SDMS Document
125654

# REGION II RST2 HEALTH AND SAFETY PLAN
# EMERGENCY RESPONSE / REMOVAL ASSESSMENT
# (Revised 28 April 2008)

**TDD No.** TO-0009-0008 **Site Name:** Cornell-Dubilier Electronics

**Site Address:** Street No. 333 Hamilton Blvd
City South Plainfield
County/State Middlesex, New Jersey

**Directions to Site:**

1. Proceed WEST on King Georges Post Road toward Clearview Ave (0.8 mi). 2. Merge onto Woodbridge Ave/CR-514E toward I-287/ New Jersey Turnpike/Rt. 440/Garden State Parkway (0.4 mi) 3. Take the New Jersey Turnpike ramp (0.2 mi) 4. Merge onto I-287 N via the exit on the Left (4.8 mi) 5. Take the Durham Ave exit –Exit 4- toward S Plainfield (0.2 mi) 6. Turn Right onto Durham Ave (0.4 mi) 7. Durham Ave becomes CR-603 (1.2 mi) 8. Stay Straight to go onto Hamilton Blvd (<0.1 mi) 9. Arrive at 333 Hamilton Blvd

**Historical/Current Site Information:**

The site known as Cornell-Dubilier Electronics is located at 333 Hamilton Blvd, South Plainfield, New Jersey. The site is the location of a former manufacturer of electronic parts and components, including capacitors. Cornell-Dubilier Electronics, Inc. also tested transformer oils. During their operations, the company dumped PCB-contaminated materials and other hazardous substances directly onto the soil at the site. The Site is on the National Priorities List and is being remediated by the EPA Remedial Program and the U.S. Army Corps of Engineers. Currently, the buildings at the Site are being demolished. The Site is approximately 25 acres in size, including an open field and adjoining wetland complex. The Bound Brook traverses the southeast corner of the Site.

In 1997, the Removal Action Branch (RAB) and START collected sediment and soil samples along 2.4 miles of the Bound Brook. In 1999, the floodplain of the Bound Brook was sampled. In December 2007, RST 2 conducted a sampling event to determine if there have been any changes in the PCB concentrations since the 1997 sampling event. Sediment and water samples were collected at 50' intervals from 44 locations along a half-mile stretch of the Bound Brook (Reaches 1-4 from the 1997 sampling event). Sediment samples were obtained from the center of the stream bed and from 2 locations along the north and south banks of the Bound Brook, approximately 5 feet and 10 feet from each stream bank (0-6 inch and 18-24 inch depths). Water samples were also collected from the center of the stream. Approximately total of 440 sediment samples were collected during the investigation.

**RST 2 Scope of Work**:

RST 2 has been tasked to expand the 1997, 2007/2008 sampling event into additional areas in the flood plain of the Bound Brook to delineate PCBs contamination. Soil samples will be obtained using a direct push rig and/or stainless steel bucket augers at 50' intervals from eight transects along Reach 3 of the Bound Brook. In addition, RST 2 will collect soil, sediment and water samples from drainage swales in Reach 2 (Transect U) and Reach 3 (Transect FF) and sediment samples from two locations in the 3rd Culvert. RST 2 will collect locational data from each sample location and provide for vegetative clearance. Date of Mobilization: **Monday, September 22, 2008.**

**Incident Type:**
( ) Emergency Response -
(X) Removal Assessment - 9/22/08 to 9/26/08
( ) Residential Sampling / Investigation -
( ) PRP Oversight -
( ) Removal Action –

**Location Class:** ( ) Industrial (X) Commercial (X) Urban/Residential ( ) Rural

U.S. EPA Contact: Nick Magriples
Original HASP: Yes or No No
Lead RST2: John Brennan

Date of Initial Site Activities: 9 / 22 / 2008
Modification Number: 02
Site Health & Safety Coordinator: John Brennan
Health & Safety Alternate: TBD

**Response Activities/Dates of Response** (fill in as applicable)

**Emergency Response**:
( ) Perimeter Recon.
( ) Site Entry
( ) Visual Documentation
( ) Multi-Media Sampling
( ) Decontamination

**Assessment:**
(X) Perimeter Recon. -9/22/08 to 9/26/08
(X) Site Entry -9/22/08 to 9/26/08
(X) Visual Documentation-9/22/08 to 9/26/08
(X) Multi-Media Sampling - 9/22/08 to 9/26/08
(X) Decontamination - 9/22/08 to 9/26/08

