Determine sequence of events leading to accident.
- Complete an accident investigation form to collect:
 - Personnel information
 - Accident information (location, events leading to accident, machines involved)
 - Causes of the accident
 - Recommendation to prevent accident
 - Follow up information
- From the accident investigation form and witness statements write an accident investigation report. The report should include:
 - Background information (where, who)
 - Summary (sequence, extent, type, source)
 - Analysis (causes)
 - Recommendations
- After determining the cause of the accident, steps can be taken to prevent a reoccurrence. Near-miss mishaps, events which result in no injury or damage, should be investigated because even though the outcomes are different, the causes are the same.

Investigation Steps

1. Survey the scene
2. Secure the scene
3. Get help for the injured
4. Collect evidence
5. Analyze data
6. Determine causes (scientific methods)
7. Follow up (eliminate hazards)

Training

All employees in management positions are to be trained and familiar with the Vortex Companies Accident Investigation Policy.



INCIDENT REPORTING FORM

Use this form to report any workplace accident, injury, incident, close call, illness, or vehicular accident.
Return completed form to the Operations Supervisor or Management. HSE Department must review.

1. Type of Incident: Lost Time/Injury First Aid Incident Close Call Vehicle Accident

2. Details of parties involved:

Person Completing the report: _____ Date: _____

Person(s) Involved: _____ ; _____ ; _____

Equipment Involved: _____ ; _____ ; _____

3. Event Details:

Date of Event: _____ Time of Event: _____

Location of Event: _____

Witnesses: _____

Description of Events: _____

4. Employee Statement: _____

Employee Signature: _____ Date: _____

5. Witness Statement (If Available): _____

Witness Signature: _____ Date: _____



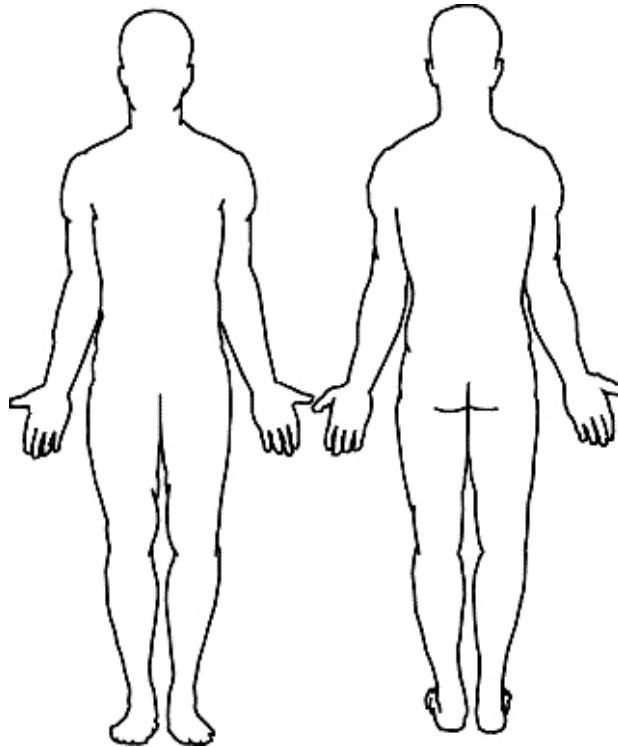
6. Was the incident caused by an unsafe act or an unsafe condition? Yes No

If yes, explain: _____

7. Did the incident result in an injury? Yes No

If Yes, describe Injury: _____

Identify where injury was sustained on body:



Was injury care beyond the scope of first aid? N/A Yes (If Yes, complete below) No

If Yes, was medical treatment offered? Yes No

Medical Provider Details:

Treatment Facility: _____ Treatment Facility Phone Number: _____

Treatment Facility Address: _____

Treating Doctor: _____

Treating Doctor Contact Information: _____



Did employee refuse medical treatment? Yes No

If medical treatment refused, employee is to sign acknowledgement below:

I, _____, am acknowledging that I am refusing any medical treatment to care for any Injuries I have sustained while working for _____ on _____

Employee Signature: _____ Date: _____

8. Did the incident result in damage to vehicle(s)? N/A Yes No

Company owned vehicles? Yes No

If Yes, describe damage: _____

Vortex Owned Vehicle/Equipment Details:

Owners Name: _____ Owners Phone Number: _____

Owners Address: _____

Vehicle Year, Make, and Model: _____

VIN, Serial, Other: _____

Damage Sustained: _____

Driver/Operator Name: _____

Driver/Operator Phone Number: _____ License No. and State: _____

Insurance Company: _____

Insurance Policy Number: _____ Insurance Phone Number: _____

Non-Vortex Owned Vehicle/Equipment Details:

Owners Name: _____ Owners Phone Number: _____

Owners Address: _____

Vehicle Year, Make, and Model: _____

VIN, Serial, Other: _____

Damage Sustained: _____

Driver/Operator Name: _____

Driver/Operator Phone Number: _____ License No. and State: _____

Insurance Company: _____

Insurance Policy Number: _____ Insurance Phone Number: _____



9. Did the incident result in any property damage? N/A Yes No

If Yes, describe property damage: _____

Owners Name: _____

Owners Address: _____

Property Address: _____

Owners Contact Info: _____

EST. Damage Amount in \$: _____

10. Police Information (Only if Responded)

Police Department Name: _____

Police Department Phone: _____

Responding Officer Name: _____ Officer Badge Number: _____

Case Number: _____ Date Report Available: _____

11. Was a STA (Safety Task Assessment) completed? N/A Yes No

If No, please explain: _____

REVIEW AND COMPLETION ACKNOWLEDGEMENT

Management sign off required

Signature of Person Completing Report: _____ Date: _____

Signature of Supervisor: _____ Date: _____

Signature of Supervisor: _____ Date: _____



PHOTOS

Photos of any damage caused or sustained, and any defective equipment required



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CHECK ALL DIRECT CAUSES THAT APPLY

What CONDITION of tools, equipment, or work area contributed to incident? Not Applicable

- Close Clearance/Congestion
- Hazardous Placement
- Inadequate Warning System
- Improper Material Storage
- Inadequate/Improper PPE
- Floors/Work Surfaces
- Inadequate Ventilation
- Inadequate Illumination
- Inadequate Guards/Barrier
- Equipment/Workstation Design
- Poor Housekeeping
- Equipment Failure
- Hazardous Materials
- Defective Tools/Equipment/Vehicle
- Other _____

What ACTION or INACTION contributed to the incident? Not Applicable

- Failure to Make Secure
- Improper Lifting
- Used Equipment Improperly
- Operating Procedure Deviation
- Horseplay/Distractive Active
- Nullified Safety/Control Devices
- Servicing Equipment In Motion
- Used Defective Equipment
- Improper Technique
- Unauthorized Actions
- Improper Position
- Unsafe Act of Another Staff
- Running/Rushing/Acting In Haste
- Other _____
- Failure to Use PPE
- Improper Loading
- Operating at Improper Speed
- Used Wrong Tool/Equipment
- Under Influence Drugs/Alcohol
- Failure to Warn/Signal

CHECK ALL UNDERLYING OR ROOT CAUSES THAT APPLY

What caused or influenced the substandard conditions or behaviors?

- Lack of Proper Procedures
- Inadequate Job Training Methods
- Inadequate Maintenance Standards
- Poor Work Design
- Lack of Communication
- Inadequate Cleaning
- Inadequate Preventive Maintenance
- Inadequate Job Instructions
- Inadequate Supervision
- Unsafe Design or Construction
- Inadequate Purchasing Standards
- Improper Extension of Service Life
- Inadequate Environmental Controls
- Inadequate Enforcement or Work Standards
- Inadequate Tools
- Improper Layout or Design
- Poor Work Practice
- Lack of Skill
- Improper Planning
- Inadequate Capacity
- Other _____

CHECK ALL ACTIONS NECESSARY TO CORRECT THE DIRECT AND ROOT CAUSES

What corrective actions have been taken or are needed to prevent a recurrence?

- Task Analysis/Procedure Revision
- Reinstruction of Employees
- Eliminate Congestion
- Task Analysis to Be Completed
- Improve Design/Construction
- Improve Illumination
- Other _____
- Improve Clean-Up Procedures
- Improve Storage/Arrangement
- Improve/Change Work Method
- Install/Revise Guards/Devices
- Job Reassignment of Employees
- Mandatory Pre-Job Instructions
- Repair/Replace Equipment
- Rotation of Employee
- Identify/Improve PPE
- Improve Enforcement
- Use Other Materials/Supplies
- Improve Ventilation

RECOMMENDED CORRECTIVE ACTIONS OR PREVENTIVE MEASURES TO BE TAKEN

Action Item	Person Responsible	Target Date	Date Complete

INVESTIGATION REVIEW (INITIAL AFTER REVIEWING THE FINDINGS OF THE INVESTIGATION)

	Initials	Review Date	Comments
Supervisor			
Manager			
Safety and Compliance			



CIVIL INFRASTRUCTURE SOLUTIONS

ACCIDENT/INJURY PREVENTION



Vortex Companies

Procedure Name	Environmental, Health & Safety Manual – Accident/Injury Prevention
Applicability	VORTEX Companies – Employees & Subcontractors
Policy Revised	07.31.17

Accident/Injury Prevention

This safety program is designed so that employees at Vortex Companies do not work in conditions that are unsanitary, hazardous, or dangerous to their health or safety.

One lax moment in terms of safety may result in a lifetime of needless pain and suffering. Disregarding safety standards may even be fatal. While an accident may happen in an instant, the consequences may last for years.

Accident prevention requires a commitment from all personnel within Vortex Companies to actively participate in our safety program. All personnel should be aware of jobsite hazards and follow procedures to eliminate these hazards by using proper work methods, use of personal protective equipment, and proper use of tools and equipment. All persons are encouraged to ask questions and make positive suggestions for safety improvement.

- Competent persons will be designated to provide jobsite expertise, as well as regular inspections of equipment, materials, and procedures.
- Competent persons will have the authority to stop work if a safety hazard is identified and it cannot be corrected immediately.
- All machinery, tools, materials, and equipment deemed unsafe will be taken out of service by physically removing, tagging, or locking controls to render them inoperable.
- Only persons qualified by training or experience will be allowed to operate equipment or machinery.
- All tools and items of equipment will be used for the purpose for which they were designed. For example, a wrench is not a hammer, a ladder is not a horizontal plank, and a fire extinguisher is not a cooler.

Never take chances or attempt any job without being aware of the proper procedures, the potential safety hazards, and the methods to reduce or eliminate risk.

STA's are required to be completed at the beginning of each day, before any work is completed. See included STA.



TECHNOLOGY

CIPP Pipe Bursting CCTV / Clean
 GeoKrete® Manhole Rehab Open Cut
 Grouting Other: _____

HSE CONCERNS

Check the applicable activities in your area and evaluate safe measures:

<input type="checkbox"/> Asbestos Exposure	<input type="checkbox"/> Lockout / Tagout
<input type="checkbox"/> Asphalt	<input type="checkbox"/> Marine Operations
<input type="checkbox"/> Barricades	<input type="checkbox"/> Material Storage
<input type="checkbox"/> Cement / Concrete	<input type="checkbox"/> Pinch Points
<input type="checkbox"/> Chemical Exposure	<input type="checkbox"/> Power Lines
<input type="checkbox"/> Confined Space	<input type="checkbox"/> Power Tools
<input type="checkbox"/> Cranes / Lifting Equip	<input type="checkbox"/> Pressurized Equipment
<input type="checkbox"/> Dismantle / Demolition	<input type="checkbox"/> Respiratory Protection
<input type="checkbox"/> Electrical	<input type="checkbox"/> Rigging
<input type="checkbox"/> Emission Controls	<input type="checkbox"/> Traffic Management
<input type="checkbox"/> Equipment Inspection	<input type="checkbox"/> Vehicles / Mobile Equip
<input type="checkbox"/> Erosion Controls	<input type="checkbox"/> Waste Streams
<input type="checkbox"/> Excavation/Trenching	<input type="checkbox"/> Weather Conditions
<input type="checkbox"/> Flammable Material	<input type="checkbox"/> Working at Height
<input type="checkbox"/> Grinding	<input type="checkbox"/> Working in Cold
<input type="checkbox"/> Heavy Equipment	<input type="checkbox"/> Working in Heat
<input type="checkbox"/> High Pressure Cleaning	<input type="checkbox"/> Working with Sharps
<input type="checkbox"/> Safety Team Involvement	<input type="checkbox"/> Other: _____
<input type="checkbox"/> Insects	
<input type="checkbox"/> Ladders / Scaffolds	
<input type="checkbox"/> Lawn Equipment	
<input type="checkbox"/> Lifting Safety	

PRESENT CREW MEMBERS

Supervisor PRINT Crew Names	Crew Member Initial

POST STA

Superintendent: _____

Date: _____ Time: _____

Was anyone injured or did an unplanned incident occur today?
 Yes No

If yes, explain: _____

Was it reported to the Safety department?
 Yes No

Is the work area clean and free of debris from the day's work?
 Yes No

What problems did you have with today's work assignment?

What can we do to improve performance?

Miscellaneous concerns:

REVIEWERS

Superintendent: _____

Safety Manager: _____

MANAGEMENT PARTICIPATION

Project Manager: _____

Return to the Project Manager Daily

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STA SAFETY TASK ASSIGNMENT

Project Name: _____

Client Name: _____

Location: _____

ZERO INCIDENTS

Superintendent: _____

Date: _____ Time: _____

Task Location: _____

Task Description: _____



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SAFETY TASK ASSIGNMENT

The Vortex Safety Task Assignment (STA) process significantly impacts the success of our Safety culture and the reduction of incidents. The interactive process requires that management/supervisors and employees shall:

- › **(Step 1)** - Define the general task for each activity
- › **(Step 2)** - Identify known and potential HSE hazards associated with the task
- › **(Step 3)** - Determine work practices to complete the task safely

- ✓ Address requirements for all personal protective equipment.
- ✓ Establish that all crew/department employees understand the above information.
- ✓ Each crew member is empowered to continuously participate in this process in an effort to promote our ZERO Incidents culture.
- ✓ Safely execute the task as described if conditions change, revise accordingly.

STAs will be completed DAILY. Post this STA in an obvious place throughout the duration of the task. Each crew member involved with the task will sign this STA.

KNOW THE EMERGENCY PROCEDURE FOR YOUR WORK AREA!

Step 1 - General Task Assignment

PERSONAL PROTECTIVE EQUIPMENT

CLOTHING

Chemical Resistant Fire Retardant
 Reflective Vest or Hand-held signal device

EAR PROTECTION

Ear Plugs Ear Muffs

EYE / FACE PROTECTION

Safety Glasses with Side-shields
 Goggles Monogoggles
 Welding Hood Face Shield

FALL PROTECTION

Harness

FOOT PROTECTION (BOOTS)

Steel Toed Electrical-Rated
 Rubber

HAND PROTECTION (GLOVES)

Leather Rubber / Latex
 Chemical Resistant

HEAD PROTECTION

Hard Hat

RESPIRATORY PROTECTION

Qualified to wear?
 Type: _____
 Other: _____

Step 2 - Potential Hazards

PERMITS / TAGS / SIGNS / DOCUMENTS REQUIRED

Confined Space Street Cuts
 Trenching & Excavation Lane Closure / Traffic Control
 Signs / Barricades SDS
 Work Near OH Lines Crane Lift
 Lockout / Tagout Scaffolds
 Hazardous Material
 Other: _____



EMPLOYEE CERTIFICATIONS REQUIRED

Crane Operator Forklift Operator
 Mobile Equipment Operator Vehicle Operator
 Certified Flagman
 Heavy Equipment Signalman
 Competent Person
 (excavations, confined space, scaffolds, hazardous material, heavy equipment)
 Other: _____

Step 3 - Safe Work Practices Pertinent to Hazards



CIVIL INFRASTRUCTURE SOLUTIONS

AERIAL LIFT



Vortex Companies

Procedure Name	Environmental, Health & Safety Manual – Aerial Lift
Applicability	VORTEX Companies – Employees & Subcontractors
Policy Revised	02.22.18

Overview

An aerial lift is any vehicle-mounted device used to elevate personnel, including:

- Extendable boom platforms
- Aerial ladders
- Articulating (jointed) boom platforms
- Vertical towers, and
- Any combination of the above

Aerial lifts have replaced ladders and scaffolding on many jobsites due to their mobility and flexibility. They may be made of metal, fiberglass reinforced plastic, or other materials. They may be powered or manually operated and are aerial lifts whether they can rotate around a primarily vertical axis. Many workers are injured or killed on aerial lifts each year. This policy outlines requirements that the VORTEX Companies are to adhere to when operating aerial lifts.

Hazards

The following hazards, among others, can lead to personal injury or death:

- Fall from elevated level
- Objects falling from lifts
- Tip-overs
- Ejections from the lift platform
- Structural failures (collapses)
- Electric shock (electrocutions)
- Entanglement hazards
- Contact with objects, and
- Contact with ceilings and other overhead objects

Training

Only trained and authorized persons can operate an aerial lift. Training should include:

- Explanations of electrical, fall, and falling object hazards.
- Procedures for dealing with hazards.
- Recognizing and avoiding unsafe conditions in the work setting.
- Instructions for correct operation of the lift (including maximum intended load and load capacity).
- Demonstrations of the skills and knowledge needed to operate an aerial lift before operating it on the job.
- When and how to perform inspections; and
- Manufacturer's requirements.



Workers should be retrained if any of the following conditions occur:

- An accident occurs during aerial lift use.
- Workplace hazards involving an aerial lift are discovered.
- A different type of aerial lift is used.
- Employers are also required to retrain workers who they observe operating an aerial lift improperly.

Inspections

Prior to each work shift, conduct a pre-start inspection to verify that the equipment and all its components are in safe operating condition. Follow the manufacturer's recommendations and include a check of:

A. Pre-Start Inspection

1. Vehicle Components

- a. Proper fluid levels (oil, hydraulic, fuel and coolant)
- b. Leaks of fluids
- c. Wheels and tires
- d. Battery and charger
- e. Lower-level controls
- f. Horn, gauges, lights and backup alarms
- g. Steering and brakes

2. Lift Components

- a. Operating and emergency controls
- b. Personal protective devices
- c. Hydraulic, air, pneumatic, fuel and electrical systems
- d. Fiberglass and other insulating components
- e. Missing or unreadable placards, warnings, or operational, instructional and control markings
- f. Mechanical fasteners and locking pins
- g. Cable and wiring harnesses
- h. Outriggers, stabilizers and other structures
- i. Loose or missing parts

Do not operate any aerial lift if any of these components are defective until it is repaired by a qualified person. Remove defective aerial lifts from service (tag out) until repairs are made.

Management and supervisors must assure that work zones are inspected for hazards and take corrective actions to eliminate such hazards before and during operation of an aerial lift. Items to look for include:

B. Work Zone Inspections

- Drop-offs, holes, or unstable surfaces such as loose dirt
- Inadequate ceiling heights
- Slopes, ditches, or bumps
- Debris and floor obstructions
- Overhead electric power lines and communication cables
- Other overhead obstructions



- Other hazardous locations and atmospheres
- High wind and other severe weather conditions, such as ice
- The presence of others near the work

During Operation

Fall Protection

- Ensure that access gates or openings are closed.
- Stand firmly on the floor of the bucket or lift platform.
- Do not climb on or lean over guardrails on handrails.
- Do not use planks, ladders, or other devices as a working position.
- Use a body harness or a restraining belt with a lanyard attached to the boom or bucket.
- Do not belt-off to adjacent structures or poles while in the bucket.

Operation/Traveling/Loading

- Do not exceed the load-capacity limits.
- Take the combined weight of the worker(s), tools and materials into account when calculating the load.
- Do not use the aerial lift as a crane.
- Do not carry objects larger than the platform.
- Do not drive with the lift platform raised (unless the manufacturer's instructions allow this).
- Do not operate lower level controls unless permission is obtained from the worker(s) in the lift (except in emergencies).
- Do not exceed vertical or horizontal reach limits.
- Do not operate an aerial lift in high winds above those recommended by the manufacturer.
- Do not override hydraulic, mechanical, or electrical safety devices.

Overhead Protection

- Be aware of overhead clearance and overhead objects, including ceilings.
- Do not position aerial lifts between overhead hazards if possible.
- Treat all overhead power lines and communication cables as energized and stay at least 10 feet (3 meters) away.
- Ensure that the power utility or power line workers de-energize power lines in the vicinity of the work.

Stability in the Work Zone

- Set outriggers on pads or on a level, solid surface.
- Set brakes when outriggers are used.
- Use wheel chocks on sloped surfaces when it is safe to do so.
- Set up work zone warnings, such as cones and signs, when necessary to warn others.

Insulated aerial lifts offer protection from electric shock and electrocution by isolating you from electrical ground. However, an insulated aerial lift does not protect you if there is another path to ground (for instance, if you touch another wire). To maintain the effectiveness of the insulating device, do not drill holes in the bucket.

Standards the Apply

OSHA Standards

29 CFR 1910.67, 29 CFR 1910.269(p), 29 CFR 1926.21, 29 CFR 1926.453, 29 CFR 1926.502.

American National Standards Institutes Standards

ANSI/SIA A92.2-1969, ANSI/SIA A92.3, ANSI/SIA A92.5, ANSI/SIA A92.6.



CIVIL INFRASTRUCTURE SOLUTIONS

ASBESTOS AWARENESS



Vortex Companies

Procedure Name	Environmental, Health & Safety Manual – Asbestos Awareness
Applicability	VORTEX Companies – Employees & Subcontractors
Policy Revised	01.06.17

Purpose

To provide basic precautions and protections for employees to avoid exposure to asbestos containing material (ACM) or presumed asbestos containing material (PACM).

Scope

This program applies to all VORTEX Companies employees. When work is performed on a nonowned or operated site, the operator’s program shall take precedence, however, this document covers VORTEX Companies Employees and contractors and shall be used on owned premises, or when an operator’s program doesn’t exist or is less stringent.

Definitions

- Asbestos – An incombustible, chemical-resistant, fibrous mineral used for fireproofing, electrical insulation, building materials, brake linings, and chemical filters.
- Asbestos Containing Material (ACM) – Any material containing more than 1% asbestos.
 - Friable Asbestos - Used for fireproofing, insulation, or soundproofing are considered to be friable, and they readily release airborne fibers if disturbed.
 - Non-Friable Asbestos - Vinyl-asbestos floor tile or roofing felts are considered nonfriable and generally do not emit airborne fibers unless subjected to sanding or sawing operations.
- Class I - Asbestos Work - Activities involving the removal of thermal system insulation (TSI) and surfacing asbestos containing material.
- Class II - Asbestos Work - Activities involving the removal of ACM that is not TSI or surfacing material. This includes removal of asbestos-containing gaskets, packing, wallboard, floor tile and sheeting, roofing and siding shingles, and construction mastics.
- Class III - Asbestos Work - Includes repair and maintenance operations where ACM, including TSI and surfacing material, is likely to be disturbed to the extent that renders ACM friable or generates visible debris. Class III asbestos work is limited to cutting away small amounts of ACM, no greater than the amount which can be contained in one standard sized glove bag or waste bag in order to access a building component. In no event shall the amount of disturbed ACM exceed that which can be contained in one glove bag or waste bag measuring 60 inches in length and width.
- Class IV - Asbestos Work - Includes custodial activities during which employees are involved in clean-up activities of waste and debris containing asbestos containing material.
- Competent Person C - A designated VORTEX Companies employee who has the authority to take prompt corrective actions and has received training and certification equivalent to the EPA’s Model Accreditation Plan and equivalent training as conducted by the National Asbestos Center, at the manager or supervisor level, and thereby is knowledgeable in identifying asbestos hazards in the workplace.



- Selecting appropriate control strategies for asbestos exposure.
- The contents of the OSHA asbestos regulations.
- Work practices for safe asbestos removal/clean-up.
- Presumed asbestos containing material (PACM) – thermal insulation and surfacing material found in buildings constructed no later than 1980.
- Surfacing material – material that is sprayed, troweled-on or otherwise applied to surfaces (such as acoustical plaster on ceilings and fireproofing materials on structural members or other materials on surfaces for acoustical, fireproofing and other purposes).
- Thermal system insulation – ACM applied to pipes, fittings, boilers, breeching, tanks, ducts or other structural components to prevent heat loss or gain.

Key Responsibilities Managers/Supervisors

- Ensure owners or operators are notified of PACM.
- Prohibit VORTEX Companies employees from working until material in question is confirmed as non-asbestos or abated.
- Ensure proper employee training is completed.
- Ensure that all requirements of this program are understood and followed by those working under his/her direction.
- Perform duties of the Competent Person for asbestos work.

All Employees

All employees are required to act in strict compliance with the requirements of this program and delay or discontinue work if there is ever an unresolved concern regarding exposure to asbestos.

Procedure Health Effects

Exposure to asbestos has been shown to cause lung cancer, asbestosis, mesothelioma, and cancer of the stomach and colon. Fibrotic Scarring of the lung tissue.

General

VORTEX Companies employees shall not work or otherwise handle asbestos containing material designated as Class I, III, IV work. Class II work is limited to removal of asbestos containing gaskets and packing materials.

All asbestos abatement work, other than the limited scope of Class II work, shall be awarded to qualified asbestos abatement contractors.

Client owned and/or operated equipment and facilities, where surfacing material or insulation is present, must be confirmed non-asbestos before VORTEX Companies employees disturb that material.

Where surfacing material or insulation cannot be confirmed non-asbestos, the client or owner must test, and where necessary abate, the material VORTEX Companies employees are permitted to work.

Signs shall be posted and employees will abide warning signs and labels and will not disturb the Asbestos Containing Material.



Approved ACM or PACM Handling

The following procedures must be followed when removing gasket or packing materials (Class II asbestos work) containing or presumed to contain asbestos:

- All employees must fulfill appropriate training, respiratory protection and medical surveillance requirements to handle ACM or PACM.
- Class II asbestos work, which employees are permitted to perform, is limited to removal of asbestos gasket and packing materials, unless special training for other Class II work as noted in 3.3.2 has been provided.
- Removal of gaskets and/or packing shall only be performed by employees that have been properly trained. When gaskets are visibly deteriorated, they are to be removed via wet methods and/or glove bagging.

Training

Employees who do not work with asbestos, but may indirectly become exposed to friable asbestos in the workplace, shall receive Asbestos Awareness training.

Employees who are assigned Class II work (which is limited to removal of asbestos gasket and/or packing materials) shall receive training compliant with 29 CFR 1926.1101(k)(9) on an annual basis. Note: Any Class II work that goes beyond working with gasket and packing materials shall require specialized training. The VORTEX Companies Safety Manager shall be notified of the need of such training.

Asbestos awareness training is required for employees whose work activities may contact asbestos containing material (ACM) or presumed asbestos containing material (PACM) but do not disturb the ACM or PACM during their work activities.

Contractors

Asbestos contractors shall be pre-screened and approved by the group responsible for contracting the work.

Contractors performing work shall comply with the requirements of this standard and all applicable OSHA and environmental regulatory requirements.

The following documents must be obtained at least 10 working days (or as soon as possible) prior to beginning the asbestos abatement work:

- Copy of the contractor's State Contractor's License (renewed annually).
- SDS for material used for the abatement process.
- Copy of all asbestos Notifications (if required).
- Copies of asbestos sample analysis (if performed by contractor).

The following are required upon completion of work by the contractor (If an asbestos project completion report is provided by the contractor, these items are often a part of it.):

- Work Summary Report, including daily work summaries.
- Results of all independent third party air sampling, including asbestos material sampling, personnel air monitoring, clearance sampling results.
- Waste Shipment Records.



Every contracted asbestos job must have assigned a competent person to monitor asbestos work and to assure compliance with all applicable regulations and requirements.

An independent third party shall be contracted to perform all required air sampling for contracted asbestos removal.

Contractors who are not involved in ACM work, but who may be inadvertently exposed to ACM on VORTEX Companies property are to be informed of this potential and advised on proper methods to avoid exposure.

Asbestos Exposure Control

Asbestos exposure controls are designed to eliminate or minimize an employee's exposure to airborne asbestos fibers through the use of work practices and engineering controls.

Prior to initiating any asbestos work the Competent Person must perform an asbestos exposure assessment.

Subsequent to the exposure assessment, the engineering controls and work practices to be employed shall be identified.

Prior to commencement of work, the affected employees shall be briefed on the engineering controls and work practices designed for the asbestos work. This briefing shall be documented and maintained with the job documentation.

When working on multi-contractor worksites, VORTEX Companies' employees shall be protected from exposure. If employees working immediately adjacent to a Class I asbestos jobs are exposed to asbestos due to the inadequate containment of such job, VORTEX Companies shall either remove the employees from the area until the enclosure breach is repaired, or perform an initial exposure assessment pursuant to 1926.1101(f).

Asbestos materials are used in the manufacture of heat-resistant clothing, automotive brake and clutch linings, and a variety of building materials including insulation, soundproofing, floor tiles, roofing felts, ceiling tiles, asbestos-cement pipe and sheet, and fire-resistant drywall. Asbestos is also present in pipe and boiler insulation materials, pipeline wrap and in sprayed-on materials located on beams, in crawlspaces, and between walls.

Signs and labels will identify the material which is present, its location, and appropriate work practices which, if followed, will ensure that asbestos containing material (ACM) and/or presumed asbestos containing material (PACM) will not be disturbed.

Personnel Air Monitoring

An independent/third party air sampling person shall perform all required air sampling during contractor asbestos work and provide the results to the VORTEX Companies Competent Person. Note: Air sampling is not required for glove bag activities that are covered under a Negative Exposure Initial Assessment.

Affected employees and/or their designated representatives are to be provided the opportunity to observe asbestos exposure monitoring.

Air sampling analysis shall be performed by an American Industrial Hygiene Association (AIHA) accredited laboratory.



Where the asbestos exposure assessment (in the absence of quantitative personnel monitoring results) does not present objective, convincing data that indicates the ACM to be handled will not (under the worst circumstances) release airborne fibers, personnel air monitoring shall be performed to quantify exposure.

If personnel monitoring is considered necessary during the asbestos exposure assessment, in an effort to verify exposures would be maintained below the PEL/excursion limit, respiratory protection shall be utilized until such time that sufficient sampling results verify that respiratory protection is not required.

The VORTEX Companies Safety Manager is to be consulted for advice and assistance in performing personnel air sampling activities.

The number of samples necessary to be considered “representative” is dependent upon many factors and must be determined in consultation with the VORTEX Companies Safety Manager, certified Industrial Hygienist consultant, or a third party air sampling professional.

Affected employees shall be notified of monitoring results, which represent the employee’s exposure, as soon as possible following receipt of the monitoring results.

Employees shall be notified in writing either individually or by posting at a centrally located place that is accessible to affected employees.

Once representative sampling indicates that exposure levels for that particular activity are consistently below the OSHA established permissible limit and/or excursion limit, the requirement for respiratory protection may be waived.

It is imperative that accurate personnel air sampling records are maintained in order to justify any relaxation of respiratory protection requirements.

Results of air sampling data must be maintained in the asbestos job documentation.

Medical Surveillance Program

All VORTEX Companies employees who for a combined total of 30 or more days per year are engaged in Class II asbestos work or who are exposed at or above the permissible exposure limit for a combined 30 days or more per year shall be included in the VORTEX Companies medical surveillance program.

Note: For purposes of this requirement, any day in which an employee is engaged in Class II or Class III work or a combination thereof for one hour or less and, while doing so, adheres fully to the work practices specified in this standard, shall not be counted.

The medical surveillance program shall be made available according to the following schedules:

- Prior to assignment of an employee to an asbestos area where negative pressure respirators are worn.
- Where exposure to asbestos may be at or above the permissible exposure level for 30 or more days per year, or where employees are engaged in Class II asbestos work for 30 or more days per year, at least annually thereafter, as long as exposures exist.



- Asbestos medical examination must be given within ten (10) working days following the thirtieth day of exposure.
- If an examining physician determines that any of the examinations should be provided more frequently than specified, they shall be provided at the periodicity specified by the physician.

No asbestos medical examination is required when complete records of such examination, performed less than twelve months prior to commencement of asbestos work are available.

As part of the medical surveillance, the attending physician shall provide a written opinion of the results of the medical examination to AJC and the Contract Medical Surveillance Provider, who in turn will provide a copy to the affected employee within 30 days.

In accordance with OSHA regulations, once employees are no longer exposed to asbestos their inclusion in the medical surveillance program is no longer required.

Respiratory Protection

The only circumstances that will necessitate VORTEX Companies employees using respiratory equipment for protection against asbestos is during the asbestos exposure assessment process, while confirming (via personnel monitoring) that the engineering controls and work practices designed and employed for a particular work activity are adequate to maintain exposure levels below the PEL/excursion limit. Asbestos work that requires respiratory equipment beyond the noted exception above, should be performed by a qualified contractor.

Prerequisites for use of respiratory equipment, regarding asbestos, include:

- Successfully passing a respiratory physical.
- Successfully completing annual respiratory protection training.
- Successfully passing a respirator fit test.

Waste Disposal

Asbestos waste, scrap, debris, bags, containers, equipment, and contaminated clothing shall be collected and disposed of in sealed, labeled impermeable bags of greater than 6 mils thickness or other closed, labeled, impermeable containers.

Bags or containers shall be imprinted and clearly labeled with the following OSHA asbestos hazard warning and address:

- DANGER
- CONTAINS ASBESTOS FIBERS AVOID CREATING DUST
- CANCER AND LUNG DISEASE HAZARD
- VORTEX Companies
- NAME
- Site Address, Contractor's Name, Contractor's Address
- Bags/containers shall be clearly labeled, for DOT, as: RQ, Asbestos, 9, NA2212, PG III
- Containers shall have a DOT number 9 diamond label on the container if the shipping container is greater than 66 pounds. For assistance with DOT labeling requirements, contact the VORTEX Companies Safety Manager.

An Asbestos Waste Shipment Record will be utilized. Check with the landfill prior to shipping to see if they require their own shipping record or use a Waste Manifest – contact the Safety Director for copies.



Asbestos will be transported to an approved landfill that accepts asbestos. A licensed waste hauler may be used to transport the packaged ACM. Transport vehicles shall either be enclosed or covered. Do not use vehicles with compactors to transport ACM.

A shipping form shall accompany the ACM, during transport, to the landfill.

Record Keeping

All records relating to any asbestos activity shall be maintained by the VORTEX Companies permanently.

The following records shall be maintained:

- Exposure Assessments that are being relied upon to support a location's position that asbestos work (specific or generic) will not result in exposures above the PEL or excursion limit.
- Employee asbestos exposure records (personnel air monitoring).
- Medical Surveillance records.
- Training records.
- Shipping papers and disposal records.
- Copies of notification letters sent to Governmental agencies.
- Pre-project asbestos sampling results.
- Post-project clearance sampling results.
- Daily Work Summaries.
- Project Completion Closure Report, if provided.



CIVIL INFRASTRUCTURE SOLUTIONS

ASSURED GROUNDING



Vortex Companies

Procedure Name	Environmental, Health & Safety Manual – Assured Equipment Grounding Conductor Program
Applicability	VORTEX Companies – Employees & Subcontractors
Policy Revised	11.08.16

Purpose

The purpose of this program is to provide requirements to eliminate all injuries resulting from possible malfunctions, improper grounding and/or defective electrical tools. This program applies to all sites, employees and contractors and shall be used on owned premises.

Definitions

Competent Person - One who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.

Ground Fault Circuit Interrupter - a device for the protection of personnel that functions to de-energize a circuit or portion thereof within an established period of time when a current to ground exceeds some predetermined value that is less than that required to operate the overcurrent protective device of the supply circuit.

Responsibilities

Supervisors are designated as competent persons for the Assured Equipment Grounding Conductor Program and are responsible for implementation.

Employees are responsible for following the requirements of this program, to perform visual inspections and to take defective equipment out of service.

Procedure

Assured Grounding

OSHA requires that employers shall use either ground fault circuit interrupters (GFCI) or an assured equipment grounding conductor program to protect personnel from electrical shock while working.

- VORTEX Companies shall use GFCIs in lieu of an assured grounding program.

Ground Fault Circuit Interrupters

All 120-volt, single-phase 15 and 20 ampere receptacle outlets on construction or maintenance sites, which are not part of the permanent wiring of the building or structure and which are in use by employees, shall have approved ground fault circuit interrupters for personnel protection.



- All hand portable electric tools and extension cords shall use a GFCI.
- Additionally, approved GFCIs shall be used for 240-Volt circuits in the same service as described above.
- GFCIs must be used on all 120 volt, single-phase 15 amp and 20 amp receptacles within 6 feet of a sink, damp areas or on installed outdoor equipment.
- The GFCI must be the first device plugged into a permanent receptacle.
- The GFCI must be tested before each use.

Assured Equipment Grounding Conductor Program

The Assured Equipment Grounding Conductor Program (AEGCP) shall cover all cord sets, receptacles not a part of the permanent wiring of a structure and equipment connected by cord and plug on all construction and maintenance sites.

This written description of the program shall be kept at the jobsite for inspection and copying by OSHA and any affected employee.

Removing Equipment

All equipment found damaged or defective or which fails any of the prescribed inspections or tests may not be used until repaired or replaced. All defective or failed equipment must be tagged with a red “do not operate tag” until repaired and tested or rendered unusable and discarded.

Daily Visual inspections

The following shall be visually inspected before each day’s use for external defects (such as deformed or missing pins or insulation damage) and for indication of possible internal damage:

- Cord sets;
- Attachment caps;
- Plug and receptacle of cord sets;
- Any equipment connected by cord and plug; and
- Damaged items shall not be used until repaired or discarded.

Continuity Testing

Testing must ensure continuity and electrically continuous. The tester shall use either a continuity tester or an ohmmeter for testing equipment grounding conductors on the following:

- All cord sets;
- Receptacles that are not a part of the permanent wiring of the building or structure; and
- All plug-connected equipment required to be grounded.

Grounding Conductor Testing

The tester shall use either a continuity tester or an ohmmeter for testing. Each receptacle and plug of the following shall be tested for correct attachment of the equipment grounding conductor and the equipment grounding conductor shall be connected to its proper terminal:

- All cord sets;
- Receptacles that are not a part of the permanent wiring of the building or structure; and
- All plug-connected equipment required to be grounded.



Test Frequency

All required tests shall be performed with the following frequency:

- Before first use;
- Before equipment is returned to service following any repairs;
- Before equipment is used after any incident that can be reasonably suspected to have caused damage; and
- At intervals not to exceed 3 months, except that cord sets and receptacles that are fixed and not exposed to damage shall be tested at intervals not to exceed six months.

All tests shall be documented to identify each receptacle, cord set and cord and plug-connected equipment that passed the test, the date of the test and the individual responsible for the test. Records shall be made available at each jobsite for inspection by employees and OSHA.

All tested cord sets and cord and plug-connected equipment shall be marked, one or both ends, with colored tape to denote the month that the tests were performed. The below color code chart that must be followed for marking.

Month #	Month	Color of Tape to Apply to Cords
1	Jan	Red
2	Feb	Yellow
3	Mar	Green
4	Apr	Blue
5	May	Brown
6	Jun	White
7	Jul	Start over with Red and repeat



CIVIL INFRASTRUCTURE SOLUTIONS

BENZENE AWARENESS



Vortex Companies

Procedure Name	Environmental, Health & Safety Manual – Benzene Awareness
Applicability	VORTEX Companies – Employees & Subcontractors
Policy Revised	05.14.19

Purpose

This program covers VORTEX policy related to Benzene hazards in the workplace. VORTEX recognizes Benzene as a very serious health hazard. The intent of this program is to provide VORTEX employees with general knowledge and guidelines enabling employees to anticipate, recognize, evaluate, and better participate in controlling their exposure to Benzene found in certain industrial worksite soils and / or due to spills or release incidents occurring within petrochemical refining and processing facilities in which VORTEX may work.

Scope

This Benzene Hazard Awareness Program and Policy is intended for support of and use by company operations both in business units and project operations. This is a hazard recognition and education focused program and does not imply that any training associated with this program certifies or qualifies any VORTEX employee to analyze worksites for Benzene, measure Benzene levels or determine safe exposure levels.

Regulatory References

This Benzene Hazard Awareness Program is primarily intended to satisfy the following regulatory requirements:

- 29 CFR 1910.1028

Policy

Stop the Work Immediately - Upon discovery or suspicion of benzene being present on a jobsite, VORTEX employees are to stop the work immediately and inform their supervisor.

Do Not Handle Benzene Products - It is VORTEX policy that employees shall not knowingly handle benzene or products containing benzene without reviewing SDS information and taking appropriate protective measures.

Do Not Dispose of Benzene - It is VORTEX policy that employees shall not participate in the disposal of benzene or products containing benzene.

Contact a Competent Individual - It is VORTEX policy to contact a competent individual upon discovery of benzene being present.

Avoid Exposure - It is VORTEX policy to train employees with general knowledge and guidelines enabling them to protect themselves and others from unnecessary benzene exposure.



Hazard Identification & Control – All employees assigned to jobsites where exposure to benzene may be possible shall participate in the identification, evaluation, and control of benzene hazards. All employees shall be familiar with the local Emergency Action Plan and specific contingency plans involving benzene.

Exposure Limits – 29 CFR 1910.1028 indicates the permissible exposure limit (PEL) for benzene is one part per million in air. The short-term exposure limit (STEL) (for 15 minutes) is five parts per million in air. The long-term exposure action level is 0.5 parts per million in air, and triggers use of personal protective equipment, employee monitoring, medical surveillance, hazard communication, regulated work areas, and record-keeping.

Exposure Monitoring – Medical surveillance will be available to all employees who are or may be exposed to benzene at or above the action level.

Responsibilities

Management

VORTEX Management is responsible for the following:

- Ensure that the HSE Management System includes a benzene policy and that the policy is reviewed annually and revised as necessary to reflect the most recent exposure monitoring data.
- Provide Benzene Hazard Awareness Training for all employees assigned to at-risk areas.
- Provide leadership and support for employees in communicating their responsibility to stop the work when benzene hazards are discovered or suspected.
- Provide resources to address and correct any benzene related events that arise.
- Determine when medical surveillance is required.
- Ensure that confirmed employee exposures are adequately documented.

Supervision

VORTEX Supervision is responsible for the following:

- Understand and enforce the VORTEX Benzene Policy.
- Implement site controls isolating employees from benzene hazards when benzene is discovered or suspected on a jobsite.
- Immediately inform management of any benzene exposures on a jobsite.
- Provide immediate on-the-spot training in recognition and control of benzene hazards for all employees assigned to at-risk locations, enabling employees to protect themselves and others from unnecessary benzene exposure.
- Contact a competent individual when benzene is discovered on a jobsite.
- Enforce Air Testing and PPE requirements and enforce discipline as necessary for PPE or any hazard control violation.

Employees

VORTEX Employees are responsible for the following:

- Upon discovery of benzene being present on a jobsite, VORTEX employees are to stop the work and immediately inform their supervisor.
- Protect themselves and others from unnecessary benzene exposure by wearing appropriate PPE and following safety rules and guidelines regarding benzene hazard protection.
- Immediately report to a supervisor any changes, deficiency or breaches in site controls established to isolate employees from benzene hazards on a jobsite.



- Participate in and understand Benzene Awareness training.
- Participate in hazard recognition activities. Make every effort to identify benzene hazards during daily STAs.

What is Benzene?

Benzene is a clear, colorless liquid with a characteristic, aromatic hydrocarbon odor. It is an EXTREMELY FLAMMABLE in both its liquid and vapor states. Benzene can accumulate static charge by flow or agitation. Since benzene's vapor is heavier than air and may spread long distances, distant ignition and flashback are possible. Liquid can float on water and may travel to distant locations and/or spread fire. It is harmful if inhaled or swallowed and is a central nervous system depressant. The vapor may cause headache, nausea, dizziness, drowsiness and confusion. Benzene may effect blood and bone marrow. It can cause skin and eye irritation. It is also an aspiration hazard because swallowing or vomiting of the liquid may result in aspiration into the lungs. Benzene is considered a CANCER HAZARD - can cause cancer and may cause genetic damage. Odor is not reliable as a hazard warning because the recognition threshold is above safe limits.

Where Do You Find Benzene?

Benzene is produced from petroleum and coal sources. Benzene is also known as benzol, carbon oil, coal naphtha, cyclohexatriene, and phenyl hydride. It is used mainly in the manufacture of ethyl benzene (55%), cumene (24%), cyclohexane (12%), nitrobenzene (5%), detergent alkylate, chlorobenzenes and maleic anhydride. Benzene is a very minor component of gasoline. Its commercial use as a solvent has practically been eliminated because of its toxicity. However, it continues to be used as a solvent and reactant in laboratories.

Industrial Hygiene Hazards Associated with Benzene

Inhalation - Short-term exposure causes depression of the central nervous system (CNS), marked by drowsiness, dizziness, headache, nausea, loss of coordination, confusion, and unconsciousness. No effects are expected at 25 ppm. Exposure to 50 to 150 ppm produces headache, and tiredness. Nose and throat irritation have also been reported following short-term exposure. Exposure to approximately 20,000 ppm for 5 to 10 minutes may result in death.

Absorption - Benzene is moderately irritating. Human studies have demonstrated that absorption of liquid benzene or its vapors occurs only to a small extent but can contribute to overall exposure. Benzene vapor can be irritating to the eyes. Splashes of benzene in the eyes will be moderately irritating but will not cause permanent injury if flushed immediately.

Ingestion - Benzene is readily absorbed following ingestion producing central nervous system depression with symptoms marked by drowsiness, dizziness, headache, nausea, loss of coordination, confusion, and unconsciousness.

Long-Term Health Effects of Exposure to Benzene

Skin - Prolonged or repeated contact causes redness, dryness, cracking (dermatitis) due to the defatting action of this solvent.

Blood and Blood-Forming Organs - Benzene causes a serious condition where the numbers of circulating red, white, and clotting cells are reduced. At this stage, effects are thought to be readily reversible. However, continued exposure can result in aplastic anemia or leukemia. Benzene also damages the bone marrow, where new blood cells are produced, resulting in aplastic anemia, which can lead to leukemia.



Immune System - Studies of workers have found changes in the immune system, which are at least partially related to the changes in the blood system discussed above.

Nervous System - Studies suggest that benzene may cause effects on the peripheral nerves and/or spinal cord. Symptoms included an increased incidence of headaches, fatigue, and difficulty sleeping and memory loss among workers with significant exposures.

Cancer - There are so many case reports and epidemiologic studies of exposed workers, that a causal relationship between benzene exposure and leukemia has been clearly established. Benzene exposure has also been associated with cancer of the lymph system (lymphoma), lung cancer and bladder (urothelial) cancer.

Hazard Recognition

Benzene is a colorless, highly flammable liquid chemical with a sweet odor. Because of the distinctive smell of benzene (and related compounds), the benzene family is classified as “aromatic”; thus, the name, aromatic hydrocarbon. Benzene has an odor threshold of 12 ppm.

Recognition

Factors and Sites *Favorable* for Benzene Exposure

- Disturbed Soils within Hydrocarbon Processing Facilities - Disturbed soil within hydrocarbon processing facilities where hydrocarbons or benzenes may have been spilled or which have long periods of exposure to low level benzene.
- Vessels or Tanks - Confined spaces with benzene residue.
- Spills, Pipe or Equipment Failure - Containment or process equipment failures resulting in benzene gas being released into the atmosphere.

Factors and Sites *LESS Favorable* for the Benzene Exposure

- Open, Un-congested Hydrocarbon Process Areas with good ventilation or air movement and properly working containment.
- Open Areas where little undisturbed soil exists.

Controls - Protection

Benzene is EXTREMELY FLAMMABLE and VERY TOXIC (CANCER HAZARD). Smoking is prohibited, and fire extinguishers shall be readily available in all areas where benzene is used or stored. Before handling, it is extremely important that engineering controls are operating, and protective equipment requirements and personal hygiene measures are being followed. Only authorized personnel should have access to this material. They should be properly trained regarding its hazards and its safe use. Maintenance and emergency personnel should be advised of potential hazards.

Control - The use of Engineering control methods to reduce hazardous exposures are preferred. Methods include mechanical ventilation (dilution and local exhaust), isolation by enclosing the process or personnel, control of process conditions, and process modification (e.g., substitution of a less hazardous material). Whenever possible, closed handling systems for processes involving this material should be used. Use a non-sparking, grounded ventilation system, separate from other exhaust ventilation systems. Exhaust directly to the outside. Supply sufficient replacement air to make up for air removed by exhaust systems.



Controlling the release of benzene gas is the primary method of protection against exposure.

- Follow confined space gas monitoring and entry procedures when entering a vessel or tank in which benzene residue may be present.
- Avoid unnecessary digging in hydrocarbon processing facilities.
- Use regulated areas - If benzene concentration exceed or are expected to exceed permissible exposure limits, either the 8-hour limit of one ppm or the 15-minute limit of 5 ppm, establish a regulated area limiting access to authorized personnel only.
- Respiratory protection - If engineering controls cannot be implemented employ respiratory protection.

Protection - Because of the high potential hazard associated with this substance, stringent PPE control measures are necessary. All required or necessary protective clothing and equipment will be provided at no cost to the employees. Protective clothing and equipment must prevent eye contact and limit dermal exposure.

Inhalation PPE - Respiratory protection shall be selected according to airborne concentrations.

Respiratory protection recommendations for benzene concentration in air Recommended Exposure Limit (REL):

- Positive pressure, full-face piece Self-Contained Breathing Apparatus (SCBA); or
- Positive pressure, full-face piece Supplied-Air Respirator (SAR) with an auxiliary positive pressure SCBA.
- Escape: Gas mask with organic vapor canister; or escape- type SCBA.

The NIOSH has classified this material as a potential occupational carcinogen, according to specific NIOSH criteria. This classification is reflected in these recommendations for respiratory protection, which specify that only the most reliable and protective respirators be worn at any detectable concentration.

Absorption PPE - PPE clothing should be made of materials suitable for the hazard. Remove contaminated clothing promptly. Keep contaminated clothing in closed containers. Discard or launder before re-wearing. Inform laundry personnel of contaminant's hazards. Have a safety shower/eye-wash fountain readily available in the immediate work area.

- Chemical safety goggles - A face shield may also be necessary.
- Chemical resistant gloves, coveralls, boots, and/or other resistant protective clothing.
- A chemical resistant full-body encapsulating suit and respiratory protection may be required in some operations.

Recommended Materials - Polyvinyl alcohol, Barricade™, Responder™, 4H™ (polyethylene/ethylene vinyl alcohol), CPF 3™, Tychem 10000™ and Teflon™.

Non-Recommended Materials - PVC, nitrile rubber, Sanranex™, butyl rubber, natural rubber, neoprene, polyethylene.

First Aid and Exposure Response

Provide general supportive measures (comfort, warmth, rest). Consult a physician and/or the nearest Poison Control Center for all exposures except very minor instances of inhalation or skin contact.

Absorption - If someone becomes ill from breathing benzene - Take proper precautions to ensure your own safety before attempting rescue. Wear appropriate protective equipment. Remove source of contamination or move victim to fresh air. If breathing has stopped, trained personnel should begin artificial respiration or, if the heart has stopped, cardiopulmonary resuscitation (CPR) immediately. Obtain medical attention immediately.



Absorption - If someone gets benzene on their skin, avoid direct contact. Wear chemical protective clothing, if necessary. As quickly as possible, flush with lukewarm, gently flowing water for at least 20 minutes. Under running water, remove contaminated clothing, shoes and leather goods (e.g., watchbands, belts). Obtain medical attention immediately. Discard contaminated clothing, shoes and leather goods (e.g., watchbands and belts). If someone gets benzene in their eyes, avoid direct contact. Wear chemical resistant gloves, if necessary. Immediately flush the contaminated eye(s) with lukewarm, gently flowing water for 20 minutes, or until the chemical is removed while holding the eyelid(s) open. Take care not to rinse contaminated water into the non-affected eye. Obtain medical attention immediately.

Ingestion - If someone swallows benzene - Never give anything by mouth if victim is rapidly losing consciousness or is unconscious or convulsing. Have victim rinse mouth thoroughly with water. DO NOT INDUCE VOMITING. Have victim drink 8 to 10 oz of water to dilute material in stomach. If vomiting occurs naturally, have victim lean forward to reduce risk of aspiration. Repeat drinking of water. Quickly transport victim to an emergency care facility.

Training

VORTEX will provide benzene hazard awareness training for all employees. Training Content - Training will cover the following topics:

- Benzene Hazard Awareness Training
 - VORTEX Benzene Policy
 - Responsibilities
 - Hazard Recognition & Control
 - Protection & First Aid

Personnel Training - VORTEX personnel shall receive the following training:

- All employees shall receive Benzene Hazard Awareness training and have access to the written plans.

Training Frequency - Training and re-training frequency shall be as follows:

- Initial Benzene Hazard Awareness Training shall take place when employees mobilize to job-sites with known benzene hazards. Benzene awareness training shall be refreshed annually as part of the Toolbox Safety Meeting Program, Industrial Hygiene & Hazard Communication agenda.

Reporting and Recordkeeping

Reports - All benzene related events shall be reported.

- Incident Report - All benzene exposure shall be record as Incidents on an VORTEX Incident Report.
- Near Miss Reports - Failures in containment, control methods, isolation, etc., not resulting in employee exposure shall be record as near miss events on an VORTEX Near Miss Report.

Control & Retention - Records associated with this program shall be handled in the following manner. Incidents shall be handled per the Incident Reporting and Record Keeping Program. Records shall be retained for a minimum of the employee's duration of employment plus 30 years.



CIVIL INFRASTRUCTURE SOLUTIONS

BLOODBORNE PATHOGENS



Vortex Companies

Procedure Name	Environmental, Health & Safety Manual – Bloodborne Pathogens
Applicability	VORTEX Companies – Employees & Subcontractors
Policy Revised	09.09.16

Purpose

This Bloodborne Pathogen Exposure Control Plan has been established to ensure a safe and healthful working environment and act as a performance standard for all employees. This program applies to all occupational exposure to blood or other potentially infectious materials. The content of this plan complies with OSHA Standard 29 CFR 1910.1030 (Occupational Exposure to Bloodborne Pathogens).

Scope

All employees who have or may have the potential for exposure to blood or other potentially infectious materials in the workplace.

Key Responsibilities

Exposure Control Officer (VORTEX Companies CSO)

Has overall responsibility for developing and implementing the Exposure Control Procedure for all facilities.

Site Project Manager and Supervisors

Site project manager and supervisors are responsible for exposure control in their respective areas.

Employees

- Know what tasks they perform that have occupational exposure.
- Plan and conduct all operations in accordance with our work practice controls.
- Develop good personal hygiene habits.

Procedure

Training

Employees with reasonable anticipated occupational exposure to bloodborne pathogens shall participate in training before their initial assignment and within one year of any previous training. Training shall include:

- What bloodborne pathogens are; how to protect themselves from exposure
- Methods of warnings (signs, labels, etc.)
- The OSHA requirements of bloodborne pathogens
- Availability of the Hepatitis B vaccine that have occupational exposure at no cost



Biohazard Label



Availability of Procedure to Employees

The Bloodborne Exposure Control Plan is kept at all locations and shall be accessible to employees.

Reviews and Update of the Procedure

The procedure is reviewed annually and updated whenever we establish new functional positions within our facility that may involve exposure to biohazards.

Exposure Determination

- There are no job classifications in which some or all employees have occupational exposure to bloodborne pathogens that may result from the performance of their routine duties.
- Designated employees are trained to render first aid and basic life support. Rendering first aid or basic life support will expose employees to bloodborne pathogens and will require them to adhere to this program.
- In addition, no medical sharps or similar equipment is provided to, or used by, employees rendering first aid or basic life support.
- This exposure determination has been made without regards to the Personal Protective Equipment that may be used by employees.
- A listing of all first aid and basic life support trained employees in this work group shall be maintained at each work site and at each first aid kit.

Methods of Compliance Universal Precautions

Under circumstances in which differential between body fluids is difficult or impossible, all body fluids will be considered potentially infectious.

Engineering Controls

Hand washing facilities (or antiseptic hand cleansers or antiseptic towelettes), which are readily accessible to all employees who have the potential for exposure. Containers for contaminated reusable sharps that our clients provide have the following characteristics: Puncture-resistant; Color-coded or labelled with a biohazard warning label; Leak-proof on the sides and bottom.

Secondary containers which are: Leak-proof; Color-coded or labelled with a biohazard warning label; Puncture-resistant, if necessary.

Work Practice Controls

- Employees shall wash their hands immediately, or as soon as feasible, after removal of potentially contaminated gloves or other personal protective equipment.
- Following any contact of body areas with blood or any other infectious materials, employees wash their hands and any other exposed skin with soap and water as soon as possible.
- Hand washing facilities shall be available. If hand washing facilities are not feasible VORTEX Companies will provide either an appropriate antiseptic hand cleanser in conjunction with cloth/paper towels or antiseptic towelettes.
- Contaminated needles and other contaminated sharps should not be handled if you are not AUTHORIZED or TRAINED to do so. Contaminated needles and other contaminated sharps are not bent or recapped.
- Eating, drinking, smoking, applying cosmetics or lip balm and handling contact lenses is prohibited in work areas where there is potential for exposure to biohazardous materials.



- Food and drink is not kept in refrigerators, freezers, on countertops or in other storage areas where potentially infectious materials are present.
- All equipment or environmental surfaces shall be cleaned & decontaminated after contact with blood or other potentially infectious materials.
- Specimens of blood or other potentially infectious materials must be put in leak proof bags for handling, storage and transport.
- If outside contamination of a primary specimen container occurs, that container is placed within a second leak proof container, appropriately labelled, for handling and storage.
- Bloodborne pathogens kits are located on top of first aid kits and are to be used in emergency situations by the caregiver. Once the seal is broken on kit and any portion has been used it is not to be reused. Pathogen Kits shall be ordered and replaced promptly. Biohazard bags are identified by stickers and located in the first aid area. Contaminated supplies are to be disposed at once.

Personal Protective Equipment

VORTEX Companies provides at no cost to our employees gloves, safety glasses, goggles, gowns, face shields/masks and other as need PPE for bloodborne pathogens response. All PPE shall be of the proper size and readily accessible.

Our employees adhere to the following practices when using their personal protective equipment:

- Any garments penetrated by blood or other infectious materials are removed immediately.
- All potentially contaminated personal protective equipment is removed prior to leaving a work area.
- Gloves are worn whenever employees anticipate hand contact with potentially infectious materials or when handling or touching contaminated items or surfaces.
- Disposable gloves are replaced as soon as practical after contamination or if they are torn, punctured or otherwise lose their ability to function as an “exposure barrier”.
- Masks and eye protection (such as goggles, face shields, etc.) are used whenever splashes or sprays may generate droplets of infectious materials.
- Any PPE exposed to bloodborne pathogens shall be disposed of properly.
- PPE shall be used unless employees temporarily declined to use PPE under rare circumstances.
- PPE should be cleaned, laundered & properly disposed of if contaminated.
- VORTEX Companies will repair and replace PPE as needed to maintain its effectiveness.

Housekeeping

Our staff employs the following practices:

- All equipment and surfaces are cleaned and decontaminated after contact with blood or other potentially infectious materials.
- Protective coverings (such as plastic trash bags or wrap, aluminum foil or absorbent paper) are removed and replaced.
- All trash containers, pails, bins, and other receptacles intended for use routinely are inspected, cleaned and decontaminated as soon as possible if visibly contaminated.
- Potentially contaminated broken glassware is picked up using mechanical means (such as dustpan and brush, tongs, forceps, etc.).



Post-Exposure and Follow Up

Post-Exposure Evaluation & Follow-Up

If there is an incident where exposure to bloodborne pathogens occurred, we immediately focus our efforts on investigating the circumstances surrounding the exposure incident and making sure that our employees receive medical consultation and immediate treatment.

The VORTEX Companies CSO/ Supervisor investigates every reported exposure incident and a written summary of the incident and its causes is prepared and recommendations are made for avoiding similar incidents in the future. We provide an exposed employee with the following confidential information:

- Documentation regarding the routes of exposure and circumstances under which the exposure incident occurred.
- Identification of the source individual (unless not feasible or prohibited by law).

Once these procedures have been completed, an appointment is arranged for the exposed employee with a qualified healthcare professional to discuss the employee's medical status. This includes an evaluation of any reported illnesses, as well as any recommended treatment.

Information Provided to the Healthcare Professional

We forward the following:

- A copy of the Biohazards Standard.
- A description of the exposure incident.
- Other pertinent information.

Healthcare Professional's Written Opinion

After the consultation, the healthcare professional provides our facility with a written opinion evaluating the exposed employee's situation. We, in turn, furnish a copy of this opinion to the exposed employee. The written opinion will contain only the following information:

- Whether Hepatitis B Vaccination is indicated for the employee.
- Whether the employee has received the Hepatitis B Vaccination.
- Confirmation that the employee has been informed of the results of the evaluation.
- Confirmation that the employee has been told about any medical conditions resulting from the exposure incident which require further evaluation or treatment.
- All other findings or diagnoses will remain confidential and will not be included in the written report.

Record Keeping

All records shall be made available upon request of employees, OHSA's Assistant Secretary and the Director of OSHA for examination and copying. Medical records must have written consent of employee before released. VORTEX Companies shall meet the requirements involving transfer of records set forth in 29 CFR 1910.1020(h).

The respective Human Resources representative shall maintain Bloodborne Pathogen exposure records.

Employee medical records shall be kept confidential and are not to be disclosed without the employee's written consent, except as required by 29 CFR 1910.1030 or other law.



Medical records shall be maintained for the duration of employment plus 30 years and will include at least the following:

- Employee's name, Social Security number and VORTEX Companies employee number.
- Employee's Hepatitis B vaccination status, including vaccination dates.
- All results from examinations, medical testing and follow-up procedures, including all health care professional's written opinions.
- Information provided to the health care professional.
- Any Hepatitis B Vaccine Declinations.

All Medical Records will be accurate for each employee with occupational exposure and will be maintained for at least the duration of employment plus 30 years.

Training records shall be maintained for 3 years from the date on which the training occurred and shall include at least the following:

- Outline of training program contents.
- Name of person conducting the training.
- Names and job titles of all persons attending the training.
- Date of training.

Labels and Signs

Biohazard warning labelling shall be used on containers of regulated waste; Sharps disposal containers; contaminated laundry bags and containers; contaminated equipment.

Information

Information provided to our employees includes:

- The Biohazards Standard itself.
- The epidemiology and symptoms of bloodborne diseases.
- The modes of transmission of bloodborne pathogens.
- Our facility's Exposure Control Procedure (and where employees can obtain a copy).
- Appropriate methods for recognizing tasks and other activities that may involve exposure.
- A review of the use and limitations of methods that will prevent or reduce exposure.
- Selection and use of personal protective equipment.
- Visual warnings of biohazards within our facility including labels, signs and "color-coded" containers.
- Information on the Hepatitis B Vaccine.
- Actions to take and persons to contact in an emergency involving potentially infectious material.
- The procedure to follow if an exposure incident occurs, including incident reporting.
- Information on the post-exposure evaluation and follow-up, including medical consultation.
- Access to a copy of the exposure plan shall be provided in a reasonable time, place, and manner.



CIVIL INFRASTRUCTURE SOLUTIONS

COMPANY FLEET USAGE AND DRIVER SAFETY



Vortex Companies

Procedure Name	Company Fleet Usage and Driver Safety
Applicability	VORTEX Companies – Employees
Policy Revised	05.21.19

Purpose

Company vehicles and trailers are for the sole intent of serving the Company's customers and carrying out activities relative to the Company's business. The purpose of this Policy is to ensure the safety of those individuals who drive company vehicles. Vehicle accidents are costly to our company, but more importantly, they may result in injury to you or others.

It is the driver's responsibility to operate all vehicles in a safe manner and to drive defensively to prevent injuries and property damage. As such the Company endorses all applicable state motor vehicle regulations relating to driver responsibility. The Company expects each driver to drive in a safe and courteous manner pursuant to the following safety rules.

Reports of abuse relating to personal use, impermissible use and impermissible passengers will be reviewed by the Safety Committee, even if the Employee is fully aware of the responsibility he/she assumes when they do not get proper permission and documents in place.

This policy will be enforced and regulated by the EHS Department.

The attitude you take when behind the wheel is the single most important factor in driving safely.

Scope

This policy applies to all personnel employed by the VORTEX Companies, LLC and its subsidiaries.

Driver Eligibility

- Drivers must always have a valid driver's license for the type of vehicle to be operated and keep the license(s) with them while driving. All CDL drivers must comply with all applicable D.O.T. regulations, including successful completion of medical, drug, and alcohol evaluations.
- Company vehicles are to be driven by authorized employees ONLY, except in emergencies, or in case of repair testing by a mechanic. Other employees and family members are not authorized to drive the Company vehicle.
- Motor Vehicle Records will be obtained on all drivers prior to employment and no less than every six months. A driving record that fails to meet the criteria stated in this policy or is in violation of the intent of this policy by the EHS Department, will result in a loss of the privilege of driving a company vehicle.
- Any employee who has a driver's license revoked or suspended shall immediately notify the HR/EHS Department by 9 a.m. Central time the next business day, and immediately discontinue operation of the company vehicle. Failure to do so may result in disciplinary action, including termination of employment.



General Rules

1. All drivers are ultimately responsible for knowing and adhering ALL local, state, and federal laws, limits, and regulations.
2. Company vehicles are to be driven by authorized employees only, except in case of repair testing by a mechanic.
3. Company vehicles are to be driven by authorized employees ONLY, except in emergencies, or in case of repair testing by a mechanic. Other employees and family members are not authorized to drive the Company vehicle.
4. All accidents in company vehicles, regardless of severity, must be reported to the police and to the Security and Fleet offices. Accidents are to be reported immediately (from the scene, during the same day, or as soon as practicable if immediate or same day reporting is not possible). Accidents in personal vehicles while on company business* must follow these same accident procedures. Accidents involving the employee's personal injury must be reported to Human Resources for Worker's Compensation purposes. Failing to stop after an accident and/or failure to report an accident may result in disciplinary action, up to and including termination of employment.
5. Drivers must report all ticket violations received during the operation of a company vehicle within 72 hours to the EHS Department.
6. Speeding is not permissible under any circumstances, and a maximum allowable speed is capped at 80 mph, regardless of whether the roadway permits higher travel speeds.
7. Omnitrac GPS Monitoring units have been installed in all company vehicles and must not be tampered with in any way
8. New vehicles without these units are to be parked until they can be outfitted with one.
9. Cell phone use while driving should be kept to a minimum. Drivers need to be aware when use of the cell phone is creating a distraction from safe driving and adjust their usage accordingly; including pulling off the road to continue/ finish the conversation if needed. Whenever possible, Drivers should complete calls while the vehicle is parked and/or use the phone in a "hands free" mode via a headset or speaker. While driving, attention to the road and safety should always take precedence over conducting business over the phone. Texting while driving is never acceptable.
10. Driving on company business and/or driving a company vehicle while under the influence of intoxicants and other drugs (which could impair driving ability) is forbidden and is enough cause for discipline, up to and including termination of employment.
11. No driver shall operate a company vehicle when his/her ability to do so safely has been impaired by illness, fatigue, injury, or prescription medication.
12. Drivers are responsible for the security of company vehicles assigned to them. The vehicle engine must be shut off, ignition keys removed, and vehicle doors locked whenever the vehicle is left unattended.
13. All vehicles must be stored in a secure location on Company premises when within proximity of any of the company's facilities.
14. Report any mechanical difficulties or repair needs to the fleet manager, or your direct supervisor upon discovery.
15. All Employee drivers are expected to operate vehicles in accordance with local, state and federal laws, as well as common standards of safe driving and courtesy. Any traffic tickets, citations and violation notices received by an Employee because of improperly operating a vehicle are the responsibility of and must be paid by that Employee.

Company business is defined as driving at the direction, or for the benefit, of employer. It does not include normal commuting to and from work.



Orange Cone - Parking Policy

The frequency of backing accidents is increasing and most of these times, the incident is minor. However, the potential for a significant or serious injury may result. The development of a safety cone policy is to reduce the frequency of backing accidents, which are caused by unsafe backing of a vehicle. The goal is to make the driver of the vehicle aware of the location of his/her vehicle and the presence of other vehicles or objects, which may come into contact with their vehicle, and to minimize the inherently hazardous act of backing up a vehicle.

Some of the common types of accidents we see are backing into other cars and objects. This simple, yet effective policy should make the driver more aware of their surroundings prior to operating the vehicle and help eliminate some of the hazards associated with a vehicle backing up.

Policy

- When parking a company owned vehicle in a parking lot or marked parking spot, the vehicle shall be backed into place and parked with the front of the vehicle facing outwards in a manner that allows the vehicle to drive forward and out of the parking place. Once parked, the driver is to place an Orange Cone in front and rear of the vehicle.
- Once the vehicle is parked the Employee(s) shall place an Orange Cone in front of and behind the vehicle immediately upon exiting the vehicle.
- If the vehicle is parked alongside a roadway, an Orange Cone shall be placed at the driver's side front and rear corners of the vehicle immediately upon exit.
- The cones are to remain in place, and only removed in preparation to immediately move the vehicle thereafter. When removing the cone, the drivers shall take a moment to make his/herself aware of any hazards that may exist in front or behind the vehicle. If a hazard is present, take the correct steps to ensure the hazard is removed before attempting to move the vehicle.

The Orange Cone Policy is a reminder to see that:

- a. You have parked the vehicle in a safe manner.
- b. You have room in front of, and behind the vehicle when backing up.

Prior to re-entering the vehicle to leave the parked location the employee will pick up the orange cone and:

- c. Look behind the vehicle to ensure that they have room to back up in a safe manner.
- d. Pick up the Orange Cone.
- e. Place it in the trunk, or truck bed or proper location on/in the vehicle.

Vehicle Operation and Maintenance

- Only the number of riders for which the vehicle is designed may be transported in vehicle.
- Materials and tools must always be stored and properly secured.
- Vehicles shall be kept clean by Employee to reflect the high standards of the Company. No items may be stored on dashboard.
- Items requiring repair and periodic maintenance shall be reported by Employee to the Company promptly.
- Seat belts shall always be worn.
- Company vehicles shall always be secured when not in transit by being locked, keys removed, and alarms activated if so equipped. (If a loss occurs while the vehicle is not secured, the Employee's personal belongings will not be paid for by the Company)
- The Employee that the vehicle is assigned to is considered the responsible person for that vehicle.



Vehicle Use

This section is to define the difference between Company use, Personal use and Impermissible uses.

Company Use

- Directly related to job activity and for the gain or benefit of the Company.
- Normal and reasonable routing to and from a job activity and Employee's residence.
- Normal and reasonable routing to and from a job activity for lunch or snack supplies.
- Normal and reasonable routing to and from a job activity and overnight lodging when the Employee is on an out-of-town jobsite.
- Additional use of company vehicles on out-of-town jobs as a means of transportation will be considered Company use, provided the use of the vehicle is for reasonable activities and routing.

Reasonable activities and routing: Within proximity of jobsite or lodging. Five to ten miles one way and does not reflect a negative company image.

Personal Use

- Not related to the Company. For the gain or benefit of the Employee.
- Personal errands or items pursued on the way to, on the way from, before or after Company use will be considered personal. When the primary purpose for leaving a jobsite is personal, the entire trip will be considered personal. (Exceptions will be reviewed on each case basis.)
- Routing that is not reasonable or normal for the Employee's job activity.

Personal use of Company vehicles is authorized on a case by case basis with prior written approval only from Management and Safety. Unauthorized personal use of company vehicles is prohibited due to liability concerns for the Company and the Employee.

Impermissible Use

- Usage that reflects negatively on the Company's image, such as improper and/or inconsiderate driving methods or places of attendance.
- To purchase, sell, or consume alcohol, non-prescription drugs, or any item of physical impairment or following the consumption of such items while physically impaired
- To transport or use firearms (Exception: When the vehicle is owned by others and used by the Company on a loan, rental, lease, or mileage reimbursement basis and/or when allowed by specific governmental 'concealed-carry' regulations).
- In relation to any illegal activity.

Note: These uses are not allowable under any circumstances and may result in discipline or sudden and immediate termination of employment

Company Vehicle Accident

In the event of an accident involving a company vehicle, the following guidelines apply:



During Company Use

- All accidents and/or damage to the Company vehicle shall be reported to the police and the Company immediately.
- Vehicle damage, liability and associated costs are covered by the Company insurance at the time of the accident.
- Employee injuries are covered by Worker's Compensation Benefit, providing criteria is met under this policy and BWC guidelines.

During Personal Use or Impermissible Use

All accidents and/or damage to the Company vehicle shall be reported to the police and the Company immediately.

- Vehicle damage, liability and associated costs are covered by the Company insurance at the time of the accident. However, since the accident occurred during Non-Company use, the Employee shall reimburse the Company for all costs associated to the accident not covered by insurance and the Company's insurance deductible amount in force at the time of the accident.
- All personal injuries to the driver and/or passenger(s) shall be the responsibility of the driver and/or passenger(s). In no circumstance shall Workers Compensation or the Company's insurance be relied upon for personal injuries or compensation. The Company will follow the guidelines in this policy as well as those set forth by the Bureau of Worker's Compensation to accept or reject any Worker's Compensation claim.
- The Employee shall submit payment to the Company when the total amount of uncovered damages has been determined.

Permissible Driver and Passenger Specifications

Drivers

The following requirements must be fulfilled before a driver is permitted to drive a company owned, borrowed, rented, leased or mileage-reimbursed vehicle:

- Must be an Employee.
- Must have required license endorsements for the vehicle.
- Must be insurable under the Company's vehicle insurance carrier.
- Must be 18 years old with a valid driver's license. Employee drivers under age 18 will be by specific approval of Company.
- Employees are expected to drive in a safe and responsible manner and to maintain a good driving record. The Fleet Safety Committee is responsible for reviewing records, including accidents, moving violations, etc., to determine if an employee's driving record indicates a pattern of unsafe or irresponsible driving, and to make a recommendation to Executive Management for suspension or revocation of driving privileges.
 - Criteria that may indicate an unacceptable record includes, but is not limited to:
 - > Three or more moving violations* in a year.
 - > Three or more chargeable accidents within a year. Chargeable means that the driver is determined to be the primary cause of the accident through speeding, inattention, etc. Contributing factors, such as weather or mechanical problems, will be taken into consideration.
 - > Any combination of accidents and/or moving violations.
 - > Violations include any ticket, charge, or other law enforcement proceeding relating to these, as well as independent evidence of violations deemed relevant by the Security department.

Passengers

Passengers must be an Employee or a business associate of the Company and must have business relationship of the Company to be considered a passenger.



Activities that the Employee rider participates in that are not covered by Workers Compensation is impermissible.

Passengers that are not an Employee or a business associate of the Company, such as family members or friends, must have written permission from the Company on a Non-Employee Passenger Approval Form to be considered a permissible passenger.

Note: Passengers of company vehicles incur extra liability for the Company and the driver. Therefore, any passenger without reasonable cause is strongly discouraged. If the Employee driver allows a passenger rider without written permission and/or proper liability disclaimer, the driver assumes responsibility and is required to reimburse the Company for any associated costs of injuries to passengers which occur in or near a Company vehicle. Costs include the insurance deductible and any associated costs not covered by the Company's vehicle insurance carrier.

Acknowledgement

I acknowledge and understand the Company Fleet Usage and Driver Safety Procedures. I hereby understand that I am to obtain prior written approval from Management and Safety for any personal usage of a company vehicle AND any exception to these procedures.

Employee Printed Name _____ Date _____

Employee Signature _____



CIVIL INFRASTRUCTURE SOLUTIONS

COMPRESSED AIR



Vortex Companies

Procedure Name	Environmental, Health & Safety Manual – Compressed Air
Applicability	VORTEX Companies – Employees & Subcontractors
Policy Revised	05.014.18

Purpose

This strategy was developed to provide guidance and requirements necessary for efficient, effective and compliant when working with Compressed Air during construction and operations.

Scope

This procedure applies to all Vortex Industrial Solutions, LLC employees and subcontractors. When work is performed on a non-owned or operated site, the operator’s program shall take precedence, however, this document covers Vortex Industrial Solutions, LLC employees and contractors and shall be used on owned premises, or when an operator’s program doesn’t exist or is less stringent.

Definitions

Absolute Pressure - (p.s.i.g.)-The sum of the atmospheric pressure and gauge pressure (p.s.i.g.).

Dead-End - Compressed air can enter the blood stream through the skin with pressures above 30 psig (2 bar) in a dead-end occurrence.

Emergency Locks - A lock designed to hold and permit the quick passage of an entire shift of employees.

Gauge Pressure - (p.s.i.g.) Pressure measured by a gauge and indicating the pressure exceeding atmospheric.

High Air - Air pressure used to supply power to pneumatic tools and devices.

Hydrostatically Tested - A way in which pressure vessels such as pipelines, plumbing, gas cylinders, boilers and fuel tanks can be tested for strength and leaks. They are then requalified at regular intervals using the proof pressure test which is also called the modified hydrostatic test.

Pneumatic - Containing or operated by air or gas under pressure.

Pressure - A force acting on a unit area. Usually shown as pounds per square inch. (p.s.i.)

Safety Excess Flow Valve - An excess flow valve (EFV) is a safety device designed to automatically shutoff the flow of fluid (natural gas) through a piping service line if it ruptures, thereby mitigating the impact of the rupture. Furthermore, EFV’s will not operate in response to a leak within a building where gas service is provided.



Responsibilities

Managers

Ensure that any tool which is not in compliance with any applicable requirement of this plan is prohibited:

- The tools shall either be identified as unsafe by tagging or locking the controls to render them inoperable, or
- Shall be physically removed from its place of operation.

Supervisors

- Ensure that all employees using compressed air tools have been trained and fully understand the operations and maintenance procedures of such tools, including their proper use.
- Provide and trained employees with all additional PPE that may be needed for the safe operation of portable tools

Employees

- Shall ensure they are properly using the correct tool for each task.
- Shall read and follow manufactures safety and operating instructions before using compressed air tools.

Safety

General Safety

- Never point an airline at the skin or another person. Attempting to clean particles or dust off a human body must never be done.
- Compressed air shall not be used for cleaning purposes except where reduced to less than 30 psi and then only with effective chip guarding and appropriate PPE according to OSHA.
- Fittings and clamping devices must be designed for the pressures expected to be encountered according to OSHA. An air hose that has come loose from the fitting can whip around and be a serious hazard.

Compressed Air Hazards

The danger associated with compressed air is often not recognized and air is often perceived as harmless. Some examples of the types of hazards that might result are:

- Air may be forced through the skin and could result in an air embolism with potential fatal results
- Air blown at the ears or eyes can result in ruptured ear drums and dislodged eye balls.
- Particles can be embedded in the ear and eye as well.
- Particles may be accelerated to a velocity that can result in injury to almost any part of the body.

Personal Protective Equipment (PPE)

- Eye protection is required, and head and face protection is recommended for employees working with pneumatic tools.
- A face shield also should be used.
- Screens must also be set up to protect nearby workers from being struck by flying fragments around chippers, riveting guns, staplers, or air drills.
- Use of heavy jackhammers can cause fatigue and strains. Heavy rubber grips reduce these effects by providing a secure handhold.
- Workers operating a jackhammer must wear safety glasses and safety shoes that protect them against injury if the jackhammer slips or falls.



Noise Hazards Associated with Pneumatic Tools

Noise is another hazard associated with pneumatic tools:

- Utilize adequate hearing protection to protect against noise levels the job will encounter.
- The noise level of exhausting air can reach levels that may result in damage to a person's hearing.
- Working with noisy tools such as jackhammers requires proper, effective use of appropriate hearing protection.

Training

Employees should be trained in the proper use of all tools. Workers should be able to recognize the hazards associated with the different types of tools and the safety precautions necessary:

- Tools are to be operated only by competent persons who have been trained in their proper use of tools.
- All employees using compressed air tools shall be trained and fully understand the operations, inspection, and maintenance procedures of such tools, including their proper use.
- All employees shall be trained to use all additional PPE that may be needed for the safe operation of compressed air tools.

Procedure

Compressed Air Safety

The following precautions pertain to the use of compressed air in machine shops:

- All pipes, hoses, and fittings must have a rating of the maximum pressure of the compressor. Compressed air pipelines should be identified (psi) as to maximum working pressure.
- Air supply shutoff valves should be located (as near as possible) at the point-of-operation.
- Air hoses should be kept free of grease and oil to reduce the possibility of deterioration.
- Hoses should not be strung across floors or aisles where they are liable to cause personnel to trip and fall. When possible, air supply hoses should be suspended overhead, or otherwise located to afford efficient access and protection against damage.
- Hose ends must be secured to prevent whipping if an accidental cut or break occurs.
- Before a pneumatic tool is disconnected (unless it has quick disconnect plugs), the air supply must be turned off at the control valve and the tool bled.
- Static electricity can be generated through the use of pneumatic tools. This type of equipment must be grounded or bonded if it is used where fuel, flammable vapors or explosive atmospheres are present.

Operating & Maintaining Compressed Air Machinery

All components of compressed air systems should be inspected regularly by qualified and trained employees. Maintenance superintendents should check with state and/or insurance companies to determine if they require their own inspection of this equipment. Operators need to be aware of the following:

a. Air Receivers

The maximum allowable working pressures of air receivers should never be exceeded except when being tested. Only hydrostatically tested and approved tanks shall be used as air receivers.

- Air tanks and receivers should be equipped with inspection openings, and tanks over 36 inches in diameter should have a manhole, pipelug openings should be provided on tanks with volumes of less than five cubic feet.
- The intake and exhaust pipes of small tanks, similar to those used in garages, should be made removable for interior inspections.
- No tank or receiver should be altered or modified by unauthorized persons.



- Air receivers should be fitted with a drain cock that is located at the bottom of the receiver.
- Receivers should be drained frequently to prevent accumulation of liquid inside the unit.
- Receivers having automatic drain systems are exempt from this Requirement.
- Air tanks should be located so that the entire outside surfaces can be easily inspected. Air tanks should not be buried or placed where they cannot be seen for frequent inspection.
- Each air receiver shall be equipped with at least one pressure gauge and an ASME safety valve of the proper design.
- A safety (spring loaded) release valve shall be installed to prevent the receiver from exceeding the maximum allowable working pressure.
- Only qualified personnel should be permitted to repair air tanks, and all work must be done according to established safety standards.

b. Air Distribution Lines

- Air lines should be made of high quality materials, fitted with secure connections.
- Only standard fittings should be used on air lines.
- Operators should avoid bending or kinking air hoses.
- Air hoses should not be placed where they will create tripping hazards.
- Hoses should be checked to make sure they are properly connected to pipe outlets before use.
- Air lines should be inspected frequently for defects, and any defective equipment repaired or replaced immediately.
- Compressed air lines should be identified as to maximum working pressures (psi), by tagging or marking pipeline outlets.

c. Pressure Regulation Devices

- Only qualified personnel should be allowed to repair or adjust pressure regulating equipment.
- Valves, gauges and other regulating devices should be installed on compressor equipment in such a way that cannot be made inoperative.
- Air tank safety valves should be set no less than 15 psi or 10 percent (whichever is greater) above the operating pressure of the compressor but never higher than the maximum allowable working pressure of the air receiver.
- Air lines between the compressor and receiver should usually not be equipped with stop valves. Where stop valves are necessary and authorized, ASME safety valves should be installed between the stop valves and the compressor.
- The Safety valves should be set to blow at pressures slightly above those necessary to pop the receiver safety valves.
- Blowoff valves should be located on the equipment and shielded so sudden blowoffs will not cause personnel injuries or equipment damage.
- Case iron seat or disk safety valves should be ASME approved and stamped for intended service application.
- If the design of a safety or a relief valve is such that liquid can collect on the discharge side of the disk, the valve should be equipped with a drain at the lowest point where liquid can collect.
- Safety valves exposed to freezing temperatures should be located so water cannot collect in the valves. Frozen valves must be thawed and drained before operating the compressor.

d. Air Compressor Operation

- Air compressor equipment should be operated only by authorized and trained personnel.
- The air intake should be from a clean, outside, fresh air source. Screens or filters can be used to clean the air.
- Air compressors should Never be operated at speeds faster than the manufacturers recommendation.
- Equipment should not become overheated.
- Moving parts, such as compressor flywheels, pulleys, and belts that could be hazardous should be effectively guarded.



e. Compressed Air Equipment Maintenance

- Only authorized and trained personnel should service and maintain air compressor equipment.
- Exposed, non-current-carrying, metal parts of compressor should be effectively grounded.
- Low flash point lubricants should not be used on compressors because of its high operating temperatures that could cause a fire or explosion.
- Equipment should not be over lubricated.
- Gasoline or diesel fuel powered compressors shall not be used indoors.
- Equipment placed outside but near buildings should have the exhausts directed away from doors, windows and fresh air intakes.
- Soapy water or lye solutions can be used to clean compressor parts of carbon deposits, but kerosene or other flammable substances should not be used. Frequent cleaning is necessary to keep compressors in good working condition.
- The air systems should be completely purged after each cleaning.
- During maintenance work, the switches of electrically operated compressors should be locked open and tagged to prevent accidental starting.
- Portable electric compressors should be disconnected from the power supply before performing maintenance.

Pneumatic Tools

Pneumatic tools are powered by compressed air and include chippers, drills, hammers, and sanders. There are several dangers associated with the use of pneumatic tools. First and foremost is the danger of getting hit by one of the tool's attachments or by some kind of fastener the worker is using with the tool.

Pneumatic Tools General Information

- Pneumatic tools must be checked to see that the tools are fastened securely to the air hose to prevent them from becoming disconnected.
- A short wire or positive locking device attaching the air hose to the tool must also be used and will serve as an added safeguard.
- If an air hose is more than 1/2-inch (12.7 millimeters) in diameter, a safety excess flow valve must be installed at the source of the air supply to reduce pressure in case of hose failure.
- When using pneumatic tools, a safety clip or retainer must be installed to prevent attachments such as chisels on a chipping hammer from being ejected during tool operation.
- Workers should never "dead-end" them against themselves or anyone else.
- A chip guard must be used when compressed air is used for cleaning.
- Pneumatic tools that shoot nails, rivets, staples, or similar fasteners and operate at pressures more than 100 pounds per square inch (6,890 kPa), must be equipped with a special device to keep fasteners from being ejected, unless the muzzle is pressed against the work surface.
- Airless spray guns that atomize paints and fluids at pressures of 1,000 pounds or more per square inch (6,890 kPa) must be equipped with automatic or visible manual safety devices that will prevent pulling the trigger until the safety device is manually released.

Note: Compressed air guns should never be pointed toward anyone.



Gauges and Valves

Every air receiver shall be equipped with an indicating pressure gauge (so located as to be readily visible) and with one or more spring-loaded safety valves. The total relieving capacity of such safety valves shall prevent pressure in the receiver from exceeding the maximum allowable working pressure of the receiver by more than 10 percent.

- No valve of any type shall be placed between the air receiver and its safety valve or valves.
- Safety appliances, such as safety valves, indicating devices and controlling devices, shall be constructed, located, and installed so that they cannot be readily rendered inoperative by any means, including the elements.
- All safety valves shall be tested frequently and at regular intervals to determine whether they are in good operating condition.

Inspection

The inspection shall involve:

- Hoses that should be inspected periodically to assure their integrity.
- Storage tanks must have a drain, gauge and valve and the tank must be located where these devices are readily accessible for the regular inspections required.

Daily Inspection

Perform daily inspections of the safety devices on compressed air systems.

- The safety valve can be checked by pulling the valve ring.
- If the ring goes back in by itself, the safety valve is working properly.

Not Working Properly

If any of the following occurs, the safety valve is NOT working properly:

- The valve sticks and the ring does not re-set,
- Air leaks out after ring is pulled, then released, or
- If air is not released when the ring is pulled.

Weekly Inspections

Inspect inlet air filters, at least weekly.

Recordkeeping

The following information must be documented and maintained for a minimum of three months by the employer that conducts the inspection:

- The items checked and the results of the inspection.
- The name and signature of the person who conducted the inspection and the date.

Documentation of Annual/Comprehensive Inspection

The following information must be documented, maintained, and retained for a minimum of 12 months, by the employer that conducts the inspection:

- The items checked and the results of the inspection.
- The name and signature of the person who conducted the inspection and the date.
- Inspection documents must be made available to all persons who conduct inspections.



CIVIL INFRASTRUCTURE SOLUTIONS

CONFINED SPACE / PERMIT CONFINED SPACE



Vortex Companies

Procedure Name	Environmental, Health & Safety Manual – Confined Space
Applicability	VORTEX Companies – Employees & Subcontractors
Policy Revised	08.12.15

Purpose

The purpose of this program is to ensure the safety of all employees and contractors working for VORTEX Companies, and to comply with all federal and state requirements that pertain to confined spaces.