**Physical Safety Hazards to Personnel**

(X) Heat – *Attach FLD05*
( ) Precipitation - *Attach FLD02*
(X) Terrain - *Attach FLD11*
(X) Walking/Working Surfaces
( ) Oxygen Deficiency
( ) Overhead Utilities
( ) Unknowns in Drums, Tanks
( ) Waterways – *Attach FLD19*
( ) Illumination - *Attach FLD39*
( ) Nonionizing Radiation
( ) Excavations– *Attach FLD28*
(X) Drilling Safety– *Attach FLD56*
( ) Cold – *Attach FLD06*
( ) Confined Space
( ) Noise- *Attach FLD01*
( ) Fire & Explosion
(X) Underground Utilities– *Attach FLD34*
( ) Heavy Equipment – *Attach FLD22*
( ) Ponds, Lagoons, Impoundments
( ) Pressurized Containers, Systems - *Attach FLD16*
( ) Noise- *Attach FLD01*
( ) Ionizing Radiation
( ) Elevated Work Surfaces / Manlifts - *Attach FLD24*
(X) Working over or near water - *Attach FLD 19*

**Water Safety**

*While working on the slopes and banks of the Bound Brook, employees should give special attention to the briars / thorny vegetation that is pervasive up and down the waterway. Avoid walking through patches of briars and if necessary, use shears to clear the vegetation. In addition, each employee should wear chest or hip waders when working in the vicinity of or in the Bound Brook due to the anticipated muddy conditions along the banks and high (3-4') water levels.*

*Any employee working in the water must be wearing a personal floatation device (pfd) / life vest. In addition, all personnel should bring a set of extra clothing with them to Site in case their clothes become wet or saturated.*

**Railroad Right-of-Way**

*Any employee working within 50 feet of a railroad on or the Conrail property must complete a training class provided by Conrail and wear a hard hat and high-visibility vest.*

**Biological Hazards to Personnel**

( ) Infectious/Medical/Hospital Waste ( ) Non-domesticated Animals (X) Insects
(X) Poisonous Plants/Vegetation ( ) Raw Sewage

**Training Requirements**

(X) 40 Hour General Site Worker Course with three days supervised experience
( ) 24 Hour Course for limited, specific tasks with one day supervised experience
(X) 8 Hour Annual Refresher Health and Safety Training
( ) 8 Hour Management/Supervisor Training in addition to basic training course
( ) Site Specific Health and Safety Training
( ) Pre-entry training for emergency response skilled support personnel

**Medical Surveillance Requirements**

(X) Baseline initial physical examination with physician certification
(X) Annual medical examination with physician certification
( ) Site Specific medical monitoring protocol (Radiation, Pesticides, PCBs, Metals)
( ) Asbestos Worker medical protocol
( ) Exempt from medical surveillance _____.
(X) Examination required in event of chemical exposure or trauma

**Vehicle Use Assessment and Selection**

Driving is one of the most hazardous and frequent activities for Weston Employees. As such, Weston Employees are required to adhere to established safe operating practices in order to maintain their eligibility to drive Weston owned, leased, or rented vehicles. Every person riding in a Weston vehicle, including passengers must maintain a commitment for a safe journey. This means being attentive while in the vehicle and helping the driver to notice hazards ahead of and around the vehicle and ensure that their presence does not distract the driver from safely operating the vehicle.

A high percentage of vehicle accidents occur when operating in reverse. Anytime a vehicle is operated in reverse, e.g., backing out of a parking area, if there are passengers, at least one of them are to assist the driver by acting as a guide person during the reverse movement or during other vehicle operation where it would be prudent to have a guide person(s) participate in the vehicle movement. When practical, the preferred parking method would be to back into the parking area.

At a minimum, each Weston Driver must:

- Possess a current, valid drivers' license
- Obey posted speed limits and other traffic laws
- Wear seat belts at all times while the vehicle is in operation
- Conduct a 360 degree inspection around the vehicle before attempting to drive the vehicle
- Report accidents / incidents immediately and complete a Notice of Incident (NOI)
- Keep vehicles on approved roadways (FWD doesn't guarantee mobility on unapproved surfaces)

All Region II RST 2 personnel are experienced and qualified to drive RST 2 fleet vehicles (Trailblazers, Suburbans, Cargo Van, and 10' x 12' Box Truck). However, in the event that vehicle rental is required, each person must take the time to familiarize themself with that particular vehicle. This familiarization includes adjustment of the dashboard knobs/controls, mirrors, steering wheel, seats, and a 360 degree external inspection of the vehicle.