Scope

This program covers all employees and other workers that may be involved in confined space entry. When work is performed on a non, owned or operated site, the operator's program shall take precedence. This document covers VORTEX Companies employees and contractors and shall be used on owned premises, or when an operator's program doesn't exist or is less stringent.

Definitions

Acceptable Entry Conditions - The conditions that must exist in a confined space to allow entry and to ensure that employees involved with a confined space entry can safely enter into and work within the space.

Attendant - An individual stationed outside one or more Confined Spaces who monitors the authorized Entrants and who performs all Attendant's duties assigned in the VORTEX Companies Confined Spaces Program. Attendants must have sufficiently completed and fully understands the Confined Space training and is approved by the HSE Manager to work in a confined space as an Attendant.

Authorized Entrant - An individual who is authorized by VORTEX Companies to enter a confined space. Entrants must have sufficiently completed and fully understands the Confined Space training and is approved by the HSE Manager to work in a confined space as an Authorized Entrant.

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.

Confined Space

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

Double Block and Bleed - The closure of a line, duct, or pipe by closing and locking or tagging two in-line valves and by opening and locking or tagging a drain or vent valve in the line between the two closed valves.



Emergency - Any occurrence (including any failure of hazard control or monitoring equipment) or an event internal or external to the confined space that could endanger Entrants.

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 confined space. Entry includes ensuing work activities in that Entry permit, the written or printed document that is provided by VORTEX Companies to allow and control entry into a confined space that contains the information specified in this program.

Entry Supervisor - The person responsible for determining if acceptable entry conditions are present at a confined space where entry is planned, for authorizing entry and overseeing entry operations, and for terminating entry as required by this section.

- Entry Supervisors must have sufficiently completed and fully understand the Confined Space training and is approved by the HSE Manager to work in a confined space.
- An Entry Supervisor also may serve as an Attendant or as an authorized Entrant, as long as that person is trained and equipped as required by this section for each role he or she fills. Also, the duties of Entry Supervisor may be passed from one individual to another during the course of an entry operation.
- The Entry Supervisor is responsible to test and monitor the atmosphere conditions.

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

- Flammable gas, vapor, or mist in excess of 10 percent of its lower flammable limit (LFL), (0% is normal).
- Atmospheric oxygen concentration below 19.5 percent or above 23.5 percent, (20.9 % is normal).
- Any other atmospheric condition that is immediately dangerous to life or health. (Ex.-H₂S 10%, 0% is normal).
- Note: For air contaminants for which OSHA has not determined a dose or permissible exposure limit, other sources of information, such as Material Safety Data Sheets that comply with the Hazard Communication Standard, published information, and internal documents can provide guidance in establishing acceptable atmospheric conditions.

Hot Work Permit - The written authorization to perform operations (for example, riveting, welding, cutting, burning, and heating) capable of providing a source of ignition.

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 confined 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 displacement of the atmosphere in a permit space by a non-combustible gas (such as nitrogen) to such an extent that the resulting atmosphere is non-combustible. This procedure produces an IDLH oxygen deficient atmosphere.

Isolation - The process by which a confined 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.

Line Breaking - The intentional opening of a pipe, line, or duct that is or has been carrying flammable, corrosive, or toxic material, an inert gas, or any fluid at a volume, pressure, or temperature capable of causing injury.

Non-Permit Confined Space - A confined space that does not contain, or with respect to atmospheric hazards, have the potential to contain any hazard capable of causing death or serious physical harm.

Oxygen Deficient Atmosphere - An atmosphere containing less than 19.5 percent oxygen by volume. **Oxygen enriched atmosphere** - an atmosphere containing more than 23.5 percent oxygen by volume.

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

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

Permit System - The employer's written procedure for preparing and issuing permits for entry and for returning the confined space to service following termination of entry.

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

Rescue Service - The personnel designated to rescue employees from Permit-Required 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 confined spaces.

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

Responsibilities

Managers/Supervisor

- Shall ensure that all employees have been trained and fully understand the requirements of this program.
- Shall provide the necessary equipment to comply with these requirements and ensure that all employees are trained on its use.
- Shall ensure that all confined space assessments have been conducted and documented.



- Shall ensure that provisions and procedures are in place for the protection of employees from external hazards including but not limited to pedestrians, vehicles and other barriers and by use of the pre-entry checklist verifying that conditions in the permit space are acceptable for entry during its duration.
- Shall ensure that all Permit-Required Confined Spaces permits are posted.
- Shall ensure an annual review of the program including all entry permits issued that during that annual period.
- Shall ensure that confined spaces are identified properly as either a Non-Permit Confined Space or a Permit-Required Confined Space.
- Shall ensure that all confined spaces that have been identified as “no entry” have signs that state, “DANGER- DO NOT ENTER”.
- Shall ensure signs have been posted at all Permit-Required Confined Space areas that state, “DANGER – PERMIT ENTRY CONFINED SPACE” along with the proper warning word such as “ASPHYXIANT, FLAMMABILITY or TOXIC HAZARD”
- Shall file all permits at the area offices for review. Permits shall be kept on file for one year.

Affected Employee

- Shall attend Confined Space Entry training commensurate with their duties and when duties change as required.
- Shall comply with all aspects of this program.
- Authorized Entrants, Attendants and Entry Supervisors may be any VORTEX Company employee that is authorized by management to work in a confined space setting and that has been trained and is proficient in the understanding of program requirements.

Authorized Entry Supervisor Duties

- Shall have a tailgate safety meeting, with all workers to be involved in the confined space entry and review the job to be performed and what safety concerns may be present.
- Shall confirm that all isolation, Lock/out and Tag/outs have been completed prior to entry into a confined space.
- Shall ensure that the requirements of this program are followed and maintained.
- Shall test all atmosphere conditions prior to entry and shall complete and maintain the confined space permit form, and have it accessible for review on the jobsite at all times.
- Shall notify VORTEX Companies supervisor of entry into a confined space, and notify the supervisor of any changes that may occur, during an entry.
- If the confined space poses a hazard that cannot be eliminated, the Entry Supervisor must arrange for a rescue services.
- If the confined space poses no hazards to the Entrants, the Entry Supervisor can reclassify the confined space to a Non-Permit Confined Space.
- A stand-by rescue team is not required to be on site for Non-Permit Confined Space entries.

Authorized Attendant Duties

- Knows the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure.
- Is aware of possible behavioral effects of hazard exposure in authorized Entrants.
- Continuously maintains communication and an accurate count of authorized Entrants in the confined space and ensures that the means used to identify authorized Entrants, and accurately identifies who is in the confined space.
- Remains outside the confined space during entry operations until relieved by another Attendant.



- Attendants are NOT allowed to monitor more than one confined space.
- Note: Attendants may enter a confined space to attempt a rescue, if they have been trained and equipped for rescue operations as required and only when they have been relieved by another authorized Attendant.
- Monitors activities inside and outside the confined space to determine if it is safe for Entrants to remain in the space and orders the authorized Entrants to evacuate the confined space immediately under any of the following conditions:
- If the Attendant detects a prohibited condition.
- If the Attendant detects the behavioral effects of hazard exposure in an authorized Entrant.
- If the Attendant detects a situation outside the space that could endanger the authorized Entrants.
- If the Attendant cannot effectively and safely perform all the duties required.
- Summon rescue and other emergency services as soon as the Attendant determines that authorized Entrants may need assistance to escape from confined space hazards.
- Takes the following actions when unauthorized persons approach or enter a confined space while entry is underway.
- Warn the unauthorized persons that they must stay away from the confined space.
- Advise the unauthorized persons to exit the confined space immediately, if they have entered the space.
- Inform the authorized Entrants and the Entry Supervisor if unauthorized persons have entered the confined space.
- Performs no duties that might interfere with the Attendant's primary duty to monitor and protect the authorized Entrants.
- Authorized Attendants shall not monitor more than one confined space at a time.

Authorized Entrant Duties

- Knows the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure.
- Uses appropriate personal protective equipment properly, e.g., face and eye protection, and other forms of barrier protection such as gloves aprons, coveralls, and breathing equipment.
- Is aware of possible behavioral effects of hazard exposure in authorized Entrants.
- Shall witness and verify calibrated air monitoring data and if approved, sign off, before entry is made.
- Is entitled to request additional monitoring at any time.
- Maintain communication with the Attendants to enable the Attendant to monitor the Entrants status as well as to alert the Entrant to evacuate if needed; and
- Exit from confined spaces as soon as possible when ordered by an Attendant or Entry Supervisor, when the Entrant recognizes the warning signs or symptoms of an exposure exists, or when a prohibited condition exists, or when an alarm is activated.

Procedure

Non-Permit Confined Space Entry

If testing of the confined space atmosphere is within acceptable limits without the use of forced air ventilation and the space is properly isolated, the space can be entered by following the requirements for Level I confined space entry.

- Entrants and/or their representative shall be given the opportunity to observe and participate in the air monitoring process.
- Entrants shall review and sign the confined space permit.



Employees may enter and work in the confined space as long as LEL, O₂, and toxicity hazards remain at safe levels.

- Complete the VORTEX Companies Confined Space Entry Permit to document that there are no confined space hazards. Make this certification available to all personnel entering the space.
- A trained Attendant must always be outside the confined space. The Attendant must monitor the authorized Entrants for the duration of the entry operation.

Exception: The Attendant requirements for Level I confined space entry may be exempted, if the job assessment is performed and has determined that there are no inherent dangers to allow single person entry.

- This provision is intended to permit field operations to enter crankcases, shallow valve boxes, cellars, excavations, etc. without an Attendant being present and all other aspects of the entry permit complied with.
- When there are changes in the use and configuration of a confined space that might increase the hazards to the Entrants (e.g., using epoxy coating on a tank floor, welding, painting, etc.), re-evaluate the space. If necessary, reclassify the space as a Permit-Required Confined Space.
- Continuously monitor the confined space atmosphere to ensure that it is still safe.
- The space must not contain a hazardous atmosphere while personnel are inside.
- If a hazardous atmosphere is detected during an entry, personnel must immediately evacuate the space.
- Re-evaluate the space to determine how the hazardous atmosphere developed.
- The Entry Supervisor shall cancel the entry permit.
- Take action to protect personnel before any subsequent activity to re-enter the space takes place.
- Reissue the VORTEX Companies Confined Space Entry Permit before allowing Entrants to re-enter the space.
- If necessary, reclassify the space as a Permit-Required Confined Space.
- Ensure that vehicle or other equipment exhaust does not enter the space.

Permit-Required Confined Space Entry

If the space is properly isolated and results of air monitoring are above acceptable parameters without local exhaust ventilation in operation, classify the entry as a Permit-Required Confined Space.

- Complete the VORTEX Companies Confined Space Entry Permit before proceeding with work in a Permit-Required Confined Space.
- Entrants and/or their representative shall be given the opportunity to observe and participate in the air monitoring process.
- Entrants shall review and sign the confined space permit.
- At least one trained Attendant must always be outside the Permit-Required Confined Space.
- The Attendant must monitor the authorized Entrants for the duration of the entry operation.
- Only authorized Entrants may enter a Permit-Required Confined Space.
- All Entrants must sign in and out on the entry permit when entering and leaving a Permit-Required Confined Space.
- The back of the permit or a sign-in sheet must be used for this purpose.
- Post signs and barricades outside all Permit-Required Confined Spaces to notify personnel that a confined space entry is in progress and unauthorized entry is prohibited.
- Conditions must be continuously monitored where Entrants are working to determine that acceptable conditions are maintained during entry.
- If a hazardous atmosphere is detected during an entry, personnel must immediately evacuate the space.
- The Entry Supervisor shall cancel the entry permit.
- Re-evaluate the space to determine how the hazardous atmosphere developed.



- Take action to protect personnel before any subsequent activity to re-enter the space takes place.
- Re-issue the VORTEX Companies Confined Space Entry Permit before allowing Entrants to re-enter the space. Employees or their representatives are entitled to request additional monitoring at any time.
- The permit must be terminated when the entry operations are complete or when permit conditions change (i.e., hazardous air monitoring results are noted, unsafe behaviors are observed, etc.).
- The minimum rescue equipment required for Permit-Required Confined Space entry is covered in the Rescue & Emergency section of this program.
- Permit-Required Confined Space entry operations will be reviewed when VORTEX Companies believes that the requirements of this confined space program may not adequately protect personnel.
- If deficiencies are found in the program, the program will be revised and personnel will be trained in the new revisions before subsequent entries are authorized.

Pre-Job Planning and Space Preparation

The Entry Supervisor must determine that the confined space is properly isolated by blinding, disconnecting, and/or by following local Lockout/Tagout procedures.

The Entry Supervisor must discuss with all Entrants the hazards of the space, communication methods and emergency procedures during the confined space entry.

Eliminate any condition making it unsafe to open the equipment to atmosphere. Promptly guard the opening to prevent an accidental fall through the opening and to protect each employee working in the space from foreign objects entering the space.

If applicable, wash, steam, ventilate or degas the confined space to properly free it of possible contaminants. Vent vapors to a safe location.

Do not allow unauthorized personnel to enter a confined space. Barricade and/or guard all confined spaces to prevent entry of unauthorized Entrants.

If performing hot work in the confined space, precautions must be taken consistent with the VORTEX Companies Hot Work Permit procedure.

Ensure that vehicle or other equipment exhaust does not enter the space.

Prep Pre-Entry Safety Meeting

The Entry Supervisor must declare when the confined space is ready for entry.

The Entry Supervisor shall hold a pre-entry safety meeting to discuss all requirements and procedures with all authorized Entrant(s) and Attendant(s) involved with the entry. He/she will discuss other concerns such as previous contents, vessel coating, PPE required etc., during this meeting.



The Entry Supervisor must coordinate entry operations when employees of more than one company are working simultaneously in the confined space. This coordination is necessary so that one company's work does not endanger the employees of another company.

Equipment

Check all work equipment to ensure that it has the proper safety features and is approved for the locations where it will be used. The Entry Supervisor shall ensure that all equipment is properly maintained in a safe condition and that Entrants use the equipment properly.

The following equipment must be considered and may be required when entering a confined space:

- Atmospheric Testing and Monitoring Equipment.
- Barriers, Shields, and Signs – Post signs and barricades outside all Permit-Required Confined Spaces to notify personnel that a confined space entry is in progress and unauthorized entry is prohibited. Any signs used must state “Danger – Permit Entry Confined Space” along with the proper warning word such as “Asphyxiant, Flammability or Toxic Hazard”. All barricades must be capable of preventing a person from inadvertently walking into or kicking an object into the space.
- Communications Equipment – Only use intrinsically safe equipment in areas where a hazardous atmosphere may exist. Use a communication system that will keep the Attendant in constant, direct communication with the Entrant(s) working in the confined space. Also, use a communication system that allows the Attendant to summon help from rescue or emergency service.
- Entry and Exit Equipment – (For example: ladders may be needed for safe entry and exit).
- Lighting Equipment– Needed for safe entry, work within the space and exit. Lighting equipment used in the confined space must be certified safe for the location.
- Portable electric lighting used in wet and/or other conductive locations (drums, tanks, vessels) must be operated at 12 volts or less. 120 volt lights may be used if protected by a ground-fault circuit interrupter.
- Personal Protective Equipment – Ensure that personnel wear the required personal protective equipment. For respiratory protection requirements, refer to the Respiratory Protection Program.
- Rescue and Emergency Equipment– Except if provided by outside rescue services.
- The Attendants must also have an approved first aid kit.
- Vacuum Trucks – When used, trucks must be properly grounded or bonded to prevent static sparks.
- Ventilating Equipment – Local exhaust air movers used to obtain acceptable atmospheric entry conditions (e.g., Copus air movers).
- Other – Any other equipment necessary for safe entry into and rescue from permit required confined spaces.

Air Monitoring

- Before an employee enters the space, the internal atmosphere shall be tested, with a calibrated direct-reading instrument, for oxygen content, for flammable gases and vapors, and for potential toxic air contaminants, in that order. Monitoring of the space must inform the entrants of the potential hazards and results and they must participate in the permit review and signing.
- Air shall be periodically tested while continuous ventilation is applied.
- Any employee who enters the space, or that employee's authorized representative, shall be provided an opportunity to observe the pre-entry testing required by this paragraph.
- Employees or their representatives are entitled to request additional air monitoring at any time.



Ventilation

Continuous forced air ventilation must be used and tested as follows:

- An employee may not enter the space until the forced air ventilation has eliminated any hazardous atmosphere.
- The forced air ventilation shall be so directed as to ventilate the immediate areas where an employee is or will be present within the space and shall continue until all employees have left the space.
- The air supply for the forced air ventilation shall be from a clean source and may not increase the hazards in the space.
- The atmosphere within the space shall be periodically tested as necessary to ensure that the continuous forced air ventilation is preventing the accumulation of a hazardous atmosphere. Any employee, who enters the space, or that employee's authorized representative, shall be provided with an opportunity to observe the periodic testing and may request additional monitoring at any time.
- If a hazardous atmosphere is detected during entry each employee shall leave the space immediately and the space shall be evaluated to determine how the hazardous atmosphere developed and measures shall be implemented to protect employees from the hazardous atmosphere before any subsequent entry takes place.

Multiple Employer Procedure

In order not to endanger the employees of any other employer, the Entry Supervisor shall:

- Verify that all contractor employees have been trained in confined space and that all contractor employees fully understand the VORTEX Companies procedures pertaining to Confined Space.
- Inform the contractor that the workplace contains permit spaces and that permit space entry is allowed only through compliance with a permit space program meeting the requirements of this section.
- Apprise the contractor of the elements, including the hazards identified and the employees experience with the space, that make the space in question a permit space.
- Inform the contractor of any precautions or procedures that VORTEX Companies has implemented for the protection of employees in or near permit spaces where contractor personnel will be working.
- Coordinate entry operations with the contractor, when both VORTEX Companies personnel and contractor personnel will be working in or near confined spaces.
- Debrief the contractor at the conclusion of the entry operations regarding the permit space program followed and regarding any hazards confronted or created in confined spaces during entry operations.
- In addition to complying with the confined space requirements that apply to all employees, each contractor, who is retained to perform permit space entry operations, shall:
- Obtain any available information regarding confined space hazards and entry operations from the VORTEX Companies Entry Supervisor.
- Coordinate entry operations with the VORTEX Companies Entry Supervisor, when both VORTEX Companies personnel and contractor personnel will be working in or near permit spaces.
- Inform VORTEX Companies of the confined space program that the contractor will follow and of any hazards confronted or created in the confined space, either through a debriefing or during the entry operation.

Rescue and Emergency Services

General

- If entry is to be made into an IDLH atmosphere, or into a space that can quickly develop an IDLH atmosphere (if ventilation fails or for other reasons), the trained rescue team or service must be standing by at the permit space while work is being performed.



- In case of an emergency and/or injuries, the confined space site shall be secured and emergency response personnel shall be notified to respond per the host facility emergency plan.
- If there is reliance on host facility or outside services for rescue the facility host or outside rescue team must be given an opportunity to examine the entry site, practice rescue and decline as appropriate. Reliance on host facility for rescue services must be stated and agreed to in contract language.
- The Attendant shall order the other Entrants not to move the injured nor allow untrained or unauthorized workers into the space that are not trained to handle a confined space rescue.
- Material Safety Data Sheet's for substances that an injured Entrant was exposed to must be provided to the medical facility treating the injured worker.

Permit-Required Confined Space Rescue:

- When the Attendant becomes aware of the need for rescue, the Attendant shall immediately summon the onsite rescue team by the agreed upon communication method, verbally, radio or cell phone, without leaving the vicinity of the confined space.
- The Attendant shall prevent unauthorized personnel from attempting a rescue.
- After the rescue team has been notified, the Attendant shall alert the Entry Supervisor of the emergency via the same communication methods.
- The preferred means of providing rescue service is through the use of a qualified outside rescue service vendor.
- The outside rescue service vendor must be:
 - Informed of the hazards that they may confront during a rescue.
 - Provided access to the Permit-Required Confined Space.
 - Access to the space allows the rescue service and local supervision to jointly develop appropriate rescue plans.
 - If VORTEX Companies employees are to perform Permit-Required Confined Space rescues, they must be:
 - Provided and trained in the use of the proper personal protective equipment necessary to make the rescue.
 - Provided PPE at no cost.
 - Trained to perform the assigned duties.
 - Required to practice making rescues at least once every 12 months.
 - Trained in basic first aid and CPR.
 - A minimum of one member of the rescue team must hold a current certification in first aid and CPR.
 - If the operator is designated to provide rescue services for VORTEX Companies, the agreement of services must be included in contract for the job.

Non-entry Rescue

- To facilitate non-entry rescue, an Entrant must be attached to a retrieval system whenever he/she enters a Permit-Required Confined Space with a vertical depth of more than 5 feet.
- The retrieval equipment is not required if it will increase the overall risk of the entry, e.g., creating an entanglement hazard, or will not contribute to the rescue of the Entrant.
- Each Entrant shall use a full body harness equipped with a "D" ring located between the shoulders or above the head.
- Wristlets may be used instead of the full body harness, if the use of the full body harness is not feasible or creates a greater hazard and that using wristlets is the safest and most effective alternative.
- The retrieval line must be attached to the "D" ring and the other end of the retrieval line attached to a retrieval device or fixed point located outside the space so that rescue can begin as soon as the rescuer becomes aware that rescue is necessary.



Issuance/Reviewing of Permit

Only when all pre-entry requirements are satisfied, the Entry Supervisor shall issue a completed and signed confined space permit. The confined space permit is valid for one shift.

In the event of any unauthorized entry, employee complaints, a hazard not covered by the permit, the occurrence of an injury or near miss the entry permit shall be cancelled and a review shall be conducted to provide employee protection and for revising the program prior to authorizing subsequent entries.

An annual review of this program, using the cancelled permits retained within 1 year after each entry shall be conducted by the HSE Manager to revise the program as necessary, to ensure that employees are protected. If no confined space entries were performed during a 12 month period, no review is necessary.

Cancellation/Closure of Permits

The Entry Supervisor shall cancel the confined space permit, at the end of the job operation, at the end of the shift or when the Entry Supervisor or Attendant determine that conditions in or near the confined space have changed and is hazardous to the Entrants.

The Entry Supervisor shall, at the conclusion of entry operation, close out the permit and provide the safety department the original copy of the Confined Space Permit.

Training

Training shall be provided so that all employees whose work is regulated by this program acquire the understanding, knowledge, and skills necessary for the safe performance of the duties assigned to them.

Training shall be provided to each affected employee, before the employee is first assigned duties under this program, if a new hazard has been created or special deviations have occurred and before there is a change in assigned duties.

Training records shall include employee name, trainer signature/initials and dates of training. Training records must be made available to employees and their authorized representative(s).

The employee shall be retrained:

- Whenever there is a change in confined space operations that presents a hazard about which an employee has not previously been trained.
- Whenever the supervisor has reason to believe either that there are deviations from the permit space entry procedures required by this section or that there are inadequacies in the employee's knowledge or use of these procedures.



CONFINED-SPACE ENTRY PERMIT

Note: Must be kept at confined space until job is complete.

Type of Entry: Permit Space Non-Permit Space Alternate Entry Procedure

Description/Location of Confined Space: _____

Date of Entry: _____ Date/Time Limit: _____

Purpose of Entry: _____

Attendant (if required): _____
Print Print

Pre-Entry Checklist (All Confined Spaces)

Note: Continuous Forced Air Ventilation is MANDATORY for Alternate Entry/Procedure Entry

Yes No

- Specific space entry procedure reviewed or prepared
- Entry area is free of debris and objects
- Needed warning barriers and signs are in place
- Required atmospheric monitoring conducted
- Any additional testing required
- All hazardous pipe connections have been isolated by DB&B, Blanking, Misalignment
- All hazardous pipe connections have been valved off
- Any hot work permitted (welding, cutting, grinding, etc.)
- All energy sources have been neutralized / locked out
- The confined space has been drained and flushed / plunged
- Forced air or exhaust ventilation is provided, if needed
- Portable electrical equipment is grounded or double insulated

Yes No

- Non-sparking tools used, if necessary
- Ground fault circuit interrupters (GFCI) provided
- Low voltage lighting used
- Electrical equipment rated for explosive atmospheres, if necessary
- No compressed gas cylinders allowed in the confined space
- Affected employees, host employer and/or contractor notified
- Entry and emergency procedures have been reviewed
- All personnel have been trained
- All personnel have been informed of potential hazards
- Attendant stationed at entrance and properly instructed
- Non-entry rescue equipment to be used
- Rescue equipment readily available

Atmospheric Checks (All Confined Spaces)

See changes in Acceptable Entry Conditions for Alternate Entry Spaces

Air monitoring equipment calibration checked on day of use? Equipment used: _____

Tests Required	Measurement									
Initials										
Time										
Oxygen										
Combustible Gas										
Carbon Monoxide										
Hydrogen Sulfide										
Carbon Dioxide										
Other										



Personal Protective Equipment

(This section required for ALL confined space entry operations)

Yes No

- Hard Hat
- Eye/Face Protection
- Boots
- Gloves
- Protective Clothing
- Hearing Protection
- _____
- _____
- Communications Equipment
- Respirator (type) _____
- Fire Extinguisher (type) _____
- _____

Basic Emergency Plan

(This section required for ALL confined space entry operations)

Primary Rescue Method

- Non-entry rescue by attendant
- Rescue by in-house team
- Entry rescue by others
- Self-rescue (alternate or non-permit space)

Emergency Notification Plan

Radios checked Yes No

Emergency Phone Number _____

Location of nearest phone _____

Rescue Equipment

(This section required for Permit Required Confined Spaces)

Yes No

- Harness and lanyard or other non-entry rescue method provided
- Retrieval system for vertical rescue in place
- Any other rescue equipment available

Authorized Entrant Roster

Printed Name	Time In/Out	Time In/Out	Time In/Out	Time In/Out
_____	/	/	/	/
_____	/	/	/	/
_____	/	/	/	/
_____	/	/	/	/
_____	/	/	/	/
_____	/	/	/	/
_____	/	/	/	/
_____	/	/	/	/
_____	/	/	/	/
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_____	/	/	/	/
_____	/	/	/	/
_____	/	/	/	/
_____	/	/	/	/

Separate Roster May Be Used (must be attached)

Entry Authorization and Termination

Authorization to Enter Time: _____ Date: _____

Entry Authorizer Signature: _____ Clock No. _____

Permit Terminated Time: _____ Date: _____

Certified as Alternate Entry Space? Yes No

Certified a Non-permit Entry Space? Yes No



CIVIL INFRASTRUCTURE SOLUTIONS

CRANES



Vortex Companies

Procedure Name	Environmental, Health & Safety Manual – Cranes
Applicability	VORTEX Companies – Employees & Subcontractors
Policy Revised	8.29.16

Purpose

To ensure compliance with regulations and manufacturer specifications for material handling tasks using cranes and hoists.

Definitions

Crane - A machine for lifting and lowering a load and moving it horizontally with the hoisting mechanism is an integral part of the machine. Cranes whether fixed or mobile are driven manually or by power.

Responsibilities

Manager/CSO

Implementation and compliance with this procedure at the Customer Center. Ensure inspections occur daily or prior to the use of a crane if not used on a daily basis, documented monthly, and annually by a Third Party inspector.

Train all crane operators and re-train following any crane incident. Maintain documentation at the Customer Center.

Employees

Conduct an inspection of the crane and rigging before use; Damaged or defective cranes must be removed from service immediately.

Ensure loads are lifted according to this procedure.

Equipment

Equipment must be inspected monthly by a competent person. The inspection must be documented. Documentation must include the following: items checked, results of inspection, and name and signature of the inspector. Documentation must be retained for 3 months. (Documented monthly inspection not required if the daily inspection is documented and records are retained for 3 months.)

Procedure Cranes/Hoist

- A. Only trained and authorized individuals are allowed to operate cranes, hoists and lift equipment.
- B. All hoists must meet the requirements of the ASME BTH-1-2005 and ASME B30.20-2006 standards and must never be altered without approval. The manufacturer's procedures and prohibitions must be complied with when assembling, disassembling and operating (including attachments) equipment.
- C. The assembly/disassembly of equipment must be directed by a competent and qualified person.



- D. Pre-operation inspections of cranes and hoist, rigging (including the safety latch), must be performed daily before use at the beginning of each shift. Defects must be reported to the Service Manager and the crane removed from service until a certified person repairs the crane.
- E. Cranes and hoists must not be loaded above their rated capacities and the rated capacities must be clearly marked on both sides of the crane and hoist and visible from the floor.
- F. Under no circumstance may a hoist be placed on a crane or other lifting attachment point (i.e. beams, trusses, etc.) if the hoist's capacity is greater than the crane or attachment point capacity.
- G. Cranes must not be used unless ground conditions are able to support the equipment and any supporting materials per the manufacturer's specifications for adequate support and degree of level of the equipment are met.
- H. A pre-operation hazard assessment will be performed to identify the work zone (shall be identified by demarcating boundaries such as flag and range limiting devices, or defining the work zone as 360 degrees around the equipment up to the maximum working radius) and determine if any part of the equipment could reach closer than 20 feet to a power line. If it is determined that any part of the equipment, load line or load could get closer than 20 feet to a power line then at least one of the following measures must be taken:
 - a. Ensure the power lines have been de-energized and visibly grounded.
 - b. Ensure no part of the equipment, load line or load gets closer than 20 feet to the power line.
 - c. Determine the line's voltage and minimum approach distance.
- I. A signal person must be provided for the following situations:
 - a. The point of operation is not in full view of the operator.
 - b. The view is obstructed when the equipment is traveling.
 - c. The operator or the person handling the load determines it is necessary due to site specific concerns.
- J. A safety plan must be used when the equipment has the potential to strike and injure an employee or pinch/crush an employee against any other object.
- K. Cranes and hoists must be maintained, checked, and serviced per the following schedule:
 - a. Daily inspection.
 - b. Monthly documented inspection.
 - c. Annual documented inspection and service required by a Third Party certified company.
- L. Maintain documentation at the Customer Center.
- M. The operator will have access to procedures applicable to the operation of the equipment. Procedures include rated capacities (load charts), recommended operating speeds, special hazard warnings, instructions and operator's manual and applicable to the operation of the equipment be readily available in the cab at all times. All the information is available in the cab at all times.
- N. The manufacturer must approve all modifications/additions in writing. A registered professional engineer must be qualified with respect to the equipment involved, and must ensure the original safety factor of the equipment is not reduced.
- O. Whenever there is a safety concern, the operator has the authority to stop and refuse to handle loads until a qualified person has determined that safety has been assured.

Training

- A. Only trained and certified persons are authorized to operate cranes and hoists. Training must include all aspects of hoist operation.
- B. All training is equipment-specific and practical on-the-job training.
- C. All A-frames shall have the manufacturer inspection criteria and safe operation visible on the crane.



- D. Training is documented and maintained at the Customer Center for the duration of employment or until the employee ceases to operate a crane/hoist.
- E. Re-certification is required for all authorized crane operators when involved in an incident.
- F. Trained and authorized individuals must conduct a rigging inspection prior to movement of a load.
- G. All loads must be lifted according to the rated load capacity of the rigging and crane/hoist.
- H. A load must only be attached to the hoist or crane hook by use of a lifting device such as a sling or other approved and rated lifting device.
- I. All loads must be raised and moved only where a clear travel path exists in all travel directions.
- J. The hoist must be centered directly over the load. If not centered, the load may swing when lifted.
- K. Moving a load must be pre-planned and moved in a controlled manner.
- L. Never lift a load higher than is necessary.
- M. People should never work underneath loads when loads are being lifted, suspended or moved.
- N. Loads must never be left suspended or unattended.
- O. Cranes and hoists must not be used for side pulls and must not be shock loaded.
- P. No load may be lowered below the point where less than two full wraps of cable remain on the hoisting drum.
- Q. All hazard areas within the boundaries of crane swing radius will be marked with caution tape, warning lines, railings or similar barriers.

Safety devices are required to be on all equipment and must be in proper working order before operations begin. If any of the devices are not in proper working order the equipment must be taken out of service and operations must not resume until the device is working properly again. Examples of safety devices may include: crane level indicator, boom stops, jib stops, foot pedal brake locks, horns, etc.

Operators

- A. Medical Qualifications: The API 2D physical requirements are:
 - a. vision of at least 20/30 Snellen in one eye and 20/50 in the other eye with or without glasses,
 - b. have depth perception be able to distinguish between red, yellow, and green; hearing, with or without a hearing aid, adequate for the specific operation;
 - c. and no history of disabling medical condition which may be sufficient reason for disqualification.
- B. Refresher training is required every four years.
- C. Crane operator qualifications must be maintained every four years and shall include vision and medical condition evaluations.
- D. Before operating, wire rope and sling inspections, testing and maintenance must take place.
- E. A competent person must conduct a visual inspection of equipment prior to each shift. The inspection must consist of observation for apparent deficiencies. Some inspection items shall include control mechanisms, pressurized lines, hooks and latches, wire rope, electrical apparatus, tires (when used), and ground conditions.



CIVIL INFRASTRUCTURE SOLUTIONS

DISCIPLINARY PROGRAM



Vortex Companies

Procedure Name	Environmental, Health & Safety Manual – Disciplinary Action Program
Applicability	VORTEX Companies – Employees & Subcontractors
Policy Revised	03.27.14

Purpose

The purpose of this program is to establish a firm but fair disciplinary action policy to enforce the safety system.

Scope

This document is applicable to all employees.

Responsibilities

It is the responsibility of each and every person employed by VORTEX Companies to work in a safe and efficient manner. The safety system provides guidelines and procedures to help insure that safe work practices are observed. In the event that any employee violates provisions of the VORTEX Companies safety system or works in a manner that threatens his own health and safety or the health and safety of the employees around him, he will be subject to disciplinary action, up to and including termination of employment. The safety manager, operations managers, supervisors and foremen are responsible for enforcing the safety system and for issuing disciplinary action as required by this section of the safety manual.

VORTEX Companies is committed to safety and senior management holds all supervisory staff responsible and accountable for safety within their respective areas.

Physical inspections by VORTEX Companies officials or insurance representatives that indicate violations showing overall lack of commitment to VORTEX Companies safety goals shall be under the same level of disciplinary actions.

Requirements

Safety is a core value and a condition of employment at VORTEX Companies. The following actions constitute a safety violation:

- Not following verbal or written safety procedures, guideline or rules of VORTEX Companies or our clients Horse play, failure to wear required PPE, and or abuse of PPE.
- Being under the influence of drugs or alcohol during work.
- Bringing weapons on the jobsite.
- Failure to report incidents or injuries.
- Attempted or actual physical force to cause injury, threatening statements or other actions to cause an employee to feel they are at risk of injury.

Procedure

The following procedures will be following after issuing a safety violation notice:



- The first offense will result in a verbal warning. The employee is to be informed that he is being issued a verbal warning and informed why. Proper procedure will be discussed to clarify the situation and allow the employee to correct his behavior. The person making this verbal warning will inform the operations manager of his branch that this warning has been issued so the operations manager may make a written record of the warning.
- The second offense will result in a written reprimand and additional training. The reprimand will be written on the standard Employee Write-Up form (see below) and will describe the unsafe activity or behavior that needs correction. Refer to the section of the safety program that was violated (when applicable). The employee receiving the reprimand has the right to submit a written rebuttal to the reprimand. The employee must sign the reprimand. The reprimand and any rebuttal will become a part of the employee's employment records.
- The third offense will result in another written reprimand (using the standard form) and punitive layoff, the duration of which will be decided at the time of the disciplinary action and is to be weighed by the severity of the offense. Again, the employee may submit a written rebuttal to the reprimand. The employee must sign the reprimand. The reprimand and any rebuttal will become a part of the employee's employment records.
- The fourth offense may result in the termination of the offending employee.

The above actions are to be placed against a sliding twelve month scale. If an employee receives a reprimand on January 1 and commits his fourth offense on or before December 31st of the same year, he is terminated. The employee does not have to commit the same violation each time to receive further reprimands. He could receive a verbal reprimand for smoking in a no smoking area on his first offense and get a written reprimand for his second offense which might be a forklift violation and yet another for failing to use proper personal protective equipment. He will be terminated upon his fourth offense in the last twelve months.

In the case of serious safety violations such as by-passing guarding or other unsafe activities that put the violator or other employees at serious risk of injury, the manager may move the violator directly to the second or third warning level. If the violator's actions put him or others at risk of death or dismemberment the manager has the option to terminate him with no further warning.



EMPLOYEE WRITE UP FORM

EMPLOYEE INFORMATION

Employee Name: _____ Date: _____

Employee ID: _____ Job Title: _____

Manager: _____ Department: _____

TYPE OF WARNING

First Warning

Second Warning

Final Warning

TYPE OF OFFENSES

Tardiness/Leaving Early

Absenteeism

Violation of Company Policies

Substandard Work

Violation of Safety Rules

Rudeness to Customers/Coworkers

Other: _____

DETAILS

Description of Infraction: _____

Plan for Improvement: _____

Consequences of Further Infractions: _____

ACKNOWLEDGMENT OF RECEIPT OF WARNINGS

By signing this form, you confirm that you understand the information in this warning. You also confirm that you and your manager have discussed the warning and a plan for improvement. Signing this form does not necessarily indicate that you agree with this warning.

Employee Signature _____ Date _____

Manager Signature _____ Date _____

Witness Signature _____ Date _____

(if employee understands warning but refuses to sign)



CIVIL INFRASTRUCTURE SOLUTIONS

DRUG AND ALCOHOL POLICY



Vortex Companies

Procedure Name	Environmental, Health & Safety Manual – Drug and Alcohol Policy
Applicability	VORTEX Companies – Employees & Subcontractors
Policy Revised	03.27.14

Vortex Companies LLC and Subsidiary Companies intends to help provide a safe and drug-free work environment for our clients and our employees. With this goal in mind and because of the serious drug abuse problem in today's workplace, we are establishing the following policy for existing employees of Vortex Companies LLC, current subcontractors, and proposed subcontractors.

Vortex Companies explicitly prohibits:

- The use, possession, solicitation for, or sale of narcotics or other illegal drugs, alcohol, or prescription medication without a prescription on Company or customer premises or while performing an assignment
- The use of drugs or alcohol; being under the influence of drugs or alcohol while operating a company vehicle and/or equipment.
- The presence of any detectable amount of prohibited substances in the employee's system while at work, while on the premises of the company or its customers, or while on company business. "Prohibited substances" Include illegal drugs, alcohol, or prescription drugs not taken in accordance with a prescription given to the employee.

The Company will conduct drug and/or alcohol testing under any of the following circumstances:

- PRE-EMPLOYMENT/PRE-ACCESS: Individuals beings considered for employment or required to access safety sensitive areas owner facilities are required to undergo and pass a pre-employment/pre-access drug and alcohol screen.
- RANDOM TESTING: Employees may be selected at random for drug and/or alcohol testing at any interval determined by the Company and/or owner facilities.
- FOR CAUSE TESTING: The Company may ask an employee to submit to a drug and/or alcohol test at any time it feels that the employee may be under the influence of drugs or alcohol, including, but not limited to, the following circumstances: evidence of drugs or alcohol on or about the employee's person or in the employee's vicinity, unusual conduct on the employee's part that suggests impairment or influence of drugs or alcohol, negative performance patterns, or excessive and unexplained absenteeism or tardiness.
- POST-ACCIDENT TESTING: Any employee involved in a company vehicle accident or on-the-job accident or injury shall be asked to submit to a drug and/or alcohol test.

"Involved in an on-the-job accident or injury" means not only the one who was or could have been injured, but also any employee who potentially contributed to the accident or injury event in any way. Testing will take place at a certified testing location and must take placed within 2 hours of incident.

If an employee is tested for drugs or alcohol outside of the employment context and the results indicate a violation of this policy, or if an employee refuses a request to submit to testing under this policy, the employee may be subject to appropriate disciplinary action, up to and possibly including discharge from employment. In such a case, the employee will be given an opportunity to explain the circumstances prior to any final employment action becoming effective.



EMPLOYEE AGREEMENT AND CONSENT TO DRUG AND/OR ALCOHOL TESTING

I hereby agree, upon a request made under the drug/alcohol testing policy of Vortex Companies, to submit to a drug or alcohol test and to furnish a sample of my urine, breath, and/or blood for analysis. I understand and agree that if I at any time refuse to submit to a drug or alcohol test under company policy, or if I otherwise fail to cooperate with the testing procedures, I will be subject to immediate termination. I further authorize and give full permission to have the Company and/or its company physician send the specimen or specimens so collected to a laboratory for a screening test for the presence of any prohibited substances under the policy, and for the laboratory or other testing facility to release any and all documentation relating to such test to the Company and/or to any governmental entity involved in a legal proceeding or investigation connected with the test. Finally, I authorize the Company to disclose any documentation relating to such test to any governmental entity involved in a legal proceeding or investigation connected with the test.

I understand that only duly-authorized Company officers, employees, and agents will have access to information furnished or obtained in connection with the test; that they will maintain and protect the confidentiality of such information to the greatest extent possible; and that they will share such information only to the extent necessary to make employment decisions and to respond to inquiries or notices from government entities.

I will hold harmless the Company, its company physician, and any testing laboratory the Company might use, meaning that I will not sue or hold responsible such parties for any alleged harm to me that might result from such testing, including loss of employment or any other kind of adverse job action that might arise as a result of the drug or alcohol test, even if a Company or laboratory representative makes an error in the administration or analysis of the test or the reporting of the results. I will further hold harmless the Company, its company physician, and any testing laboratory the Company might use for any alleged harm to me that might result from the release or use of information or documentation relating to the drug or alcohol test, as long as the release or use of the information is within the scope of this policy and the procedures as explained in the paragraph above.

This policy and authorization have been explained to me in a language I understand, and I have been told that if I have any questions about the test or the policy, they will be answered.

I UNDERSTAND THAT THE COMPANY WILL REQUIRE A DRUG SCREEN AND/OR ALCOHOL TEST UNDER THIS POLICY WHENEVER I AM INVOLVED IN AN ON-THE-JOB ACCIDENT OR INJURY UNDER CIRCUMSTANCES THAT SUGGEST POSSIBLE INVOLVEMENT OR INFLUENCE OF DRUGS OR ALCOHOL IN THE ACCIDENT OR INJURY EVENT AND I AGREE TO SUBMIT TO ANY SUCH TEST.

Employee Signature _____

Date _____

Employee's Name — Printed _____



CIVIL INFRASTRUCTURE SOLUTIONS

ELECTRICAL SAFETY AWARENESS



Vortex Companies

Procedure Name	Environmental, Health & Safety Manual - Electrical Safety Awareness
Applicability	VORTEX Companies - Employees & Subcontractors
Policy Revised	11.08.16

Purpose

The purpose of the Electrical Safety program is to set forth procedures for the safe use of electrical equipment, tools, and appliances at VORTEX Companies.

Scope

This program applies to all VORTEX Companies employees, temporary employees, and contractors. When work is performed on a non-owned or operated site, the operator's program shall take precedence, however, this document covers VORTEX Companies employees and contractors and shall be used on owned premises, or when an operator's program doesn't exist or is less stringent.

Definitions

Affected Personnel - Personnel who normally use and work with electrical equipment, tools, and appliances, but who do not make repairs or perform lock out/tag out procedures.

Appliances - Electrical devices not normally associated with commercial or industrial equipment such as air conditioners, computers, printers, copiers, coffee pots, microwave ovens, toasters, etc.

Circuit Breaker - A device designed to open and close a circuit by non-automatic means and to open the circuit automatically on a predetermined over current without injury to itself when properly applied within its rating.

Disconnecting Means - A device, or group of devices, or other means by which the conductors of a circuit can be disconnected from their source of supply.

Disconnecting Switch - A mechanical switching device used for isolating a circuit or equipment from a source of power.

Double Insulated Tool - Tools designed of non-conductive materials that do not require a grounded, three wire plug.

Ground - Connected to earth or some conducting body that serves in place of the earth.

Grounded Conductor - A conductor used to connect equipment or the grounded circuit of a wiring system to a grounding electrode or electrodes.



Ground Fault Circuit Interrupter (GFCI) - A device whose function is to interrupt the electric circuit to the load when a fault current to ground exceeds some predetermined value that is less than that required to operate the over current protective device of the supply circuit. VORTEX Companies shall use GFCIs in lieu of an assured grounding program.

Insulated - A conductor encased within material of composition and thickness that is recognized as electrical insulation.

Premises Wiring - That interior and exterior wiring, including power, lighting, control, and signal circuit wiring together with all of its associated hardware, fittings, and wiring devices, both permanently and temporarily installed, which extends from the load end of the service drop, or load end of the service lateral conductors to the outlet (s). Such wiring does not include wiring internal to appliances, fixtures, motors, controllers, motor control centers, and similar equipment.

Qualified Person - One that has been trained in the repair, construction and operation of electrical equipment and the hazards involved.

Strain Relief - A mechanical device that prevents force from being transmitted to the connections or terminals of a cable or extension cord.

Class I Locations - Are those in which flammable gases or vapors are or may be present in the air in quantities sufficient to produce explosive or ignitable mixtures.

- Class 1 Division 1 - Is a location (a) in which hazardous concentrations of flammable gases or vapors may exist under normal operating conditions; or (b) in which hazardous concentrations of such gases or vapors may exist frequently because of repairs or maintenance operations or because of leakage; or (c) in which a breakdown or faulty operation or equipment or processes might release hazardous concentrations of flammable gases or vapors, and might also cause simultaneous failure of electrical equipment.
- Class 1 Division 2 - Is a location (a) in which volatile flammable liquids or flammable gases are handled, processed, or used, but in which the hazardous liquid, vapors, or gases will normally be confined within closed containers or closed systems from which they can escape only in case of accidental rupture or breakdown of such containers or systems, or in of abnormal operation of equipment or (b) in which hazardous concentrations of gases or vapors are normally prevented by positive mechanical ventilation, and which might become hazardous through failure or abnormal operations of the ventilating equipment; or (c) that is adjacent to a Class 1, Division 1 location, and to which hazardous concentrations of gases or vapors might occasionally be communicated unless such communication is prevented by adequate positive-pressure ventilation from a source of clean air, and effective safeguards against ventilation failure are provided.

Class II locations - Class II locations are those that are hazardous because of the presence of combustible dust. Class II locations include the following:

- Class II, Division 1 - A Class II, Division 1 location is a location (a) in which combustible dust is or may be in suspension in the air under normal operating conditions, in quantities sufficient to produce explosive or ignitable mixtures; or (b) where mechanical failure or abnormal operation of machinery or equipment might cause such explosive or ignitable mixtures to be produced, and might also provide a source of ignition through simultaneous failure of electric equipment, operation of protection devices, or from other causes, or (c) in which combustible dusts of an electrically conductive nature may be present.



NOTE: This classification may include areas where metal dusts and powders are produced or processed, and other similar locations that contain dust producing machinery and equipment (except where the equipment is dust-tight or vented to the outside).

- These areas would have combustible dust in the air, under normal operating conditions, in quantities sufficient to produce explosive or ignitable mixtures.
 - Combustible dusts that are electrically nonconductive include dusts produced in the handling and processing produce combustible dusts when processed or handled.
 - Dusts containing magnesium or aluminum are particularly hazardous and the use of extreme caution is necessary to avoid ignition and explosion.
- Class II, Division 2 - A Class II, Division 2 location is a location in which: (a) combustible dust will not normally be in suspension in the air in quantities sufficient to produce explosive or ignitable mixtures, and dust accumulations are normally insufficient to interfere with the normal operation of electrical equipment or other apparatus; or (b) dust may be in suspension in the air as a result of infrequent malfunctioning of handling or processing equipment, and dust accumulations resulting there from may be ignitable by abnormal operation or failure of electrical equipment or other apparatus.

NOTE: This classification includes locations where dangerous concentrations of suspended dust would not be likely but where dust accumulations might form on or in the vicinity of electric equipment. These areas may contain equipment from which appreciable quantities of dust would escape under abnormal operating conditions or be adjacent to a Class II Division 1 location, as described above, into which an explosive or ignitable concentration of dust may be put into suspension under abnormal operating conditions.

Responsibilities

Managers/Supervisor

The HSE Manager will develop electrical safety programs and procedures in accordance with OSHA requirements and/or as indicated by events and circumstances.

Operations Managers and Supervisors are responsible for ensuring that only qualified employees and or qualified contractors perform electrical repairs or installations.

Operations Managers are also responsible for ensuring all applicable electrical safety programs are implemented and maintained at their locations.

Employees are responsible to use electrical equipment, tools, and appliances according to this program, for attending required training sessions when directed to do so and to report unsafe conditions to their supervisor immediately.

Only qualified employees may work on electric circuit parts or equipment that has not been de-energized. Such employees shall be made familiar with the use of special precautionary techniques, PPE, insulating and shielding materials and insulated tools.



Safe Work Practices

Inspections

- Electrical equipment, tools, and appliances must be inspected prior to each use.
- The use of a hard fixed GFCI or a portable GFCI adapter shall be used with all portable hand tools, electric extension cords, drop lights and all 110 volt equipment.
- Faulty equipment, tools, or appliances shall be removed from service immediately and tagged “Out of Service”, dated and signed by the employee applying the tag.

Repairs

- Only Qualified Personnel, who have been authorized by the department supervisor or manager, may make repairs to supply cords on electrical tools and to extension cords.
- The names of employees authorized to make repairs will be posted in the workplace.
- Only certified electricians shall be allowed to make repairs to electrical equipment and wiring systems.
- The supervisor obtaining the services of a certified electrician is responsible to verify the electrician’s credentials.
- Employees shall not enter spaces containing exposed energized parts unless qualified and proper illumination exists to enable employees to work safely.
- Employees shall not wear conductive apparel such as rings, watches, jewelry, etc. (unless they are rendered non-conductive by covering, wrapping, or other insulating means) while working on or near open energized equipment this includes batteries on trucks, forklifts, phone backup systems or other such equipment.
- If employees are subject to handle long dimensional conductor objects (ducts or pipes), steps for safe work practices shall be employed to ensure the safety of workers.

Extension Cords

- Use only three-wire, grounded, extension cords and cables that conform to a hard service rating of 14 amperes or higher, and grounding of the tools or equipment being supplied.
- Only commercial or industrial rated-grounded extension cords may be used in shops and outdoors.
- Cords for use other than indoor appliances must have a rating of at least 14 amps.
- Cords must have suitable strain relief provisions at both the plug the receptacle ends.
- Work lamps (drop light) used to power electrical tools must have a 3 wire, grounded outlet, unless powering insulated tools.
- Adapters that allow three wire, grounded prongs, connected to two wire non-grounded outlets are strictly prohibited.
- Cords must have a service rating for hard or extra-hard service and have S, AJ, ST, SO, SJO, SJT, STO, or SJTO printed on the cord.
- Cords may not be run through doorways, under mats or carpets, across walkways or aisles, concealed behind walls, ceilings or floors, or run through holes in walls, or anywhere where they can become a tripping hazard.
- High current equipment or appliances should be plugged directly into a wall outlet whenever possible.
 - All extension cords shall be plugged into one of the following:
 - A GFCI outlet;
 - A GFCI built into the cord;
 - A GFCI adapter used between the wall outlet and cord plug.
- All extension cords and or electrical cords shall be inspected daily or before each use, for breaks, plug condition and ground lugs, possible internal breaks, and any other damage. If damage is found, the extension cord or electrical cord shall be remove from service and repaired or replaced.



- Extension cords shall not be used on compressor skid to operated heat tapes or any other type of equipment on a temporary basis. Heat tapes or other equipment shall be hard wired per applicable electrical codes.

Outlets

Outlets connected to circuits with different voltages must use a design such that the attachment plugs on the circuits are not interchangeable.

Multiple Outlet Boxes

- Multiple outlet boxes must be plugged into a wall receptacle.
- Multiple outlet boxes must not be used to provide power to microwave ovens, toasters, space heaters, hot plates, coffeepots, or other high-current loads.

Double Insulated Tools

- Double insulated tools must have the factory label intact indicating the tool has been approved to be used without a three wire grounded supply cord connection.
- Double insulated tools must not be altered in any way, which would negate the factory rating.

Switches, Circuit Breakers, and Disconnects

- All electrical equipment and tools must have an on and off switch and may not be turned on or off by plugging or unplugging the supply cord at the power outlet.
- Circuit breaker panel boxes and disconnects must be labelled with the voltage rating.
- Each breaker within a breaker panel must be labelled for the service it provides.
- Disconnect switches providing power for individual equipment must be labelled accordingly.

Ladders

- Only approved, non-conductive ladders, may be used when working near or with electrical equipment, which includes changing light bulbs.
- Ladders must be either constructed of wood, fiberglass, or have non-conductive side rails.
- Wood ladders should not be painted, which can hide defects, except with clear lacquer.
- When using ladders they shall be free from any moisture, oils, and greases.

Energized and Overhead High Voltage Power Lines and Equipment

- A minimum clearance of 10 feet from high voltage lines must be maintained when operating vehicular and mechanical equipment such as forklifts, cranes, winch trucks, and other similar equipment.
- When possible, power lines shall be de-energized and grounded or other protective measures shall be provided before work is started.
- Minimum approach distance to energized high power voltages lines for unqualified employees is 10 feet.
- Minimum approach distance for qualified employees shall be followed per 29 CFR 1910.333(c)(3)(i) Qualified - Table S5 Selection and Use of Work Practices - Approach Distances for Qualified Employees - Alternating Current).



Confined or Enclosed Work Spaces

- When an employee works in a confined or enclosed space that contains exposed energized parts, the employee shall isolate the energy source and turn off the source and lock and tag out the energy source (Only qualified electricians can work on an exposed energy source).
- Protective shields, protective barriers or insulating materials as necessary shall be provided.

Enclosures, Breaker Panels, and Distribution Rooms

- A clear working space must be maintained in the front, back and on each side of all electrical enclosures and around electrical equipment for a safe operation and to permit access for maintenance and alteration.
- A minimum two-foot working floor space in front of panels and enclosures shall be painted yellow.
- Employees may not enter spaces containing exposed energized parts unless illumination is provided that enables the employees to work safely.
- Housekeeping in distribution rooms must receive high priority to provide a safe working and walking area in front of panels and to keep combustible materials to the minimum required to perform maintenance operations.
- All enclosures and distribution rooms must have "Danger: High Voltage – Authorized Personnel Only" posted on the front panel and on entrance doors.
- Flammable materials are strictly prohibited inside distribution rooms (Boxes, rags, cleaning fluids, etc.)

Lock Out/Tag Out

- No work shall be performed on (or near enough to them for employees to be exposed due to the dangers of tools or other equipment coming into contact with the live parts) live parts and the hazards they present.
- If any employee is exposed to contact with parts of fixed electric equipment or circuits which have been de-energized, the circuits energizing the parts shall be locked out or tagged or both.
- Conductors and parts of electrical equipment that have been de-energized but not been locked or tagged out shall be treated as live parts.
- Per VORTEX Companies policy all electrical will be outsourced and performed only by qualified and licensed electrical contractors who are familiar with the use of special precautionary techniques, PPE, insulating and shielding materials and insulated tools. Any equipment being made ready for maintenance will be locked out using VORTEX Companies or client property's Control of Hazardous Energy – Lock Out/Tag Out Program. Lockouts are performed by the HSE Manager, Shop Foreman or Branch Manager. Designated employees in some branches may be trained by local management to lock out equipment. If live sources are to be worked it will only be performed with the knowledge of local management. Only certified electricians may work on electric circuit parts or equipment.
- Only authorized personnel may perform lock out/tag out work on electrical equipment and will follow VORTEX Companies' Control of Hazardous Energy – Lock out/Tag Out Program.
- Authorized personnel will be trained in lock out/tag out procedures.
- Affected personnel will be notified when lock out/tag out activities are being performed in their work area.

Contractors

- Only approved, certified, electrical contractors may perform construction and service work on VORTEX Companies or client property.
- It is the Manager/Supervisors responsibility to verify the contractor's certification.



Fire Extinguishers

- Approved fire extinguishers must be provided near electrical breaker panels and distribution centers.
- Water type extinguishers shall not be located closer than 50 feet from electrical equipment.

Electric Shock-CPR

- If someone is discovered to have received an electric shock and is unconscious, first check to see if their body is in contact with an electrical circuit. Do not touch a person until you are sure there is no contact with an electrical circuit.
- When it is safe to make contact with the victim, begin CPR if the person's heart has stopped or they are not breathing.
- Call for help immediately.

Electric Welders

- A disconnecting means shall be provided in the supply circuit for each motor-generator arc welder, and for each AC transformer and DC rectifier arc welder which is not equipped with a disconnect mounted as an integral part of the welder.
- A switch or circuit breaker shall be provided by which each resistance welder and its control equipment can be isolated from the supply circuit. The ampere rating of this disconnecting means may not be less than the supply conductor capacity.

Equipment Grounding

- All gas compressors, air compressors, separators, vessels, etc. shall be grounded by means of using a lug and ground strap, nominal in size to a 1/2" bolt or larger, attached to a ground rod six feet or longer.
- Equipment bonding jumpers shall be of copper or other corrosion-resistance material.
- The transfer of hazardous or flammable material from a metal or plastic container with a flash point of 100°F or less shall have a ground strap from the container and attached to the skid or a ground rod placed in the ground.

Assured Grounding

OSHA requires that employers shall use either ground fault circuit interrupters (GFCI) or an assured equipment grounding conductor program to protect personnel from electrical shock while working.

VORTEX Companies shall use GFCI's in lieu of an assured grounding program.

Ground Fault Circuit Interrupters

All 120-volt, single-phase 15 and 20 ampere receptacle outlets on construction or maintenance sites, which are not part of the permanent wiring of the building or structure and which are in use by employees, shall have approved ground fault circuit interrupters for personnel protection.

- All hand portable electric tools and extension cords shall use a GFCI.
- Additionally, approved GFCI's shall be used for 240-Volt circuits in the same service as described above.
- GFCI's must be used on all 120 volt, single-phase 15 amp and 20 amp receptacles within 6 feet of a sink, damp areas or on installed outdoor equipment.
- The GFCI must be the first device plugged into a permanent receptacle.
- The GFCI must be tested before each use.



Training

All regular full time and temporary employees will be trained in Electrical Safety utilizing the VORTEX Companies Electrical Safety Training course or an approved equivalent.

Employees who face a risk of electric shock, but who are not qualified persons, shall be trained and familiar with electrically related safety practices.

Employee shall be trained in safety related work practices that pertain to their respective job assignments. Employees shall be trained on clearance distances.

Safe work practices shall be employed to prevent electric shock or other injuries resulting for either direct or indirect electrical contacts when work is performed near or on equipment or circuits, which are or may be energized.



CIVIL INFRASTRUCTURE SOLUTIONS

EMERGENCY ACTION PROCEDURE



Vortex Companies

Procedure Name	Environmental, Health & Safety Manual – Emergency Action Procedure
Applicability	VORTEX Companies – Employees & Subcontractors
Policy Revised	05.14.19

Purpose

The purpose of Vortex Companies LLC’s Emergency Action Plan is to provide guidance and instructions for responding to workplace emergencies, with the primary goal of ensuring employee and visitor safety and protecting property. This Emergency Action Plan applies to all Vortex Companies LLC employees, volunteers, visitors and contractors.

Program Responsibilities

Management

The management of Vortex Companies LLC is committed to the safety of its employees, visitors and contractors. Management supports the efforts of the Program Administrator by pledging financial and leadership support. Management will regularly communicate with employees about the program.

Program Administrator

The Program Administrator reports directly to upper management and is responsible for this plan. All evaluations, controls and training are coordinated under the direction of the Program Administrator in collaboration with management and employees. The Program Administrator will also:

- Identify emergency situations that may affect our organization and determine the appropriate course of action before, during and after those emergencies
- Ensure each department or functional area has a copy of the plan
- Schedule employee training and ensure new hires are properly trained on the plan
- Schedule drills and tabletop exercises
- Activate appropriate emergency procedures when necessary
- Notify and coordinate response actions with local emergency responders
- Periodically review the plan and update as needed
- Direct the shutdown of utilities or specific plant processes as necessary

First Responders

All Vortex Companies LLC first responders will:

- Attend Emergency Action Plan training
- Attend annual first aid/CPR/AED and bloodborne pathogens training
- Follow all Bloodborne Pathogens Program requirements
- Follow emergency procedures and assist in the event of a medical emergency
- Ensure employee medical information obtained during their duties remains confidential A list of first responders can be found in Appendix F.



Regional Coordinators

Vortex Companies LLC Regional coordinators are employees who have volunteered to assist in communicating the Emergency Action Plan to other employees in their immediate region.

Additionally, these employees will communicate the evacuation status of their area to the Program Administrator during drills and actual incidents. Area coordinators will also:

- Attend Emergency Action Plan training
- Assist employees in their area in the safe and orderly evacuation of the building
- Assist employees in their area to the proper shelter-in-place locations
- Understand the alarm systems and emergency equipment
- Review emergency procedures with new employees in their area
- Communicate to the Program Administrator where employees in need of assistance are located
- Know primary and secondary exit routes
- Know the location of hazardous items in their area, such as flammables, radioactive materials, etc. A list of coordinators can be found in Appendix E.

Managers and Supervisors

Managers and supervisors of Vortex Companies LLC will:

- Attend Emergency Action Plan training
- Ensure employees in their area have received training on the Emergency Action Plan
- Maintain an updated list of employees noting those with special assistance needs

Employees

Every Vortex Companies LLC employee is responsible for conducting himself/herself in accordance with this plan. All employees will:

- Attend Emergency Action Plan training
- Follow all procedures in the plan and all alarms or verbal instructions given during an emergency
- Become familiar with evacuation routes, assembly areas and shelter locations
- Respond to all emergencies in an orderly manner

When Working as a Subcontractor

The Vortex Companies LLC is to strictly adhere to the building/facilities/site ownerships' Emergency Action Procedures.

- Site Specific EAP's trump internal company procedures when not working at a Vortex owned facility.

Emergency Reporting

During an emergency, employees who are in a position to safely communicate should call 911 and have another person call the main office at (713) 750-9081.

Alarms

Vortex Companies LLC uses audible alarms, strobes, cellular devices, electronic communications and voice announcements to communicate emergencies to employees. See **Appendix A** for details on all emergency alarms.



Employee Contact Information

Employee emergency contact information is maintained by Human Resources and can be accessed by any HR or senior management officer. This information is confidential and will not be shared with the general employee population or public.

Drills and Tabletop Exercises

Vortex Companies LLC uses drills and tabletop exercises to test our emergency response protocols and communication capabilities, and allow employees to become familiar with the procedures, exit routes and assembly areas.

Drills

Each Vortex Companies LLC location will perform the following drills annually.

- Fire drill – March and September
- Severe weather drill – April
- Lockdown drill – January and July
- Drill of choice from emergency plan - October

Prior to each drill, the Program Administrator will identify personnel to assume command of the drill and post-drill activities. Records of drills will be logged using the form in Appendix D.

During each drill the Program Administrator will identify:

- Gaps or weaknesses in emergency procedures
- Notification and communication system problems
- Opportunities for response speed and coordination improvements
- Problems with roles and responsibilities
- Opportunities for improvements amongst employees

After each drill, management and the Program Administrator will evaluate and document the drill results, noting any particular problems or concerns. They will establish an improvement plan with detailed goals and assign tasks to those affected with clear, specific deadlines.

Tabletop Exercises

The Program Administrator will coordinate tabletop exercises twice a year at each location to test elements of the Emergency Action Plan. The exercise should be determined based on drill results or other observed elements needing improvement. If no improvement opportunities are identified, then use a high-hazard scenario. Vortex Companies LLC will use the FEMA tabletop model.



Employee Training

General Training Requirements

All employees will receive training on the following Emergency Action Plan elements within the first 30 days of employment and annually thereafter:

- Emergency reporting procedures
- Alarms/notices/announcements
- Exits/shelters/assembly locations
- Emergency duties and responsibilities

All training will be recorded on the Employee Training Record Form located in Appendix C.

Periodic Program Review

The Program Administrator will conduct an annual review to assess the plan's effectiveness. The review will consider the following:

- Any newly identified hazards or threats
- Changes in facility processes or layout
- Lessons learned from drills and/or tabletop exercises

The annual review report will be submitted to management using the form in Appendix B.

Record Retention

Vortex Companies LLC will maintain the Emergency Action Plan training records and emergency drill logs for three years. All Emergency Action Plan records will be kept by the Program Administrator.



APPENDIX A - EMPLOYEE EMERGENCY HANDBOOK

This handbook is to be tailored and made specific to each Business Unit, lead by the BU/Regional Leads.
The highlighted area below are to be updated to reflect each location.

EMERGENCY NUMBERS

Fire or Police	911
Emergency Medical Services.....	911
Main Office	713-950-9081
Building Maintenance.....	___-___-___
Poison Control Center	800-222-1222
Gas Company.....	___-___-___
Electric Company.....	___-___-___
Public Works.....	___-___-___

EMERGENCY PERSONNEL

Program Administrator:

Brad Jones.....	832-509-6329
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Regional Coordinators:

South.....	___-___-___
Southeast.....	___-___-___
Northeast.....	___-___-___
Central.....	___-___-___
West.....	___-___-___
North.....	___-___-___



Evacuation Routes/Shelters

Evacuation route maps are posted in each company owned building and area. The maps illustrate:

1. Emergency exits
2. Primary and secondary evacuation routes
3. Locations of fire extinguishers
4. Locations of fire alarm pull stations
5. Assembly areas

All personnel are expected to know at least two evacuation routes and their designated assembly area.

Fire

1. Immediately and calmly evacuate the building in the event of a fire, regardless if an audible alarm sounds or not. Go to the nearest exit. Do not use the elevators. If the fire alarm is not activated, pull the fire alarm on the way out of the building. If the fire alarm doesn't sound or if a pull station is not nearby, communicate that everyone should begin to calmly evacuate the building.
2. Call 911 when safe and provide the dispatcher with the following information:
 - a) Address of the facility
 - b) Your name
 - c) If there are injuries, the size of the fire and other pertinent information
3. Go to your designated assembly area as indicated on the evacuation route/areas of assembly map.
4. Regional coordinators will communicate to the emergency team the evacuation status of the floor or area.
5. Stay where you are. Do not leave your assembly area until your supervisor or Regional coordinator directs you to do so.

Severe Weather

Vortex Companies LLC monitors the weather via a weather radio.

1. When a warning is issued, seek shelter in a designated area.
2. Stay in the designated shelter area until released. The Program Administrator will make the determination to return to work.
3. As more information is learned, additional announcements will be made via electronic communications.

Earthquake

1. In the event of an earthquake stay calm and seek shelter under sturdy furniture, in doorways or outside.
2. Keep away from overhead fixtures, windows, filing cabinets and electrical power sources.
3. Evacuate the building as soon as possible after the earthquake.
4. Go to your designated assembly area as indicated on the evacuation route/areas of assembly map.
5. Regional coordinators will communicate the evacuation status of the floor or area to the emergency team.
6. Stay where you are. Do not leave your assembly area until your supervisor or Regional coordinator instructs you to do so.

Lockdown

If you are in the immediate vicinity of active violence, evacuate or hide out.

- Attempt to evacuate the building if there is a safe, accessible escape path.
- If evacuation is not possible, find a place to hide where the perpetrator is less likely to see or find you.
- Once out of the building or hidden, call 911. Have another person call (713) 750-9081 to alert the building security.



Evacuate

- If you decide to evacuate, do so whether others agree to follow or not
- Leave belongings behind
- Alert others to the danger as you evacuate
- Follow the instructions of any police officers
- Do not attempt to move wounded people

Hide Out

- Get out of sight
- Seek shelter in offices or other areas with doors
- Lock the door if possible, or blockade the door with furniture
- Silence your cell phone and turn off any other noise sources
- Hide behind large items
- Remain quiet until resolution message is announced

Lockdown Announcement

Upon notification of an active violence event in the facilities, security will make a company-wide announcement. Upon resolution of the threat, security will make a company-wide announcement alerting everyone the threat has been resolved.

Interacting with Law Enforcement

Law enforcement's role is to stop the active violence as quickly as possible. Officers will proceed directly to the area in which the perpetrator was last seen, last shots were heard, etc. Officers may shout commands and may push employees to the ground for their safety.

- Follow all officers' instructions
- Put down any items in your hands
- Immediately raise hands and spread fingers
- Keep hands visible at all times
- Avoid making quick movements towards officers



APPENDIX B - ANNUAL PROGRAM EVALUATION REPORT

Date of Evaluation: _____

Evaluated By (list all present): _____

Written Program Reviewed: Yes No

Comments on written program: _____

The following specific procedures have been reviewed: _____

The following specific procedures were modified: _____

The following specific procedures were added: _____

Comments: _____



APPENDIX C - TRAINING RECORD FOR THE EMERGENCY ACTION PLAN

The following individuals received training on the Emergency Action Plan.

Print Name	Sign Name

The undersigned conducted training in accordance with Vortex Companies LLC's Emergency Action Plan.

Print Instructor's Name	
Instructor's Signature	
Instructor's Title	
Date of Training	



APPENDIX D - DRILL SCHEDULE AND LOG

Company Location: _____

Manager: _____

Fire/Evacuation Drills

Practice using secondary evacuation routes once per year.

Date Scheduled	Date Conducted	Weather Conditions	Number Of Participants	Evacuation Time	Comments

Severe Weather Drills

Date Scheduled	Date Conducted	Weather Conditions	Number Of Participants	Shelter Time	Comments

Other Drills

Shelter-in-place, etc.

Date Scheduled	Date Conducted	Weather Conditions	Number Of Participants	Shelter Time	Comments



APPENDIX E - LIST OF REGIONAL COORDINATORS

Name of Employee	Region	Title



APPENDIX F - LIST OF FIRST RESPONDERS

Name of Employee	Region	Supervisor



CIVIL INFRASTRUCTURE SOLUTIONS

ENFORCEMENT



Vortex Companies

Procedure Name	Environmental, Health & Safety Manual – Enforcement
Applicability	VORTEX Companies – Employees & Subcontractors
Policy Revised	05.02.18

Purpose

The purpose of this policy is to ensure the proper enforcement of Vortex Companies safety policies and procedures.

Scope

It is expected that all employees will abide by the safety rules and guidelines that Vortex Companies has in place, not only to protect themselves, but also to protect their fellow workers from harm. If a safety violation occurs, the following steps will be taken by the employee's immediate supervisor.

Minor Safety Violations

Violations which would not reasonably be expected to result in serious injury.

- The hazardous situation will be corrected.
- The employee will be informed of the correct procedures to follow and the supervisor will ensure that these procedures are understood.
- The supervisor will make a written report of the occurrence using the Enforcement Documentation Form and inform the employee that this documentation will be forwarded to Brad Jones, our Safety Director, for a retention period of one year.
- A repeat occurrence of the same minor safety violation is considered substantially more serious than the first.

Major Safety Violations

Violations which would reasonably be expected to result in serious injury or death.

- The hazardous situation will be corrected.
- The employee will be informed of the correct procedures to follow and their supervisor will impress upon the individual the severity of the violation and the likely consequences should this type of violation be repeated.
- The supervisor will ensure that the individual understands the correct procedures and will be cautioned that a reoccurrence could result in disciplinary action up to and including discharge.
- The supervisor will make a written report of the occurrence using the Enforcement Documentation Form and inform the employee that this documentation will be forwarded to Brad Jones for a retention period of one year.

Willful Major Safety Violations

Intentional violation of a safety rule which would reasonably be expected to result in serious injury to the employee or a fellow worker.

- The hazardous situation will be corrected.
- The employee will be removed from the jobsite, the event will be documented and forwarded to Brad Jones, and the employee will be discharged.



Employees are to understand that the primary purpose of documenting safety violations is to ensure that the important business of employee safety is taken seriously and that the potential for injury is reduced to the lowest possible level.

Schedule of Enforcement Actions

Violations occurring within a 1-year period.

Minor Violation

Offense	Action	Repeat of Same Offense	Action
1st	Written Notice	1st	1 Day Off
2nd	Written Notice	2nd	3 Days Off
3rd	1 Day Off	3rd	Dismissal
4th	2 Days Off		
5th	3 Days Off		
6th	Dismissal		

Major Violation

Offense	Action	Repeat of Same Offense	Action
1st	Written Notice	1st	4 Days Off
2nd	3 Days Off	2nd	Dismissal
3rd	Dismissal		

Willful Major Violation

Offense	Action	Repeat of Same Offense	Action
1st	Dismissal	N/A	N/A



EMPLOYEE WRITE UP FORM

EMPLOYEE INFORMATION

Employee Name: _____ Date: _____

Employee ID: _____ Job Title: _____

Manager: _____ Department: _____

TYPE OF WARNING

First Warning

Second Warning

Final Warning

TYPE OF OFFENSES

Tardiness/Leaving Early

Absenteeism

Violation of Company Policies

Substandard Work

Violation of Safety Rules

Rudeness to Customers/Coworkers

Other: _____

DETAILS

Description of Infraction: _____

Plan for Improvement: _____

Consequences of Further Infractions: _____

ACKNOWLEDGMENT OF RECEIPT OF WARNINGS

By signing this form, you confirm that you understand the information in this warning. You also confirm that you and your manager have discussed the warning and a plan for improvement. Signing this form does not necessarily indicate that you agree with this warning.

Employee Signature _____ Date _____

Manager Signature _____ Date _____

Witness Signature _____ Date _____

(if employee understands warning but refuses to sign)



CIVIL INFRASTRUCTURE SOLUTIONS

FALL PROTECTION



Vortex Companies

Procedure Name	Environmental, Health & Safety Manual – Fall Protection
Applicability	VORTEX Companies – Employees & Subcontractors
Policy Revised	10.30.14

Purpose

The purpose of this program is to provide fall protection procedures to prevent injury to employees while performing work assignments at elevated levels.

Any changes to this Fall Protection Program must be approved by the HSE Manager, who is designated as the Qualified Person. This is based on training received in fall protection planning and has demonstrated skills and knowledge in the preparation of fall programs, plans and the hazards involved.

Scope

Applies to all VORTEX Companies employees who have work assignments at work levels that exceed 6 feet in height where guardrails or nets are not utilized. This includes work near and around excavations. Guardrails, safety nets, or personal fall arrest systems shall be used where feasible. When work is performed on a non-owned or operated site, the operator's program shall take precedence, however, this document covers VORTEX Companies employees and shall be used on owned premises, or when an operator's program doesn't exist or is less stringent.

Definitions

Anchorage - A secure point of attachment for lifelines, lanyards or deceleration devices.

Body Belt (Safety Belt) - A strap with means both for securing it about the waist and for attaching it to a lanyard, lifeline, or deceleration device.

Body Harness - Straps which may be secured about the employee in a manner that will distribute the fall arrest forces over at least the thighs, pelvis, waist, chest and shoulders with means for attaching it to other components of a personal fall arrest system.

Buckle - Any device for holding the body belt or body harness closed around the employee's body.

Carabineer - See Snaphook.

Connector - A device which is used to couple (connect) parts of the personal fall arrest system and positioning device systems together. It may be an independent component of the system, such as a carabineer, or it may be an integral component of part of the system (such as a buckle or D-ring sewn into a body belt or body harness, or a snaphook spliced or sewn to a lanyard or self-retracting lanyard).



Deceleration Device - Any mechanism, such as a rope grab, rip-stitch lanyard, specially-woven lanyard, tearing or deforming lanyards, automatic self-retracting lifelines/lanyards, etc., which serves to dissipate a substantial amount of energy during a fall arrest, or otherwise limit the energy imposed on an employee during fall arrest.

Deceleration Distance - The additional vertical distance a falling employee travels, excluding lifeline elongation as the distance between the location of an employee's body belt or body harness attachment point at the moment of activation (at the onset of fall arrest forces) of the deceleration device during a fall, and the location of that attachment point after the employee comes to a full stop.

Equivalent - Alternative designs, materials, or methods to protect against a hazard which the employer can demonstrate will provide an equal or greater degree of safety for employees than the methods, materials or designs specified in the standard.

Failure - Load refusal, breakage, or separation of component parts. Load refusal is the point where the ultimate strength is exceeded.

Free Fall - The act of falling before a personal fall arrest system begins to apply force to arrest the fall.

Free Fall Distance - The vertical displacement of the fall arrest attachment point on the employee's body belt or body harness between onset of the fall and just before the system begins to apply force to arrest the fall. This distance excludes deceleration distance, and lifeline/lanyard elongation, but includes any deceleration device slide distance or self-retracting lifeline/lanyard extension before they operate and fall arrest forces occur.

Guardrail System - A barrier erected to prevent employees from falling to lower levels.

Infeasible - It is impossible to perform the inspection work using a conventional fall protection system (i.e., guardrail system, safety net system, or personal fall arrest system) or that it is technologically impossible to use any one of these systems to provide fall protection.

Lanyard - A flexible line of rope, wire rope, or strap which generally has a connector at each end for connecting the body belt or body harness to a deceleration device, lifeline, or anchorage.

Leading Edge - The edge of a floor, roof, or formwork for a floor or other walking/working surface (such as the deck) which changes location as additional floor, roof, decking, or formwork sections are placed, formed, or constructed. A leading edge is considered to be an "unprotected side and edge" during periods when it is not actively and continuously under construction.

Lifeline - A component consisting of a flexible line for connection to an anchorage at one end to hang vertically (vertical lifeline), or for connection to anchorages at both ends to stretch horizontally (horizontal lifeline), and which serves as a means for connecting other components of a personal fall arrest system to the anchorage.

Lower Levels - Those areas or surfaces to which an employee can fall. Such areas or surfaces include, but are not limited to, ground levels, floors, platforms, ramps, runways, excavations, pits, tanks, material, water, equipment, structures, or portions thereof.



Personal Fall Arrest System - A system used to arrest an employee in a fall from a working level. It consists of an anchorage, connectors, a body belt or body harness and may include a lanyard, deceleration device, lifeline, or suitable combinations of these.

Positioning Device System - A body belt or body harness system rigged to allow an employee to be supported on an elevated vertical surface, such as a wall, and work with both hands free while leaning.

Rope Grab - A deceleration device which travels on a lifeline and automatically, by friction, engages the lifeline and locks so as to arrest the fall of an employee. A rope grab usually employs the principle of inertial locking, cam/level locking, or both.

Safety Nets - Safety nets shall be provided when workplaces are higher than 25 feet above ground or water surfaces or other surfaces where the use of ladders, scaffolds, catch platforms, temporary floors, safety lines or safety belts are impractical.

- Nets shall extend 8 feet beyond the edge of the work surface where employees are exposed and shall be installed as close under the work surface as practical but in no case more than 25 feet below the work surface. Nets shall be positioned in a manner to prevent the user from coming into contact with below surfaces or structures. Proper clearance positioning of nets shall be determined by impact load testing. Work procedures shall not begin until nets are in place and have been properly tested.
- New nets shall meet accepted performance standards of 17,500 foot pounds minimum impact resistance as determined and certified by the manufacturers and shall bear a label of proof test. Edge ropes shall provide a minimum breaking strength of 5000 pounds.

Self-Retracting Lifeline/Lanyard - A deceleration device containing a drum-wound line which can be slowly extracted from, or retracted onto, the drum under slight tension during normal employee movement, and which, after onset of a fall, automatically locks the drum and arrests the fall.

Snaphook - A connector comprised of a hook-shaped member with a normally closed keeper, or similar arrangement, which may be opened to permit the hook to receive an object and, when released, automatically closes to retain the object. Snaphooks are generally one of two types: (1) The locking type with a self-closing, self-locking keeper which remains closed and locked until unlocked and pressed open for connection or disconnection; or (2) The non-locking type with a self-closing keeper which remains closed until pressed open for connection or disconnection. As of January 1, 1998, the use of a non-locking snaphook as part of personal fall arrest systems and positioning device systems is prohibited.

Unprotected Sides and Edges - Any side or edge (except at entrances to points of access) of a walking/working surface, e.g., floor, roof, ramp, or runway where there is no wall or guardrail system at least 39 inches (1.0 m) high.

Walking/Working Surface - 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 located in order to perform their job duties.

Work Area - That portion of a walking/working surface where job duties are being performed.



DRAWINGS OF COMPONENTS



Figure A

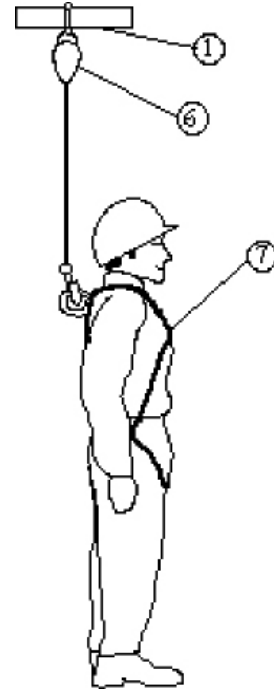


Figure B

1. Tie-off Point
2. Lifeline
3. Rope Grab
4. Shock Absorbing Lanyard
5. Cross-Arm Strap
6. Retractable Lifeline
7. Full-Body Harness
8. Restraining Belt
9. Restraining Lanyard
10. Carabineer

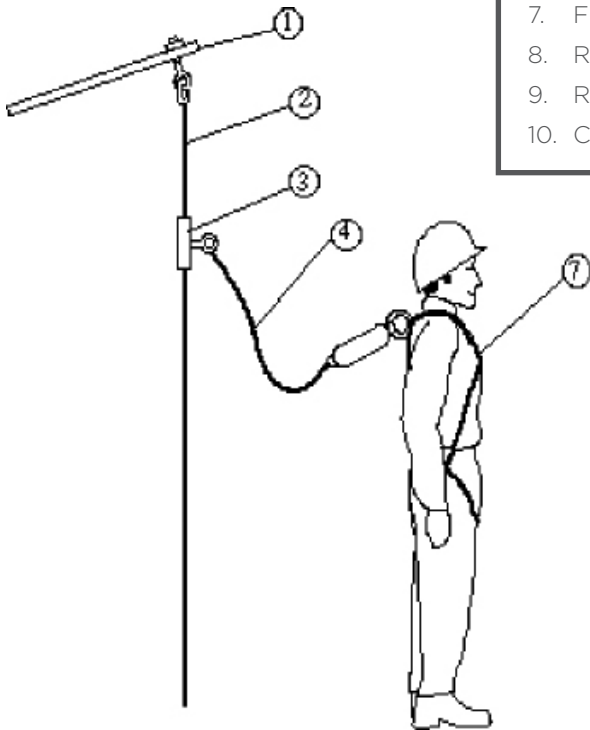


Figure C

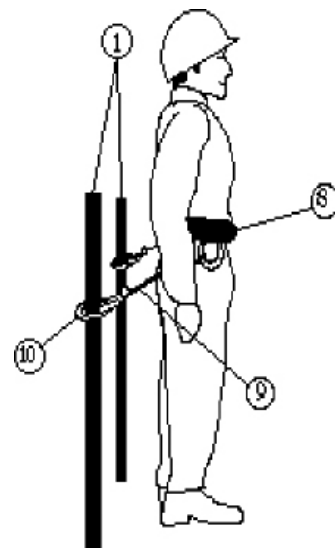


Figure D



Responsibilities

Operations Manager

It is the responsibility of the local operations manager (designated competent person) to implement this Fall Protection Program. Continual observational safety checks of work operations and the enforcement of the safety policy and procedures shall be regularly enforced. All jobs shall be pre-planned prior to the start of work.

Supervisor

The Supervisor shall ensure that all persons assigned to work at elevated levels, exceeding 6 feet in height or more above lower level and where guardrails or nets are not utilized, be protected by personal fall protection equipment.

- Supervisors shall make exposure determinations and shall discuss with their employees the extent to which scaffolds, ladders or vehicle mounted work platforms can be used.
- Ensure that fall protection equipment is available and in safe working condition.
- Provide for emergency rescue in the event of a fall. Pre-plan the job to ensure that employees have been properly trained in the use, limitations, inspections and rescue procedures and that training records are on file.

Employees

Employees shall ensure they have and use the fall protection equipment as required by this program and:

- Understand the potential hazards of working at elevated levels as well as gaining access to and from the work location.
- Understand the use and limitations of such equipment.
- Pre-plan the job with his/her supervisor to agree that the job can be done safely. Inspect such equipment before each use and to report defective equipment immediately to their supervisor.

Procedure

Fall protection is required whenever employees are potentially exposed to falls from heights of six feet or greater to lower levels. This includes work near and around excavations. Use of guard rails, safety net, or personal fall arrest systems should be used when the standard methods of protection are not feasible or a greater hazard would be created.

When purchasing equipment and raw materials for use in fall protection systems applicable ANSI, ASTM or OSHA approved equipment shall be used.

Minimum Standards

The following are minimum standards for VORTEX Companies employee personal fall protection systems:

- Connectors shall be drop forged, pressed or formed steel, or made of equivalent materials.
- Connectors shall have a corrosion-resistant finish, and all surfaces and edges shall be smooth to prevent damage to interfacing parts of the system.
- D-rings and snap hooks shall have a minimum tensile strength of 5,000 pounds.
- D-rings and snap hooks shall be proof-tested to a minimum tensile load of 3,600 pounds without cracking, breaking, or taking permanent deformation.
- Snap hooks shall be sized to be compatible with the member to which they are connected to prevent unintentional disengagement of the snap hook. Only a locking type snap hook designed and used to prevent disengagement of the snap hook by the contact of the snap hook keeper by the connected member shall be used.
- Horizontal lifelines shall be designed, installed, and used, under the supervision of a qualified person, as part of a complete personal fall arrest system, which maintains a safety factor of at least two.



- Lanyards and vertical lifelines shall have a minimum breaking strength of 5,000 pounds. Where vertical lifelines are used, each employee shall be attached to a separate lifeline.
- Lifelines shall be protected against being cut or abraded.
- Self-retracting lifelines and lanyards which automatically limit free fall distance to 2 feet or less shall be capable of sustaining a minimum tensile load of 3,000 pounds applied to the device with the lifeline or lanyard in the fully extended position.
- Self-retracting lifelines and lanyards which do not limit free fall distance to 2 feet or less, rip stitch lanyards, and tearing and deforming lanyards shall be capable of sustaining a minimum tensile load of 5,000 pounds applied to the device with the lifeline or lanyard in the fully extended position.
- Anchorages used for attachment of personal fall arrest equipment shall be independent of any anchorage being used to support or suspend platforms and capable of supporting at least 5,000 pounds per employee attached, or shall be designed, installed, and used as part of a complete personal fall arrest system which maintains a safety factor of at least two and under the supervision of a qualified person.
- Systems used by an employee having a combined person and tool weight in excess of the weight rating, shall be modified to provide proper protection for such heavier loads.
- The attachment point of the body harness shall be located in the center of the wearer's back near shoulder level, or above the wearer's head, except when climbing.
- Body harnesses and components shall be used only for employee protection and not to hoist materials.
- Personal fall arrest systems and components subjected to impact loading shall be immediately removed from service and shall not be used again for employee protection until inspected and determined by a competent person to be undamaged and suitable for reuse.
- Provide for prompt rescue of employees in the event of a fall or assure that employees are able to rescue themselves.
- Personal fall arrest systems shall be inspected prior to each use for wear, damage and other deterioration, and defective components shall be removed from service.
- Personal fall arrest systems shall not be attached to guardrail systems, nor shall they be attached to hoists unless prior approval is obtained from a competent person.
- If and when a personal fall arrest system is used at hoist areas, it shall be rigged to allow the movement of the employee only as far as the edge of the walking/working surface.

Stopping a Fall

The arresting force on an employee stopped by a fall shall be limited to a maximum arresting force of 1,800 pounds when wearing a body harness.

The fall arrest system shall be rigged such that an employee can neither free fall more than 6 feet, nor contact any lower level.

The fall arrest system shall bring an employee to a complete stop and limit maximum deceleration distance an employee travels to 3.5 feet.

The fall arrest system shall have sufficient strength to withstand twice the potential impact energy of an employee free falling a distance of 6 feet, or the free fall distance permitted by the system, whichever is less.



Protection From Falling Objects

When employees are required to work in the near vicinity of others working with materials, tools, or equipment at elevated levels, Barricades around the immediate area of the overhead work shall be erected to prohibit employees from entering the barricaded area.

Employees performing work at elevated levels shall keep tools, materials, and equipment away from the edge to keep potential objects from falling over the side. Where practical, tools, etc. shall be secured with rope, wire, etc. to keep them from falling.

Portable Ladders

Three point climbing is required while ascending/descending ladders. While on ladders, both hands and one foot, or both feet and one hand shall always be in contact with the ladder.

Tools required to perform a task shall be transported by a mechanical carrier such as a tag line, suspended bucket or tool belt.

- Tools shall not be carried by hand while climbing.
- Hands must be free to grip the ladder.
- Tools shall not be carried in clothing pockets.
- Tools shall be pulled up to the jobsite only after reaching the area of work.

When work is to be performed from straight/extension ladders, fall protection shall be utilized when heights exceed 6 feet.

Straight ladders shall be tied off at the top to prevent them from moving. A second person shall steady the ladder at the base while it is being tied off at the top by another employee. Do not tie off fall protection equipment to the ladder.

Storage

A dedicated storage area shall be provided for the storage of fall protection equipment and all components. The storage area shall keep the equipment clean, dry, and free from oils, chemicals, paints, and excessive heat.

Inspections

Fall protection equipment shall be inspected before each use for wear, damage, other deterioration, or other defects.

Elevated Personnel Platforms

Work performed, regardless of the nature of the work, from personnel platforms raised by forklifts, cranes, scissor lifts, etc., shall require the use of a full body harness and shall be connected to the platform.

Rescue

Prompt rescue of employees shall be provided in the event of a fall or shall assure the employees are able to rescue themselves. The pre-planning stage prior to the beginning of each elevated work assignment shall be evaluated by the supervisor to provide rescue of employees involved in a fall.



Fall Protection Plan

This option is available only to employees engaged in leading edge work who can demonstrate that it is infeasible or it creates a greater hazard to use conventional fall protection equipment. The fall protection plan shall conform to the following provisions:

- The fall protection plan shall be prepared by a qualified supervisor and developed specifically for the site where the leading edge work is being performed.
- The fall protection plan shall document the reasons why the use of conventional fall protection systems (guardrail systems, personal fall arrest systems, or safety net systems) are infeasible or why their use would create a greater hazard.
- The fall protection plan shall identify each location where conventional fall protection methods cannot be used.
- These locations shall then be classified as controlled access zones.

Controlled Access Zones

When used to control access to areas where leading edge or other operations are taking place the controlled access zone shall be defined by a control line or by any other means that restricts access.

When control lines are used, they shall be erected not less than 6 feet (1.8 m) nor more than 25 feet (7.7 m) from the unprotected or leading edge.

The control line shall extend along the entire length of the unprotected or leading edge and shall be approximately parallel to the unprotected or leading edge.

The control line shall be connected on each side to a guardrail system or wall.

- Control lines shall consist of ropes, wires, tapes, or equivalent materials.
- Each line shall be flagged or otherwise clearly marked at not more than 6-foot (1.8 m) intervals with high-visibility material.
- Each line shall be rigged and supported in such a way that its lowest point (including sag) is not less than 39 inches (1 m) from the walking/working surface and its highest point is not more than 45 inches (1.3 m).
- Each line shall have a minimum breaking strength of 200 pounds. Only employees engaged in the related work shall be permitted in the controlled access zone.

Safety Monitoring System

When the use of conventional fall protection equipment is deemed infeasible or the use of this equipment creates a greater hazard, a Fall Protection Plan which includes a safety monitoring system shall be implemented by the supervisor.

Supervisors shall designate a competent person to monitor the safety of other employees. The competent person shall be assigned to:

- Recognize fall hazards.
- Warn employees if they are unaware of fall hazard or are acting in an unsafe manner.
- Be on the same working surface and in visual contact of working employees.
- Stay close enough for verbal communication; and
- Not have other assignments that would take his/her attention from the monitoring function.



Incident Investigations

All incidents and near misses must be investigated according to VORTEX Companies' incident investigation procedure. Changes to the fall protection program shall be implemented if deemed appropriate from incident corrective actions.

Training

Employees who may be exposed to fall hazards shall be trained to recognize the hazards of falling and understand the procedures to be followed in order to minimize these hazards.

The employee will be trained in the use and operation of fall arrest systems, inspections, and maintenance procedures. Training must be conducted initially and refresher training conducted annually or as needed due to deficiencies in training, changes in the workplace, changes in fall protection systems or procedures that render previous training obsolete or inadequacies in an employee's understanding of previous training.

Training must be documented in writing. Training records shall include:

- Who was trained.
- When and dates of training.
- Signature of person providing training.
- Date training was deemed adequate.

Training records shall be retained in the corporate office.



CIVIL INFRASTRUCTURE SOLUTIONS

FIRE PROTECTION / EXTINGUISHERS



Vortex Companies

Procedure Name	Environmental, Health & Safety Manual – Fire Protection/Extinguishers
Applicability	VORTEX Companies – Employees & Subcontractors
Policy Revised	07.08.14

Purpose

The purpose of this program is to provide fire extinguisher procedures to ensure equipment is operable and employees have the knowledge to safely operate in case of a fire incident.

Scope

Applies to all VORTEX Companies employees and all VORTEX Companies locations.

Responsibilities

The Safety Manager is responsible for developing procedures for the use and care of fire extinguishers and for developing a training program for the proper use of these devices. The Manager is responsible for implementing fire extinguisher training at his location. The shop foremen are responsible for enforcing the provisions of this section of the safety manual. All employees are responsible for following these provisions.

Procedure

Selection and Distribution

Portable fire extinguishers shall be provided for employee use and selected and distributed based on the classes of anticipated workplace fires and on the size and degree of the hazard which would affect their use. Fire extinguishers used by this company are for four classes of fires:

- Class A Fire Extinguishers. Use on ordinary combustibles or fibrous material, such as wood, paper, cloth, rubber and some plastics. Travel distance for employees to any extinguisher is 75 feet (22.9 m) or less.
- Class B Fire Extinguishers. Use on flammable or combustible liquids such as gasoline, kerosene, paint, paint thinners and propane. Travel distance from the Class B hazard area to any extinguisher is 50 feet (15.2 m) or less.
- Class C Fire Extinguishers. Use on energized electrical equipment, such as appliances, switches, panel boxes and power tools. Travel distance from the Class C hazard area to any extinguishing agent is 50 feet (15.2 m) or less.
- Class D Fire Extinguishers. Use on combustible metals, such as magnesium, titanium, potassium and sodium. Travel distance from the combustible metal working area to any extinguishing agent is 75 feet (22.9 m) or less.

Labelling of Fire Extinguishers

Fire extinguishers are to be mounted in easily accessible locations that are indicated by a sign that reads “Fire Extinguisher”. Fire extinguishers are to be located so that no employee will ever be more than 75 feet from an extinguisher. No equipment, boxes or product may be placed (even temporarily) in the way of a fire extinguisher. Each fire extinguisher will be assigned a unique number.



Maintenance

All fire extinguishers shall be mounted no higher and no lower than four (4) feet from the floor. All fire extinguishers shall be maintained as follows:

- Numbered to identify their proper location.
- Fully charged and in operable condition.
- Clean and free of defects.
- Readily accessible at all times.

Inspection, Maintenance and Testing

All fire extinguishers are to be visually inspected by VORTEX Companies employees monthly. All fire extinguishers are to receive an annual maintenance check by certified personnel from a fire extinguisher dealer. Fire extinguishers are to be inspected and re-issued by certified personnel after any use.

Any fire extinguisher that shows a loss of pressure during the monthly inspection will be inspected and re-charged by certified personnel. Completed fire extinguisher inspection logs will be maintained in the safety files and become a part of the safety records. They are to be maintained for 5 years.

Use

In the event of a fire, one employee will get the nearest fire extinguisher and use it to attempt to put the fire out. All other employees in the immediate area will prepare to evacuate if needed. All other employees in the building need to be advised that a fire is in progress.

The employee attempting to extinguish the fire will break the safety seal on the handle and pull the pin. He will then aim his extinguisher at the base of the fire and discharge it with a sweeping motion from side to side, continuing until the fire is out or the extinguisher is emptied.

Remember that a standard fire extinguisher will be emptied in about 10 to 15 seconds. If the fire is not out when the extinguisher has been completely discharged, the employees must evacuate the area.

Training and Education

The purpose of this section is to establish training procedures which are necessary for the proper use and understanding of a fire extinguisher and incipient stage fire fighting. Training will occur prior to initial assignment and at least annually thereafter.

Training will be conducted by the Safety Manager and will include a demonstration of the use of a fire extinguisher, without actually discharging the unit.

New employees will be given the odd number year training upon hire.



Initial Training Outline

- General principles of a fire.
- Hazards employed with an incipient stage fire(s).
- When to “back off” (evacuate) of an incipient stage fire(s).
- General fire principles of a fire extinguisher.
- Hazards employed with the use a fire extinguisher.
- Use of a fire extinguisher.

Retraining

Retraining shall reestablish employee proficiency and introduce new or revised control methods and procedures, as necessary. Retraining shall be provided for all authorized and affected employees whenever there is:

- An annual basis or
- A change in job assignment or
- VORTEX Companies has reason to believe that there are deviations from or inadequacies in the employee’s knowledge or use of fire extinguishers or fire prevention procedures.

Training Documentation

- All training will be documented and each employee’s understanding will be subject to a “hands-on” test.
- Documentation will consist of; as a minimum, the employee’s name, the trainer’s name, the date of the training, and an outline of training provided.



CIVIL INFRASTRUCTURE SOLUTIONS

FIRST
AID



Vortex Companies

Procedure Name	Environmental, Health & Safety Manual – First Aid & CPR Program
Applicability	VORTEX Companies – Employees & Subcontractors
Policy Revised	04.11.14

Purpose

The purpose of this program is to establish the minimum first aid supplies, equipment and actions to properly respond to injuries.

Scope

This program is applicable to all VORTEX Companies employees while engaged in work at VORTEX Companies facilities and/or facilities operated by others.

Responsibilities

- It is the responsibility of the site manager to ensure that first aid kits are provided and maintained.
- All employees are responsible for using first aid materials in a safe and responsible manner.
- The HSE Manager is responsible for corresponding with the Red Cross or an equivalent to keep employee training levels current.

Requirements:

Planning

The site manager will:

- Ensure that a minimum of one employee, with a valid certificate, shall be present to render first aid at all times work is being performed if medical assistance is not available within 3-4 minutes.
- Ensure that provisions shall have been made prior to commencement of a project for prompt medical attention, including transportation, in case of serious injury.
- Ensure adequate first aid supplies and equipment are easily accessible when required.
- Ensure that in areas where 911 is not available, the telephone numbers of the physicians, hospitals, or ambulances to be used shall be conspicuously posted.

Medical Response

All minor first aid is to be self rendered. Because of the risks presented by certain bloodborne pathogens, no one is allowed to tend the minor injuries of another.

In the absence of medical assistance within 3 to 4 minutes of a VORTEX Companies worksite there shall be a person who has a valid certificate in first aid training from the American Red Cross or equivalent and able to render emergency first aid. Employees authorized to render first aid will always observe universal precautions. (Universal Precautions means that the aid giver treats all bodily fluids as if they were contaminated).



If 911 is not available refer to the list of posted phone numbers for prearranged medical response providers. All VORTEX Companies authorized first responders shall have a cell phone as a means of communications, otherwise hand held radios or telephones shall be used as a means of communication.

Supplies and Equipment

First aid supplies shall be provided in easily accessed and posted locations. Always follow the manufacturer's instructions when using the materials in the first aid kit.

All VORTEX Companies first aid kits contain appropriate items determined to be adequate for the environment in which they are used and are stored in a weather proof container with individual contents sealed from the manufacturer for each type of item.

VORTEX Companies is responsible to ensure the availability of adequate first aid supplies and to periodically reassess the demand for supplies and to adjust its inventories. First Aid kits are to be inspected:

- On the first working day of each week to verify that they are fully stocked and that no expiration dates have been exceeded, and
- Before being sent out to each job, and
- Replace any items that have exceeded their expiration dates or that have been depleted.

Where the eyes or body of any person may be exposed to injurious corrosive materials, a safety shower and/or eye wash (suitable facilities) or other suitable facilities shall be provided within the work area. Ensure expiration dates are checked and water used in storage devices is sanitized.

An assessment of the material or materials used shall be performed to determine the type flushing/drenching equipment required. At client jobsites, portable or temporary stations must be established prior to the use of corrosive materials.

Transportation

Based on the first responder's assessment of the injuries involved, decide whether the injured requires to be taken directly to a hospital's emergency room, occupational medicine provider or administer first aid on location.

Examples of serious injuries that result in the injured being transported to a medical provider are those resulting in severe blood loss, possible permanent disfigurement, head trauma, spinal injuries, internal injuries and loss of consciousness. Keep in mind that the needs and well being of the injured are the first priority.

Proper equipment for prompt transportation of the injured person to a physician or hospital or a communication system for contacting necessary ambulance service shall be provided.

Choices to consider include: private automobile, company vehicle, helicopter, crew boat, EMS vehicles including medivac helicopters, or any other transportation that can provide safe transportation to the hospital or doctors office in order to provide medical attention to the injured in the quickest manner without any additional complications or injuries to the injured employee.



Transportation needs must be preplanned and coordinated with the transportation provider prior to an incident requiring such service.

Training

Volunteers or selected employees are trained by the American Red Cross in CPR and first aid. Each of these trained and certified employees are equipped with protective gloves and other required paraphernalia. CPR training must be re-certified annually and first aid training must be re-certified every three years.



CIVIL INFRASTRUCTURE SOLUTIONS

FITNESS
FOR DUTY



Vortex Companies

Procedure Name	Environmental, Health & Safety Manual – Fitness for Duty
Applicability	VORTEX Companies – All Owned Companies and Employees
Policy Revised	02.03.20

Purpose

VORTEX Companies is committed to promoting a safe and healthy environment for its employees, students, patients and visitors. Such an environment is possible only when each employee is able to perform his or her job duties in a safe, secure, and effective manner, and remains able to do so throughout the entire time they are working. Employees who are not fit for duty may present a safety risk to themselves and to others. This policy outlines the responsible parties and necessary actions when an employee's fitness for duty is in question, the steps necessary to assess the employee's physical or mental capabilities, necessary follow-up, and return to work.

Scope

This policy covers only those situations in which an employee is (1) having observable difficulty performing his/her duties in an effective manner that is safe for the employee and/or for his or her co-workers, or (2) posing a serious safety threat to self or others. The policy prescribes the circumstances under which an employee may be referred to an independent, licensed health care evaluator for a fitness for duty evaluation should either of those situations be present.

An employee shall not be allowed to work unless he/she maintains a fitness for duty required for the safe performance of essential job functions, with or without reasonable accommodation. Each employee is required to report to work in an emotional, mental and physical condition (including free of the effects of alcohol and drugs) necessary to perform his or her job in a safe and satisfactory manner.

This policy does not apply to employees with short term, infectious/communicable diseases (e.g., flu, colds). If an employee exhibits symptoms of an infectious/communicable disease, the supervisor may ask the employee to leave the workplace in order to have his/her symptoms evaluated by the employee's own health care provider or by the COMPANY'S occupational medicine provider.

A fitness for duty evaluation is designed to address behavioral changes in an employee that may pose a potential threat to self or others in the workplace. Application of this policy is not intended as a substitute for VORTEX Companies policies or procedures related to chronic performance or behavioral problems or as a substitute for discipline. Supervisors shall continue to address performance or behavioral problems through the performance appraisal process and to implement appropriate corrective or disciplinary action.



The VORTEX Companies is required to comply with federal disability law (primarily the Americans with Disabilities Act of 1990 [ADA]). In general, the ADA prohibits: (1) employers from requiring an employee to submit to a medical examination; and (2) employer inquiries into whether an individual has a disability. However, the protections afforded to employees by the ADA are not without limits. Federal law permits the VORTEX Companies to require a medical examination of an employee if the requirement for the examination is job-related, consistent with business necessity, and if the COMPANY has a reasonable belief that:

1. The employee's ability to perform essential job functions may be impaired by a medical condition; or
2. An employee may pose a direct threat (i.e., significant risk of substantial harm to the health and safety of self or others) due to a medical condition.

Fitness for Duty Requirements

An employee is expected to perform essential job functions in a safe and effective manner, and to discuss with his/her supervisor any circumstances that may impact his/her ability to do so. The VORTEX Companies may require professional evaluation of an employee's physical, emotional or mental capacities to determine his or her ability to perform essential job functions. Such evaluations are conducted by an independent, licensed health care professional and are undertaken only after review by the coordinating team. Fitness for duty evaluations will include drug and alcohol screenings. FFD evaluations may be requested, but are not limited to, within the following scenarios:

- Pre-employment
- Post-accident as applicable by state laws
- For-Cause
- Random

The employee's department is responsible for paying the cost of an evaluation(s). To the extent allowed by law, the VORTEX Companies shall protect the confidentiality of the evaluation and the results.

Employees who have the responsibility for on-call shifts must meet the fitness for duty standard during the entire on-call period.

Non-compliance with a request for a fitness for duty evaluation shall be cause for disciplinary action.

The employee's satisfactory work performance is the basis for continued employment. Participation in a treatment or rehabilitation program does not guarantee continued employment and may not necessarily prevent disciplinary action for violation of VORTEX Companies policies. An employee must comply with all treatment recommendations resulting from a fitness for duty evaluation to be allowed to return to work. A salaried employee referred for an evaluation will be prohibited from appearing for work pending the completion of the evaluation and approval for return to work. During this time, applicable leave policies shall apply. A wage employee (including a temporary employee) referred for an evaluation will be prohibited from working or appearing for work until an evaluation is completed and the employee has been approved to return to work (compensation during this time shall be discontinued).



Coordinating Team

Before initiating an evaluation, the coordinating team shall consult with the employee's supervisor to gain a clear understanding of the behavior/circumstances that have raised questions about the employee's fitness for duty. A member of the coordinating team shall also notify the employee of the opportunity to provide any relevant previous medical or psychological treatment information. The coordinating team shall determine the appropriateness of fitness for duty testing within a reasonable time after notification from the supervisor, usually within three business days.

While the employee is prohibited from appearing for work until completion of the FFD evaluation and approval to return to work is provided, the coordinating team shall use its discretion to determine whether to allow the employee to work off-site or to represent the VORTEX Companies in any work-related capacity.

Results of the Evaluation

The results of FFD evaluations performed by qualified, licensed health care professionals shall be presumed to be valid. Results of the evaluation will be received by VORTEX Companies as appropriate. The employee shall be notified of the results of the FFD by the evaluator and/or VORTEX Companies. Only necessary information shall be shared with the coordinating team. A member of the coordinating team will communicate whether the employee may return to work to the employee's supervisor and the respective dean or vice president.

After an evaluation, information given to the employee's supervisor and respective dean or vice president shall be limited to whether the employee may:

- return to full duty;
- not return to full duty, in which case the employee will be referred to Human Resources for a benefits discussion; or
- return to full duty with reasonable accommodations to meet the evaluator's recommendations.

Return to Work

In conjunction with the employee's supervisor, the coordinating team shall discuss whether any reasonable and necessary accommodations need to be made. Continued employment shall be contingent upon compliance with recommendations provided by the evaluator, such as periodic testing, participation in professional counseling and treatment programs. During this time, applicable leave policies and health plan benefits shall apply. In consultation with the coordinating team, the supervisor and employee should engage in an interactive process to determine if any reasonable accommodations (e.g., re-assignment of duties for a specific period of time, a flexible work schedule) should be implemented. Failure to comply with the recommendations or agreed upon accommodations may result in disciplinary action up to and including possible termination from employment.

Confidentiality/Privacy of Fitness for Duty Evaluations

Under the Health Insurance Portability and Accountability Act (HIPAA), any document containing medical information about an employee is considered a medical record and is regarded as confidential. Records of fitness for duty evaluations shall be treated as confidential medical records and maintained by VORTEX Companies as appropriate. This information may be shared only on a "need to know" basis. Employees may obtain a copy of the medical report from VORTEX Companies upon written request.



Responsibilities

An *employee* is responsible for:

- Performing his/her job responsibilities in a safe and effective manner, with or without reasonable accommodations during the entire time at work;
- Notifying the supervisor when taking prescription or over-the-counter medication that could impair his/her ability to work safely;
- Notifying the supervisor when not fit for duty;
- Notifying the supervisor when a coworker is observed acting in a manner that indicates the coworker may not be fit for duty;
- Informing the upper level manager or calling the VORTEX Companies Human Resources for further guidance, if the supervisor's behavior is the focus of concern.
- Providing relevant medical and psychological information when given the opportunity to do so; and
- Complying with this policy and any authorized request to submit to an evaluation.

A *supervisor* is responsible for:

- Observing the attendance, performance, and behavior of the employees under his/her supervision;
- Notifying VORTEX Companies Human Resources or their local HR between the hours of 8 a.m. and 5:00 p.m. when an employee is exhibiting behavior that suggests he/she may not be fit for duty;
- Following this policy's procedures for completing an initial observation report when presented with circumstances or knowledge that indicate that an employee may not be fit for duty;
- Removing and escorting an employee deemed not fit for duty from the worksite unless he/she poses an immediate safety threat in which case the supervisor should call 911;
 - Arranging transportation for the employee from the work site if necessary;
- Maintaining the confidentiality of an employee's medical information; and
- Implementing any reasonable accommodation deemed necessary.

The *Coordinating Team, or a member of,* is responsible for:

- Soliciting information from the supervisor regarding employee behaviors or performance, and from the employee regarding any relevant previous medical or psychological treatment information;
- Identifying who will conduct the fitness for duty evaluation;
- Receiving the results of the fitness for duty evaluation;
- Communicating the results to the employee if not done so by the evaluator;
- Maintaining confidentiality except as detailed in the Confidentiality/Privacy section above;
- Coordinating payment by the employee's department for the fitness for duty evaluation;
- Implementing any recommendations proposed by the FFD evaluation;
- Discussing recommendations and subsequent accommodations with the supervisor; and
- Communicating with the employee as to their rights, responsibilities and employment status.

The *employee's department* is responsible for:

- Paying the costs associated with a recommended fitness for duty evaluation.



CIVIL INFRASTRUCTURE SOLUTIONS

GENERAL WASTE MANAGEMENT



Vortex Companies

Procedure Name	Environmental, Health & Safety Manual – General Waste Management
Applicability	VORTEX Companies – Employees & Subcontractors
Policy Revised	07.14.14

Purpose

The purpose of this waste management strategy was developed to provide guidance and requirements necessary for efficient, effective and compliant waste management during construction and operations.

Scope

This procedure applies to all VORTEX Companies employees. When work is performed on a non-owned or operated site, the operator’s program shall take precedence, however, this document covers VORTEX Companies employees and contractors and shall be used on owned premises, or when an operator’s program doesn’t exist or is less stringent.

Procedure

The VORTEX Companies Safety Manager or other designated person in his or her absence is assigned the responsibility for proper waste or scrap materials.

Waste Estimation

Each work site will estimate the waste that will be generated prior to work being performed so the need for containers and waste removal, if necessary, can be determined.

Each site will utilize the following for planning of dumpster scheduling and total non-hazardous dry waste material. These figures do not include neither recycling nor waste minimization efforts and reflect no use of an incinerator. Dumpster figures are based on a 40 yard container and can be modified if another size is used by changing the table below.



Sample Only - Solid Waste

NUMBER OF EMPLOYEES	10	25	35	50	100
Total Estimated Square Feet of Waste (@ 0.675 cu ft per person daily)					
Daily	7	17	24	34	68
Weekly	47	118	165	236	473
Monthly (4.33 wks)	205	511	716	1,023	2,046
Annual	2,455	6,138	8,593	12,276	24,551
Total Estimated Weight of Waste (@ 4lb per person daily)					
Daily	40	100	140	200	400
Weekly	280	700	980	1,400	2,800
Monthly (4.33 wks)	1,212	3,031	4,243	6,062	12,124
Annual	14,549	36,372	50,921	72,744	145,488
Number of Total Dumpster Fills - 40 yard dumpster 7x8x22 = 1,232 square feet					
Daily	0.0	0.0	0.0	0.0	0.1
Weekly	0.0	0.1	0.1	0.2	0.4
Monthly (4.33 wks)	0.2	0.4	0.6	0.8	1.7
Annual	2.0	5.0	7.0	10.0	19.9

VORTEX Companies must coordinate with the project site or owner to ensure proper disposal of wastes or scrap materials.

VORTEX Companies must ensure the owner client is aware of whether wastes and scrap materials will be taken off site by VORTEX Companies or will be disposed of on the owner client's site.

Waste Segregation

- Do not mix waste streams.
- Only place waste in the designated container, satellite accumulation area (SAA), recyclable accumulation area (RSS), universal waste accumulation area (UWAA) or designated dumpster.

Recycling

The collection of recycled material will reduce the total load on the environment. Bins of sufficient size must be lined with a plastic bag and clearly labeled for use. Posters from VORTEX Companies will be posted throughout the work site to encourage recycling. Collection bins will also be placed in administrative areas will follow the following color guiding:

- Blue - Paper
- Green - Aluminum cans
- Yellow - Plastic

Cardboard will be flattened, staples and excess shipping tape removed. No cardboard shall be placed in the dumpster used for the landfill.



Waste Handling Matrix

Each work site will develop a Waste Handling Matrix (sample shown) that will address safe practices related to the immediate storage and handling of waste, scrap or leftover material.

WASTE STREAM	LOCATION	ACTIVITY GENERATING WASTE	HAZARDOUS/ NON HAZARDOUS	SAFE STORAGE PRACTICE	DISPOSAL METHOD	PPE OR OTHER PRECAUTIONS
Aerosol Can Contents	Equipment Repair Shop	Puncturing of aerosol cans	Hazardous	SAA is self-contained in the equipment repair shop	Ship to assigned site for recycling or disposal	Read warnings before use of Aerosol unit.
Aerosol Can Puncturing Unit Filter	Equipment Repair Shop	Filter Changes	Hazardous	Place in designated labeled container	Ship to assigned site for recycling or disposal	Change filter every 3 months
Aerosol Cans	Various Locations	Painting, lubricants, cleaning	Non-Hazardous if aerosol can is punctured and drained	Place punctured aerosol can in RAA storage drum	Crush RAA storage drum and place in the scrap metal dumpster from client.	See "Scrap Metal" for waste stream management
Ash	Smart Ash Unit	Incineration of acceptable waste	Non Hazardous	Dispose of Immediately	Place in the Burnable Waste Dumpster	Gloves Goggles
Automotive and Heavy Equipment Parts-Used	Equipment Repair Shop and Fab Shop	Replacement	Non-Hazardous	RAA's by equipment repair shop	Returned to vendors for recycling	Starters, Alternators, Pumps, Transmissions
Batteries (Alkaline)	Various Locations	Battery Failures	Universal Waste	Place in the UWAA in the equipment repair shop	"D" cell and below are acceptable in the Non-Burnable Waste Dumpster	Ship to designated site for recycling or disposal
Batteries (Lead Acid)	Equipment Repair Shop and Fab Shop	Battery Failures	Universal Waste	No storage allowed. Containment boxes are labeled and available in the shops.	Lead acid batteries are returned to the Vendor upon removal	Ship to designated site for recycling
Batteries (Nicad)	Various Locations	Battery Failures	Universal Waste	UWAA in the equipment repair shop.	Ship to assigned site for recycling or disposal	Cell phones, radios
Butane Torch Bottle	Various Locations	Mechanic activities	Excluded Hazardous if recycled	Place drained Butane Torch Bottles in RAA storage drum	storage drum and place in the scrap metal dumpster	Prosolv Butane Bottle processor I
Cardboard/Office Paper	Parts Department & Offices	Shipping Boxes & Office Activities	Non-Hazardous	RAA in the Hog Barn	Place on pallet in RAA and band for shipment to assigned site for recycling.	
Computers Discarded	Parts Department & Offices	Replacement	Non-Hazardous	Place in RAA @ EMS Conex	Ship to assigned site for recycling or disposal	
Diesel Filters-Used	Equipment Repair Shop and Fab Shop	Filter Changes	Non-Hazardous	RAA for drained and crushed used filters	Drain for 12 hrs., crush and incinerate in Smart Ash unit	Place metal in recycle metal dumpster
Diesel Rags	Various Locations	Mechanic activities	Non-Hazardous	Oily waste rag in clear bags w/ yellow stripes.	Incinerated in Smart Ash unit	See "Ash" for management and disposal
Drained Diesel	Equipment Repair and Fab Shop	Draining diesel fuel and filters	Non-Hazardous when burned as off-Spec fuel	Place in "used oil" tank in the equipment repair shop and fab shop.	Burned for energy recovery in our clean burn multi-oil heating system.	



WASTE STREAM	LOCATION	ACTIVITY GENERATING WASTE	HAZARDOUS/ NON HAZARDOUS	SAFE STORAGE PRACTICE	DISPOSAL METHOD	PPE OR OTHER PRECAUTIONS
Empty Paint Cans	Various Locations	Painting activities	Non-Hazardous	No storage allowed	Ship to assigned site for recycling or disposal	Paint cans must be RCRA empty.
Fluorescent Light Ballast	Various Locations	Failure	Non-Hazardous unless they contain PCB's or DEHP	None	Place in Non-Burnable Dumpster	Ballast will say on the label if it contains PCB's
Fluorescent Light Bulbs	Shops, Office Areas	Bulb replacement	Universal Waste	Place bulbs in their original container in the RAA in the EMS Conex	Ship to assigned site for recycling or disposal	Label bulbs "Used Bulb" when put into RAA.
Glass	Various Locations	Replacement	Non-Hazardous	None	Place in Non-Burnable Dumpster	Ensure glass containers are empty.
Glycol Rags	Equipment Repair Shop and Fab Shop	Fluid Changes	Non-Hazardous	Oily waste rag WAA's lined w/clear bags w/yellow stripes.	Incinerated in Smart Ash unit	Minimize use of absorbent rags
Grinding Wheels	Equipment Repair Shop and Fab Shop	Grinding activities	Non-Hazardous	None	Place in Non-Burnable Dumpster	
Hoses & Belts	Equipment Repair Shop and Fab Shop	Replacement	Non-Hazardous	Place in Non-Burnable Dumpster of NSB or into the Oily Waste WAA's	Place in Non-Burnable Dumpster	Drain all fluids from hoses
Metal Shavings/Cuttings	Equipment Repair Shop and Fab Shop	Fabricating activities	Excluded Hazardous if recycled	Placed in recycle metal dumpster or metal only RAA's	Place in recycle metal dumpster	Ensure there are no free flowing cutting fluids present before disposal.
Oil Filters-Used	Equipment Repair Shop and Fab Shop	Oil filter changes	Excluded Hazardous	RAA for drained and crushed used filters	Drain for 12 hrs., crush and incinerate in Smart Ash unit	Place metal in recycle metal dumpster
Oil-Used	Equipment Repair Shop, Fab Shop, Service Trucks	Draining oil and filters	Excluded Hazardous if burned for energy recovery	Receiving sumps are located in the Equipment Repair Shop and Fab Shop	Burned for energy recovery in clean burn multi-oil heating system.	Keep lids on receiving sumps at all times. DO NOT PUT SOLVENTS INTO USED OIL
Oily Waste (rags, absorbents)	Various Locations	Mechanic activities, equipment drips and leaks	Non-Hazardous	Oily waste rag WAA's lined w/clear bags w/yellow stripes.	Incinerated in Smart Ash unit	Collected daily. See "Ash" for management and disposal
Paint Waste (rags, rollers, brushes, etc.)	Various Locations	Painting activities	Determine on per occurrence basis. Use SDS or testing	If hazardous, store in the assigned area. If non-hazardous, no storage is required.	If hazardous, ship to assigned site for disposal. If nonhazardous, place in burnable waste dumpster.	Need to review SDS, do analytical test, or use generator knowledge to make waste determinations.
Parts Cleaner Rags	Equipment Repair Shop	Cleaning parts	Non-Hazardous	Oily waste rag WAA's lined w/clear bags w/yellow stripes.	Incinerated in Smart Ash unit	See "Ash" for management and disposal
Scrap Metal	Various Locations	Fabrication activities & house cleaning	Excluded Hazardous if recycled	Placed in recycle metal dumpster or metal only RAA's	Place in recycle metal dumpster	Eye Protection Gloves
Sodium Vapor/ Metal Halide Light Bulbs	Various Locations	Bulb replacement	Universal Waste	Place bulbs in their original container in the RAA.	Ship to assigned site for recycling or disposal	Label bulbs "Used Bulb" when put into RAA.



WASTE STREAM	LOCATION	ACTIVITY GENERATING WASTE	HAZARDOUS/ NON HAZARDOUS	SAFE STORAGE PRACTICE	DISPOSAL METHOD	PPE OR OTHER PRECAUTIONS
Tires	Various Locations	Replacement	Non-Hazardous	None	Place tires up to 20" rim diameter into dumpster.	
Toner Cartridges	Offices	Copiers, printers, fax machines	Non-Hazardous	Placed in original container in RAA	Ship to assigned site for recycling or disposal	Verify toner is expended before disposal.
Water Scrubber Filter & Absorbents	Equipment Repair Shop and Fab Shop	Filtering sump water in shops	Non-Hazardous	None	Incinerated in Smart Ash unit	See "Ash" for management and disposal
Welding Rods	Various Locations	Welding activities	Excluded Hazardous	Placed in recycle metal dumpster or metal only RAA's	Ship to assigned site for recycling or disposal	See "Scrap Metal" for waste stream management
Wood Waste	Various Locations	Various activities and shipping pallets	Non-Hazardous	Store on the far back corner of the pad or in the dump truck box if available.	Place in recycle wood dumpster	Pallets are refurbished and recycled when possible

Storage Requirements

VORTEX Companies must ensure project related wastes are stored and maintained in an organized fashion to encourage proper disposal and minimize risks to employees. Proper waste receptacles must be provided for trash and materials that may be reused or recycled during a project.

VORTEX Companies will ensure to properly handle, organize, and storage the waste and scrap materials to minimize potential impact to the environment.

Education and Training

Employees shall be instructed on the proper disposal method of wastes. Examples include:

- General instruction on disposal of non-hazardous wastes, trash or scrap materials
- Minimization methods to reduce waste
- Recycling methods
- If wastes generated are hazardous then employees shall be trained to ensure proper disposal and compliance with regulations.



CIVIL INFRASTRUCTURE SOLUTIONS

H₂S AWARENESS



Vortex Companies

Procedure Name	Environmental, Health & Safety Manual - H ₂ S Awareness
Applicability	VORTEX Companies - Employees & Subcontractors
Policy Revised	05.14.19

Purpose

The purpose of this policy is to ensure:

- That workers can identify the hazards and risks of H₂S;
- Implement control measures;
- Follow safe working procedures;
- To ensure the risk of worker exposure to H₂S is eliminated or controlled to a safe level.

Workers may potentially be exposed to H₂S when working on all VORTEX Projects.

Requirements

- I. Comply with the applicable government regulations (federal, state, municipal).
- II. Comply with the applicable industry standards.
- III. A person not protected with supplied breathing air must not be exposed to more than 10 ppm of H₂S at any time.

Properties of H₂S

- I. H₂S is a naturally occurring gas found in numerous industries and largely in the municipal and industrial industries.
- II. Physical state is a poisonous gas with no visible color.
- III. Smells like rotten eggs at low concentrations starting from less than 1ppm; at higher concentrations (100-150ppm) your sense of smell is impaired.
- IV. Soluble in water and liquids.
- V. Flammable with an explosive range between 4 - 44%; burns with a blue flame and gives off Sulfur Dioxide (SO₂).
- VI. Heavier than air (1.19 vapor density), will be found in low lying areas.

Responsibilities

Company

- Shall ensure that this policy follows applicable government regulations and legislation, and industry standards.
- Shall ensure that the necessary resources, training and material required to execute this policy are made available.
- Shall ensure that the necessary respiratory protection is available for workers.
- Shall ensure that the necessary H₂S gas detection and personal H₂S monitoring equipment are made available.
- Shall ensure a worker completes H₂S training before working in an environment that contains or may contain H₂S.
- Shall ensure that employees comply with this policy.
- Shall review a submitted contractor/subcontractor H₂S program for approval.
- Shall review this policy at least annually and revise as required.
- Shall designate Senior Management to be responsible for the administration of this policy.



- Shall participate in implementing this policy with the participation of all employees.
- Shall observe the effectiveness of this policy and report any deficiencies to Senior Management.
- Shall participate with the review and creation of applicable written safe work procedures/practices.
- Shall ensure that this policy remains accessible in the workplace.
- Shall post H₂S warning/danger signs in the work area that contains or may contain H₂S.
- Shall only permit a worker that has completed H₂S training to enter a workplace where the worker may be exposed to H₂S.
- Shall execute disciplinary actions toward a worker that violates this policy.

Management

- Shall comply with this policy.
- Shall participate in implementing this policy with the participation of Senior Management, Middle Management, the Occupational Safety Health Environment & Wellness Committee and Supervision.
- Shall observe the effectiveness of this policy and report any deficiencies to Senior Management.
- Shall ensure that all employees on site are familiar with the site-specific emergency plan.
- Shall participate with the review and creation of applicable written safe work procedures/practices.

Employees

- Shall comply with this policy.
- Shall complete H₂S training as required.

Contractor/Subcontractor

- Shall comply with this policy.
- Shall submit a H₂S program to Senior Management for review and approval.

Training

- I. Training must be provided to each worker that will be working in an environment that contains or may contain H₂S.
- II. Approved H₂S training must be conducted by a qualified instructor.
- III. Company training includes:
 - Review and understanding of this policy.
 - Identifying work areas that contain or may contain H₂S.
 - The hazards and risks of working in an H₂S environment.
 - Establishing and implementing control measures.
 - Correct use, inspection and maintenance of supplied breathing air equipment.
 - Correct use, inspection and maintenance of gas detection equipment.
 - Correct use, inspection and maintenance of a personal H₂S gas monitor.
 - Competent with the emergency and rescue procedures.

Planning

- I. Complete a hazard and risk assessment.
- II. Establish and implement safe procedures for conducting gas detection.
- III. Identify if the work area is known to have a presence of H₂S.
- IV. Identify if the work processes will create a presence of H₂S.



- V. Ensure that each worker that may be exposed to H₂S has completed approved H₂S training.
- VI. Ensure the necessary H₂S gas detector and H₂S personal monitor equipment is made available; the alarm must be set to 10ppm.
- VII. Ensure that training is provided for the person that will be operating a gas detector or personal H₂S monitor. 8. Ensure the person conducting gas detection is protected with supplied breathing air if there is a possibility the person may be exposed to H₂S or if the person is entering an area with unknown substances or contamination.
- VIII. Ensure the necessary PPE including supplied breathing air is made available.
- IX. Provide H₂S warning/danger signs.
- X. Install a wind sock so workers can easily identify the wind direction.
- XI. Conduct a pre-shift meeting with all the applicable workers to communicate the hazards, risks and control measures for working in an area with H₂S.
- XII. Establish area specific emergency procedures to safely shut down equipment in the event of an unexpected or uncontrolled release of H₂S.
- XIII. Establish area specific emergency evacuation procedures for the event of an unexpected or uncontrolled release of H₂S.
- XIV. Establish area specific procedures for tasks involving the controlled release of H₂S.

Inspection

- I. Inspect the work area for hazards (poor visibility, poor housekeeping, traffic, other workers, ground conditions, electrical hazards, etc.).
- II. Inspect the supplied breathing air equipment and air lines.
- III. Inspect the PPE: coveralls, safety glasses, gloves, boots, etc.
- IV. Inspect the fire extinguisher: fully charged, correct type, correct size.
- V. Inspect the H₂S gas detection equipment and perform a bump test at the start of the shift.
- VI. Perform a gas detection test in the area that is known to have or may have a presence of H₂S, record the results; this inspection must be conducted before workers can enter the area.

Control Measures

- I. Complete a hazard and risk assessment to establish control measures specific for the work area and work tasks.
- II. The following is a list of general control measures:
 - Inform all workers of the areas that have or may have a presence of H₂S; and the concentration of H₂S.
 - Post warning/danger signs.
 - Set the personal H₂S monitor and the H₂S gas detector to alarm at 10 ppm. If the H₂S Monitor alarm sounds, all personnel in the area shall immediately evacuate or don a SCBA unit.
 - Always perform a gas test of the work area suspected of containing H₂S before starting work and at specified intervals during the work shift.
 - Wear supplied breathing air when entering an atmosphere that contains more than 10ppm of H₂S or if the H₂S concentration is unknown.
 - Designate a safety watch where necessary for tasks involving the controlled release of H₂S.
 - Immediately vacate the work area when the personal H₂S monitor alarms.



Emergency Planning

- I. An emergency response plan must be written for work that involves the risk of H₂S exposure.
- II. Emergency response plan shall include:
 - Work area: exact location, structure/layout of the building or structure the work area is in.
 - Hazards that may impede rescue, location of emergency SCBA (self-contained breathing air) packs, location of communication equipment.
 - Rescue team: names, location of rescue team, communication method, response time for rescue team.
 - Procedures for safely shutting down equipment.
 - Procedures for extricating a worker.
 - Procedures for transporting an injured worker to a hospital or medical center.

First Aid

- I. A qualified first aid attendant must be designated for a workplace that contains a presence of H₂S.
- II. First aid including CPR must be provided by a qualified first aid attendant.
- III. A person exposed to more than 10ppm of H₂S that is not protected by supplied breathing air must be removed to fresh air immediately.
- IV. A person knocked down from H₂S exposure must be examined by a medical doctor immediately for the risk of pulmonary edema and other illnesses/injuries.

H₂S Exposure and Possible Health Effects

- I. Less than 1ppm
 - Smells like rotten eggs
 - 10ppm
 - No known adverse health effects for most people.
 - Respiratory protection is required beyond this level.
- II. 20-200ppm
 - Eye and respiratory tract irritation and loss of smell.
 - Headache and nausea.
 - 100ppm is considered immediately dangerous to life and health.
- III. 200-500ppm
 - Above effects, but sooner and more severe.
 - Loss of breathing and death within hours.
- IV. 500-700ppm
 - Affects the central nervous system.
 - Loss of reasoning, loss of balance, unconsciousness and breathing stops within minutes.
- V. 700ppm and above
 - Immediate loss of consciousness.
 - Permanent brain damage and death if not rescued immediately.



CIVIL INFRASTRUCTURE SOLUTIONS

**HAND AND/OR
POWER TOOLS**



Vortex Companies

Procedure Name	Environmental, Health & Safety Manual – Hand & Power Tools
Applicability	VORTEX Companies – Employees & Subcontractors
Policy Revised	11.08.16

Purpose

The purpose of this program is to establish requirements for the safe operation of hand and power tools and other portable tools, including proper guarding. All hand and power tools shall be maintained in a safe condition. This program applies to all VORTEX Companies employees who use hand and power tools.

Scope

This program is applicable to all VORTEX Companies employees while engaged in work at VORTEX Companies facilities and/or facilities operated by others.

Responsibilities

Any tool which is not in compliance with any applicable requirement of this plan is prohibited and shall either be identified as unsafe by tagging or locking the controls to render them inoperable or shall be physically removed from its place of operation.

Managers/Supervisors

- Ensure that all employees using portable tools have been trained and fully understand the operations and maintenance procedures of such tools, including their proper use.
- Provide and train employees with all additional PPE that may be needed for the safe operation of portable tools.

Employees

- Shall ensure they have and properly use the correct tool for each task.
- Shall follow manufacturer’s safety and operating instructions before using.

Requirements

General

All tools, regardless of ownership, shall be of an approved type and maintained in good condition.

- Tools are subject to inspection at any time.
- All employees have the authority and responsibility to condemn unsafe tools, regardless of ownership.

Unsafe tools shall be tagged with a “DO NOT USE OR OPERATE” tag to prevent their use.

Employees shall always use the proper tool for the job to be performed. Makeshift and substitute tools shall not be used.



Hammers with metal handles, screwdrivers with metal continuing through the handle, and metallic measuring tapes shall not be used on or near energized electrical circuit or equipment.

Tools shall not be thrown from place to place or from person to person. Tools that must be raised or lowered from one elevation to another shall be placed in tool buckets or firmly attached to hand lines.

Tools shall never be placed unsecured on elevated places.

Impact tools such as chisels, punches, and drift pins that become mushroomed or cracked shall be dressed, repaired, or replaced before further use.

Chisels, drills, punches, ground rods, and pipes shall be held with suitable holders or tongs (not with the hands) while being struck by another employee.

Shims shall not be used to make a wrench fit.

Wrenches with sprung or damaged jaws shall not be used.

Tools shall be used only for the purposes for which they have been approved.

Tools with sharp edges shall be stored and handled so that they will not cause injury or damage. They shall not be carried in pockets unless suitable protectors are in use to protect the edge.

Wooden handles that are loose, cracked, or splintered shall be replaced. The handle shall not be taped or lashed with wire. The handle shall not be taped or lashed with wire.

Tools shall not be left lying around where they may cause a person to trip or stumble.

When working on or above open grating, a canvas or other suitable covering shall be used to cover the grating to prevent tools or parts from dropping to a lower level where others are present or the danger area shall be barricaded or guarded.

The insulation on hand tools shall not be depended upon to protect users from high voltage shock (except approved live line tools).

Portable Electric Tools

The non-current carrying metal parts of portable electric tools such as drills, saws, and grinders shall be effectively grounded when connected to a power source unless:

- The tool is an approved double-insulated type, or
- The tool is connected to the power supply by means of an isolating transformer or other isolated power supply.

All powered tools shall be examined prior to use to ensure general serviceability and the presence of all applicable safety devices.



Powered tools shall be used only within their design and shall be operated in accordance with manufacturer's instructions. The use of electric cords for hoisting or lowering tools shall not be permitted.

All tools shall be kept in good repair and shall be disconnected from the power source while repairs or adjustments are being made. Electrical tools shall not be used where there is hazard of flammable vapors, gases, or dusts without a valid Hotwork Permit.

Ground fault circuit interrupters or use of an Assured Grounding Program shall be used with portable electric tools. This does not apply to equipment run off of portable or truck mounted generators at 5kw or less that are isolated from ground or to equipment ran directly off of secondaries.

Pneumatic Tools

Pneumatic tools shall never be pointed at another person.

Pneumatic power tools shall be secured to the hose or whip by some positive means to prevent the tool from becoming accidentally disconnected.

Safety clips or retainers shall be securely installed and maintained on pneumatic impact (percussion) tools to prevent attachments from being accidentally expelled.

Compressed air shall not be used for cleaning purposes, except where reduced to less than 30 psi and then only with effective chip guarding and personal protective equipment.

Compressed air shall not be used to blow dust or dirt from clothing.

The manufacturer's stated safe operating pressure for hoses, pipes, valves, filters, and other fitting shall not be exceeded. The use of hoses for hoisting or lowering tools shall not be permitted. Before making adjustments or changing air tools, unless equipped with quick-change connectors, the air shall be shut off at the air supply valve ahead of the hose. The hose shall be bled at the tool before breaking the connection.

Compressed air tools, while under pressure, must not be left unattended.

All connections to air tools shall be made secure before turning on air pressure. Air at the tool shall not be turned on until the tool is properly controlled.

All couplings and clamps on pressurized air hose shall be bridged (pinned) with suitable fasteners.

Hose and hose connections used for conducting compressed air to utilization equipment shall be designed for the pressure and service to which they are subjected.

Use only approved end-fitting clamps (screw type heater hose clamps are not acceptable). While blowing down hose, do not point it toward people.



Power tools are to be operated only by competent persons who have been trained in their proper use.

Conductive hose should not be used near energized equipment.

Foot protection shall be worn while operating paving breakers, tampers, rotary drills, clay spades, and similar impactor-type tools or at other times when instructed by supervision.

All pneumatically driven nailers, staplers, and other similar equipment provided with automatic fastener feed, which operate at more than 100 psi. pressure at the tool shall have a safety device on the muzzle to prevent the tool from ejecting fasteners, unless the muzzle is in contact with the work surface.

Airless spray guns of the type which atomize paints and fluids at high pressures (1,000 pounds or more per square inch) shall be equipped with automatic or visible manual safety devices which will prevent pulling of the trigger to prevent release of the paint or fluid until the safety device is manually released.

In lieu of the above, a diffuser nut (which will prevent high pressure), high velocity release (while the nozzle tip is removed), plus a nozzle tip guard (which will prevent the tip from coming into contact with the operator), or other equivalent protection, shall be provided.

Powder Actuated Tools (Tools actuated by an explosive charge)

Only those employees who have been certified in their use shall operate these tools. Explosive charges shall be carried and transported in approved containers. Operators and assistants using these tools shall be protected by means of eye, face, and hearing protection.

Tools shall be maintained in good condition and serviced regularly by qualified persons. The material upon which these tools are to be used shall be examined before work is started to determine its suitability and to eliminate the possibility of hazards to the operator and others.

Prior to use, the operator shall ensure that the protective shield is properly attached to the tool.

Before using a tool, the operator shall inspect it to determine to his satisfaction that it is clean, that all moving parts operate freely, all guards and safety devices are in place, and that the barrel is free from obstructions.

Before using tools the operator shall read and become familiar with the manufacturer's operating guidelines and procedures.

When a tool develops a defect during use, the operator shall immediately cease to use it, until it is properly repaired in accordance with the manufacturer's specifications.

Tools shall not be loaded until just prior to the intended firing time, nor shall an unattended tool be left loaded. Empty tools are not to be pointed at any workmen.



In case of a misfire, the operator shall hold the tool in the operating position for at least 30 seconds. He shall then try to operate the tool a second time. He shall wait another 30 seconds, holding the tool in the operating position; then he shall proceed to remove the explosive load in strict accordance with the manufacturer's instructions.

A tool shall never be left unattended in a place where it would be available to unauthorized persons.

Fasteners shall not be driven into very hard or brittle materials including, but not limited to, cast iron, glazed tile, surface hardened steel, glass block, live rock, face brick, or hollow tile.

Driving into materials easily penetrated shall be avoided unless such materials are backed by a substance that will prevent the pin or fastener from passing completely through and creating a flying missile hazard on the other side.

Tools shall not be used in an explosive or flammable atmosphere.

Hydraulic Power Tools

The fluid used in hydraulic powered tools shall be fire-resistant fluids approved under Schedule 30 of the U.S. Bureau of Mines, Department of the Interior, and shall retain its operating characteristics at the most extreme temperatures to which it will be exposed.

The manufacturer's safe operating pressures for hoses, valves, pipes, filters, and other fittings shall not be exceeded.

All hydraulic tools, which are used on or around energized lines or equipment, shall use non-conducting hoses having adequate strength for the normal operating pressures.

Hydraulic Jacks

Loading and Marking

- The operator shall make sure that the jack used has a rating sufficient to lift and sustain the load.
- The rated load shall be legibly and permanently marked in a prominent location on the jack by casting, stamping, or other suitable means.

Operation and Maintenance

- In the absence of a firm foundation, the base of the jack shall be blocked. If there is a possibility of slippage of the cap, a block shall be placed in between the cap and the load.
- The operator shall watch the stop indicator, which shall be kept clean, in order to determine the limit of travel. The indicated limit shall not be overrun.
- After the load has been raised, it shall be cribbed, blocked, or otherwise secured at once.
- Hydraulic jacks exposed to freezing temperatures shall be supplied with adequate antifreeze liquid.
- All jacks shall be properly lubricated at regular intervals.

Each jack shall be thoroughly inspected before each use. Jacks, which are in unsafe condition, shall be tagged accordingly, and shall not be used until repairs are made.



Abrasive Blast Cleaning Nozzles

The blast cleaning nozzles shall be equipped with an operating valve, which must be held open manually. A support shall be provided on which the nozzle may be mounted when it is not in use.

Fuel Powered Tools

All fuel-powered tools shall be stopped while being refueled, serviced, or maintained, and fuel shall be transported, handled, and stored in accordance with the Flammable and Combustible Liquids Program.

When fuel powered tools are used in enclosed spaces, the applicable requirements for concentrations of toxic gases and use of personal protective equipment, shall be adhered to.

Guarding Portable Tools

Guards shall be in place and operable at all times while the tool is in use. The guard may not be manipulated in such a way that will compromise its integrity or compromise the protection in which intended. Guarding shall meet the requirements set forth in ANSI B15.1.

Portable Circular Saws

- All portable, power-driven circular saws having a blade diameter greater than 2 in. shall be equipped with guards above and below the base plate or shoe.
- The upper guard shall cover the saw to the depth of the teeth, except for the minimum arc required to permit the base to be tilted for bevel cuts.
- The lower guard shall cover the saw to the depth of the teeth, except for the minimum arc required to allow proper retraction and contact with the work.
- When the tool is withdrawn from the work, the lower guard shall automatically and instantly return to covering position.
- All cracked saw blades shall be removed from service.

Switches and Controls

- All hand held powered tools, circular saws, drills, tappers, fastener drivers, horizontal or vertical angle grinders, etc., shall be with a constant pressure switch or control, and may have a lock-on control provided that turnoff can be accomplished by a single motion of the same finger or fingers that turn it on.
- All hand-held powered circular saws having a blade diameter greater than 2 inches, electric, hydraulic or pneumatic chain saws, and percussion tools without positive accessory holding means shall be equipped with a constant pressure switch or control that will shut off the power when the pressure is released. All hand-held gasoline powered chain saws shall be equipped with a constant pressure throttle control that will shut off the power to the saw chain when the pressure is released.
- The operating control on hand-held power tools shall be so located as to minimize the possibility of its accidental operation, if such accidental operation would constitute a hazard to employees.
- Grounding of portable electric powered tools shall meet the electrical requirements that can be found in the Electrical Safety Program. All electric power tools shall be equipped with a three-prong plug.

Portable Abrasive Wheels

Safety Guards Exceptions

- Wheels used for internal work while within the work being ground.



- Mounted wheels used in portable operations 2 inches and smaller in diameter.
- Types 16, 17, 18, 18R, and 19 cones, plugs, and threaded hole pot balls where the work offers protection.
- Guards shall be made of steel or other material with adequate strength.
- A safety guard shall cover the spindle end, nut and flange projections. The safety guard shall be mounted so as to maintain proper alignment with the wheel, and the strength of the fastenings shall exceed the strength of the guard.
- Exception: safety guards on all operations where the work provides a suitable measure of protection to the operator may be so constructed that the spindle end, nut and outer flange are exposed. Where the nature of the work is such as to entirely cover the side of the wheel, the side covers of the guard may be omitted.
- Exception: the spindle end, nut, and outer flange may be exposed on portable machines designed for, and used with, type 6, 11, 27, and 28 abrasive wheels, cutting off wheels, and tuck pointing wheels.

Mounting and Inspection of Abrasive Wheels

- Immediately before mounting, all wheels shall be closely inspected and a ring test performed, to make sure they have not been damaged in transit, storage, or otherwise.
- Ring test - "tap" wheels about 45 degrees each side of the vertical centerline and about 1 or 2 inches from the periphery; then rotate the wheel 45 degrees and repeat the test; a sound and undamaged wheel will give a clear metallic tone - If cracked, there will be a dead sound and not a clear "ring."
- The spindle speed of the machine shall be checked before mounting of the wheel to be certain that it does not exceed the maximum operating speed marked on the wheel.
- Grinding wheels shall fit freely on the spindle and remain free under all grinding conditions.
- A controlled clearance between the wheel hole and the machine spindle (or wheel sleeves or adaptors) is essential to avoid excessive pressure from mounting and spindle expansion.
- The machine spindle shall be made to nominal (standard) size plus zero minus .002 inch, and the wheel hole shall be made suitably oversize to assure safety clearance under the conditions of operating heat and pressure.
- All contact surfaces of wheels, blotters, and flanges shall be flat and free of foreign matter.
- When a bushing is used in the wheel hole it shall not exceed the width of the wheel and shall not contact the flanges.

Portable Grinders

Special "revolving cup guards" which mount behind the wheel and turn with it shall be used. They shall be made of steel or other material with adequate strength and shall enclose the wheel sides upward from the back for one-third of the wheel thickness. It is necessary to maintain clearance between the wheel side and the guard. The clearance shall not exceed one-sixteenth inch.

Vertical portable grinders, also known as right angle grinders, shall have a maximum exposure angle of 180 degrees and the guard shall be located between the operator and the wheel during use. Adjustment of the guard shall ensure that pieces of an accidentally broken wheel will be deflected away from the operator.

Other Portable Grinders

The maximum angular exposure of the grinding wheel periphery and sides for safety guards used on other portable grinding machines shall not exceed 180 degrees and the top half of the wheel shall be enclosed at all times.

Personal Protective Equipment

Employees using hand and power tools and exposed to the hazard of falling, flying, abrasive, and splashing objects, or exposed to harmful dust, fumes, mists, vapors or gases shall be provided with the particular PPE necessary to protect them from the hazard.



WEEKLY SAFETY INSPECTION REPORT

Inspected By: _____ Job Name: _____ Date: _____

JOB INFORMATION				
	Y	N	N/A	COMMENT
OSHA 300 forms posted and complete?				
OSHA poster posted?				
Phone no. for the nearest medical center posted?				
Weekly Safety Meetings up to date?				
Work areas properly signed and barricaded?				
Is each employee instructed in the recognition and avoidance of unsafe conditions?				
Are first aid supplies readily accessible?				
Is facility for the treatment of injured employees located within 15 minutes of the jobsite, if not, is there an employee trained in first aid at the site?				
Are telephone numbers, physicians, hospitals and ambulances conspicuously posted?				
Are potable drinking water and toilet facilities available at the site?				
Is there protection for bloodborne pathogens?				
HOUSEKEEPING				
	Y	N	N/A	COMMENT
General neatness of work area?				
Projecting nails removed or bent over?				
Waste containers provided and used?				
Passageways and walkways clear?				
FIRE PREVENTION				
	Y	N	N/A	COMMENT
Adequate fire extinguishers, checked and accessible?				
Phone no. of fire department posted?				
"No Smoking" posted and enforced near flammables?				
ELECTRICAL				
	Y	N	N/A	COMMENT
Extension cords or attachments cords with bare wires or missing ground prongs or damaged taken out of service?				
Ground fault circuit interrupters being used?				
Terminal boxes equipped with required covers?				
Are flexible cords and cables protected from damage?				
Are unused openings in cabinet boxes and fittings closed?				
Are all cabinets, panels and switches located in wet locations enclosed in weather proof enclosures?				
HAND, POWER & POWDER ACTUATED TOOLS				
	Y	N	N/A	COMMENT
Hand tools inspected regularly? Broken handles and mushroom heads?				
Guards in place on machines, such as saws?				
Right tool being used for job at hand?				
Operators of powder actuated tools are licensed?				



WEEKLY SAFETY INSPECTION REPORT

FALL PROTECTION				
	Y	N	N/A	COMMENT
Safety rails and cables are secured properly?				
Employees exposed to fall hazards are tied off?				
Employees below protected from falling objects?				
Employees using body belts for positioning devices only?				
Are employees working more than 6' above a lower level protected by guardrails, safety nets, personal fall arrest system?				
LADDERS				
	Y	N	N/A	COMMENT
Ladders extend at least 36" above the landing?				
Ladders are secured to prevent slipping, sliding, or falling?				
Ladders with split or missing rungs taken out of service?				
Stepladders used in fully open position?				
No step at top two rungs of stepladder?				
SCAFFOLDING				
	Y	N	N/A	COMMENT
All scaffolding inspected daily?				
Erected on sound rigid footing?				
Tied to structure as required?				
Guardrails, intermediate rails, toeboards and screens in place?				
Planking is sound and sturdy?				
Proper access provided?				
Employees below protected from falling objects?				
FLOOR & WALL OPENINGS				
	Y	N	N/A	COMMENT
All floor or deck openings are planked over or barricaded?				
Perimeter protection is in place?				
Deck planks are secured?				
Materials are stored away from edge?				
TRENCHES, EXCAVATION & SHORING				
	Y	N	N/A	COMMENT
Competent person on hand inspecting daily?				
Excavations over 5' in depth are shored or sloped back?				
Materials are stored at least two feet from trench?				
Equipment is a safe distance from edge of trench or excavation?				
Ladders provided every 25' in trench more than 4' deep?				
Have underground utility installations been located?				
Are employees exposed to vehicular traffic wearing warning vests of reflectorized or highly visibility material?				



WEEKLY SAFETY INSPECTION REPORT

MATERIAL HANDLING				
	Y	N	N/A	COMMENT
Materials are properly stored or stacked?				
Employees are using proper lifting methods?				
Tag lines are used to guide loads?				
Proper number of workers for each operation?				
WELDING & BURNING				
	Y	N	N/A	COMMENT
Gas cylinders stored upright and secured?				
Proper separating distance between fuels and oxygen? (min 20')				
Burning/welding goggles or shields are used?				
Fire extinguishers are nearby?				
Hoses and regulators are in good condition?				
CRANES				
	Y	N	N/A	COMMENT
Outriggers are extended and swing radius barricade in place?				
Operator is familiar with load carts?				
Crane operators logs are up-to-date?				
Employees kept from under suspended loads?				
Chains and sling inspected and tagged as required?				
Hand signal charts are on crane?				
CONCRETE CONSTRUCTION				
	Y	N	N/A	COMMENT
Employees are protected from cement dust?				
Exposed skin covered?				
Runways are adequate?				
Walls over 8' are supported?				
Are all protruding reinforcing rods covered?				
Is lockout/tagout procedure in use on any machinery where inadvertent operation could cause injury?				
PERSONAL PROTECTIVE EQUIPMENT				
	Y	N	N/A	COMMENT
Hard hats are being worn?				
Safety glasses are being worn?				
Respirators are used when required?				
Hearing protection being worn when required?				
Traffic vests being worn?				



WEEKLY SAFETY INSPECTION REPORT

VEHICLES				
	Y	N	N/A	COMMENT
Do vehicles, earth moving or compacting equipment with an obstructed view to the rear have a backup alarm or used with an observer?				
Do vehicles and earth moving equipment have seat belts and are they used?				
Are flagmen wearing reflectorized garments and using flags, sign paddles or lights?				
CONFINED SPACE				
	Y	N	N/A	COMMENT
Is the Confined Space Entry Program being properly followed?				
MISCELLANEOUS				
	Y	N	N/A	COMMENT
Is a written Hazard Communication Program on site including SDS, materials list, container labeling, employee training?				
Is exposure to lead or lead based paint, such as paint removal controlled?				
Is exposure to silica, such as sandblasting, using sand or cutting brick or cinderblock controlled?				
Is exposure to asbestos controlled?				
MISCELLANEOUS				

Unsafe Acts or Practices Observed (List): _____

Signature: _____ **Date:** _____



CIVIL INFRASTRUCTURE SOLUTIONS

HAZARD ANALYSIS (JHA - STA)



Vortex Companies

Procedure Name	Environmental, Health & Safety Manual - Hazard Analysis
Applicability	VORTEX Companies - Employees & Subcontractors
Policy Revised	05.14.18

Purpose

Vortex Companies is committed to providing for the occupational safety and health of personnel, preventing accidental loss of material resources (e.g., property damage), and avoiding interruptions to essential services resulting from accident and other incidents. An effective occupational safety and health program must include procedures to evaluate job hazards and to eliminate or control the related risks to employees or property. Although identification of possible property damage losses is important, the primary objective of a hazard assessment and analysis is to identify the risk of injury associated with systems or equipment, a task or series of tasks, and to recommend solutions to reduce the risk to a standard or acceptable level.

A hazard assessment and analysis facilitate the discovery and evaluation of hazards that exist in the workplace and the selection of control measures to reduce or eliminate the hazard. Once the hazards have been identified, an evaluation by technically qualified safety personnel will determine the priority for the establishment of appropriate control measures. Based on the potential severity and risk of injury or property damage, hazards will be promptly eliminated or controlled.

Definitions

Activity - A named process, procedure, function, or task, or grouping of tasks, that occur(s) over time and has recognizable results.

Hazard - Potential for harm to people or property.

Job hazard analysis (JHA) - A technique that focuses on the relationship between the worker, the worker's activities or job task(s), the tools, and the work environment to identify hazards before accidents, injuries, or illnesses occur. The JHA is used as Vortex's project hazard assessment and analysis tool.

Safety Task Assessment (STA) - The safety task assessment is Vortex's daily hazard assessment and analysis tool. The STA and JHA go hand in hand.

Plan Review and Update

JHAs/STAs will be reviewed annually and updated as needed to reflect changes in the work and/or work site conditions, and when injury or illness incidents warrant a review. All employees affected by any changes in engineering controls or work procedures after a JHA/STA review will be trained in the new job methods, procedures, or protective measures adopted.



Responsibilities

HSE Managers

- Responsible for reviewing all completed JHAs and STAs
- Responsible for overseeing the hazard analysis program and ensuring its implementation.

Project Managers/Project Engineers

Responsible for conducting and completing JHAs before the project begins.

Superintendents/Foreman

Responsible for conducting and completing STAs before work begins each day/shift.

All Employees

Responsible for actively participating in applicable JHAs and STAs.

Activities Subject to JHA

A JHA will be conducted for each work project. Part of the purpose of the JHA process is to determine whether hazards exist, through careful and regular examination of the location(s) and procedures involved in the project. The assumption that some work does not have potential for hazards to exist has led to unnecessary and costly injuries, such as cumulative trauma disorders, back injuries, and electrical shock. If there is a project that truly has no potential for employees to be exposed to hazards, the JHA would demonstrate that.

Activities Subject to STA

A STA will be conducted at the beginning of each day, before any works begins. Part of the purpose of the STA process is to determine whether hazards exist, through careful and regular examination of the location(s), procedures involved in the project, and to fight complacency. The assumption that some work does not have potential for hazards to exist has led to unnecessary and costly injuries, such as cumulative trauma disorders, back injuries, and electrical shock. If there is a daily activity that truly has no potential for employees to be exposed to hazards, the STA would demonstrate that.

Activity Selection

Personnel authorized by the Corporate HSE Manager to perform JHA/STAs (i.e., JHA/STA Analysts) will select the job(s), tasks, operations, or processes to be analyzed by reviewing:

- Injury and illness data
- Near-miss reports
- New or modified work tasks, activities, or projects
- Employee safety process comments, surveys, and reports
- Regulatory requirements

Initial JHA/STAs will be scheduled by priority starting with those that have the highest injury and illness rates as recorded in OSHA Form 300, Injury and Illness Log. Where accident or near-miss data are lacking, a review of the nature of the job and the equipment and/or materials being used will be conducted to help determine which jobs will receive a JHA/STA. Employee participation in the JHA/STA selection and implementation process will be encouraged and solicited. The analysis of methods to control hazards will incorporate regulatory requirements for each type of activity.



Employees' input in the JHA/STA process will be collected and reviewed.

All job hazard Analysts will consider the potential for all types of physical, chemical, and atmospheric exposures, and the likelihood of accidents in their operations when determining the priorities.

JHA/STA Uses

The primary use of a JHA/STA is to identify and resolve safety issues before beginning a work activity or project. JHA/STAs will also support other functions related to workplace safety and health, including:

- Cost projections
- Employee orientation
- Training needs determination
- Performance evaluation
- Accident investigation

JHA/STA Process

A JHA/STA is conducted in two basic steps:

1. Identify each potential hazard that might exist because of the characteristics of the worksite, the procedures, and/or tasks that are involved in that project.
2. Determine what action(s) must be taken to prevent exposure of employees to each hazard. During each of these steps, the person(s) conducting the analysis will gather information from such resources as:
 - Personal experience
 - Jobsite observations
 - Input from employees who will be working in the area or on the project affected by the JHA
 - People who have done similar work on other projects
 - Occupational safety and health specialists
 - Material safety data sheets (MSDSs)
 - Equipment manuals
 - Equipment manufacture's technical representatives
 - Health and safety handbooks
 - Existing health and safety plans and handbooks

JHA/STA Procedures

Following are the specific JHA/ST procedures, listed in the order that they will be performed.

1. List specific activities. Make a list of specific activities that will be performed by employees at a location (work area or jobsite), for the use of machines and equipment, or for a specific process or project. Where projects are very broad and involve diverse activities, conduct a JHA/STA for each activity.
 - a. When a project or activity involves the same tasks and the same conditions over a wide range of work areas, a single job hazard analysis will suffice. For a simple activity, use Attachment [number], Job Hazard Analysis Worksheet (simple).
 - b. For an activity with complicated tasks that require multiple steps, use Attachment [number], Job Hazard Analysis Worksheet (detailed).



- c. When an activity involves unique site characteristics or unusual equipment at a site, conduct a JHA/STA that focuses on the site. For evaluating tasks with multiple potential hazards (physical, chemical, biological) at a specific site, use Attachment [number], Site-Specific Job Hazard Analysis worksheet.
 - d. For activities that involve specific chemicals, use Attachment [number], Chemical Job Hazard Analysis Worksheet.
 - e. For activities that involve respirators, use Attachment [number], Respiratory Hazard Assessment Certificate.
 - f. For activities that may require other PPE, use Attachment [number], Personal Protective Equipment Hazard Assessment Certificate.
2. List Each Potential Hazard
- Examine the hazards or potential hazards associated with each task or activity. Continue to use the worksheet or certificate used to list the specific tasks.
- a. Examine the location where the activities are or will be performed to determine if there are any apparent hazards, such as poor lighting, live electrical contacts, improperly stored materials or waste, adjacent operations that may affect the safe operation of the job under review, etc.
 - b. Interview appropriate personnel who are familiar with the job and/or equipment. The intent of the interviews is to determine the orderly sequence of job tasks and any perceived hazards.
 - c. Observe, where possible, employees performing the actual job tasks. Thoroughly document the findings on the JHA/STA worksheet. Refer to OSHA Publication 3071 for examples.
 - d. Review available literature associated with the activity for additional hazards, including SDSs, equipment manuals, safety checklists, and existing health and safety plans and manuals.
3. List Corrective Controls
- Once the hazards are identified, select the corrective controls that will be implemented to ensure employee safety and health, and list them on the appropriate worksheet or certificate. Corrective controls will be considered in the following order of precedence:
- a. Elimination - removing the hazard or hazardous work practice from the workplace. This is the most effective control measure.
 - b. Substitution - substituting or replacing a hazard or hazardous work practice with a less hazardous one. For example, substitution of a less hazardous or toxic solvent for a highly flammable or carcinogenic solvent.
 - c. Engineering control - if the hazard cannot be eliminated or substituted, an engineering control is the next preferred measure. This may include modifications to tools or equipment, such as providing guards to machinery or equipment, or providing local exhaust or general ventilation to control emissions of toxic or hazardous gases, vapors, or particulates.
 - d. Isolation - isolating or separating the hazard or hazardous work practice from people not involved in the work or the general work areas. This can be done by marking off hazardous areas or by installing screens or barriers.
 - e. Administrative control - introducing work practices that reduce the exposure to workers. Some examples include limiting the amount of time a person is exposed to a hazard, demarcating exclusion areas and establishing physical access controls to prevent workers from entering hazardous areas and ensuring proper training of employees.
 - f. Personal protective equipment - consider the use of PPE when other control measures are not feasible or as an interim control until one of the other described controls can be implemented.
4. Certify the JHA/STA. Ensure that the JHA/STA is reviewed and signed by an authorized job hazard analyst and shared with and signed by all the employees who will be doing the work.
5. Review and modify JHA/STA as necessary. Repeat the JHA/STA process, as necessary, by evaluating new equipment or work processes, reviewing accident records, and periodically reevaluating the suitability of previously selected PPE and/or engineering controls.



Implementation of Corrective Actions

Once the JHA/STA has been conducted for each project or activity, corrective actions recommended in the JHA/STA that are approved by management will be implemented. Supervisors will inform employees of the hazards and corrective actions and conduct employee training before the commencement of related tasks.

JHA/STA Training

Before any designated job hazard analyst, manager, supervisor, or other employee conducts or participates in a JHA/STA, he or she will receive training in the JHA/STA process. JHA/STAs will be conducted by technically qualified safety personnel who have the experience and training to identify hazards in the workplace.

Documentation and Recordkeeping

All JHA/STAs will be documented on the Job Hazard Analysis Worksheet or related assessment forms. JHA/STA worksheets and certificates will be maintained by Regional HSE Managers

Contractors

A JHA/STA conducted for Vortex employees does not necessarily address the work of a contractor or the contractor's employees; however, the JHA/STA for a project or activity that involves Vortex employees working in an area affected by contract activities will address any hazards that such activities present for the [company name] employees.



Job Hazard Analysis (JHA)

Activity/Work Task:		Overall Risk Assessment Code (RAC) (Use highest code)				
Project Location:		Risk Assessment Code (RAC) Matrix				
Project Name:		Severity				
Date Prepared:		Probability				
Prepared by (Name/Title):		1.Frequent	2.Likely	3.Occasional	4.Seldom	5.Unlikely
Reviewed by (Name/Title):		E	H	H	H	M
		E	H	H	M	L
		H	M	M	L	L
		M	L	L	L	L
Employer/GBU:		Step 1: Review each "Hazard" with identified safety "Controls" and determine RAC (See above). The RAC is developed after correctly identifying all the hazards and fully implementing all controls.				
Notes: (Field Notes, Review Comments, etc.) Reference:		P "Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely. RAC Chart				
		S "Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible				
		Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.				
Job Steps		Controls				
Hazards		P S RAC				



Job Steps	Hazards	Controls	P	S	RAC



Job Steps	Hazards	Controls	P	S	RAC
Equipment to be Used	Training Requirements/Competent or Qualified Personnel	Inspection Requirements			



PERMITS / TAGS / SIGNS / DOCUMENTS REQUIRED

Confined Space Street Cuts
 Trenching & Excavation SDS
 Lane Closure / Traffic Control Crane Lift
 Signs / Barricades Scaffolds
 Work Near OH Lines
 Lockout / Tagout
 Hazardous Material
 Other: _____

EMPLOYEE CERTIFICATIONS REQUIRED

Crane Operator Forklift Operator
 Mobile Equipment Operator Vehicle Operator
 Certified Flagman
 Heavy Equipment Signalman
 Competent Person
 (excavations, confined space, scaffolds, hazardous material, heavy equipment)
 Other: _____



PRESENT CREW MEMBERS

PRINT Crew Names	Signature

POST STA

Superintendent: _____
 Date: _____ Time: _____

Was anyone injured or did an unplanned incident occur today?
 Yes No

If yes, explain: _____

Was it reported to the Safety department?
 Yes No

Is the work area clean and free of debris from the day's work?
 Yes No

What problems did you have with today's work assignment?

What can we do to improve performance?

Miscellaneous concerns:

REVIEWERS

Superintendent: _____
 Safety Manager: _____

MANAGEMENT PARTICIPATION

Project Manager: _____

Return to the Project Manager Daily

PERSONAL PROTECTIVE EQUIPMENT

CLOTHING
 Chemical Resistant Fire Retardant
 Reflective Vest or Hand-held signal device

EAR PROTECTION
 Ear Plugs Ear Muffs

EYE / FACE PROTECTION
 Safety Glasses with Side-shields
 Goggles Monogoggles
 Welding Hood Face Shield

FALL PROTECTION
 Harness

FOOT PROTECTION (BOOTS)
 Steel Toed Electrical-Rated
 Rubber

HAND PROTECTION (GLOVES)
 Leather Rubber / Latex
 Chemical Resistant

HEAD PROTECTION
 Hard Hat

RESPIRATORY PROTECTION
 Qualified to wear?
 Type: _____
 Other: _____



STA SAFETY TASK ASSESSMENT

Project Name: _____

Client Name: _____

Location: _____

ZERO INCIDENTS

Superintendent: _____

Date: _____ Time: _____

Task Location: _____

Task Description: _____

TECHNOLOGY

CIPP Pipe Bursting CCTV / Clean
 Geokrete Manhole Rehab Open Cut
 Grouting Other: _____

vortexcompanies.com

SAFETY TASK ASSIGNMENT

The Vortex Safety Task Assignment (STA) process significantly impacts the success of our Safety culture and the reduction of incidents. The interactive process requires that management/supervisors and employees shall:

- › **(Step 1)** - Define the general task for each activity
 - › **(Step 2)** - Identify known and potential HSE hazards associated with the task
 - › **(Step 3)** - Determine work practices to complete the task safely
 - › **(Step 4)** - Identify what's different today
- ✓ Address requirements for all personal protective equipment.
 - ✓ Establish that all crew/department employees understand the above information.
 - ✓ Each crew member is empowered to continuously participate in this process in an effort to promote our ZERO Incidents culture.
 - ✓ Safely execute the task as described if conditions change, revise accordingly.

STAs will be completed DAILY. Post this STA in an obvious place throughout the duration of the task. Each crew member involved with the task will sign this STA.

KNOW THE EMERGENCY PROCEDURE FOR YOUR WORK AREA!

Step 1 - General Task Assignment

Step 2 - Potential Hazards

Step 3 - Safe Work Practices Pertinent to Hazards





CIVIL INFRASTRUCTURE SOLUTIONS

HAZARD COMMUNICATION (HAZCOM)



Vortex Companies

Procedure Name	Environmental, Health & Safety Manual - Hazardous Communication (HAZCOM-GHS)
Applicability	VORTEX Companies - Employees & Subcontractors
Policy Revised	12.01.15

Purpose

The purpose of this program is to ensure that the hazards of all chemicals and substances are evaluated and the information concerning their hazards is communicated to employees, including emergency response organizations, state and federal agencies, other employers and contractors, as necessary. This hazard information will be communicated, and displayed in accordance with this Hazard Communication Program.

VORTEX Companies is firmly committed to providing each of its employees a safe and healthy work environment. It is recognized that workers may use chemicals or substances that have potentially hazardous properties. When using these substances, workers must be aware of the identity, toxicity or hazardous properties of a chemical or substance, since an informed employee is more likely to be a safe employee. To this end, VORTEX Companies has established a written Hazard Communication Program.

Scope

This program is applicable to all VORTEX Companies employees who may be exposed to hazardous chemicals. When work is performed on a non-owned or operated site, the operator's program shall take precedence, however, this document covers VORTEX Companies employees and contractors and shall be used on owned premises, or when an operator's program doesn't exist or is less stringent.

Definitions

Chemical - Any element, chemical compound, or mixture of elements and/or compounds.

Chemical Inventory List - A list of chemicals used at this facility, or by personnel that report to this facility.

Electronic Access - Using electronic media (telephone, fax, internet, etc.) to obtain Safety Data Sheets or health information.

Facility - An establishment at one geographical location containing one or more work areas.

Hazardous Chemical - Any chemical that is a physical hazard, a health hazard, or has a Permissible Exposure Limit established for it.

Hazardous Substance - See hazardous chemical.

Hazard Communication Program Coordinator - The person who has overall responsibility at a facility for that facility's Hazard Communication Program.



Health Hazard - A substance for which there is statistically significant evidence based on at least one study conducted in accordance with established scientific principles that acute or chronic adverse health effects may occur in exposed employees.

IDLH - Immediately dangerous to life and health.

Immediate Use - The chemical will be under the control of and used only by the person who transfers it from a labeled container and only within the work shift in which it is transferred.

Jobsite - An area remote from a VORTEX Companies facility where hazardous chemicals are stored or used and employees are present for the purpose of VORTEX Companies business.

Safety Data Sheet (SDS) - Written or printed material concerning a hazardous chemical that is prepared in accordance with paragraph (g) of this section.

National Fire Protection Association Labeling (NFPA) - A common industry labeling method developed by the National Fire Protection Association to identify the hazards associated with a particular chemical.

Permissible Exposure Limit (PEL) - The maximum eight-hour time weighted average of any airborne contaminant to which an employee may be exposed.

Readily Available - When an employee has access during the course of his/her normal work shift.

Substance - See Chemical.

Threshold Limit Value (TLV) - The airborne concentration of a substance that represents conditions under which it is believed that nearly all normal workers may be repeatedly exposed day after day without adverse effect.

Work Area - A room or defined space in a facility where hazardous chemicals are stored or used and where one or more employees are present.

Workplace - See Facility.

Workplace Chemical List - See Facility Chemical List.

Responsibilities

A written hazard communication program shall be developed, implemented and maintained at each VORTEX Companies workplace. The program shall describe how labels, other forms of warning and safety data sheets shall be communicated to employees.

The CSO is responsible for developing and implementing the Hazard Communications Program. Managers are responsible for maintaining Safety Data Sheets and the Chemical Inventory List for their locations. The CSO reviews the SDS files and Chemical Inventory List at each location at least annually to ensure that they are complete and up to date.



Employees are responsible for following the requirements in the Hazard Communication Program, to use proper personal protective equipment, to report containers without labels immediately and to not deface any label.

Any employee who transfers any material from one container to another is responsible for labeling the new container with all required information.

All employees are responsible for learning the requirements of this section and for applying them to their daily work routine.

Requirements

Introduction

This Hazard Communication Program was prepared for use by VORTEX Companies to explain how VORTEX Companies meets the requirements of the federal Occupational Safety and Health Administration's Hazard Communication Standard (29 CFR 1910.1200). It spells out how VORTEX Companies will inventory chemicals stored and used, obtain and use safety data sheets, maintain labels on chemical substances, and train employees about the hazards of chemicals they are likely to encounter on the job.

Preparation of this program indicates our continuing commitment to safety among our employees in all of our locations.

- Each facility is expected to follow this program and maintain its work areas in accordance with these requirements.
- Employees, their designated representatives, and government officials must be provided copies of this program upon request.
- In addition to the program, other information required as part of our hazard communication effort is available to workers upon request.
- Asking to see this information is an employee's right.
- Using this information is part of our shared commitment to a safe, healthy workplace.

List of Hazardous Chemicals

VORTEX Companies maintains a listing of all known hazardous chemicals known to be present at, or by this facility by using the identity that is referenced on the safety data sheet (SDS). This identity is often a common name, such as the product or trade name (i.e., Lime-A-Way).

The Chemical Inventory List is updated as necessary and at least annually by the Hazard Communication Program Coordinator or their designee.

The facility Chemical Inventory List must be available for review upon request.

Safety Data Sheets

Chemical manufacturers and importers shall obtain or develop a safety data sheet for each hazardous chemical they produce or import. VORTEX Companies shall have a safety data sheet in the workplace for each hazardous chemical which they use.

Safety Data Sheets, for chemicals used in this facility or by personnel reporting to this facility, shall be maintained, readily accessible in each work area and be made available, upon request, to employees, their designated representatives and regulatory officials.



Safety Data Sheets are to be provided by manufacturers upon request.

VORTEX Companies shall maintain any safety data sheets that are received with incoming shipments of hazardous chemicals, and ensure that they are readily accessible during each work shift to laboratory employees when they are in their work areas.

VORTEX Companies shall maintain copies of any safety data sheets that are received with incoming shipment of the sealed containers of hazardous chemicals, shall obtain a safety data sheet as soon as possible for sealed containers of hazardous chemicals received without a safety data sheet if an employee requests the safety data sheet, and shall ensure that the safety data sheets are readily accessible during each work shift to employees when they are in their work area(s).

VORTEX Companies CSO must provide a list of the hazardous chemicals known to be present using a product identifier that is referenced on the appropriate safety data sheet (the list may be compiled for the workplace as a whole or for individual work areas).

The chemical manufacturer or importer preparing the safety data sheet shall ensure that it is in English (although VORTEX Companies may maintain copies in other languages as well), and includes at least the following section number and headings, and associated information under each heading, in the order listed:

- Section 1, Identification.
- Section 2, Hazard(s) identification.
- Section 3, Composition/information on ingredients.
- Section 4, First-aid measures.
- Section 5, Fire-fighting measures.
- Section 6, Accidental release measures.
- Section 7, Handling and storage.
- Section 8, Exposure controls/personal protection.
- Section 9, Physical and chemical properties.
- Section 10, Stability and reactivity.
- Section 11, Toxicological information.
- Section 12, Ecological information.
- Section 13, Disposal considerations.
- Section 14, Transport information.
- Section 15, Regulatory information.
- Section 16, Other information, including date of preparation or last revision.

If no relevant information is found for any sub-heading within a section on the safety data sheet, the chemical manufacturer, importer or employer preparing the safety data sheet shall mark it to indicate that no applicable information was found.

Where complex mixtures have similar hazards and contents (i.e. the chemical ingredients are essentially the same, but the specific composition varies from mixture to mixture), the chemical manufacturer, importer or VORTEX Companies may prepare one safety data sheet to apply to all of these similar mixtures.



The chemical manufacturer, importer or employer preparing the safety data sheet shall ensure that the information provided accurately reflects the scientific evidence used in making the hazard classification. If the chemical manufacturer, importer or employer preparing the safety data sheet becomes newly aware of any significant information regarding the hazards of a chemical, or ways to protect against the hazards, this new information shall be added to the safety data sheet within three months. If the chemical is not currently being produced or imported, the chemical manufacturer or importer shall add the information to the safety data sheet before the chemical is introduced into the workplace again.

Chemical manufacturers or importers shall ensure that distributors and employers are provided an appropriate safety data sheet with their initial shipment, and with the first shipment after a safety data sheet is updated.

The chemical manufacturer or importer shall either provide safety data sheets with the shipped containers or send them to the distributor or VORTEX Companies prior to or at the time of the shipment.

If the safety data sheet is not provided with a shipment that has been labeled as a hazardous chemical, the distributor or VORTEX Companies shall obtain one from the chemical manufacturer or importer as soon as possible.

The chemical manufacturer or importer shall also provide distributors or employers with a safety data sheet upon request.

Distributors shall ensure that safety data sheets, and updated information, are provided to other distributors and employers with their initial shipment and with the first shipment after a safety data sheet is updated.

The distributor shall either provide safety data sheets with the shipped containers, or send them to the other distributor or VORTEX Companies prior to or at the time of the shipment.

Retail distributors selling hazardous chemicals to employers having a commercial account shall provide a safety data sheet to such employers upon request, and shall post a sign or otherwise inform them that a safety data sheet is available.

Wholesale distributors selling hazardous chemicals to employers over-the-counter may also provide safety data sheets upon the request of VORTEX Companies at the time of the over-the-counter purchase, and shall post a sign or otherwise inform such employers that a safety data sheet is available.

If an employer without a commercial account purchases a hazardous chemical from a retail distributor not required to have safety data sheets on file (i.e., the retail distributor does not have commercial accounts and does not use the materials), the retail distributor shall provide VORTEX Companies, upon request, with the name, address, and telephone number of the chemical manufacturer, importer, or distributor from which a safety data sheet can be obtained.

Wholesale distributors shall also provide safety data sheets to VORTEX Companies or other distributors upon request.

Chemical manufacturers, importers, and distributors need not provide safety data sheets to retail distributors that have informed them that the retail distributor does not sell the product to commercial accounts or open the sealed container to use it in their own workplaces.



VORTEX Companies shall maintain in the workplace copies of the required safety data sheets for each hazardous chemical, and shall ensure that they are readily accessible during each work shift to employees when they are in their work area(s). Electronic access and other alternatives to maintaining paper copies of the safety data sheets are permitted as long as no barriers to immediate employee access in each workplace are created by such options.

Where employees must travel between workplaces during a workshift, i.e., their work is carried out at more than one geographical location, the material safety data sheets may be kept at the primary workplace facility. In this situation, VORTEX Companies shall ensure that employees can immediately obtain the required information in an emergency.

Safety data sheets may be kept in any form, including operating procedures, and may be designed to cover groups of hazardous chemicals in a work area where it may be more appropriate to address the hazards of a process rather than individual hazardous chemicals. However, VORTEX Companies shall ensure that in all cases the required information is provided for each hazardous chemical, and is readily accessible during each work shift to employees when they are in their work area(s).

Safety data sheets shall also be made readily available, upon request, to designated representatives, the Assistant Secretary, and the Director, in accordance with the requirements of § 1910.1020(e).

Training

VORTEX Companies shall provide employees and new hires at their initial assignment effective information and training on hazardous chemicals in their work area.

Additional training will be provided whenever a new chemical hazard is introduced into the work area. To reinforce the importance of handling chemicals properly when performing new or non-routine tasks, Site management will coordinate supplementary training as needed.

Formal training will be conducted by facility employees or individuals who are knowledgeable in the Hazard Communication program.

The Manager shall ensure records of employee training are maintained.

When an outside contractor, such as a pest control worker or a carpenter enters a VORTEX Companies site to perform a service for the company, he must first present SDS' for any and all hazardous chemicals he will use. These SDS' will be treated as above with the same training requirements. The Manager will be responsible for contacting each contractor before work is started to gather and disseminate any information concerning chemical hazards the contractor is bringing into the work place.

The Hazard Communication Program documented training shall, as a minimum, include:

- Requirements, details and rights of the employee as contained in the Hazard Communication regulation.
- Operations and work areas where hazardous chemicals are present.
- Location of the written Hazard Communication Program, SDSs and the Chemical Inventory List.
- How to access SDS' or SDS information.



- How to read and an explanation of labels and Safety Data Sheets for pertinent hazard information and how employees can obtain and use the appropriate hazard information.
- Methods and observations that may be used to detect the presence or release of hazardous chemicals by use of monitoring devices, visual appearance or odor.
- The physical & health hazards of chemicals in the work area.
- Protection measures to be utilized to prevent exposure.
- Appropriate work practices.
- Emergency procedures.
- Proper PPE to be used.