1. The following vehicles are anticipated to be used on this project:

( ) Car
( ) Pickup Truck
( ) Intermediate / Standard SUV (e.g. Chevy Trailblazer, Chevy Tahoe, Jeep Liberty, Ford Explorer)
(X) Full Size SUV (e.g., Chevy Suburban, Ford Expedition, GMC Yukon)
(X) Minivan / Cargo Van
( ) Box Truck (Size:_____) or Emergency Response Vehicle (ERV)
( ) Other _____

( ) Other _____

2. Are there any on-site considerations that should be noted:

( ) Working/Driving Surfaces, (X) Debris, ( ) Overhead Clearance, ( ) Obstructions, (X) Tire Puncture Hazards, ( ) Vegetation, (X) Terrain, ( ) Parking, ( ) Congestion, ( ) Site Entry/Exit Hazards, ( ) Local Traffic Volume, ( ) Security, ( ) Heavy Equipment, (X) Time/Length of Work Day

Do any of the considerations above require further explanation:

No _____

_____

3. Are there any seasonal considerations that should be noted (e.g., Anticipated Snowy Conditions):

No _____

_____

4. Is a Traffic Control Plan required? ( ) Yes / (X) No.
   If so, the Traffic Control Plan must be attached to this Health & Safety Plan.

# Chemical Hazards to Personnel

| **Physical Parameters** | **Chemical Contaminant**<br>**Chlorodiphenyl (54% Cl)**<br>**CAS 11097-69-1** |
|---|---|
| Exposure Limits<br>IDLH Level | ____ ppm 0.5 mg/m$^3$ PEL<br>____ ppm 0.001 mg/m$^3$ REL<br>____ ppm Ca [5] mg/m$^3$ IDLH |
| Physical Form (Solid/Liquid/Gas)<br>Color | X (below 50degF) Solid X Liquid<br>____ Gas<br>Colorless to light colored or pale yellow Color |
| Odor | Mild hydrocarbon odor |
| Flash Point<br>Flammable Limits | NA Degrees F or C<br>NA % UEL NA % LEL |
| Vapor Pressure<br>Vapor Density | 0.00006 mm/Hg<br>NA Air = 1 |
| Specific Gravity | 1.38 Water = 1 |
| Solubility | Insoluble |
| Incompatible Material | Strong oxidizers |
| Routes of Exposure | X Inh X Abs<br>X Con X Ing |
| Symptoms of Acute Exposure | Eye irritant, chloracne, liver damage, reproductive effects, (potential occupational carcinogen) |
| First Aid Treatment | Irrigate eyes immediately for 15 minutes, remove to fresh air. If contacts skin, wash with soap immediately. If breathing has stopped, perform artificial respiration. Keep the affected person warm and at rest. Seek medical attention immediately. |
| Ionization Potential | N/A eV |
| Instruments for Detection | ____ PID w/ ____ Probe<br>____ FID ____ CGI ____ RAD<br>____ Det Tube ____ pH<br>Other NIOSH 5503 |

**Control Measures**

Site Map with work zones:

**Work Zone Definitions:**

Exclusion Zone - the area where contamination is either known or expected to occur and the greatest potential for exposure exists. The outer boundary of the Exclusion Zone, called the Hotline, separates the area of contamination from the rest of the site.

Contamination Reduction Zone (CRZ) - the area in which decontamination procedures take place. The purpose of the CRZ is to reduce the possibility that the Support Zone will become contaminated or affected by the site hazards.

Support Zone - the uncontaminated area where workers are unlikely to be exposed to hazardous substances or dangerous conditions. The Support Zone is the appropriate location for the command post, medical station, equipment and supply center, field laboratory, and any other administrative or support functions that are necessary to keep site operations running efficiently.

**Communications:**

(X) Buddy System ( ) Radio ( ) Air Horn for emergencies
(X) Hand Signals (X) Visual Contact

**Personnel Decontamination Procedures:**

(X) Wet Decontamination (procedures as follows)
(X) Dry Decontamination (procedures as follows)

Used PPE will be placed in designated containers at the entrance to the hot zone and will be disposed of with the PPE generated by the EPA / USACE. Wash-water generated from the decontamination of chest-waders will be containerized in 55-gallon drums on-site and will be disposed of by the EPA / USACE.

**Equipment Decontamination Procedures:**

(X) None (Dedicated Equipment)
(X) Wet Decontamination (Non-Dedicated Equipment - Procedures As Follows)
( ) Dry Decontamination

All non-disposable stainless steel equipment (stainless steel bucket augers, Geoprobe® tubes and drive shoes) involved in field sampling activities will be decontaminated in accordance to EPA/ERT SOP # 2006 before, during and after the sampling event. Following the dry removal of adhering soil to the greatest practical extent, decontamination will be conducted as: (1)- Alconox detergent and potable water scrub. (2) – Potable water rinse, distilled water rinse, (3) Hexane rinse followed by distilled water rinse and air dry. Geoprobe® tubes and drive shoes may require additional decontamination with a Steam Jenny® following the Alconox detergent / potable water scrub.