Multi-Employer Jobsites/Multi-Work Site

Multi-Work Sites

Where employees must travel between work places during a work shift, the written HAZCOM Program shall be kept at a primary jobsite. If there is no primary jobsite, then the program shall be sent with employees.

The program shall be made available, upon request, to employees, their designated representatives, the Assistant Secretary and the Director in accordance with requirements of 29 CFR 1910.1020(e).

Multi-Employer Jobsites

A pre-job briefing shall be conducted with the contractor prior to the initiation of work on the site.

- During this pre-job briefing, contractors shall notify VORTEX Companies and present current copies of Safety Data Sheets and label information for every hazardous substance brought VORTEX Companies shall notify and provide SDS' and label information for all hazardous materials the contractor may encounter on the job.
- The facilities labeling system and any precautionary measures to be taken by contractor during normal conditions and emergencies shall be addressed.
- By providing such information to other employers, VORTEX Companies does not assume any obligations that other employers have for the safety of their employees.
- In this regard, other employers working on VORTEX Companies property or for VORTEX Companies on client's property remain fully responsible for developing and implementing their own compliant hazard communication programs.

Hazard Warnings/ NFPA 704

The NFPA 704 Diamond is a means of disseminating hazard warning and information for a material. The diamond is divided into four sections. Each of the first three colored sections has a number in it associated with a particular hazard. The higher the number is, the more hazardous a material is for that characteristic. The fourth section includes special hazard information. The four sections and an explanation of the numbers in them are provided at right:

NFPA Rating Explanation Guide					
RATING NUMBER	HEALTH HAZARD	FLAMMABILITY HAZARD	INSTABILITY HAZARD	RATING SYMBOL	SPECIAL HAZARD
4	Can be lethal	Will vaporize and readily burn at normal temperatures	May explode at normal temperatures and pressures	ALK	Alkaline
3	Can cause serious or permanent injury	Can be ignited under almost all ambient temperatures	May explode at high temperature or shock	ACID	Acidic
2	Can cause temporary incapacitation or residual injury	Must be heated or high ambient temperature to burn	Violent chemical change at high temperatures or pressures	COR	Corrosive
1	Can cause significant irritation	Must be preheated before ignition can occur	Normally stable. High temperatures make unstable	OX	Oxidizing
0	No hazard	Will not burn	Stable	RA	Radioactive
				W	Reacts violently or explosively with water
				W OX	Reacts violently or explosively with water and oxidizing



CIVIL INFRASTRUCTURE SOLUTIONS

HAZCOM: LABELS AND PICTOGRAMS



Vortex Companies

Procedure Name	HAZCOM: Labels and Pictograms
Applicability	VORTEX Companies – Employees & Subcontractors
Policy Revised	05.14.19

Purpose

OSHA has adopted new hazardous chemical labeling requirements as a part of its recent revision of the Hazard Communication Standard, 29 CFR 1910.1200 (HCS), bringing it into alignment with the United Nations' Globally Harmonized System of Classification and Labelling of Chemicals (GHS). These changes will help ensure improved quality and consistency in the classification and labeling of all chemicals and will also enhance worker comprehension. As a result, workers will have better information available on the safe handling and use of hazardous chemicals, thereby allowing them to avoid injuries and illnesses related to exposures to hazardous chemicals.

The revised HCS changes the existing Hazard Communication Standard (HCS/HazCom 1994) from a performance-based standard to one that has more structured requirements for the labeling of chemicals. The revised standard requires that information about chemical hazards be conveyed on labels using quick visual notations to alert the user, providing immediate recognition of the hazards. Labels must also provide instructions on how to handle the chemical so that chemical users are informed about how to protect themselves.

The label provides information to the workers on the specific hazardous chemical. While labels provide important information for anyone who handles, uses, stores, and transports hazardous chemicals, they are limited by design in the amount of information they can provide. Safety Data Sheets (SDSs), which must accompany hazardous chemicals, are the more complete resource for details regarding hazardous chemicals. The revised standard also requires the use of a 16-section safety data sheet format, which provides detailed information regarding the chemical. There is a separate OSHA Brief on SDSs that provides information on the new SDS requirements.

All hazardous chemicals shipped after June 1, 2015, must be labeled with specified elements including pictograms, signal words and hazard and precautionary statements. However, manufacturers, importers, and distributors may start using the new labeling system in the revised HCS before the June 1, 2015 effective date if they so choose. Until the June 1, 2015 effective date, manufacturers, importers and distributors may maintain compliance with the requirements of HazCom 1994 or the revised standard. Distributors may continue to ship containers labeled by manufacturers or importers (but not by the distributor themselves) in compliance with the HazCom 1994 until December 1, 2015.

This document is designed to inform chemical receivers, chemical purchasers, chemical handlers, and trainers about the label requirements. It explains the new labeling elements, identifies what goes on a label, and describes what pictograms are and how to use them.



Label Requirements

Labels, as defined in the HCS, are an appropriate group of written, printed or graphic informational elements concerning a hazardous chemical that are affixed to, printed on, or attached to the immediate container of a hazardous chemical, or to the outside packaging.

The HCS requires chemical manufacturers, importers, or distributors to ensure that each container of hazardous chemicals leaving the workplace is labeled, tagged or marked with the following information: product identifier; signal word; hazard statement(s); precautionary statement(s); and pictogram(s); and name, address and telephone number of the chemical manufacturer, importer, or other responsible party.

Labels for a Hazardous Chemical Must Contain:
Name, Address and Telephone Number
Product Identifier
Signal Word
Hazard Statement(s)
Precautionary Statement(s)
Pictograms(s)

To develop labels under the revised HCS, manufacturers, importers and distributors must first identify and classify the chemical hazard(s). Appendices A, B, and C are all mandatory. The classification criteria for health hazards are in Appendix A and the criteria for physical hazards are presented in Appendix B of the revised Hazard Communication Standard. After classifying the hazardous chemicals, the manufacturer, importer or distributor then consults Appendix C to determine the appropriate pictograms, signal words, and hazard and precautionary statement(s), for the chemical label. Once this information has been identified and gathered, then a label may be created.

Label Elements

The HCS now requires the following elements on labels of hazardous chemicals:

Name, Address and Telephone Number

Chemical manufacturer, importer or other responsible party.

Product Identifier

This is how the hazardous chemical is identified. This can be (but is not limited to) the chemical name, code number or batch number. The manufacturer, importer or distributor can decide the appropriate product identifier. The same product identifier must be both on the label and in section 1 of the SDS.

Signal Words

Are used to indicate the relative level of severity of the hazard and alert the reader to a potential hazard on the label. There are only two words used as signal words, "Danger" and "Warning." Within a specific hazard class, "Danger" is used for the more severe hazards and "Warning" is used for the less severe hazards. There will only be one signal word on the label no matter how many hazards a chemical may have. If one of the hazards warrants a "Danger" signal word and another warrants the signal word "Warning," then only "Danger" should appear on the label.



Hazard Statements

Describe the nature of the hazard(s) of a chemical, including, where appropriate, the degree of hazard. For example: “Causes damage to kidneys through prolonged or repeated exposure when absorbed through the skin.” All the applicable hazard statements must appear on the label. Hazard statements may be combined where appropriate to reduce redundancies and improve readability. The hazard statements are specific to the hazard classification categories, and chemical users should always see the same statement for the same hazards no matter what the chemical is or who produces it.

Precautionary Statements

Describe recommended measures that should be taken to minimize or prevent adverse effects resulting from exposure to the hazardous chemical or improper storage or handling. There are four types of precautionary statements: prevention (to minimize exposure); response (in case of accidental spillage or exposure emergency response, and first-aid); storage; and disposal. For example, a chemical presenting a specific target organ toxicity (repeated exposure) hazard would include the following on the label: “Do not breathe dust/fume/gas/mist/ vapors/spray. Get medical advice/attention if you feel unwell. Dispose of contents/ container in accordance with local/regional/ national and international regulations.”

A forward slash (/) designates that the classifier can choose one of the precautionary statements. In the example above, the label could state, “Do not breathe vapors or spray. Get medical attention if you feel unwell. Dispose of contents in accordance with local/regional/ national/international regulations.” See Examples 1 and 2A of this document as an example. In most cases, the precautionary statements are independent. However, OSHA does allow flexibility for applying precautionary statements to the label, such as combining statements, using an order of precedence or eliminating an inappropriate statement.

Precautionary statements may be combined on the label to save on space and improve readability. For example, “Keep away from heat, spark and open flames,” “Store in a well-ventilated place,” and “Keep cool” may be combined to read: “Keep away from heat, sparks and open flames and store in a cool, well-ventilated place.” Where a chemical is classified for several hazards and the precautionary statements are similar, the most stringent statements must be included on the label. In this case, the chemical manufacturer, importer, or distributor may impose an order of precedence where phrases concerning response require rapid action to ensure the health and safety of the exposed person. In the self-reactive hazard category Types C, D, E or F, three of the four precautionary statements for prevention are:

1. “Keep away from heat/sparks/open flame/hot surfaces. - No Smoking.”;
2. “Keep/Store away from clothing/.../ combustible materials”;
3. “Keep only in original container.”

These three precautionary statements could be combined to read: “Keep in original container and away from heat, open flames, combustible materials and hot surfaces. - No Smoking.”

Finally, a manufacturer or importer may eliminate a precautionary statement if it can demonstrate that the statement is inappropriate.



Supplementary Information

The label producer may provide additional instructions or information that it deems helpful. It may also list any hazards not otherwise classified under this portion of the label. This section must also identify the percentage of ingredient(s) of unknown acute toxicity when it is present in a concentration of <1% (and the classification is not based on testing the mixture as a whole). If an employer decides to include additional information regarding the chemical that is above and beyond what the standard requires, it may list this information under what is considered "supplementary information." There is also no required format for how a workplace label must look and no format an employer must use; however, it cannot contradict or detract from the required information.










An example of an item that may be considered supplementary is the personal protective equipment (PPE) pictogram indicating what workers handling the chemical may need to wear to protect themselves. For example, the Hazardous Materials Identification System (HMIS) pictogram of a person wearing goggles may be listed. Other supplementary information may include directions of use, expiration date, or fill date, all of which may provide additional information specific to the process in which the chemical is used.

Pictograms

Are graphic symbols used to communicate specific information about the hazards of a chemical. On hazardous chemicals being shipped or transported from a manufacturer, importer or distributor, the required pictograms consist of a red square frame set at a point with a black hazard symbol on a white background, sufficiently wide to be clearly visible. A square red frame set at a point without a hazard symbol is not a pictogram and is not permitted on the label.

The pictograms OSHA has adopted improve worker safety and health, conform with the GHS, and are used worldwide. While the GHS uses a total of nine pictograms, OSHA will only enforce the use of eight. The environmental pictogram is not mandatory but may be used to provide additional information. Workers may see the ninth symbol on a label because label preparers may choose to add the environment pictogram as supplementary information. Figure 1 shows the symbol for each pictogram, the written name for each pictogram, and the hazards associated with each of the pictograms. Most of the symbols are already used for transportation and many chemical users may be familiar with them.

Figure 1: Pictograms and Hazards

Health Hazard <ul style="list-style-type: none"> • Carcinogen • Mutagenicity • Reproductive Toxicity • Respiratory Sensitizer • Target Organ Toxicity • Aspiration Toxicity 	Flame <ul style="list-style-type: none"> • Flammables • Pyrophorics • Self-Heating • Emits Flammable Gas • Self-Reactives • Organic Peroxides 	Exclamation Mark <ul style="list-style-type: none"> • Irritant (Skin and Eye) • Skin Sensitizer • Acute Toxicity • Narcotic Effects • Respiratory Tract Irritant • Hazardous to Ozone Layer (Non-Mandatory) 
Gas Cylinder <ul style="list-style-type: none"> • Gases Under Pressure 	Corrosion <ul style="list-style-type: none"> • Skin Corrosion/Burns • Eye Damage • Corrosive to Metals 	Exploding Bomb <ul style="list-style-type: none"> • Explosives • Self-Reactives • Organic Peroxides 
Flame Over Circle <ul style="list-style-type: none"> • Oxidizers 	Environment (Non-Mandatory) <ul style="list-style-type: none"> • Aquatic Toxicity 	Skull and Crossbones <ul style="list-style-type: none"> • Acute Toxicity (Fatal or Toxic) 



It is important to note that the OSHA pictograms do not replace the diamond-shaped labels that the U.S. Department of Transportation (DOT) requires for the transport of chemicals, including chemical drums, chemical totes, tanks or other containers. Those labels must be on the external part of a shipped container and must meet the DOT requirements set forth in 49 CFR 172, Subpart E. If a label has a DOT transport pictogram, Appendix C.2.3.3 states that the corresponding HCS pictogram shall not appear. However, DOT does not view the HCS pictogram as a conflict and for some international trade both pictograms may need to be present on the label. Therefore, OSHA intends to revise C.2.3.3. In the meantime, the agency will allow both DOT and HCS pictograms for the same hazard on a label. While the DOT diamond label is required for all hazardous chemicals on the outside shipping containers, chemicals in smaller containers inside the larger shipped container do not require the DOT diamond but do require the OSHA pictograms. (See Example 2.)

Labels must be legible, in English, and prominently displayed. Other languages may be displayed in addition to English. Chemical manufacturers, importers, and distributors who become newly aware of any significant information regarding the hazards of a chemical must revise the label within six months.

Employer Responsibilities

Employers are responsible for maintaining the labels on the containers, including, but not limited to, tanks, totes, and drums. This means that labels must be maintained on chemicals in a manner which continues to be legible and the pertinent information (such as the hazards and directions for use) does not get defaced (i.e., fade, get washed off) or removed in any way.

The employer is not responsible for updating labels on shipped containers, even if the shipped containers are labeled under HazCom 1994. The employer must relabel items if the labels are removed or defaced. However, if the employer is aware of newly-identified hazards that are not disclosed on the label, the employer must ensure that the workers are aware of the hazards as discussed below under workplace labels.

Workplace Labels

OSHA has not changed the general requirements for workplace labeling. Employers have the option to create their own workplace labels. They can either provide all the required information that is on the label from the chemical manufacturer or, the product identifier and words, pictures, symbols or a combination thereof, which in combination with other information immediately available to employees, provide specific information regarding the hazards of the chemicals.

If an employer has an in-plant or workplace system of labeling that meets the requirements of HazCom 1994, the employer may continue to use this system in the workplace as long as this system, in conjunction with other information immediately available to the employees, provides the employees with the information on all the health and physical hazards of the hazardous chemical. This workplace labeling system may include signs, placards, process sheets, batch tickets, operating procedures, or other such written materials to identify hazardous chemicals. Any of these labeling methods or a combination thereof may be used instead of a label from the manufacturer, importer or distributor if the employees have immediate access to all the information about the hazards of the chemical. Workplace labels must be in English. Other languages may be added to the label if applicable.

If the employer chooses to use the pictograms that appear in Appendix C on the workplace (or in-plant) labels, these pictograms may have a black border, rather than a red border.



Employers may use additional instructional symbols that are not included in OSHA's HCS pictograms on the workplace labels. An example of an instructional pictogram is a person with goggles, denoting that goggles must be worn while handling the given chemical. Including both types of pictograms on workplace labels is acceptable. The same is true if the employer wants to list environmental pictograms or PPE pictograms from the HMIS to identify protective measures for those handling the chemical.

Employers may continue to use rating systems such as National Fire Protection Association (NFPA) diamonds or HMIS requirements for workplace labels if they are consistent with the requirements of the Hazard Communication Standard and the employees have immediate access to the specific hazard information as discussed above. An employer using NFPA or HMIS labeling must, through training, ensure that its employees are fully aware of the hazards of the chemicals used.

If an employer transfers hazardous chemical from a labeled container to a portable container that is only intended for immediate use by the employee who performs the transfer, no labels are required for the portable container.

Sample Labels

The following examples demonstrate how a manufacturer or importer may display the appropriate information on the label. As mentioned above, once the manufacturer determines the classification of the chemical (class and category of each hazard) using Appendices A and B, it would determine the required pictograms, signal words, hazard statements, and precautionary statements using Appendix C. The final step is to put the information on the label.

The examples below show what a sample label might look like under the revised HCS requirements. The examples break the labeling out into "steps" to show the order of information gathering and how label creation occurs. Step 1 is performing classification; step 2 is gathering full label information; and step 3 is creating the label.

These examples are for informational purposes only and are not meant to represent the only labels manufacturers, importers and distributors may create for these hazards.



EXAMPLE 1: THIS EXAMPLE DEMONSTRATES A SIMPLE LABEL

The Substance:

HS85
Batch Number: 85L6543

Step 1: Perform Classification

Class: Acute Oral Toxicity; Category 4

Step 2: Gather Labeling Information

Pictograms:



Signal Word:

WARNING

Hazard Statements:

Harmful if Swallowed

Precautionary Statements

Prevention:

- Wash hands and face thoroughly after handling.
- Do not eat, drink or smoke when using this product.

Response:

- If swallowed: Call a doctor if you feel unwell.
- Rinse mouth

Storage:

None specified

Disposal:

- Dispose of contents/container in accordance with local/regional/national/international regulations

Step 3: Create the Label

Putting together the above information on HS85, a label might list the following information:

EXAMPLE 1: HS85 LABEL

HS85

Batch Number 85L6543



Warning

Harmful if swallowed

Wash hands and face thoroughly after handling. Do not eat, drink or smoke when using this product.
Dispose of contents/container in accordance with local, state and federal regulations.

First Aid:

If swallowed: Call a doctor if you feel unwell. Rinse mouth.



EXAMPLE 2: THIS EXAMPLE DEMONSTRATES A MORE COMPLEX LABEL

Example 2 is for a substance that is a severe physical and health hazard. For shipping packages of chemicals that will be transported in the United States (i.e., drums, totes, tanks, etc.), the U.S. DOT requires a DOT label(s) on the outside container(s) for hazardous chemicals. Two versions of this label are presented below to demonstrate the difference between an OSHA label with pictograms from the HCS and a DOT label required for transport of a shipping container.

The Substance:

OXI252 (disodiumflammy)

CAS number: 111-11-11xx

Step 1: Perform Classification

Class: Oxidizing Solid, Category 1

Class: Skin Corrosive, Category 1A

Step 2: Gather Labeling Information

Pictograms:



Signal Word:

DANGER

Hazard Statements:

- May cause fire or explosion; strong oxidizer
- Causes severe skin burns and eye damage

Precautionary Statements

Prevention:

- Keep away from heat.
- Keep away from clothing and other combustible materials.
- Take any precaution to avoid mixing with combustibles.
- Wear protective neoprene gloves, safety goggles and face shield with chin guard.
- Wear fire/flame resistant clothing.
- Do not breathe dust or mists.
- Wash arms, hands and face thoroughly after handling.

Response:

- IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water.
- IF ON CLOTHING: Rinse immediately contaminated clothing and skin with plenty of water before removing clothes. Wash contaminated clothing before reuse.
- IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
- IF INHALED: Remove person to fresh air and keep comfortable for breathing.
- IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
- Immediately call poison center.

Specific Treatment:

Treat with doctor-prescribed burn cream.⁵

In Case of Fire:

Use water spray. In case of major fire and large quantities: Evacuate area. Fight fire remotely due to the risk of explosion.

Storage:

Store locked up.

Disposal:

- Dispose of contents/container in accordance with local/regional/national/international regulations

Step 3: Create the Label

Putting together the above information on OXI252, a label might list the following information (see next page):



EXAMPLE 2B: OXI252 LABEL MEETING DOT REQUIREMENTS FOR SHIPPING7

OXI252

(disodiumflammy) CAS #: 111-11-11xx



Danger

May cause fire or explosion; strong oxidizer causes severe skin burns and eye damage.

Keep away from heat. Keep away from clothing and other combustible materials. Take any precaution to avoid mixing with combustibles. Wear protective neoprene gloves, safety goggles and face shield with chin guard. Wear fire/flame resistant clothing. Do not breathe dust or mists. Wash arms, hands and face thoroughly after handling. Store locked up. Dispose of contents and container in accordance with local, state and federal regulations.

First Aid:

IF ON SKIN (or hair) or clothing: Rinse immediately contaminated clothing and skin with plenty of water before removing clothes. Wash contaminated clothing before reuse.

IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a doctor.

IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.

Immediately call poison center.

Specific Treatment: Treat with doctor-prescribed burn cream.

Fire:

In case of fire: Use water spray. In case of major fire and large quantities: Evacuate area. Fight fire remotely due to the risk of explosion.

Great Chemical Company, 55 Main Street, Anywhere, CT 064XX

Telephone (888) 777-8888

EXAMPLE 2A: OXI252 LABEL INNER PACKAGE LABEL WITH OSHA PICTOGRAMS

OXI252

(disodiumflammy) CAS #: 111-11-11xx



Danger

May cause fire or explosion; strong oxidizer causes severe skin burns and eye damage.

Keep away from heat. Keep away from clothing and other combustible materials. Take any precaution to avoid mixing with combustibles. Wear protective neoprene gloves, safety goggles and face shield with chin guard. Wear fire/flame resistant clothing. Do not breathe dust or mists. Wash arms, hands and face thoroughly after handling. Store locked up. Dispose of contents and container in accordance with local, state and federal regulations.

First Aid:

IF ON SKIN (or hair) or clothing: Rinse immediately contaminated clothing and skin with plenty of water before removing clothes. Wash contaminated clothing before reuse.

IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a doctor.

IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.

Immediately call poison center.

Specific Treatment: Treat with doctor-prescribed burn cream.

Fire:

In case of fire: Use water spray. In case of major fire and large quantities: Evacuate area. Fight fire remotely due to the risk of explosion.

Great Chemical Company, 55 Main Street, Anywhere, CT 064XX

Telephone (888) 777-8888



CIVIL INFRASTRUCTURE SOLUTIONS

HAZARD WASTE CONTINGENCY PLAN



Vortex Companies

Procedure Name	Environmental, Health & Safety Manual – Hazardous Waste Contingency Plan
Applicability	VORTEX Companies – Employees & Subcontractors
Policy Revised	05.02.18

Purpose

This contingency plan is designed to minimize hazards to human health or the environment from fires, explosions, or any unplanned or sudden or non-sudden release of chemicals or hazardous waste to the air, soil, or surface water.

Scope

This program applies to the VORTEX Company and all employees that may be present onsite.

Roles and Responsibilities

All communications for Hazardous Waste must go through the Hazardous Waste manager or team leaders.

At all times, one of the team leaders or Hazardous Waste Facilities managers must be on site.

Safety meetings and training of employees is done weekly in the safety meeting conducted by Scott Peterson and recorded in the safety-meeting log.

- Hazardous Waste Facilities manager is Scott Peterson.
- 1st team leader is Matthew Peterson
- 2nd Team leader Ryan Eakin

General Information and Requirements

VORTEX Companies developed this training program along with the J.J. Keller Hazardous waste training program to comply with State and Federal regulations.

VORTEX Companies is a quantity generator of Hazardous Waste as determined by subpart D of 40 CFR Part 261 The waste that is being generated by VORTEX Companies is being transported by AET Environment to be burned. No other disposal has been used or is approved by VORTEX Companies Waste that for any reason cannot be delivered to AET must be returned to VORTEX Companies no secondary facility is approved.

The waste that is disposed of by AET for VORTEX Companies is a specific type of waste and the frequency of the shipments are monthly as needed.

Many solvents used inside the facility are dirty from washing the paint pots. These solvents can be used many times before they have lost their strength. Some of them may be used in low-grade primers. These solvents that are used in cleaning are called DIRTY WASH SOLVENTS. The drum marking for this is DWS. Stag does not consider this material to be Hazardous Waste it is a raw good that is used in some of the coatings.



The EPA ID # UTR has been upgraded to small quantity generator.

Manifest

Manifests are kept in Scott's office in the Credenza on the right-side drawer.

Manifests are filled out by Scott or Matthew the 1st team leader and kept in the file.

AET returns after every shipment a document verifying that the waste was disposed of by the disposal facility.

Scott keeps all return verifications up to date.

Manifests and the reclamation agreement are kept for at least 3 years after the expiration of the agreement.

With each shipment do the following:

1. Maintain 1 copy of the manifest.
2. Send two copies of the manifest with the shipper.
3. Verify that a copy of the manifest is returned after the waste is disposed of.

Use of the Manifest

1. Sign the manifest certification by hand.
2. Obtain the handwritten signature of the initial transporter and date of acceptance on the manifest.
3. Retain one copy in accordance with EPA requirements.
4. Give remaining copies to the transporter.

Pre-Inspection Checklist

After the shipment of waste is prepared the team leader fills out a Pre-Inspection checklist to ensure the safety and documentation of the shipment. In addition to the Pre-Inspection check list the following must be inspected.

Check list 49CFR Parts 173, 178 and 179.

- Verify that all drums are sealed properly.
- Paint all drums that have resin residue or drips on the outside to verify that the drum doesn't leak.
- Verify the date of transfer.
- Verify the location where the shipment is being transferred.
- DOT numbers are on documentation and containers.
- Site number is on shipping document.

Biennial Report

A generator who ships any hazardous waste off-site to a treatment, storage or disposal facility within the United States must prepare and submit a single copy of a Biennial Report to the Regional Administrator by March 1 of each even numbered year. The Biennial Report must be submitted on EPA Form 8700-13A, must cover generator activities during the previous year. The biennial report must contain the following information.



- The EPA identification number, name, and address of the generator;
- The calendar year covered by the report;
- The EPA identification number, name, and address of the generator;
- The name and EPA identification number of each transporter used during the reporting year for shipments to a treatment, storage or disposal facility within the United States;
- A description, EPA hazardous waste number (from 40 CFR Part 261, Subpart C and D), DOT hazard class, and quantity of each hazardous waste shipped off-site for shipments, a treatment, storage or disposal facility within the United States. This information must be listed by EPA identification number of each such off-site facility to which waste was shipped.
- A description of the efforts undertaken during the year to reduce the volume and toxicity of waste generated.
- A description of the changes in volume and toxicity of waste achieved during the year in comparison to previous years to the extent such information is available for years prior to 1984.
- The certification signed by the generator or authorized representative.
 - The generator who treats, stores, or disposes of hazardous waste on-site must submit a biennial report covering those wastes in accordance with the provisions of 40 CFR Parts 270, 264, 265, and 266.

Exception Reporting

A generator of greater than 1000 kilograms of hazardous waste in a calendar month who does not receive a copy of the manifest with the handwritten signature of the owner or operator of the designated facility within 35 days of the date the waste was accepted by the initial transporter must contact the transporter and/or the owner or operator of the designated facility to determine the status of the hazardous waste.

A generator of greater than 1000 kilograms of hazardous waste in a calendar month must submit an Exception Report to the EPA Regional Administrator for the Region in which the generator is located if he has not received a copy of the manifest with the handwritten signature of the owner or operator of the designated facility within 45 days of the date the waste was accepted by the initial transporter.

The Exception Report must include:

- A legible copy of the manifest for which the generator does not have confirmation of delivery.
- A cover letter signed by the generator or his authorized representative explaining the efforts taken to locate the hazardous waste and the results of those efforts.
- A generator of greater than 10 kilograms but less than 1000 kilograms of hazardous waste in a calendar month who does not receive a copy of the manifest with the handwritten signature of the owner or operator of the designated facility within 60 days of the date the waste was accepted by the initial transporter must submit a legible copy of the manifest, either some indication that the generator has not received confirmation of delivery, to the EPA Regional Administrator for the Region in which the generator is located.

Packaging, Labeling, Marking, and Packaging

1 - Storage, packaging and shipping of hazardous waste must be properly marked in compliance with DOT regulations.

All hazardous waste must be properly marked in compliance with DOT regulations:

1. Use hazardous waste stickers with the date that the waste was determined to be hazardous waste for disposal.
2. Mark all accumulation vessels or drum with the appropriate date and stickers.



3. Verify that the shipping container is in good condition with no drip marks or residue.
4. Verify that the shipper transportation vehicle has the appropriate Placard.

2 - Marking

Before shipping the waste, containers must be marked with the appropriate Hazardous Waste stickers and the date the waste began to be accumulated 49CFR Part 172. Stickers must read:

HAZARDOUS WASTE-Federal Law Prohibits Improper Disposal. If found, contact the nearest police or public safety authority or the U.S. Environmental Protection Agency.

Generator's Name and Address _____

Manifest Document Number _____

3 - Placarding

Before allowing the AET Transporter to remove hazardous waste off-site, verify that the truck is placards 49CFR Part 172 Subpart F.

Accumulation Times

- Accumulation of hazardous waste may not be kept on site for more than 90 days.
- All waste is dated and shall be removed within 90 days of the date marked on the container.
- Monthly shipments are made through AET and dates on containers are reviewed each month to ensure no waste is on site for over 90 days.
- All containers containing Hazardous waste and the date of the waste are logged weekly.
- Keep all containers completely closed except when adding waste.
- Do not open, handle or store containers of hazardous waste in a manner which may cause a release.

Preparedness and Prevention Measures

In compliance with prevention and preparedness the plant has been divided into two sections. The east section is the storage of raw goods and finish goods. This area is considered an H-3 occupancy zone. Compliance for this area is set forth by ICC:

- Electrical connections must be 18 inches of the floor since the fumes are heavier than air and they concentrate low to the ground.
- Dikes are maintained at each entrance to create primary containment and a drainage pit creates secondary containment.
- Fire walls are maintained between the office and the manufacturing area.
- The west end of the building is the manufacturing area. This area is considered to be H2. This area complies with the requirements of an extremely hazardous area. The major compliance items are;
- Skylights provide blow out panels incase of explosion.
- Dikes provide primary containment and the 2nd dike provides secondary containment.
- Spacing protects the fire from jumping to other buildings.
- Explosion proof machinery only in this area.



- Explosion proof wiring.
- Ventilation to maintain 5600 cfm runs constantly to reduce accumulation of fumes.

Aisle Spacing:

Maintain aisle space to allow unobstructed movement of personnel and emergency equipment.

Spills:

At all times there must be at least one employee either on the premises or on call available to respond to an emergency by reaching the facility within a short period of time) with the responsibility for coordinating all emergency response measures.

The following information is posted at the phones:

- Names and emergency coordinator.
- Location of fire extinguishers, spill control material and fire alarm.
- Telephone number of the fire department, unless the facility has a direct alarm. (Facility has a direct alarm)

The employees are thoroughly familiar with proper waste handling and emergency procedures.

The emergency coordinator or his designee must respond to any emergencies that arise. The applicable responses are as follows:

- In the event of a fire, call the fire department or attempt to extinguish it using a fire extinguisher.
- In the event of a spill, contain the flow of hazardous waste to the smallest extent possible and as soon as is possible, clean up the hazardous waste and any contaminated materials or soil. Dispose of cleanup materials as hazardous.
- In the event of a fire, explosion, or other release which could threaten human health outside the facility or when the generator has knowledge that a spill has reached surface water, the generator must immediately notify the National Response Center (using their 24-hour toll free number 800-424-8802). The report must include the following information:
 - The name, address, and U.S. EPA Identification Number of the generator;
 - Date, time, and type of Incident (e.g., spill of fire).
 - Quantity and type of hazardous waste involved in the incident.
 - Extent of injuries, if any; and
 - Estimated quantity and disposition of recovered materials, if any.

Containers of Hazardous Waste Storage:

- Containers of Hazardous Waste must be closed at all times except when waste is being added.
- Use only good condition drums with no potential leaks.
- Activators are stored in red drums in the activator area. No other waste is to be stored with activators.

Fire-Explosion:

- Eliminate all potential risk of spark or ignition: Electrical connections must be maintained 18 inches off the ground since all the solvents used in the plant are heavier than air.
- Do not slide drums or containers.
- Secure the use of extension cords above the 18 inches.
- Immediately cleanup any spills and store contaminated items in the rag drum. Be sure that the drums are sealed.
- Do not block the exits or exit pathways.



- No drums or containers are to be stored on their side.
- Containers are maintained in a closed position. Satellite Hazardous waste is stored only within the yellow taped area. The hazardous waste area is located in this area, in a specific location. No Other Storage Area Is Permitted.
- Containers of all Hazardous materials are labeled with the product name and a flammable sticker.
- Fire extinguisher is maintained at each door for easy access.
- Water pressure has been tested for adequate pressure.
- Review the location of alarms in the building.

The west section of the building is the manufacturing area. This area is considered an H-2 occupancy area because of the open use of Hazardous materials. The safety prevention and preparedness of this area is more involved because it is a higher risk than other areas of the plant. This area has been built to be intrinsically safe in accordance with ICC. All safety requirements of the previous section apply to this section as well as the following:

- Use ground cables on all the equipment. Ground all pots to the grounded machines during manufacturing and pouring.
- Review the static electricity guide supplied by Univar.
- Contain any spills in the area.
- Pour and package paints in this area.
- Maintain ventilation at all times.

Fire extinguisher training:

To be provided by the fire department or qualified person.

Prevention awareness:

- Local police, fire departments, and emergency response teams have been notified of the layout of the facility, character of the hazardous waste managed, locations where facility entrance and possible evacuation routes.
- The Unified fire department has conducted periodic inspections of the facility and they are the primary emergency response authority for any response to an emergency at the location.
- Employees are trained for emergency response and no outside contractors are authorized to engage in the cleanup process.
- For notification of emergency personnel, a letter and map of the facility has been sent.

GOOD HOUSEKEEPING IS ESSENTIAL TO PREPAREDNESS AND PREVENTION!

Contingency Plan

Minimizing risk to human health. In the West side of the plant the largest vessel containing hazardous material is 55 gallons. The actions needed to minimize spills are as outlined:

Spills:

- Use designated dike material to contain any spill in as small an area as possible. Dike material is located next to fire extinguishers
 - Minimize the spread of any spill
- Do not do any preventive measures that will cause spark or source of ignition.
 - slide drums near a spill
 - Use electrical item during the cleanup



- Do not use electrical forklift until the spill is cleaned up.
- Absorption materials, which are used for cleanup, are to be disposed of with hazardous waste.
- Wear approved respirator and appropriate protection to safely clean up spills.

Sudden or Non-Sudden Release of Hazardous Waste:

- In an immediate emergency any employee is authorized to pull the alarm system. If the danger is not immediate only the response coordinator may pull the alarm or signal evacuation.
- Fire alarm is immediate evacuation
- Personnel are trained to handle small spills. Training does not include major emergency. In the case of a major emergency or fire situation employees are trained to clear other employees out of the facilities.

The individuals qualified to act as an emergency response coordinator are:

- Owner/Coordinator
 - Scott Peterson
- Assistant Coordinator
 - Matthew Peterson

List of Emergency Items at the Facilities:

- Fire extinguisher located at each exit and the center pole near the shipping area
- Absorption materials located at the doors near the fire extinguishers
- Intercom
- Fire alarms located at entrances and the wall between the manufacturing area and storage area
- Telephones with emergency response numbers on them
- Secondary containment pit for spills and for water retention incase of
- Water suppression
- Procedure outline

Evacuation:

- The location for meeting in case of an emergency is across the parking lot to the east in the south-east corner.
- The Hazardous waste manager or the assistant may assign employees to evacuate the locations around the facilities.
The facilities that may require evacuation are:
 - Buildings to the south
 - Building to the north
 - Building across the street.
- All exits are marked with illuminated exit signs and yellow lines exit lines.
- Building has been built with skylight incase of power outage and for blow out panels.
- Exit diagrams are provided to the employees as part of the training program.

Internal Communication:

- All Employees are trained to use the intercom system. This system is used to instruct employees when a hazard exists or instructions need to be communicated throughout the plant.
- In case of an emergency, which requires outside emergency assistance the fire alarms, are connected to the fire department as part of the emergency response program.



- Immediate notification to emergency agencies is accomplished by any employee. Notification of State and Federal agency as required is accomplished by the emergency coordinator.

Signals:

- Waving the arm overhead in a motion to go away indicates evacuation of the building due to immediate danger.
- Wave directing someone to come indicates the need for quick response to come help.
- When signals are given everyone should look around as they follow the directions to pass on the information.
- Thumbs up means all clear. The danger has passed.
- Voice signals are acted on directly.

Outline of Procedure to Identify Spills or Hazards

Hazardous substances in the building are broken into 2 categories the outline to immediately identify spills and or cleanup of the item in each category are:

- Liquids (Solvents and Resins additive): Solvents are stored in 55-gallon drums, plastic jugs and gallon cans. Solvents create the most immediate danger for fire in the facility. All solvents in the facility follow the same danger and the same cleanup procedures.
 - Character; Solvents can be determined by sight and odor. There are no monitoring devices in the facility to notify of a spill or leak. Use common sense.
 - Source: Sight is the method to determine the source. Don't move any metal item or equipment that could produce a spark while finding the source.
 - Amount: The emergency coordinator will determine the amount of the hazardous material by examine the size the container or vessel that released the material and the space that the spill has occupied.
 - Extent of release: Because the building has primary and secondary containment capable of containing any spill, caution and assertiveness to containing the area is the most important procedure. No environmental hazards are possible. Release of material in the event of fire may not be determined until the fire has been contained.
- Powders (Pigments, epoxy resins and dried lacquer resins)
 - Character: Powders and hard resins are the least hazardous spills. Respirator and gloves are needed for cleaning up these spills. The contents of cleaning up these spills may be disposed of in the dumpster or a landfill.
 - Source: Determine by sight.
 - Amount: This is not a reportable hazard so no documentation of a spill or cleanup is needed.
 - Extent of Release: Sight.

Threats to Human Health or the Environment Outside the Facility

The only threat to human health or the environment outside the facility is in the case of fire. Any threat of fire is to evacuate the surrounding building as outlined earlier in this training document. If there is any threat of fire or release of a hazardous substance the emergency coordinator must notify local, State, and Federal authorities.

The information to be released to the authorities is:

1. Name: VORTEX Companies
2. Address: 564 West 9320 South, Sandy, UT 84070
3. Phone: 801-209-8846
4. Name and Quantity of Product released



5. Extent of Injury
6. Possibility of exposure outside the building.
7. No other hazardous waste stored in other facilities

Monitors and Shutdown

Ventilation inside the facility is constant to reduce buildup of hazardous fumes. This in conjunction with the containment is adequate to contain any leak or release of hazardous substance. All hazardous waste is contained in individual drums to reduce risk. No monitoring or valving is use for hazardous waste.

Management of a Hazardous Waste as a Result of a Cleanup

Hazardous waste as a result of a cleanup will have the same procedure as a spill or leak of solvent or resin.

In the West side of the plant the largest vessel containing hazardous material is 55 gallons. The actions needed to minimize spills are as outlined:

- Use designated dike material to contain any spill in as small an area as possible. Dike material is located next to fire extinguishers.
 - Minimize the spread of any spill.
- Do not do any preventive measures that will cause spark or source of ignition.
 - Slide drums near a spill.
 - Use electrical item during the cleanup.
 - Do not use electrical forklift until the spill is cleaned up.
- Absorption materials, which are used for cleanup, are to be disposed of with hazardous waste.
- Wear approved respirator and appropriate protection to safely clean up spills.
- Prior to start up or production after a spill or cleanup effort the safety coordinator or assistance will inspect equipment used in the cleanup before it is approved for use.

Monitors and Shutdown

After notification to Federal and State authorities of an incident covered in the contingency plan the same agencies must be notified that the incident has been cleaned up or resolved before beginning operations.

The hazardous waste coordinator or the assistants will notify Federal, state authorities and provide the Regional Administer within 15 days in writing. The following information will be included in the report.

- The name, address, and telephone # of the owner operator;
- The name, address, telephone # of the facility.
- Date, time, and type of incident;
- Name and quantity of material (s) involved;
- Extent of injury, if any;
- An assessment of the actual or potential hazard to human health or the environment; and
- An estimate of the quantity and disposition of recovered material (s) that resulted from the incident.



Personnel Training

Training of all employees is ongoing on Monday morning. It is estimated that the hazardous training requires four training sessions. All employees are trained within 6 months of the date of employment, and review of the training program occurs at least every 6 months.

Hazardous Waste Facility Manger:
Scott Peterson Owner-Manager

The Hazardous waste facility manager is responsible for the following:

- Training of new employees.
- 6-month review of employees.
- Safety training program form JJ Keller.
- Notification of government agencies in the event of a spill, Hazardous release of material or fire.
- Documentation of meetings and attendees.

1st Team Leader:

- Matt Peterson
 - Be on site when the Hazardous waste manager is not on the premises.
 - Fill in on training meeting for the Hazardous Waste manager Monday meetings.
 - Maintain weekly documentation of Hazardous waste drums.
 - Fill out transportation documentation and receiving the return documents for Hazardous Waste shipments.
 - Weekly inspect Hazardous Waste drums for leaks or damage..
 - Oversee accumulation of Hazardous Waste.
 - Attend all hazardous waste training meetings.
 - Attend all JJ Keller training sessions.

2nd Team Leader:

- Ryan Eakin
 - Be on site if the Hazardous Waste facility manager or the 1st team leader is not on the site.
 - Prepare Hazardous Waste drums for transportation.
 - Paint over drips or splashes on the Hazardous Waste drums.
 - Help prepare Hazardous Waste Shipments.
 - Attend all Hazardous Waste training meetings
 - Attend all JJ Keller safety training meetings.

Container Storage and Management

Special Requirements for Incompatible Waste

Satellite Accumulation

The area designated to be used for Hazardous waste accumulation is near the west overhead door located on North side of the building. Satellite locations are in the manufacturing area on the west end of the building and on the north side in the production area. This area on the north is separated because it accumulates the activator waste, which is not to be mixed during accumulation.



The substances that are accumulated as waste are solvents and resins. The solvents used to clean pots and equipment is flammable.

Solvents:

- Aromatic Hydrocarbons
- Ketones
- Glycol Ethers
- Aliphatic Hydrocarbons

Solvents such as these absorb into the body through Absorption and Inhalation. To minimize the concentration of these hazardous materials the plant is outfitted with ventilation.

- The ventilation is adequate in the general areas. The areas of additional safety requirements are:

The areas of batch making are the highest concentration of hazardous material.

- Respirators are used to minimize exposure.

Contaminated solvents and old paint will have the same hazards as the virgin products but they will be combined with hazards associated with the individual ingredients inside.

Yes	No	Does everyone producing batches or cleaning pots have their own respirators?
Yes	No	Have fit tests been done for each employee?
Yes	No	Was the fit test signed off?
Yes	No	Are batch makers trained?

Notification of Local Authorities

Notification of Local authorities was done by Scott Peterson at the time of occupancy of the building located at 564 West 9320 So. Sandy, UT 84070. Notification included Police, Fire Department, Hospital, and State officials Emergency phone numbers are attached to all telephones in the building.

Spills

All employees' working in manufacturing, shipping and the lab are required to receive training for spills.

Containment: First line defense of hazardous material is containment. Contain spills or discharge of raw goods or finish goods in as small an area as possible. Spills of 1 to 5 gallons may be cleaned up by any employee without notification of the safety coordinator by using rags and discarding them into the contaminated rag drum in the located in the Hazardous Waste storage area. The drum is discarded with the hazardous waste. Large Spills over 5 gallons are to be contained and then reported to the Hazardous waste coordinator. Large spills are to be cleaned up with the scoop shovel and rags. Spill cleanup residue may be placed in the rag collection container and be discarded with the Hazardous waste material.

All the exits to the building are raised for containment. This is considered the primary containment and the secondary containment is a 2 containment at the doors. Secondary containment serves as the secondary containment and 20 minutes of water.



Safety clothing; Gloves and/or respirators are to be worn when cleaning spills.

Record Keeping: Manifests

The following format is to be used for proof of employee training in which handle Hazardous waste:

- Date
- Time
- Trainer
- Topics Covered

Hazardous Waste Accumulation Time

- Do not store hazardous waste for longer than 90 days on site.
- Label each container or tank with the words “Hazardous Waste”.
- Container must be mark with the date under the Hazardous Waste label which the container began accumulating the waste or the date it was determined that the material was waste.

Accumulation areas

- Store Hazardous Waste only in the designated waste storage area and the two satellite areas.
 - Do not leave any container under the pour spout of the recycling machine.
 - Buckets of dirty wash solvent used to waste out pots is not considered Hazardous Waste and must be marked only as dirty wash solvents with flammable liquid stickers on them.

Use and Management of Containers

- Maintain a log weekly on the hazardous waste containers, Assigned to Gabe. The log is kept in Scott’s office with the Hazardous Waste files.
 - Containers are to be kept closed.
 - > Dates must be marked on the container at the time accumulation begins
 - > Any Problems with the Hazardous Waste or the containers must be brought to the attention of the emergency coordinator.
 - > The emergency coordinator is Scott Peterson and the secondary coordinator is Matthew Peterson.

Employee Acknowledgement

I have received a copy of the VORTEX Companies Hazardous Materials Contingency Plan.

Printed Name	Signature	Date



CIVIL INFRASTRUCTURE SOLUTIONS

HEAVY EQUIPMENT



Vortex Companies

Procedure Name	Environmental, Health & Safety Manual – Heavy Equipment
Applicability	VORTEX Companies – Employees
Policy Revised	02.22.18

Purpose

The VORTEX Companies has developed this Program to establish the minimum requirements for heavy equipment operation. This Program is intended to establish minimum requirements for all heavy equipment not otherwise covered under the Occupational Safety and Health Administration (OSHA) Powered Industrial Truck standard contained within 29 CFR 1910.178.

Scope

This Program applies to all VORTEX employees that operate or work in conjunction with heavy equipment, including, but not limited to, farm vehicles, vehicles intended for earth-moving, vehicles intended for over-the-road hauling.

General Requirements

- All trenching and excavation performed by heavy equipment covered by this Program shall be performed in accordance with the excavation requirements specified within 29 CFR 1926.651.
- All heavy equipment shall be equipped with roll over protective structures (ROPS), unless designed for standup operation. Seat belts shall be provided on all heavy equipment with ROPS and shall meet the requirements of the Society of Automotive Engineers, J386-1969, Seat Belts for Construction Equipment. Seat belts for agricultural and light industrial tractors shall meet the seat belt requirements of Society of Automotive Engineers J333a-1970, Operator Protection for Agricultural and Light Industrial Tractors.
- No employee shall move or cause heavy equipment to be moved upon any access roadway or grade unless the access roadway or grade is constructed and maintained to accommodate the safe movement of the equipment and vehicles involved.
- All heavy equipment shall have a service braking system capable of stopping and holding the equipment fully loaded as specified in 29 CFR 1926.602. Brake systems for self-propelled rubber-tired off-highway equipment shall meet the applicable minimum performance criteria specific in 29 CFR 1926.602.
- ROPS, if utilized, shall meet all applicable design specifications contained within 29 CFR 1926 Subpart W App A.
- All heavy equipment capable of bi-directional movement, such as articulating tractors, skid-steers, front-end loaders, backhoes, and similar equipment, shall be equipped with a horn, distinguishable from the surrounding noise level, which shall be operated as needed when the machine is moving in either direction. The horn shall be maintained in an operative condition.
- Heavy equipment (i.e. capable of reverse) with an obstructed view to the rear, shall not be used unless the equipment has in operation a reverse signal alarm distinguishable from the surrounding noise level or an employee signals that it is safe to do so.



- All heavy equipment shall be guarded in accordance with the Machinery and Machine Guarding Program, except when the mechanical motion is a result of forward and reverse movement of the equipment. Employees shall be restricted from working in the path of this motion. Scissor points, which constitute a hazard to the operator during normal operation, shall be guarded.
- Steering or spinner knobs shall not be attached to the steering wheel unless the steering mechanism is of a type that prevents road reactions from causing the steering handwheel to spin. The steering knob shall be mounted within the periphery of the wheel.
- When hazards exist as a result of falling objects, protection from falling objects shall be provided to protect the employee from hazards associated with the specific operating conditions. For additional information or clarification regarding adequate overhead protection, contact your area Safety Manager.
- Assisting employees shall not perform work within a 10 foot radius of the heavy equipment, unless the equipment is designed to accommodate such work and does not present a hazard to the other employees. This restriction does not apply when the operator has disengaged machine movement.
- Operators shall never permit employees or other bystanders to pass under a suspended load.
- Operators shall use the equipment within all capacity limits specified by the manufacturer. No modifications or additions which affect the capacity or safe operation of the equipment shall be made without the manufacturer's written approval. If such modifications or changes are made, the capacity, operation, and maintenance instruction plates, tags, or decals shall be changed accordingly. In no case shall the original safety factor of the equipment be reduced.
- Operators shall remain an appropriate distances from electrical lines and systems in accordance with the Electrical Safety Program, unless the equipment is designed specifically for that application.

Inspection Requirements

- Heavy equipment covered by this Program shall be inspected prior to each use by the operator using a safety inspection checklist developed by the responsible department.
- The inspection shall include both a visual inspection list (e.g. Damage to hydraulic hoses?) and a function test list (e.g. Audible alarm works?). The safety inspection shall be specific to the equipment.
- If the equipment, attachments used on the equipment, or other conditions change that present new hazards, the pre-use inspection shall be revised appropriately.
- Equipment shall be removed from service if conditions identified on the pre-use inspection or during operation pose a risk to the operator, other employees, or bystanders.

Training

- VORTEX shall be responsible for providing equipment-specific operator training that includes instruction and practical training for employees who would operate heavy equipment. Training shall include at a minimum:
 - A description and identification of the specific hazards associated with the equipment;
 - Specific personal protective equipment (PPE) required for operation of the equipment;
 - How to perform the pre-use inspection; and
 - How to start, operate, and shutdown the heavy equipment safely in accordance with the manufacturer recommendations and this Program.
- Training shall be provided to all new operators and associated employees. If the equipment, attachments used on the equipment, or other conditions change that present new hazards, employees shall be retrained to account for these changes.



CIVIL INFRASTRUCTURE SOLUTIONS

LADDER SAFETY



Vortex Companies

Procedure Name	Environmental, Health & Safety Manual – Ladder Safety
Applicability	VORTEX Companies – Employees & Subcontractors
Policy Revised	12.02.16

Purpose

The purpose of the program is to prescribe rules and establish minimum requirements for the construction, care, and use of the common types of ladders.

All ladders that are purchased and placed into service; or, any ladders that are engineered, manufactured and installed on any of VORTEX Companies' equipment shall follow the requirements set forth by this program.

Scope

This program is applicable to all employees who may utilize ladders. When work is performed on a non-owned or operated site, the operator's program shall take precedence, however, this document covers VORTEX Companies employees and contractors and shall be used on owned premises, or when an operator's program doesn't exist or is less stringent.

Definitions

Ladder - An appliance usually consisting of two side rails joined at regular intervals by cross- pieces called steps, rungs, or cleats, on which a person may step in ascending or descending.

Stepladder - A self-supporting portable ladder, nonadjustable in length, having flat steps and a hinged back. Its size is designated by the overall length of the ladder measured along the front edge of the side rails.

Single Ladder - A non-self-supporting portable ladder, nonadjustable in length, consisting of but one section. The overall length of the side rail designates its size.

Extension Ladder - A non-self-supporting portable ladder adjustable in length. It consists of two or more sections traveling in guides or brackets so arranged as to permit length adjustment. Its size is designated by the sum of the lengths of the sections measured along the side rails.

Fixed Ladder - A ladder permanently attached to a structure, building, or equipment.

Individual-rung Ladder - A fixed ladder each rung of which is individually attached to a structure, building, or equipment.

Cage - A guard that may be referred to as a cage or basket guard, which is an enclosure that is fastened to the side rails of the fixed ladder or to the structure to encircle the climbing space of the ladder for the safety of the person who must climb the ladder.



Key Responsibilities

Managers and Supervisors

- Managers and supervisors are responsible for ensuring that all employees, and/or contractors have been trained.
- Managers and supervisors are responsible for ensuring that all employees and contractors are aware that if an inspection discovers a defect, the ladder shall not be used and taken out of service.

Employees

- Employees shall inspect ladders prior, during and at the completion of each use to ensure the condition of the ladder and the safety of its occupants.
- Employees are responsible for following this program and reporting any damage or repairs that may be needed to their supervisor.

Procedure

Inspection, Care and Safe Work Practices of Ladders

Inspection

Ladders shall be inspected by a competent person for visible defects on a periodic basis and after any occurrence that could affect their safe use.

- Ladder rungs, cleats and steps shall be parallel, level and uniformly spaced when the ladder is in position for use.
- Any ladder has developed defects, shall be withdrawn from service for repair or destruction and tagged or marked as “Dangerous, Do Not Use.”
- If a ladder is tipped over, it shall be inspected by a competent person for side rail dents or bends, or excessively dented rungs; check all rung to side rail connections; check hardware connections; check rivets for shears.
- Ladders with broken or missing steps, rungs, or cleats, broken side rails, or other faulty equipment shall not be used; improvised repairs shall not be made.
- All wood parts shall be free from sharp edges and splinters; sound and free from accepted visual inspection from shake, or other irregularities.

Care

Ladders shall be maintained in good condition at all times, the joint between the steps and side rails shall be tight, all hardware and fittings securely attached, and the movable parts shall operate freely without binding or undue play.

Metal bearings of locks, wheels, pulleys, etc., shall be frequently lubricated.

Frayed or badly worn rope shall be replaced. Safety feet and other auxiliary equipment shall be kept in good condition to ensure proper performance.

Rungs shall be kept free of grease and oil.

Ladders shall be stored in a well-ventilated area in a manner to prevent sagging and warping.

Ladder rungs, cleats, and steps shall be parallel, level, and uniformly spaced, when the ladder is in position for use.



Safe Work Practices

Ladders shall be used only for the intended purpose for which they were designed.

The ladder shall be secured at the top or held by another person at the base.

The footing of the ladder shall be placed on a stable and level surface.

Ladders shall extend 3 feet above the top of an upper landing surface and extension ladders shall be placed at a 4:1 ratio.

When ladders are not able to be extended then the ladder shall be secured at its top to a rigid support that will not deflect.

Ladders shall not be placed on boxes, barrels, or other unstable bases to obtain additional height.

Ladders shall not be used in a horizontal position as platforms, runways, or scaffolds.

Ladders shall not be used by more than one man at a time.

Ladders shall not be placed in front of doors opening toward the ladder unless the door is blocked open, locked, or guarded.

If a ladder is used in a high traffic area, barricades shall be placed to avoid accidental displacement due to collisions.

Do not stand on the top two rungs or top of step ladders.

On two-section extension ladders the minimum overlap for the two sections in use shall be as follows:

Size of Ladder (feet)	Overlap (feet)
Up to and including 36'	3
Over 36 up to and including 48'	4
Over 48 up to and including 60'	5

No ladder shall be used to gain access to an elevated surface unless the top of the ladder extends at least 3 feet above the point of support, and properly tied off.

The employee shall maintain a three (3)-point grip on the ladder at all times and carry tools/equipment on a belt or hoist up. Do not carry anything in the hands that could cause injury in case of fall.

The employee shall face the ladder while ascending or descending.

The bracing on the back legs of stepladders is designed solely for increasing stability and not for climbing.

The ladder shall not be moved while occupied.



Portable Ladders

Stepladders shall not be longer than 20 feet.

Single ladders shall not be longer than 30 feet.

A two-section extension ladders shall not be longer than 60 feet. All ladders of this type shall consist of two sections, one to fit within the side rails of the other, and arranged in such a manner that the upper section can be raised and lowered.

Keep all ladders at least ten (10) feet away from power lines.

Ladders shall not be loaded beyond the maximum intended load for which they were built or in excess of the manufacturer's rated capacity. Weight includes the combined weight of the climber and his tools/equipment.

Ladders are rated as the following:

- I (holds 250 lbs)
- I-A (holds 300 lbs)
- II (holds 225 lbs)
- III (holds 200 lbs)

Fixed Metal Ladders

Ladders shall be constructed to withstand a minimum of 200 pounds.

All metal rungs shall have a minimum diameter of 3/4 inches and wooden rungs shall have a minimum diameter of 1-1/8 inches.

Rungs shall not be more than 12 inches apart and shall be uniform throughout the length of the ladder. Rungs shall be a minimum length of 16 inches and provide protection so a foot cannot slip off the end. Rungs shall have a minimum of 7 inches between itself and the structure behind it.

A fall restraint system must be provided for all fixed ladders greater than six feet in length.

- A Cage is required when the fixed ladder is at least twenty feet tall.
- Cages on fixed ladders shall not begin at a point less than 7 feet nor greater than 8 feet from the walking surface below the cage.
- Cages shall provide a clear width of 15 inches in each direction of the rung's centerline.
- Cages shall not extend less than 27 inches, but not greater than 28 inches from the centerline of the rung.
- A climbing fall restraint system may be substituted for a ladder cage.



CIVIL INFRASTRUCTURE SOLUTIONS

LEAD AWARENESS



Vortex Companies

Procedure Name	Environmental, Health & Safety Manual – Lead Awareness
Applicability	VORTEX Companies – Employees & Subcontractors
Policy Revised	08.22.14

Purpose

The purpose of this procedure is to identify the controls and actions necessary to prevent adverse health effects to employees from occupational exposure to lead, and to ensure that VORTEX Companies lead exposure management practices meet regulatory requirements.

Scope

This procedure applies to VORTEX Companies operations where employees may be exposed to lead while working with lead containing materials during routine maintenance or emergency situations. When work is performed on a non-owned or operated site, the operator's program shall take precedence, however, this document covers VORTEX Companies employees and contractors and shall be used on owned premises, or when an operator's program doesn't exist or is less stringent.

Responsibilities Managers and Supervisors

- In coordination with the HSE Manager, develop and implement written project/task specific lead exposure management procedures prior to the start of activities to reduce exposure to or below the permissible limits.
- Ensure personnel are aware of work that has the potential of exposure to lead.
- Ensure individuals responsible for monitoring areas of exposure are properly trained.
- Ensure personnel receive documented medical surveillance.
- Ensure that all affected employees receive initial and annual lead management training.
- Inform the HSE Manager of upcoming work involving lead-containing materials, allowing the HSE Manager to provide any necessary monitoring.
- Ensure employees have the appropriate personal protective equipment (PPE) and are properly trained in its use and care, including respiratory protection, full body disposable clothing and gloves, when the Action Level is expected to be met or exceeded.
- Ensure employees comply with the lead exposure management procedure.

HSE Manager Shall:

- Coordinate air sampling and monitoring activities, ensuring monitoring equipment is in proper working order and, as necessary, modifying the lead exposure management procedures to reflect exposure monitoring data.
- Maintain the lead exposure management procedure, notifying management of any regulatory changes and ensuring compliance with federal and state requirements.
- Coordinate initial and annual refresher training activities.
- Coordinate the medical surveillance program for employees exposed to lead above the Action Level for more than 30 days per year.



- Document training, including dates of training, employee names, and trainer name.
- Coordinate waste management and disposal activities; ensuring waste with lead containing materials is disposed of only at an approved facility.
- Make known possible locations of lead containing materials such as leaded paints, leaded solders, pipes, batteries, circuit boards, cathode ray tubes, leaded glass, and demolition/salvage materials.

Affected Employees Shall:

- Comply with the lead exposure management procedure, consulting with the supervisor or HSE Manager to ensure the proper PPE is used when required.
- Comply with the medical surveillance program.
- Attend initial and annual refresher training.
- Wear respiratory protection equipment and other specified PPE as required by the project/task specific control program.
- Wash hands and face if lead materials are contacted.
- Maintain respiratory protection equipment in good working order, notifying the supervisor or HSE Manager of any problems prior to starting work.
- Review material safety data sheets or consult with the supervisor to identify any container with lead-containing material.
- Leave the work area to wash if skin irritation is noted or if PPE has been compromised.

Procedure

Written Compliance Program

- Each worksite shall develop and implement written project/task specific lead exposure management procedures prior to the start of activities to reduce exposure to or below the permissible limits if exposure is possible.
- The procedure shall include engineering controls, work practices, PPE, air sampling, a description of each lead related task and all employees shall be trained prior to work beginning.
- The compliance program shall be revised and updated annually.

Permissible Exposure Limits

- Per OSHA regulation, employees shall not be exposed to greater than 50 micrograms per cubic meter of air (50 $\mu\text{g}/\text{m}^3$), time-weighted average, during an 8-hour workday. This permissible exposure limit (PEL) includes the use of respiratory protection. If an employee is exposed more than 8 hours in any one workday, the maximum PEL ($\mu\text{g}/\text{m}^3$) shall be calculated by using the following formula:
 - $400/\text{hours worked in the day}$
 - For example: $400/12 \text{ hours} = 33.33 \mu\text{g}/\text{m}^3$
- If respirators are used to supplement engineering and/or work practice controls, the respirator's protection factor may be used to determine compliance with the PEL.

Exposure (Air) Monitoring

- Exposure is defined in this section to be any employee who is not wearing a respirator to meet the Action Level and monitoring requirements in this section
- Initial air samples shall be representative of the employee's regular, daily activities.



- Initial sampling results:
 - If the initial monitoring is less than the Action Level, monitoring need not be repeated unless there has been a production, process, control, or personnel change which may result in new or additional exposure to lead.
 - If the initial determination or subsequent monitoring reveals employee exposure to be at or above the Action Level but below the PEL, monitoring must be performed at least every six (6) months, with the cycle continuing.
 - If the initial determination exceeds the PEL, monitoring will be performed quarterly until two (2) samples taken at least seven (7) days apart are below the PEL but above the Action Level, and the monitoring frequency described above will be used.
- Within 15 working days after the receipt of the results of any monitoring VORTEX Companies shall notify each affected employee of these results either individually in writing or by posting the results in an appropriate location that is accessible to affected employees.
- Whenever the results indicate that the exposure, without regard to respirators, exceeds the permissible exposure limit, VORTEX Companies shall include in the written notice a statement that the permissible exposure limit was exceeded and a description of the corrective action taken or to be taken to reduce exposure to or below the permissible exposure limit.
- All documentation of training should be documented. Lead awareness training should be documented including dates of training, employee name, and trainer name.

Control Measures

Engineering Controls

- If an employee is exposed to lead above the PEL for 30 or more days in a year, engineering controls, including administrative controls, will be implemented to reduce the exposure.
- Respiratory protection will be used if engineering and administrative controls are not effective in reducing the exposure to or below the PEL.
- If air is re-circulated back into the workplace, the system must be equipped with a HEPA (high efficiency particulate air) and backup filter, and a system to monitor the lead level will be installed.
- When using mechanical means to remove lead-containing paints or coatings, use equipment which is equipped with a HEPA collection system.
- Whenever possible, use a wet system to reduce airborne dust.
- Whenever possible, substitute lead material with non-lead material.
- When working on a multi contractor worksite, all employees working immediately adjacent to a lead abatement activity who are exposed to lead due to the inadequate containment of such job, will be removed from the area until the enclosure breach is repaired or perform an initial exposure assessment.

Administrative Controls

- Administrative controls will include job rotation schedules to reduce employee PEL exposure.
- When exposure to lead is at or above the PEL VORTEX Companies shall provide lunch rooms, changing, shower and hygiene facilities.
- Regulated access signs will demarcate the lead exposure regulated work areas. The signs will read as follows:
WARNING
LEAD WORK AREA
POISON
NO SMOKING OR EATING



Personal Protective Equipment

- Respirators shall be used during the time period required to install or implement control if engineering and work practices are insufficient as well as for emergency use.
- PPE will be selected on the basis of its ability to prevent absorption, inhalation and ingestion and will be provided to employees at no cost.
- PPE will reflect the needs of the employee based on work conditions, amount and duration of exposure and other known environmental factors.
- If respirators are required, they will be NIOSH certified and all employees will follow the VORTEX Companies Respiratory Protection Program.
- Gloves, hats, vented goggles, shoes or disposable shoe covers shall be provided. Protective clothing shall be clean and dry. Protective clothing shall be cleaned, laundered, repair and replaced as necessary and disposable clothing shall be identified and handled properly.

Health Effects of Lead

Common symptoms of acute lead poisoning are loss of appetite, nausea, vomiting, stomach cramps, constipation, difficulty in sleeping, fatigue, moodiness, headache, joint or muscle aches, and anemia.

Long term (chronic) overexposure to lead may result in severe damage to the blood-forming, nervous, urinary, and reproductive systems.

Medical Surveillance

- A baseline blood sample shall be obtained prior to any lead exposure.
- Employees who are or may be exposed above the Action Level for more than 30 days per year will be included in a medical surveillance program which is performed by or under the supervision of a licensed physician at no cost to the employee.
- Any employee with elevated blood levels shall be temporarily removed.
- Blood sampling will occur at least every 6 months to each affected employee until two consecutive blood samples and analysis are acceptable.
- Employees shall be notified in writing within 5 days of blood sampling results when lead levels are not acceptable.
- Blood sampling shall occur on a monthly during a removal period of each employee removed from exposure to lead due to an elevated blood lead level.
- Whenever the results of a blood lead level test indicate that an employee's blood lead level exceeds the level for medical removal VORTEX Companies shall provide a second (follow-up) blood sampling test within two weeks after the employer receives the results of the first blood sampling test.

Medical Removal

- Employees will be removed from exposure to lead when an exposure meets or exceeds the Action Level on each occasion that a periodic and follow-up blood sampling test indicates that blood lead level is at or above 60 Qg/100 g of whole blood.
- An employee will be removed from exposure to lead when the average of the last three (3) blood sampling tests indicates the employee's blood level is at or above 50 Qg/100 g of whole blood (the employee need not be removed if the last blood sampling test shows blood lead level to be at or below 40 Qg/100 g of whole blood).



- If the employee's blood lead level does not decline adequately with 18 months of removal, the employee will be offered a medical examination to determine if the employee may be returned to his or her former job status.
- Medical Removal Protection requirements of 1910.1025(k)(2) shall be followed.

Recordkeeping

- Medical surveillance records shall be maintained for 30 years after termination of employment.
- Exposure monitoring records shall be maintained for 30 years after completion of the project.
- Exposure and medical monitoring records shall be made available to affected employees or their representatives and to regulatory agencies upon request.

Training

Training shall be provided to employees who have the potential to exposure of lead prior to the time of initial assignment and annually thereafter. Training will include the following:

- Distribute a copy of the content of the lead standard and its appendices and it's readily availability.
- Content of any compliance plan in effect.
- Access to information and training records.
- Specific operations where lead exposure is above the action level.
- Engineering controls and work practices associated with the job.
- Purpose, proper selection, fitting, use, and limitations of respirators.
- Purpose of the medical surveillance program, which will include potential health effects and medical removal program.
- Instructions to employees that chelating agents should not routinely be used to remove lead from their bodies and should not be used at all except under the direction of a licensed physician.

Employees must abide by any signs/labels/assessment reports indicating the presence of lead containing materials. Appropriate work practices must be followed to ensure the lead containing materials are not disturbed.

Training records shall be provided upon request all materials relating to the employee information and training program to regulatory agencies.



CIVIL INFRASTRUCTURE SOLUTIONS

LOCKOUT / TAGOUT



Vortex Companies

Procedure Name	Environmental, Health & Safety Manual – Lockout Tagout
Applicability	VORTEX Companies – Employees & Subcontractors
Policy Revised	10.30.14

Purpose

The purpose of this program is to establish procedures for affixing appropriate lockout/tagout equipment to energy isolating devices and to otherwise disable machines or equipment to prevent unexpected energization, start up or release of stored energy to prevent injury or incident.

Scope

This program covers the servicing and maintenance of machines and equipment where the unexpected energization or start up of the machine or equipment, or the release of stored energy could cause an incident. This program establishes minimum performance requirements for the control of such hazardous energy. When work is performed on a non-owned or operated site, the operator's program shall take precedence, however, this document covers VORTEX Companies employees and contractors and shall be used on owned premises, or when an operator's program doesn't exist or is less stringent.

Definitions

Affected Employee - An employee whose job requires them to operate or use a machine or equipment on which servicing and maintenance is being performed under lockout/tagout, or whose job requires the employee to work in an area in which such servicing or maintenance is being performed.

Authorized Employee - A person that performs lockout/tagout procedures on machines or equipment in order to perform servicing or maintenance on that machine or equipment. An affected employee becomes authorized when that employee's duties include performing servicing or maintenance covered under this program.

Capable of Being Locked Out - An energy isolating device is capable of being locked out if it has a hasp or other means of attachment to which, or through which, a lock can be affixed, or it has a locking mechanism built into it. Other energy isolating devices are capable of being locked out if lockout can be achieved without the need to dismantle, rebuild or replace the energy isolating device or permanently alter its energy control capability.

Energized - Connected to an energy source or containing residual or stored energy.

Energy Isolating Device - A mechanical device that physically prevents the transmission or release of energy including, but not limited to, the following:

- A manually operated electrical circuit breaker, a disconnect switch, a manually operated switch by which the conductors and no pole can be operated independently, a line valve, a block and any similar device used to block or isolate energy.
- Push buttons, selector switches and other control circuit type devices are not isolating devices.



Energy Source - Any source of gas, electrical, mechanical, hydraulic, pneumatic, chemical, thermal, or other energy sources.

Hot Tap - A procedure used in the repair, maintenance and service activities that involves welding on a piece of equipment (pipelines, vessels or tanks) under pressure, in order to install connections or other appurtenances (note: 1910.147 (2) (iii) [B] [1] [2] [3]).

Lockout - The placement of a lockout device on an energy isolating device in accordance with an established procedure, ensuring that the energy isolating device and the equipment being controlled cannot be operated until the lockout device is removed.

Lockout Device - A device that utilizes a positive means, such as either a key or combination type lock, to hold an energy isolating device in the safe position and prevent the energizing of a machine or equipment. Included are blank flanges and bolted slip blinds.

Normal Operation - The utilization of a machine or equipment to perform its intended operation.

Servicing and/or Maintenance - Workplace activities such as constructing, setting up, adjusting, inspecting, modifying and maintaining and/or servicing machines and equipment, where the employee may be exposed to an unexpected energization or startup of the equipment or release of a hazardous energy source.

Setting Up - Any work performed to prepare a machine or equipment for performing its normal operation.

Tagout - The placement of a tagout device on an energy isolating device, in accordance with an established procedure, to indicate that the energy isolating device and the equipment being controlled may not be operated until the tagout device is removed.

Tagout Device - A prominent warning device, such as a tag and a means of attachment, which can be securely fastened to an energy isolating device in accordance with an established procedure, to indicate that the energy isolating device and the equipment being controlled may not be operated until tagout device is removed.

Key Responsibilities

Managers and Supervisors

- Responsible to control and enforce this plan and to see that all their employees and contractors that are affected by lockout/tagout procedures, have the knowledge and understanding required for safe application, usage, and removal of all energy controls and devices.
- Ensure employees are trained and comply with the requirements of this program.

Employees

- Employees who are affected by this program are required to attend training on an annual basis.
- Are required to follow the provisions of this program.



Procedure

General

Only an authorized employee or employees performing the servicing or maintenance shall perform lockout or tagout.

Devices

Lockout Device - If an energy source can be locked out a device that utilizes a lock to hold an energy isolating device in a safe position shall be used. Each site shall have the same type of lock as specified by VORTEX Companies.

Tagout Device - If an energy source cannot be locked out with a lockout device then a tagout device shall be used. Tagout devices are a warning only level of protection and shall be weather and chemical resistant, standardized in color with clear written warning of hazardous energy; i.e. Do Not Operate, Do Not Start, Do Not Energize, etc. Each site shall have the same style of tags specified by VORTEX Companies.

Specific Energy Control Procedures

Each manager or supervisor is responsible for developing specific step-by-step shutdown and startup procedures for a particular machine or piece of equipment in their respective area.

- A written, step-by-step isolation procedure for shutdown and startup shall be prepared for each type of machine or piece of equipment.
- This procedure shall include:
 - Equipment number if assigned
 - Equipment location
 - Energy Source(s) (i.e. electrical, hydraulic, gas pressure, etc.)
 - Location of isolating controls (i.e. breaker switches, valves, etc.)
 - Quantity of isolating controls
 - Quantity of locks required to isolate the equipment
 - Other hardware required to isolate the equipment (i.e. chains, valve covers, blocks, etc.)
- List any residual energy required to be dissipated before work begins

Specific Sequence for Application of Energy Control

1. Notification

Authorized employees must notify all other affected employees of the application and removal of lockout/tagout devices. Notification shall be given before the controls are applied and before they are removed from the machine or equipment.

2. Preparation for Shutdown

Before an authorized or affected employee shuts down a machine or equipment, the authorized employee shall have the knowledge of the type and magnitude of the energy, the hazards of the energy to be controlled, and the method or means (locks) to control the energy sources.

3. Machine or Equipment Shutdown

The machine or equipment shall be shut down using the procedures established for that machine or piece of equipment. The shutdown shall be orderly to avoid any additional hazards to employees as a result of the stoppage.



4. Machine or Equipment Isolation

All energy isolating devices that are needed to control the energy to the machine or equipment shall be physically located and operated in such a manner as to isolate the machine or equipment from the energy source(s).

5. Lockout/Tagout Devices and Application

- Each authorized employee shall have the proper number of locks and devices to be able to perform proper lockout/tagout procedures for machines or equipment that they may be working on.
- Lockout or tagout devices shall be affixed to each energy isolating device by authorized employees.
- Each lockout and tagout devices shall include the name of the individual placing the device.
- Lockout devices shall be affixed in a manner to hold the energy isolating devices in a safe or off position.
- Tagout devices shall be affixed in a manner that will clearly indicate that the operation or movement of isolating devices from the safe or off position.
- Tagout devices used with energy isolating devices with the capability of being locked out shall be fastened at the same point at which the lock would have been attached. If a tag cannot be directly attached to the energy isolation device it shall be located as close as safely as possible to the device in a position that will be immediately obvious to anyone attempting to operate the device.
- Each energy source shall be locked out completely isolating the equipment.
- Isolating machines or equipment shall include, but are not limited to:
 - Pumps, compressors, generators, electric distribution, storage tanks, etc.
 - Each type of equipment to be isolated shall have specific procedures for isolation, i.e. for compressors: suction, discharge, power, starting, fuel, dumps shall be closed, locked and tagged out properly. The blow-down valve shall be opened, locked and tagged out properly. NOTE: If compressor has a side stream hooked up, the side stream shall be closed, locked and tagged out properly.

6. Stored Energy and the Possibility of Reaccumulation

Following the application of lockout or tagout devices to energy isolating devices, all potentially hazardous stored or residual energy shall be relieved, disconnected, restrained and otherwise rendered safe.

If there is a possibility of re-accumulation of stored energy, verification of isolation shall be continued until the servicing or maintenance operation is completed, or until the possibility of such accumulation no longer exists.

7. Verification of Isolation

The authorized employees performing the lockout procedure verifies/ensures that the equipment is isolated or disconnected from the energy source(s) by first checking that no personnel are exposed, then verify the isolation of the machine or equipment by operating the control(s) or by testing to make certain the equipment will not operate.

Multiple Workers

A crew of authorized employees may use a group lockout or tagout device. This will afford the group of employees a level of protection equal to that provided by a personal lockout or tagout device.

- A tailgate meeting shall be conducted to review the lockout procedures and other information as required for safe work to continue - all crafts and effected departments shall be involved.
 - An authorized employee will isolate the equipment and ascertain the exposure status of individual group members.



- All workers will then place their individual locks on the device's group lockout or tagout device after they have verified the procedure.
- The crew leader or an assigned authorized employee shall be responsible of assuring the continuity of the lockout procedures including documenting lockout information passed along during a shift or personnel changes.

Release from Lockout/Tagout

When servicing or maintenance is completed or when Lockout / Tagout devices must be temporarily removed, the equipment requires testing and the machine or equipment is ready for testing or to return to normal operating conditions, the following steps shall be taken, in this order:

- Check the machine or equipment and the immediate area surrounding the machine or equipment to ensure that all nonessential items such as tools have been removed and that the machine or equipment components are operationally intact.
- Check the work area to ensure that all personnel have been safely positioned or removed from the area.
- Remove the Lockout/Tagout device.
- Energize and proceed with testing.
- Deenergize and reapply control methods including Lockout / Tagout devices.
- Document the procedure by use of the completed isolation log and provide to supervisor for filing.

Removal of Locks

The authorized employee who applied the lock shall be the one to remove their lock. However, after all work has been completed, certain conditions may arise which prohibit this person from being present to remove the lock.

The following procedures shall be followed to allow for the removal of a lock that another person has applied:

- Every effort shall be made to contact the authorized employee who applied the lock to obtain the key(s).
- If the key(s) cannot be made available, the employee who requests removal of the lock shall contact their supervisor.
- The supervisor shall verify that every effort was made to contact the original authorized employee who applied the lock and to obtain the key(s).
- The employee removing the lock shall note on the Service Report that the lock(s) were removed with permission by supervisor.
- All reasonable efforts will be made by supervisor to notify that employee their lock has been removed, ensuring that the authorized employee has this knowledge before they return to work.
- If the equipment is client owned, the supervisor or employee requesting to remove the lock(s) shall contact the client to get the lock removed. Clients must remove their lock(s).
- NOTE: VORTEX Companies employees shall not remove any client locks.

Shift or Personnel Changes

In the event shift or personnel changes occur during maintenance and/or repair activities, the designated VORTEX Companies employee in charge shall take the necessary steps to maintain the continuity of the lockout/ tagout protection. This includes maintaining that all provisions in this procedure are adhered to and the transfer of lockout/ tagout devices between authorized employees is accomplished.



Contractors

Contractors performing lockout procedures on VORTEX Companies property shall comply with this procedure. Contractors shall supply their own locks.

VORTEX Companies shall initially lockout VORTEX Companies machines and equipment before the contractor will be allowed to apply their own lock in addition to the VORTEX Companies'.

Annual Audits

Each year the manager or supervisor, or his representative, will perform an inspection of the Lockout Program in their respective areas to verify the effectiveness of the program. An authorized employee other than the one(s) utilizing the energy control procedure being inspected shall perform the audit and shall verify that:

- Each authorized and/or affected employee has been trained as required.
- Any new equipment added has specific lockout procedures developed and documented.
- Current procedures are adequate for performing complete isolation of equipment and resulting in a zero energy state.
- The annual audit will be certified in writing and a copy of the audit maintained on file at the managers/supervisors office.

Training

VORTEX Companies shall provide training to ensure that the purpose and function of the energy control program are understood by authorized employees and that the knowledge and skills required for the safe application, usage, and removal of the energy controls are acquired by employees. The training shall include the following:

- The recognition of applicable hazardous energy (lockout/tagout) sources, the type and magnitude of the energy available in the workplace, and the methods and means necessary for energy isolation and control.
- The purpose and use of energy control procedures.
- When tagout systems are used, employees shall also be trained in the following limitations of tags:
 - Tags are essentially warning devices affixed to energy isolating devices, and do not provide the physical restraint on those devices that is provided by a lock.
 - When a tag is attached to an energy isolating means, it is not to be removed without authorization of the authorized person responsible for it, and it is never to be bypassed, ignored, or otherwise defeated.
 - Tags must be legible and understandable by all authorized employees, affected employees, and all other employees whose work operations are or may be in the area, in order to be effective.
 - Tags and their means of attachment must be made of materials which will withstand the environmental conditions encountered in the workplace.
 - Tags must be securely attached to energy isolating devices so that they cannot be inadvertently or accidentally detached during use.
 - Tags may evoke a false sense of security, and their meaning needs to be understood as part of the overall energy control program.

All other employees whose work operations are or may be in an area where energy control procedures may be utilized, shall be instructed about the procedure, and about the prohibition relating to attempts to restart or reenergize machines or equipment which are locked out or tagged out.



Retraining

Retraining shall be conducted whenever a periodic inspection reveals, or whenever VORTEX Companies has reason to believe that there are deviations from or inadequacies in the employee's knowledge or use of the energy control procedures. The retraining shall reestablish employee proficiency and introduce new or revised control methods and procedures, as necessary.

Training Documentation

VORTEX Companies shall certify that employee training has been accomplished and is being kept up to date. The certification shall contain each employee's name and dates of training.



SPECIFIC EQUIPMENT LOCKOUT PROCEDURES

Department: _____

Equipment No.: _____

Energy Source: _____

Procedure for Shutdown and Isolation:

(List number of steps required to isolate machine or equipment - write N/A on lines not used or add additional steps if necessary.)

Step No.

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

7. _____

8. _____

9. _____

10. _____

Additional Information: _____

Prepared By: _____ Date: _____

(This procedure to be communicated to all authorized and affected employees and kept on file at location of machine or equipment.)



SAMPLE TAG

WARNING!

MINIMUM LOCK/OUT - TAG/OUT PROCEDURES

Inlet Suction Block Valve Discharge Block
Valve Fuel Gas Valve Start Gas Valve
Liquid Dump Line Blow Down (Lock Open)

When working on this compressor package the following items must be **LOCKED OUT & TAGGED OUT**. Residual pressure must be blown down. Open all valves on surge bottles and piping to relieve any pressure that may be trapped.

Side Stream (For Units Set up with Side Streams)

When working on the compressor each person must lock and tag the compressor package!



ISOLATION LOG

Date of Isolation: _____

Description of Work: _____

List of Equipment Out-of-Service: _____

Necessary Requirements of Clear Isolation: _____

Authorized Employee Signature: _____

Person Continuing Work Signature: _____

Locks/Tags for GROUP LOCKOUT or Multiple Locks/Tags

Lock # or Tag	Date Installed	Date Removed	Print Name (for Group Lockout)	Signature

(If additional space is needed, please attach an additional page.)



ANNUAL AUDIT OF THE CONTROL OF HAZARDOUS ENERGY PROGRAM

I certify that an audit of the VORTEX Companies "Control of Hazardous Energy" Program was conducted and that each employee has been trained in the recognition and procedures to lockout equipment they may be required to work on or may be affected by. I further acknowledge that the current procedure is adequate to safely lockout equipment in this department for servicing and maintenance.

Department: _____

Manager (or Representative): _____

Date: _____

Original to file: _____



CIVIL INFRASTRUCTURE SOLUTIONS

NOISE EXPOSURE / HEARING CONSERVATION



Vortex Companies

Procedure Name	Environmental, Health & Safety Manual – Noise Exposure/Hearing Conservation
Applicability	VORTEX Companies – Employees & Subcontractors
Policy Revised	10.30.14

Purpose

The purpose of this program is to provide a process to minimize employee-hearing loss caused by excessive occupational exposure to noise.

Scope

This program is applicable to all employees who may be exposed to noise in excess of 85 decibels (decibels). When work is performed on a non-owned or operated site, the operator's program shall take precedence, however, this document covers VORTEX Companies employees and contractors and shall be used on owned premises, or when an operator's program doesn't exist or is less stringent.

Definitions

Audiometric Testing - Detection by the person being tested of a series of pure tones. For each tone, the person indicates the lowest level of intensity that they are able to perceive.

Decibels - The sound energy measured by a sound level meter using the "A" scale. The "A" scale is electronically weighted to simulate the response of the human ear to high and low frequency noise.

Slow Response - The setting on the sound level meter that averages out impulses of brief duration that would cause wide fluctuation in the sound level meter reading.

Standard Threshold Shift - A change in hearing threshold relative to the baseline audiogram of an average of 10 dB (corrected for age) at 2000, 3000 and 4000 Hz in either ear.

Key Responsibilities

Managers and Supervisors

- Ensure requirements of this program are established and maintained.
- Ensure employees are trained and comply with the requirements of this program.

Employees

- Wear hearing protection when required, attend the training, and cooperate with testing and sampling.

Procedure

Occupational hearing loss is a cumulative result of repeated or continued absorption of sound energy by the ear; employee protection is based on reduction of the noise level at the ear or limiting the employee's exposure time.



VORTEX Companies shall offer hearing protection to all employees exposed to potential high noise levels in working areas and to those employees requesting hearing protection.

All employees, who work in areas where the exposure to noise levels are 85 decibels or greater for the 8 hour time-weighted average of 85 decibels, must wear hearing protection and VORTEX Companies shall implement a monitoring program to identify employees to be included in the hearing conservation program.

Surveys

Surveys will be conducted by a qualified employee or third party.

To evaluate noise exposure in terms of possible hearing damage, it is necessary to know the overall sound level ("A" scale measurement), the exposure time of the individual in hours per day and the length of time the individual has worked in the area being surveyed. This data shall be supplemented by the following:

- Name of area and location
- Date and time of survey
- Name of person conducting survey
- Description of instrument used, model and serial number
- Environmental conditions
- Description of people exposed

VORTEX Companies shall notify each employee of their monitoring results, or, if their job is exposed to noise 85 decibels or greater.

A plot of noise levels must be made for owned facilities. The plot must be filed or posted at the facility. VORTEX Companies shall evaluate hearing protector attenuation for the specific noise environments. The adequacy of hearing PPE shall be reevaluated whenever noise exposures increase to the point that the PPE provided may no longer provide adequate protection. VORTEX Companies shall then provide more effective PPE where necessary.

All sound measuring equipment must be calibrated before and after each survey. Records of sound measuring equipment calibration and noise level surveys shall be kept for 20 years.

Noise Surveys must be repeated whenever changes in the workplace may expose additional personnel to high noise or hearing protection being used by employees may not be adequate to reduce the noise exposure to a level below 85 decibels.

Sound Level Surveys

- All owned facilities that are suspected of having noise levels exceeding 85 decibels must be screened.

Exposure Surveys

- A representative sampling of employees shall be conducted to determine the exposure to noise over a period of time.
- Noise dosimeters must be capable of integrating all continuous, intermittent and impulsive sound levels from 80 dB to 130 dB and must be calibrated so a dose of 50% corresponds to a time weighted average of 85 dB.

Signage

Clearly worded signs shall be posted at entrances to, or on the periphery of, areas where employees may be exposed to noise levels in excess of 85 decibels. These signs shall describe the hazards involved and the required protective actions.



Audiometric Testing

Each employee who is exposed to noise 85 decibels (8 hr TWA) or greater must take an audiogram annually.

- An employee must receive a baseline audiogram within six months of their first exposure to 85 decibels or greater for an eight hour period.
- An employee shall receive an annual audiogram every year they work in a position that is exposed to noise 85 decibels or greater.
- A qualified third party shall perform all audiometric testing, evaluation, reporting and retesting.
- Audiometric testing shall be preceded by a period of at least 14 hours during which there is no exposure to workplace sound levels in excess of 80 decibels.
- This requirement may be met by the use of hearing protectors that reduce the employee noise exposure level below 80 decibels.
- An otoscopic exam is required before an audiogram is initiated. A qualified person shall examine the ear canal for any ear infections or canal irregularities that might affect the audiogram or rule out the use of earplugs.

Annual audiograms shall be evaluated as follows:

- Each audiogram shall be compared to the employees' baseline audiogram to ensure the test was valid and to determine if a standard threshold shift has occurred.
- If a standard threshold shift is determined, the employee will be retested within 30 days.
- The retest results will be considered as the annual audiogram.
- Employees shall be informed of their audiometric test results in writing within 21 days of determination.
- If the employee has sustained a standard threshold shift, after retesting, that employee shall be retrained and refitted for appropriate hearing protection.
- The employee shall be referred for additional medical evaluation if indicated.

Employee audiograms are considered medical/exposure records. These records must be kept for the length of employment plus 30 years.

Hearing Protection Devices

Earmuffs and earplugs shall be made available to the employee in sizes and configurations that will be comfortable to the employee. These hearing protection devices shall be made available to all employees exposed to an 8 hour time--weighted average of 85 db at no cost to employees. Employees shall be instructed how to obtain the proper fit.

Training

A training program shall be established to inform employee, on an annual basis, of the effect of noise on hearing; the purpose of hearing protectors, including the advantages, disadvantages and alternatives of various types, including instructions on selection, fitting, use and care; and the purpose of audiometric testing and an explanation of test procedures.

Training shall be updated to be consistent with changes in the work process and PPE requirements.

All staff shall have a copy of this program and it shall be posted at the work-site and a copy made available to all employees, their representatives and regulatory agencies.

The training must be documented.



CIVIL INFRASTRUCTURE SOLUTIONS

NEW HIRE TRAINING



Vortex Companies

Procedure Name	Environmental, Health & Safety Manual - New Hire Training
Applicability	VORTEX Companies - Employees
Policy Revised	09.28.18

Purpose

The purpose of this program is to ensure that VORTEX Companies continues to improve subcontractor health, safety and environmental performance and to establish a standard for minimum training required for New Hires involved in where their primary function will be based around field work.

Scope

This program applies to all VORTEX Companies operations.

General Requirements

All VORTEX Companies operations departments are to be managed in accordance with this program.

Minimum training required for New Hire Employees that are to be performing work in the field:

General Labor

- OSHA 10
- Confined Space
- Heavy Equipment (i.e. Forklifts, excavators, backhoes, etc.)
- Work Task Specific

Superintendent/Foreman

- OSHA 30
- Confined Space
- Heavy Equipment
- Hazard Recognition and Assessment
- Work Task Specific

All Employees

- Continuous Training as directed by the VORTEX Safety and Compliance Department.
- Task specific training as required
- Tool specific training as required

Procedure

The Safety and Compliance Manager is to be notified of the addition of a new hire with, at minimum, a 5 days' notice before the employee is expected to be in the field. During 5-day orientation period, the Safety and Compliance Manager with coordinate and administer all required training need by the New Hire.



Safety Orientation Field Employees	Description
Vortex Way review and presentation. Vision, Values, Habits.	The Vortex Way presentation is your opprunity to share our Vortex vision, values, and habits. Using the Vortex Way PowerPoint presentation and the printed Vortex Way Book you are able to explain the things that make us who we are. The Vortex Vision shows us where we are going, our Vortex Values are the things we all share and they make up who we are as people and as a company, and our Vortex Habits are how we take those values out into the world and into our work.
Issue Vortex Way Book (ENG or ESP)	Issuing the Vortex Way Book is a special and symbolic moment for a new employee. The Vortex Way should inspire and inform new employees. When team members believe in the vision of a company, they are much more likely to tie their individual values to that shared vision. This allows them to have a greater sense of ownership and contribution and motivates them.
Issue and Review Vortex Field Safety Guide (ENG or ESP)	The Vortex Field Safety Guide is a tool that was designed and built by the Vortex health and safety team as a way to provide simple tutorials around some of the most common exposures to Vortex employees as well as some of the health and safety stragegies we use everyday in the field. Use the Vortex Field Safety Guide PowerPoint and printed Guide.
OSHA 10 (if not complete at date of hire setup OSHA 10 training account)	All Vortex workers who primarily conduct their work in field are required to have OSHA 10 Hour training at a minimum. The OSHA 10 hour training program is intended for the training of entry level workers. The program helps to ensure that the workers are more knowledgeable about workplace hazards, their rights and contribution to the total national productivity. The training program is 100% online and can be completed in segments, 24/7.
Vortex HASP review and acknowledgment, right to know.	The Vortex Health and Safety Plan is the comprehensive consildation of all Vortex policies and procedures, it is too exhaustive to review in its entirety during the early stages of the onboarding process however all employees have the right to know where policies exist and who to contact if they have any questions regarding specific policies and safety programs.Training for employees specific job roles are completed by the Regional Health and Safety Manager.
STA Review and Training	USE Vortex Field Safety Guide and review daily STA form and process
STOP work authority review	USE Vortex Field Safety Guide
Incident reporting policy review	USE Vortex Field Safety Guide and review Incident Reporting policy and
Safety TRAPS and STAR	USE Vortex Field Safety Guide
Fit for duty	USE Vortex Field Safety Guide
Stretches	USE Vortex Field Safety Guide and demonstrate
Issue "Vortex Ready to work PPE Kit" Vortex orange (white hard hat if employee is experienced in field and is not considered a employee brand new to the trade) hard hat, Vortex t-shirt, safety vest, safety glasses, ear plugs, Vortex welcome bag, Vortex water bottle, snack, and welcome card from Regional Vice President.	The Vortex Work Ready Kit is an important part of the introduction and onboarding process and shows our employees that they are important and valued. The Vortex work ready kits will be kept in inventory and ready to go prior to new employees first day of work. This Vortex SWAG allows them to show their company pride on day one and feel welcome.
PPE training. Selection, inspection, proper use, and maintenance. Hard hat, safety vest, harness, hearing protection, respiratory protection, eye protection.	Each employee who is required to use PPE shall be trained to know at least the following. (i) When PPE is necessary (ii) What PPE is necessary (iii) How to properly don, doff, adjust, and wear PPE (iv) The limitations of the PPE (v) The poper care, maintenance, useful life, and disposal of the PPE. Each employee shall demonstrate an understanding of the training and ability to use the PPE properly before starting work.
Confined Space Entry Program Review & Training	The employer shall ensure that each employee who enters a confined space, enclosed space, or other areas with dangerous atmospheres is trained to: (i) Recognize the characteristics of the confined space; (ii) Anticipate and be aware of the hazards that may be faced during entry; (iii) Recognize the adverse health effects that may be caused by the exposure to a hazard; (iv) Understand the physical signs and reactions related to exposures to such hazards; (v) Know what personal protective equipment is needed for safe entry into and exit from the space; (vi) Use personal protective equipment; and (vii) Where necessary, be aware of the presence and proper use of barriers that may be needed to protect an entrant from hazards



Fall Protection Program Review & Training	The employee will be trained in the use and operation of fall arrest systems, inspections, and maintenance procedures.
Hand and power tool safety best practices	Only employees who have been trained in the operation of the particular tool in use shall be allowed to operate a power tool.
Work Zone Program Review & Training	A work zone is an area where roadwork takes place and may involve lane closures, detours and moving equipment. Highway work zones are set up according to the type of road and the work to be done on the road. The work zone can be long or short term and can exist at anytime of the year. The employee will be trained in workzone safety awareness if applicable.
Substance Abuse Program Review & Training	The employee will be may aware of the Vortex Substand Abuse Policy at time of hire. Ensure that all supervisors understand their specific responsibilities for initiating and carrying out the drug-free workplace policy and program.
Exposure Control Program Review & Training	This instruction provides for uniform policy for protection of Vortex personnel who, as part of their job, face reasonably anticipated exposure to bloodborne pathogens.
Hazard Communication Program Review & Training	Hazard communication, also known as HazCom, is a set of processes and procedures that employers and importers must implement in the workplace to effectively communicate hazards associated with chemicals during handling, shipping, and any form of exposure. Vortex stores and deals with hazardous materials in the workplace and must have labels and safety data sheets for the exposed workers, and train them to handle the chemicals appropriately
Hearing Conservation Program Review & Training	The employer shall ensure that each employee is informed of the following: (i) The effects of noise on hearing; (ii) The purpose of hearing protectors, the advantages, disadvantages, and attenuation of various types, and instructions on selection, fitting, use, and care; and (iii) The purpose of audiometric testing, and an explanation of the test procedures.
Respiratory Protection Program Review & Training	The employer shall ensure that each employee can demonstrate knowledge of at least the following: (i) Why the respirator is necessary and how improper fit, usage, or maintenance can compromise the protective effect of the respirator; (ii) What the limitations and capabilities of the respirator are; (iii) How to use the respirator effectively in emergency situations, including situations in which the respirator malfunctions; (iv) How to inspect, put on and remove, use, and check the seals of the respirator; (v) What the procedures are for maintenance and storage of the respirator; (vi) How to recognize medical signs and symptoms that may limit or prevent the effective use of respirators.
Lock Out Tag Out Program Review & Training	The employer shall ensure that each employee can demonstrate knowledge of at least the following the safe application, usage, and removal of the energy controls are acquired by employees. The training shall include the following: (i)The recognition of applicable hazardous energy (lockout/tagout) sources, the type and magnitude of the energy available in the workplace, and the methods and means necessary for energy isolation and control.(ii) The purpose and use of energy control procedures. (iii) When tagout systems are used, employees shall also be trained in the following limitations of tags:
Excavation Safety Program Review & Training	Personnel who perform work in trenches or excavations must comply with the requirements of this Plan and receive appropriate training that will include: (i) Safe work practices during work in excavations (ii)The use of personal protective equipment (PPE) that will typically be required during work in excavations (iii) Procedures to be followed if a hazardous atmosphere exists or could reasonably be expected to develop during work in an excavation (iv) Emergency and nonentry rescue methods and procedures for calling rescue services
Site specific training per region as needed (example Pixell Paper training for Ted Berry)	Some facilities have specific work training required for sites they work at exclusively at. These should be managed by the Regional HSE manager.
Driver Responsibilities, Pre-Trip Inspection truck and trailer	Overview of Driver responsibilities on day to day. The Pre-Trip Inspection is a thorough inspection of the vehicle and all of its major systems. Inspecting the vehicle before driving each day is a Federal requirement and normally takes about 15 minutes. It must be logged in your logbook as "on duty not driving.
FMCSA, HOS, and ELD Training for CMV drivers	The USDOT designates vehicles as commercial if they are: designed to carry more than 15 passengers, greater in weight than 10000 pounds with a towed unit or units' total weight to 26,001 pounds, or weighing greater than 26,001 pounds on its own. Additionally, any vehicles that are used to transport hazardous materials are deemed a CMV.
Pre-Trip Inspection truck and trailer	The Pre-Trip Inspection is a thorough inspection of the vehicle and all of its major systems. Inspecting the vehicle before driving each day is a Federal requirement and normally takes about 15 minutes. It must be logged in your logbook as "on duty not driving.
Equipment Maintenance Required procedure review	Our Vortex projects rely heavily on equipment of all types and it requires continual operations maintenance and occasionally repairs. Training on how employees document and communicate equipment deficiencies.



CIVIL INFRASTRUCTURE SOLUTIONS

**PERSONAL
PROTECTIVE
EQUIPMENT /
ASSESSMENTS - (PPE)**



Vortex Companies

Procedure Name	Environmental, Health & Safety Manual – Personal Protective Equipment
Applicability	VORTEX Companies – Employees & Subcontractors
Policy Revised	10.30.14

Purpose

The purpose of the Personal Protective Equipment section is to set forth the procedures for the use, care, and maintenance of personal protective equipment required to be used by employees for the prevention of injuries.

Scope

Applies to all VORTEX Companies employees. When work is performed on a non-owned or operated site, the operator's program shall take precedence, however, this document covers VORTEX Companies employees and contractors and shall be used on owned premises, or when an operator's program doesn't exist or is less stringent.

Key Responsibilities

HSE Manager

- Assists in the selection of appropriate PPE. If a task exposes an employee to hazards which cannot be eliminated through engineering or administrative controls, the HSE Manager assists the supervisor and project manager to identify and select PPE suitable for the specific task performed, conditions present, and frequency and duration of exposure. Employees need to give feedback to the supervisor about the fit, comfort, and suitability of the PPE being selected. Employees are provided reasons for selection of PPE.
- Assists supervisor and site managers in assuring all PPE obtained meets regulatory and this procedure's requirements.
- Performs Worksite Hazard Assessments - The hazard assessment must indicate a determination if hazards are present or are likely to be present, which necessitate the use of PPE. Sources of hazards include, but are not limited to: hazards from impact/motion, high/low temperatures, chemicals, materials, radiation, falling objects, sharp objects, rolling or pinching objects, electrical hazards, and workplace layout.
- Certifies in writing the tasks evaluated, hazards found and PPE required to protect employees against hazards and ensures exposed employees are made aware of hazards and required PPE before they are assigned to the hazardous task. Certificate shall include certifier's name, signature, dates and identification of assessment documents.

Managers and Supervisors

- Supervisors and managers shall regularly monitor employees for correct use and care of PPE, and obtain follow-up training if required to ensure each employee has adequate skill, knowledge, and ability to use PPE.
- Supervisors and managers shall enforce PPE safety rules following the guidance of the VORTEX Companies progressive disciplinary procedures and ensure Required PPE Poster is posted properly.

Employees

- Complying with the correct use and care of PPE.
- Reporting changes in exposure to hazardous conditions that might require a follow-up assessment of the task for PPE.



- Reporting and replacing defective PPE, which shall not be used.
- Wearing of required PPE is a condition of employment.

Procedure

General

Employee owned equipment is NOT permitted, except for safety toe footwear and prescription safety glasses. VORTEX Companies is still responsible for the assurance of its adequacy, maintenance and sanitation of those two items.

All PPE issued by VORTEX Companies shall be at no cost to the employee and PPE shall be used and maintained in a sanitary and reliable condition.

All employees will know and follow the procedures outlined in this Program.

Eye Protection

Employees must use appropriate eye or face protection when exposed to eye or face hazards from flying particles, molten metal, liquid chemicals, acids or caustic liquids or chemical gases or vapors. Eye and Face PPE must comply with ANSI Standard Z87.1-2003 (Z87+), Occupational and Educational Personal Eye and Face Protective Devices.

Safety Glasses

Safety glasses, with side shields, that meet ANSI Z87.1-2003 standards with “high Impact lenses” are required to be worn by all employees, subcontractors, and visitors while on VORTEX Companies property, at all times, as described below:

- At field locations, in shops and warehouses, except in approved, designated, striped safety zones.
- In all yard work zones or by everyone when in the vicinity of loading or unloading equipment, performing mechanic or maintenance work, test stand operations, operating equipment such as forklifts, welding, or any type of work which has the potential to inflict an eye injury.
- In any office, restroom, or any other building while performing any type of work where a potential eye injury may be present.
- Visitors will be provided with visitor glasses. In the absence of approved prescription safety glasses, “Over the glass” type safety glasses or goggles, must be worn over the nonsafety glasses until approved prescription safety glasses are obtained.
- Workers assisting welders must wear absorbent safety glasses that protect the wearer from ultra-violet (UV) and/or infrared rays (IR).
- Dark shaded lens (sunglasses) darker than a # 1 shade is prohibited to be worn indoors unless welding or assisting a welder.
- A doctor must support “exceptions for medical reasons” in writing to exempt safety eyewear requirements.
- Safety glasses are not required:
 - Inside offices.
 - Parking lots when traveling from vehicles to and from office buildings by way of main doors that do not pass through shops.



Goggles

- Chemical splash proof goggles shall be worn when handling or mixing liquid chemicals, solvents, paints, etc., and/or as recommended on the Material Safety Data Sheet of the material being handled.
- Dust proof goggles shall be worn when blowing equipment down with air or while performing other jobs where safety glasses are not adequate to prevent airborne particles from entering the openings around the lenses and side shields.

Face Shields

Full face shields shall be worn over safety glasses when operating hand held or stationery grinders with abrasive or wire wheels, while chipping paint or concrete or, performing jobs where there is the potential for flying objects striking the face and safety glasses or goggles would not provide adequate protection.

Head Protection

Employees must wear protective helmets when working in areas where there is a potential for injury to the head from employee initiated impact or impact from falling or other moving objects. Helmets must comply with ANSI Standard Z89.1-1997 Class E, American National Standard for Industrial Head Protection for Type II head protection or be equally effective.

- Employees must wear protective helmets when working in areas where there is a potential for injury to the head from falling objects.
- Hardhats are to be worn at all field, shop and warehouse locations, or where deemed necessary as per each location's PPE Hazard Assessment.
- Hardhats will not be altered in any way.
- Do not paint or apply unauthorized stickers, name plates, etc.
- Do not drill, cut, bend, or apply heat.
- Do not alter the suspension system.
- Hardhats will be inspected by the employee regularly for cracks, chips, scratches, signs of heat exposure (sun cracks), etc.
- Defective hardhats will be replaced immediately.
- Hardhats shall not be placed in rear windows of vehicles where they will be exposed to the sun or become projectiles during an accident.
- A supply of hardhats must be made available to visitors.
- VORTEX Companies shall provide hardhats.
- Employees will be trained in the use, care and maintenance of head protection equipment.

Hearing Protection

Hearing protection is required to be worn by all employees, subcontractors, and visitors while in posted "High Noise" areas. Refer to the VORTEX Companies Hearing Conservation Program for more information.

Warning signs will be posted in areas known or suspected to have noise levels exceeding 85 dBA either constantly or intermittently.

When signs are not posted, employees shall wear hearing protection when noise caused by machinery, tools, etc., prevents normal conversations to be heard clearly.

Rule of thumb: If you have to yell to be heard, hearing protection is required.



Types

- Molded Inserts (ear plugs)
- Canal Caps (head band type)
- Muff, either headband or hard hat mounted Earmuffs and earplugs shall be provided to the employee in sizes and configurations that will be comfortable to the employee.

Care and Maintenance

- Inspect hearing protection prior to each use.
- Hearing protection must be kept clean to prevent ear infections.
- Most earplugs used today are disposable and must be discarded when they become dirty, greasy, or cracked.
- Earmuffs that have deteriorated foam inserts, cracked seals or are defective must be replaced.

Fit

- Due to individual differences, not everyone can wear the same type of hearing protection. A variety of styles may have to be tried before one is found to be comfortable and provide adequate protection.
- Employees shall be instructed how to obtain the proper fit.

Hand Protection

Gloves

- Gloves are required to be worn when performing work, which may expose the hands to extreme temperatures, cuts and abrasions, or exposure to chemicals.
- Welding: Welding gloves made of leather or other heat resistant materials shall be worn when performing arc welding or oxy/gas cutting.
- Chemical: Impervious (chemical resistant) gloves shall be worn when handling chemicals that specify gloves as personal protection equipment when handling.
- Refer to the specific chemical's Material Safety Data Sheet for the correct glove type.
- Persons assigned to working with chemicals, i.e., solvent vats, shall be issued their own individual gloves for hygiene purposes.
- Leather: Leather gloves should be worn when working with sharp materials or when handling rigging equipment.
- Cloth: Cloth gloves should be worn when handling objects or materials, which could cause blisters, splinters, cuts, etc.
- Heat Resistant: Heat resistant gloves shall be worn when handling hot bearings, races, or other materials or objects that have been heated beyond ambient temperatures.
- Insulated: Insulated gloves shall be worn to prevent frostbite in extreme cold climates.
- Glove Inspections:
 - Gloves shall be inspected before each use for holes, tears, and worn areas.
 - Chemical gloves shall be periodically air tested for pinholes by twisting the cuff tightly, apply low air pressure to expand the glove, and then submersing in water to check for bubbles.
 - Defective gloves shall be discarded immediately. Exception: machinists are exempted from wearing gloves while working with rotating machinery.

Foot Protection

Safety footwear shall be worn by all employees with regularly assigned duties at field locations, in shops and warehouses.



- Office workers and visitors who enter these areas on an infrequent basis will not be required to wear foot protection provided they stay clear of the work being performed.
- If required to be in the close proximity of the work, the work will be stopped while visiting the area or safety footwear will be worn.

Shops, Field Locations, Warehouses and Parts Departments: Leather or equivalent boots, either lace up or pull up, shall be worn.

- The boot must provide ankle protection and have soles designed to protect from punctures with defined heels for climbing ladders.
- Metatarsal guards will be worn when duties present a hazard of equipment or material crushing the foot.
- All safety footwear must meet ANSI Z41-1999 standards.
- Client locations may require safety footwear to be worn by everyone; check with the local supervisor for client requirements before visiting field locations.

Fall Protection

Personal fall protection is required when performing certain elevated jobs in excess of six feet. Consult the VORTEX Companies Fall Protection Program.

Electrical Protection

Consult the VORTEX Companies Electrical Safety Program.

Worksite Hazard Assessment

During a hazard assessment the following sample hazard sources will be identified:

- High or low temperatures; Chemical exposures (use SDS for guidance)
- Flying particles, molten metal or other eye, face, or skin hazards
- Falling objects or potential for dropping objects; employee falling from a height of 6' or more
- Sharp objects; Rolling or pinching that could crush the hands or feet;
- Electrical hazards

Where these hazards could cause injury to employees, personal protective equipment must be selected to substantially eliminate the injury potential. Employees will be notified for the selection and reason.

The results of this assessment shall be communicated to each affected employee and kept at the local office.

Selected/identified PPE shall be fitted to each affected employee. Exemptions for use of PPE must be supported by the PPE hazard assessment.

Monitoring

Supervisors and site managers monitor worksite tasks for changes in, or the introduction of new hazards. If new hazards are discovered, they advise the HSE Manager who then conducts a hazard assessment for appropriate PPE. The HSE Manager monitors the effectiveness of the PPE Procedure and makes recommendations to management to improve the procedure.



Training

Each employee who requires PPE shall be properly trained. Training shall include:

- When PPE is necessary.
- What PPE is necessary.
- How to properly don, doff, adjust and wear PPE.
- The limitations of PPE.
- How to maintain PPE in a sanitary and reliable condition.

Retraining

Retraining is required when:

- The workplace changes, making the previous training obsolete.
- The type of PPE changes.
- When the employee demonstrates lack of use, improper use, or insufficient skill or understanding in PPE selection, necessity, use and limitations.

Documentation

Training shall be documented and records kept at the local office. The training documentation shall include:

- Name of employee(s) trained;
- The dates of training; and
- The training subject.



PPE ASSESSMENT MATRIX

PPE Matrix: _____ **Site** **Location:** _____ **Insert Location or Work**

TASK					

D = Depends on situation

M = Mandatory

— = Not Mandatory unless hazards become present

SUBJECT TO CHANGE BASED ON INDIVIDUAL WORKSITE HAZARD ASSESSMENT

CHANGE ALL AS NEEDED

EQUIPMENT	HAZARD	INSPECTION	MAINTENANCE						
HEAD PROTECTION									
Hard Hat (Class G or E Only)	Striking Head or Falling Objects	Each Use	Dispose	—	—	D	—	—	—
EYE AND FACE PROTECTION									
Safety Glasses w/Shields	Objects Striking Eyes	Each Use	Dispose	D	D	M	*	—	M
Impact Vented Goggles	Small Particles in Eyes	Each Use	Dispose	—	—	D	—	—	D
Chemical Splash Goggles	Chemicals or Oil in Eyes	Each Use	Dispose	D	D	D	—	—	—
HEARING PROTECTION									
Disposable Earplugs	Damage to Hearing (85 db)	Each Use	Dispose	D	D	D	—	—	—
Ear Muffs	Damage to Hearing (105 db)	Each Use	Dispose	D	D	D	—	—	—
PERSONAL PROTECTIVE CLOTHING									
Cold Weather Clothing	Cold Temperature	Each Use	Clean & Repair	D	D	D	D	—	D
Rainwear	Wet Body	Each Use	Dispose	—	—	D	—	—	—
Protective Sleeves	Biohazardous Materials	Each Use	Dispose	—	M	—	—	—	—
<i>Insert More or Delete as Needed</i>									
FOOT PROTECTION									
Slip Resistant Footwear	Injury to Body	Each Use	Replace	M	M	M	—	—	—
Anti-Slip Cleats During Winter	Injury to Body	Each Use	Dispose	M	M	M	—	—	M
HAND PROTECTION									
Anti-cut Gloves	Cuts	Each Use	Dispose	M	D	M	—	—	—
Vinyl Disposable Gloves	Biohazardous Materials	Each Use	Dispose	—	M	—	—	—	—
Heavy Duty Gloves	Injuries to Hands	Each Use	Dispose	—	—	M	—	—	—
Cold Weather Gloves	Environmental Exposure	Each Use	Dispose	—	—	—	—	—	M
Rubber Gloves	Hot Water Burns	Each Use	Dispose	M	—	—	—	—	—



PPE HAZARD ASSESSMENT CERTIFICATION FORM

Name of Work Place: _____

Work Place Address: _____

Work Area(s): _____

Job/Task(s): _____

(Use a separate sheet for each job/task or work area.)

EYES

Work activities, such as:

- Abrasive Blasting
- Chopping
- Cutting
- Drilling
- Welding
- Soldering
- Torch Brazing
- Working Outdoors
- Computer Work
- Punch Press Operations
- Other _____

Work-related exposure to:

- Airborne Dust
- Dirt
- UV
- Flying Particles/Objects
- Blood Splashes
- Hazardous Liquid Chemicals Mists
- Chemical Splashes
- Molten Metal Splashes
- Glare/High Intensity Lights
- Laser Operations
- Intense Light
- Hot Sparks
- Other _____

Can hazard be eliminated w/out the use of PPE?

- Yes No
- If no, use: _____ With: _____
- Safety Glasses Face Shield
- Safety Goggles Face Shield
- Dust-tight Goggles
- Impact Goggles
- Welding Helmet/Shield
- Chemical Goggles
- Chemical Splash Goggles
- Laser Goggles
- Shading/Filter (# _____)
- Welding Shield
- Other _____

FACE

Work activities, such as:

- Cleaning
- Cooking
- Siphoning
- Painting
- Dip Tank Operations
- Metal Pouring
- Other _____

Work-related exposure to:

- Hazardous Liquid Chemicals
- Extreme Heat
- Extreme Cold
- Potential Irritants _____
- Other _____

Can hazard be eliminated w/out the use of PPE?

- Yes No
- If no, use: _____
- Face Shield
- Shading/Filter (# _____)
- Welding Shield
- Other _____

HEAD

Work activities, such as:

- Building Maintenance
- Confined Space Operations
- Construction
- Electrical Wiring
- Walking/Working Under Catwalks
- Walking/Working on Catwalks
- Walking/Working Under Conveyor Belts
- Working With/Around Conveyor Belts
- Walking/Working Under Crane Loads
- Other _____

Work-related exposure to:

- Beams
- Pipes
- Exposed Electrical Wiring or Components
- Falling Objects
- Fixed Object
- Machine Parts
- Other _____

Can hazard be eliminated w/out the use of PPE?

- Yes No
- If no, use: _____
- Protective Helmet
 - Type A (Low Voltage)
 - Type B (High Voltage)
 - Type C
 - Bump Cap (not ANSI-Approved)
- Hair Net or Soft Cap
- Other _____



HANDS / ARMS

Work activities, such as:

- Baking
- Cooking
- Grinding
- Welding
- Working With Glass
- Using Power Tools
- Using Computers
- Working Outdoors
- Using Knives
- Dental and Health Care Services
- Garbage Disposal
- Computer Work
- Other _____

Work-related exposure to:

- Blood
- Irritating Chemicals
- Tools or Materials that Could Scrape or Cut
- Extreme Heat
- Extreme Cold
- Animal Bites
- Electric Shock
- Vibration
- Musculoskeletal Disorders
- Sharps Injury
- Other _____

Can hazard be eliminated w/out the use of PPE?

- Yes No

If no, use:

- Gloves
 - Chemical Resistance
 - Liquid/Leak Resistance
 - Temperature Resistance
 - Abrasion/Cut Resistance
 - Slip Resistance
 - Latex or Nitrile Anti-
 - Vibration
- Protective Sleeves
- Ergonomic Equipment _____
- Other _____

FEET / LEGS

Work activities, such as:

- Building Maintenance
- Construction
- Demolition
- Food Processing
- Foundry Work
- Working Outdoors
- Logging
- Plumbing
- Trenching
- Use of Highly Flammable Materials
- Welding
- Other _____

Work-related exposure to:

- Explosive Atmospheres
- Explosives
- Exposed Electrical Wiring or Components
- Heavy Equipment
- Slippery Surfaces
- Impact from Objects
- Pinch Points
- Crushing
- Slippery/Wet Surface
- Sharps Injury
- Blood
- Chemical Splash
- Chemical Penetration
- Extreme Heat/Cold
- Fall
- Other _____

Can hazard be eliminated w/out the use of PPE?

- Yes No

If no, use:

- Safety Shoes or Boots
 - Toe Protection
 - Electrical Protection
 - Heat/Cold Protection
 - Puncture Resistance
 - Chemical Resistance
 - Anti-slip Soles
- Leggings or Chaps
- Foot-leg Guards
- Other _____

BODY / SKIN

Work activities, such as:

- Baking or Frying
- Battery Charging
- Dip Tank Operations
- Fiberglass Installation
- Sawing
- Other _____

Work-related exposure to:

- Chemical Splashes
- Extreme Heat
- Extreme Cold
- Sharp or Rough Edges
- Irritating Chemicals
- Other _____

Can hazard be eliminated w/out the use of PPE?

- Yes No

If no, use:

With:

- Vest, Jacket Long Sleeves
- Coveralls, Body Suit
- Raingear
- Apron
- Welding Leathers
- Abrasion/Cut Resistance
- Other _____



BODY / WHOLE

Work activities, such as:

- Building Maintenance
- Construction
- Logging
- Computer Work
- Working Outdoors
- Utility Work
- Other _____

Work-related exposure to:

- Working from Heights of 10 Feet or More
- Impact from Flying Objects
- Impact from Moving Vehicles
- Sharps Injury
- Blood
- Electrical/Static Discharge
- Hot Metal
- Musculoskeletal Disorders
- Sparks
- Chemicals
- Extreme Heat/Cold
- Elevated Waling/Working Surface
- Working Near Water
- Injury from Slip/Trip/Fall
- Other _____

Can hazard be eliminated w/out the use of PPE?

- Yes No
- If no, use: Fall Arrest/Restraint Hood
- Traffic Vest Full Sleeves
- Static Coats/Overalls
- Flame Resistant Jacket/Pants
- Insulated Jacket
- Cut Resistant Sleeves/Wristlets
- Hoists/Lifts
- Ergonomic Equipment
- Other _____

LUNGS / RESPIRATORY

Work activities, such as:

- Cleaning
- Mixing
- Painting
- Fiberglass Installation
- Compressed Air or Gas Operations
- Confined Space Work
- Floor Installation
- Ceiling Repair
- Working Outdoors
- Other _____

Work-related exposure to:

- Dust or Particulate
- Toxic Gas/Vapor
- Chemical Irritants (Acids)
- Welding Fume
- Asbestos
- Pesticides
- Organic Vapors
- Oxygen Deficient Environment
- Paint Spray
- Extreme Heat/Cold
- Other _____

Can hazard be eliminated w/out the use of PPE?

- Yes No
- If no, use with type: Dust Mask
- Disposable Particulate Respirator
- Replaceable Filter Particulate w/ Cartridge
- Half-Faced
- Full-Faced
- PAPR (Air Recycle)
- PPSA (Air Supply)

EARS / HEARING

Work activities, such as:

- Generator
- Grinding
- Ventilation Fans Machining
- Motors
- Routers
- Sanding
- Sawing
- Pneumatic Equipment
- Sparks
- Punch or Brake Presses
- Use of Conveyors
- Other _____

Work-related exposure to:

- Loud Noises
- Loud Work Environment
- Noisy Machines/Tools
- Punch or Brake Presses
- Other _____

Can hazard be eliminated w/out the use of PPE?

- Yes No
- If no, use: Ear Muffs
- Ear Plugs
- Leather Welding Hood



CIVIL INFRASTRUCTURE SOLUTIONS

PROCESS SAFETY MANAGEMENT (PSM)



Vortex Companies

Procedure Name	Environmental, Health & Safety Manual – Process Safety Management
Applicability	VORTEX Companies – Employees & Subcontractors
Policy Revised	05.14.18

The Vortex Companies will ensure that Standard Practice Instructions, and emergency plans are developed. These documents will ensure that the potential for emergencies such as accidental releases of toxic gases, chemical spills, fires, explosions, and personal injury incidents within our facility(s) are evaluated. This standard practice instruction is intended to provide company employees with basic guidance to assist them in the development of company plans and SPIs which address the issues of; evaluating and identifying potential emergencies, emergency planning, written procedures, and communicating information concerning these hazards to employees.

Responsibility

The Corporate Safety Manager. He/she is solely responsible for all facets of this program and has full authority to make necessary decisions to ensure success of the program. The Safety Manager is the sole person authorized to amend these instructions and is authorized to halt any operation of the company where there is danger of serious personal injury. This policy includes respiratory hazards.

Contents of the Process Safety Program

1. Written Program
2. General
3. Facility Planning Requirements
4. Employee Involvement
5. Process Safety Committee
6. Incident Investigation
7. Process Safety Information
8. Facility/Dept. Evaluation
9. Process Hazard Analysis
10. Process Operating Procedures
11. Employee Training
12. Use of Contractors
13. Pre-Startup Safety Review
14. Mechanical Integrity
15. Quality Assurance
16. Non-routine Work Authorization
17. Managing Change
18. Emergency Preparedness



1. Written Program

The Vortex Companies will review and evaluate this standard practice instruction on an annual basis, or when facility operational changes occur that require revision. Effective implementation of this program requires support from all levels of management within this company. This written program will be communicated to all personnel that are affected by it. It encompasses the total workplace, regardless of number of workers employed or the number of work shifts. It is designed to establish clear goals, and objectives.

2. General

Process safety management is the proactive identification, evaluation and mitigation or prevention of chemical releases that could occur as a result of failures in process, procedures or equipment. The major objective of process safety management of highly hazardous chemicals is to prevent unwanted releases of hazardous chemicals especially into locations which could expose our employees and or community to serious hazards.

2.1 This program will use a systematic approach to evaluating the whole process. Each process will be evaluated as a separate entity. The various lines of defense that have been incorporated into the design and operation of the process to prevent or mitigate the release of hazardous chemicals will be evaluated and strengthened where required to assure their effectiveness at each level. The following elements will be used in the evaluation process.

- 2.1.1 Process design
- 2.1.2 Process technology
- 2.1.3 Operational and maintenance activities/procedures
- 2.1.4 Non-routine tasks, activities and procedures
- 2.1.5 Emergency preparedness plans and procedures
- 2.1.6 Training programs
- 2.1.7 Other elements which impact the process

3. Facility Planning Requirements

Proper planning for emergencies is necessary to minimize employee injury and property damage. The effectiveness of response during emergencies depends on the amount of planning and training performed. Management must show its support of plant safety programs and the importance of emergency planning. If management is not interested in employee protection and minimizing property loss, little can be done to promote a safe workplace. It is therefore management's responsibility within this company to see that this program is instituted and that it is frequently reviewed and updated. The input and support of all employees must be obtained to ensure an effective program. The emergency response plans required by this company will be developed locally and will be comprehensive enough to deal with all known types of emergencies.

4. Employee Involvement in Process Safety Management

Section 304 of the Clean Air Act Amendments states that employers are to consult with their employees and their representatives regarding the employers efforts in the development and implementation of the process safety management program. Section 304 also requires us to train and educate our employees and to inform affected employees of the findings from incident investigations conducted under the process safety management program. It is our company policy that not only will we consult with our employees regarding efforts to develop and implement process safety management programs, but that we will, where ever possible, integrally involve our employees in the entire process. This is essential because



employees of this company comprise the best determination of process safety procedures, and solutions to process safety problems peculiar to our business. This will be accomplished through a “Process Safety Committee.” This committee will be responsible for developing process safety policy and procedures.

5. Process Safety Committee

5.1 Composition

The company process safety committee will be comprised of members of management/supervision and hourly personnel. The make up of the committee will consist of the following:

Process Safety Committee

<i>Title</i>	<i>Member</i>
Chairman	President/General Manager
Vice Chairman	Plant/Facility Manager
Director	Plant/Facility Engineer
Information Manager	Personnel
Director Quality Assurance	Process Engineer
	Process Engineer
	Process Engineer
	Safety Manager
	Company Healthcare Provider
	Supervisory personnel
	Hourly “lead” personnel
	Hourly “non-lead” personnel

5.2 Principal Responsibilities

The principal responsibilities of the company process safety committee will be as follows:

- 5.2.1 Assemble on a monthly basis to conduct process safety meetings.
- 5.2.2 Conduct and oversee departmental process safety evaluations, inspections, and reviews.
- 5.2.3 Review accident, injury, and near-miss reports to determine process safety deficiencies and discuss corrective actions.
- 5.2.4 Direct and monitor departmental training and safety meetings.
- 5.2.5 Discuss and report on unfinished business from previous meetings.
- 5.2.6 Discuss new business.
- 5.2.7 Maintain appropriate records of activities.
- 5.2.8 The Safety Manager will make notations of the meeting. He/she will track open process safety items to conclusion. He/she will also act as chairman in the absence of the designated chairman or vice chairman.

5.3 Charter

Charter for the The Vortex Companies Process Safety Committee. This committee will be responsible for developing process safety policy and procedure. The committee will encourage process safety awareness among all employees. It will be established to evaluate, and monitor the process safety performance of evaluated hazardous processes operated by this company, perform the necessary process safety evaluations, and inspections, and aid in administering the company process safety program.



- To reduce injuries and save lives by prevention of unwanted releases of hazardous process chemicals.
- To constantly be aware of process conditions in all work areas that can produce injuries.
- To aid the company in complying with all laws pertaining to process safety.
- To place the personal safety and health of each employee of this company, and the general public located in the vicinity of this facility in a position of primary importance.
- To aid in the prevention of occupationally-induced injuries and illnesses.
- To the greatest degree possible, aid management in providing all mechanical and physical facilities required for personal safety and health in keeping with the highest standards.
- To maintain a process safety program conforming to the best management practices of organizations of this type.
- To establish a program that instills the proper attitudes toward process safety not only on the part of supervisors and employees, but also between each employee and his or her co-workers.
- To ultimately achieve a process safety program maintained in the best interest of all concerned.

6. Investigation of Incidents and Near Misses

Incident investigation will be directed by Safety Manager. The investigation will be initiated as promptly as possible, but no more than 48 hours following the incident. The investigation will focus on the process of identifying the underlying causes of incidents and implementing steps to prevent similar events from occurring. Routine process safety investigations will be conducted on all company processes designated by the process safety committee. The investigation will be conducted to discover process conditions and work practices that could be determined to lead to toxic releases, accidents and industrial illnesses.

*DECISION POINT Below is a suggested format for an investigation team.

6.1 Process safety incident investigation team (PSIIT) composition

The team director will select additional personnel as required to serve on the PSIIT based on the specific process being reviewed. The core PSIIT will be comprised of the following core team members:

Process Safety Incident Investigation Team

<i>Title</i>	<i>Member</i>
Director	Plant/Facility Engineer
Member	Process Engineer
Member	Department Manager
Member	Safety Manager
Member	Company Health Care Provider

6.2 Intervals

Supervisor will coordinate dates and times with all assigned inspection team members. The team will conduct inspections on a monthly basis or when conditions or near misses occur which warrant an unscheduled investigation.

*DECISION POINT Suggested classification system.

6.3 Hazard/Deficiency priority classification system

Hazards/Deficiencies will be rated according to the following rating system. Where it is unclear where a hazard/deficiency should be rated, the next higher priority classification will be assumed.



6.3.1 Priority 1

The most serious type of unsafe process safety condition or unsafe work practice that could cause a toxic release resulting in loss of life, or permanent disability, or extensive loss of structure, equipment, or material.

6.3.2 Priority 2

An unsafe process safety condition or work practice that could cause a toxic release resulting in serious injury, industrial illness, or disruptive property damage.

6.3.3 Priority 3

An unsafe process safety condition or work practice that might cause a recordable injury or industrial illness or nondisruptive property damage.

6.3.4 Priority 4

Minor condition, a housekeeping item or unsafe work practice infraction with little likelihood of injury or illness other than perhaps a first-aid case.

6.4 Investigation Procedures

The following elements will be checked during investigations. Investigations will be conducted on individual processes. The investigation can and will where required serve as a compliance audit. The format for the investigation will be established in advance. The format, staffing, scheduling and verification methods will all be established prior to conducting the investigation. The following will be used as the basis for the development of inspection criteria.

6.4.1 Sequence of Events

The sequence of actions of the The Vortex Companies incident investigation/compliance audit program will be as follows:

- Begin the planning stage of the specific investigation
- Select the investigation staff
- Review requirements of 29 CFR 1910.119
- Review existing inspection checklists
- Conduct the investigation
- Evaluate the results
- Assign action items to individuals
- Determine estimated completion dates
- Develop a corrective action plan
- Hold an investigation review meeting
- Perform follow-up actions as required
- Document the entire process

*DECISION POINT Since processes can vary in great degree it is impossible to provide you with a list of detailed elements you need to inspect during inspections. From the below list you can develop more detailed individual checklists for each element and the criteria to be used for it's inspection. OSHA can provide you with additional information and aid in the development of inspection criteria.

6.4.2 Program elements. The format will be designed to provide the lead investigator with a procedure or checklist which details the requirements of each section of the process safety standard.



Element

Employee Participation

Criteria

- Written plan
- Involvement in planning

Process Safety Information

- Hazard dissemination
- Process technology
- Process equipment

Process Hazard Analysis

- Percent complete

Hazardous Materials

- Types used in the process.
- Reporting requirements (release)

Emergency Management

- Notification procedures
- Written procedures content
- Emergency containment procedures
- Outside resources involvement
- Spill containment procedures
- Personal Protective Equipment
- Drill frequency

Training Program

- Initial training conducted
- Refresher training conducted
- Adequacy of content
- Frequency of training
- Effectiveness of training
- Documentation
- Interviews results
- Written procedures content
- Proper personnel trained
- Frequency of training
- Interview results
- Test results
- Documented properly

Operator Procedures

- Written operating procedures
- Written content
- Steps in operating phases
- Operating limits
- Safety/Health considerations
- Safety systems and function
- Knowledgeable of duties
- Safety procedures followed
- Non-routine task procedures



Contractors	<ul style="list-style-type: none">• Application• Employer responsibilities• Contractor responsibilities
Pre-Start-up Review	<ul style="list-style-type: none">• Requirements
Mechanical Integrity	<ul style="list-style-type: none">• Written procedures• Training for maintenance• Inspection and testing• Equipment deficiencies• Quality assurance
Hot-work permits	<ul style="list-style-type: none">• Issue procedures• Documentation
Management-of-Change	<ul style="list-style-type: none">• Establishment• Implementation• Employee awareness
Incident investigation	<ul style="list-style-type: none">• Prompt initiation of invest.• Procedures always followed
Trade secrets	<ul style="list-style-type: none">• Protected• Hazard information obtained

6.5 Final Report

Safety Lead will develop a final report detailing the results of the inspection. The following items will be accomplished:

6.5.1 Action items

The report will indicate who is responsible for accomplishing action items generated during the investigation.

6.5.2 Estimated Completion Dates (ECD)

Estimated completion dates will be assigned to each action item.

6.5.3 Follow-up Actions

An investigation review meeting will be held before the estimated completion dates arrive to ensure action item completion is progressing smoothly. The meeting will also discuss if the ECDs are still realistic.

6.5.4 Safety Lead will develop a statistical analysis of deficiencies noted to determine jobs/areas/processes that have a high incidence of release potential. These areas will be emphasized during future inspections and meetings.

6.5.5 Documentation

After all action items have been completed and closed the investigation will be closed. The final report will be distributed and the original copy maintained in the HSE office/department.



6.5.6 Distribution (key staff)

The report will be distributed immediately to personnel responsible for correcting deficiencies noted during the inspection. These personnel will use the hazard classification system to prioritize deficiency correction.

6.5.7 Distribution (all others)

The report will be distributed to all supervisors and key management personnel. Supervisors will brief the results to all employees under their control. Any employee requesting to be placed on the distribution list will be accommodated.

7. Process Safety Information

7.1 Uses

The Vortex Companies will maintain complete and accurate written documentation concerning process chemicals, process technology, and process equipment. The compiled information will be used for the following:

7.1.1 To perform the process hazards analysis

7.1.2 Develop training programs

7.1.3 Develop operating procedures

7.1.4 Aid contractors whose employees will be working with the process

7.1.5 Conduct pre-startup reviews

7.1.6 Aid local emergency preparedness planners, insurance, and enforcement officials

7.1.7 Employee awareness

7.2 Information to be maintained

The information to be compiled about the chemicals, including process intermediates, needs to be comprehensive enough for an accurate assessment of the hazards involved. The following information as a minimum will be maintained:

7.2.1 Fire and explosion characteristics

7.2.2 Reactivity hazards

7.2.3 Safety and health hazards to workers

7.2.4 Corrosion and erosion effects on the process equipment and monitoring tools.

7.2.5 Current safety data sheets (SDS)

7.2.6 Process chemistry information including runaway reaction and overpressure hazards if applicable.

7.2.7 Established criteria for maximum inventory levels for process chemicals, and limits beyond which would be considered upset conditions; and a qualitative estimate of the consequences or results of deviation that could occur if operating beyond the established process limits.

7.3 Use of diagrams

Diagrams will be used where possible to show process flow information.



7.3.1 Block Flow Diagrams (BFD)

A block flow diagrams will be used to show the major process equipment and interconnecting process flow lines and show flow rates, stream composition, temperatures, and pressures when necessary for clarity. The block flow diagram is considered a simplified flow diagram.

7.3.2 Process Flow Diagrams (PFD)

Process flow diagrams are considered to be more complex and will be constructed where necessary to show all main flow streams including valves to enhance the understanding of the process, as well as pressures and temperatures on all feed and product lines within all major vessels, in and out of headers and heat exchangers, and points of pressure and temperature control. The process flow diagram is considered a detailed flow diagram.

7.3.2.1 Types of information used on PFDs

- Materials of construction information
- Pump capacities and pressure heads
- Compressor horsepower and vessel design pressures
- Process temperatures
- Major components of control loops are usually shown
- Key utilities

Note: For each process, Piping and instrument diagrams (P&IDs) will be reviewed to determine if they are a more appropriate type of diagram to show some of the above details and to display the information for the piping designer and engineering staff. The P&IDs are to be used to describe the relationships between equipment and instrumentation as well as other relevant information that will enhance clarity. Computer software programs which do P&IDs or other diagrams useful to the information package, may be used to help meet this requirement.

7.4 Documentation of sources

The information pertaining to process equipment design will be documented, such as, the codes and standards relied on to establish good engineering practice. 7.4.1 Older equipment/process. For existing equipment designed and constructed many years ago in accordance with the codes and standards available at that time and no longer in general use today, this employer and construction along with the testing, inspection and operation are still suitable for the intended use. Where the process technology requires a design which departs from the applicable codes and standards, this employer will document that the design and construction is suitable for the intended purpose.

8. Facility/Department Evaluation

An evaluation of our facility(s) will be conducted to identify, designate, and prioritize processes which have the potential for release of hazardous chemicals during a systems or operational failure.

8.1 Existing Processes

A process hazard analysis (PHA) will be conducted for existing processes. Existing processes where possible, will be designated and managed as a complete and separate process.



8.2 Future Processes

For new processes, a process hazard analysis will be conducted. The PHA will be used to improve the design and construction of the process from a reliability and quality point of view. The safe operation of the new process will be enhanced by making use of the PHA recommendations before final installations are completed.

DESIGNATED PROCESS LISTING TEMPLATE			
Process Title	Area Supervisor	Date Designated	Date Evaluated

9. Process Hazard Analysis (PHA)

A PHA will be conducted in an organized and systematic effort to identify and analyze the significance of potential hazards associated with the processing or handling of highly hazardous chemicals. Information obtained from a PHA will assist in making decisions for improving safety and reducing the consequences of unwanted or unplanned releases of hazardous chemicals.

9.1 Responsibility

The company representative responsible for process hazard analysis is Safety Lead. He/she is solely responsible for all facets of the analysis and has full authority to make necessary decisions to ensure success of the program. He/she is the sole person authorized to amend these instructions and is authorized to halt any process operation of this company where there is danger of chemical release or serious personal injury. 9.2 Any PHA conducted by this company will be directed toward determining the hazards and potential failure points or failure modes in a designated process by analyzing the following:

- 9.2.1 Potential causes and consequences of:
 - Fires
 - Explosions
 - Releases of toxic or flammable chemicals
 - Major spills of hazardous chemicals



9.2.2 The PHA will focus on:

- Equipment
- Instrumentation
- Utilities
- Human actions (routine and nonroutine)
- External factors that might impact the process

9.3 Selection of a PHA methodology or technique will be influenced by many factors including:

9.3.1 The amount of existing knowledge about the process.

9.3.2 Is it a process that has been operated for a long period of time with little or no innovation and extensive experience has been generated with its use?

9.3.3 Is it a new process or one which has been changed frequently by the inclusion of innovative features?

9.3.4 The size and complexity of the process.

9.3.5 The application of a PHA to a process may involve the use of different methodologies for various parts of the process. For example, a process involving a series of unit operations of varying sizes, complexities, and ages may use different methodologies and team members for each operation. Then the conclusions can be integrated into one final study and evaluation.

9.3.6 Priority System

The below listing designates the priority for which PHAs will be conducted by this company. A preliminary or gross hazard analysis will be performed to prioritize the processes that are determined to be subject to coverage by the process safety management standard.

9.3.6.1 Priority Considerations

The prioritization process will consider the following in prioritizing the potential severity of a chemical release:

- Priority will first be given to those processes with the potential of adversely affecting the largest number of employees and or people in our community.
- The operating history of the process such as the frequency of past chemical releases.
- The age of the process and any other relevant factors.

9.3.7 Designated Process Priority Listing

The above listed factors will be used to establish a ranking order. Either a weighing factor system or a systematic ranking method will be used. The preliminary hazard analysis will be used in determining which process should be of the highest priority and thereby obtaining the greatest improvement in safety for our company.



DESIGNATED PROCESS PRIORITY LISTING TEMPLATE

Priority	Process Title	Date Designated	Date Evaluated
1.			
2.			
3.			
4.			
5.			
6.			
7.			

9.4 PHA Methodology Considerations

9.4.1 Checklist methodology will be used for processes that are very stable and where no little changes occur over extended periods. The checklist method however, may miss the most recent changes and consequently the changes would not be evaluated.

9.4.2 Assumptions Made by the Team

The PHA is dependent on good judgment and the assumptions made during the study need to be documented and understood by the team and reviewer and kept for a future PHA.

9.4.3 The team director will ensure that all team members understand the methodology that is going to be used.

9.4.4 Team Size

The team director will make the initial size determination of the team. A PHA team can vary in size from two people to a larger number of people with varied operational and technical backgrounds. Some team members may only need to be a part of the team for a limited time. The team director will make him/her self fully knowledgeable in the proper implementation of the PHA methodology that is to be used and should be impartial as possible in the evaluation.

9.4.5 Team members will provide the team with expertise in areas such as:

- Process design
- Process Operating procedures and practices
- How the work is actually performed
- Alarms
- Emergency procedures
- Instrumentation
- Maintenance procedures
- Routine and nonroutine tasks, including:
 - How the tasks are authorized
- Procurement of parts and supplies
- Safety and health
- Other relevant subjects as the need dictates.



10. Process Operating Procedures and Practices

Operating procedures for designated processes will be reviewed by the Process Hazard Analysis team, engineering staff, and operating personnel to ensure that they are accurate and provide practical instructions on how to actually carry out job duties safely.

10.1 Content

10.1.1 Operating procedures will include specific instructions or details on what steps are to be taken or followed in carrying out the stated procedures.

10.1.2 Operating instructions for each procedure will include the applicable safety precautions, and appropriate information on safety implications, to include (where required):

- Pressure limits
- Temperature ranges
- Flow rates
- Procedures to follow when an upset condition occurs
- Pertinent alarms and instruments
- Start-up or shut-down procedures
- Distinctions between startup and normal operations
- Other subjects as required

10.1.3 Computerized Process Control Systems

These operating instructions need to describe the logic of the software as well as the relationship between the equipment and the control system; otherwise, it may not be apparent to the operator.

10.1.4 Operating procedures and instructions are important for training operating personnel. The operating procedures are often viewed as the standard operating practices (SOPs) for operations. Control room personnel and operating staff, in general, need to have a full understanding of operating procedures.

10.1.5 Bilingual Procedures and Instructions

If workers are not fluent in English then procedures and instructions need to be prepared in a second language understood by the workers.

10.1.6 Changes in the Procedures and Processes

Operating procedures need to be changed when there is a change in the process as a result of the management of change procedures. Supervisors will ensure that the consequences of operating procedure changes are fully evaluated and the information conveyed to the personnel.

10.1.6.1 Timing

All management-of-change actions must be coordinated and integrated with current operating procedures and operating personnel must be oriented to the changes in procedures before the change is made. When the process is shut down in order to make a change, then the operating procedures must be updated before startup of the process.

10.1.7 Emergency and Upset Conditions

Supervisors will ensure that procedural instructions and training in how to handle upset conditions are accomplished, as well as what operating personnel are to do in emergencies.



- 10.1.8 Communication between operating personnel and workers performing work within the process area, such as nonroutine tasks, also must be maintained. The hazards of the tasks will be conveyed to operating personnel in accordance with established procedures and to those performing the actual tasks. When the work is completed, operating personnel will be informed to provide closure on the job.

11. Employee Training

All employees, including maintenance and contractor employees, involved with highly hazardous chemicals will be provided training to fully understand the safety and health hazards of the chemicals and processes they work with, for the protection of themselves, their fellow employees, and the citizens of nearby communities. Training requirements will be clearly defined. The affected employees to be trained and what subjects are to be covered in their training will be delineated and the course of instruction will be developed based on these requirements. Goals and objectives will be clearly defined. The learning goals or objectives will be written in clear measurable terms before the training begins. These goals and objectives will be tailored to each of the specific training modules or segments. Training plans will describe the important actions and conditions under which the employee will demonstrate competence or knowledge as well as what is acceptable performance. Hands-on-training will be conducted where ever possible.

11.1 Initial Training

Training shall be conducted prior to job assignment. This employer shall provide training to ensure that employees understand the safety and health hazards of chemicals and processes they work with. The training shall include, as a minimum the following:

- 11.1.1 Training will be determined from the individual process. All employees associated with a given process will be given training concerning the hazards associated with that process.
- 11.1.2 Hazard communication training, will help employees to be more knowledgeable about the chemicals they work with as well as familiarize them with reading and understanding MSDS. Contractors and visitors who work closely with designated processes will have their HazCom training verified before being allowed access.
- 11.1.3 Process Specific Training
Process supervisors will coordinate additional training requirements with the safety Manager in subjects such as operating procedures and safety work practices, emergency evacuation and response, safety procedures, routine and non-routine work authorization activities, and other areas pertinent to process safety and health not covered under the HazCom program.
- 11.1.4 Written procedures/checklists required for use.
- 11.1.5 Recognition of applicable hazards associated with the operation or work to be completed.
- 11.1.6 All other employees whose work operations are or may be in an area that may be affected by the process, shall be instructed to an awareness level concerning hazards associated with the process.
- 11.1.7 Preventative Maintenance Training
Appropriate training will be provided to maintenance personnel to ensure that they understand the preventive maintenance program procedures, safe practices, and the proper use and application of special equipment or unique tools that may be required.
- 11.1.8 Certification
This employer shall certify that employee training has been accomplished and is being kept up to date. The certification shall contain each employee's name and dates of training.



11.2 Refresher Training

Careful consideration will be given to assure that employees including maintenance and contract employees are receiving current and updated training. The training content shall be identical to initial training and include any changes in the process or scope of work. Refresher training will be conducted on a quarterly basis or when the following conditions are met, which ever event occurs sooner.

11.2.1 Retraining shall be provided for all authorized and affected employees whenever (and prior to) there being a change in their job assignments, a change in the process, operating procedures, or when a known hazard is added to the work environment.

11.2.2 Additional retraining shall also be conducted whenever a periodic inspection or audit reveals, or whenever this employer has reason to believe, that there are deviations from or inadequacies in the employee's knowledge operating or safety practices.

11.2.3 The retraining shall reestablish employee proficiency and introduce new or revised methods and procedures, as necessary. For example, if changes are made to a process, impacted employees must be trained in the changes and understand the effects of the changes on their job tasks (e.g., any new operating procedures pertinent to their tasks).

11.3 Certification

This employer shall certify that employee training has been accomplished and is being kept up to date. The certification shall contain each employee's name and dates of training.

11.4 Process Trainers

The following employees or position titles will receive training and as required, serve as process trainers. Company qualified trainers will consist of the following:

Process Trainers

Title	Member
Process Trainer	Process Engineer
Process Trainer	Department Manager
Process Trainer	Safety Manager
Process Trainer	First Line Supervisors

11.5 Training plans

Training plans will be reviewed on a(n) _____ basis to ensure the training is current and to periodically ensure that the necessary skills, knowledge, and routines are being properly understood and implemented by trained employees.

12. Use of Contractors

Whenever contractors are used to perform work in and around processes that involve highly hazardous chemicals, they will need to be provided with site specific training so that they can accomplish the desired job tasks without compromising the safety and health of employees at this facility. For contractors, whose safety performance on the job is not known, this employer will obtain information on injury and illness rates, and experience, and will obtain contractor references. Additionally, this employer will assure that the contractor has the appropriate job skills, knowledge and certifications. Contractor work methods and experiences may be evaluated for certain processes.



12.1 Site Injury and Illness Log

If deemed necessary, a site injury and illness log for contractors will be maintained to track and maintain current knowledge of work activities involving contract employees working on or adjacent to covered processes. Injury and illness logs of both the employer's employees and contract employees allow this employer to have full knowledge of process injury and illness experience. This log will also contain information which will be of use to those auditing process safety management compliance and those involved in incident investigations.

12.2 Contract employees must perform their work safely. Considering that contractors often perform very specialized and potentially hazardous tasks such as confined space entry activities and nonroutine repair activities it is quite important that their activities be controlled while they are working on or near a covered process.

12.3 Permitting System

A permit system or work authorization system for these activities may be instituted if deemed necessary. The use of a work authorization system keeps an employer informed of contract employee activities, and as a benefit the employer will have better coordination and more management control over the work being performed in the process area. A well run and well maintained process where employee safety is fully recognized will benefit all of those who work in the facility whether they be contract employees or employees of the owner.

13. Pre-Startup Safety Review

13.1 For New Processes

A PHA will be conducted to improve the design and construction of the process from a reliability and quality point of view. The safe operation of the new process will be enhanced by making use of the PHA recommendations before final installations are completed. P&IDs are to be completed along with having the operating procedures in place and the operating staff trained to run the process before startup. The initial startup procedures and normal operating procedures will be fully evaluated as part of the pre-startup review to assure a safe transfer into the normal operating mode for meeting the process parameters.

13.2 For existing processes that have been shutdown for turnaround, or modification, etc., a PHA will be conducted to assure that any changes other than "replacement in kind" made to the process during shutdown go through the management-of-change procedures.

13.2.1 Impact Requirements

P&IDs will need to be updated as necessary, as well as operating procedures and instructions. If the changes made to the process during shutdown are significant and impact the training program, then operating personnel as well as employees engaged in routine and nonroutine work in the process area may need some refresher or additional training in light of the changes.

13.2.2 Incident Investigations/Audits

Any incident investigation recommendations, compliance audits or PHA recommendations need to be reviewed as well to see what impacts they may have on the process before beginning the startup.

14. Mechanical Integrity

Maintenance programs and schedules will be reviewed to see if there are areas where "breakdown" maintenance is used rather than an on-going mechanical integrity program. Equipment used to process, store, or handle highly hazardous chemicals needs to be designed, constructed, installed and maintained to minimize the risk of releases of such chemicals.



14.1 Elements of a mechanical integrity program include:

- 14.1.1 Identification and categorization of equipment and instrumentation.
- 14.1.2 Inspections and tests.
- 14.1.3 Testing and inspection frequencies.
- 14.1.4 Development of maintenance procedure.
- 14.1.5 Training of maintenance personnel.
- 14.1.6 Establishment of criteria for acceptable test results, documentation of test and inspection results, and documentation of manufacturer recommendations as to meantime to failure for equipment and instrumentation.

14.2 Preventing a Release

The first safety priority for our processes will be to ensure that the process is operated and maintained as designed, and to keep the chemicals contained.

14.3 Controlling a Release

The second safety priority will be to control release of chemicals through engineering controls such as; venting to scrubbers, flares, or to surge or overflow tanks which are designed to receive such chemicals, etc. Also included are; fixed fire protection systems, water spray, or deluge systems, monitor guns, dikes, designed drainage systems, and other systems which would control or mitigate hazardous chemicals once an unwanted release occurs.

14.4 Process Equipment and Instrumentation

A list of process equipment and instrumentation for inclusion in the program will be developed. This list will include pressure vessels, storage tanks, process piping, relief and vent systems, fire protection system components, emergency shutdown systems and alarms and interlocks and pumps.

14.4.1 Prioritization

For the categorization of instrumentation and the listed equipment this equipment will be prioritized to denote which pieces of equipment require closer scrutiny than others.

14.4.2 Meantime Between Failure (MTBF)

Meantime between failure of various instrumentation and equipment parts will be determined from the manufacturers data, company records or the experience with the parts, which will then influence the inspection and testing frequency and associated procedures. Also, applicable codes and standards such as the National Board Inspection Code, or those from the American Society for Testing and Material, American Petroleum Institute, National Fire Protection Association, American National Standards Institute, American Society of Mechanical Engineers, and other groups, will be used to provide information to help establish an effective testing and inspection frequency, as well as appropriate methodologies.

14.5 Preventative Maintenance Training

Appropriate training will be provided to maintenance personnel to ensure that they understand the preventive maintenance program procedures, safe practices, and the proper use and application of special equipment or unique tools that may be required. This training will be part of the overall training program called for in 29 CFR 1910.119.



15. Quality Assurance

A quality assurance system will be used to ensure that the proper materials of construction are used, that fabrication and inspection procedures are proper, and that installation procedures recognize field installation concerns. The quality assurance program is an essential part of the mechanical integrity program and will help to maintain the first and secondary lines of defense that have been designed into the process to prevent unwanted chemical releases or those which control or mitigate a release.

15.1 Drawings

All "As built" drawings, together with certifications of coded vessels and other equipment, and materials of construction will be reviewed for verification. All pertinent drawings will be retained with other quality assurance documentation.

15.2 Installation

Equipment installation jobs will be properly inspected in the field for use of proper materials and procedures and to assure that qualified workers are used to do the job. The use of appropriate gaskets, packing, bolts, valves, lubricants and welding rods will be verified. Also, procedures for installation of safety devices will be verified, such as the torque on the bolts on ruptured disc installations, uniform torque on flange bolts, proper installation of pump seals, etc.

15.3 Equipment Supplier Audits

If the quality of parts is in question, an audit of the respective supplier will be conducted to ensure purchases of equipment are suitable for the intended service or purpose. Any changes in equipment that may become necessary will go through the management-of-change procedures.

16. Non-Routine Work Authorizations

Non-routine work conducted in process areas will be controlled by the supervisor of the area in a consistent manner. The known hazards involving the work that is to be accomplished will be communicated to those doing the work, but also to those operating personnel whose actions could affect the safety of the process.

*DECISION POINT Suggestion. We recommend that you adopt a work authorization permitting system to control nonroutine work. The following is a suggested system.

16.1 A work authorization notice or permit will contain a procedure that describes the steps the maintenance supervisor, contractor representative, or other person needs to follow to obtain the necessary clearance to get the job started. The following requirements will be addressed:

16.1.1 Pre-Start Coordination

The work authorization procedures will reference and coordinate, as applicable, lockout/tagout procedures, line breaking procedures, confined space entry procedures and hot work authorizations.

16.1.2 Non-Routine Work Authorization Permit

A standardized permit will be developed and used by this company. The permit will detail the requirements to authorize non-routine work at specific job locations.

16.1.3 Job-Closure Coordination

The permitting procedure will also provide clear steps to follow once the job is completed in order to provide closure for those that need to know the job is now completed and equipment and operations can be returned to normal.



16.2 Non-Routine Work Authorization Permitting System

The Supervisor will maintain work authorization permits. All requests to perform nonroutine work will be requested through the Safety Lead via email. Safety Lead will coordinate the authorization permit with the concerned parties and approve the work authorization.

- 16.2.1 Before the work is authorized, Safety Lead will document the completion of the following measures:
- 16.2.1.2 Specify acceptable work conditions (see permit).
 - 16.2.1.3 If required isolate the work area.
 - 16.2.1.4 Purging, inerting, flushing, or ventilating the work area as necessary to eliminate or control atmospheric hazards (see confined space instructions).
 - 16.2.1.5 Provide pedestrian, vehicle, or other barriers as necessary to protect workers from external hazards.
 - 16.2.1.6 Verify that conditions in the work area are acceptable for the duration of the authorized work period.
 - 16.2.1.7 Ensure supervisors affected by the non-routine work are notified and coordinated with.
 - 16.2.1.8 Ensure all affected workers and workers that may affect the non-routing work are notified of the task to be accomplished.
 - 16.2.1.9 Ensure that the appropriate parties shall sign the work authorization to authorize the work to begin.
 - 16.2.1.10 The completed permit shall be made available at the time of the work begins all authorized workers and their supervisors, by posting it at the work site or by any other equally effective means, so that the workers can confirm that pre-start preparations and authorizations have been completed.
 - 16.2.1.11 The duration of the permit may not exceed the time required to complete the assigned task or job identified on the permit.
 - 16.2.1.12 The supervisor shall terminate the work authorization and cancel the permit when:
 - The operations covered by the permit are completed.
 - A condition that is not allowed under the permit arises in or near the permissible work area.
 - 16.2.1.13 Develop and utilize checklists based on this standard practice instruction and 29 CFR 1910.119.

16.3 Canceled Permit Retention

This employer shall retain each canceled permit for at least 1 year to facilitate the review of the process safety program. Any problems encountered during the work authorization period shall be noted on the pertinent permit so that appropriate revisions to the process safety program can be made.

17. Managing Change

Change, for the purposes of this standard practice instruction include; all modifications to equipment, procedures, raw materials and processing conditions other than “replacement-in-kind”. These changes will to be properly managed by identifying and reviewing them prior to implementation of the change. The operator must have the flexibility to maintain safe operation within the established parameters, any operation outside of these parameters requires review and approval by a written management-of-change procedure.



- 17.1 Management-of-change covers changes in process technology and changes to equipment and instrumentation. These changes may be the result of changes in production rates, raw materials usage, experimentation, equipment availability, new equipment, new product development, change in catalyst and changes in operating conditions to improve yield or quality.
- 17.2 The Vortex Companies will establish means and methods to detect both technical and mechanical changes.

17.2.1 Temporary Change

Time limits for temporary changes will be established and monitored since, without control, these changes may tend to become permanent. Temporary changes are subject to the management-of-change provisions. In addition, the management-of-change procedures are used to insure that the equipment and procedures are returned to their original or designed conditions at the end of the temporary change. Proper documentation and review of these changes is invaluable in ensuring that the safety and health considerations are being incorporated into the operating procedures and the process.

17.2.1.1 Management-of-Change Authorization Permit

A standardized permit will be developed and used by this company. The permit will detail the requirements to authorize management-of-change actions. The permit will include as a minimum the following items/actions:

- Description and the purpose of the change
- Technical basis for the change
- Safety and health considerations
- Changes required to operating procedures
- Maintenance procedures
- Inspection and testing change requirements
- Piping and instrument diagrams (P&IDs) changes
- Electrical classification changes
- Training and communications changes
- Pre-startup inspection requirements
- Duration if a temporary change
- Approvals and authorization

17.2.1.2 Management-of-Change Authorization Checklist

Where the impact of the change is minor and well understood, a check list reviewed by Supervisor with proper communication to all employees concerned will be sufficient.

17.2.1.3 Complex or Significant Design Changes

For a more complex or significant design change, a process hazard audit with approvals by operations, maintenance, and the safety Manager will be conducted and used. Changes in documents such as P&IDs, raw materials, operating procedures, mechanical integrity programs, electrical classifications, etc., will be noted so that these revisions can be made permanent when the drawings and procedure manuals are updated. Copies of process changes will be kept in digital format in the HSE folder to ensure that design changes are available to operating personnel as well as to PHA team members when a PHA is being done or one is being updated.



18. Emergency Preparedness

*DECISION POINT You will need to decide:

- If you want employees to handle and contain small or minor incidental releases.
- If you wish to mobilize the available resources at your facility and have them brought to bear on a more significant release.
- If you want to evacuate the danger area and promptly escape to a preplanned safe zone area, and allow the local community emergency response organizations to handle the release.
- Or if you want to use some combination of these actions.

18.1 Emergency Action Plan

The Vortex Companies will develop and implement an emergency action plan which will facilitate the prompt evacuation of employees due to an unwanted release of a highly hazardous chemical.

18.1.1 Alarm System

This employer will have a plan that will be activated by an alarm system to alert employees when to evacuate and will ensure that, employees who are physically impaired, will have the necessary support and assistance to get them to the safe zone. The intent of these actions will be to alert and move employees to a safe zone quickly. Delaying alarms or confusing alarms will be avoided.

18.1.2 Evacuation/Relocation

Unwanted incidental releases of highly hazardous chemicals in the process area will be addressed in the emergency action plan and detail the actions employees are to take. If the decision to evacuate the area, is made then the emergency action plan will be activated. For any outdoor process where wind direction is important for selecting the safe route to a refuge area, a wind sock or pennant will be placed at the highest point that can be seen throughout the process area. Employees can then move in the direction of cross wind to upwind to gain safe access to the refuge area by knowing the wind direction.

18.1.3 Preplanning for Releases

Preplanning for releases that are more serious than incidental releases will be addressed in the emergency action plan. When a serious release of a highly hazardous chemical occurs, this employer through preplanning will have determined in advance what actions employees are to take. The evacuation of the immediate release area and other areas as necessary will be accomplished under the emergency action plan. Cooperation and coordination between our company and local community emergency preparedness managers will be pursued to aid in complying with the Environmental Protection Agency's Risk Management Plan criteria.

COMPLIWARE NOTE: An effective way for medium to large facilities to enhance coordination and communication during emergencies for on-site operations and with local community organizations is for employers to establish and equip an emergency control center. The emergency control center would be situated in a safe zone area so that it could be occupied throughout the duration of an emergency. The center would serve as the major communication link between the on-scene incident commander and plant or corporate management as well as with the local community officials. The communication equipment in the emergency control center should include a network to receive and transmit information by telephone, radio or other means. It is important to have a backup communication network in case of power or communication failures. The center should also be equipped with the plant layout and community maps, utility drawings including fire, water, emergency lighting, appropriate reference materials such



as a government agency notification list, company personnel phone lists, SARA Title III reports and material safety data sheets, emergency plans and procedures manual, a listing with the location of emergency response equipment, mutual aid information, and access to meteorological or weather condition data and any dispersion modeling data.

Sources of Further Information

1. Center for Chemical Process Safety, American Institute of Chemical Engineers, 345 East 47th Street, New York, NY 10017, (212) 705-7319.
2. "Guidelines for Hazard Evaluation Procedures," American Institute of Chemical Engineers; 345 East 47th Street, New York, NY 10017.
3. "Guidelines for Technical Management of Chemical Process Safety," Center for Chemical Process Safety of the American Institute of Chemical Engineers; 345 East 47th Street, New York, NY 10017.
4. "Evaluating Process Safety in the Chemical Industry," Chemical Manufacturers Association; 2501 M Street NW, Washington, DC 20037.
5. "Safe Warehousing of Chemicals," Chemical Manufacturers Association; 2501 M Street NW, Washington, DC 20037.
6. "Management of Process Hazards," American Petroleum Institute (API Recommended Practice 750); 1220 L Street, N.W., Washington, D.C. 20005.
7. "Improving Owner and Contractor Safety Performance," American Petroleum Institute (API Recommended Practice 2220); API, 1220 L Street N.W., Washington, D.C. 20005.
8. Chemical Manufacturers Association (CMA's Manager Guide), First Edition, September 1991; CMA, 2501 M Street, N.W., Washington, D.C. 20037.
9. "Improving Construction Safety Performance," Report A-3, The Business Roundtable; The Business Roundtable, 200 Park Avenue, New York, NY 10166.
(Report includes criteria to evaluate contractor safety performance and criteria to enhance contractor safety performance).
10. "Recommended Guidelines for Contractor Safety and Health," Texas Chemical Council; Texas Chemical Council, 1402 Nueces Street, Austin, TX 78701-1534.
11. "Loss Prevention in the Process Industries," Volumes I and II; Frank P. Lees, Butterworth; London 1983.
12. "Safety and Health Program Management Guidelines," 1989; U.S. Department of Labor, Occupational Safety and Health Administration.
13. "Safety and Health Guide for the Chemical Industry," 1986, (OSHA 3091); U.S. Department of Labor, Occupational Safety and Health Administration; 200 Constitution Avenue, N.W., Washington, D.C. 20210.
14. "Review of Emergency Systems," June 1988; U.S. Environmental Protection Agency (EPA), Office of Solid Waste and Emergency Response, Washington, DC 20460.
15. "Technical Guidance for Hazards Analysis, Emergency Planning for Extremely Hazardous Substances," December 1987; U.S. Environmental Protection Agency (EPA), Federal Emergency Management Administration (FEMA) and U.S. Department of Transportation (DOT), Washington, DC 20460.
16. "Accident Investigation * * * A New Approach," 1983, National Safety Council; 444 North Michigan Avenue, Chicago, IL 60611-3991.
17. "Fire & Explosion Index Hazard Classification Guide," 6th Edition, May 1987, Dow Chemical Company; Midland, Michigan 48674.
18. "Chemical Exposure Index," May 1988, Dow Chemical Company; Midland, Michigan 48674.



CIVIL INFRASTRUCTURE SOLUTIONS

RESPIRABLE CRYSTALLINE SILICA



Vortex Companies

Procedure Name	Environmental, Health & Safety Manual – Respirable Crystalline Silica
Applicability	VORTEX Companies – Employees & Subcontractors
Policy Revised	10.24.2017

Purpose

This Respirable Crystalline Silica Program was developed to prevent employee exposure to hazardous levels of Respirable Crystalline Silica that could result through construction activities or nearby construction activities occurring on worksites. Respirable Crystalline Silica exposure at hazardous levels can lead to lung cancer, silicosis, chronic obstructive pulmonary disease, and kidney disease. It is intended to meet the requirements of the Respirable Crystalline Silica Construction Standard (29 CFR 1926.1153) established by the Occupational Safety and Health Administration (OSHA).

All work involving chipping, cutting, drilling, grinding, or similar activities on materials containing Crystalline Silica can lead to the release of respirable-sized particles of Crystalline Silica (i.e. Respirable Crystalline Silica). Crystalline Silica is a basic component of soil, sand, granite and many other minerals. Quartz is the most common form of Crystalline Silica. Many materials found on construction sites include Crystalline Silica; including but not limited to – cement, concrete, asphalt, pre-formed structures (inlets, pipe, etc.) and others. Consequently, this program has been developed to address and control these potential exposures to prevent our employees from experiencing the effects of occupational illnesses related to Respirable Crystalline Silica exposure.

Scope

This Respirable Crystalline Silica Program applies to all employees who have the potential to be exposed to Respirable Crystalline Silica when covered by the OSHA Standard. The OSHA Respirable Crystalline Silica Construction Standard applies to all occupational exposures to Respirable Crystalline Silica in construction work, except where employee exposure will remain below 25 micrograms of Respirable Crystalline Silica per cubic meter of air (25 Qg/m³) as an 8-hour time-weighted average (TWA) under any foreseeable conditions.

Definitions

If a definition is not listed in this section, please contact your supervisor. If your supervisor is unaware of what the term means, please contact the Competent Person or your Safety Department.

Action Level - A concentration of airborne Respirable Crystalline Silica of 25 Qg/m³, calculated as an 8-hour TWA.

Competent Person - An individual who is capable of identifying existing and foreseeable Respirable Crystalline Silica hazards in the workplace and who has authorization to take prompt corrective measures to eliminate or minimize them.

Employee Exposure - The exposure to airborne Respirable Crystalline Silica that would occur if the employee were not using a respirator.

High-Efficiency Particulate Air (HEPA) Filter - A filter that is at least 99.97 percent efficient in removing monodispersed particles of 0.3 micrometers in diameter.



Objective Data - Information, such as air monitoring data from industry-wide surveys or calculations based on the composition of a substance, demonstrating employee exposure to Respirable Crystalline Silica associated with a particular product or material or a specific process, task, or activity. The data must reflect workplace conditions closely resembling or with a higher exposure potential than the processes, types of material, control methods, work practices, and environmental conditions in the employer's current operations

Permissible Exposure Limit (PEL) - The employer shall ensure that no employee is exposed to an airborne concentration of Respirable Crystalline Silica in excess of 50 Qg/m³, calculated as an 8-hour TWA.

Physician or Other Licensed Health Care Professional (PLHCP) - An individual whose legally permitted scope of practice (i.e., license, registration, or certification) allows him or her to independently provide or be delegated the responsibility to provide some or all of the particular health care services required by the Medical Surveillance Section of the OSHA Respirable Crystalline Silica Standard.

Respirable Crystalline Silica - Quartz, Cristobalite, and/or Tridymite contained in airborne particles that are determined to be respirable by a sampling device designed to meet the characteristics for respirable-particle size selective samplers specified in the International Organization for Standardization (ISO) 7708:1995: Air Quality-Particle Size Fraction Definitions for Health-Related Sampling.

Specialist - An American Board Certified Specialist in Pulmonary Disease or an American Board Certified Specialist in Occupational Medicine.

Key Responsibilities

VORTEX Companies firmly believes protecting the health and safety of our employees is everyone's responsibility. This responsibility begins with upper management providing the necessary support to properly implement this program. However, all levels of the organization assume some level of responsibility for this program including the following positions.

Safety Department

- Conduct jobsite assessments for Silica containing materials and perform employee Respirable Crystalline Silica hazard assessments in order to determine if an employee's exposure will be above 25 Qg/m³ as an 8-hour TWA under any foreseeable conditions
- Select and implement into the project's ECP the appropriate control measures in accordance with the Construction Tasks identified in OSHA's Construction Standard Table 1; and potentially including (but not limited to) - a written Exposure Control Plan (ECP), exposure monitoring, Hazard Communication training, medical surveillance, housekeeping and others. NOTE: OSHA's Construction Standard Table 1 is a list of 18 common construction tasks along with acceptable exposure control methods and work practices that limit exposure for those tasks.
- Ensure that the materials, tools, equipment, personal protective equipment (PPE), and other resources (such as worker training) required to fully implement and maintain this Respirable Crystalline Silica Program are in place and readily available if needed.
- Ensure that Project Managers, Site Managers, Competent Persons, and employees are educated in the hazards of Silica exposure and trained to work safely with Silica in accordance with OSHA's Respirable Crystalline Silica Construction Standard and OSHA's Hazard Communication Standard. Managers and Competent Persons may receive more advanced training than other employees.



- Maintain written records of training (for example, proper use of respirators), ECPs, inspections (for equipment, PPE, and work methods/practices), medical surveillance (under lock and key), respirator medical clearances (under lock and key) and fit-test results.
- Conduct an annual review (or more often if conditions change) of the effectiveness of this program and any active project ECP's that extend beyond a year. This includes a review of available dust control technologies to ensure these are selected and used when practical.
- Coordinate work with other employers and contractors to ensure a safe work environment relative to Silica exposure.

Managers and Supervisors

- Ensure all applicable elements of this Respirable Crystalline Silica Program are implemented on the project including the selection of a Competent Person.
- Assist the Safety Department in conduct jobsite assessments for Silica containing materials and perform employee Respirable Crystalline Silica hazard assessments in order to determine if an ECP, exposure monitoring, and medical surveillance is necessary.
- Assist in the selection and implementation of the appropriate control measures in accordance with the Construction Tasks identified in OSHA's Construction Standard Table 1; and potentially including (but not limited to) - a written Exposure Control Plan (ECP), exposure monitoring, Hazard Communication training, medical surveillance, housekeeping and others.
- Ensure that employees using respirators have been properly trained, medically cleared, and fit-tested in accordance with the company's Respiratory Protection Program. This process will be documented.
- Ensure that work is conducted in a manner that minimizes and adequately controls the risk to workers and others. This includes ensuring that workers use appropriate engineering controls, work practices, and wear the necessary PPE.
- Where there is risk of exposure to Silica dust, verify employees are properly trained on the applicable contents of this program, the project-specific ECP, and the applicable OSHA Standards (such as Hazard Communication). Ensure employees are provided appropriate PPE when conducting such work.

Competent Person and/or Site Manager (Superintendent, Foreman, etc.)

- Make frequent and regular inspections of jobsites, materials, and equipment to implement the written ECP.
- Identify existing and foreseeable Respirable Crystalline Silica hazards in the workplace and take prompt corrective measures to eliminate or minimize them.
- Notify the Project Manager and/or Safety Department of any deficiencies identified during inspections in order to coordinate and facilitate prompt corrective action.
- Assist the Project Manager and Safety Department in conducting jobsite assessments for Silica containing materials and perform employee Respirable Crystalline Silica hazard assessments in order to determine if an ECP, exposure monitoring, and medical surveillance is necessary.

Employees

- Follow recognized work procedures (such as the Construction Tasks identified in OSHA's Construction Standard Table 1) as established in the project's ECP and this program.
- Use the assigned PPE in an effective and safe manner.
- Participate in Respirable Crystalline Silica exposure monitoring and the medical surveillance program.
- Report any unsafe conditions or acts to the Site Manager and/or Competent Person.
- Report any exposure incidents or any signs or symptoms of Silica illness.



Procedure - Requirements

Specified Exposure Control Methods

When possible and applicable, VORTEX Companies will conduct activities with potential Silica exposure to be consistent with OSHA’s Construction Standard Table 1. Supervisors will ensure each employee under their supervision and engaged in a task identified on OSHA’s Construction Standard Table 1 have fully and properly implemented the engineering controls, work practices, and respiratory protection specified for the task on Table 1 (unless VORTEX Companies has assessed and limited the exposure of the employee to Respirable Crystalline Silica in accordance with the Alternative Exposure Control Methods Section of this program).

The task(s) being performed by VORTEX Companies identified on OSHA’s Construction Standard Table 1 is/are: Select any/all of the following that apply:

Table 1: Specified Exposure Control Methods When Working With Materials Containing Crystalline Silica

Construction Task or Equipment Operation		Engineering and Work Practice Control Methods	Required Respiratory Protection	
			≤ 4 hours/shift	>4 hours/shift
1	Stationary masonry saws	<ul style="list-style-type: none"> Use saw equipped with integrated water delivery system that continuously feeds water to the blade. Operate and maintain tool in accordance with manufacturer’s instructions to minimize dust emissions. 	None	None
2a	Handheld power saws (any blade diameter) when used outdoors	<ul style="list-style-type: none"> Use saw equipped with integrated water delivery system that continuously feeds water to the blade. Operate and maintain tool in accordance with manufacturer’s instructions to minimize dust emissions. 	None	N95 (or Greater Efficiency) Filtering Facepiece or Half Mask
2b	Handheld power saws (any blade diameter) when used indoors or in an enclosed area	<ul style="list-style-type: none"> Use saw equipped with integrated water delivery system that continuously feeds water to the blade. Operate and maintain tool in accordance with manufacturer’s instructions to minimize dust emissions. 	N95 (or Greater Efficiency) Filtering Facepiece or Half Mask	N95 (or Greater Efficiency) Filtering Facepiece or Half Mask
3	Handheld power saws for cutting fiber-cement board (with blade diameter of 8 inches or less) for tasks performed outdoors only	<ul style="list-style-type: none"> Use saw equipped with commercially available dust collection system. Operate and maintain tool in accordance with manufacturer’s instructions to minimize dust emissions. Dust collector must provide the air flow recommended by the tool manufacturer, or greater, and have a filter with 99% or greater efficiency. 	None	None
4a	Walk-behind saws when used outdoors	<ul style="list-style-type: none"> Use saw equipped with integrated water delivery system that continuously feeds water to the blade. Operate and maintain tool in accordance with manufacturer’s instructions to minimize dust emissions. 	None	None
4b	Walk-behind saws when used indoors or in an enclosed area	<ul style="list-style-type: none"> Use saw equipped with integrated water delivery system that continuously feeds water to the blade. Operate and maintain tool in accordance with manufacturer’s instructions to minimize dust emissions. 	N95 (or Greater Efficiency) Filtering Facepiece or Half Mask	N95 (or Greater Efficiency) Filtering Facepiece or Half Mask



Construction Task or Equipment Operation		Engineering and Work Practice Control Methods	Required Respiratory Protection	
			≤ 4 hours/shift	>4 hours/shift
5	Drivable saws for tasks performed outdoors only	<ul style="list-style-type: none"> Use saw equipped with integrated water delivery system that continuously feeds water to the blade. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. 	None	None
6	Rig-mounted core saws or drills	<ul style="list-style-type: none"> Use saw equipped with integrated water delivery system that continuously feeds water to the blade. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. 	None	None
7	Handheld and stand-mounted drills (including impact and rotary hammer drills)	<ul style="list-style-type: none"> Use drill equipped with commercially available shroud or cowl with dust collection system. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. Dust collector must provide the air flow recommended by the tool manufacturer, or greater, and have a filter with 99% or greater efficiency and a filter-cleaning mechanism. Use a HEPA-filtered vacuum when cleaning holes. 	None	None
8	Dowel drilling rigs for concrete for tasks performed outdoors only	<ul style="list-style-type: none"> Use shroud around drill bit with a dust collection system. Dust collector must have a filter with 99% or greater efficiency and a filter cleaning mechanism. Use a HEPA-filtered vacuum when cleaning holes. 	N95 (or Greater Efficiency) Filtering Facepiece or Half Mask	N95 (or Greater Efficiency) Filtering Facepiece or Half Mask
9a	Vehicle-mounted drilling rigs for rock and concrete	<ul style="list-style-type: none"> Use dust collection system with close capture hood or shroud around drill bit with a low-flow water spray to wet the dust at the discharge point from the dust collector. 	None	None
9b	Vehicle-mounted drilling rigs for rock and concrete	<ul style="list-style-type: none"> Operate from within an enclosed cab and use water for dust suppression on drill bit. 	None	None
10a	Jackhammers and handheld powered chipping tools when used outdoors	<ul style="list-style-type: none"> Use tool with water delivery system that supplies a continuous stream or spray of water at the point of impact. 	None	N95 (or Greater Efficiency) Filtering Facepiece or Half Mask
10b	Jackhammers and handheld powered chipping tools when used indoors or in an enclosed area	<ul style="list-style-type: none"> Use tool with water delivery system that supplies a continuous stream or spray of water at the point of impact. 	N95 (or Greater Efficiency) Filtering Facepiece or Half Mask	N95 (or Greater Efficiency) Filtering Facepiece or Half Mask
10c	Jackhammers and handheld powered chipping tools when used outdoors	<ul style="list-style-type: none"> Use tool equipped with commercially available shroud and dust collection system. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. Dust collector must provide the air flow recommended by the tool manufacturer, or greater, and have a filter with 99% or greater efficiency and a filter-cleaning mechanism. 	None	N95 (or Greater Efficiency) Filtering Facepiece or Half Mask



Construction Task or Equipment Operation		Engineering and Work Practice Control Methods	Required Respiratory Protection	
			≤ 4 hours/shift	>4 hours/shift
10d	Jackhammers and handheld powered chipping tools when used indoors or in an enclosed area	<ul style="list-style-type: none"> Use tool equipped with commercially available shroud and dust collection system. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. Dust collector must provide the air flow recommended by the tool manufacturer, or greater, and have a filter with 99% or greater efficiency and a filter-cleaning mechanism. 	N95 (or Greater Efficiency) Filtering Facepiece or Half Mask	N95 (or Greater Efficiency) Filtering Facepiece or Half Mask
11	Handheld grinders for mortar removal (i.e., tuckpointing)	<ul style="list-style-type: none"> Use grinder equipped with commercially available shroud and dust collection system. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. Dust collector must provide 25 cubic feet per minute (cfm) or greater of airflow per inch of wheel diameter and have a filter with 99% or greater efficiency and a cyclonic pre-separator or filter-cleaning mechanism. 	N95 (or Greater Efficiency) Filtering Facepiece or Half Mask	Powered Air-Purifying Respirator (PAPR) with P100 Filters
12a	Handheld grinders for uses other than mortar removal for tasks performed outdoors only	<ul style="list-style-type: none"> Use grinder equipped with integrated water delivery system that continuously feeds water to the grinding surface. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. 	None	None
12b	Handheld grinders for uses other than mortar removal when used outdoors	<ul style="list-style-type: none"> Use grinder equipped with commercially available shroud and dust collection system. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. Dust collector must provide 25 cubic feet per minute (cfm) or greater of airflow per inch of wheel diameter and have a filter with 99% or greater efficiency and a cyclonic pre-separator or filter-cleaning mechanism. 	None	None
12c	Handheld grinders for uses other than mortar removal when used indoors or in an enclosed area	<ul style="list-style-type: none"> Use grinder equipped with commercially available shroud and dust collection system. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. Dust collector must provide 25 cubic feet per minute (cfm) or greater of airflow per inch of wheel diameter and have a filter with 99% or greater efficiency and a cyclonic pre-separator or filter-cleaning mechanism. 	None	N95 (or Greater Efficiency) Filtering Facepiece or Half Mask
13a	Walk-behind milling machines and floor grinders	<ul style="list-style-type: none"> Use machine equipped with integrated water delivery system that continuously feeds water to the cutting surface. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. 	None	None
13b	Walk-behind milling machines and floor grinders	<ul style="list-style-type: none"> Use machine equipped with dust collection system recommended by the manufacturer. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. Dust collector must provide the air flow recommended by the manufacturer, or greater, and have a filter with 99% or greater efficiency and a filter-cleaning mechanism. When used indoors or in an enclosed area, use a HEPA-filtered vacuum to remove loose dust in between passes. 	None	None



Construction Task or Equipment Operation		Engineering and Work Practice Control Methods	Required Respiratory Protection	
			≤ 4 hours/shift	>4 hours/shift
14	Small drivable milling machines (less than half-lane)	<ul style="list-style-type: none"> Use a machine equipped with supplemental water sprays designed to suppress dust. Water must be combined with a surfactant. Operate and maintain machine to minimize dust emissions. 	None	None
15a	Large drivable milling machines (half-lane and larger) for cuts of any depth on asphalt only	<ul style="list-style-type: none"> Use machine equipped with exhaust ventilation on drum enclosure and supplemental water sprays designed to suppress dust. Operate and maintain machine to minimize dust emissions. 	None	None
15b	Large drivable milling machines (half-lane and larger) for cuts of four inches in depth or less on any substrate	<ul style="list-style-type: none"> Use machine equipped with exhaust ventilation on drum enclosure and supplemental water sprays designed to suppress dust. Operate and maintain machine to minimize dust emissions. 	None	None
15c	Large drivable milling machines (half-lane and larger) for cuts of four inches in depth or less on any substrate	<ul style="list-style-type: none"> Use a machine equipped with supplemental water spray designed to suppress dust. Water must be combined with a surfactant. Operate and maintain machine to minimize dust emissions. 	None	None
16	Crushing machines	<ul style="list-style-type: none"> Use equipment designed to deliver water spray or mist for dust suppression at crusher and other points where dust is generated (e.g., hoppers, conveyers, sieves/sizing or vibrating components, and discharge points). Operate and maintain machine in accordance with manufacturer's instructions to minimize dust emissions. Use a ventilated booth that provides fresh, climate-controlled air to the operator, or a remote control station. 	None	None
17a	Heavy equipment and utility vehicles used to abrade or fracture silicacontaining materials (e.g., hoerammimg, rock ripping) or used during demolition activities involving silica-containing materials	Operate equipment from within an enclosed cab.	None	None
17b	Heavy equipment and utility vehicles used to abrade or fracture silicacontaining materials (e.g., hoerammimg, rock ripping) or used during demolition activities involving silica-containing materials	When employees outside of the cab are engaged in the task, apply water and/or dust suppressants as necessary to minimize dust emissions.	None	None
18a	Heavy equipment and utility vehicles for tasks such as grading and excavating but not including demolishing, abrading, or fracturing silica-containing materials	Apply water and/or dust suppressants as necessary to minimize dust emissions.	None	None
18a	Heavy equipment and utility vehicles for tasks such as grading and excavating but not including demolishing, abrading, or fracturing silica-containing materials	When the equipment operator is the only employee engaged in the task, operate equipment from within an enclosed cab.	None	None



When implementing the control measures specified in Table 1, VORTEX Companies shall:

- For tasks performed indoors or in enclosed areas, provide a means of exhaust as needed to minimize the accumulation of visible airborne dust;
- For tasks performed using wet methods, apply water at flow rates sufficient to minimize release of visible dust;
- For measures implemented that include an enclosed cab or booth, ensure that the enclosed cab or booth:
 - Is maintained as free as practicable from settled dust;
 - Has door seals and closing mechanisms that work properly;
 - Has gaskets and seals that are in good condition and working properly;
 - Is under positive pressure maintained through continuous delivery of fresh air;
 - Has intake air that is filtered through a filter that is 95% efficient in the 0.3-10.0 Qm range (e.g., MERV-16 or better); and
 - Has heating and cooling capabilities.
- Where an employee performs more than one task included on OSHA's Construction Standard Table 1 during the course of a shift, and the total duration of all tasks combined is more than four hours, the required respiratory protection for each task is the respiratory protection specified for more than four hours per shift. If the total duration of all tasks on Table 1 combined is less than four hours, the required respiratory protection for each task is the respiratory protection specified for less than four hours per shift.