All disposable sampling equipment (plastic scoops, aluminum pans) and used acetate sleeves will be bagged and drummed in 55-gallon drums on-site and will be disposed of by the EPA / USACE.

Adequacy of decontamination determined by: Site H&S Supervisor

**Personal Protective Equipment**

| TASK TO BE PERFORMED | ANTICIPATED LEVEL OF PROTECTION | TYPE OF CHEMICAL PROTECTIVE COVERALL | INNER GLOVE OUTER GLOVE BOOT COVER | TYPE OF APR CARTRIDGE OR CANISTER |
|---|---|---|---|---|
| Perimeter Recon / GPS / Equipment Decontamination | Level D | Tyvek | Blue Nitrile/Blue Nitrile/ Booties | N/A |
| In-Stream Sediment Sampling | Level D | Saranex or Tyvek and Chest Waders, PFD | Blue Nitrile/Blue Nitrile/ Booties | N/A |
| Floodplain Sediment / Soil / Water Sampling | Level D | Saranex or Tyvek and Chest Waders | Blue Nitrile/Blue Nitrile/ Booties | N/A |
| Soil Sampling within Railroad Right-of-Way | Level D | Saranex or Tyvek | Blue Nitrile/Blue Nitrile/ Booties | N/A |

Frequency and Types of Air Monitoring: ( ) Continuous ( ) Routine ( ) Periodic (X) Not Required

| DIRECT READING INSTRUMENTS<br><br>ID NUMBER | **MultiRAE** CGI/O2-H2S-CO-PHOTO IONIZATION DETECTOR | **Ludlum 19** Micro-R Meter/**Ludlum Model 3** Survey Meter/Probe | **Photovac** MicroFID | **Drager** Chemical Detector Tube | OTHER |
|---|---|---|---|---|---|
| CALIBRATION DATE | | | | | |
| RST MEMBER | | | | | |
| ACTION LEVEL | ≥ 10 - 20% LEL (ConfinedSpace/non-ConfinedSpace)<br><br>≤ 19.5%, $O_2$ Deficient<br><br>≥ 23% $O_2$ - Enriched | 3X BACKGROUND - CAUTION;<br><br>1 mR/HR - LEAVE | UNKNOWNS:<br><br>1 - 5 UNITS - "C"<br><br>5-500 UNITS-"B" | PEL/TLV COMPARE WITH RESPONSE OF TUBE | |

## Emergency Telephone Numbers

| Emergency Contact | Location | Phone Number | Notified |
|---|---|---|---|
| **Hospital *** | **Muhlenberg Regional Medical Center 1200 Randolph Road, Plainfield, NJ 07060** | **(908) 668-2000** | Yes |
| **Ambulance** | | 911 | No |
| **Police** | 2480 Plainfield Avenue, South Plainfield, NJ 07080 | 911 or (908) 755-0700 | No |
| **Fire Department** | 123 Maple Ave. South Plainfield, NJ 07080 | 911 or (908) 226-7715 | No |

*Chemical Trauma Capability? (X) Yes ( ) No

If no, closest backup: _____ Phone:

Directions to Hospital:

1. Start out going SOUTHWEST on HAMILTON BLVD toward LAKEVIEW AVE / CR-603
2. Turn SHARP RIGHT onto LAKEVIEW AVE / CR-603
3. Turn RIGHT onto MAPLE AVE / CR-602
4. Turn LEFT onto PARK AVE / CR-531
5. End at Muhlenberg Regional Med Ctr
   (Approx. 2.5 miles, 8 minutes)

Route verified by: _____ Date: __/__/

**Additional Emergency Phone Contacts**

| | |
|---|---|
| WESTON Medical Emergency Service<br>(Dr. Patrice Marshall, Medical Director)<br><br>WESTON Medical Emergency Service<br>Dr. Frank Mitchell (After Hours) | 800-874-4676<br>(Regular Business Hours)<br><br>404-898-4723 |
| Chemtrec | 800-424-9300 |
| ATSDR | 404-639-0615 |
| ATF (explosives information) | 800-424-9555 |
| National Response Center | 800-424-8802 |
| National Poison Control Center | 800-764-7661 |
| Chemtel | 800-255-3924 |
| DOT | 800-424-8802 |
| CDC | 800-232-0124 |
| | |
| | |