Alternative Exposure Control Methods

Alternative Exposure Control Methods apply for tasks not listed in OSHA's Construction Standard Table 1, or where VORTEX Companies cannot not fully and properly implement the engineering controls, work practices, and respiratory protection described in Table 1.

First, VORTEX Companies will assess the exposure of each employee who is or may reasonably be expected to be exposed to Respirable Crystalline Silica at or above the Action Level in accordance with either the Performance Option or the Scheduled Monitoring Option.

- Performance Option – VORTEX Companies will assess the 8-hour TWA exposure for each employee on the basis of any combination of air monitoring data or objective data sufficient to accurately characterize employee exposures to Respirable Crystalline Silica.
- Scheduled Monitoring Option:
 - VORTEX Companies will perform initial monitoring to assess the 8-hour TWA exposure for each employee on the basis of one or more personal breathing zone air samples that reflect the exposures of employees on each shift, for each job classification, and in each work area. Where several employees perform the same tasks on the same shift and in the same work area, VORTEX Companies will plan to monitor a representative fraction of these employees. When using representative monitoring, VORTEX Companies will sample the employee(s) who are expected to have the highest exposure to Respirable Crystalline Silica.
 - If initial monitoring indicates that employee exposures are below the Action Level, VORTEX Companies will probably discontinue monitoring for those employees whose exposures are represented by such monitoring.
 - Where the most recent exposure monitoring indicates that employee exposures are at or above the Action Level but at or below the PEL, VORTEX Companies will repeat such monitoring within six months of the most recent monitoring.
 - Where the most recent exposure monitoring indicates that employee exposures are above the PEL, VORTEX Companies will repeat such monitoring within three months of the most recent monitoring.



- Where the most recent (non-initial) exposure monitoring indicates that employee exposures are below the Action Level, VORTEX Companies will repeat such monitoring within six months of the most recent monitoring until two consecutive measurements, taken seven or more days apart, are below the Action Level, at which time VORTEX Companies will probably discontinue monitoring for those employees whose exposures are represented by such monitoring, except when a reassessment is required. VORTEX Companies will reassess exposures whenever a change in the production, process, control equipment, personnel, or work practices may reasonably be expected to result in new or additional exposures at or above the Action Level, or when VORTEX Companies has any reason to believe that new or additional exposures at or above the Action Level have occurred.

VORTEX Companies will ensure that all Respirable Crystalline Silica samples taken to satisfy the monitoring requirements of this program and OSHA are collected by a qualified individual (i.e. a Certified Industrial Hygienist) and the samples are evaluated by a qualified laboratory (i.e. accredited to ANS/ISO/IEC Standard 17025:2005 with respect to Crystalline Silica analyses by a body that is compliant with ISO/IEC Standard 17011:2004 for implementation of quality assessment programs).

Within five working days after completing an exposure assessment, VORTEX Companies will individually notify each affected employee in writing of the results of that assessment or post the results in an appropriate location accessible to all affected employees.

Whenever an exposure assessment indicates that employee exposure is above the PEL, VORTEX Companies will describe in the written notification the corrective action being taken to reduce employee exposure to or below the PEL.

Where air monitoring is performed, VORTEX Companies will provide affected employees or their designated representatives an opportunity to observe any monitoring of employee exposure to Respirable Crystalline Silica. When observation of monitoring requires entry into an area where the use of protective clothing or equipment is required for any workplace hazard, VORTEX Companies will provide the observer with protective clothing and equipment at no cost and shall ensure that the observer uses such clothing and equipment.

Once air monitoring has been performed, VORTEX Companies will determine its method of compliance based on the monitoring data and the hierarchy of controls. VORTEX Companies will use engineering and work practice controls to reduce and maintain employee exposure to Respirable Crystalline Silica to or below the PEL, unless VORTEX Companies can demonstrate that such controls are not feasible. Wherever such feasible engineering and work practice controls are not sufficient to reduce employee exposure to or below the PEL, VORTEX Companies will nonetheless use them to reduce employee exposure to the lowest feasible level and shall supplement them with the use of respiratory protection.

In addition to the requirements of this program, VORTEX Companies will comply with other programs and OSHA standards (such as 29 CFR 1926.57 [Ventilation]), when applicable where abrasive blasting is conducted using Crystalline Silica-containing blasting agents, or where abrasive blasting is conducted on substrates that contain Crystalline Silica.

Control Methods

VORTEX Companies will provide control methods that are either consistent with Table 1 or otherwise minimize worker exposures to Silica. These exposure control methods can include engineering controls, work practices, and respiratory protection. Listed below are control methods to be used when Table 1 is not followed:



NIOSH Safety Recommendations:

NIOSH recommends the following measures to reduce crystalline silica exposures in the workplace and prevent silicosis and silicosis-related deaths:

1. Prohibit silica sand (or other substances containing more than 1% crystalline silica) as an abrasive blasting material and substitute less hazardous materials.
2. Conduct air monitoring to measure worker exposures.
3. Use containment methods such as blast-cleaning machines and cabinets to control the hazard and protect adjacent workers from exposure.
4. Practice good personal hygiene to avoid unnecessary exposure to silica dust.
 - a. Wash hands and face before eating.
 - b. No eating, drinking or tobacco products in the blasting area.
 - c. Shower before leaving work site.
 - d. Vehicles parked away from contaminated area.
5. Wear washable or disposable protective clothes at the worksite; shower and change into clean clothes before leaving the worksite to prevent contamination of cars, homes, and other work areas.
6. Use respiratory protection when source controls cannot keep silica exposures below the NIOSH REL.
7. Provide periodic medical examinations for all workers who may be exposed to crystalline silica.
8. Post signs to warn workers about the hazard and to inform them about required protective equipment.
9. Provide workers with training that includes information about health effects, work practices, and protective equipment for crystalline silica.
10. Report all cases of silicosis to the state health department.

Respiratory Protection

Where respiratory protection is required by this program, VORTEX Companies will provide each employee an appropriate respirator that complies with the requirements of the company's Respiratory Protection Program and the OSHA Respiratory Protection Standard (29 CFR 1910.134).

Respiratory protection is required where specified by the OSHA Construction Standard Table 1, for tasks not listed in Table 1, or where the company has not fully and properly implemented the engineering controls, work practices, and respiratory protection described in Table 1. Situations requiring respiratory protection include:

- Where exposures exceed the PEL during periods necessary to install or implement feasible engineering and work practice controls;
- Where exposures exceed the PEL during tasks, such as certain maintenance and repair tasks, for which engineering and work practice controls are not feasible; and
- During tasks for which an employer has implemented all feasible engineering and work practice controls and such controls are not sufficient to reduce exposures to or below the PEL.
- Up to 5 micrograms per cubic meter of air (Qg/m^3) of airborne exposures to crystalline silica:
 - Half-facepiece particulate respirators with N95 or better filters.
- Up to 12.5 micrograms per cubic meter of air (Qg/m^3) of airborne exposures to crystalline silica:
 - Any powered, air-purifying respirator with a high-efficiency particulate filter.
- Up to 25 micrograms per cubic meter of air (Qg/m^3) of airborne exposures to crystalline silica:
 - Any air-purifying full-facepiece respirator with an N100, R100, or P100 filter.
 - Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter.



- Up to 25 micrograms per cubic meter of air (Qg/m³) of airborne exposures to crystalline silica:
 - Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode.

Housekeeping

VORTEX Companies does not allow dry sweeping or dry brushing where such activity could contribute to employee exposure to Respirable Crystalline Silica unless wet sweeping, HEPA-filtered vacuuming, or other methods that minimize the likelihood of exposure are not feasible.

VORTEX Companies does not allow compressed air to be used to clean clothing or surfaces where such activity could contribute to employee exposure to Respirable Crystalline Silica unless:

- The compressed air is used in conjunction with a ventilation system that effectively captures the dust cloud created by the compressed air; or
- No alternative method is feasible.

Written Exposure Control Plan

When employee exposure on a construction project is expected to be at or above the Action Level, a Written Exposure Control Plan (ECP) will be established and implemented. This ECP will contain at least the following elements:

- A description of the tasks in the workplace that involve exposure to Respirable Crystalline Silica;
- A description of the engineering controls, work practices, and respiratory protection used to limit employee exposure to Respirable Crystalline Silica for each task;
- A description of the housekeeping measures used to limit employee exposure to Respirable Crystalline Silica; and
- A description of the procedures used to restrict access to work areas, when necessary, to minimize the number of employees exposed to Respirable Crystalline Silica and their level of exposure, including exposures generated by other employers or sole proprietors.

The written ECP will designate a Competent Person to make frequent and regular inspections of jobsites, materials, and equipment to ensure the ECP is implemented.

The written ECP will be reviewed at least annually to evaluate the effectiveness of it and update it as necessary. Having said this, ECP's are project specific and most project durations do not exceed a year. The written ECP will be readily available for examination and copying, upon request, to each employee covered by this program and/or ECP, their designated representatives, and OSHA.

Medical Surveillance

Medical surveillance will be made available for each employee who will be required to use a respirator for 30 or more days per year due to their Respirable Crystalline Silica exposure. Medical surveillance (i.e. medical examinations and procedures) will be performed by a PLHCP and provided at no cost to the employee at a reasonable time and place.

VORTEX Companies will make available an initial (baseline) medical examination within 30 days after initial assignment, unless the employee has received a medical examination that meets the requirements of the OSHA Respirable Crystalline Silica Construction Standard within the last three years. The examination shall consist of:



- A medical and work history, with emphasis on past, present, and anticipated exposure to Respirable Crystalline Silica, dust, and other agents affecting the respiratory system in addition to any history of respiratory system dysfunction, including signs and symptoms of respiratory disease (e.g., shortness of breath, cough, wheezing), history of tuberculosis, and smoking status and history;
- A physical examination with special emphasis on the respiratory system;
- A chest X-ray (a single postero-anterior radiographic projection or radiograph of the chest at full inspiration recorded on either film [no less than 14 x 17 inches and no more than 16 x 17 inches] or digital radiography systems) interpreted and classified according to the International Labour Office (ILO) International Classification of Radiographs of Pneumoconiosis by a NIOSH-certified B Reader;
- A pulmonary function test to include forced vital capacity (FVC) and forced expiratory volume in one second (FEV1) and FEV1/FVC ratio, administered by a spirometry technician with a current certificate from a NIOSH-approved spirometry course;
- Testing for latent tuberculosis infection; and
- Any other tests deemed appropriate by the PLHCP.

VORTEX Companies will make available medical examinations that include the aforementioned procedures (except testing for latent tuberculosis infection) at least every three years. If recommended by the PLHCP, periodic examinations can be more frequently than every three years.

VORTEX Companies will ensure that the examining PLHCP has a copy of the OSHA Respirable Crystalline Silica Construction Standard, this program, and the following information:

- A description of the employee's former, current, and anticipated duties as they relate to the employee's occupational exposure to Respirable Crystalline Silica;
- The employee's former, current, and anticipated levels of occupational exposure to Respirable Crystalline Silica;
- A description of any personal protective equipment (PPE) used or to be used by the employee, including when and for how long the employee has used or will use that equipment; and
- Information from records of employment-related medical examinations previously provided to the employee and currently within the control of VORTEX Companies.

VORTEX Companies will ensure that the PLHCP explains to the employee the results of the medical examination and provides each employee with a written medical report within 30 days of each medical examination performed. The written report shall contain:

- A statement indicating the results of the medical examination, including any medical condition(s) that would place the employee at increased risk of material impairment to health from exposure to Respirable Crystalline Silica and any medical conditions that require further evaluation or treatment;
- Any recommended limitations on the employee's use of respirators;
- Any recommended limitations on the employee's exposure to Respirable Crystalline Silica; and
- A statement that the employee should be examined by a Specialist if the chest X-ray is classified as 1/0 or higher by the B Reader, or if referral to a Specialist is otherwise deemed appropriate by the PLHCP.

VORTEX Companies will also obtain a written medical opinion from the PLHCP within 30 days of the medical examination. The written opinion shall contain only the following in order to protect the employee's privacy:

- The date of the examination;



- A statement that the examination has met the requirements of the OSHA Respirable Crystalline Silica Construction Standard; and
- Any recommended limitations on the employee's use of respirators.

If the employee provides written authorization, the written opinion shall also contain either or both of the following:

- Any recommended limitations on the employee's exposure to Respirable Crystalline Silica; and/or
- A statement that the employee should be examined by a Specialist if the chest X-ray is classified as 1/0 or higher by the B Reader, or if referral to a Specialist is otherwise deemed appropriate by the PLHCP.

If the PLHCP's written medical opinion indicates that an employee should be examined by a Specialist, VORTEX Companies will make available a medical examination by a Specialist within 30 days after receiving the PLHCP's written opinion. VORTEX Companies will ensure that the examining Specialist is provided with all of the information that the employer is obligated to provide to the PLHCP.

VORTEX Companies will ensure that the Specialist explains to the employee the results of the medical examination and provides each employee with a written medical report within 30 days of the examination. The written report will contain:

- A statement indicating the results of the medical examination, including any medical condition(s) that would place the employee at increased risk of material impairment to health from exposure to Respirable Crystalline Silica and any medical conditions that require further evaluation or treatment;
- Any recommended limitations on the employee's use of respirators; and
- Any recommended limitations on the employee's exposure to respirable crystalline Silica.

In addition, VORTEX Companies will obtain a written opinion from the Specialist within 30 days of the medical examination. The written opinion shall contain the following:

- The date of the examination;
- Any recommended limitations on the employee's use of respirators; and
- If the employee provides written authorization, the written opinion shall also contain any recommended limitations on the employee's exposure to Respirable Crystalline Silica.

Hazard Communication

VORTEX Companies will include Respirable Crystalline Silica in the company's Hazard Communication Program established to comply with the OSHA Hazard Communication Standard (29 CFR 1910.1200).

VORTEX Companies will ensure that each employee has access to labels on containers of Crystalline Silica and those containers respective Safety Data Sheets (SDS's).

All employees will be trained in accordance with the provisions of the OSHA Hazard Communication Standard and the Training Section of this program. This training will cover concerns relating to cancer, lung effects, immune system effects, and kidney effects.

VORTEX Companies will ensure that each employee with the potential to be exposed at or above the Action Level for Respirable Crystalline Silica can demonstrate knowledge and understanding of at least the following:



- The health hazards associated with exposure to Respirable Crystalline Silica;
- Specific tasks in the workplace that could result in exposure to Respirable Crystalline Silica;
- Specific measures VORTEX Companies has implemented to protect employees from exposure to Respirable Crystalline Silica, including engineering controls, work practices, and respirators to be used;
- The contents of the OSHA Respirable Crystalline Silica Construction Standard;
- The identity of the Competent Person designated by VORTEX Companies; and
- The purpose and a description of the company's Medical Surveillance Program.

VORTEX Companies will make a copy of the OSHA Respirable Crystalline Silica Construction Standard readily available without cost to any employee who requests it.

Recordkeeping

VORTEX Companies will make and maintain an accurate record of all exposure measurements taken to assess employee exposure to Respirable Crystalline Silica. This record will include at least the following information:

- The date of measurement for each sample taken;
- The task monitored;
- Sampling and analytical methods used;
- Number, duration, and results of samples taken;
- Identity of the laboratory that performed the analysis;
- Type of personal protective equipment (PPE), such as respirators, worn by the employees monitored; and
- Name, social security number, and job classification of all employees represented by the monitoring, indicating which employees were actually monitored.

VORTEX Companies will ensure that exposure records are maintained and made available in accordance with 29 CFR 1910.1020. Exposure records will be kept for at least 30 years.

The employer shall make and maintain an accurate record of all objective data relied upon to comply with the requirements of the OSHA Respirable Crystalline Silica Construction Standard. This record shall include at least the following information:

- The Crystalline Silica-containing material in question;
- The source of the objective data;
- The testing protocol and results of testing;
- A description of the process, task, or activity on which the objective data were based; and
- Other data relevant to the process, task, activity, material, or exposures on which the objective data were based.

VORTEX Companies will ensure that objective data are maintained and made available in accordance with 29 CFR 1910.1020. Objective data records will be kept for at least 30 years.

VORTEX Companies will make and maintain an accurate record for each employee enrolled in the Medical Surveillance portion of this program. The record shall include the following information about the employee:

- Name and social security number;
- A copy of the PLHCPs' and/or Specialists' written medical opinions; and
- A copy of the information provided to the PLHCPs and Specialists.



VORTEX Companies will ensure that medical records are maintained and made available in accordance with 29 CFR 1910.1020. Medical records will be kept under lock and key for at least the duration of employment plus 30 years. It is necessary to keep these records for extended periods because Silica-related diseases such as cancer often cannot be detected until several decades after exposure. However, if an employee works for an employer for less than one year, the employer does not have to keep the medical records after employment ends, as long as the employer gives those records to the employee.

Program Evaluation

This program will be reviewed and evaluated on an annual basis by the Safety Department unless changes to operations, the OSHA Respirable Crystalline Silica Construction Standard (29 CFR 1926.1153), or another applicable OSHA Standard require an immediate re-validation of this program.

Applicable Forms

The following lists applicable forms relating to this program.

Appendices

See attached ECP Template.



WRITTEN SILICA EXPOSURE CONTROL PLAN - TEMPLATE

Company: _____ **Date:** _____

Person Completing the Plan, Title: _____

Competent Person: _____

Job site/location: _____

Description of Task: (Routine task, new task, Indoors/outdoors, task found on Table 1?) _____

Engineering Controls: _____

Any deviation from Table 1 = air monitoring is required. Engineering controls must be used at all times!

(Wet methods, continuous water feed, local exhaust ventilation w/ HEPA filters, commercially available shrouds, commercial dust collection system, cyclone pre-separator/filter cleaning system, surfactant used, and ventilation \geq 25 cfm/inch of wheel diameter, enclosed cab w/ fresh climate controlled air to operator, employees outside of cabs applying water/dust suppressants, equipment maintained to minimize dust emissions.)

Work Practices: _____

(Maintain equipment functionality - cleaned/spare filters, hoses to start; good connections; hoses with no holes, kinks, permanent bends, crushed; power source available; water source available, ensure ventilation is \geq 25 cfm/inch of wheel diameter; water/exhaust ventilation lines safe from damage; shrouds/cowls fit correctly and not damaged; follow Manufacturer's instruction for filter cleaning/change out.)

Respiratory Protection: _____

(Use respirator with APF = 10 the entire time the task is being performed - See Table 1.)

See Part 451 - Respiratory Protection rule for information on selection, training and fit testing requirements, and proper use instruction for respirators (i.e., no facial hair interfering with the respirator sealing surface).



Housekeeping: _____

(Dust containing silica on work surfaces/equipment must be cleaned up using wet methods of HEPA equipped vacuum, no use of compressed air or dry sweeping for removing dust and debris containing silica, dispose of used vacuum bags in a closed sealed container).

Procedures Used to Restrict Access to Work Area (Construction = optional, GI = required if exposures exceed the permissible exposure limit, PEL): _____

(Signage, barricades, enclosures, spotters, work when area is cleared of other contractors to reduce risk of exposure.)

Objective Data Use (Optional) - Yes No

Data Source: _____

Data conditions from the source exactly matches the work conditions? **Yes** **No**

(Same conditions, equipment, process, controls, material silica %, environmental.)

Where Required:

- Review and update this plan annually.
- Keep a copy of this plan at the jobsite.
- Provide this plan of action to the General Contractor.
- Review this plan with all involved employees.



CIVIL INFRASTRUCTURE SOLUTIONS

RESPIRATORY PROTECTION



Vortex Companies

Procedure Name	Environmental, Health & Safety Manual – Respiratory Protection
Applicability	VORTEX Companies – Employees & Subcontractors
Policy Revised	10.30.14

Purpose

It is the intention of VORTEX Companies to provide a respirator protection program that meets or exceeds all federal standards. VORTEX Companies will attempt to engineer potential harmful vapors and oxygen deficient atmosphere exposure hazards out of the work environment.

If engineering control measures are not feasible or during emergency situations with high exposure then respirators shall be provided which are applicable and suitable for purpose intended.

Scope

This program applies to all VORTEX Companies projects and operations.

Respiratory Program Administrator

Overall responsibility for the respiratory protection program is assigned to the VORTEX Companies Safety Manager in order to ensure that specific requirements are followed.

The Administrator must be knowledgeable of the complexity of the program, conduct evaluations, and be properly trained.

This assignment is made, however, with the understanding that individual supervisors will have to implement and enforce major portions of the program. It is understood that the Program Administrator will report performance problems to the appropriate manager for resolution. The person who will have responsibility for administering all the aspects of this program will be the Project Manager or their designee.

The responsibilities of the Program Administrator will include, but are not limited to:

- Conducting an annual written evaluation of the program. The program evaluation should be completed no later than December, 31, of each year.
- Ensuring an adequate supply of respirators, cartridges, and repair/replacement parts. The Program Administrator may delegate this duty but will retain overall responsibility. The person(s) to whom this duty has been delegated is the Project Manager and/or Field Supervisor.
- Ensuring that only respirators that have been approved by the Corporate Health and Safety office are ordered and used. Under no circumstances will respirators be used that have not been approved by NIOSH/MSHA. The selected designated respirator manufacturer for VORTEX Companies is North Safety.
- Ensuring that all respirator users have been trained in the use, selection and limitations of the type of respirators they will be using prior to the first time the respirator must be used. While the duty of conducting the training may be delegated, the Program Administrator retains final responsibility for seeing that all employees are appropriately trained.



- Ensuring that all respirator users have been medically evaluated and found fit to use the type of respirators that will be required in their job. The medical evaluation must be completed prior to assigning any employee to a task that requires use of a respirator.
- Ensuring that all respirator users are fit-tested at least annually and more often if other federal requirements apply.
- Ensuring that respirators are individually issued, are cleaned and sanitized on a regular basis, and respirators are stored in a clean and accessible location. This duty may also be delegated but the Program Administrator retains final responsibility for seeing that it is done.
- Ensuring that respirators are selected based on the hazard that will be encountered. This program describes the basic respirators that will be used at this site and the tasks for which they will be required. In special circumstances, the Program Administrator will contact the corporate health and safety staff for guidance in selecting the correct respirator.
- Ensuring that employee exposure is monitored to assure correct respirator type is used. Exposure monitoring may be delegated to others; however, the Program Administrator has final responsibility of monitoring completion and to request assistance when necessary.
- Ensuring surveillance of employees who wear respirators shall leave the area to wash, change cartridges or if they detect break through or resistance.
- Ensuring that the elements of the Respiratory Protection Program for the selection, use, cleaning/maintenance, storage and fit-testing of respirators are followed.
- Ensuring that respirator parts are not exchanged between brands of respirators.
- Ensuring medical evaluations, respirators and required training are provided at no cost to the employee.

Medical Requirements General

VORTEX Companies shall provide a medical evaluation to determine the employee's ability to use a respirator, before the employee is fit tested or required to use the respirator in the workplace. VORTEX Companies may discontinue an employee's medical evaluations when the employee is no longer required to use a respirator.

Medical Evaluation Procedures

VORTEX Companies shall identify a physician or other licensed health care professional (PLHCP) to perform medical evaluations using a medical questionnaire or an initial medical examination that obtains the same information as the medical questionnaire.

The medical evaluation shall obtain the information requested by the Medical Questionnaire in Forms section (or equivalent). The medical evaluation prior to fit-testing will be confidential, conducted during normal working hours, be at a convenient time and location, be understandable and the employee will be given a chance to discuss the results with the PLHCP.

Supplemental Information for the PLHCP

The following information must be provided to the PLHCP before the PLHCP makes a recommendation concerning an employee's ability to use a respirator:

- The type and weight of the respirator to be used by the employee;
- The duration and frequency of respirator use (including use for rescue and escape);
- The expected physical work effort;
- Additional protective clothing and equipment to be worn; and
- Temperature and humidity extremes that may be encountered.



VORTEX Companies shall provide the PLHCP with a copy of the VORTEX Companies Respiratory Protection Program.

Note: When VORTEX Companies replaces a PLHCP, VORTEX Companies must ensure that the new PLHCP obtains this information, either by providing the documents new PLHCP. However, OSHA does not expect employers to have employees medically re-evaluated solely because a new PLHCP has been selected.

Medical Determination

In determining the employee's ability to use a respirator, VORTEX Companies shall obtain a written recommendation regarding the employee's ability to use the respirator from the PLHCP. The recommendation shall provide only the following information:

- Any limitations on respirator use related to the medical condition of the employee, or relating to the workplace conditions in which the respirator will be used, including whether or not the employee is medically able to use the respirator;
- The need, if any, for follow-medical evaluations; and
- A statement that the PLHCP has provided the employee with a copy of the PLHCP's written recommendation. All recommendations are to be sent to VORTEX Companies 's Safety Manager.

Additional Medical Evaluations

At a minimum, VORTEX Companies shall provide additional medical evaluations that comply with the requirements of this program if:

- An employee reports medical signs or symptoms that are related to ability to use a respirator;
- A PLHCP, supervisor, or the respirator Program Administrator informs VORTEX Companies that an employee needs to be re-evaluated;
- Information from the respiratory protection program, including observations made during fit testing and program evaluation, indicates a need for employee re-evaluation; or
- A change occurs in workplace conditions (e.g., physical work effort, protective clothing, and temperature) that may result in a substantial increase in the physiological burden placed on an employee.

Work Site Procedures

Each work site where respirators are required to protect the health of the worker shall have work site procedures that follow the guidelines of this program. Specific procedures may also be required by our client which will be followed. The following areas shall be included:

- Identification of specific hazard requiring respiratory protection
- The selection of the appropriate respiratory protection equipment based on the specific hazard and concentration levels, characteristics, etc. Specific brand and models of respiratory equipment to be used shall be identified in the procedures.
- Verification that each user of respiratory protection is qualified (medical approval, current fit test, annual training and demonstrates competency.

Respirator Selection Criteria

The selection of the respiratory equipment is based on the hazards the employee is exposed to. VORTEX Companies shall:

- Perform hazard identification,
- Select and provide respirators based on those hazards and factors affecting performance,
- Establish brands and models to be used, and
- Estimate exposures and contaminant information.



Hazard Identification

Due to the many varied work locations VORTEX Companies 's identification of respiratory hazards will be contained in the various work site-specific safety plans. However, common respiratory hazards that will be encountered include:

- Dust
- Fumes
- Gases
- Chemical particles
- Oxygen Deficiency

Characteristics of Hazardous Operation or Process

- Hot operations: welding, chemical reactions, soldering, melting, melding and burning.
- Liquid operations: painting, degreasing, dipping, spraying, brushing, coating, etching, cleaning, pickling, plating, mixing, galvanizing and chemical reactions.
- Solid operations: pouring, mixing, separations, extraction, crushing, conveying, loading, bagging and demolition.
- Pressurized spraying: cleaning parts, applying pesticides, degreasing, sand blasting and painting.
- Shaping operations: cutting, grinding, filing, milling, melding, sawing and drilling.

Gaseous Contaminants

- Inert gases (helium, argon, etc.), which do not metabolize in the body but displace air to produce an oxygen deficiency.
- Acid gases (SO₂, H₂S, HCl, etc.) which are acids or produce acids by reaction with water.
- Alkaline gases (NH₃, etc.), which are alkalies or produce alkalies by reaction with water.
- Organic gases (butane, acetone, etc.), which exist as true gases or vapors from organic liquids.
- Organometallic gases (tetraethyl lead, organo-phosphates, etc.), which have metals attached to organic groups.

Particulate Contaminants

- Dusts are mechanically generated solid particulates (0.5 to 10 Qm).
- Fumes are solid condensation particles of small diameter (0.1 to 1.0 Qm).
- Mists are liquid particulate matter (5 to 100 Qm).
- Smoke is chemically generated particulates (solid and liquid) of organic origins (0.01 to 0.3 Qm).

Selection of Respirator

The following factors shall be taken into account when selecting the proper respirator.

Concentration and Type of Contaminant

The concentration and type of contaminant will determine the model and type of respirator and cartridges/filters or filters to be used. The concentration is based on a sampling of the atmosphere.

Location of Hazardous Area

(Confined Space, nearby contaminants, etc.)

Worker Activity

(Extreme heat, cold, welding hood requirement, etc.)



Types of Respirators

Air-purifying respirators can be either full-face or half masks with mechanical or chemical cartridges to filter dusts, mists, fumes, vapors or gases.

Powered air-purifying respirators use a blower to pass the contaminated air through a filter. The purified air is then delivered into a mask or hood. They filter dusts, mists, fumes, vapors and gases, just like ordinary air-purifying respirators.

Air-purifying respirators cannot be used in oxygen-deficient atmospheres, which can result when another gas displaces the oxygen or consumption of oxygen by a chemical reaction occurs. Oxygen levels below 19.5% require either a source of supplied air or supplied-air respirator protection. Levels below 16% are considered to be unsafe and could cause death. To determine the proper cartridge for air-purifying respirators contact the VORTEX Companies Safety Manager or a qualified on-site safety representative of the client. You should also consult the Material Safety Data Sheet of the substance that needs to be filtered. All cartridges are assigned a color designating the type of contaminant they will filter:

- White: Acid gas
- Black: Organic vapors
- Green: Ammonia gas
- Yellow: Acid gas and organic vapors
- Purple: Radioactive materials
- Orange: Dust, fumes and mists
- Olive: Other gases and vapors

Once the wearer of the respirator can detect an odor, irritation, or taste of the contaminant, the cartridge should be replaced. All cartridges and/or filters shall be changed at the beginning of each shift.

Supplied-air respirators provide the highest level of protection against highly toxic and unknown materials. Supplied air refers to self-contained breathing apparatuses (SCBAs) and air-line respirators. SCBAs have a limited air supply that is carried by the user, allowing for good mobility and fewer restrictions than air-line respirators.

Air-line respirators have an air hose that is connected to a fresh air supply from a central source. The source can be from a compressed air cylinder or air compressor that provides at least Grade D breathing air.

Emergency Escape Breathing Apparatuses (EEBAs) provide oxygen for 5, 10 or 15 minutes depending on the unit. These are for emergency situations in which an employee must escape from environments immediately dangerous to life or health (IDLH).

SCBA (Self Contained Breathing Apparatus)

VORTEX Companies **does NOT allow employees to work in an Immediately Dangerous to Life and Health (IDLH) environment.**

In order to maintain the NIOSH/MSHA approval of any respirator, mixing parts from other respirator manufacturers is prohibited. This includes airline hoses, valves, gaskets, cartridges, etc. For example, do not use North cartridges or valve gaskets with an MSA product.



Brand and Models

VORTEX Companies has selected North Safety as its NIOSH-certified respirator. Only this brand of respirator shall be used in compliance with the conditions of the certification of its Respiratory Protection Program (fit testing model, no mixing of different manufacturer parts, cartridges, filters, etc.).

The specific model will be based on the hazard, concentration of contaminant, oxygen level, work environment and type of work being performed. To aid in the selection process the following will be used to identify the proper North respiratory equipment for the work being performed and hazard that is present.

- NIOSH Pocket Guide to Chemicals
- North Cartridge Selection Guide
- North Respirator Selection Guide

Estimate of Exposures and Contaminant Information

- No employee shall enter an IDLH environment.
- Normal oxygen levels shall be maintained.
- No employee shall be exposed to an atmosphere containing concentrations that would exceed the STEL or PEL for the identified atmospheric hazard.

Respirator Fit Testing

Before an employee may be required to use any respirator with a negative or positive pressure tight-fitting face piece, the employee must be fit tested with the same make, model, style, and size of respirator that will be used. This section specifies the kinds of fit tests allowed, the procedures for conducting them, and how the results of the fit tests must be used.

All respirator users are fit-tested at least annually and more often if other federal requirements apply. Supplied Air Respirators are required to be fit tested as well.

VORTEX Companies shall ensure that employees using a tight-fitting face piece respirator pass an appropriate qualitative fit test (QLFT) or quantitative fit test (QNFT) as stated in this program.

VORTEX Companies shall ensure that an employee using a tight-fitting face piece respirator is fit tested prior to initial use of the respirator, whenever a different respirator face piece (size, style, model or make) is used, and at least annually thereafter.

VORTEX Companies shall conduct an additional fit test whenever the employee reports, or VORTEX Companies 's PLHCP, supervisor, or Program Administrator makes visual observations of, changes in the employee's physical condition that could affect respirator fit. Such conditions include, but are not limited to, facial scarring, dental changes, cosmetic surgery, or an obvious change in body weight.

If after passing a QLFT or QNFT, the employee subsequently notifies VORTEX Companies, Program Administrator, supervisor, or PLHCP that the fit of the respirator is unacceptable, the employee shall be given a reasonable opportunity to select a different respirator face piece and to be retested.

The fit test shall be administered using an OSHA-accepted QLFT or QNFT protocol. The OSHA-accepted QLFT and QNFT protocols and procedures are contained in this section.



QLFT may only be used to fit test negative pressure air-purifying respirators that must achieve a fit factor of 100 or less. Half face air filtering respirators may be fit tested with irritant smoke while full face air filtering respirators require Portacount fit testing.

If the fit factor, as determined through an OSHA-accepted QNFT protocol, is equal to or greater than 100 for tight-fitting half face pieces, or equal to or greater than 500 for tight-fitting full face pieces, the QNFT has been passed with that respirator.

Fit testing of tight-fitting atmosphere-supplying respirators and tight-fitting powered air-purifying respirators shall be accomplished by performing quantitative or qualitative fit testing in the negative pressure mode, regardless of the mode of operation (negative or positive pressure) that is used for respiratory protection.

Qualitative fit testing of these respirators shall be accomplished by temporarily converting the respirator user's actual face piece into a negative pressure respirator with appropriate filters, or by using an identical negative pressure air-purifying respirator face piece with the same sealing surfaces as a surrogate for the atmosphere-supplying or powered air-purifying respirator face piece.

Quantitative fit testing of these respirators shall be accomplished by modifying the face piece to allow sampling inside the face piece in the breathing zone of the user, midway between the nose and mouth. This requirement shall be accomplished by installing a permanent sampling probe onto a surrogate face piece, or by using a sampling adapter designed to temporarily provide a means of sampling air from inside the face piece.

Any modifications to the respirator face piece for fit testing shall be completely removed, and the face piece restored to NIOSH-approved configuration, before that face piece can be used in the workplace.

Fit Test Procedures

The requirements in this section apply to all OSHA-accepted fit test methods, both QLFT and QNFT.

The test subject shall be allowed to pick the most acceptable respirator from a sufficient number of respirator sizes so that the respirator is acceptable to, and correctly fits, the user.

Prior to the selection process, the test subject shall be shown how to put on a respirator, how it should be positioned on the face, how to set strap tension and how to determine an acceptable fit. A mirror shall be available to assist the subject in evaluating the fit and positioning of the respirator. This instruction may not constitute the subject's formal training on respirator use, because it is only a review.

The test subject shall be informed that he/she is being asked to select the respirator that provides the most acceptable fit. Each respirator represents a different size and shape, and if fitted and used properly, will provide adequate protection.

The test subject shall be instructed to hold each chosen face piece up to the face and eliminate those that obviously do not give an acceptable fit.

The more acceptable face pieces are noted in case the one selected proves unacceptable; 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 following points:



- If the test subject is not familiar with using a particular respirator, the test subject shall be directed to don the mask several times and to adjust the straps each time to become adept at setting proper tension on the straps.
- Position of the mask on the nose
- Room for eye protection
- Room to talk
- Position of mask on face and cheeks

The following criteria shall be used to help determine the adequacy of the respirator fit:

- Chin properly placed;
- Adequate strap tension, not overly tightened;
- Fit across nose bridge;
- Respirator of proper size to span distance from nose to chin;
- Tendency of respirator to slip;
- Self-observation in mirror to evaluate fit and respirator position.
- Use the Fit Test form.

User Seal Check

Before conducting the negative and positive pressure checks, the subject shall be told to seal the mask on the face by moving the head from side-to-side and up and down slowly while taking in a few slow deep breaths. The test subject shall conduct a user seal check, either the negative or positive pressure seal checks described below:

Positive Pressure Check

Close off the exhalation valve and exhale gently into the face piece. The face fit is considered satisfactory if a slight positive pressure can be built up inside the face piece without any evidence of outward leakage of air at the seal. For most respirators this method of leak testing requires the wearer to first remove the exhalation valve cover before closing off the exhalation valve and then carefully replacing it after the test.

Negative Pressure Check

Close off the inlet opening of the canister or cartridge(s) by covering with the palm of the hand(s) or by replacing the filter seal(s), inhale gently so that the face piece collapses slightly, and hold the breath for ten seconds. The design of the inlet opening of some cartridges cannot be effectively covered with the palm of the hand. The test can be performed by covering the inlet opening of the cartridge with a thin latex or nitrile glove. If the face piece remains in its slightly collapsed condition and no inward leakage of air is detected, the tightness of the respirator is considered satisfactory.

The test shall not be conducted if there is any hair growth between the skin and the face piece sealing surface, such as stubble beard growth, beard, moustache or sideburns which cross the respirator sealing surface. Any type of apparel which interferes with a satisfactory fit shall be altered or removed, including glasses.

If a test subject exhibits difficulty in breathing during the tests, she or he shall be referred to a physician or other licensed health care professional, as appropriate, to determine whether the test subject can wear a respirator while performing her or his duties. If the employee finds the fit of the respirator unacceptable, the test subject shall be given the opportunity to select a different respirator and to be retested.



Prior to the commencement of the fit test, the test subject shall be given a description of the fit test and the test subject's responsibilities during the test procedure. The description of the process shall include a description of the test exercises that the subject will be performing. The respirator to be tested shall be worn for at least 5 minutes before the start of the fit test.

The fit test shall be performed while the test subject is wearing any applicable safety equipment that may be worn during actual respirator use which could interfere with respirator fit.

Test Exercises

Each test exercise shall be performed for one minute except for the grimace exercise which shall be performed for 15 seconds. The test subject shall be questioned by the test conductor regarding the comfort of the respirator upon completion of the protocol. If it has become unacceptable, another model of respirator shall be tried. If due to medical or health conditions the employee cannot perform the test exercises the fit test shall not be performed and the employee not allowed to use a respirator until all elements of the fit test can be achieved.

The respirator shall not be adjusted once the fit test exercises begin. Any adjustment voids the test, and the fit test must be repeated.

The following test exercises are to be performed for all fit testing methods prescribed in this procedure:

- Normal breathing. In a normal standing position, without talking, the subject shall breathe normally.
- Deep breathing. In a normal standing position, the subject shall breathe slowly and deeply, taking caution so as not to hyperventilate.
- Turning head side to side. Standing in place, the subject shall slowly turn his/her head from side to side between the extreme positions on each side. The head shall be held at each extreme momentarily so the subject can inhale at each side.
- Moving head up and down. Standing in place, the subject shall slowly move his/her head up and down. The subject shall be instructed to inhale in the up position (i.e., when looking toward the ceiling).
- Talking. The subject shall talk out loud slowly and loud enough so as to be heard clearly by the test conductor. The subject shall read from the Rainbow Passage

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." Continue to read for one minute.

- Grimace. The test subject shall grimace by smiling or frowning. (This applies only to QNFT testing; it is not performed for QLFT)
- Jogging in place. The test subject shall jog in place being careful to be aware of their surroundings.
- Normal breathing. Same as exercise (1).



Qualitative Fit Test (QLFT) Protocols

General

VORTEX Companies shall ensure that persons administering QLFT are able to prepare test solutions, calibrate equipment and perform tests properly, recognize invalid tests, and ensure that test equipment is in proper working order. VORTEX Companies shall ensure that QLFT equipment is kept clean and well maintained so as to operate within the parameters for which it was designed.

Irritant Smoke (Stannic Chloride) Protocol

This qualitative fit test uses a person's response to the irritating chemicals released in the "smoke" produced by a stannic chloride ventilation smoke tube to detect leakage into the respirator.

General Requirements and Precautions. The respirator to be tested shall be equipped with high efficiency particulate air (HEPA) or P100 series filter(s).

Only stannic chloride smoke tubes shall be used for this protocol. No form of test enclosure or hood for the test subject shall be used.

The smoke can be irritating to the eyes, lungs, and nasal passages. The test conductor shall take precautions to minimize the test subject's exposure to irritant smoke. Sensitivity varies, and certain individuals may respond to a greater degree to irritant smoke. Care shall be taken when performing the sensitivity screening checks that determine whether the test subject can detect irritant smoke to use only the minimum amount of smoke necessary to elicit a response from the test subject.

The fit test shall be performed in an area with adequate ventilation to prevent exposure of the person conducting the fit test or the build-up of irritant smoke in the general atmosphere.

The person to be tested must demonstrate his or her ability to detect a weak concentration of the irritant smoke.

- The test operator shall break both ends of a ventilation smoke tube containing stannic chloride, and attach one end of the smoke tube to a low flow air pump set to deliver 200 milliliters per minute, or an aspirator squeeze bulb. The test operator shall cover the other end of the smoke tube with a short piece of tubing to prevent potential injury from the jagged end of the smoke tube.
- The test operator shall advise the test subject that the smoke can be irritating to the eyes, lungs, and nasal passages and instruct the subject to keep his/her eyes closed while the test is performed.
- The test subject shall be allowed to smell a weak concentration of the irritant smoke before the respirator is donned to become familiar with its irritating properties and to determine if he/she can detect the irritating properties of the smoke. The test operator shall carefully direct a small amount of the irritant smoke in the test subject's direction to determine that he/she can detect it.

Irritant Smoke Fit Test Procedure

- The person being fit tested shall don the respirator without assistance, and perform the required user seal check(s).
- The test subject shall be instructed to keep his/her eyes closed if wearing a half face respirator.



- The test operator shall direct the stream of irritant smoke from the smoke tube toward the face seal area of the test subject, using the low flow pump or the squeeze bulb. The test operator shall begin at least 12 inches from the face piece and move the smoke stream around the whole perimeter of the mask. The operator shall gradually make two more passes around the perimeter of the mask, moving to within six inches of the respirator.
- If the person being tested has not had an involuntary response and/or detected the irritant smoke, proceed with the test exercises.
- The exercises identified in the Test Exercises of this procedure shall be performed by the test subject while the respirator seal is being continually challenged by the smoke, directed around the perimeter of the respirator at a distance of six inches.
- If the person being fit tested reports detecting the irritant smoke at any time, the test is failed. The person being retested must repeat the entire sensitivity check and fit test procedure.
- Each test subject passing the irritant smoke test without evidence of a response (involuntary cough, irritation) shall be given a second sensitivity screening check, with the smoke from the same smoke tube used during the fit test, once the respirator has been removed, to determine whether he/she still reacts to the smoke. Failure to evoke a response shall void the fit test.
- If a response is produced during this second sensitivity check, then the fit test is passed. The glass tube shall be disposed of properly.

Quantitative Fit Test (QNFT) Protocols

Using controlled negative pressure and appropriate instrumentation to measure the volumetric leak rate of a face piece to quantify the respirator have been demonstrated to be acceptable to OSHA.

VORTEX Companies shall ensure that persons administering QNFT are able to calibrate equipment and perform tests properly, recognize invalid tests, calculate fit factors properly and ensure that test equipment is in proper working order. VORTEX Companies shall ensure that QNFT equipment is kept clean, and is maintained and calibrated according to the manufacturer's instructions so as to operate at the parameters for which it was designed.

Portacount Fit Test Requirements

- Check the respirator to make sure the respirator is fitted with a high-efficiency filter and that the sampling probe and line are properly attached to the face piece.
- Instruct the person to be tested to don the respirator for five minutes before the fit test starts. This purges the ambient particles trapped inside the respirator and permits the wearer to make certain the respirator is comfortable. This individual shall already have been trained on how to wear the respirator properly.
- Check the following conditions for the adequacy of the respirator fit: Chin properly placed; Adequate strap tension, not overly tightened; Fit across nose bridge; Respirator of proper size to span distance from nose to chin; Tendency of the respirator to slip; Self-observation in a mirror to evaluate fit and respirator position.
- Have the person wearing the respirator do a user seal check. If leakage is detected, determine the cause. If leakage is from a poorly fitting face piece, try another size of the same model respirator, or another model of respirator.
- Follow the manufacturer's instructions for operating the Portacount and proceed with the test.
- The test subject shall be instructed to perform the exercises in Test Exercises section of this procedure.
- After the test exercises, the test subject shall be questioned by the test conductor regarding the comfort of the respirator upon completion of the protocol. If it has become unacceptable, another model of respirator shall be tried.



Portacount Test Instrument

The Portacount will automatically stop and calculate the overall fit factor for the entire set of exercises. The overall fit factor is what counts. The Pass or Fail message will indicate whether or not the test was successful. If the test was a Pass, the fit test is over. Since the pass or fail criterion of the Portacount is user programmable, the test operator shall ensure that the pass or fail criterion meet the requirements for minimum respirator performance.

A record of the test needs to be sent to the Safety Manager and kept on file, assuming the fit test was successful. The record must contain the test subject's name; overall fit factor; make, model, style, and size of respirator used; and date tested.

Use, Maintenance and Care of Respirators

This section requires VORTEX Companies to provide for the use, cleaning and disinfecting, storage, inspection, and repair of respirators used by employees. Appendix B - Respirator Cleaning Procedures (Mandatory) shall be followed.

Use

- Items that can affect the face to mask seal are prohibited. This includes facial hair, glasses, clothing, etc.
- Each time a respirator is put on a positive and negative pressure check shall be performed.

Cleaning and Disinfecting Requirements

VORTEX Companies shall provide each respirator user with a respirator that is clean, sanitary, and in good working order. VORTEX Companies shall ensure that respirators are cleaned \ and disinfected using the procedures in this Respiratory Protection Program, or procedures recommended by the respirator manufacturer, provided that such procedures are of equivalent effectiveness. The respirators shall be cleaned and disinfected at the following intervals:

- Respirators issued for the exclusive use of an employee shall be cleaned and disinfected by the employee as often as necessary to be maintained in a sanitary condition,
- Respirators used in fit testing and training shall be cleaned and disinfected after each use by the Safety Manager or designated person.
- Each individual who is assigned a cartridge respirator is responsible for seeing that the respirator is cleaned, inspected and properly stored.

Cleaning Procedures

- Remove filters, cartridges, or canisters. Disassemble face pieces by removing speaking diaphragms, demand and pressure-demand valve assemblies, hoses, or any components recommended by the manufacturer. Discard or repair any defective parts.
- Wash components in warm water with a mild detergent or with a cleaner recommended by the manufacturer. A stiff bristle (not wire) brush may be used to facilitate the removal of dirt.
- Rinse components thoroughly in clean, warm, preferably running water. Drain.
- When the cleaner used does not contain a disinfecting agent, respirator components should be immersed for two minutes in commercially available cleansers of equivalent disinfectant quality. Another alternative is to use wipes containing alcohol that are intended for use with respirators.
- Rinse components thoroughly in clean, warm, preferably running water. Drain. The importance of thorough rinsing cannot be overemphasized. Detergents or disinfectants that dry on face pieces may result in dermatitis. In addition, some disinfectants may cause deterioration of rubber or corrosion of metal parts if not completely removed.
- Components should be hand-dried with a clean lint-free cloth or air-dried. Reassemble face piece, replacing filters, cartridges, and canisters where necessary. Test the respirator to ensure that all components work properly.



Storage and Inspection

- Respiratory equipment shall be stored in a manner to protect it from damage, contamination, temperature extreme, etc.
- Respiratory equipment intended for emergency use shall be stored in an area that is readily accessible and be clearly marked.

VORTEX Companies shall ensure that respirators are inspected as follows:

- All respirators used in routine situations shall be inspected by the employee before each use and during cleaning;
- A check by the employee of respirator function, tightness of connections, and the condition of the various parts including, but not limited to, the face piece, head straps, valves, connecting tube, and cartridges, canisters or filters; and
- A check of elastomeric parts for pliability and signs of deterioration.
- Emergency respiratory equipment will be inspected at least monthly, and before and after each use.
- Escape only respiratory equipment will be inspected before being carried into workplace.

Breathing Air Quality and Use

VORTEX Companies shall ensure that compressed air accords with the following specifications:

- Compressed breathing air shall meet at least the requirements for Type 1-Grade D breathing air described in ANSI/Compressed Gas Association Commodity Specification for Air, G-7.1-1989, to include:
 - Oxygen content (v/v) of 19.5-23.5%;
 - Hydrocarbon (condensed) content of 5 milligrams per cubic meter of air or less;
 - Carbon monoxide (CO) content of 10 ppm or less;
 - Carbon dioxide content of 1,000 ppm or less; and
 - Lack of noticeable odor.
- VORTEX Companies shall ensure that oxygen is not used in compressed air units.
- VORTEX Companies shall ensure that oxygen concentrations greater than 23.5% are used only in equipment designed for oxygen service or distribution.
- VORTEX Companies shall ensure that cylinders used to supply breathing air to respirators meet DOT requirements and that:
 - Cylinders are tested and maintained as prescribed in the Shipping Container Specification Regulations of the Department of Transportation (49 CFR part 173 and part 178);
 - Cylinders of purchased breathing air have a certificate of analysis from the supplier that the breathing air meets the requirements for Type 1 - Grade D breathing air; and
 - The moisture content in the cylinder does not exceed a dew point of -50 deg. F (-45.6 deg. C) at 1 atmosphere pressure.
- VORTEX Companies shall ensure that compressors used to supply breathing air to respirators are constructed and situated so as to:
 - Prevent entry of contaminated air into the air-supply system;
 - Minimize moisture content so that the dew point at 1 atmosphere pressure is 10 degrees F (5.56 deg. C) below the ambient temperature;
 - Have suitable in-line air-purifying sorbent beds and filters to further ensure breathing air quality. Sorbent beds and filters shall be maintained and replaced or refurbished periodically following the manufacturer's instructions.
- Have a tag containing the most recent change date and the signature of the person authorized by.
- VORTEX Companies to perform the change. The tag shall be maintained at the compressor.
- For compressors that are not oil- lubricated, VORTEX Companies shall ensure that carbon monoxide levels in the breathing air do not exceed 10 ppm.



- Prevent entry of contaminated air into the air-supply system;
- Minimize moisture content so that the dew point at 1 atmosphere pressure is 10 degrees F (5.56 deg. C) below the ambient temperature;
- Have suitable in-line air-purifying sorbent beds and filters to further ensure breathing air quality. Sorbent beds and filters shall be maintained and replaced or refurbished periodically following the manufacturer's instructions.
- For oil-lubricated compressors, VORTEX Companies shall use a high-temperature or carbon monoxide alarm, or both, to monitor carbon monoxide levels. If only high-temperature alarms are used, the air supply shall be monitored at intervals sufficient to prevent carbon monoxide in the breathing air from exceeding 10 ppm.
- VORTEX Companies shall ensure that breathing air couplings are incompatible with outlets for non-respirable worksite air or other gas systems. No asphyxiating substance shall be introduced into breathing air lines.

Repairs

VORTEX Companies shall ensure that respirators that fail an inspection or are otherwise found to be defective are immediately removed from service, and are discarded or repaired or adjusted in accordance with the following procedures:

- Repairs or adjustments to respirators are to be made only by persons appropriately trained to perform such operations and shall use only the respirator manufacturer's NIOSH-approved parts designed for the respirator;
- Repairs shall be made according to the manufacturer's recommendations and specifications for the type and extent of repairs to be performed; and

Voluntary Use

If an employee chooses to voluntarily wear a respirator when not required by this Program (contaminants do not meet protection standards, odors, etc.) they will be advised of the following in their training:

Respirators are an effective method of protection against designated hazards when properly selected and worn. Respirator use is encouraged, even when exposures are below the exposure limit, to provide an additional level of comfort and protection for employees.

However, if a respirator is used improperly or not kept clean, the respirator itself can become a hazard to the employee. Sometimes, employees may wear respirators to avoid exposures to hazards, even if the amount of hazardous substance does not exceed the limits set by OSHA standards. If your employer provides respirators for your voluntary use, or if you provide your own respirator, you need to take certain precautions to be sure that the respirator itself does not present a hazard.

You should do the following:

- Read and heed all instructions provided by the manufacturer on use, maintenance, cleaning and care, and warnings regarding the respirators limitations.
- Choose respirators certified for use to protect against the contaminant of concern. NIOSH, the National Institute for Occupational Safety and Health of the U.S. Department of Health and Human Services, certifies respirators. A label or statement of certification should appear on the respirator or respirator packaging. It will tell you what the respirator is designed for and how much it will protect you.
- Do not wear your respirator into atmospheres containing contaminants for which your respirator is not designed to protect against. For example, a respirator designed to filter dust particles will not protect you against gases, vapors, or very small solid particles of fumes or smoke.



- Keep track of your respirator so that you do not mistakenly use someone else's respirator.

Workplace Monitoring

A program of monitoring potential employee exposures has been implemented through the corporate health and safety department. Project personnel may also be assigned with the task of conducting air monitoring. Direct-reading instruments will also be used in the characterization of potential exposures. All the data collected is used to determine the appropriateness of the respiratory equipment.

Recordkeeping

VORTEX Companies will establish and retain written information regarding medical evaluations, fit testing and the respirator program. Records of medical evaluations required by this section must be retained and made available in accordance with 29 CFR 1910.1020. VORTEX Companies shall provide the employee with an opportunity to discuss the questionnaire and examination results with the PLHCP.

Records will be treated confidentially and maintained on file in the VORTEX Companies corporate office by the Safety Manager.

Program Evaluation

VORTEX Companies shall conduct evaluations of the workplace as necessary to ensure that the provisions of the current written program are being effectively implemented and that it continues to be effective.

VORTEX Companies shall regularly consult employees required to use respirators to assess the employees' views on this program's effectiveness and to identify any problems. Any problems that are identified during this assessment shall be corrected. Factors to be assessed and verified include, but are not limited to:

- Respirator fit (including the ability to use the respirator without interfering with effective workplace performance);
Appropriate respirator selection for the hazards to which the employee is exposed;
- Proper respirator use under the workplace conditions the employee encounters; and
- Proper respirator maintenance.

Training

All employees will receive respirator training during their initial health and safety training class and on at least an annual basis, if required for their job classification. Training shall address employee knowledge of respirators, fit, use, limitations, emergency situations, wearing, fit checks, maintenance & storage, medical signs and symptoms of effective use and general requirements of the OSHA standard. The training must be provided before requiring the employee to use the respirator.

Retraining

Retraining shall be administered annually, and when the following situations occur:

- Changes in the workplace or the type of respirator render previous training obsolete;
- Inadequacies in the employee's knowledge or use of the respirator indicate that the employee has not retained the requisite understanding or skill; or
- Any other situation arises in which retraining appears necessary to ensure safe respirator use.



RESPIRATOR FIT TEST RECORD

Employee Name: _____ Employee No. _____

Respirator Type: _____ Model: _____ Size: _____

Testing Agent: Sweet Bitter Sensitivity Test Squeezes: _____

Use a particulate filter unless otherwise indicated. Note other cartridge used when necessary.

RESULTS

Exercise	Fit	Taste Detected
Normal Breathing		
Deep Breathing		
Turning Head Side to Side		
Nodding Head Up and Down		
Talking - Rainbow Passage		
Bending Over		
Normal Breathing		

Prior to being fit tested this person was observed clean shaven.

Tested by: _____ Date Tested: _____

I have been instructed in and understand the proper fitting, use and care of the above named respirator. I understand that this equipment is not to be used in oxygen deficient or immediately dangerous to life and health (IDLH) atmospheres and is not to be used for other than the uses specified by the manufacturer. To my knowledge, I have no medical problems to prevent me from using this equipment.

Employee Signature: _____ Date: _____

NOTES: _____



CIVIL INFRASTRUCTURE SOLUTIONS

RIGGING MATERIAL HANDLING



Vortex Companies

Procedure Name	Environmental, Health & Safety Manual – Rigging & Material Handling
Applicability	VORTEX Companies – Employees & Subcontractors
Policy Revised	08.11.16

Purpose

The purpose of this training program is to ensure a safe and incident free lifting operation in the onshore and offshore environment.

Scope

All VORTEX Companies employees that work onshore or in the Outer Continental Shelf (OCS). When work is performed on a non-owned or operated site, the operator’s program shall take precedence, however, this document covers VORTEX Companies employees and contractors and shall be used on owned premises, or when an operator’s program doesn’t exist or is less stringent.

Key Responsibilities

Management shall determine if this program is required for regulatory compliance within his/her region. If this program is deemed necessary, then management shall determine which employees within his/her region is required to receive this training. Management shall select a training facility or use an in-house qualified trainer to supply the training.

Supervisors shall assist the managers in the tasks described above. The supervisor shall verify that each of their employees have the proper training before those employees report to duty onshore or on an OCS facility.

Employees shall assist their supervisors in tracking required training and follow safe rigging practices. The employee shall monitor all expiration dates pertaining to his/her required training and notify his/her supervisor in advance of any nearing expiration dates.

Workers must be provided with the personal protective equipment necessary to perform activities of lifting and carrying loads, in order to avoid injuries or musculoskeletal disorders.

Only qualified personnel can attach or detach lifting equipment to loads or offshore cranes.

General

Only “qualified riggers” are allowed to attach any loads to a lifting hook and only “qualified operators” are allowed to operate a crane while engaged in crane lifting operations onshore or on the Outer Continental Shelf.

API RP-2D has established a three-tiered classification. Employees will be certified in the applicable classifications as required before starting job assignments requiring rigging and lift operations offshore:



- Qualified rigger.
- Qualified inspector.
- Qualified operator. (VORTEX Companies personnel DO NOT operate offshore cranes.)

Work areas will be kept free of obstacles and the floors clean. Pallets will not obstruct light and ventilation in areas where they are needed.

The program for monitoring the health of workers should consider at least the following:

- A. The implementation of medical examinations for admission to integrate the work related medical records;
- B. The practice of medical examinations in accordance with the specific activity of workers, subject to annual clinical follow-up or the evidence of signs or symptoms that denote alteration of the health of workers.
- C. The application of preventive and corrective actions for monitoring the health of workers shall be carried out on the basis of the detected risk factors and the results of medical examinations.

Material Handling

- Rigging equipment shall be inspected to ensure it is safe. Rigging equipment for material handling shall be inspected prior to use and on each shift and as necessary during its use to ensure that equipment is safe.
- Defective rigging equipment shall not be used and removed from service.
- Rigging equipment shall not be loaded beyond its recommended safe working load and load identification shall be attached to the rigging.
- Rigging equipment not in use shall be removed from the immediate work area so as not to present a hazard to employees.
- Tag lines shall be used unless their use creates an unsafe condition.
- Hooks on overhaul ball assemblies, lower load blocks, or other attachment assemblies shall be a type that can be closed and locked, eliminating the hook throat opening. Alternatively, an alloy anchor type shackle with a bolt, nut and retaining pin may be used.
- All employees shall be kept clear of loads about to be lifted and of suspended loads. No employee shall be allowed under a suspended load.
- The proper methods of securing the load, attaching the load to the hook, lifting the load, handling of the load during the movement of the load, and lowering and placement of load.
- The proper storage of the rigging equipment.



CIVIL INFRASTRUCTURE SOLUTIONS

Safety Inspections



Vortex Companies

Procedure Name	Environmental, Health & Safety Manual – Safety Inspections
Applicability	VORTEX Companies – Employees & Subcontractors
Policy Revised	05.014.18

Purpose

This procedure outlines the requirements for the conduct of regular worksite inspections in Vortex workplaces. Regular workplace inspections are performed to ensure a safe working environment is maintained. These inspections aim to identify hazards in the workplace and to minimise risks to health, safety or environmental harm.

Scope

This procedure applies to all worksites owned or operated by Vortex Companies.

Definitions

Hazard is a situation that has the potential to harm a person, the environment or damage property.

Worksite inspection is a regularly scheduled inspection of worksites using a checklist to assist with the monitoring and identification of hazards.

Roles & Responsibilities

Managers/Supervisors are responsible for:

- preparing a schedule of regular worksite inspections as per the suggested frequency
- the conduct of worksite inspections
- the implementation of appropriate risk control measures identified during worksite inspections
- consulting with employees in relation to outcomes of worksite inspections and the rectification of issues

Workers are responsible for:

- participating in worksite inspections
- using control measures as required and any other action taken, which is designed to protect health and safety and the environment.

Procedure

Function of Inspections

- Identify hazards in the work environment
- Monitoring expected organizational standards



- Improve health and safety practices and procedures;
- Measure WHS legislative compliance; Maintain worker involvement and participation in Health and Safety activities.

Frequency

Worksite inspections should be carried out as determined by the level of risk to the area and work practices. This can be identified by the JHA completed during projected planning and the assigned risk to the projected in accordance with the RAC Chart included below. The following offers a guide to the frequency; however an assessment of each individual area needs to occur to determine the frequency.

Extremely High-risk - Weekly

High-risk areas - Bi-Weekly

Medium risk areas - Monthly

Low Risk areas - 3 months

RAC Chart
E = Extremely High Risk
H = High Risk
M = Moderate Risk
L = Low Risk

Participation in Workplace Inspections

For best results a manager and at least one other worker should be involved in the worksite inspections.

1. Review the inspection format/checklist to be used
2. Conduct an inspection by walking around the work environment
3. Identify any physical hazards and areas of non compliance against the checklist
4. Record all findings, providing specific comments, ensuring form is signed and dated and includes personnel conducting the inspections
5. Ensure responsibilities, priorities and time frames are listed when determining corrective action.
6. Notification of proper personnel as to the findings of the inspection.

Particular note should be taken of the following;

- Confined spaces
- Trenches and excavations
- Environmental hazards
- Vehicular Traffic
- Slip & trip hazards
- Relevance and adequacy of signs with a health and safety focus



- Condition of safety signage
- General housekeeping
- Damaged equipment
- Trapping/crushing/entanglement/severing hazards
- Lighting and noise
- Emergency equipment, inspection of testing & tagging of
- Storage practices
- Labelling and use of hazardous substances
- Access and Egress

Corrective Action

If a hazard or a non conformance is identified corrective action must be identified. All corrective action must have a person or persons allocated responsibility with time frames and priority. Priority should be determined by the level of risk posed by the hazard. The following gives an indication of time frames required for each priority:

Priority	Time Frame	Responsibility
High	Immediate action required	Manager/CEO should be aware
Medium	Needs to be actioned within 2 months	Supervisor/Manager
Low	Needs to be monitored, action can be planned	Supervisor/Manager

Review

The information obtained from regular inspections shall be reviewed and monitored by Manager in an attempt to identify the following

- trends;
- the need for training
- reoccurring issues;
- establishment of priorities for corrective action;
- assist in establishing or improving safe work practices
- need for further risk assessment



SAFETY INSPECTION REPORT

Example ONLY - Please Contact Regional HSE Manager for Correct Report Form.

Inspected By: _____ **Job Name:** _____ **Date:** _____

JOB INFORMATION				
	Y	N	N/A	COMMENT
OSHA 300 forms posted and complete?				
OSHA poster posted?				
Phone no. for the nearest medical center posted?				
Weekly Safety Meetings up to date?				
Work areas properly signed and barricaded?				
Is each employee instructed in the recognition and avoidance of unsafe conditions?				
Are first aid supplies readily accessible?				
Is facility for the treatment of injured employees located within 15 minutes of the jobsite, if not, is there an employee trained in first aid at the site?				
Are telephone numbers, physicians, hospitals and ambulances conspicuously posted?				
Are potable drinking water and toilet facilities available at the site?				
Is there protection for bloodborne pathogens?				
HOUSEKEEPING				
	Y	N	N/A	COMMENT
General neatness of work area?				
Projecting nails removed or bent over?				
Waste containers provided and used?				
Passageways and walkways clear?				
FIRE PREVENTION				
	Y	N	N/A	COMMENT
Adequate fire extinguishers, checked and accessible?				
Phone no. of fire department posted?				
"No Smoking" posted and enforced near flammables?				
ELECTRICAL				
	Y	N	N/A	COMMENT
Extension cords or attachments cords with bare wires or missing ground prongs or damaged taken out of service?				
Ground fault circuit interrupters being used?				
Terminal boxes equipped with required covers?				
Are flexible cords and cables protected from damage?				
Are unused openings in cabinet boxes and fittings closed?				
Are all cabinets, panels and switches located in wet locations enclosed in weather proof enclosures?				
HAND, POWER & POWDER ACTUATED TOOLS				
	Y	N	N/A	COMMENT
Hand tools inspected regularly? Broken handles and mushroom heads?				
Guards in place on machines, such as saws?				
Right tool being used for job at hand?				
Operators of powder actuated tools are licensed?				



FALL PROTECTION				
	Y	N	N/A	COMMENT
Safety rails and cables are secured properly?				
Employees exposed to fall hazards are tied off?				
Employees below protected from falling objects?				
Employees using body belts for positioning devices only?				
Are employees working more than 6' above a lower level protected by guardrails, safety nets, personal fall arrest system?				
LADDERS				
	Y	N	N/A	COMMENT
Ladders extend at least 36" above the landing?				
Ladders are secured to prevent slipping, sliding, or falling?				
Ladders with split or missing rungs taken out of service?				
Stepladders used in fully open position?				
No step at top two rungs of stepladder?				
SCAFFOLDING				
	Y	N	N/A	COMMENT
All scaffolding inspected daily?				
Erected on sound rigid footing?				
Tied to structure as required?				
Guardrails, intermediate rails, toeboards and screens in place?				
Planking is sound and sturdy?				
Proper access provided?				
Employees below protected from falling objects?				
FLOOR & WALL OPENINGS				
	Y	N	N/A	COMMENT
All floor or deck openings are planked over or barricaded?				
Perimeter protection is in place?				
Deck planks are secured?				
Materials are stored away from edge?				
TRENCHES, EXCAVATION & SHORING				
	Y	N	N/A	COMMENT
Competent person on hand inspecting daily?				
Excavations over 5' in depth are shored or sloped back?				
Materials are stored at least two feet from trench?				
Equipment is a safe distance from edge of trench or excavation?				
Ladders provided every 25' in trench more than 4' deep?				
Have underground utility installations been located?				
Are employees exposed to vehicular traffic wearing warning vests of reflectorized or highly visibility material?				



MATERIAL HANDLING				
	Y	N	N/A	COMMENT
Materials are properly stored or stacked?				
Employees are using proper lifting methods?				
Tag lines are used to guide loads?				
Proper number of workers for each operation?				
WELDING & BURNING				
	Y	N	N/A	COMMENT
Gas cylinders stored upright and secured?				
Proper separating distance between fuels and oxygen? (min 20')				
Burning/welding goggles or shields are used?				
Fire extinguishers are nearby?				
Hoses and regulators are in good condition?				
CRANES				
	Y	N	N/A	COMMENT
Outriggers are extended and swing radius barricade in place?				
Operator is familiar with load carts?				
Crane operators logs are up-to-date?				
Employees kept from under suspended loads?				
Chains and sling inspected and tagged as required?				
Hand signal charts are on crane?				
CONCRETE CONSTRUCTION				
	Y	N	N/A	COMMENT
Employees are protected from cement dust?				
Exposed skin covered?				
Runways are adequate?				
Walls over 8' are supported?				
Are all protruding reinforcing rods covered?				
Is lockout/tagout procedure in use on any machinery where inadvertent operation could cause injury?				
PERSONAL PROTECTIVE EQUIPMENT				
	Y	N	N/A	COMMENT
Hard hats are being worn?				
Safety glasses are being worn?				
Respirators are used when required?				
Hearing protection being worn when required?				
Traffic vests being worn?				



VEHICLES				
	Y	N	N/A	COMMENT
Do vehicles, earth moving or compacting equipment with an obstructed view to the rear have a backup alarm or used with an observer?				
Do vehicles and earth moving equipment have seat belts and are they used?				
Are flagmen wearing reflectorized garments and using flags, sign paddles or lights?				
CONFINED SPACE				
	Y	N	N/A	COMMENT
Is the Confined Space Entry Program being properly followed?				
MISCELLANEOUS				
	Y	N	N/A	COMMENT
Is a written Hazard Communication Program on site including SDS, materials list, container labeling, employee training?				
Is exposure to lead or lead based paint, such as paint removal controlled?				
Is exposure to silica, such as sandblasting, using sand or cutting brick or cinderblock controlled?				
Is exposure to asbestos controlled?				
MISCELLANEOUS				

Unsafe Acts or Practices Observed (List): _____

Signature: _____ **Date:** _____



CIVIL INFRASTRUCTURE SOLUTIONS

SCAFFOLDS



Vortex Companies

Procedure Name	Environmental, Health & Safety Manual – Scaffolds
Applicability	VORTEX Companies – Employees & Subcontractors
Policy Revised	07.16.15

Purpose

The purpose of this program is to prevent injuries do to falls from elevated work areas and ensure employees and contractors are able to inspect scaffolding materials and erected scaffolds.

Scope

This program is applicable at every work area where scaffolding is erected. When work is performed on a non-owned or operated site, the operator’s program shall take precedence, however, this document covers VORTEX Companies employees and contractors and shall be used on owned premises, or when an operator’s program doesn’t exist or is less stringent.

Definitions

Bearer - A horizontal member of a scaffold upon which the platform rests and which may be supported by ledgers.

Brace - A tie that holds one scaffold member in a fixed position with respect to another member.

Coupler - A tie that holds one scaffold member in a fixed position with respect to another member.

Double Pole or Independent Pole Scaffold - A scaffold supported from the base by a double row of uprights, independent of support from the walls and constructed of uprights, ledgers, horizontal platform bearers, and diagonal bracing.

Guardrail - A rail secured to uprights and erected along the exposed sides and ends of platforms.

Heavy Duty Scaffold - A scaffold designed and constructed to carry a working load not to exceed 75 pounds per square foot.

Ledger (Stringer) - A horizontal scaffold member which extends from post to post and which supports the putlogs or bearer forming a tie between the posts.

Light Duty Scaffold - A scaffold designed and constructed to carry a working load not to exceed 25 pounds per square foot.

Manually Propelled Mobile Scaffold - Manually propelled mobile scaffold.

Maximum Intended Load - The total of all loads including the working load, the weight of the scaffold, and such other loads as may be reasonably anticipated.



Medium Duty Scaffold - A scaffold designed and constructed to carry a working load not to exceed 50 pounds per square foot.

Mid-Rail - A rail approximately midway between the guardrail and platform, used when required, and secured to the uprights erected along the exposed sides and ends of platforms.

Putlog - A scaffold member upon which the platform rests.

Runner - The lengthwise horizontal bracing or bearing members or both.

Scaffold - Any temporary elevated platform and its supporting structure used for supporting workmen or materials or both.

Toe Board - A barrier secured along the sides and ends of a platform, to guard against the falling of material.

Tube and Coupler Scaffold - An assembly consisting of tubing, which serves as posts, bearers, braces, ties, and runners, a base supporting the posts, and special couplers which serve to connect the uprights and to join the various members.

Tubular Welded Frame Scaffold - A sectional, panel, or frame metal scaffold substantially built up of prefabricated welded sections that consist of posts and horizontal bearer with intermediate members. Panels or frames shall be braced with diagonal or cross braces.

Working Load - Load imposed by men, materials, and equipment.

Key Responsibilities

Managers and Supervisors

- Responsible for ensuring that scaffolds are erected by a qualified person, that set up inspections are performed, and all daily inspections are performed before work starts for the day.
- Responsible for ensuring that all employees, and/or contractors have been trained in the use and inspection methods for scaffolds.
- Responsible for ensuring that all employees and contractors are aware that if an inspection discovers a defect, the scaffold cannot be used until repairs are made.

Employees

- Responsible for following this program by inspecting the scaffolds daily and report any damages or repairs that may be needed to their supervisor.

Procedure

General Requirements

Scaffolds shall be furnished and erected in accordance with applicable standards for persons engaged in work that cannot be done safely from the ground or from solid construction. Except that ladders used for such work shall conform to ladder safety standards.



Scaffolds shall only be erected by a qualified third party, who is competent to certify the scaffolding safe to use.

The footing or anchorage for scaffolds shall be sound, rigid, and capable of carrying the maximum intended load without settling or displacement. Unstable objects such as barrels, boxes, loose boards shall not be used to support scaffolds or planks.

Scaffolds and their components shall be capable of supporting without failure at least four times the maximum intended loads. Scaffold components must meet OSHA requirements 29 CFR 1910.28 and 29 CFR 1926.451.

Wood scaffold planks must be cross-supported every 8 feet. Scaffold deck boards shall be cleated, wired or nailed into place.

All working levels of scaffolds will be floored completely except where internal ladders require space for ladder openings.

Scaffolds and other devices mentioned or described in this program shall be maintained in safe condition.

Scaffolds shall not be altered or moved horizontally while they are occupied.

Any scaffold damaged or weakened from any cause shall be immediately repaired and shall not be used until repairs have been completed.

Scaffolds shall not be loaded in excess of the working loads for which they are intended.

Bolts used in the construction of scaffolds shall be of adequate size and in sufficient numbers at each connection to develop the designed strength of the scaffold.

All platforms shall be overlapped (minimum 12 inches) and secured from any movement.

An access ladder or equivalent safe access shall be provided.

Scaffold planks shall extend over their end supports not less than 6 inches or more than 18 inches.

The poles, legs, or uprights of scaffolds shall be plumb, and securely and rigidly braced to prevent swaying and displacement.

Materials being hoisted onto a scaffold shall have a tag line.

Overhead protection shall be provided for workers on a scaffold exposed to overhead hazards.

Toe boards and guardrails shall be installed if a scaffold or platform is erected to a height of 6 feet or more. Scaffolds shall be provided with a screen between the toe board and the guardrail, extending along the entire opening, consisting of No. 18 gauge wire one-half inch mesh or the equivalent, where workers are required to work or pass under the scaffolds.

Work shall not be performed on a scaffold during storms or high winds.



Work shall not be performed on scaffolds that are covered with snow or ice, unless all snow and ice has been removed and all planking has been sanded to prevent slipping.

Tools, material, and debris shall not be allowed to accumulate in quantities to cause a hazard.

Inspections

Scaffolding shall be inspected, by a qualified person, in conjunction with the manufacturer's required recommendations. The Competent Person must insure scaffolds are safe prior to and during scaffold use.

- At a minimum, the following shall be inspected after erection, before the start of the day or beginning of a shift change:
 - Ground or surface footing shall be inspected to ensure that there is no settling.
 - All main supports and cross braces shall be inspected for any signs of damage, missing pins, bolts and any locks and/or safety keepers.
 - All walking surfaces and/or planks shall be inspected for damage and proper placements and any possible movement.
 - All walkways and planks must be secure to prevent any movement.
- Inspection shall be made to ensure that the scaffold is stable and any movement is prevented.
- If during the inspection, a defect or damage to the scaffold is discovered, the scaffold shall be tagged out and use prohibited until needed repairs are made.

Mandatory Signs and Tags

Signs and tags shall be visible at all times when work is being performed, and shall be removed or covered promptly when the hazards no longer exist.

Defective or unsafe equipment or conditions shall be tagged out by the competent person using a weather resistant tag secured to the scaffolding structure on all four sides and must be complied with.

Danger signs shall be used only where an immediate hazard exists. Danger signs must be posted around the immediate area of the scaffold, to alert other workers of possible danger from falling objects from the scaffold.

Caution Signs and/or barricade tape shall be used to mark off a larger area around scaffolding warning other workers to use caution.

Modifications

Modification and repairs shall be performed by a qualified person, who is competent to certify the scaffolding safe to use.

Employees shall not perform any modifications or repairs, unless they have been trained and certified, failure to comply may result in disciplinary action and or termination.

Training Requirements

The supervisor shall have each employee who performs work while on a scaffold trained by a person qualified in the subject matter to recognize the hazards associated with the type of scaffold being used and to understand the procedures to control or minimize those hazards. The training shall occur before use and include the following areas, as applicable:

- Basic safety information.
- The nature of any electrical hazards, fall hazards and falling object hazards in the work area.



- The proper use of the scaffold, and the proper handling of materials on the scaffold.
- The correct procedures for dealing with electrical hazards and for erecting, maintaining, and disassembling the fall protection systems and falling object protection systems being used.
- The maximum intended load and the load-carrying capacities of the scaffolds used.

The supervisor shall have each employee who is involved in erecting, disassembling, moving, operating, repairing, maintaining, or inspecting a scaffold trained by a competent person to recognize any hazards associated with the work in question.

- The training shall include the following topics, as applicable:
 - The nature of scaffold hazards.
 - The correct procedures for erecting, disassembling, moving, operating, repairing, inspecting, and maintaining the type of scaffold in use.
 - The design criteria, maximum intended load-carrying capacity and intended use of the scaffold.

When the employer has reason to believe that an employee lacks the skill or understanding needed for safe work involving the erection, use or dismantling of scaffolds, the employer shall retrain each employee so that the requisite proficiency is regained. Retraining is required in at least the following situations:

- Where changes in scaffolding at the worksite present a hazard about which an employee has not been previously trained.
- Where changes in the types of scaffolds, fall protection, falling object protection, or other equipment present a hazard about which an employee has not been previously trained.
- Where inadequacies in an affected employee's work involving scaffolds indicate that the employee has not retained the requisite proficiency.



CIVIL INFRASTRUCTURE SOLUTIONS

SHORT SERVICE WORKER (SSE)



Vortex Companies

Procedure Name	Environmental, Health & Safety Manual – Short Service Worker (SSE)
Applicability	VORTEX Companies – All Owned Companies and Employees
Policy Revised	02.03.20

Purpose

To ensure that short service employees are identified, appropriately supervised, trained, mentored, and managed to prevent accidents such as personal injury, injury to others, and environmental or property damage.

Scope

- This procedure applies to all company facilities and worksites. It is important to ensure that newly placed employees work under the direction of experienced personnel (mentor(s)).
- Short Service Employees should make up no more than 50% of a single crew at one time. Further, a crew of 5 employees or less should include no more than one Short Service Employee at a time.
- A Short Service Employee MAY NOT work alone.
- Subcontractors are included in this program.
- A Short Service Employee (SSE) should be under this program until the SSE demonstrates the knowledge and skills necessary to perform their tasks safely.
- Adherence to this policy is required.

Definitions

Mentoring - A process of transferring skills and knowledge from one person to another in a work environment.

Supervisor - The individual responsible for the direct supervision and oversight of an employee.

Short Service Employee (SSE) - A newly placed full-time or temporary employee or subcontractor with less than six months' experience in assigned job.

Short Service Employee Mentor - Person with at least 6 months' employment with the company who has demonstrated safe and efficient work habits.

Responsibilities

Management

- The responsibilities of company leadership and management are to set expectations, evaluate effectiveness and:
- Make and demonstrate a personal commitment to a strong and functional Health Safety and Environmental work culture,
- Establish a written, signed and dated HSE policy that sets compliance expectations for management and employees,
- Provide employees access to company policies, standards and procedures,
- Establish written HSE Orientation and Short Service Employee Programs for all employees newly assigned to any job or task,



- Ensure that all employees new to a job assignment are identified to the responsible supervisor(s) and placed into the HSE Orientation and Short Service Employee Programs, and
- Audit, review performance and take timely corrective actions to continually improve the effectiveness of the orientation and Short Service Employee Programs.

Supervisor

- Know which jobs and crews are using Short Service Employees,
- Ensure Short Service Employees are appropriately identified per this plan,
- Develop and communicate Job Safety Analyses (JSA's, JHA's, STA's, etc.) to affected personnel upon initial assignment and when the operation changes,
- Ensure Short Service Employee Mentor possesses proper knowledge and skills in the job task assigned,
- Ensure Short Service Employee Mentor is adequately training SSE,
- Ensure Short Service Employee is gaining the necessary knowledge and skills in the job tasks, and
- Ensure the host facility is properly notified that a SSE is working on their site,
- Follow all safety rules and company policies.

Mentors

- Be an experienced and responsible person assigned by the supervisor to work with the new employee,
- Be selected based on a history of safe work and policy/procedural knowledge,
- Be able to communicate the expectations and characteristics of work tasks and their associated hazards,
- Have a patient disposition, as well as the desire and willingness to devote the necessary time to succeed as a mentor,
- Possess knowledge and skills in the job tasks assigned to the SSE,
- Be willing and able to effectively listen to the SSE to determine if the SSE is learning and retaining the knowledge being shared,
- Be willing to watch a SSE perform a job without interfering as long as the SSE is not in a position to harm themselves, others, the environment or the equipment,
- Adopt a positive safety attitude, avoid criticism, and strive to build confidence and self-esteem in the SSE,
- Be able to teach the SSE the proper way to create a quality (JSA's, JHA's, STA's, etc.) and to follow it while performing tasks,
- Keep abreast of new equipment in their field of expertise,
- Refrain from taking shortcuts and doing anything else that jeopardizes health or safety,
- Demonstrate a positive work ethic at all times, and
- Introduce the SSE Checklist (Appendix B) to the new employee. The checklist is a tool to train the new employee and monitor progress,
- Review the checklist with the new employee periodically over a six-month period, and forward the information for supervisor and management review, and
- Follow all company policies and procedures.



Short Service Employee

- Be willing to watch and listen to the Mentor,
- Establish a positive safety attitude toward assigned job tasks,
- Learn how to create and follow JSA's, JHA's, STA's, etc.
- Be willing to learn how to do each task in a safe and environmentally sound manner,
- Stop and report unsafe conditions immediately,
- Participate in safety meetings, and
- Follow all safety rules and company policies.

Procedures

The following procedures apply to the Short Service Employee Program.

- I. Notification (Appendix A)
 1. The HR department notifies worksite management/supervision and safety department of all newly hired or reassigned employees. In turn, Management will notify the Safety Coordinator of new employees in their region who require training.
- II. Orientation
 1. Management will provide a company-approved orientation. The orientation will include a Job Orientation Checklist (Appendix C) that the supervisor reviews with each newly hired employee.
 2. Each SSE will be provided orientation specifically based on job position and job-related topics prior to performing job tasks.
 3. Each SSE will be taught how to access company policies, standards and procedures.
 4. Satisfactory completion of the orientation must be signed and dated by the employee and supervisor.
- III. Training
 1. The supervisor will ensure that each SSE is properly trained per federal, state, industry, company and operator requirements before starting work when:
 - a. the employee is hired;
 2. The employee is appointed a new job assignment; and
 3. The employee is exposed to new substances, processes, procedures, equipment, etc that represent a new hazard to the employee.
 4. The supervisor will ensure that each SSE is properly trained in:
 - a. the hazard(s) present in the workplace;
 - b. the policies, procedures, processes and PPE utilized to control these hazards and prevent illnesses, injuries, property damage and/or environmental incidents; and
 - c. the skills necessary to conduct their assigned jobs safely and efficiently while providing quality and economy.

Identification System

- It is important for supervisors, co-workers and project managers to recognize a Short Service Employee; therefore, an identification system is developed for this purpose.
- The identification system is a means of communicating to the workforce that the Short Service Employee is in a transitional period.
- It will not be a designation of in-experience or used to mark an employee as having lower skill sets.



- The SSE will be identified by a vest, colored hardhat, decal or other clothing or PPE that prominently identifies the employee as a SSE employee. For example, if a hardhat decal is used, it should be placed on each side of the hardhat with a label under the decal indicating the date when the employee is no longer considered to be a Short Service Employee.
- The Supervisor and the SSE Mentor will provide supervision and not allow the SSE to perform any task in which they have not been properly trained.
- The Supervisor and the SSE Mentor will ensure that the SSE understands the task to be performed and the associated hazards.
- The Supervisor removes the decals and other identifiers upon expiration of the SSE term, and after verifying that the SSE exhibits a knowledge and skill level to perform the job tasks assigned.

Documentation

- The HR Specialist completes the SSE Notification form for new employees (Appendix A) and forwards to the Supervisor.
- Upon completion of training, supervisor signs off and forwards notification form to HR.
- All records for the SSE Orientation and Training should be maintained at the employee's location by the Supervisor.

SSE Quality Assessment and Control

- Management should review the effectiveness and quality of the Short Service Employee Program at least annually.
- SSE Orientation and Training documentation should be audited for accuracy, timeliness and completeness.
- Onsite inspections will be conducted to ensure that supervisors, mentors and Short Service Employees are adhering to the SSE Program.
- The number of incidents involving new employees should be measured, compared to the general workforce and evaluated for trends or performance variations.
- Management should ensure that all program deficiencies are promptly corrected and documented.



Appendix A
SHORT SERVICE EMPLOYEE NOTIFICATION FORM

Employee Name (Print): _____

Employee Hire Date: _____

Current Job Title: _____

Time in Present Position: _____

Years of Experience: _____

Types of Experience: _____

SSE MENTOR INFORMATION (COMPLETED BY SUPERVISOR)

Employee Name (Print)	
Employee Hire Date	
Current Job Title	
Time in Present Position	
Years of Experience	
Types of Experience	

Supervisor Sign-Off

Print Name: _____ Print Job Title: _____ Signature: _____

SEND TO SAFETY AND HR DIRECTORS AND RETAIN IN EMPLOYEE'S FILES

Employee has received the required Safety Orientation	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Employee has received all required Safety Training*	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Employee has received the required safety training except (Attach list of any exceptions)	<input type="checkbox"/> Yes	<input type="checkbox"/> No

*Safety training shall be determined and conducted by individual company policies and procedures, in compliance with all regulatory requirements.



Appendix B
SHORT SERVICE EMPLOYEE CHECK LIST

Mentor Initial as Completed	Employee Initial as completed	Understands Expectations and Consequences for safe behaviors.
		Does not take unnecessary risks.
		Asks for help when needed
		Does not try to lift or handle too heavy of a load. Gets mechanical help when needed
		Raises awareness of possible hazards.
		Intervenes with unsafe behaviors
		Understands his/her "stop work" authority and responsibility
		Short Service Employee demonstrates ability to do job required:
		Works in a craftsman-like manner
		Has clear understanding of job to be done
		New Employee is able to identify the following at the work site:
		Struck by hazards
		Crushed by hazards
		Burns and scalds
		Sharp objects and precautions
		Trip hazards and precautions
		Electrical hazards and precautions
		Fall hazards and precautions
		Hot and / or cold surfaces, piping and equipment
		Chemical hazards and precautions
		Emergency procedures
		Emergency communications
		Respiratory hazards and precautions
		Toxic substance hazards and precautions
		Any additional hazards specific to the job site
		Short Service Employee exhibits compliance to:
		General safety rules and policies
		Safety rules and policies specific to the job being performed
		Housekeeping policies
		PPE requirements
		Short Service Employee shows competency on following equipment:
		Equipment Name:
		Equipment Name:
		Equipment Name:
		Other:
		Other:

Mentor

New Employee

Today's Date

New Hire Date



Appendix C JOB ORIENTATION GUIDE

Company: _____ Employee: _____

Trainer: _____ Hire Date: _____

Date: _____ Position: _____

This checklist is a guideline for conducting employee safety orientations for employees new to the VORTEX Companies. Once completed and signed by the supervisor and employee, it serves as documentation that orientation has taken place.

	Date	Initials
1. Explain the company safety program, including:		
Orientation	_____	_____
On-the-job training	_____	_____
Safety meetings	_____	_____
Accident investigation	_____	_____
Disciplinary action	_____	_____
2. Use and care of personal protective equipment (e.g. hard hat, fall protection, eye protection, foot protection, etc.)		
3. Line of communication and responsibility for immediately reporting accidents		
A. When to report an injury	_____	_____
B. How to report an injury	_____	_____
C. Who to report an injury to	_____	_____
D. Filling out accident report forms	_____	_____
4. General overview of operation, procedures, methods and hazards as they relate to the specific job		
5. Pertinent safety rules of the company		
6. "Stop Work" authority and responsibility is understood		
7. First aid supplies, equipment and training		
A. Obtaining treatment	_____	_____
B. Location of facilities	_____	_____
C. Location and names of first-aid trained personnel	_____	_____
8. Emergency plan		
A. Exit location and evaluation routes	_____	_____
B. Use of fire fighting equipment (extinguishers, hose)	_____	_____
C. Specific procedures (medical, chemical, etc.)	_____	_____
9. Vehicle safety		
10. Personal work habits		
A. Serious consequences of horseplay	_____	_____
B. Fighting	_____	_____
C. Inattention	_____	_____
D. Smoking policy	_____	_____
E. Good housekeeping practices	_____	_____
F. Proper lifting techniques	_____	_____

The signatures below document that the appropriate elements have been discussed to the satisfaction of both parties, and that the supervisor and the employee responsibility for maintaining a safe and healthful work environment.

Date: _____ Supervisor's Signature: _____

Date: _____ Employee's Signature: _____



CIVIL INFRASTRUCTURE SOLUTIONS

SPILL PREVENTION / RESPONSE



Vortex Companies

Procedure Name	Environmental, Health & Safety Manual – Spill Prevention / Response
Applicability	VORTEX Companies – Employees & Subcontractors
Policy Revised	07.16.15

Policy Statement

VORTEX Companies has adopted this policy to inform employees of the Spill Prevention and Response Policy. This ensures the safety and health of the employees.

The CSO is responsible for ensuring that the following policy is enforced.

It is the policy of VORTEX Companies that all chemical substances must be stored in the proper containers to minimize the potential for a spill. Whenever possible, chemicals will be kept in closed containers and stored so they are not exposed to stormwater.

Substance Identification

It is the determination of VORTEX Companies to ensure that all chemicals used that may be potentially spilled or released are kept on the chemicals with potential spill or release list provided on page 4 of this policy. The chemicals list will consist of both liquid chemicals used at the facilities of VORTEX Companies or brought on to the sites of the owner client.

Spill Kits

It is the policy of VORTEX Companies that spill kits must contain the appropriate supplies for the materials that may be spilled. The supplies will be easily accessible when required and considerations will be made for both the type and quantity of materials.

Spill kits will consist of but not limited to the following:

- 10 white absorbents for oil
- Vermiculite or other absorbent
- 10 gray absorbents for all chemical spills
- Broom and pan
- Plastic bags with waste labels
- Personnel protective equipment (gloves, goggles, dust/mist mask)
- 6 gallon empty recovery drum

It is the determination of VORTEX Companies to ensure the availability of adequate spill response supplies by periodic inspection to assess their availability and adjust inventory as necessary.



Training

It is the policy of VORTEX Companies that all employees will be instructed on the proper response procedures for spilled materials. The following procedures will be carried out in the event of a spill.

Immediately Contact CSO

At all times, there will be one person on call (and available to respond to an emergency, who will be responsible for coordinating all hazardous waste emergency response measures.

This individual will be designated the Emergency Coordinator, and will have the authority to mobilize all resources necessary to carry out procedures outlined in the plan. All hazardous waste generating operations and activities at the location and characteristics of hazardous waste, the location of records, and location of all emergency response and spill cleanup and control equipment.

In the event of a hazardous waste release the Emergency Coordinator, or alternate, must be contacted immediately. A mobile communication system (i.e., telephone, radio, walkie-talkie, or cellular phone) will be available near the storage locations during transfer operations. If fuel delivery trucks are equipped with a communication system, that will be considered adequate means for emergency communication.

Emergency Coordinator Assumes Control

The Emergency Coordinator must be informed of the nature and location of the spill and will direct the resources of manpower and equipment for the spill response action. The emergency coordinator shall remain in control for the duration of the response.

The Need of Outside Support (Larger Spills)

The Emergency Coordinator, or individual directed by the Emergency Coordinator, will make the necessary contact with outside support and regulatory agencies. Larger Spills Contractor.

Spill Events

In the event of an incident involving a large spill (greater than 1 gallon of hazardous material or 1 pint of acutely hazardous).

Alert the Emergency Coordinator

The Emergency Coordinator will immediately notify the Environmental Health and Safety Department. The Emergency Coordinator will summon additional assistance, if necessary (local or state emergency response teams, Fire Depts. etc.).

Appropriate PPE

Determine exact source of leak or spill, amount, and area affected by the release. After putting on personal protective equipment and after assessing the nature of the hazards and hazardous chemicals, remedy and stop the point source spill, if safe to do so. Stop spill material with standard industrial absorbent. Take the necessary action to keep the spill from spreading. Spread absorbent to surround and absorb the spilled material. Collect contaminated material (absorbent, rags, disposal suits, etc.) into a recovery drum and label for proper disposal.



Disposal of Spill Materials Oil Spill Waste

Oil Spill Waste will be cleaned up using spill absorbent material, and drummed for off-site disposal. Free liquid is pumped into UN approved 30 or 55-gallon drums. The UTPA Environmental Protection Division using approved UT System Vendor disposes of waste generated.

Hazardous Waste Releases

The emergency coordinator must, immediately after an emergency, provide for the treatment, storage, or disposal of recovered waste, contaminated soil or surface water, or any other material that results from a fire, explosion, or other release at the facility.

Housekeeping

It is the policy of VORTEX Companies that areas where chemicals may be used or stored must be maintained using good housekeeping best management practices. This includes, but is not limited to clean and organized storage, labelling, and secondary containment where necessary.

Communication Measures

The following emergency contacts will be summoned by telephone or directly in the event of a spill of any quantity that is either indoors or outdoors.

Emergency Contact Numbers will be posted at telephones located throughout the facility. The following information should be provided when reporting a spill:

1. Identity of the caller
2. Contact phone number
3. Location of spill
4. Type of product spilled
5. Quantity spilled
6. Extent of actual and/or potential water pollution
7. Date and time of spill
8. Cause of spill



CIVIL INFRASTRUCTURE SOLUTIONS

STOP WORK AUTHORITY



Vortex Companies

Procedure Name	Environmental, Health & Safety Manual – Stop Work Authority – Weather Event
Applicability	VORTEX Companies – Employees & Subcontractors
Policy Revised	07.31.17

Purpose

The Stop Work Authority process involves a stop, notify, correct and resume approach for the resolution of a perceived unsafe condition, act, error, omission or lack of understanding that could result in an undesirable event.

All COMPANY employees have the authority to stop work when the control of the HSE risk is not clearly established or understood. All COMPANY employees have the authority and obligation to stop any task or operation where concerns or questions regarding the control of HSE risk exist.

Scope

This program applies to all COMPANY projects and operations during a weather event.

Roles and Responsibilities of Employees and Management

- Employees are responsible to initiate a Stop Work Intervention when warranted and management is responsible to create a culture where SWA is exercised freely.
- Supervisors are responsible to ensure a culture is created where SWA is exercised and honored freely to resolve issues before operations resume and recognize proactive participation.
- Management must establish and support clear expectations to exercise SWA, create a culture where SWA is exercised freely and hold those accountable that chose not to comply with established SWA policies.

Stop Work Authority Steps for Weather Event

- When an unsafe weather event is identified, a Stop Work Intervention will be initiated, coordinated through the supervisor, initiated in a positive manner.
- Notify all affected personnel and supervision of the stop work, take cover in a permanent structure or vehicle if no structure is easily accessible.
- Work is to remain suspended for at least 30 event free minutes after the weather event has passed.
- No work will resume until all potential hazards from the weather event have been eliminated or have substantially subsided.
- Employees will not be reprimanded for issuing a Stop Work Intervention. Any form of retribution or intimidation directed at any individual or company for exercising their right to issue a stop work authority will not be tolerated.



HEALTH, SAFETY AND ENVIRONMENTAL PERFORMANCE

Health, Safety and Environmental Performance

Provide the following data for your firm using your record keeping forms from the past three (3) years.

If the data is not available, please reply with Not Available - N/A.

Safety Performance Definitions and Guidance

- a. **Hours Worked** — Employee hours worked last three years. Please report actual scheduled total hours worked and total overtime hours worked. If actual hours worked are not available for certain individual's hours worked may be estimated. A default of 2000 hour per individual per year can be used as an estimate.
- b. **Recordable Incidents** — Recordable cases are those that involve any work-related injury or illness, including death but excluding first-aid injuries.
- c. **Lost Workday Cases** — A Lost Workday Case is a medical case that involves fatalities, days away from work cases or restricted work activity cases.
 - Days Away from Work Case** — Where the employee is away from scheduled work day one day or more after the day of a work-related injury or illness. The day of the incident does not count as lost workday. Stop count when total days away and restricted duty days reach 180 or employee leaves the firm.
 - Restricted Work Activity Case** — Where the employee as result of work-related injury or illness:
 - Assigned to another job on a temporary or permanent basis or
 - Worked at their permanent job but less than a full day
 - Could not perform routine functions associated with their permanent job
 The day of the incident is not counted as a Restricted Duty day. Stop count when total days away or restricted duty days reach 180 or if employee leaves the firm.
- d. **Motor Vehicle Incident** — A motor vehicle is any mechanically or electrically powered devices (excluding one moved by human power), upon which or by which any person or property may be transported upon a land roadway.
 - Motor Vehicle Incident** — Includes any event involving a motor vehicle that is owned, leased or rented by the firm that results in death, injury or property damage unless the vehicle is properly parked.

Health and Safety Incidents	2016	2017	2018
a. Total Hours Worked			
b. Total Recordable Incidents = # Fatalities # Medical Aids # Days Away from Work Cases # Restricted Work Activity Cases			
c. Total Recordable Incident Rate (TRIR) = Total # of Recordable Incidents x 200,000 Total # of Hours Worked			
d. Lost Workday Cases (LWC) = # Fatalities # Days Away from Work Case # Restricted Work Activity Case			
e. Lost Workday Incident Rate (LWDR) = Total # of Lost Workday Incidents x 200,000 Total # of Hours Worked			



Unsafe Conditions Warranting Stop Work Authority for a Weather Event

- Visible Lighting
- Audible Thunder
- High Winds
- Heavy Rainfall and Flooding
- Severe Winter Weather
- Hail
- Rapidly Rising Tides
- Rapidly Rising River levels
- Any other weather conditions in which the employees are potentially put in a dangerous position.

Follow-Up

- All Stop Work Interventions shall be documented and filed.
- Stop Work reports shall be reviewed by a supervisor, or manager, in order to measure participation, determine quality of interventions and follow-up, trend common issues, identify opportunities for improvement, and facilitate sharing of learnings.
- COMPANY places a high importance of follow-up after a Stop Work Intervention has been initiated and closed. It is the desired outcome of any Stop Work Intervention that the identified safety concern(s) have been addressed to the satisfaction of all involved persons prior to the resumption of work. Most issues can be adequately resolved in a timely manner at the jobsite, occasionally additional investigation and corrective actions may be required to identify and address root causes.

Training

Employees are provided training on Stop Work Authority. Employees must receive Stop Work Authority training before initial assignment. The training must be documented including the employee name, the dates of training and subject.



STOP WORK INTERVENTION FORM

SECTION 1: STOP WORK ISSUANCE

Location of Operation: _____ Date & Time: _____

Supervisor: _____ Phone: _____

Person initiating stop work: _____

Person performing work: _____

Work operation or condition (include names of individuals performing work): _____

Hazard (as stated by person initiating stop work): _____

SECTION 2: DATE / TIME INFORMED

Supervisor: _____ Safety Manager: _____

Operations: _____ Client Safety (If required): _____

SECTION 3: FOLLOW-UP ACTION (BE SPECIFIC - WHAT BY, WHO BY, WHEN BY TO CORRECT HAZARD)

SECTION 4: RESTART CONCURRENCE

Supervisor: _____ Date: _____

Operations: _____ Date: _____

Safety Manager: _____ Date: _____



Vortex Companies

Procedure Name	Environmental, Health & Safety Manual – Stop Work Authority
Applicability	VORTEX Companies – Employees & Subcontractors
Policy Revised	03.27.14
Procedure Owner	Brad Jones - Competent Safety Officer (CSO)
Procedure Number	Stop Work Authority Rev. A

Purpose

The Stop Work Authority process involves a stop, notify, correct and resume approach for the resolution of a perceived unsafe condition, act, error, omission or lack of understanding that could result in an undesirable event.

All COMPANY employees have the authority to stop work when the control of the HSE risk is not clearly established or understood. All COMPANY employees have the authority and obligation to stop any task or operation where concerns or questions regarding the control of HSE risk exist.

Scope

This program applies to all COMPANY projects and operations.

Roles and Responsibilities of Employees and Management

- Employees are responsible to initiate a Stop Work Intervention when warranted and management is responsible to create a culture where SWA is exercised freely.
- Supervisors are responsible to ensure a culture is created where SWA is exercised and honored freely to resolve issues before operations resume and recognize proactive participation.
- Management must establish and support clear expectations to exercise SWA, create a culture where SWA is exercised freely and hold those accountable that chose not to comply with established SWA policies.

Stop Work Authority Steps

- When an unsafe condition is identified the Stop Work Intervention will be initiated, coordinated through the supervisor, initiated in a positive manner, notify all affected personnel and supervision of the stop work issue, correct the issue and resume work when safe to do so.
- No work will resume until all stop work issues and concerns have been adequately addressed.
- Employees will not be reprimanded for issuing a Stop Work Intervention. Any form of retribution or intimidation directed at any individual or company for exercising their right to issue a stop work authority will not be tolerated.

Follow-Up

- All Stop Work Interventions shall be documented for lessons learned and corrective measures to be put into place.
- Stop Work reports shall be reviewed by a supervisor or manager in order to measure participation, determine quality of interventions and follow-up, trend common issues, identify opportunities for improvement, and facilitate sharing of learnings.



- COMPANY places a high importance of follow-up after a Stop Work Intervention has been initiated and closed. It is the desired outcome of any Stop Work Intervention that the identified safety concern(s) have been addressed to the satisfaction of all involved persons prior to the resumption of work. Most issues can be adequately resolved in a timely manner at the jobsite, occasionally additional investigation and corrective actions may be required to identify and address root causes.

Training

Employees are provided training on Stop Work Authority. Employees must receive Stop Work Authority training before initial assignment. The training must be documented including the employee name, the dates of training and subject.



STOP WORK INTERVENTION FORM

SECTION 1: STOP WORK ISSUANCE

Location of Operation: _____ Date & Time: _____

Supervisor: _____ Phone: _____

Person initiating stop work: _____

Person performing work: _____

Work operation or condition (include names of individuals performing work): _____

Hazard (as stated by person initiating stop work): _____

SECTION 2: DATE / TIME INFORMED

Supervisor: _____ Safety Manager: _____

Operations: _____ Client Safety (If required): _____

SECTION 3: FOLLOW-UP ACTION (BE SPECIFIC - WHAT BY, WHO BY, WHEN BY TO CORRECT HAZARD)

SECTION 4: RESTART CONCURRENCE

Supervisor: _____ Date: _____

Operations: _____ Date: _____

Safety Manager: _____ Date: _____



CIVIL INFRASTRUCTURE SOLUTIONS

SUBCONTRACTOR/TEMP AGENCY MANAGEMENT



Vortex Companies

Procedure Name	Environmental, Health & Safety Manual – Subcontractor Mgmt.
Applicability	VORTEX Companies – Employees & Subcontractors
Policy Revised	09.28.18

Purpose

The purpose of this program is to ensure that VORTEX Companies continues to improve subcontractor/temp agency health, safety and environmental performance and to establish a standard for pre-qualification, evaluation/selection and development of our subcontractors/temp agencies.

Scope

This program applies to all subcontractors/temp agencies and VORTEX Companies locations.

General Requirements

All VORTEX Companies subcontractors/temp agencies are to be managed in accordance with this program.

The use of subcontractors/temp agencies must be pre-approved by VORTEX Companies. Approval requirements include:

- A formal safety review of the subcontractor/temp agency being performed by VORTEX Companies safety department.
- The scope of the review was commensurate with the hazards and risk exposure.
- Subcontractor/Temp Agency has been/will be oriented to the safety policies, expectations and requirements of VORTEX Companies.
- The subcontractor/temp agency agrees to abide by our Drug and Alcohol policy and onsite safety rules throughout the duration of the work.

Any subcontractor/temp agency that has a “Non-Approved” safety status will not be used on any VORTEX Companies project.

Procedure

Pre-Qualification of Subcontractors/Temp Agencies

Pre-Qualification of Subcontractors/Temp Agencies will be pre-qualified by reviewing their safety programs, safety training documents and safety statistics.

Evaluation Safety Metrics

Acceptable safety metrics will be used as criteria for prequalifying and selecting subcontractors/temp agencies. The safety metrics and scoring will consider:

- VORTEX Companies Safety Pre-Qualification Form responses and subcontractor safety program documents review 60% (Rated from 0-60 total points)
- Subcontractor safety training documents review 20% (Rated from 0-20 total points)
- Subcontractor safety statistics review 20% (Rated from 0-20 total points)



Evaluation Rating and Acceptance

The subcontractor rating system will have five designations:

- A) Approved with no restrictions. = Equal to or Greater than 90 points
- B) Approved with the following restrictions = Between 85 and 89 points
 - a. A mitigation plan must be documented and approved by VORTEX Companies Environmental, Health, and Safety.
- C) Approved with the following restrictions = Between 81 and 84 points
 - a. Mitigation plan must be documented and approved by VORTEX Companies EHS.
 - b. Management approval in writing.
- D) Approved with the following restrictions = Between 71 and 80 points
 - a. Mandatory commitment meeting with senior subcontractor management present.
 - b. Mitigation plan documented and approved by VORTEX Companies EHS;
 - c. Management approval in writing;
 - d. Trained subcontractor safety personnel on site during work regardless of number of workers.
- F) Not Approved = Less than 70 points
 - a. Subcontractor is not approved to work on any VORTEX Companies project.

Once each subcontractor has been evaluated and scored, VORTEX Companies safety will provide management the scores/ranking.

VORTEX Companies reserves the right to change a subcontractor's status to "Not Approved" if the subcontractor shows insufficient progress towards accepted mitigation plan or other agreed upon criteria.

Subcontractor Involvement

Contractors are required to follow or implement the work practices and systems described below while performing work at VORTEX Companies worksites:

- Attend a safety orientation, pre-job meeting or kick-off meeting provided by VORTEX Companies prior to any work beginning.
- Monitor employees for substance abuse and report nonconformities to VORTEX Companies.
- Ensure personnel have the required training and competency for their work.
- Participate in VORTEX Companies tailgate safety meetings, job safety analysis or hazard assessments and on the job safety inspections.
- Perform a pre-job safety inspection that includes equipment.
- Participate in the BBS hazard reporting system.
- Report all injuries, spills, property damage incidents and near misses.
- Comply with onsite and Owner Client safety rules.
- Implement VORTEX Companies safety practices and processes as applicable.
- Clean up and restore the worksite after the job is over.
- Ensure compliance with regulations at all times.
- Post job safety performance reviews shall be conducted for subcontractors/temp agencies.
- Safety metrics, such as TRIR, EMR, DART, Fatality Rate will be used as criteria for selecting subcontractors.



SAFETY PRE-QUALIFICATION FORM

GENERAL INFORMATION

Subcontractor/Temp Agency Information

Name: _____ Telephone Number: _____
 Street Address: _____ Fax Number: _____
 City: _____ Website Address: _____
 Province/State: _____ Postal Code/Zip: _____

Officers

President: _____
 Vice President: _____
 Treasurer: _____

How many years has your organization been in business under your present firm's name? _____

Parent Firm Name: _____

City: _____ Province/State: _____ Postal Code/Zip: _____
 Subsidiaries: _____

Under current management since (Date): _____

Contact for Insurance Information: _____

Title: _____ Telephone: _____ Fax: _____ Email: _____

Insurance

Name	Type of Coverage	Telephone
_____	_____	_____
_____	_____	_____

Worker's Compensation Account Status (Please enclose a copy of your workers compensation insurance certificate.)

Account Number: _____ Industry Code: _____

Contact for requesting bids:

Title: _____ Telephone: _____ Fax: _____ Email: _____

Contractor Evaluation form completed by:

Title: _____ Telephone: _____ Fax: _____ Email: _____



HEALTH, SAFETY AND ENVIRONMENTAL PERFORMANCE

Health, Safety and Environmental Performance

Provide the following data for your firm using your record keeping forms from the past three (3) years.

If the data is not available, please reply with Not Available - N/A.

Safety Performance Definitions and Guidance

- a. **Hours Worked** — Employee hours worked last three years. Please report actual scheduled total hours worked and total overtime hours worked. If actual hours worked are not available for certain individual's hours worked may be estimated. A default of 2000 hour per individual per year can be used as an estimate.
- b. **Recordable Incidents** — Recordable cases are those that involve any work-related injury or illness, including death but excluding first-aid injuries.
- c. **Lost Workday Cases** — A Lost Workday Case is a medical case that involves fatalities, days away from work cases or restricted work activity cases.
 - Days Away from Work Case** — Where the employee is away from scheduled work day one day or more after the day of a work-related injury or illness. The day of the incident does not count as lost workday. Stop count when total days away and restricted duty days reach 180 or employee leaves the firm.
 - Restricted Work Activity Case** — Where the employee as result of work-related injury or illness:
 - Assigned to another job on a temporary or permanent basis or
 - Worked at their permanent job but less than a full day
 - Could not perform routine functions associated with their permanent job
 The day of the incident is not counted as a Restricted Duty day. Stop count when total days away or restricted duty days reach 180 or if employee leaves the firm.
- d. **Motor Vehicle Incident** — A motor vehicle is any mechanically or electrically powered devices (excluding one moved by human power), upon which or by which any person or property may be transported upon a land roadway.
 - Motor Vehicle Incident** — Includes any event involving a motor vehicle that is owned, leased or rented by the firm that results in death, injury or property damage unless the vehicle is properly parked.

Health and Safety Incidents	2017	2018	2019
a. Total Hours Worked			
b. Total Recordable Incidents = # Fatalities # Medical Aids # Days Away from Work Cases # Restricted Work Activity Cases			
c. Total Recordable Incident Rate (TRIR) = Total # of Recordable Incidents x 200,000 Total # of Hours Worked			
d. Lost Workday Cases (LWC) = # Fatalities # Days Away from Work Case # Restricted Work Activity Case			
e. Lost Workday Incident Rate (LWDR) = Total # of Lost Workday Incidents x 200,000 Total # of Hours Worked			



Health and Safety Incidents - Continued	2017	2018	2019
f. Motor Vehicle Incidents (MVI) # of Motor Vehicles Incidents •# of Miles Driven			
g. Motor Vehicle Incident Frequency Rate (MVIFR) Total # of Motor Vehicle Incidents x 1,000,000 Total # of Miles driven			
Environmental Incidents	2017	2018	2019
Total # Spills to Water a. Petroleum Spills # of spills Sheen (est. volume as 0.1 bbl. To < 1bbl. # of spills 1 bbl. To < 100 bbls. # of spills 100 bbls. or more b. Chemical Spills # of spills 1 bbl./42 gal. to < 100 bbls. /4,200 gal. # of spills 100 bbls. /4,200 gal. or more			
Total # Spills onto Land a. Petroleum Spills # spills 1 bbl. To < 100 bbls. # spills 100 bbls. or more b. Chemical Spills # spills 1 bbl./42 gal. to < 50 bbls. /2,100 gal. # spills 50 bbls. /2,100 gal. or more			
OSHA Enforcement Actions	2017	2018	2019
Total # of Federal Issued Citations • Health and Safety • Environmental • Please provide details			
Fines • Total # Fines • Total \$\$ Paid • Please provide details			



HEALTH, SAFETY AND ENVIRONMENTAL MANAGEMENT

Highest Ranking HSE Professional in the Firm

Name/Title: _____ Email: _____ Telephone Numbers: _____

Do you have a written Basic Safety / HSE Program?

Yes

No

Does your Basic Safety/HSE Program include the following?

a. HSE Policy statement signed by management

Yes

No

b. Management Involvement and Commitment

Yes

No

c. Hazard Identification and Risk Control

Yes

No

d. Rules and Work Procedures

Yes

No

e. Training

Yes

No

f. Communications

Yes

No

g. Incident and Accident Reporting and Investigation

Yes

No

Does the program include work practices and procedures such as?

a. Permit to Work including Isolation of Energy

Yes

No

b. Confined Space Entry

Yes

No

c. Injury and Illness Recording

Yes

No

d. Fall Protection

Yes

No

e. Personal Protective Equipment

Yes

No

f. Portable Electrical/Power Tools

Yes

No

g. Motor Vehicle/Driving Safety

Yes

No

h. Compressed Gas Cylinders

Yes

No

i. Electrical Equipment Grounding Assurance

Yes

No

j. Powered Industrial Vehicles (Cranes, Forklifts, Etc.)

Yes

No

k. Housekeeping

Yes

No

l. Accident/Incident Reporting and Investigations

Yes

No

m. Unsafe Condition Reporting

Yes

No

n. Emergency Preparedness, Including Evacuation Plan

Yes

No

o. Waste Disposal and Pollution Prevention

Yes

No

p. Regular Workplace Inspection / Audits

Yes

No

Do you have a Drug and Alcohol program?

a. Pre-employment Testing

Yes

No

b. Reasonable Cause Testing

Yes

No

c. Post-rehabilitation/Return to Work Testing

Yes

No

ENVIRONMENTAL, HEALTH, AND SAFETY MANAGEMENT

Do you have a Job Safety Analysis (JSA) process in place?

Yes

No

Is there a Root Cause Analysis process used for investigations, near misses, environmental spills?

Yes

No

Is there a Management of Change (MOC) Process in place?

Yes

No



Equipment and Materials		
a. Do you own or lease Equipment and Materials? If yes, please complete the following questions:	<input type="checkbox"/> Yes	<input type="checkbox"/> No
b. Do you have a system for establishing applicable health, safety, and environmental specifications for acquisition of materials and equipment?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
c. Do you conduct inspections on operating equipment (e.g., cranes, forklifts) in compliance with regulatory requirements?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
d. Do you maintain operating equipment in compliance with regulatory requirements?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
e. Do you maintain the applicable inspection and maintenance certification records for operating equipment?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
f. Do you document corrections or deficiencies from equipment inspections and maintenance?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Subcontractor Management		
a. Do you subcontract any work? If the answer is yes, please completing the following questions	<input type="checkbox"/> Yes	<input type="checkbox"/> No
b. Do you have a written contractor safety management process?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
c. Do you use HSE performance criteria in selection of subcontractors/temp agencies?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
d. Do you evaluate the ability of subcontractors/temp agencies to comply with applicable HSE requirements as part of the selection process?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
e. Do your subcontractors/temp agencies have a written HSE Program?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
f. Do you include your subcontractors/temp agencies in:		
<input type="checkbox"/> HSE Orientation	<input type="checkbox"/> Yes	<input type="checkbox"/> No
<input type="checkbox"/> HSE Meetings	<input type="checkbox"/> Yes	<input type="checkbox"/> No
<input type="checkbox"/> HSE Equipment Inspections	<input type="checkbox"/> Yes	<input type="checkbox"/> No
<input type="checkbox"/> HSE Program Audits	<input type="checkbox"/> Yes	<input type="checkbox"/> No
<input type="checkbox"/> Are corrections or deficiencies documented?	<input type="checkbox"/> Yes	<input type="checkbox"/> No



CIVIL INFRASTRUCTURE SOLUTIONS

TRENCHING / SHORING / EXCAVATIONS



Vortex Companies

Procedure Name	Environmental, Health & Safety Manual – Excavation, Trenching and Shoring Plan
Applicability	VORTEX Companies – Employees & Subcontractors
Policy Revised	05.014.18

Purpose

This Excavation and Trenching Plan (Plan) addresses the requirements and safe practices to ensure the safety of employees and contractors who work in or around trenching and excavation activities. These requirements apply to all work involving excavation, digging, and trenching, grading, or ditching operations.

Policy

Vortex Companies LLC will provide safe work areas for employees, visitors, and others who are or may be exposed to hazards in or around trenches and other excavation areas. All trenching and excavation activities will be evaluated to eliminate or minimize the potential of cave-ins, review environment contamination, and contact with underground utilities or other subsurface impediments. No digging, trenching, or excavation activities will be performed unless the requirements of federal rules for excavations (29 CFR 1926.650 to 1926.652) and employee training (29 CFR 1926.20(b)(1) and 29 CFR 1926.21(b)(1)) and Vortex Companies safety and environmental policies are met.

Plan Review and Update

This Plan will be reviewed annually by the plan administrator or designee(s) to ensure the program's effectiveness and will be updated as determined by the review. This Plan will also be updated whenever:

- New types of protective systems or equipment are introduced to an excavation site.
- Evaluations of workplace hazards, injuries, and near misses demonstrate that the current plan is outdated or not effective.
- When regulatory or national consensus standards adopted as part of the Plan change.

Definitions

Competent Person - Someone who can identify existing and predictable hazards in the surroundings, or working conditions that are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt, corrective measures to eliminate them.

Confined Space - A space that is large enough and so configured that an employee can bodily enter and perform work and has limited or restricted means of entry or exit and is not designed for continuous employee occupancy.

Excavation - Any man-made cut, cavity, trench, or depression in the earth's surface formed by earth removal.

Hazardous Atmosphere - An atmosphere that is explosive, flammable, poisonous, corrosive, oxidizing, irritating, oxygen-deficient, toxic, or otherwise harmful that may cause death, illness, or injury to persons exposed to it.



Protective System - A method of protecting employees from cave-ins, from material that could fall or roll from an excavation face or into an excavation, or from the collapse of adjacent structures. Protective systems include support systems, sloping and benching systems, shield systems, and other systems that provide the necessary protection.

Registered Professional Engineer - A person who is registered as a professional engineer in the state where the work is to be performed. However, a professional engineer who is registered in any state is deemed to be a “registered professional engineer” within the meaning of federal rules when approving designs for “manufactured protective systems” or “tabulated data” to be used in interstate commerce.

Shield (Trench Box) - A structure that can withstand the forces imposed on it by a cave-in and thereby protects employees within the structures. Shields can be permanent structures or can be designed to be portable and moved along as work progresses. Additionally, shields can be either premanufactured or job-built in accordance with the OSHA regulations at 29 CFR 1926.652(c)(3) or 29 CFR 1926.652(c)(4). Shields used in trenches are usually referred to as trench boxes or trench shields. Trench boxes or shields protect employees from cave-ins that might occur by providing sheltered space where employees may work. They are not designed to prevent cave-ins. A typical shield consists of two steel plates separated by structural members to form a box open at the top, bottom, and both ends. The box is lowered into the trench so that the steel plates face the trench’s sidewalls. Employees then climb into the protected area defined by the steel plates. As the work progresses, the box is dragged along the bottom of the trench by a chain or cable suspended from a backhoe above the ground.

Shoring System - A structure such as a metal hydraulic mechanical or timber shoring system that supports the sides of an excavation and is designed to prevent cave-ins.

Sloping - A method of protecting employees from cave-ins by excavating to form sides of an excavation that are inclined away from the excavations to prevent cave-ins. The angle of incline required to prevent a cave-in varies with differences in such factors as the soil type, environment conditions of exposure, and application of exposure and application of surcharge loads.

Support System - Structures such as underpinning, bracing, and shoring that provide support to an adjacent structure or underground installation or to the sides of an excavation or trench.

Surface Encumbrance - Anything that creates a hazardous surcharge load on the sides of a trench or excavation, such as equipment, building materials, vehicles, soil, and sources of vibration, foundations, streams, water tables, or geological anomalies, that could cause it to cave in and injure or kill those inside.

Trench - A narrow underground excavation that is deeper than it is wide, and no wider than 15 feet (ft.) (4.5 meters (m)). In general, the depth is greater than the width, but the width of a trench (measured at the bottom) is not greater than 15 ft. (4.6 m). If forms or other structures are installed or constructed in an excavation to reduce the dimension measured from the forms or structure to the side of the excavation to 15 ft. (4.6 m) or less (measured at the bottom of the excavation), the excavation is also considered to be a trench.



Competent Person

The competent person must be able to demonstrate the training, experience, and knowledge of soil analysis, use of protective systems, and the requirements of this Plan and all relevant local, state, and federal regulatory requirements, including the federal rules for excavations at 29 CFR Part 1926, Subpart P. The competent person will be able to:

- Evaluate soil conditions and select appropriate protective measures.
- Construct protective systems in accordance with the excavation regulatory requirements.
- Preplan, such as contact utilities (gas, electric) to locate underground lines; plan for traffic control, if necessary; and determine proximity to structures that could affect choice of protective systems.
- Test for low oxygen, hazardous fumes, and toxic gasses, especially when gasoline engine-driven equipment is running, or the dirt has been contaminated by leaking lines or storage tanks.
- Ensure adequate ventilation or respiratory equipment, if necessary.
- Provide safe access into and out of the excavation.
- Provide appropriate protection if water accumulation is a problem.
- Inspect the site daily at the start of each shift, following a rainstorm, or after any other hazard-increasing event.
- Keep excavations open the minimum amount of time needed to complete operations.

The competent person must be able to detect:

- Conditions that could result in cave-ins
- Failures in protective systems
- Hazardous atmospheres
- Other hazards, including those associated with confined spaces

The competent person will have the authority to take prompt corrective measures to eliminate existing and predictable hazards and stop work when required.

Supervisor

A supervisor must be classified as a competent person and will oversee each excavation. The supervisor will:

- Successfully complete training for classification as a competent person for trenching operations.
- Implement the Excavation and Trenching Plan for work areas under their control.
- Act as the competent person for excavation sites under his or her control.
- Ensure that the equipment necessary to complete an excavation safely is available and in good condition.
- Conduct soil tests to determine soil type.
- Ensure that all underground utility installations are located and marked before excavation begins.
- Receive written approval from the relevant utilities and landowners for digging, trenching, or excavating operations.
- Ensure that underground installations are protected, supported, or removed while the excavation is open. Notify the appropriate agencies when utility systems are exposed during the excavation process to allow the location and condition of the utility to be evaluated.
- Ensure worker protection and compliance with other applicable safety plans or programs.
- Ensure protection of the public with appropriate barricades.
- Determine what protective systems will be used to prevent cave-ins.
- Conduct daily inspections of excavations, the adjacent areas, and protective systems for evidence of a situation that could result in possible cave-ins, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions.
- Immediately notify [insert name] if a utility system is damaged during the trenching or excavation process.



Employee

Each employee engaged in trenching or other excavation-related activities must:

- Complete training, and request assistance when uncertain about any activity he or she must perform.
- Use appropriate personal protective equipment (PPE).
- Adhere to the requirements of the Plan.
- Report all workplace injuries and unsafe conditions to the supervisor.

Hazard Assessment

Excavation and trenching work presents serious hazards to all workers involved. Cave-ins pose the greatest risk and are much more likely than other excavation-related accidents to result in worker fatalities. Other potential hazards include falls, falling loads, hazardous atmospheres, and incidents involving mobile equipment.

Before work begins on an excavation or trench, the competent person(s) will evaluate the specific hazardous conditions at the worksite through jobsite studies, observations, test borings for soil type or conditions, and consultations with local officials and utility companies. The following factors will be considered to determine the hazards associated with specific site conditions:

- Traffic
- Proximity and physical conditions of nearby structures
- Soil
- Surface water and groundwater
- Location of the water table
- Overhead and underground utilities
- Weather

Soil Classification

Before any work is begun on an excavation or trench, the soil classification will be determined by the competent person and in accordance with the App a Soil Classification guidelines (29 CFR 1926 Subpart P, Appendix A).

The supervisor or other competent person will determine the soil type.

Visual Test

The entire excavation site, including the soil adjacent to the site, will be observed. During the visual test, the designated supervisor will check for crack-line openings along the failure zone that indicate tension cracks and observe the open side of the excavation for indications of layered geologic structuring. Other conditions to look for are signs of bulging, boiling, or sloughing, as well as signs of surface water seeping from the side of the excavation or from the water table.

Manual Test

Thumb penetration test. When the thumb is pressed firmly into the soil and penetrates no further than the length of the nail, it is probably Type B soil. If the thumb penetrates the full length of the thumb, it is Type C. This is the least accurate of the manual test methods.



Dry Strength Test

If a sample of dry soil is crumbled freely or with moderate pressure into individual grains, it is considered granular, or Type C. Dry soil that falls into clumps that subsequently break into smaller clumps is probably clay in combination with gravel, sand, or silt (Type B).

Plasticity or Wet Thread Test

A moist sample of the soil is molded into a ball and then rolled into a thin thread approximately 1/8 inch in diameter by 2 inches in length. If the soil sample does not break when held by one end, it may be considered Type B. If the soil sample does break, it is considered Type C.

Soil Compression Strength Test

A pocket penetrometer, shear vane, or torvane may also be used to determine the unconfined compression strength of soils.

Surface Encumbrances

All surface encumbrances that are located to create a hazard to employees will be removed or supported, as necessary, to safeguard employees.

Underground Installations

The estimated location of utility installations, such as sewer, telephone, fuel, electric, water lines, or any other underground installations that reasonably may be expected to be encountered during excavation work, will be determined before opening an excavation.

Utility companies or owners will be contacted within established or customary local response times, advised of the proposed work, and asked to establish the location of the utility underground installations before the start of actual excavation. When utility companies or owners cannot respond to a request to locate underground utility installations within 24 hours (unless a longer period is required by state or local law) or cannot establish the exact location of these installations, the excavation work may proceed provided that such work is done with caution, and detection equipment or other acceptable means to locate utility installations are used.

When operations approach the location of underground utilities, excavation will progress with caution until the exact location of the utility is determined. While the excavation is open, underground installations will be protected, supported, or removed as necessary to safeguard employees.

Safety Procedures (General Requirements)

General Requirements

If evidence of a situation that could result in possible cave-ins, slides, failure of protective systems, hazardous atmospheres, or other hazardous condition is identified, exposed workers will be removed from the hazard and all work in the excavation or trench stopped until all necessary safety precautions have been implemented.

Competent Person

A competent person will oversee work performed at any excavation to ensure compliance with this Plan.

Worker Training

Employees who work in or around excavations will be provided training according to their work activities.



Protective Systems

The excavation or trench must either be sloped or supported as required to comply with OSHA worker protection requirements.

Personal Protective Equipment (PPE)

Employees must use PPE as required by their job task.

Electrical Installations

Work conducted on or around electrical utilization systems must be performed in accordance with the procedures from the electrical Safety Plan.

Lockout/Tagout

Work that may impact existing utilities that need to be locked and tagged out may be performed by following procedures from the Lockout/Tagout Plan.

Noise Protection

Work performed at noise levels that exceed permissible limits must meet the provisions of the Hearing Conservation Plan.

Safe Access and Exit

Workers will be provided with safe access into and exiting from trenches or excavations that are more than 4 ft. deep.

- Access
 - The means of access and the design specifications for such access will be determined by the competent person and in accordance with the following guidelines:
 - Ladders used as access to a trench or excavation will extend from the bottom of the excavation to not less than 3 ft. (0.9 m) above the surface.
 - Ramps used solely for personnel access will be a minimum width of 4 ft. (1.2 m) and provided with standard guardrails.
 - Ramps used for equipment access will be a minimum width of 12 ft. (3.6 m). Curbs not less than 8-in x 8-in (20.3-cm x 20.3-cm) timbers, or equivalent protection, will be provided. Equipment ramps will be designed and constructed in accordance with accepted engineering practice.
- Exit Route
 - The means of exit and the design specifications for such exit will be determined by the competent person and in accordance with the following guidelines:
 - A stairway, ladder, ramp, personnel hoist, or other safe means of exit will be in trench excavations that are 4 ft. (1.2 m) or more in depth.
 - Exit route(s) will be placed within 25 lateral ft. of workers.
 - When two or more components form a ramp or runway, they must be connected to prevent displacement and be of uniform thickness.
 - Cleats or other means of connecting runway components must be attached in a way that would not cause tripping (e.g., to the bottom of the structure).
 - Structural ramps used in place of steps must have a nonslip surface.
 - Earthen ramps may be used as a means of exit only if a worker can walk them in an upright position and only if they have been evaluated by a competent person.



Perimeter Protection

Protection will be provided to prevent personnel, vehicles, and equipment from falling into excavations.

Fall Protection

All wells, calyx holes, pits, and shafts will be barricaded or covered.

Excavations will be backfilled as soon as possible. Upon completion of exploration and similar operations, test pits, temporary wells, and calyx holes will be backfilled immediately.

Walkways or bridges will be provided with standard guardrails where people or equipment are required or permitted to cross over excavations.

Falling Loads

Workers and other personnel must be prevented from passing or standing underneath loads handled by lifting or digging equipment. They must stand away from any vehicle being loaded or unloaded to avoid being struck by any spillage or falling materials. Operators may remain in the cabs of vehicles being loaded or unloaded when the vehicles are equipped to provide adequate protection for the operator during loading and unloading operations.

Falling Material

Employees will not be permitted to work on the faces of sloped or benched excavations at levels above other employees except when employees at lower levels are adequately protected from the hazard of falling material or equipment.

Employees will be protected by scaling, ice removal, benching, barricading, rock bolting, wire mesh, or other means from loose rock or soil that could create a hazard by falling from the excavation wall. Special attention will be given to slopes that may be adversely affected by weather, moisture content, or vibration.

Placement of Excavated Material

Excavated material will be placed at least 2 ft. (0.6 m) from the edge of an excavation or will be retained by devices that are sufficient to prevent the materials from falling into the excavation. In any case, material will be placed at a distance to prevent excessive loading on the face of the excavation. Materials such as boulders or stumps that may slide or roll into the excavation will be removed or made safe.

Hazardous Atmospheres

Workers will not be permitted to work in or near hazardous atmospheres unless required testing and monitoring, worker precautions, and rescue services are in place. Work conducted in enclosed areas where hazardous atmospheres or gases could accumulate must be done in accordance with the Confined Spaces Plan.

- Types of atmospheres
 - Such atmospheres include those with the following:
 - > Atmospheric oxygen concentration below 19.5 percent or above 23.5 percent
 - > A combustible gas concentration greater than 10 percent of the lower flammable limit
 - > Concentrations of hazardous substances that exceed those specified in the threshold limit values (TLVs) for airborne contaminants established by the American Conference of Governmental Industrial Hygienists (ACGIH)



- Atmospheric Tests
 - Air quality tests will be taken before employees enter excavations more than 4 ft. in deep when a hazardous atmosphere exists or could be expected to exist. If there is any possibility that the trench or excavation could contain a hazardous atmosphere, the supervisor or other competent person will ensure that:
 - > Atmospheric testing is conducted before worker entry and continuously during work.
 - > Where oxygen deficiency (atmospheres containing less than 19.5 percent oxygen) or a hazardous atmosphere exists or could reasonably be expected to exist, the atmospheres in the excavation will be tested before employees enter excavations greater than 4 ft. (1.2 m) deep.
 - > Tests will be conducted as often as necessary to ensure the quality and quantity of the atmosphere, including checks for flammable gases and oxygen deficiency.
 - > A log of all test results will be maintained at the worksite.
- Worker Precautions
 - Suitable precautions will be taken as necessary to protect workers in areas where hazardous atmospheres exist or potentially exist. These precautions will include the following:
 - > Engineering controls such as ventilation
 - > Respiratory protection in accordance with the Respiratory Protection Plan
 - > Full body harnesses and lifelines
- Rescue Equipment
 - Where hazardous atmospheres exist, or may reasonably be expected to exist, non-entry rescue equipment will be on the worksite and readily accessible to personnel.
- Daily Inspections
 - Daily inspections for hazardous atmospheres must be conducted by a competent person.

Walkways and Guardrails Over Excavations

Walkways will be provided where workers or equipment can cross over excavations. Guardrails will be provided on walkways used by the public regardless of the height above the excavation. Guardrails will be provided on walkways used only by on-site personnel if the walkway is 4 ft. or more above lower levels. If workers pass below a walkway, guardrails and toe boards will be provided.

Confined Spaces

Employees entering excavations classified as confined spaces or that otherwise present the potential for emergency rescue, such as bell-bottom pier holes or similar deep and confined footing, will wear rescue equipment and maintain communication with the confined space attendant. See the Confined Space Plan for more information about safety procedures related to confined spaces.

Water Accumulation

- Control Measures
 - Employees will not work in excavations in which there is accumulated water or in which water is accumulating unless the water hazards posed by accumulation is controlled. Freezing, pumping, draining, and similar control measures will be planned and directed by a registered engineer. Consideration will be given to the existing moisture balances in surrounding soils and the effects on foundations and structures if the soil is disturbed.
- Drainage
 - Diversion ditches, dikes, or other means will be used to prevent surface water entering an excavation and to provide good drainage of the area adjacent to the excavation.



- Water Control Equipment
 - When continuous operation of groundwater control equipment is necessary, an emergency power source will be provided. Water control equipment and operations will be monitored by a competent person to ensure proper operation.

Mobile Equipment and Motor Vehicle Traffic Precautions

Traffic around the excavation or trench site must be controlled and barricades, signs, and/or flag persons used as needed to control both vehicular and pedestrian traffic.

- High Visibility PPE
 - Workers exposed to public vehicular traffic will be provided with and will wear warning vests or other suitable garments marked with or made of reflective or high-visibility material.
- Barricades
 - When vehicles or mobile equipment are used or allowed adjacent to an excavation, substantial stop logs or barricades will be installed. The use of a ground guide is recommended.
- Loading/Unloading Vehicles
 - Workers will stand away from vehicles being loaded or unloaded to avoid being struck by spillage or falling materials.
- Hoisting Operations
 - Excavating or hoisting equipment will not be allowed to raise, lower, or swing loads over or adjacent to personnel in the excavation without substantial overhead protection. Personnel will maintain a safe distance from a hoisting operation until the load has been placed.
- Warning System
 - When mobile equipment is operated adjacent to an excavation, or when such equipment is required to approach the edge of an excavation, and the operator does not have a clear and direct view of the edge of the excavation, a warning system will be utilized, such as barricades, hand or mechanical signals, or stop logs. If possible, the grade should be away from the excavation.

Stability of Adjacent Structures

- Protective Systems
 - If the stability of adjoining buildings or walls is endangered by excavations, shoring, bracing, or underpinning will be provided to ensure the stability of the structure and to protect employees.
- Support Systems
 - Sidewalks, pavements, and related structures will not be undermined unless a support system is provided to protect employees and the sidewalk, pavement, or related structure.
- Excavation Below the Level of Adjacent Structures
 - Excavations below the level of the base of footing of any foundation or retaining wall will not be permitted unless:
 - > A support system, such as underpinning, is provided to ensure the stability of the structure and to protect employees involved in the excavation work or in the vicinity thereof; or
 - > The excavation is in stable rock; or
 - > A registered professional engineer has approved the determination that the structure is sufficiently removed from the excavation to be unaffected by the excavation or determines that the excavation will not pose a hazard to employees.



Site Inspections

When personnel will be in or around an excavation, a competent person will inspect the excavation, the adjacent areas, and protective systems daily:

- Before each work shift
- Throughout the work shifts as dictated by the work being done
- After every rainstorm
- After other events that could increase hazards (e.g., snowstorm, windstorm, thaw, earthquake)
- When fissures, tension cracks, sloughing, undercutting, water seepage, bulging at the bottom, or other similar conditions occur
- When there is a change in size, location, or placement of the spoil pile
- Where there is any indication of change in adjacent structures

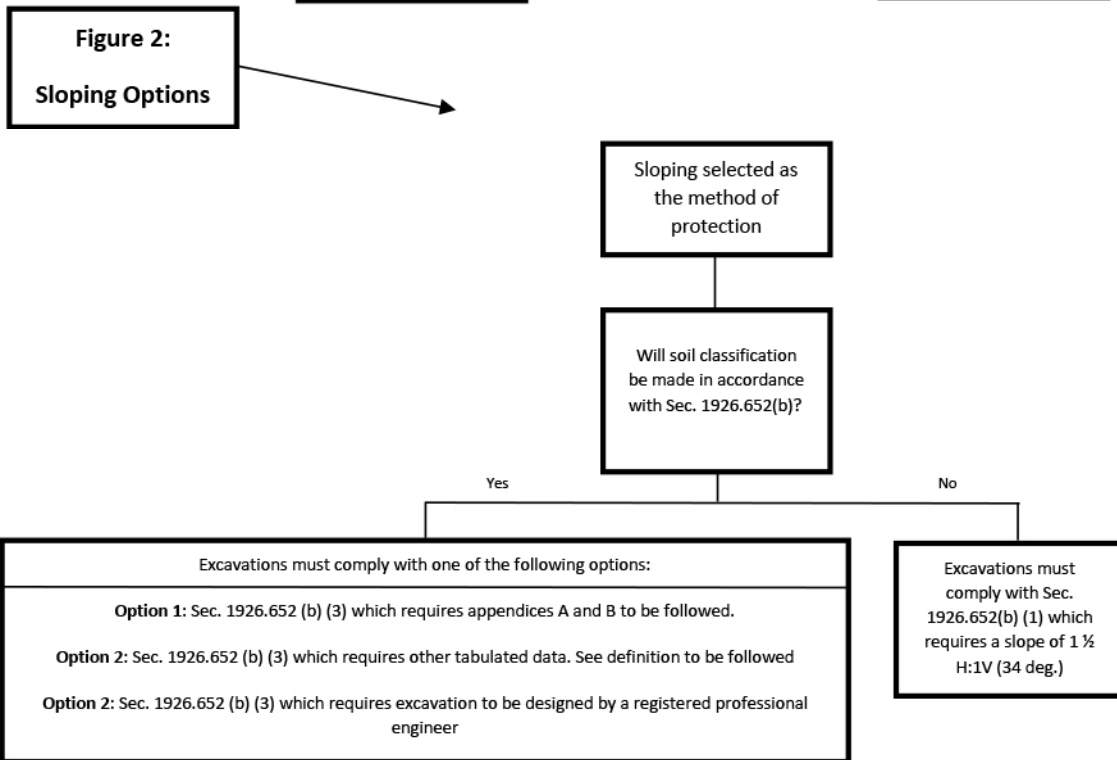
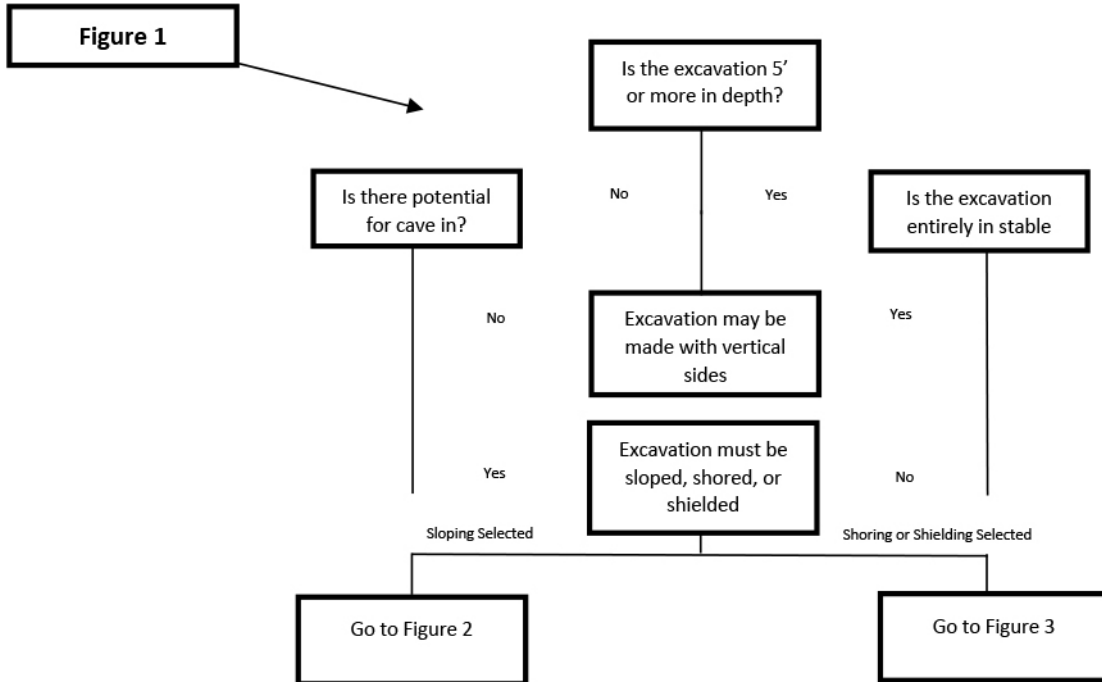
The competent person will use the attached Excavation Site Inspection Checklist or equivalent form when conducting inspections. All completed inspection forms will be maintained at the worksite during construction and stored at [insert location] after excavation work is completed.

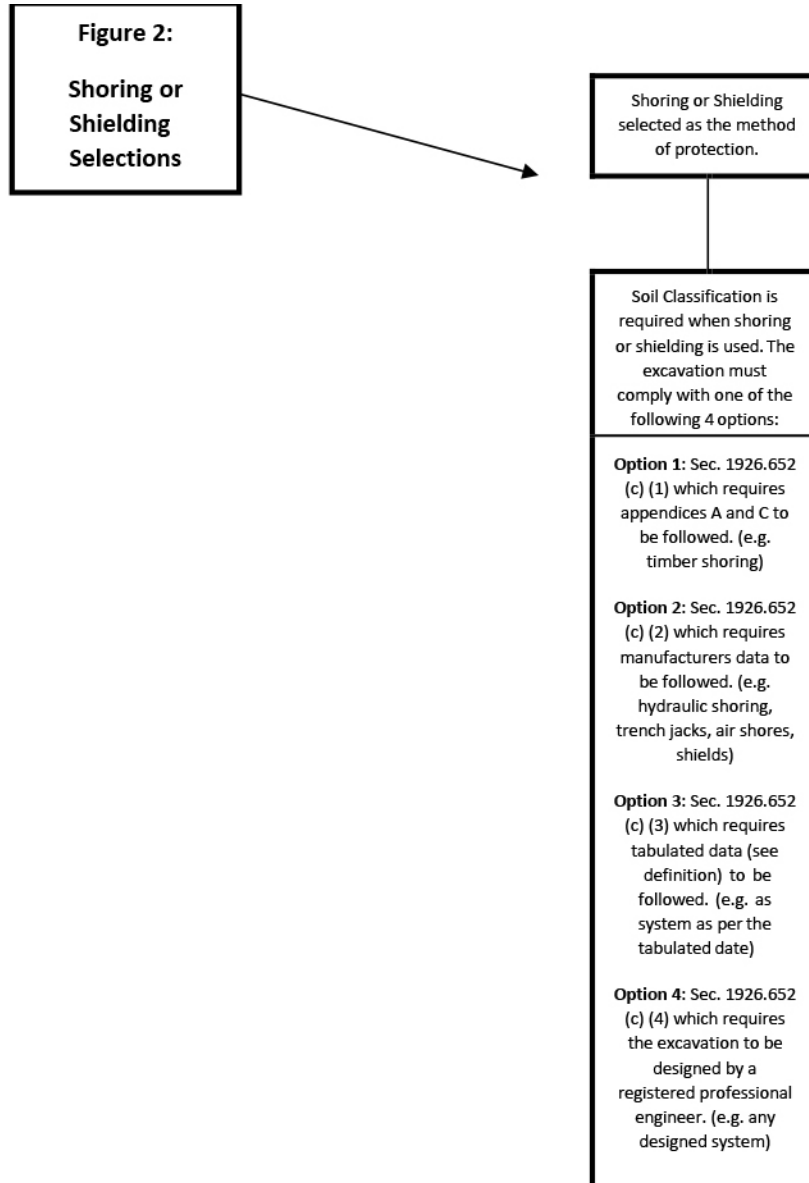
Protective Systems

General Requirements

- Excavations less than 5 ft. deep.
 - For excavations less than 5 ft. (1.5 m) deep, the competent person will examine the excavation for potential cave-in hazards and determine if a protective system is needed.
- Excavations 5 ft. deep or deeper
 - All workers in an excavation or trench 5 ft. deep or deeper will be protected from cave-ins by an adequate protective system. Protective systems will have the capacity to resist without failure all loads that are intended or could reasonably be expected to be applied or transmitted to the system.
- Excavations more than 20 ft. deep
 - Protective systems for all excavations more than 20 ft. (6.0 m) deep will be designed and approved by a registered professional engineer.
- Protective System Selection
 - [See the attached App F Protective System Selection guide for a graphic summary of the process for selecting a protective system for excavations and trenches 20 ft. deep or less. A combination of protective systems may be used for an excavation or trench.]

The competent person will select the method of protection that is most suitable for the excavation site, taking into consideration soil type and surrounding structures. See the Soil Classification subsection of this Plan for more information. Competent person will refer to CFR 1926 Subpart P App F (see on the next page) when selecting protective systems.







Types of Protective Systems

Excavations in which employees could potentially be exposed to cave-ins will be protected by:

1. Sloping or benching the sides of the excavation; or
2. Supporting or shoring the sides of the excavation; or
3. Placing a shield between the side of the excavation and the work area.

Exempt Excavations

The following excavations do not require protective systems:

1. Excavations made entirely in stable rock; or
2. Excavations are less than 5 ft. (1.52 m) deep and examination of the ground by a competent person provides no indication of a potential cave-in.

A fixed means to safely exit exempt excavations will be provided for workers.

Sloping or Benching Systems

The competent person or supervisor will select and construct slopes and configurations of sloping and benching systems from one of four options. [Choose the option best suited to each excavation or trench site and delete the remaining three options.]

- Option 1

Slope the walls of the excavation at an angle so that soil does not roll into the excavation. The degree of the sloping angle needed depends on the stability of the soil at the site. The maximum allowable slopes for excavations less than 20 ft. deep based on soil type and angle to the horizontal are as follows:

Soil Type	Height/Depth Ratio	Slope Angle
B	1:1 or less	45
C	1 1/2:1	34

Examples:

In Type B soil, a 10-ft deep trench must be sloped to a 45-degree angle. The total distance across such a trench would be 20 ft. plus the width of the trench.

In Type C soil, the 10-ft deep trench would be sloped at a 34-degree angle. The total width of the trench would be 15 ft. in both directions, for a total of 30 ft. across plus the width of the trench.

Sloping will be greater if the areas near the excavation are subject to heavy loads (e.g., soil piles and vehicles).

- Option 2

Determine maximum slope with site-specific variables.

- Determine the maximum slope based on site-specific variables. Consult the CFR 1926 Subpart P App a Soil Classification and CFR 1926 Subpart B App B Sloping and Benching of the regulations about procedures for Option 2.



- Option 3
Use tabulated data to determine the slope.
 - Use tabulated data, such as tables and charts approved by a registered professional engineer, to design the excavation. This data will be in writing and include sufficient explanatory information to enable the user to select, including the criteria for determining the selection and limits of the data. A copy of the information will be kept at the worksite during construction of the protective system.
- Option 4
Use a registered professional engineer.
 - Use a registered professional engineer to design the sloping or benching system based on professional judgment.

Benching Systems

Benching is not permitted in Type C soil.

Benching may be one of two types:

- Single level or step not exceeding 4 ft. high; or
- Multiple levels or steps, each not exceeding 4 ft. high.

Benching may be used in conjunction with simple sloping. Benches must be below the maximum allowable slope for that soil type. For example, a 10-ft-deep trench in Type B soil must be benched back 10 ft. in each direction with the maximum 45-degree angle.

Worker Safeguards

Workers must not work on the faces of sloped or benched excavations at levels above other employees except when employees at the lower levels are adequately protected from the hazard of falling, rolling, or sliding material or equipment.

Shoring and Shielding Systems

[Choose the option best suited to each excavation or trench site and delete the remaining three options.]

- Option 1
Design the shoring system using the soil classification, timber shoring, and aluminum shoring of the OSHA excavation rule or applicable state regulations. Designs for timber shoring in trenches will be determined according to the conditions and requirements of Appendices A and C of the excavation rule. Designs for aluminum hydraulic shoring must be according to the manufacturer's tabulated data, but if such data cannot be used, designs must follow the requirements of Appendix D of the rule. The system must be approved by a registered professional engineer.
- Option 2
Design using the system manufacturer's tabulated data. Design of support systems, shield systems, or other protective systems that are drawn from manufacturer's tabulated data will be in accordance with all specifications, recommendations, and limitations issued or made by the manufacturer, and the data will be in written form and kept at the jobsite during construction of the protective system. The system must be approved by a registered professional engineer.
- Option 3
Design using other tabulated data. Designs of protective systems will be selected from and be in accordance with tabulated data, such as tables and charts approved by a registered professional engineer. These data must be in writing and must include sufficient explanatory information to enable the user to select, including the criteria for determining the selection and limits of the data. A copy of the information must be kept at the worksite during construction of the protective system. Upon completion of the system, the data may be stored away from the jobsite but must be made available to regulatory staff on request.



- Option 4

Use a registered professional engineer to design the shoring and shield protective systems. Designs must be in the form of a written plan kept at the jobsite during construction of the protective system.

Shoring

Shoring is used when the location or depth of the trench makes sloping back to the maximum allowable slope impractical. Shoring will be used for unstable soil or depths greater than 5 ft. (1.5 m) unless benching, sloping, or another acceptable plan is accepted by the competent person.

Installation and Removal of Support Systems

Installation of a shoring or support system will be closely coordinated with the excavation of trenches. All shoring will be installed from the top down and removed from the bottom up.

- Installations Procedures

- Members of shoring or support systems will be securely connected to prevent sliding, falling, kick-outs, or other predictable failure.
- Support systems will be installed and removed in a manner that protects employees from cave-ins, structural collapses, or from being struck by members of the support system.
- Individual members of support systems will not be subjected to loads exceeding those that those members were designed to withstand.

- Removal Procedures

- Before temporary removal of individual members begins, additional precautions will be taken to ensure the safety of employees, such as installing other structural members to carry the loads imposed on the support system.
- Removal will begin at, and progress from, the bottom of the excavation. Members will be released slowly to note any indication of possible failure of the remaining members of the structure or possible cave-in of the sides of the excavation.

Shields

A trench shield may be used if the protection it provides is equal to or greater than the protection that would be provided by the appropriate shoring system. The competent person or supervisor must follow manufacturer's instructions for premade boxes and shields once a design has been chosen.

Shields may be used in conjunction with sloping or benching.

Load Requirements

Shield systems will not be subjected to loads exceeding those that the system was designed to withstand.

Installation Requirements

Shields will be installed in a manner to restrict lateral or other hazardous movement of the shield in the event of the application of sudden lateral loads.

Worker Protections

- Workers will be protected from the hazard of cave-ins when entering or exiting the areas protected by shields.
- Workers will not be allowed in shields when shields are being installed, removed, or moved vertically.



Excavations Below the Depth of the Shield

Excavations of earth material to a level not greater than 2 ft. (.6 m) below the bottom of a shield will be permitted, but only if the shield is designed to resist the forces calculated for the full depth of the trench and there are no indications while the trench is open of a possible loss of soil from behind or below the bottom of the shield.

Fall Protection

Each employee at the edge of an excavation 6 feet or more in depth shall be protected from falling by guardrail systems, fences, or barricades when the excavations are not readily seen because of plant growth or other visual barrier.

Each employee at the edge of an excavation, 6 feet or more in depth, shall be protected from falling by guardrail systems, fences, barricades, or covers.

In the event that a task requires leading edge work 6ft or more above the lower level of a trench or excavation, the employees shall be protected from falling by guardrail systems, safety net systems, or personal fall arrest systems.

- The PFAS system must consist of the following:
 - Full Body Harness
 - Positioning device
 - Connecting device such as a shock absorbing lanyard, self-retracting lifeline, rope grab, fall limiter, etc.
- Anchorage points shall be capable of supporting no less than 5,000 LBS per employee attached, or shall be designed, installed, and used as follows: as part of a complete personal fall arrest system which maintains a safety factor of at least two.
- Potential fall distance must be calculated to determine type of connecting device to be used
 - Typically, under 18-1/2 ft., always use a self-retracting lifeline/fall limiter;
 - Over 18-1/2 ft., use a shock-absorbing lanyard or self-retracting lifeline/fall limiter.

Backfilling Procedures

Backfilling will progress together with the removal of support systems from excavations.

Excavation of material to a level no greater than 2 ft. (0.6 m) below the bottom of the members of a support system will be permitted, but only if the system is designed to resist the forces calculated for the full depth of the trench and there are no indications while the trench is open of a possible loss of soil from behind or below the bottom of the support system.

Protective System Materials and Equipment

Maintenance of Materials and Equipment

Materials and equipment used for protective systems will be free from damage or defects that might impair their proper function. Manufactured materials and equipment used for protective systems will be used and maintained in a manner that is consistent with the recommendations of the manufacturer and in a manner, that will prevent employee exposure to hazards.

Damaged Materials and Equipment

When material or equipment that is used for protective systems is damaged, a competent person will examine the material or equipment and evaluate its suitability for continued use. If the competent person cannot ensure that the material or equipment is able to support the intended loads or is otherwise suitable for safe use, such material or equipment will be removed from service and will be evaluated and approved by a registered professional engineer before being returned to service.



Accident Investigation and Near-Miss Reporting

Accident Investigation

If an employee sustains a work-related injury, the employee or a co-worker will immediately notify the supervisor of the work-related injury or illness, and the supervisor will ensure that the injured or ill employee receives prompt medical treatment. The employee will complete the employee part of the Accident Investigation Report form. If the date and time of the injury or illness cannot be determined, the date of the last time that the employee worked is entered on the form.

Near-Miss Incident

The investigation procedures for near-miss incidents will follow an abbreviated outline derived from the Accident Investigation procedures. Supervisors will use the Near-Miss Incident Report form or equivalent for gathering information about near misses.

Any person who observes or causes damage to property or equipment will immediately report such damage to a supervisor.

Training

All employees, including contractors, involved in trenching or excavation work must be trained in the requirements of this Plan before any trenching- or excavation-related activities begin.

Supervisor Training

All supervisors of trenching and excavation activities must satisfy OSHA requirements for a competent person. Such supervisors must attend competent person training conducted by a trainer approved by the plan administrator or designee.

Employee Training

Personnel who perform work in trenches or excavations must comply with the requirements of this Plan and receive appropriate training that will include:

- Safe work practices during work in excavations
- The use of personal protective equipment (PPE) that will typically be required during work in excavations
- Procedures to be followed if a hazardous atmosphere exists or could reasonably be expected to develop during work in an excavation
- Emergency and nonentry rescue methods and procedures for calling rescue services

Refresher Training

Refresher training will be performed whenever worksite inspections conducted by the supervisor or the plan administrator or designee indicate that an employee or contractor does not have the necessary knowledge or skills to safely work in or around excavations.

Training Records

Training records will be maintained by the plan administrator or designee.

Recordkeeping

The competent person or supervisor will ensure that the following records and documents are kept for each excavation or trench project in a place accessible for inspection by authorized personnel and regulatory agency staff:

- The credentials of the competent person(s)



- Soil classification methodology and results of tests
- Methodology and background information used to determine which protective systems are required and the type of systems used
- Records of the employee training program, including dates of training and attendee lists
- Safety program enforcement activities
- Worksite inspection reports or logs
- The aspects of the protective systems that have been designed or approved by a registered professional engineer, including the name of such individual or, if a firm, the firm's name, the name of the engineer of record that approved the work for the firm, and the registration number
- Where applicable, evidence that the registered professional engineer of record is in fact working within a discipline applicable to the excavation work
- Accident investigation and near-miss incident reports
- Copies of related safety and health plans
- Injury and illness records

Attachments

App A Soil Classification

App B Sloping and Benching

App C Timber Shoring

App D Aluminum Shoring

App F Protective System Selection



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Regulations (Standards - 29 CFR) - Table of Contents

• Part Number:	1926
• Part Title:	Safety and Health Regulations for Construction
• Subpart:	P
• Subpart Title:	Excavations
• Standard Number:	1926 Subpart P App A
• Title:	Soil Classification

(a) Scope and application - (1) Scope. This appendix describes a method of classifying soil and rock deposits based on site and environmental conditions, and on the structure and composition of the earth deposits. The appendix contains definitions, sets forth requirements, and describes acceptable visual and manual tests for use in classifying soils.

(2) Application. This appendix applies when a sloping or benching system is designed in accordance with the requirements set forth in 1926.652(b)(2) as a method of protection for employees from cave-ins. This appendix also applies when timber shoring for excavations is designed as a method of protection from cave-ins in accordance with appendix C to subpart P of part 1926, and when aluminum hydraulic shoring is designed in accordance with appendix D. This Appendix also applies if other protective systems are designed and selected for use from data prepared in accordance with the requirements set forth in 1926.652(c), and the use of the data is predicated on the use of the soil classification system set forth in this appendix.

(b) Definitions. The definitions and examples given below are based on, in whole or in part, the following; American Society for Testing Materials (ASTM) Standards D653-85 and D2488; The Unified Soils Classification System; The U.S. Department of Agriculture (USDA) Textural Classification Scheme; and The National Bureau of Standards Report BSS-121.

"Cemented soil" means a soil in which the particles are held together by a chemical agent, such as calcium carbonate, such that a hand-size sample cannot be crushed into powder or individual soil particles by finger pressure.

"Cohesive soil" means clay (fine grained soil), or soil with a high clay content, which has cohesive strength. Cohesive soil does not crumble, can

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Soil Classification - 1926 Subpart P App A

be excavated with vertical sideslopes, and is plastic when moist.

Cohesive soil is hard to break up when dry, and exhibits significant cohesion when submerged. Cohesive soils include clayey silt, sandy clay, silty clay, clay and organic clay.

"Dry soil" means soil that does not exhibit visible signs of moisture content.

"Fissured" means a soil material that has a tendency to break along definite planes of fracture with little resistance, or a material that exhibits open cracks, such as tension cracks, in an exposed surface.

"Granular soil" means gravel, sand, or silt (coarse grained soil) with little or no clay content. Granular soil has no cohesive strength. Some moist granular soils exhibit apparent cohesion. Granular soil cannot be molded when moist and crumbles easily when dry.

"Layered system" means two or more distinctly different soil or rock types arranged in layers. Micaceous seams or weakened planes in rock or shale are considered layered.

"Moist soil" means a condition in which a soil looks and feels damp. Moist cohesive soil can easily be shaped into a ball and rolled into small diameter threads before crumbling. Moist granular soil that contains some cohesive material will exhibit signs of cohesion between particles.

"Plastic" means a property of a soil which allows the soil to be deformed or molded without cracking, or appreciable volume change.

"Saturated soil" means a soil in which the voids are filled with water. Saturation does not require flow. Saturation, or near saturation, is necessary for the proper use of instruments such as a pocket penetrometer or sheer vane.

"Soil classification system" means, for the purpose of this subpart, a method of categorizing soil and rock deposits in a hierarchy of Stable Rock, Type A, Type B, and Type C, in decreasing order of stability. The categories are determined based on an analysis of the properties and performance characteristics of the deposits and the characteristics of the deposits and the environmental conditions of exposure.

"Stable rock" means natural solid mineral matter that can be excavated with vertical sides and remain intact while exposed.

"Submerged soil" means soil which is underwater or is free seeping.

"Type A" means cohesive soils with an unconfined, compressive strength of 1.5 ton per square foot (tsf) (144 kPa) or greater. Examples of cohesive soils are: clay, silty clay, sandy clay, clay loam and, in some cases, silty clay loam and sandy clay loam. Cemented soils such as caliche and hardpan are also considered Type A. However, no soil is Type A if:

- (i) The soil is fissured; or
- (ii) The soil is subject to vibration from heavy traffic, pile driving, or similar effects; or
- (iii) The soil has been previously disturbed; or
- (iv) The soil is part of a sloped, layered system where the layers dip into the excavation on a slope of four horizontal to one vertical (4H:1V) or greater; or
- (v) The material is subject to other factors that would require it to be



Soil Classification - 1926 Subpart P App A

classified as a less stable material.

"Type B" means:

- (i) Cohesive soil with an unconfined compressive strength greater than 0.5 tsf (48 kPa) but less than 1.5 tsf (144 kPa); or
- (ii) Granular cohesionless soils including: angular gravel (similar to crushed rock), silt, silt loam, sandy loam and, in some cases, silty clay loam and sandy clay loam.
- (iii) Previously disturbed soils except those which would otherwise be classed as Type C soil.
- (iv) Soil that meets the unconfined compressive strength or cementation requirements for Type A, but is fissured or subject to vibration; or
- (v) Dry rock that is not stable; or
- (vi) Material that is part of a sloped, layered system where the layers dip into the excavation on a slope less steep than four horizontal to one vertical (4H:1V), but only if the material would otherwise be classified as Type B.

"Type C" means:

- (i) Cohesive soil with an unconfined compressive strength of 0.5 tsf (48 kPa) or less; or
- (ii) Granular soils including gravel, sand, and loamy sand; or
- (iii) Submerged soil or soil from which water is freely seeping; or
- (iv) Submerged rock that is not stable, or
- (v) Material in a sloped, layered system where the layers dip into the excavation on a slope of four horizontal to one vertical (4H:1V) or steeper.

"Unconfined compressive strength" means the load per unit area at which a soil will fail in compression. It can be determined by laboratory testing, or estimated in the field using a pocket penetrometer, by thumb penetration tests, and other methods.

"Wet soil" means soil that contains significantly more moisture than moist soil, but in such a range of values that cohesive material will slump or begin to flow when vibrated. Granular material that would exhibit cohesive properties when moist will lose those cohesive properties when wet.

(c) Requirements - (1) Classification of soil and rock deposits. Each soil and rock deposit shall be classified by a competent person as Stable Rock, Type A, Type B, or Type C in accordance with the definitions set forth in paragraph (b) of this appendix.

(2) Basis of classification. The classification of the deposits shall be made based on the results of at least one visual and at least one manual analysis. Such analyses shall be conducted by a competent person using tests described in paragraph (d) below, or in other recognized methods of soil classification and testing such as those adopted by the American Society for Testing Materials, or the U.S. Department of Agriculture textural classification system.

(3) Visual and manual analyses. The visual and manual analyses, such as those noted as being acceptable in paragraph (d) of this appendix, shall be designed and conducted to provide sufficient quantitative and qualitative information as may be necessary to identify properly the properties, factors, and conditions affecting the classification of the deposits.

(4) Layered systems. In a layered system, the system shall be classified in accordance with its weakest layer. However, each layer may be classified individually where a more stable layer lies under a less stable layer.



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(c) Reclassification. If, after classifying a deposit, the properties, factors, or conditions affecting its classification change in any way, the changes shall be evaluated by a competent person. The deposit shall be reclassified as necessary to reflect the changed circumstances.

(d) Acceptable visual and manual tests. - (1) Visual tests. Visual analysis is conducted to determine qualitative information regarding the excavation site in general, the soil adjacent to the excavation, the soil forming the sides of the open excavation, and the soil taken as samples from excavated material.

(i) Observe samples of soil that are excavated and soil in the sides of the excavation. Estimate the range of particle sizes and the relative amounts of the particle sizes. Soil that is primarily composed of fine-grained material is cohesive material. Soil composed primarily of coarse-grained sand or gravel is granular material.

(ii) Observe soil as it is excavated. Soil that remains in clumps when excavated is cohesive. Soil that breaks up easily and does not stay in clumps is granular.

(iii) Observe the side of the opened excavation and the surface area adjacent to the excavation. Crack-like openings such as tension cracks could indicate fissured material. If chunks of soil spill off a vertical side, the soil could be fissured. Small spalls are evidence of moving ground and are indications of potentially hazardous situations.

(iv) Observe the area adjacent to the excavation and the excavation itself for evidence of existing utility and other underground structures, and to identify previously disturbed soil.

(v) Observe the opened side of the excavation to identify layered systems. Examine layered systems to identify if the layers slope toward the excavation. Estimate the degree of slope of the layers.

(vi) Observe the area adjacent to the excavation and the sides of the opened excavation for evidence of surface water, water seeping from the sides of the excavation, or the location of the level of the water table.

(vii) Observe the area adjacent to the excavation and the area within the excavation for sources of vibration that may affect the stability of the excavation face.

(2) Manual tests. Manual analysis of soil samples is conducted to determine quantitative as well as qualitative properties of soil and to provide more information in order to classify soil properly.

(i) Plasticity. Mold a moist or wet sample of soil into a ball and attempt to roll it into threads as thin as 1/8-inch in diameter. Cohesive material can be successfully rolled into threads without crumbling. For example, if at least a two inch (50 mm) length of 1/8-inch thread can be held on one end without tearing, the soil is cohesive.

(ii) Dry strength. If the soil is dry and crumbles on its own or with moderate pressure into individual grains or fine powder, it is granular (any combination of gravel, sand, or silt). If the soil is dry and falls into clumps which break up into smaller clumps, but the smaller clumps can only be broken up with difficulty, it may be clay in any combination with gravel, sand or silt. If the dry soil breaks into clumps which do not break up into small clumps and which can only be broken with difficulty, and there is no visual indication the soil is fissured, the soil may be considered unfissured.

(iii) Thumb penetration. The thumb penetration test can be used to estimate the unconfined compressive strength of cohesive soils. (This test is based on the thumb penetration test described in American Society for Testing and Materials (ASTM) Standard designation D2488 - "Standard Recommended Practice for Description of Soils (Visual - Manual Procedure).") Type A soils with an unconfined compressive strength of 1.5 tsf can be readily indented by the thumb; however, they can be penetrated by the thumb only with very great effort. Type C soils with an unconfined compressive strength of 0.5 tsf can be easily penetrated several inches by the thumb, and can be molded by light finger pressure. This test should be conducted on an undisturbed soil sample, such as a large clump of spoil, as soon as practicable after excavation to keep to a minimum the effects of exposure to drying influences. If the excavation is later exposed to wetting influences (rain, flooding), the classification of the soil must be changed accordingly.

(iv) Other strength tests. Estimates of unconfined compressive strength of soils can also be obtained by use of a pocket penetrometer or by using a hand-operated shearvane.

(v) Drying test. The basic purpose of the drying test is to differentiate between cohesive material with fissures, unfissured cohesive material, and granular material. The procedure for the drying test involves drying a sample of soil that is approximately one inch thick (2.54 cm) and six inches (15.24 cm) in diameter until it is thoroughly dry:



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(A) If the sample develops cracks as it dries, significant fissures are indicated.

(B) Samples that dry without cracking are to be broken by hand. If considerable force is necessary to break a sample, the soil has significant cohesive material content. The soil can be classified as an unfissured cohesive material and the unconfined compressive strength should be determined.

(C) If a sample breaks easily by hand, it is either a fissured cohesive material or a granular material. To distinguish between the two, pulverize the dried clumps of the sample by hand or by stepping on them. If the clumps do not pulverize easily, the material is cohesive with fissures. If they pulverize easily into very small fragments, the material is granular.

[← Next Standard \(1926 Subpart P App B\)](#)

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threads without crumbling. For example, if at least a two inch (50 mm) length of $\frac{1}{8}$ -inch thread can be held on one end without tearing, the soil is cohesive.

(ii) *Dry strength.* If the soil is dry and crumbles on its own or with moderate pressure into individual grains or fine powder, it is granular (any combination of gravel, sand, or silt). If the soil is dry and falls into clumps which break up into smaller clumps, but the smaller clumps can only be broken up with difficulty, it may be clay in any combination with gravel, sand or silt. If the dry soil breaks into clumps which do not break up into small clumps and which can only be broken with difficulty, and there is no visual indication the soil is fissured, the soil may be considered unfissured.

(iii) *Thumb penetration.* The thumb penetration test can be used to estimate the unconfined compressive strength of cohesive soils. (This test is based on the thumb penetration test described in American Society for Testing and Materials (ASTM) Standard designation D2488—"Standard Recommended Practice for Description of Soils (Visual—Manual Procedure).") Type A soils with an unconfined compressive strength of 1.5 tsf can be readily indented by the thumb; however, they can be penetrated by the thumb only with very great effort. Type C soils with an unconfined compressive strength of 0.5 tsf can be easily penetrated several inches by the thumb, and can be molded by light finger pressure. This test should be conducted on an undisturbed soil sample, such as a large clump of spoil, as soon as practicable after excavation to keep to a minimum the effects of exposure to drying influences. If the excavation is later exposed to wetting influences (rain, flooding), the classification of the soil must be changed accordingly.

(iv) *Other strength tests.* Estimates of unconfined compressive strength of soils can also be obtained by use of a pocket penetrometer or by using a hand-operated shearvane.

(v) *Drying test.* The basic purpose of the drying test is to differentiate between cohesive material with fissures, unfissured cohesive material, and granular material. The procedure for the drying test involves drying a sample of soil that is approximately one inch thick (2.54 cm) and six inches (15.24 cm) in diameter until it is thoroughly dry:

(A) If the sample develops cracks as it dries, significant fissures are indicated.

(B) Samples that dry without cracking are to be broken by hand. If considerable force is necessary to break a sample, the soil has significant cohesive material content. The soil can be classified as a unfissured cohesive material and the unconfined compressive strength should be determined.

(C) If a sample breaks easily by hand, it is either a fissured cohesive material or a granular material. To distinguish between

the two, pulverize the dried clumps of the sample by hand or by stepping on them. If the clumps do not pulverize easily, the material is cohesive with fissures. If they pulverize easily into very small fragments, the material is granular.

APPENDIX B TO SUBPART P OF PART 1926—SLOPING AND BENCHING

(a) *Scope and application.* This appendix contains specifications for sloping and benching when used as methods of protecting employees working in excavations from cave-ins. The requirements of this appendix apply when the design of sloping and benching protective systems is to be performed in accordance with the requirements set forth in § 1926.652(b)(2).

(b) *Definitions.*

Actual slope means the slope to which an excavation face is excavated.

Distress means that the soil is in a condition where a cave-in is imminent or is likely to occur. Distress is evidenced by such phenomena as the development of fissures in the face of or adjacent to an open excavation; the subsidence of the edge of an excavation; the slumping of material from the face or the bulging or heaving of material from the bottom of an excavation; the spalling of material from the face of an excavation; and raveling, i.e., small amounts of material such as pebbles or little clumps of material suddenly separating from the face of an excavation and trickling or rolling down into the excavation.

Maximum allowable slope means the steepest incline of an excavation face that is acceptable for the most favorable site conditions as protection against cave-ins, and is expressed as the ratio of horizontal distance to vertical rise (H:V).

Short term exposure means a period of time less than or equal to 24 hours that an excavation is open.

(c) *Requirements—(1) Soil classification.* Soil and rock deposits shall be classified in accordance with appendix A to subpart P of part 1926.

(2) *Maximum allowable slope.* The maximum allowable slope for a soil or rock deposit shall be determined from Table B-1 of this appendix.

(3) *Actual slope.* (i) The actual slope shall not be steeper than the maximum allowable slope.

(ii) The actual slope shall be less steep than the maximum allowable slope, when there are signs of distress. If that situation occurs, the slope shall be cut back to an actual slope which is at least $\frac{1}{2}$ horizontal to one vertical ($\frac{1}{2}$ H:1V) less steep than the maximum allowable slope.

(iii) When surcharge loads from stored material or equipment, operating equipment, or traffic are present, a competent person shall



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determine the degree to which the actual slope must be reduced below the maximum allowable slope, and shall assure that such reduction is achieved. Surcharge loads from

adjacent structures shall be evaluated in accordance with §1926.651(i).

(4) *Configurations.* Configurations of sloping and benching systems shall be in accordance with Figure B-1.

TABLE B-1
MAXIMUM ALLOWABLE SLOPES

SOIL OR ROCK TYPE	MAXIMUM ALLOWABLE SLOPES (H:V) ^[1] FOR EXCAVATIONS LESS THAN 20 FEET DEEP ^[3]
STABLE ROCK	VERTICAL (90°)
TYPE A ^[2]	3/4 : 1 (53°)
TYPE B	1 : 1 (45°)
TYPE C	1½ : 1 (34°)

NOTES:

1. Numbers shown in parentheses next to maximum allowable slopes are angles expressed in degrees from the horizontal. Angles have been rounded off.
2. A short-term maximum allowable slope of 1/2H:1V (63°) is allowed in excavations in Type A soil that are 12 feet (3.67 m) or less in depth. Short-term maximum allowable slopes for excavations greater than 12 feet (3.67 m) in depth shall be 3/4H:1V (53°).
3. Sloping or benching for excavations greater than 20 feet deep shall be designed by a registered professional engineer.

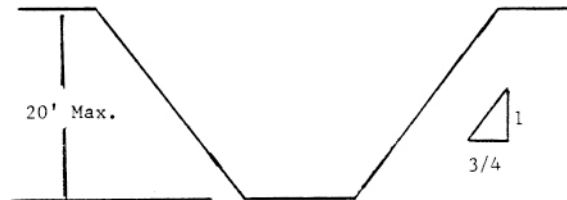
Figure B-1

Slope Configurations

(All slopes stated below are in the horizontal to vertical ratio)

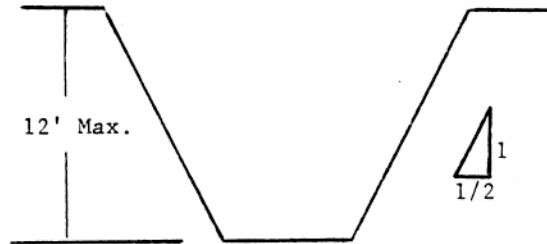
B-1.1 Excavations made in Type A soil.

1. All simple slope excavation 20 feet or less in depth shall have a maximum allowable slope of ¾:1.



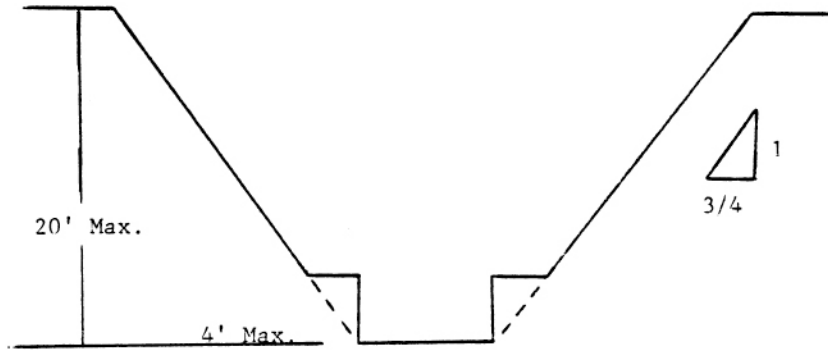
SIMPLE SLOPE—GENERAL

Exception: Simple slope excavations which are open 24 hours or less (short term) and which are 12 feet or less in depth shall have a maximum allowable slope of ½:1.