HASP prepared by: _____ Date: 9/16/08
Pre-Response/Entry Approval by: _____ Date: 9/16/08
Verbal Approval/Modification to Original HASP by: _____ Date: __/__/

**Description of Site and Response Activities**

Size of Site: _____ Terrain: _____ Weather:

Distance to Nearest:

Residence _____ School _____ Hospital

Public Building _____ Nearest Waterway: _____ - (name)

Other

Evacuation: ( ) Yes ( ) No By Whom:

| Condition | Observed | Potential | None | Comments/Observations |
|---|---|---|---|---|
| Surface Water Contamination | | | | |
| Ground Water Contamination | | | | |
| Drinking Water Contamination | | | | |
| Air Release | | | | |
| Soil Contamination | | | | |
| Stressed Vegetation | | | | |
| Dead Animal Species | | | | |

Action Taken On-Site:

Perimeter Monitoring:( ) Yes ( ) No
Site entry by RST2: ( ) Yes ( ) No

| **Tasks Conducted** | **Level of Protection/Specific PPE Used** |
|---|---|
| | |
| | |
| | |

**Hazardous Waste Site and Environmental Sampling Activities**

Off Site: (X) Yes ( ) No
On Site: (X) Yes ( ) No

Describe types off samples and methods used to obtain samples:
Soil samples will be obtained using a direct push rig and/or stainless steel bucket augers from depths of 0-6 inches, 18-24 inches and 36-42 inches below grade from eight transects along Reach 3 of the Bound Brook. In addition, RST 2 will collect soil, sediment and water samples from drainage swales in Reach 2 (Transect U) and Reach 3 (Transect FF) and sediment samples from two locations in the 3rd Culvert.

Was laboratory notified of potential hazard level of samples? (X) Yes ( ) No

Note: The nature of the work assignment may require the use of the following procedures/programs which will be included as attachments to this HASP as applicable: Emergency Response Plan, Confined Space entry Procedures, Spill Containment Program.

Disclaimer: This Health and Safety Plan (HASP) was prepared for work to be conducted under the Removal Support Team 2 (RST2) Contract EP-W-06-072. Use of this HASP by WESTON and its subcontractors is intended to fulfill the OSHA requirements found in 29 CFR 1910.120. Items not specifically covered in this HASP are included by reference to 29 CFR 1910 and 1926.

The signatures below indicate that the individuals have read and understood this Health and Safety Plan.

| PRINTED NAME | SIGNATURE | AFFILIATION | DATE |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

| | | |
|---|---|---|
| Final Submission of HASP by: | | Date |
| Post Response Review by: | | |
| Post Response Approval by: | | |
| RST2 HSO Review by: | | |

## Air Monitoring Summary Log

Date: __/__/
Data Collected by:

| Station/Location | CGI/$O_2$ Meter | Radiation Meter | PID | FID | Other (_____) |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

Summary/Comments (data to be summarized by a range of readings, i.e. "Low to High" and/or "Average" by location):

## ATTACHMENT A

## FLDS

Heat – FLD05

Terrain – FLD11

Working Over or Near Water – FLD19

Underground Utilities – FLD34

Drilling Safety – FLD56

## FLD 05 HEAT STRESS PREVENTION AND MONITORING

Heat stress may occur at any time work is performed at elevated temperatures. If the body's physiological processes fail to maintain a normal body temperature because of excessive heat, a number of physical reactions can occur such as fatigue, irritability, anxiety, and decreased concentration or dexterity, and possibly death. Because heat stress is one of the most common and potentially serious illnesses at field sites, regular monitoring and other preventive measures are vital to ensure worker safety. Wearing chemical protective clothing often decreases natural body heat loss (cooling) and increases the risk of heat stress.

Employees who are taking prescription or over-the-counter medications should consult with their personal physician prior to working in high-temperature environments to see if their medication would impair their ability to handle heat stress.

### REFERENCES

OSHA 29 CFR 1910 and 1926

### RELATED FLDs

*FLD 02 – Inclement Weather*
*FLD 03 – Hot Processes – Steam, Low Temperature Thermal Treatment Unit, and Transportable Incinerator*
*FLD 08 – Confined Space Entry Program*
*FLD 36 – Welding/Cutting/Burning*
*FLD 37 – Pressure Washers/Sandblasting*

### PROCEDURE

#### Heat Stress Symptoms and Treatment

Heat Rash

Heat rash, also known as prickly heat, may occur in hot and humid environments where sweat is not easily removed from the surface of the skin by evaporation and is aggravated by chafing clothes. When extensive or complicated by infection, heat rash can be so uncomfortable that it inhibits sleep and impairs a worker's performance.

*Symptoms* – Mild red rash, especially in areas of the body that come into contact with protective gear.

*Treatment* – Decrease amount of time spent working in protective gear and provide body powder to help absorb moisture and decrease chafing. Heat rash can be prevented by showering, resting in a cool place, and allowing the skin to dry.

Heat Cramps

Heat cramps are caused by inadequate electrolyte intake. The individual may be receiving adequate water; however, if not combined with an adequate supply of electrolytes, the blood can thin to the point where it seeps into the active muscle tissue, causing cramping.

*Symptoms* – Acute painful spasms of voluntary muscles, most notably the abdomen and extremities.

*Treatment* – Move the victim to a cool area and loosen clothing. Have the victim drink 1 to 2 cups of lightly salted water or diluted commercial electrolyte solution (e.g., Gatorade, Quench) immediately, and then every 20 minutes thereafter until symptoms subside. Electrolyte supplements can enhance recovery however, it is best to double the amount of water required by the dry mix package directions or add water to the liquid form.

Heat Exhaustion

Heat exhaustion is a state of weakness or exhaustion caused by the loss of fluids from the body. The condition is much less dangerous than heat stroke, but it nonetheless must be treated.

*Symptoms* – Pale, clammy, and moist skin, profuse perspiring, and extreme weakness. Body temperature is normal, pulse is weak and rapid, and breathing is shallow. The person may have a headache, may vomit, may feel dizzy, and may be irritable or confused.

*Treatment* – Move the victim to a cool, air-conditioned or temperature-controlled area, loosen clothing, place in a position with the head lower than the feet (shock prevention), and allow the victim to rest. Consult a physician. Have the victim drink 1 to 2 cups of water immediately, and every 20 minutes thereafter until symptoms subside. Seek medical attention at the advice of the consulting physician.

Heat Stroke

Heat stroke is an acute and dangerous reaction to heat stress caused by a failure of the body's heat regulating mechanisms (i.e., the individual's temperature control system [sweating] stops working correctly). Body temperature rises so high that brain damage and death may result if the person is not cooled quickly.

*Symptoms* – Red, hot, dry skin (although the person may have been sweating earlier); nausea, dizziness, confusion, extremely high body temperature, rapid respiratory and pulse rate, seizures or convulsions, unconsciousness or coma.

*Treatment* – Immediately call for emergency medical assistance. Remove the victim from the source of heat and cool the victim quickly. If the body temperature is not brought down quickly, permanent brain damage or death may result. Soak the victim in cool (not cold) water, sponge the body with cool water, or pour water on the body to reduce the temperature to a safe level (less than 102°F). Monitor the victim's vital signs. If possible, have the victim drink cool water. Do not give the victim coffee, tea, or alcoholic beverages.

**Recognition and Risk Assessment**

In the planning stages of a project, the potential for heat stress disorders must be considered as a physical hazard in the site-specific Health and Safety Plan (HASP). Risk assessment can be accomplished in the development stages of a project by listing in the HASP the most likely heat stress disorders that may occur. The Field Safety Officer (FSO) must make decisions on the proper safety procedures and recommend them to the site manager. Each worker must evaluate the risk associated with his or her work and be actively alert to these hazards. Any site worker may stop work if safety procedures are not followed or the risk is too great. In addition, all site personnel must be aware of these symptoms in both themselves and their co-workers.

**Prevention and Protection Programs**

Heat stress is affected by several interacting factors including, but not limited to, age, obesity, physical condition, substance abuse, level of personal protective equipment (PPE) worn, and environmental conditions (temperature, shade, and humidity). Site workers must learn to recognize and treat the various forms of heat stress. The following recommendations should be followed to prevent heat stress:

- The most important measure to prevent heat-related illness is adequate fluid intake. Workers should drink 1/2 to 1 quarts of liquids per hour in high heat conditions. Most of this liquid should be water. Under heavy work and heat conditions, the body may lose up to 2 gallons of fluids per day. To prevent heat stress symptoms, the individual must ensure replacement of this fluid.
- Provide disposable cups that hold about 4 ounces, and water that is maintained at 50 to 60°F. Workers should drink 16 ounces of water before beginning work, and a cup or two at each break period.
- Provide a shaded area for rest breaks. Ensure that adequate shelter is available to protect personnel against heat and direct sunlight. When possible, shade the work area.
- Discourage the intake of caffeinated drinks during working hours.
- Monitor for signs of heat stress.
- Encourage workers to maintain a good diet during these periods. In most cases, a balanced diet and lightly salted foods should help maintain the body's electrolyte balance. Bananas are especially good for maintaining the body's potassium level.
- If utilizing commercial electrolyte mixes, double the amount of water called for in the package directions. Indications are that "full-strength" preparations taken under high heat stress conditions may actually decrease the body's electrolytes.
- Acclimate workers to site work conditions by slowly increasing workloads (i.e., do not begin work activities with extremely demanding tasks).
- Rotate shifts of workers who are required to wear impervious clothing in hot weather.
- Encourage workers to wear lightweight, light-colored, loose-fitting clothing.
- In extremely hot weather, conduct field activities in the early morning and evening.
- Provide cooling devices to aid natural body heat regulation. These devices, however, add weight and their use should be balanced against worker efficiency. An example of a cooling aid is long cotton underwear, which acts as a wick to absorb moisture and protect the skin from direct contact with heat-absorbing protective clothing.
- Good hygienic standards must be maintained by frequent showering and changes of clothing.
- Clothing should be permitted to dry during rest periods.
- Whenever working in the sun, provide employees with sunscreen with both UVA and UVB protection.
- Persons who notice skin problems should immediately consult medical personnel.

**Heat Stress Monitoring and Work Cycle Management**

When strenuous field activities are part of on-going site work conducted in hot weather, the following guidelines should be used to monitor the body's physiological response to heat, and to manage the work cycle, even if workers are not wearing impervious clothing. These procedures should be instituted when the temperature exceeds 70°F and the tasks/risk analysis indicates an increased risk of heat stress

problems. Consult the HASP and a safety professional (e.g., Division EHS Manager, FSO) if questions arise as to the need for specific heat stress monitoring. In all cases, the site personnel must be aware of the signs and symptoms of heat stress and provide adequate rest breaks and proper aid as necessary.

*Measure Heart Rate* – Heart rate should be measured by the radial pulse for 30 seconds as early as possible in the rest period. The heart rate at the beginning of the rest period should not exceed 110 beats per minute. If the heart rate is higher, the next work period should be shortened by 33%, while the length of the rest period stays the same. If the pulse rate still exceeds 110 beats per minute at the beginning of the next rest period, the following work cycle should be further shortened by 33%. The procedure is continued until the rate is maintained below 110 beats per minute.

*Measure Body Temperature* – When ambient temperatures are over 90°F, body temperatures should be measured with a clinical thermometer as early as possible in the rest period. If the oral temperature exceeds 99.6°F (or 1 degree change from baseline) at the beginning of the rest period, the following work cycle should be shortened by 33%. The procedure is continued until the body temperature is maintained below 99.6°F (or 1 degree change from baseline). Under no circumstances should a worker be allowed to work if their oral temperature exceeds 100.6°F.

*Measure Body Water Loss* – Body water loss greater than 1.5% of total body weight is indicative of a heat stress condition. Body weight is measured before PPE is donned and after the PPE is removed following a work cycle. Body water loss can be measured with an ordinary bathroom scale; however, the scale must be sensitive to one-half pounds increments. A worker is required to drink additional fluids and rest if their body water loss is greater than 1.5%.

**NOTE:** For purposes of this operating practice, a break is defined as a 15-minute period and/or until an individual's vital signs are within prescribed guidelines.

A physiological monitoring schedule is determined by following the steps below:

- Measure the air temperature with a standard thermometer.
- Estimate the fraction of sunshine by judging what percent the sun is out (refer to Table 1).
- Calculate the adjusted temperature based on the following formula:

  Adjusted Temperature = Actual Temperature + 13 X (where X = sunshine fraction from Table 1)
- Using Table 2, determine the physiological monitoring schedule for fit and acclimated workers for the calculated adjusted temperature.

The length of work period is governed by frequency of physiological monitoring (Table 2). The length of the rest period is governed by physiological parameters (heart rate and oral temperature).

**Table 1. Percent Sunshine Factors**
**Heat Stress Prevention and Monitoring**

| Percent Sunshine (%) | Cloud Cover | Sunshine fraction |
|---|---|---|
| 100 | No cloud cover | 1.0 |
| 50 | 50% cloud cover | 0.5 |
| 0 | Full cloud cover | 0.0 |

**Table 2. Physiological Monitoring Schedule**
**Heat Stress Prevention and Monitoring**

| Adjusted Temperature | Level D (Permeable clothing) | Level C, B, or A (Nonpermeable clothing) |
|---|---|---|
| 90°F (32.2°C) or above | After each 45 minutes of work | After each 15 minutes of work |
| 87.5°F (30.8° - 32.2°C) | After each 60 minutes of work | After each 30 minutes of work |
| 82.5° - 87.5°F (28.1° - 32.2°C) | After each 90 minutes of work | After each 60 minutes of work |
| 77.5° - 82.5°F (25.3° - 28.1°C) | After each 120 minutes of work | After each 90 minutes of work |
| 72.5° - 77.5°F (22.5° - 25.3°C) | After each 150 minutes of work | After each 120 minutes of work |