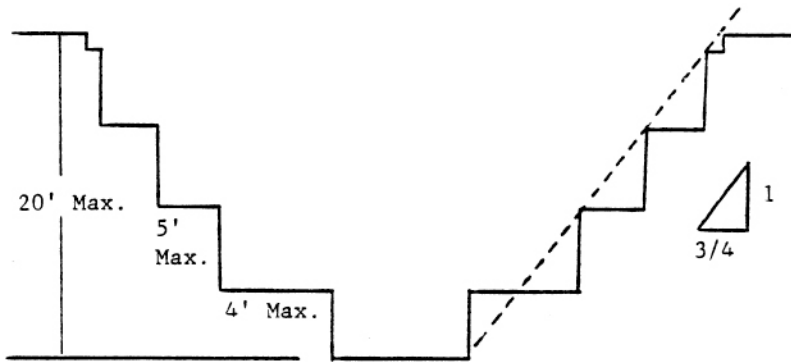


SIMPLE SLOPE—SHORT TERM

2. All benched excavations 20 feet or less in depth shall have a maximum allowable slope of $\frac{3}{4}$ to 1 and maximum bench dimensions as follows:



SIMPLE BENCH



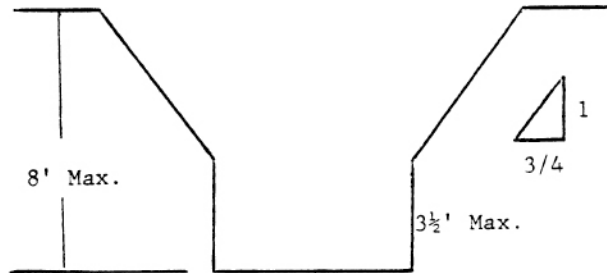
MULTIPLE BENCH

3. All excavations 8 feet or less in depth which have unsupported vertically sided lower portions shall have a maximum vertical side of $3\frac{1}{2}$ feet.



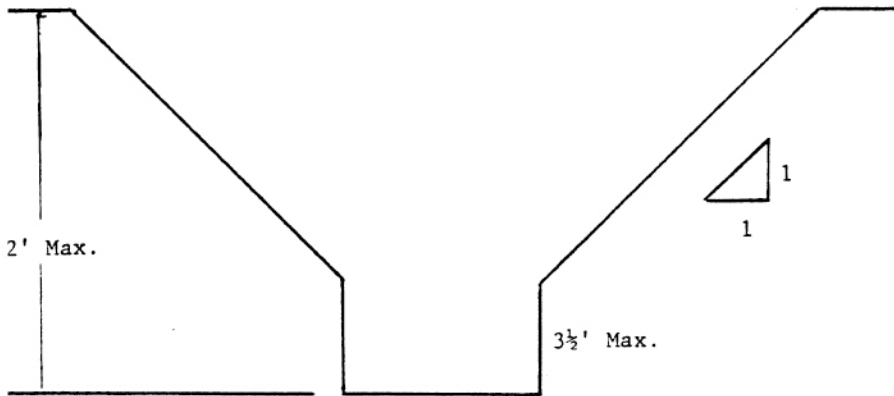
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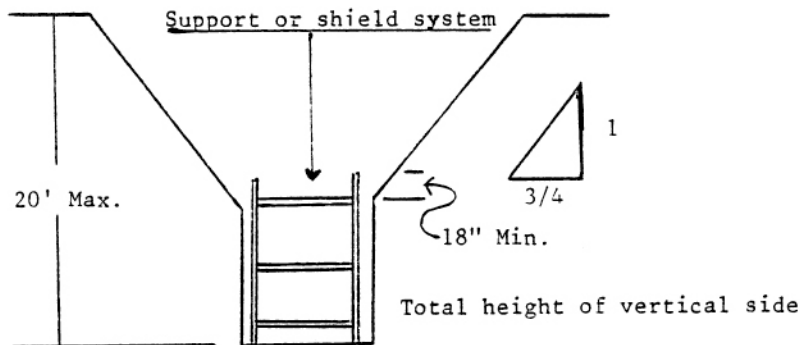
UNSUPPORTED VERTICALLY SIDED LOWER PORTION—MAXIMUM 8 FEET IN DEPTH

All excavations more than 8 feet but not more than 12 feet in depth which unsupported vertically sided lower portions shall have a maximum allowable slope of 1:1 and a maximum vertical side of 3½ feet.



UNSUPPORTED VERTICALLY SIDED LOWER PORTION—MAXIMUM 12 FEET IN DEPTH

All excavations 20 feet or less in depth which have vertically sided lower portions that are supported or shielded shall have a maximum allowable slope of ¾:1. The support or shield system must extend at least 18 inches above the top of the vertical side.



SUPPORTED OR SHIELDED VERTICALLY SIDED LOWER PORTION

4. All other simple slope, compound slope, and vertically sided lower portion excavations shall be in accordance with the other options permitted under §1926.652(b).

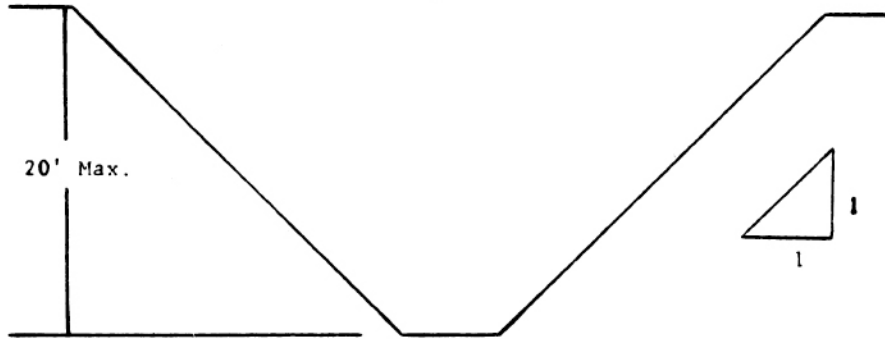


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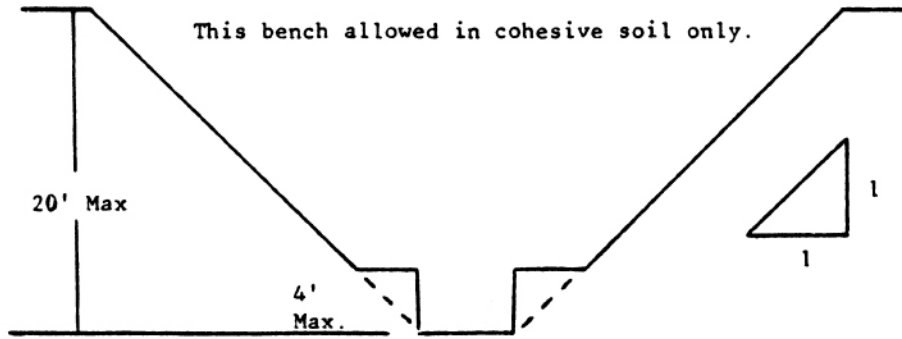
B-1.2 Excavations Made in Type B Soil

1. All simple slope excavations 20 feet or less in depth shall have a maximum allowable slope of 1:1.

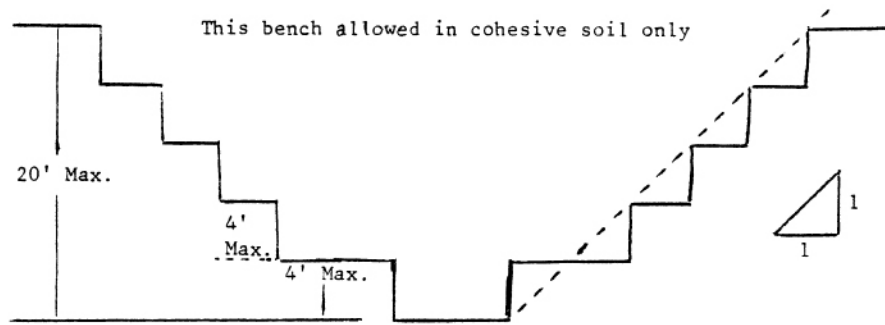


SIMPLE SLOPE

2. All benched excavations 20 feet or less in depth shall have a maximum allowable slope of 1:1 and maximum bench dimensions as follows:

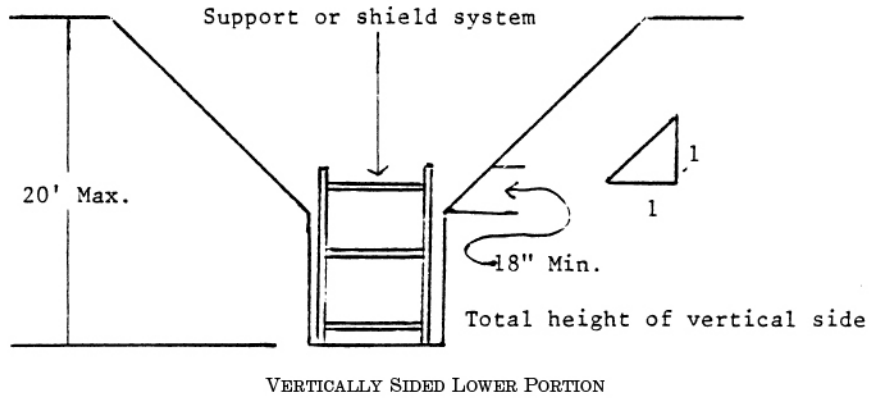


SINGLE BENCH



MULTIPLE BENCH

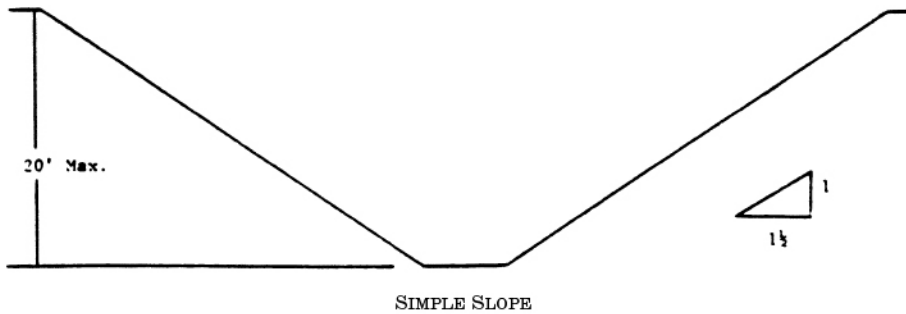
3. All excavations 20 feet or less in depth which have vertically sided lower portions shall be shielded or supported to a height at least 18 inches above the top of the vertical side. All such excavations shall have a maximum allowable slope of 1:1.



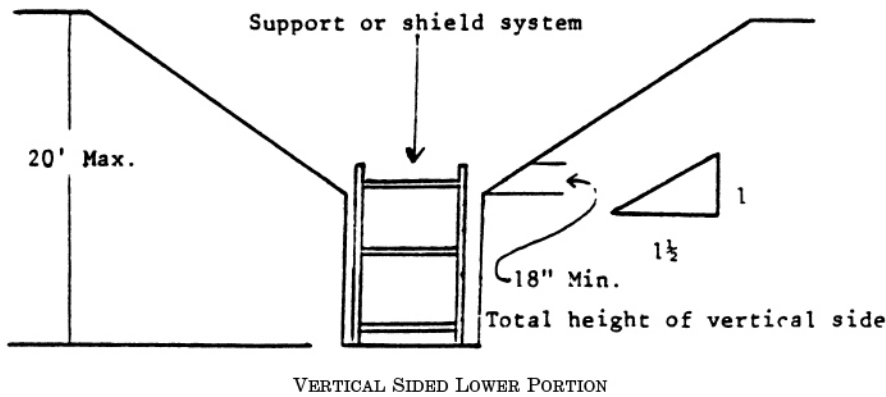
4. All other sloped excavations shall be in accordance with the other options permitted in §1926.652(b).

B-1.3 Excavations Made in Type C Soil

1. All simple slope excavations 20 feet or less in depth shall have a maximum allowable slope of 1½:1.



2. All excavations 20 feet or less in depth which have vertically sided lower portions shall be shielded or supported to a height at least 18 inches above the top of the vertical side. All such excavations shall have a maximum allowable slope of 1½:1.



3. All other sloped excavations shall be in accordance with the other options permitted in §1926.652(b).

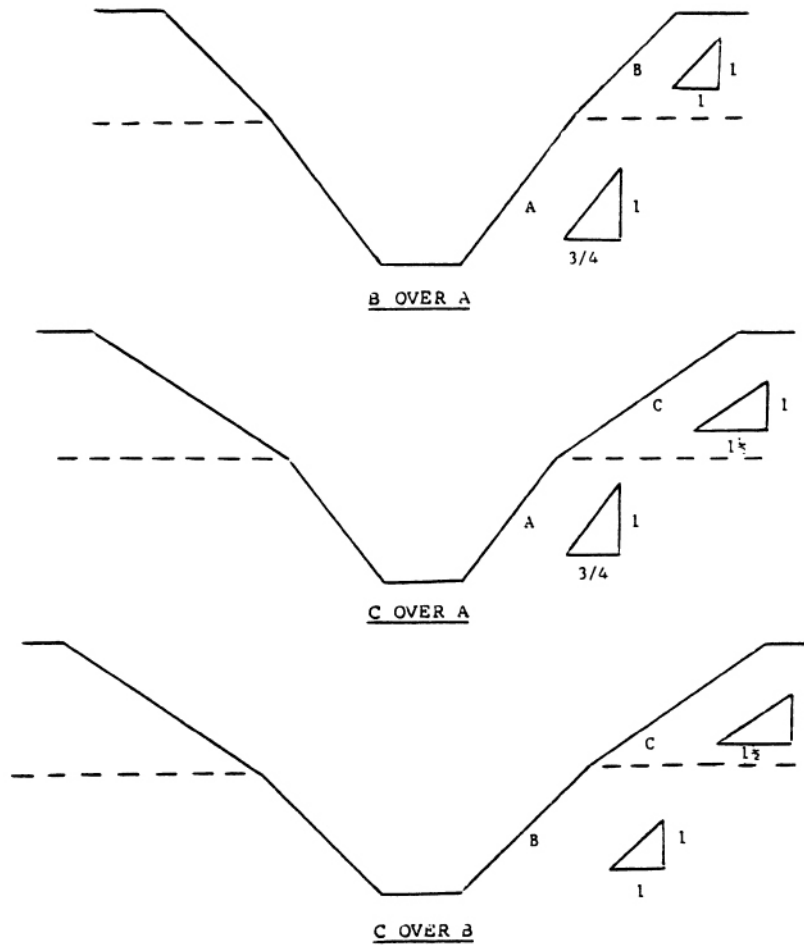


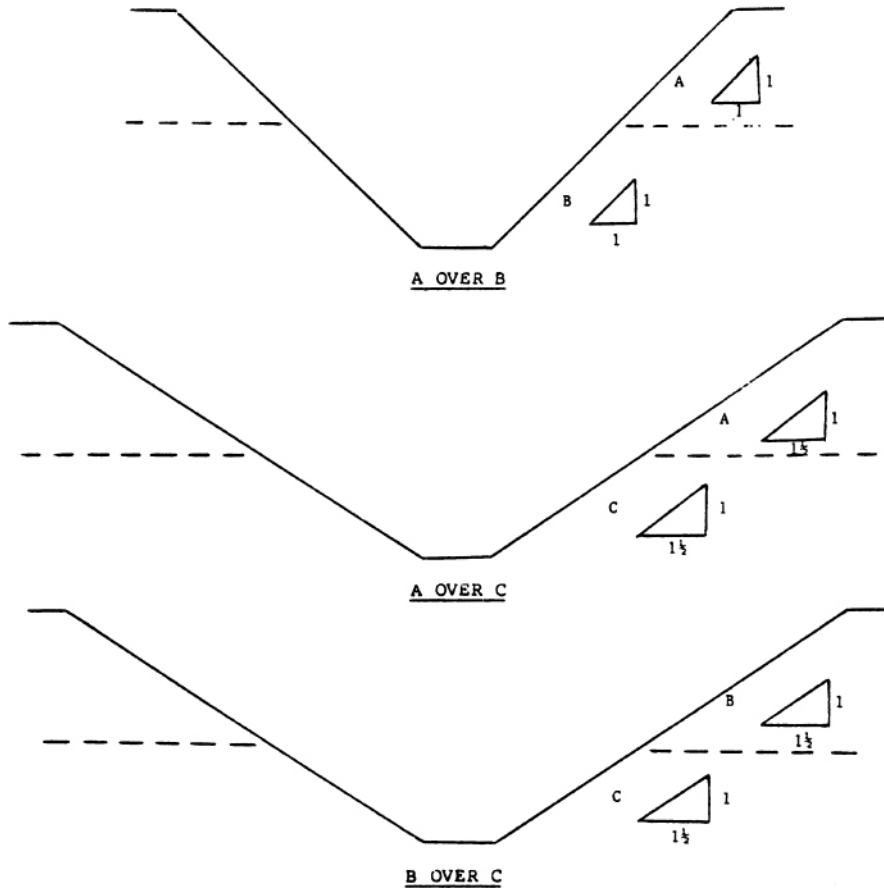
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B-1.4 Excavations Made in Layered Soils

1. All excavations 20 feet or less in depth made in layered soils shall have a maximum allowable slope for each layer as set forth below.





2. All other sloped excavations shall be in accordance with the other options permitted in §1926.652(b).

APPENDIX C TO SUBPART P OF PART 1926—TIMBER SHORING FOR TRENCHES

(a) *Scope.* This appendix contains information that can be used timber shoring is provided as a method of protection from cave-ins in trenches that do not exceed 20 feet (6.1 m) in depth. This appendix must be used when design of timber shoring protective systems is to be performed in accordance with §1926.652(c)(1). Other timber shoring configurations; other systems of support such as hydraulic and pneumatic systems; and other protective systems such as sloping, benching, shielding, and freezing systems must be designed in accordance with the requirements set forth in §1926.652(b) and §1926.652(c).

(b) *Soil Classification.* In order to use the data presented in this appendix, the soil type or types in which the excavation is made must first be determined using the soil classification method set forth in appendix A of subpart P of this part.

(c) *Presentation of Information.* Information is presented in several forms as follows:

(1) Information is presented in tabular form in Tables C-1.1, C-1.2, and C-1.3, and Tables C-2.1, C-2.2 and C-2.3 following paragraph (g) of the appendix. Each table presents the minimum sizes of timber members to use in a shoring system, and each table contains data only for the particular soil type in which the excavation or portion of

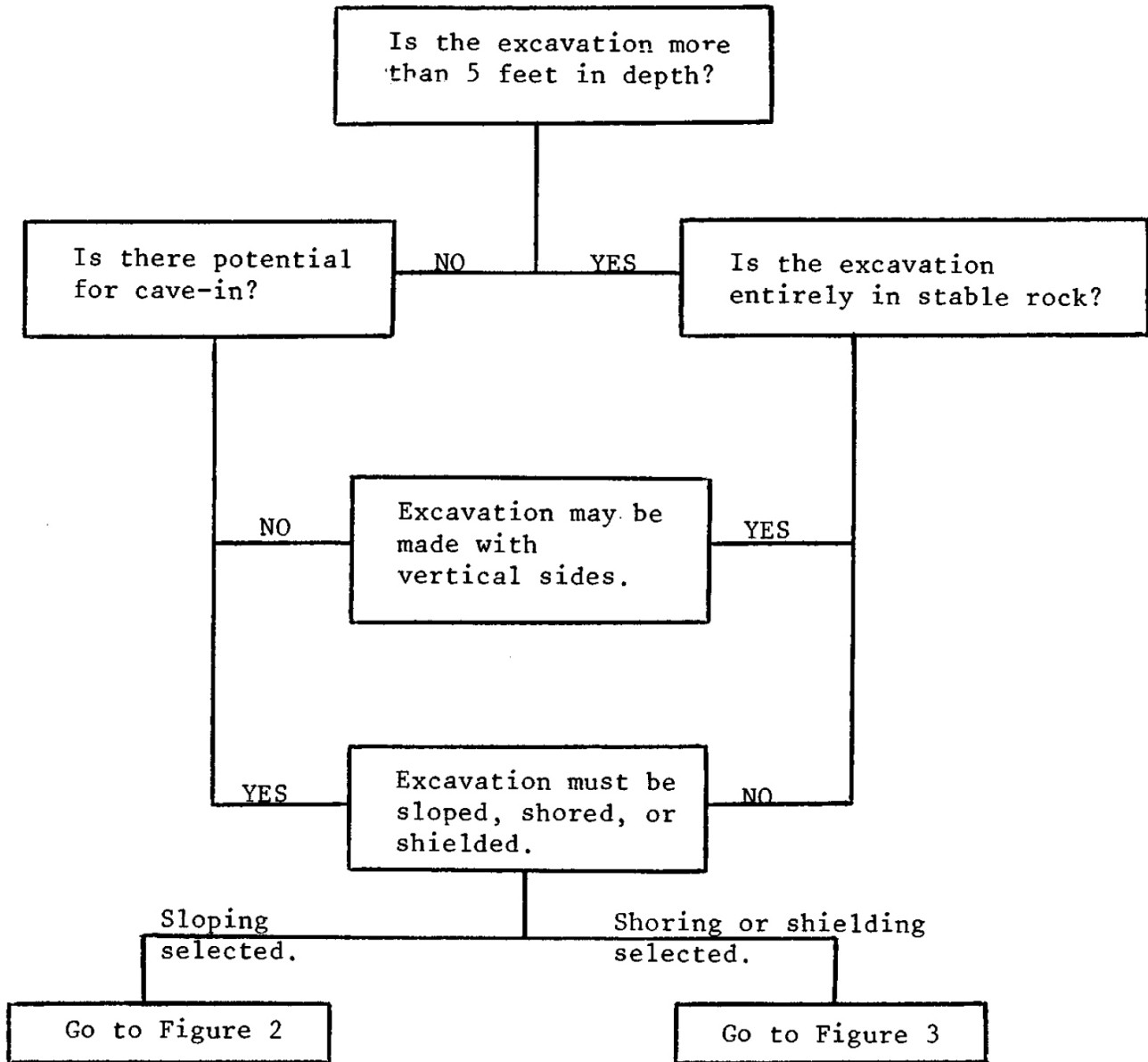


FIGURE 1 - PRELIMINARY DECISIONS

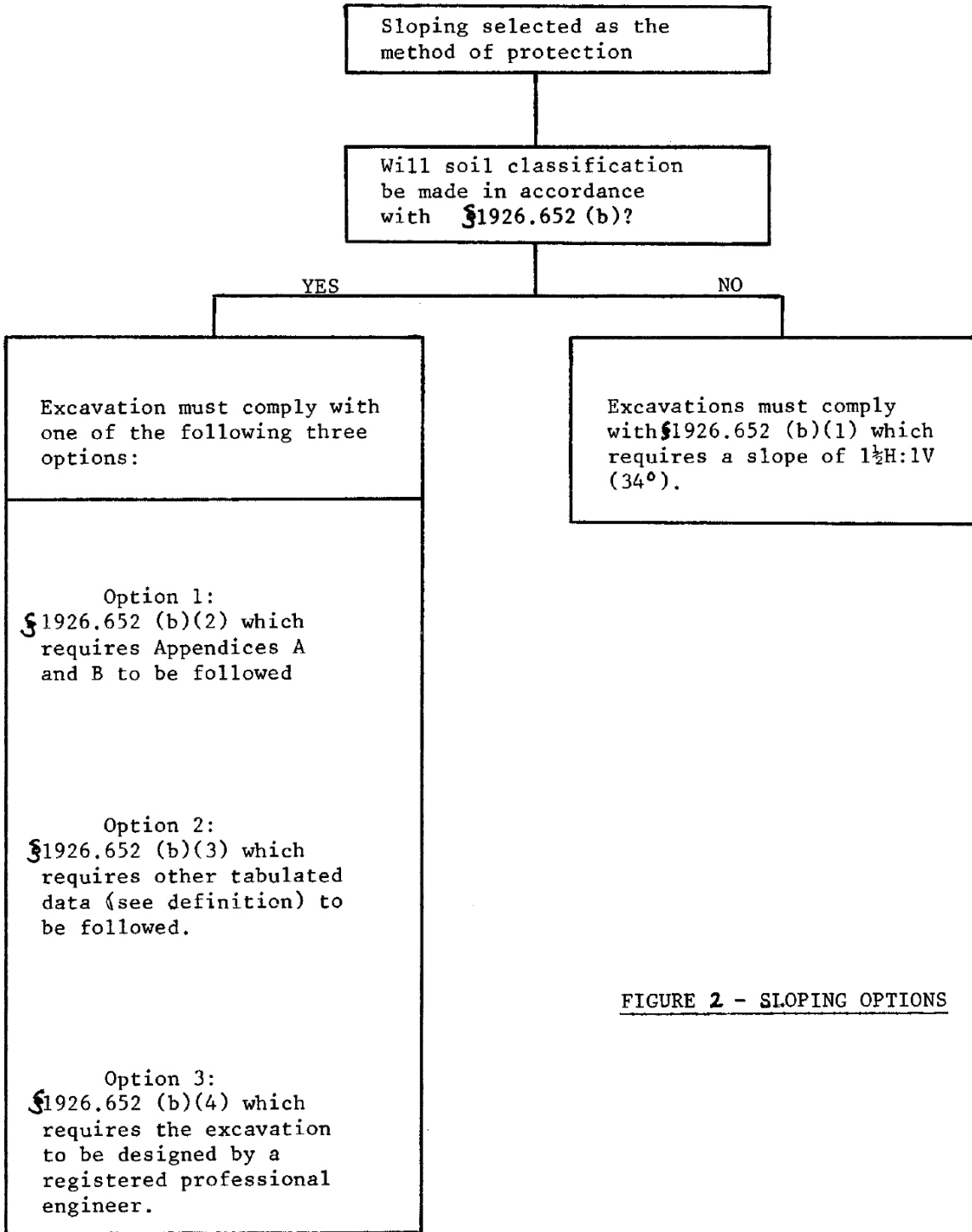


FIGURE 2 - SLOPING OPTIONS

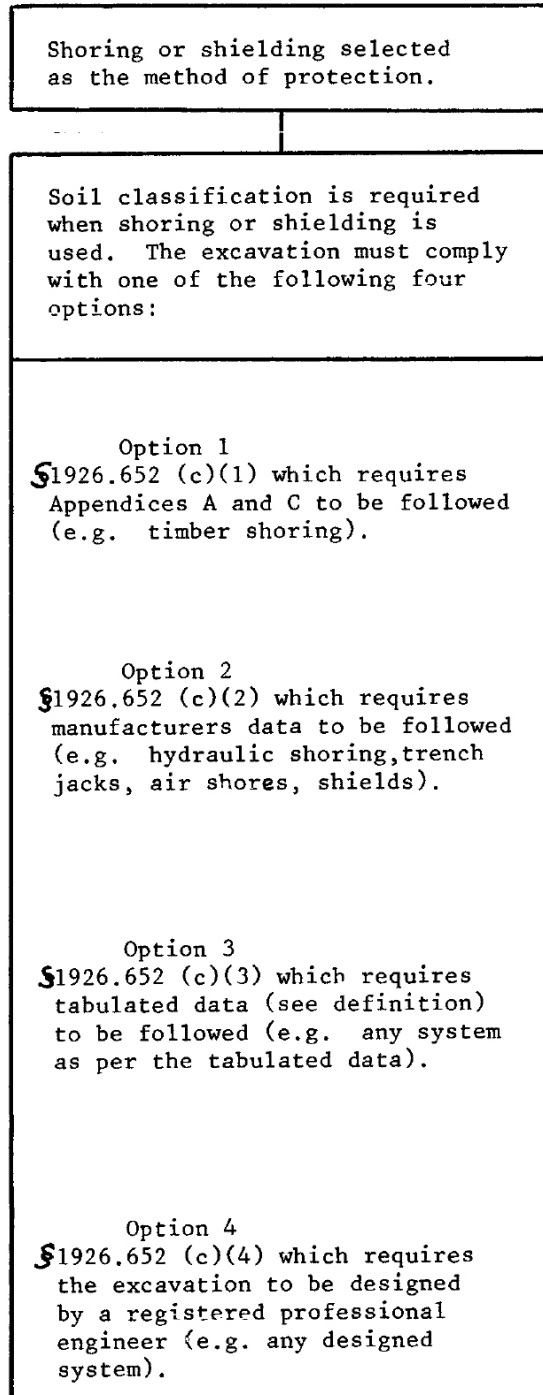


FIGURE 3 - SHORING AND SHIELDING OPTIONS



CIVIL INFRASTRUCTURE SOLUTIONS

EXCAVATOR GUIDE FOR UNDERGROUND UTILITIES



Vortex Companies

Procedure Name	Environmental, Health & Safety Manual – Underground Utilities and Excavations
Applicability	VORTEX Companies – Employees & Subcontractors
Policy Revised	05.014.19

How to Contact Texas811

Web: www.texas811.org/portal

Phone: Dial 811

Information Required for a Locate Request

You'll need to provide the following information to request underground line markings for your work location. If you cannot provide all of the information, you may have to re-contact the contact center later to complete your request and your work could be delayed.

- Who is the work being done for? The work is being done for your client or the owner of the property.
- How long will it take to complete the work?
- Will you be using explosives? Texas law requires that we ask this question.
- Will you be digging or disturbing the dirt deeper than 16"?
- Is the work area marked in white paint or flags? Indicating your planned work area with white marks is not required by law, but it is helpful to locators to know exactly where you plan to dig.
- What kind of work is being done?

Information About the Work Location

It is very important that the work location/site be described as accurately as possible to ensure that all of the utilities near your work site are notified of your plan to dig. We will ask very specific questions about where you plan to work and how to get to the work site because our Damage Prevention Agents must be able to find your work site on a map. Finding the location on the map is extremely important because that is how we know which utility companies to notify and which regional office.

- What county is the work taking place in?
- What town is the work taking place in? If the work is in a rural area, what is the closest town to your location?
- What is the address where the work is taking place? If there is no address, please provide driving directions from the nearest intersection.
- What is the name of the street at the closest intersection to your work location/site?

Information About You and the Company

- Your name, company name (if applicable), physical address, email, and phone number.
- Primary Contact information (if someone else will be the primary contact at the work location/site) – the same information as before and the best time of the day to contact them.



Locate Request Ticket Types

- What kind of ticket/notification is this? Here are the options:
- A Normal ticket requires a two working day notice, excluding weekends and holidays, before work can begin.
- A Digup ticket is issued if you expose, cut or hit an underground utility while working. If you hit a gas pipeline, even if it is just a scratch, leave the area immediately. Once at a safe distance, please call 911, then Texas811. If you make contact with a utility line that is not a gas pipeline, please contact Texas811 immediately so we can notify the utility whose lines are affected. The utilities will come to the site to inspect the damage and make any repairs that may be necessary.
- An Emergency ticket is used when the work being done is to repair a situation that is a danger to life, health or property. Penalties may result if non-emergency situations are reported as an emergency.
- An update ticket extends the life of an existing ticket and gets the lines remarked. Update tickets can be requested during the automated recording when calling or through The Portal online.

What You Will Receive from Texas811

You will receive:

- Your ticket number. This number is your proof that you have contacted Texas811 and requested a locate for your work location. You should keep it until the project has been completed. You will need to provide it whenever you contact Texas811 about this project.
- An email copy of your ticket containing a list of all utilities that have facilities in your area if you have provided an email address.
- Within a few hours you'll receive an identical ticket from the other contact center in Texas listing which utility companies they have notified of your work.

Excavator Responsibilities

An Excavator is responsible for:

- Knowing and following the tolerance zones for digging around the locators' markers.
- Providing your client with the appropriate ticket or notification number prior to beginning work.
- Requesting a line locate at least two working days, excluding weekends and holidays, before beginning work.
- Knowing and following the tolerance zones for digging around the locators' markers.
- Providing your client with the appropriate ticket or notification number prior to beginning work.
- Requesting a line locate at least two working days, excluding weekends and holidays, before beginning work.
- Providing accurate driving directions with distances and cardinal headings (North, South, East, West) when working in rural areas.
- Confirming the response of the notified utilities before proceeding with any excavation.
- Notifying the on-call center after determining that one or more utilities have not responded to a locate request.
- Looking for utility signage at your work site and obeying instructions on those signs.
- Following safe digging practices and maintaining equipment condition to ensure safety standards.



What to Do if You Hit a Line

A hit to a line can be a complete rupture, a dent or even a scratch on the outer surface of the casing. In any of these cases, please do the following.

- Stop work immediately. Do not resume work until a representative of the utility company gives you permission to resume work.
- Call 811 to Report the Damage. It is helpful to have your ticket number, the exact location of the damage within your work area and if you know what kind of utility line is involved.
- If you hit a gas line and gas is leaking or spewing, also call 911. But first walk a safe distance from the damage.
- Do not start a vehicle engine or use your cell phone until you can no longer smell gas.
- Do not attempt to repair any utility line yourself.
- Do not backfill the location of the damaged line.

What to do if You Smell Gas in the Area

Since natural gas is colorless and odorless, a chemical that smells like rotten eggs is added so it is easier to detect a gas leak before it can create a hazardous situation. If you suspect a gas leak in your area, please follow these safety guidelines:

- Leave the area immediately.
- Do not turn any electrical switches on or off.
- Do not use your cell phone or a landline.
- If you are currently on a landline, do not hang up.
- Do not start your car engine.
- Once you are a safe distance from the gas smell, call your local gas company or call 911 to report the gas odor. Remain a safe distance from the suspected leak until someone from the gas company or an emergency responder says it is safe to return.
- Warn others to stay away from the area.

Remember that paint and flags are a guide, because the exact location of the line may differ underground. If digging must take place within the Tolerance Zone, the location of the buried utility should be proven by sight before using ANY power or mechanical equipment.



Utility Locate Marking Colors

Color Coding System — Color coding is used to identify the type of underground facilities.

RED	Electric Power Lines, Cables, Conduit and Lighting Cables
YELLOW	Gas, Oil, Steam, Petroleum or Gaseous Materials
ORANGE	Communication, Alarm or Signal Lines, Cables or Conduit
BLUE	Potable Water
GREEN	Sewers and Drain Lines
PURPLE	Reclaimed Water, Irrigation and Slurry Lines
PINK	Temporary Survey Markings
WHITE	Proposed Excavation

Digging and Excavation

95% of locating is visual – Look for utility structures, man holes, light poles, transformers, marker posts, meters, etc.) — if you see any utility structures near your site with NO marks, you need to start communicating!

If exposing a facility, the excavator provides proper support and protection for it so that the facility will not be damaged.

When the excavation is complete, the excavator provides proper backfill for any facilities that have been exposed, and removes all utility markings.

While working, the excavator takes care to find and maintain any markings that have been placed.

When digging near a buried facility, the excavator observes the tolerance zone around that facility.

Excavations that affects the Tolerance Zone:

If you must dig in the Tolerance Zone, for example to expose a line, the use of the following methods is required:

- Hand digging
- Pot holing
- Soft digging
- Vacuum excavation

Mechanical digging within a tolerance zone is not permissible.



- Mechanical digging can only resume once the utility has been exposed entirely in the immediate excavation.

A locator's marks provide the excavator with information about the location of underground lines. Due to natural shifting of the ground and other causes, the markings only show a general location. So a Tolerance Zone must also be observed while excavating. The Tolerance Zone acts as added protection to buried utilities.

A Tolerance Zone refers to the amount of space parallel and directly next to the underground utility. In the state of Texas, the Tolerance Zone is half the nominal diameter of the underground pipeline plus a minimum of 18 inches on either side of the outside edge of the underground pipeline on a horizontal plane.

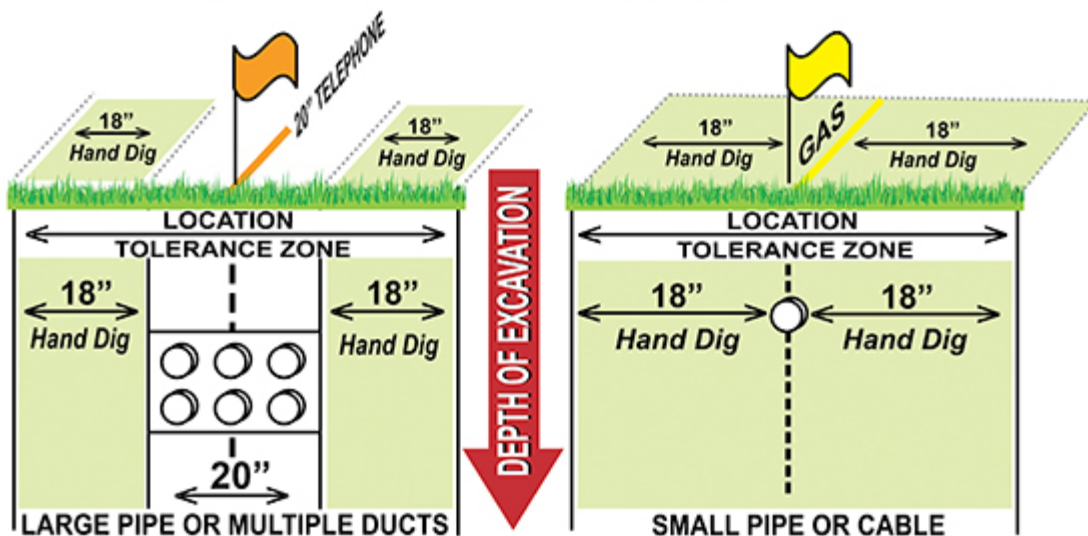
Before you excavate within the Tolerance Zone, you must:

- Complete the Pre-Excavation Inspection Form and verify the location, type, size, direction-of-run, and depth of the facility. The facility must be exposed to view; if after a diligent search the facility cannot be verified in this manner, notify the facility operator).
- For gas and liquid petroleum lines, verification must be by means of hand-dug test holes or vacuum excavation. The location of other utilities must also be verified by means of hand-dug test holes or vacuum excavation unless otherwise agreed upon by the facility operator.
- If the excavation is going to cross a Tolerance Zone, dig a test hole to expose the facility at the point of crossing.
- Do not assume that buried facilities will be at a certain depth (they may have been originally installed at a prescribed depth, but later erosion or grade changes cause them to now have a shallower or deeper cover).
- If exposing a facility, the excavator provides proper support and protection for it so that the facility will not be damaged.

When the excavation is complete, the excavator provides proper backfill for any facilities that have been exposed, and removes all utility markings.

If a utility is damaged, it must be reported and documented on the Utility Damage Report.

DIGGING IN THE TOLERANCE ZONE





PRE-EXCAVATION CHECK-LIST



Crew Superintendent: _____ One-Call Ticket #: _____ Contact #: _____ Date: _____

1. Complete a pre-excavation walk-out of the entire job site.
2. Your objective is to visually inspect the dig area to ensure all utilities are marked. Look for signs of utilities that may not be marked such as, above-ground pedestals, gas meters, man-hole covers, drains, or utility poles with cable risers. If you find these indicators and suspect that there is an unmarked utility DO NOT PROCEED. Notify One Call that an unidentified line has been discovered.
3. When you have completed your walk-out, complete the following check list:

1. Verify that the One-Call ticket covers the 'Scope of work' and 'Work to begin' date:

- I have verified the One-Call ticket covers the 'Scope of work' Yes No
- I have verified the One-Call ticket 'Work to begin' date Yes No

2. What marked utilities did you observe?

- Gas (Yellow) Electric (Red) Telephone (Orange) Cable TV (Orange) Water (Blue) Sewer (Green)

3. Based on visual observation, did you see signs of any unmarked utilities?

Yes No

If Yes, please identify.

- Gas (Yellow) Electric (Red) Telephone (Orange) Cable TV (Orange) Water (Blue) Sewer (Green)

- I have notified One Call of the unmarked Utility Yes No

4. Photograph the entire proposed work area including all locate marks.

- I have photographed the entire site prior to excavation. Yes No
- I have photographed existing locate/markings. Yes No

4. Advise your crew members of the following: If they have to cross a marked Utility they must HAND DIG ONLY within 18" of the locate marks plus half the diameter of the buried facility.

- If a gas main is present, HAND DIGGING is required within 5' of the locate marks.
- I have advised my crew of the 18" and 5' hand dig rule. Yes No

RESPECT THE MARKS!

IN THE EVENT OF DAMAGE

- Notify One Call and your supervisor.
- Complete the reverse side of this form.
- Photograph entire area and damage location.

Superintendent Name: _____

Date: _____

Superintendent Signature: _____



UTILITY DAMAGE REPORT

PART A - DATE AND LOCATION

Date of Damage: _____ Street Address: _____

City: _____ State: _____

Nearest Intersection: _____

PART B - AFFECTED UTILITY

Electric Natural Gas Sewer Water Telephone Cable TV

What type of Service? Service/Drop Main Fiber Optic

Depth of damaged facility: _____

PART C - LOCATING AND MARKING

Was the One-Call Center notified? Yes No If Yes, provide the locate ticket number: _____

Were facility marks visible in the area of excavation? Yes No

Were facility marks accurate? Yes No

What were facilities marked with? Paint Flags Paint & Flags

Were painted locate marks present? Duct Bank (*Diamond Pattern*) Single Line (*With Buffer*) Single Line (*Without Buffer*)

Have you taken Photos (Required) Yes No What is the distance between the locate marks? _____

PART D - EXCAVATION INFORMATION

Type of Excavation Equipment? Backhoe/Track hoe Boring Auger Trencher

Directional Drill Drilling Hand tools Probing Device

Type of work Performed? Installing Gas Pipeline Installing Electric Cable Joint Trench Installing Telephone

Installing Cable TV Installing Poles Installing Anchors Other, specify: _____

Location of dig site? Private property Utility Easement Road right-of-way

PART E - DESCRIBE HOW THE INCIDENT OCCURRED

PART F - DIAGRAM

Superintendent Name: _____ Superintendent Phone #: _____

Operator Name: _____ Operator Phone #: _____

Project Name: _____



CIVIL INFRASTRUCTURE SOLUTIONS

WELDING, CUTTING, HOT WORK



Vortex Companies

Procedure Name	Environmental, Health & Safety Manual – Welding / Hot Work
Applicability	VORTEX Companies – Employees & Subcontractors
Policy Revised	10.30.14

Purpose

The purpose of this program is to assure a safe work environment during welding, cutting, and hot work operations.

Scope

This program is applicable to all employees directly involved or assisting in the welding, cutting and hot work operations. When work is performed on a no owned or operated site, the operator’s program shall take precedence, however, this document covers VORTEX Companies employees and contractors and shall be used on owned premises, or when an operator’s program doesn’t exist or is less stringent. Operators of equipment should report any equipment defect or safety hazards and discontinue use of equipment until its safety has been assured. Repairs shall be made only by qualified personnel. If welding and cutting cannot be conducted safely the welding and cutting operation shall not be performed.

Definitions

Welding/Hot Work Procedures - Any activity which results in sparks, fire, molten slag, or hot material which has the potential to cause fires or explosions.

Examples of Hot Work - Cutting, Brazing, Soldering, Thawing Pipes, Grinding, using an electric tool in a hazardous area and Welding.

Special Hazard Occupancies - Any area containing Flammable Liquids, Dust Accumulation, Gases, Plastics, Rubber and Paper Products.

Hazards - Includes, but not limited to the following; fires and explosions, skin burns, welding “blindness”, and respiratory hazards from fumes and smoke.

Key Responsibilities

Managers and Supervisors

- Determine if its property is safe for welding and cutting operations.
- Establish safe areas for welding and cutting operations.
- Provide training for all employees whose task includes heat, spark or flame producing operations such as welding, brazing, or grinding.
- Develop and monitor effective hot work procedures.
- Provide safe equipment for hot work.
- Provide proper and effective PPE for all hot work.
- Monitor all hot work operations.



- Ensure all hot work equipment and PPE are in safe working order.
- Allow only trained and authorized employees to conduct hot work and conduct inspections of the hot work area before operations begin.
- Ensure permits are used for all hot work outside authorized areas.

Employees

- Follow all hot work procedures.
- Properly use appropriate hot work PPE.
- Inspect all hot work equipment before use.
- Report any equipment problems or unsafe conditions.

Procedure

General

Before cutting or welding is permitted the area shall be inspected by a VORTEX Companies supervisor responsible for inspection and granting authorized welding and cutting operations. Precautions that are to be taken shall be in the form of a written Hot Work permit.

Where practicable all combustibles shall be relocated at least 35 feet from the work site. Where relocation is impractical, combustibles shall be protected with flameproof covers, shielded with metal, guards, curtains, or wet down the material to help prevent ignition of material.

Ducts, conveyor systems, and augers that might carry sparks to distant combustibles shall be protected or shut down.

Where cutting or welding is done near walls, partitions, ceilings, or openings in the floor (grating, manholes, etc.), fireresistant shields or guards shall be provided to prevent ignition.

If welding is to be done on a metal wall, partition, ceiling, or solid decking/flooring, precautions shall be taken to prevent ignition of combustibles on the other side, due to conduction or radiation of heat. Where combustibles cannot be relocated on the opposite side of the work, a fire watch person shall be provided on the opposite side of the work.

Welding shall not be attempted on a metal partition, wall, and ceiling or decking/flooring constructed of combustible sandwich panels.

Cutting or welding on pipes or other metal in contact with combustible walls, partitions, floors, ceilings, or roofs shall not be undertaken if the work is close enough to cause ignition by combustion.

Cutting or welding shall not be permitted in the following situations:

- In areas not authorized by management.
- In sprinkled buildings while such protection is impaired.
- In the presence of potentially explosive atmospheres, e.g. flammables.
- In areas near the storage of large quantities of exposed, readily ignitable materials.
- In areas where there is dust accumulation of greater than 1/16 inch within 35 feet of the area where welding/hot work will be conducted.



- All dust accumulation shall be cleaned up before welding or hot work is permitted.

Whenever welding or cutting is performed in locations where other than a minor fire might develop or any of the conditions mentioned above cannot be met, a fire watch shall be provided.

- The fire watch shall be provided during and for a minimum of 1/2 hour past the completion of the welding project.
- The fire watch shall be trained in the use of fire extinguishers and the facility's alarm system.
- During this time the fire watch will have appropriate fire extinguishers readily available.
- Suitable extinguishers shall be provided and maintained ready for instant use.
- A hot-work permit will be issued on all welding or cutting outside of the designated welding area.

Fire Prevention Measures

A designated welding area shall be established to meet the following requirements:

- Floors swept and cleaned of combustibles within 35 feet of work area.
- Flammable and combustible liquids and material will be kept 35 feet from work area.
- Adequate ventilation providing 20 air changes per hour.
- At least one 10 pound dry chemical fire extinguisher shall be within access of 35 feet of the work area.
- Protective dividers such as welding curtains or noncombustible walls will be provided to contain sparks and slag to the combustible free area.

Requirements for welding conducted outside the designated welding area:

- Portable welding curtains or shields must be used to protect other workers in the welding area.
- A hot-work permit must be completed and complied with prior to initiating welding operations.
- Respiratory protection is mandatory unless an adequate monitored airflow away from the welder and others present can be established and maintained.
- Plastic materials must be covered with welding tarps during welding procedures.
- Fire Watch must be provided for all hot-work operations.

After welding operations are completed, the welder shall mark the hot metal or provide some other means of warning other workers.

Confined Space

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

Refer to VORTEX Companies 's Confined Space Program before commencing any welding, cutting, and/or brazing operations in an area meeting the requirements of a confined space.

Ventilation is a prerequisite to work in confined spaces.



When welding or cutting is being performed in any confined spaces, the gas cylinders and welding machines shall be left on the outside. Before operations are started, heavy portable equipment mounted on wheels shall be securely blocked to prevent accidental movement.

When a welder must enter a confined space through a manhole or other small opening, means shall be provided for quickly removing him in case of an emergency.

- When safety belts and lifelines are used for this purpose, they shall be so attached to the welder's body that it cannot be jammed in a small exit opening.
- An attendant with a preplanned rescue procedure shall be stationed outside to observe the welder at all times and be capable of putting rescue operations into effect.

When arc welding is to be suspended for any substantial period of time, such as during lunch or overnight, all electrodes shall be removed from the holders and the holders carefully located so that accidental contact cannot occur and the machine shall be disconnected from the power source.

In order to eliminate the possibility of gas escaping through leaks of improperly closed valves, when gas welding or cuffing, the torch valves shall be closed and the fuel-gas and oxygen supply to the torch positively shut off at some point outside the confined area whenever the torch is not to be used for a substantial period of time, such as during lunch hour or overnight. If practical, the torch and hose shall also be removed from the confined space.

When welding must be performed in a space entirely screened on all sides, the screens shall be so arranged that no serious restriction of ventilation exists. It is desirable to have the screens so mounted that they are about 2 feet (0.61 m) above the floor unless the work is performed at so low a level that the screen must be extended nearer to the floor to protect nearby workers from the glare of welding.

A fixed enclosure shall have a top and not less than two sides which surround the welding or cutting operations, and a rate of airflow sufficient to maintain a velocity away from the welder of not less than 100 linear feet (30 m) per minute.

All welding and cutting operations carried on in confined spaces shall be adequately ventilated to prevent the accumulation of toxic materials or possible oxygen deficiency. This applies not only to the welder, but also to helpers and other personnel in the immediate vicinity. All air withdrawn will be replaced with air that is clean.

In circumstances for which it is impossible to provide such ventilation, airline respirators or hose masks approved for this purpose by the National Institute for Occupational Safety and Health (NIOSH) will be provided. In areas immediately hazardous to life, a full-face piece, positive pressure, self-contained breathing apparatus or a combination full-face piece, positive pressure supplied-air respirator with an auxiliary, self contained air supply approved by NIOSH must be used.

Where welding operations are carried on in confined spaces and where welders and helpers are provided with hose masks, hose masks with blowers or self-contained breathing equipment, a worker shall be stationed on the outside of such confined spaces to ensure the safety of those working within.



Fumes, Gases and Dust

Fumes produced by some welding processes can be toxic and may require source extraction. An assessment of the work to be performed must be completed before each job is undertaken. Fumes generally contain particles from the material being welded. Welding fumes can have an acute effect on the respiratory system.

Any welding, cutting or burning of lead base metals, zinc, cadmium, mercury, beryllium or exotic metals or paints that could produce dangerous fumes shall have proper ventilation or respiratory protection.

Welders and helpers will refer to the VORTEX Companies Respiratory Protection Program to determine the appropriate respiratory protection to be used during welding operations.

All welding and cutting operations shall be adequately ventilated to prevent the accumulation of toxic materials. This applies not only to the welder, but also to helpers and other personnel in the immediate vicinity.

Personal Protection

Helmets and hand shields shall be made of a material, which is an insulator for heat and electricity. Helmets, shields, and goggles shall not be readily flammable and shall be capable of withstanding sterilization.

Helmets and hand shields shall be arranged to protect the face, neck and ears from direct radiant energy from the arc.

Helmets shall be provided with filter plates and cover plates designed for easy removal.

All parts shall be constructed of a material, which will not readily corrode or discolor the skin.

Goggles shall be ventilated to prevent fogging of the lenses as much as practicable.

All glass for lenses shall be tempered, substantially free from scratches, air bubbles, waves and other flaws. Except when a lens is ground to provide proper optical vision correction, the front and rear surfaces of lenses and windows shall be smooth and parallel.

Lenses shall bear some permanent distinctive marking which may readily identify the source and shade.

The following is a guide for the selection of the proper shade numbers. These recommendations may be varied to suit the individual's needs.



Welding Operation		Shade Number
Shielded metal – arc welding 1/16, 3/32, 1/8-5/32 inch electrodes		10
Gas-shielded arc welding (nonferrous) 1/16, 3/32, 5/32 inch electrodes		11
Gas-shielded arc welding (ferrous) 1/16, 3/32, 1/8, 5/32 electrodes		12
Shielded metal arc welding: 3/16	7/32, 1/4 inch electrodes	12
	5/16, 3/8-inch electrodes	14
Atomic hydrogen welding		10-14
Carbon arc welding		14
Soldering		2
Torch brazing		3 or 4
Light cutting, hp to 1 inch		3 or 4
Medium cutting, 1 inch to 6 inches		4 or 5
Heavy cutting, 6 inches or over		5 or 6
Gas welding (light) up to 1/8 inch		4 or 5
Gas welding (medium) 1/8 - 1/2 inch		5 or 6
Gas welding (heavy) 1/2 inch or over		6 or 8

NOTE:

In gas welding or oxygen cutting where the torch produces a high yellow light, it is desirable to use a filter or lens that absorbs the yellow or sodium line in the visible light of the operation. All filter lenses and plates shall meet the test for transmission of radiant energy prescribed in ANSI Z87.1 – 1968 – American National Standard Practice for Occupational and Educational Eye and Face Protection. Where the work permits the welder to be enclosed in an individual booth painted with a finish of low reflectivity such as zinc oxide (an important factor for absorbing ultraviolet radiation) and lamp black, or shall be enclosed with noncombustible screens similarly painted. Booths and screens shall permit circulation of air at floor level. Workers or other persons adjacent to the welding areas shall be protected from the rays by noncombustible or flameproof screens or shields or shall be required to wear appropriate goggles.

Adequate hand protection and clothing must be used to protect the body from welding hazards.

Cleaning Compounds

In the use of cleaning materials, because of their possible toxicity or flammability, appropriate precautions such as manufacturer instructions shall be followed.

- Degreasing and other cleaning operations involving chlorinated hydrocarbons shall be so located that no vapors from these operations will reach or be drawn into the atmosphere surrounding any welding operation.
- In addition, trichloroethylene and perchloroethylene shall be kept out of atmospheres penetrated by the ultraviolet radiation of gas-shielded welding operations.

Oxygen cutting, using a chemical flux, iron powder or gas shielded arc cutting for stainless steel shall be performed using mechanical ventilation adequate to remove the fumes generated.



Cylinders

Compressed gas cylinders shall be DOT-approved and legibly marked near the shoulder of the cylinder for the purpose of identifying the gas content with either the chemical or trade name of the gas.

- All compressed gas cylinder connections must comply with ANSI B57.1-1965 Standards.
- Compressed gas cylinders shall be secured in an upright position at all times except, if necessary, for short periods of time while cylinders are actually being hoisted or carried.

All cylinders shall be kept away from sources of heat and from radiators and piping systems that may be used for grounding purposes. Cylinders and cylinder valves including couplings and regulators shall be kept free from oily or greasy substances and must not be handled with gloves or rags in the same condition.

Stored oxygen cylinders shall be kept at least 20 feet from the fuel gas cylinders or combustible materials, especially oil or grease, or separated by a non-combustible barrier at least 5 feet high with a fire rating of at least one-half hour. All empty cylinders shall have closed valves. Valve protection caps shall always be in place and hand-tight except when cylinders are in use or connected for use.

Cylinders shall not be kept in unventilated enclosures such as lockers and cupboards.

Fuel gas cylinders stored inside buildings shall be limited to a total capacity of 2000 cubic feet (300 pounds) of liquefied petroleum gas, except for those in actual use or attached ready for use.

All acetylene cylinders shall be stored valve-end up.

Assigned storage spaces shall be located where cylinders cannot be knocked over or damaged by falling objects or subject to tampering by unauthorized persons.

- Back flow protection shall be provided by an approved device that will prevent oxygen from flowing into the fuel-gas system or fuel from flowing into the oxygen system.
- An approved device that will prevent flame from passing into the fuel-gas system shall provide flashback protection.
- An approved pressure-relief device set at the appropriate pressure shall provide backpressure protection.

Special care must be taken when transporting gas cylinders:

- Cylinders must be secured with valve cap installed.
- Cylinders shall not be lifted by the valve protection caps, the regulators must be removed and cylinders shall not be dropped or permitted to strike each other.
- Removed regulators must be carried in the cab of the vehicle.
- Cylinders shall not be tampered with nor should any attempt be made to repair them.
- They shall be handled carefully - rough handling, knocks, or falls are liable to damage the cylinder, valve or safety device and cause leakage.

Safety devices shall not be tampered with.



Arc Welding and Cutting

All personnel operating, installing, and maintaining welding equipment shall be qualified or trained to operate and maintain such equipment.

- All workmen assigned to operate or maintain equipment shall be familiar with and electrical welding equipment shall be chosen for safe operation and comply with applicable Requirements for Electric Arc Welding Standards to include: 29 CFR 1910.254, 29 CFR 1910.252 (a)(b) (c) and if gas shielded arc welding is done the must be familiar with the American Welding Society Standard A6- 1- 1966.
- Arc welding equipment must be designed to meet conditions such as exposure to corrosive fumes, excessive humidity, excessive oil vapor, flammable gasses, abnormal vibration or shock, excessive dust and seacoast or shipboard conditions.
- It shall be operated at recommended voltage in accordance to the manufacturer recommendations.
- All leads shall be periodically inspected and replaced if insulation is broken or splices are unprotected.
- Leads shall not be repaired with electrical tape.
- All ground connections shall be checked to determine that they are mechanically strong and electrically adequate for the required current.

A disconnecting switch or controller shall be provided at or near each welding machine along with over current protection.

All direct current machines shall be connected with the same polarity and all alternating current machines connected to the same phase of the supply circuit and with the same polarity.

- To prevent electrical contact with personnel, all electrode holders shall be placed where they do not make contact with persons, conducting objects or the fuel of compressed gas tanks.
- All cables with splices within 10 feet of the holder shall not be used.

If the object to be welded or cut cannot readily be moved, all moveable fire hazards should be removed.

If an object to be welded or cut cannot be moved and if all the fire hazards cannot be removed, then guards shall be used to confine the heat sparks and slag and to protect the immovable fire hazards.

Resistance Welding

All personnel operating, installing, and maintaining welding equipment shall be qualified or trained to operate and maintain such equipment.

- Voltage, interlocks, guarding, grounding and shields shall be in accordance with manufacturer recommendations.
- Precautions such as flash guarding, ventilation and shields shall be provided to control flashes, toxic elements and metal fumes.

If the object to be welded or cut cannot readily be moved, all moveable fire hazards should be removed.

Transmission Pipeline

When arc welding is performed in wet conditions, or under conditions of high humidity, special protection against electric shock shall be supplied.

Pressure testing:

- In pressure testing of pipelines, the workers and the public shall be protected against injury by the blowing out of closures or other pressure restraining devices.



- Protection shall be provided against expulsion of loose dirt that may have become trapped in the pipe.

The welded construction of transmission pipelines shall be conducted in accordance with the Standard for Welding Pipelines and Related Facilities, API Std. 1104-1998.

Oxygen Fuel Gas Welding and Cutting

Only approved apparatuses such as torches, regulators or pressure-reducing valves, setting generators and manifolds shall be used:

- Mixtures of fuel gases and air or oxygen may be explosive and must be guarded against.
- All hoses and hose connections shall comply with the Compressed Gas Association and Rubber Manufacturers' Associations' applicable standards.
- Workers in charge of the oxygen or fuel-gas supply equipment, including generators, shall be instructed and judged competent by the VORTEX Companies before being left in charge.

If the object to be welded or cut cannot readily be moved, all moveable fire hazards should be removed.

Fire Watch Requirements

A fire watch shall be under these conditions as a minimum:

- Locations where other than a minor fire might develop.
- Combustible materials are closer than 35 feet to the point of operation.
- Combustibles that are 35 feet or more away but are easily ignited.
- Wall or floor openings within a 35 feet radius of exposed combustible materials.
- Combustible materials are adjacent to the opposite side of metal partitions, ceilings or roofs.

Fire watch personnel MUST be maintained at least a half an hour after welding or cutting operations have been completed.

First Aid Equipment

First aid equipment shall be available at all times. All injuries shall be reported as soon as possible for medical attention. First aid shall be rendered until medical attention can be provided.

Training

Training shall include:

- Position Responsibilities
- Cutters, welders and their supervisors must be suitably trained in the safe operations of their equipment and the safe use of the process.
- Fire Watch Responsibilities - specifically, the fire watch must know:
 - That their ONLY duty is Fire Watch.
 - When they can terminate the watch.
 - How to use the provided fire extinguisher(s).
 - Be familiar with facilities and how to activate fire alarm, if fire is beyond the incipient stage.
- Operator Responsibilities
- Contractor Responsibilities
- Documentation requirements
 - Respirator Usage requirements
 - Fire Extinguisher training.



CIVIL INFRASTRUCTURE SOLUTIONS

WORK ZONE TRAFFIC SAFETY



Vortex Companies

Procedure Name	Environmental, Health & Safety Manual – Work Zone Traffic Safety
Applicability	VORTEX Companies – Employees & Subcontractors
Policy Revised	02.22.18

Purpose

Transportation incidents and workers struck by vehicles or mobile equipment account for the highest number of fatal work injuries, according to the Bureau of Labor Statistics. Workers such as emergency responders, clean-up, utility, demolition, construction, and others in areas where there are moving vehicles and traffic are exposed to being struck-by moving vehicles.

Work zones are used to move traffic in an approved direction and are typically identified by signs, cones, barrels, and barriers.

There must be a traffic control plan for the movement of vehicles in areas where there are also workers conducting other tasks. Drivers, workers on foot, and pedestrians must be able to see and understand the routes they are to follow.

Scope and Responsibilities

This Program applies to all VORTEX operated work zones and jobsites.

The project manager will determine the internal traffic control plan within the project worksite.

When there are several projects, coordinated vehicle routes and communication between contractors will reduce vehicular struck-by incidents.

The authority in charge, Federal, state, or local, will determine the configuration of the temporary traffic control zone for motorists and pedestrians.

General Requirements

Signs

- Standard highway signs for information, speed limits, and work zones will assist drivers in identifying, in designated traffic paths, such directives as: EVACUATION ROUTE; DO NOT ENTER; REDUCED SPEED AHEAD; ROAD CLOSED; and NO OUTLET.
- Using standard highway signs for internal construction worksite traffic control will assist workers in recognizing the route they are to use at the construction site.



Traffic Control Devices

- Standard traffic control devices, signals, and message boards will instruct drivers to follow a path away from where work is being done.
- The authority in charge will determine the approved traffic control devices such as cones, barrels, barricades, and delineator posts that will be used as part of the traffic control plan.
- These standard devices should also be used inside the work zone.

Flagging

- Flaggers and others providing temporary traffic control should wear high visibility clothing with a background of fluorescent orange-red or yellow-green and reflective material of orange, yellow, white, silver, or yellow-green.
- In areas of traffic movement, this personal protective equipment will make the worker visible for at least 1,000 feet, so that the worker can be seen from any direction, and make the worker stand out from the background.
- Class 2 garments are required when working on or adjacent to a roadway where traffic is moving under 50 mph.
- Class 3 Hi-Viz Garments are required when working on or adjacent to roadways where traffic is moving in excess of 50 mph.
 - Class 3 Hi-Viz Garments are also required during low-visibility situations, such as heavy snow or dense fog conditions.
- Drivers should be warned in advance with signs that there will be a flagger ahead.
- Flaggers should use STOP/SLOW paddles, paddles with lights, or flags.
 - The STOP sign should be octagonal with a red background and white letters and border.
 - The SLOW sign is the same shape, with an orange background and black letters and a border.

Lighting

- Flagger stations should be illuminated.
- Lighting for workers on foot and equipment operators is to be at least 5 foot-candles or greater.
- Where available lighting is not sufficient, flares or chemical lighting should be used.
- Glare affecting workers and motorists should be controlled or eliminated.

Training

- Flaggers should be trained/certified and use the signaling methods required by the authority in charge.
- Workers on foot, equipment operators, and drivers in internal work zones need to know the routes that construction vehicles will use.
- Equipment operators and signal persons need to know the hand signals used on the worksite. Operators and workers on foot need to know the visibility limits and the “blind spots” for each vehicle on site.
- Workers on foot are required to wear high visibility safety garments designated as class 1, 2, or 3 depending on the jobsite location and/or speed of traffic on the roadway.
- Workers are to be made aware of the ways in which shiftwork and nightwork may affect their performance.

Driving

- Seat belts and rollover protection is required be used and in place on equipment and vehicles as stated by the manufacturer.



WORKPLACE INCIDENT REPORTING PROCEDURE



Vortex Companies

Procedure Name	Environmental, Health & Safety Manual – Incident Reporting Procedure
Applicability	VORTEX Companies – Employees & Subcontractors
Policy Revised	10.28.2021

Purpose

The following procedures are provided to guide employees in reporting work-related incidents to ensure the proper care is given to our employees, we comply with local, state, federal, or site specific requirements, and we can properly manage claims through our insurance providers

Vortex Leadership Habits

Managing conflict and risk: I take a proactive approach to handling conflict in the workplace; solve problems by analyzing situations and applying critical thinking; identify, assess, and manage risk while striving to achieve desired organizational goals.

Definitions

Incident– An occurrence, condition, or situation arising during work that resulted in or could have resulted in injuries, illnesses, damage to health, or fatalities. An incident also encompasses all accidents or unplanned events that interrupt the completion of an activity, and that may (or may not) include injury or property damage.

As Soon as Reasonably Possible – at the first opportunity. When the site is secure, and employees are safe and treated if needed, but no later than the end of the work shift.

Notify - to give notice or report the occurrence of. Verbal confirmation of notification must be obtained for proper notification to have taken place.

RCA – Root Cause Analysis is the process of discovering the root causes of problems in order to identify appropriate solutions. RCA assumes that it is much more effective to systematically prevent and solve for underlying issues rather than just treating ad hoc symptoms.

First Aid - Any one-time treatment and subsequent observations which do not ordinarily require medical care.

Medical Treatment - Includes treatment of injuries, other than first aid, administered by physicians, registered professional personnel, or non-medical personnel.

Lost Time - Cases that involve days away from work or days of restricted work activity, or both.

Restricted work - occurs when, as the result of a work-related injury or illness: (A) You keep the employee from performing one or more of the routine functions of his or her job, or from working the full workday that he or she would otherwise have been scheduled to work.

Near Miss - unplanned occurrence that May or Could have resulted in injury/illness, property damage, or environmental/pollution releases in a work environment, but did not.

Good Catch - is recognition by an employee of a condition or situation that had the potential to cause an accident but did not cause one due to corrective actions or timely intervention by the employee.



Not Work Related (NWR) - Injury, illness, or pre-existing condition that is not work-related.

Recordable - All work-related injuries and illness which require medical treatment beyond first aid as defined by OSHA (Occupational Safety and Health Administration) 29 CFR 1904 Subpart C - Recordkeeping Forms and Recording Criteria.

Incident Reports

1. *Life-Threatening-Injury* – Severe, major incident requiring medical care above first aid level. Incident capable of causing death; potentially fatal.
2. *Non-Life-Threatening*– does not involve a substantial risk of death or fatality. Non-Life-Threatening injuries may be classified as first aids or recordables.
3. *Motor Vehicle Accident* – an accident involving a company-owned or operated motor vehicle.
 - a. Motor Vehicle Accident - Vortex NOT at fault
 - b. Motor Vehicle Accident - Vortex at fault
4. *Near Miss* – an unplanned event that did not result in injury, illness, or damage – but had the potential to do so.
5. *Good Catch* - a condition or situation that had the potential to cause an accident but did not cause one due to corrective actions or timely intervention by the employee.
6. *Unusual Incident* – an incident that is not an injury or motor vehicle accident, however, causes damage to Vortex owned or operated vehicle and equipment, public/private property damage, or an uncontrolled release of fluid or materials. Unusual incidents are broken down into the following categories.
 - a. Unusual Incident - equipment damage
 - b. Unusual Incident - sewer backup/overflow
 - i. *See sewer overflow and backup procedures*
 - c. Unusual Incident - private property damage
 - d. Unusual Incident - utility strike no other private property damage.
 - e. Unusual Incident - utility strike with private property damage
 - f. Unusual Incident - theft
 - g. Unusual Incident – Environmental/other
7. *Employee Welfare Concern* – clearly defines a non-work-related injury or illness for record keeping purposes only. The report may also be used to record an event or employee concern for historical reasons.

Key Personnel

Corporate	
Matt Timberlake Vortex CAO Phone: (207) 754-4282 Email: matt.timberlake@vortexcompanies.com	Johnathan Gonzalez Director of HSE Cell: (832) 820-1621 Email: jgonzalez@vortexcompanies.com
Wes Kingery President Vortex Services Phone: (813) 751-5652 Email: wkingery@vortexcompanies.com	Jack Frey Vortex Products COO Phone: (936) 520-3481 Email: jfrey@vortexcompanies.com
Brooke Malone HR Director Phone: (903) 522-1213 Email: bmalone@vortexcompanies.com	Andrew Gonnella President Vortex Products Phone: (845) 326-2633 Email: andrewg@vortexcompanies.com



Regional Health, Safety, and Environment Team Contacts	
Priscilla Cantu HSE Compliance Manager Phone: (832) 531-0953 Email: pcantu@vortexcompanies.com	Carlos Rueda Regional HSE Manager (Southeast & FL - US) Phone: (832) 425-7061 Email: crueda@vortexcompanies.com
Jamie Raymond Regional HSE Manager (Northeast - US) Phone: (207) 491-4110 Email: jraymond@vortexcompanies.com	TBD Regional HSE Manager (North Atlantic - US) Phone: (000) 000-0000 Email:
James Toups Regional HSE Manager (Northwest and Rocky Mountains) Phone: (832) 210-4388 Email: jtoups@vortexcompanies.com	Incident Report Inbox: Safety@vortexcompanies.com
Regional HR Team Contacts	
Katie Estes HR Representative – (Southwest - US) Phone: (281) 475-6422 Email: kestes@vortexcompanies.com	Samantha Byam HR Representative – (Northeast – US) Phone: (207) 320-3662 Email: samantha.byam@vortexcompanies.com
Courtney Swartzel Administrative Asst. – (Mid Atlantic - US) Phone: (814) 270-7602 Email: courtneys@vortexcompanies.com	Orland de Pedro HR Representative – (Southeast and FL - US) Phone: (719) 930-4389 Email: odedepedro@vortexcompanies.com

Departmental Responsibilities

The matrix below outlines what department is responsible for leading the incident investigation, incident life cycle management, and close out.

- The investigation lead is responsible for report writing, and or conducting an RCA when applicable.

HSE	Shared	Operations
<ul style="list-style-type: none"> • Life-Threatening Injury • Non-Life-Threatening Injury • Near Miss/Good Catch • Not Work Related • Stop Work Intervention • Regulatory Violation 	<ul style="list-style-type: none"> • Unusual Incident-Utility Strike w/Property Damage • Unusual Incident-Utility Strike w/o Property Damage • Unusual Incident - Other • Motor Vehicle Accident - At Fault • Motor Vehicle Accident - Not at Fault • Moving Violation 	<ul style="list-style-type: none"> • Unusual Incident Equipment Damage • Unusual Incident - Sewer Backup/Overflow • Unusual Incident - Private Property Damage • Unusual Incident - Theft



Incident Reporting Procedure

In the event of a workplace incident, the following basic reporting procedure must be followed:

1. The employee involved in, or witnessing an incident, must report the workplace incidents immediately to their supervisor. If you are unsure who your immediate supervisor is, report the said incident to your Regional Safety Manager or Corporate contact noted in this policy.
 - If an employee is faced with a life-threatening medical emergency, call 911 immediately for emergency medical treatment
2. Supervisors must report (*notify) the workplace incident immediately to their Regional Safety Manager.
 - **Immediate notification must be verbal. Emails, text, or voice mails are not appropriate forms of initial notification.**
3. If a Regional Safety Manager cannot be reached, your next point of contact is the Corporate Safety Director. Contact information is included above in this policy.
4. The Regional Safety Manager will advise the supervisor and/or employee involved in the incident on the appropriate next steps/actions to take.
 - In the event of a non-life-threatening incident, the Regional HSE Manager will advise on the necessary steps warranted and direct the type of facility the employee should seek if the incident warrants professional treatment. The health and well-being of our employees is our number 1 priority, yet not all illnesses/injuries/incidents warrant a trip to the ER.
 - Reference - Occupational Facility Provider List (Addendum), which compiles all preferred occupational clinics.
5. Incident leads (Reference - Incident Investigation and Management Responsibilities matrix above) are to complete the appropriate Incident Report Form, collect employee/witness statements, and collect all required signatures for the report. Regional safety Managers and Supervisors alike are to aid in this process however possible, regardless of who is lead.
 - Completed reports along with employee/witness statements are due to corporate compliance/claims within 24 hours.
 - Submit reports and statement to: Safety@vortexcompanies.com
 - For employees who experience a workplace incident, a post-accident/incident drug test may be required within 24 hours of the injury/incident. The HR Director or the Regional HR Manager shall provide the employee with the appropriate form for such testing at pre-approved drug testing facilities.
6. Depending on the incident type (Reference - Incident Investigation and Management Responsibilities matrix above), either the Regional HSE Manager or the operational lead, will take lead in performing a root cause analysis/investigation and report on the findings. The need for an RCA will be determined at a corporate level. RCA findings will be presented by the investigation team lead to an executive panel selected by our CEO.
7. Incidents involving the public and/or those that require compensation or settlements will require the completion of a release of liability agreement.

Incident Management Protocol

Multiple things may need to take place at once. Ensure to enlist the aid foreman and other employees to ensure all the below are taken care of:



1. Care for your employee first. The injured employees' safety comes first and getting an injured employee treated quickly is essential.
2. Secure the scene.
 - Do away with, isolate, or take care of the immediate hazard.
 - Take pictures, take pictures, and take pictures.
 - Collect statements.
3. Complete the necessary paperwork.
 - Meet with the designated regional safety manager for support when gathering the required information to complete your investigation
4. Institute corrective and mitigations action to prevent a recurrence.
5. Establish a return-to-work program.

Notes:

1. Implement progressive disciplinary action if the root cause is determined to be the result of the employee's engagement in unsafe work practices.
 - Communication with HR and employee's immediate supervisor regarding any potential disciplinary action needed.
2. A supervisor's failure to report a workplace incident within policy guidelines may result in disciplinary action, up to and including termination of employment.

HSE Regional Leads

1. Review incident report for accuracy and completion.
2. Aid/Lead in the performance of root cause investigations and analysis with designated supervisors and/or any other witnesses at the scene of the incident.
3. Ensure incident reports and findings are submitted to the Corporate Compliance/Claims Manager in a timely manner.
4. Report and review incident findings with the appropriate Regional Vice President and affected employees.
5. Recommended/review corrective actions to ensure they will successfully reduce future loss exposure.
6. Follow up with the appropriate Regional Vice President and affected personnel to ensure corrective actions are actively being implemented.
7. Ensure the incident file is completed and filed accordingly.

Corporate Compliance/Claims Manager

All claims must be reviewed and submitted by the Corporate Claims Manager. No claims may be handled at the regional level. Not all losses covered by insurance will result in a claim. Business units may be required to carry the expense associated with a loss when a claim is determined not to be the best path forward.

1. Gather appropriate documents from the Regional HSE Manager
2. Review the incident and submit a claim to the appropriate insurance carrier if warranted.
3. Provide the employee with the following documents and information:
 - Inform the employee of his/her rights under the appropriate State Workers' Compensation Act.
 - Provide the employee with appropriate workers' compensation documents and contact information.



4. Provide notice to payroll to ensure the employee is compensated for reasonable time spent at doctors and treatment appointments.
5. Provide notice to the employee's supervisor and appropriate Regional Safety Manager regarding the individual's status and/or restrictions, next appointment, and treatments as provided by the designated physician
6. Notification of the appropriate Regional Safety Manager of the employee's return to work.
7. Update Corporate Safety KPI .xlsx document with all relevant information, this document is communicated weekly to the leadership and regional managers.
8. Management of the claim from through its lifespan.

Revision Log

Rev. No.	Date	Completed By	Revision Details
0			Original Issue.
1	9/22/2020	Matthew Timberlake	Update to incident reporting procedures, definitions, and contacts.
2	03/08/2021	Johnathan Gonzalez	Definitions and reporting procedures were updated along with modifications to incident reports to match the revisions.

GENERAL REPORT

Return completed report to the HSE Department. The Regional Vice President must review before submittal.

Business Unit: _____ Report Prepared By: _____

Employee Involved: _____

Date of Event: _____ Time of Event: _____ Date Event was Reported: _____

Foreman: _____ Supervisor: _____

Description of incident or event: _____

Did the employee bring this to your attention? Yes _____ No _____

If NO, please explain: _____

Employee or witness statement (Attach if available)

REVIEW AND COMPLETION ACKNOWLEDGEMENT	
All signatures required prior to submitting	
Report Prepared By Signature: _____	Date: _____
Signature of HSE Manager: _____	Date: _____
Signature of RVP: _____	Date: _____
EVENT CLASSIFICATION	
DO NOT COMPLETE – TO BE COMPLETED BY SAFETY DEPARTMENT ONLY	
Not Work-Related _____	Report Only _____



GOOD CATCH/NEAR MISS REPORT

Return completed report to the HSE Department. The Regional Vice President must review before submittal.

Business Unit: _____ Report Prepared By: _____ Employee Involved: _____

Date of Event: _____ Time of Event: _____ Date Event was Reported: _____

Length of Service: 0-1 Month _____ 1-3 Months _____ 3-6 Months _____ 7mos. – 1 Year _____
 1-2 Years _____ 2-3 Years _____ 3-4 Years _____ 4-5 Years _____ 5+ Years _____

Foreman: _____ Supervisor: _____ Occupation of Employee Involved: _____

Witnesses (**Attach witness statement**): _____ ; _____ ; _____

Equipment Involved: _____ ; _____ ; _____

Location of Event: _____

Description of Events: _____

Corrective Action Taken: _____

Photos (photos of damage caused or sustained, any defective equipment required, and the scene as a whole):

REVIEW AND COMPLETION ACKNOWLEDGEMENT

All signatures required prior to submitting

Report Prepared By Signature: _____ Date: _____

Signature of HSE Manager: _____ Date: _____

Signature of RVP: _____ Date: _____

EVENT CLASSIFICATION

Good Catch _____

Near Miss _____

Stop Work Intervention _____

NON-LIFE THREATENING INCIDENT REPORT

Return completed report to the HSE Department. The Regional Vice President must review before submittal.

Business Unit: _____ Employee's Name: _____ Date of Incident: _____

Time of Incident: _____ Date Incident was Reported: _____ Employee Age: _____

Length of Service: 0-1 Month _____ 1-3 Months _____ 3-6 Months _____ 7mos. – 1 Year _____

1-2 Years _____ 2-3 Years _____ 3-4 Years _____ 4-5 Years _____ 5+ Years _____

Foreman: _____ Supervisor: _____

Injured Employee Occupation: _____

Witnesses: _____ ; _____ ; _____

Equipment Involved: _____ ; _____ ; _____

Location of Incident: _____

Type and Body Part (ex. Burn to L. Forearm): _____

Description of Events: _____

Corrective Action Taken: _____

Did Employee refuse medical treatment? Yes _____ No _____

Facility where Employee was treated: _____

Phone: _____

Address: _____

City: _____ State: _____ Zip: _____

Photos (photos of any injuries, damage caused or sustained, any defective equipment, and the scene as a whole):

REVIEW AND COMPLETION ACKNOWLEDGEMENT

All signatures required prior to submitting

Report Prepared by Signature: _____ Date: _____

Signature of HSE Manager: _____ Date: _____

Signature of RVP: _____ Date: _____

INJURY CLASSIFICATION

DO NOT COMPLETE – TO BE COMPLETED BY SAFETY DEPARTMENT ONLY

First Aid Jobsite _____

First Aid Clinic _____

Recordable _____

Recordable – Lost Time _____

Recordable – Restricted/Transfer _____



UNUSUAL INCIDENT REPORT

Return completed report to the HSE Department. The Regional Vice President must review before submittal.

Business Unit: _____ Employee’s Name: _____ Date of Incident: _____

Time of Incident: _____ Date Incident was Reported: _____ Employee Age: _____

Length of Service: 0-1 Month _____ 1-3 Months _____ 3-6 Months _____ 7mos. – 1 Year _____
1-2 Years _____ 2-3 Years _____ 3-4 Years _____ 4-5 Years _____ 5+ Years _____

Foreman: _____ Supervisor: _____

Witnesses: _____ ; _____ ; _____

Location of Event: _____

Description of Events: _____

Corrective Action Taken: _____

Vehicle/Equipment Details (Company Owned):

Vehicle/Equipment Year, Make, and Model: _____

VIN, Serial, Other: _____ Estimated cost of damages in \$: _____

Property Owner Details (Company Owned):

Property Address: _____ Contact Name: _____

Estimated cost of damages in \$: _____ Contact Number: _____

Vehicle/Equipment Details (Non-Company Owned):

Owner Name: _____ Contact Number: _____

Owner Address: _____

Vehicle/Equipment Year, Make, and Model: _____ VIN, Serial, Other: _____

Insurance Company: _____ Policy Number: _____

Insurance Company Contact Number: _____ Estimated cost of damages in \$: _____

Property Owner Details (Non-Company Owned):

Owner Name: _____ Owner Contact Number: _____

Owner Address: _____

Insurance Company: _____ Policy Number: _____

Insurance Company Contact Number: _____ Estimated cost of damages in \$: _____

Police Information (Only if Responded):

Police Department: _____ Police Department Contact Number: _____

Officer Name: _____ Officer Badge Number: _____

Case Number: _____ Date Report Available: _____

Photos (photos of damage caused or sustained, any defective equipment, and the scene as a whole):

REVIEW AND COMPLETION ACKNOWLEDGEMENT

All signatures required prior to submitting

Signature of Person Completing Report: _____ Date: _____

Signature of HSE Manager: _____ Date: _____

Signature of RVP: _____ Date: _____

INJURY CLASSIFICATION

DO NOT COMPLETE – TO BE COMPLETED BY SAFETY DEPARTMENT ONLY

DOT Reportable _____ Moving Violation _____ Regulatory Violation _____

Sewer Backup/Overflow _____ Equipment Damage _____ Property Damage _____

Utility Strike w/ Private Property Damage _____ Utility Strike w/o Private Property Damage _____

Motor Vehicle Accident – At Fault _____ Motor Vehicle Accident – Not At Fault _____

Theft _____ Complaints _____ Other _____



Incident Investigation Form

Use this form to investigate any workplace accident, injury, incident, close call or illness.
Return completed form to the Operations Supervisor, or Management.

Type of Incident:

Life-Threatening
 Non-Life Threatening
 Vehicle Accident
 Unusual Incident
 Near Miss

Location of incident:	Date of incident: Time: _____ am pm	Date accident/incident was reported:
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ACCIDENT/INCIDENT INFORMATION		
Supervisor: _____	Date of first missed shift: _____	No. of days lost: _____
Approximate date of onset (if no specific date of injury): _____		
Object/equipment/substance inflicting damage/injury: _____		
Nature of injury: _____ Body part(s) affected: _____		

EMPLOYEE INFORMATION	
Name (last name, first name—please print): _____	Home phone number: _____
	Age: _____ Sex: M / F
Home Address: _____ _____ _____	Date of employment: _____
	Occupation/position: _____
	Experience (time) in job: _____

Evaluation of Loss Potential if not corrected	Loss severity <input type="checkbox"/> Major <input type="checkbox"/> Serious <input type="checkbox"/> Minor	Probability of occurrence <input type="checkbox"/> High <input type="checkbox"/> Moderate <input type="checkbox"/> Low
---	--	--



Describe how the event occurred:

Immediate causes: What substandard acts/practices and conditions caused or could cause the event? See end of form.

Basic causes: What specific personal or job/system factors caused or could cause this event? See end of form.



Corrective actions: What has and/or should be done to control the causes listed?

PREVENTION OF ACCIDENT/INCIDENT RECURRENCE

Describe what action is planned or has been taken to prevent a recurrence of the accident/incident, based on the key contributing factors:

Immediate:

Long term:

Signed by the Supervisor: _____ **Signed by the person involved:** _____

Signed by the Senior Manager: _____

Investigation completed by: _____ **Date:** _____



CHECK ALL DIRECT CAUSES THAT APPLY

What CONDITION of tools, equipment, or work area contributed to incident? Not Applicable

- | | | |
|---|--|--|
| <input type="checkbox"/> Close Clearance/Congestion | <input type="checkbox"/> Floors/Work Surfaces | <input type="checkbox"/> Poor Housekeeping |
| <input type="checkbox"/> Hazardous Placement | <input type="checkbox"/> Inadequate Ventilation | <input type="checkbox"/> Equipment Failure |
| <input type="checkbox"/> Inadequate Warning System | <input type="checkbox"/> Inadequate Illumination | <input type="checkbox"/> Hazardous Materials |
| <input type="checkbox"/> Improper Material Storage | <input type="checkbox"/> Inadequate Guards/Barrier | <input type="checkbox"/> Defective Tools/Equipment/Vehicle |
| <input type="checkbox"/> Inadequate/Improper PPE | <input type="checkbox"/> Equipment Design | <input type="checkbox"/> Other _____ |

What ACTION or INACTION contributed to the incident? Not Applicable

- | | | |
|---|--|--|
| <input type="checkbox"/> Failure to Make Secure | <input type="checkbox"/> Used Defective Equipment | <input type="checkbox"/> Failure to Use PPE |
| <input type="checkbox"/> Improper Lifting | <input type="checkbox"/> Improper Technique | <input type="checkbox"/> Improper Loading/securement |
| <input type="checkbox"/> Used Equipment Improperly | <input type="checkbox"/> Unauthorized Actions | <input type="checkbox"/> Operating at Improper Speed |
| <input type="checkbox"/> Operating Procedure Deviation | <input type="checkbox"/> Improper Position | <input type="checkbox"/> Used Wrong Tool/Equipment |
| <input type="checkbox"/> Horseplay/Distractive Active | <input type="checkbox"/> Unsafe Act of Another Staff | <input type="checkbox"/> Under Influence Drugs/Alcohol |
| <input type="checkbox"/> Nullified Safety/Control Devices | <input type="checkbox"/> Running/Rushing/Acting In Haste | <input type="checkbox"/> Failure to Warn/Signal |
| <input type="checkbox"/> Servicing Equipment In Motion | <input type="checkbox"/> Other _____ | |

CHECK ALL UNDERLYING OR ROOT CAUSES THAT APPLY

What caused or influenced the substandard conditions or behaviors?

- | | | |
|--|---|--|
| <input type="checkbox"/> Lack of Proper Procedures | <input type="checkbox"/> Inadequate Job Instructions | <input type="checkbox"/> Inadequate Tools |
| <input type="checkbox"/> Inadequate Job Training Methods | <input type="checkbox"/> Inadequate Supervision | <input type="checkbox"/> Improper Layout or Design |
| <input type="checkbox"/> Inadequate Maintenance Standards | <input type="checkbox"/> Unsafe Design or Construction | <input type="checkbox"/> Poor Work Practice |
| <input type="checkbox"/> Poor Work Design | <input type="checkbox"/> Inadequate Purchasing Standards | <input type="checkbox"/> Lack of Skill |
| <input type="checkbox"/> Lack of Communication | <input type="checkbox"/> Improper Extension of Service Life | <input type="checkbox"/> Improper Planning |
| <input type="checkbox"/> Inadequate Cleaning | <input type="checkbox"/> Inadequate Environmental Controls | <input type="checkbox"/> Inadequate Capacity |
| <input type="checkbox"/> Inadequate Preventive Maintenance | <input type="checkbox"/> Inadequate Enforcement or Work Standards | |
| <input type="checkbox"/> Other _____ | | |

CHECK ALL ACTIONS NECESSARY TO CORRECT THE DIRECT AND ROOT CAUSES

What corrective actions have been taken or are needed to prevent a recurrence?

- | | | |
|---|---|---|
| <input type="checkbox"/> Task Analysis/Procedure Revision | <input type="checkbox"/> Improve Clean-Up Procedures | <input type="checkbox"/> Repair/Replace Equipment |
| <input type="checkbox"/> Reinstruction of Employees | <input type="checkbox"/> Improve Storage/Arrangement | <input type="checkbox"/> Rotation of Employee |
| <input type="checkbox"/> Eliminate Congestion | <input type="checkbox"/> Improve/Change Work Method | <input type="checkbox"/> Identify/Improve PPE |
| <input type="checkbox"/> Task Analysis to Be Completed | <input type="checkbox"/> Install/Revise Guards/Devices | <input type="checkbox"/> Improve Enforcement |
| <input type="checkbox"/> Improve Design/Construction | <input type="checkbox"/> Job Reassignment of Employees | <input type="checkbox"/> Use Other Materials/Supplies |
| <input type="checkbox"/> Improve Illumination | <input type="checkbox"/> Mandatory Pre-Job Instructions | <input type="checkbox"/> Improve Ventilation |
| <input type="checkbox"/> Other _____ | | |

Recommended corrective actions or preventive measures to be taken

Action Item	Person Responsible	Target Date	Date Complete

Investigation Review (Initial after reviewing the findings of the investigation):

	Initials	Review Date	Comments
Supervisor			
Manager			
Safety and Compliance			

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