**Example:** Site personnel anticipate wearing level C (impermeable clothing) during site activities. The air temperature is 80°F and there are no clouds in the sky (100% sunshine). The adjusted temperature is calculated in the following manner:

Adjusted Temperature (Adj T °F) = Actual Temperature (Amb T °F) + (13 x sunshine fraction)
Adj T °F = 80°F + (13 x 1.0)
Adj T °F = 93°F

Using Table 2, the pulse rate, oral temperature and body water loss monitoring would be conducted after each 15 minutes of work. The adjusted temperature may need to be redetermined if the percent sunshine and ambient temperature changes drastically during site work.

If an individual's heart rate exceeds 110 beats per minute at the beginning of the rest period, that individual will continue to rest until his or her heart rate drops to baseline; the next work period is then decreased by 33%.

# FLD 11 ROUGH TERRAIN

## RELATED FLDs

*FLD 02 – Inclement Weather*
*FLD 05 – Heat Stress Prevention and Monitoring*
*FLD 06 – Cold Stress*
*FLD 22 – Heavy Equipment Operation*
*FLD 47 – Clearing, Grubbing, and Logging Operations*
*FLD 57 – Motor Vehicle Safety*

## HAZARD

Physical hazards associated with rough terrain include vehicle accidents, heavy equipment incidents, falling, slipping, and tripping.

Driving vehicles on uneven surfaces creates a possibility of the vehicle rolling, getting stuck in mud or ditches, or of an accident due to flat tires or striking obstacles and other vehicles.

When working on foot, step inclines and heavy or downed vegetation can hide holes or breaks in the terrain, increasing the risk of slips, trips, and falls.

## RECOGNITION AND RISK ASSESSMENT

Rough terrain complicates work activities and adds to or increases risk. In the planning stages of a project, rough terrain must be considered as a physical hazard and identified in the site-specific health and safety plan (HASP). Risk assessment is usually accomplished from site history information (i.e., site topography) and on site by the Field Safety Officer (FSO).

## HAZARD PREVENTION AND PROTECTION PROGRAMS

### Safety on Foot

Personnel working on rough terrain should maintain a high level of physical conditioning due to increased body stress and exertion.

The site crew should be alert and observe terrain while walking to minimize slips, trips, and falls.

Boots should be ankle high or higher to provide additional support and stability.

Work will be completed in adequate natural light or sufficient illumination will be maintained.

Site personnel will conduct an initial walkover and the "buddy system" will be implemented.

Emergency communications such as a cell phone or two-way radio should be carried at all times.

Personnel should be aware of potential hazards and ensure the availability of first-aid supplies and knowledge of the location of the nearest medical assistance.

## VEHICLE SAFETY

Vehicle drivers and passengers will wear seatbelts at all times.

Hazards can be prevented by ensuring regular maintenance is performed on vehicles and all safety features are working. Have brakes and wheel bearings of vehicles used off road or in four wheel drive inspected at increased frequency (suggest inspections at twice the manufacturer's recommended frequency).

In order to minimize accidents, site surveillance on foot may be required to ensure clear driving paths.

Minimize side hill travel. Travel straight up and down hills whenever possible. Passengers will not be allowed when side hill travel is required.

Take into account loads or superstructure of vehicles which raise the center of gravity and increase risk of tipping.

Cross streams, small logs or other passable (there is adequate clearance of the undercarriage) obstructions at right angles.

Four wheel drive vehicles should be used if terrain conditions are wet, frozen, broken, or otherwise deemed unsafe for two wheel drive vehicles by the FSO. Use of vehicles off-road will be specifically addressed in the HASP and personnel operating vehicles will be checked for proficiency.

- Before moving a vehicle in the field, first walk the route of travel, inspecting for depressions, stumps, gullies, ruts, and similar obstacles.
- Always check the brakes of a vehicle before traveling, particularly on rough, uneven, or hilly ground.
- Check the complete drive train of a carrier at least weekly for loose or damaged bolts, nuts, studs, shafts, and mountings.
- Engage the all wheel drive when traveling off highway on hilly terrain.
- Increase tire pressures before traveling in hilly terrain (do not exceed rated tire pressure).
- Use the assistance of someone on the ground as a guide when lateral or overhead clearance is close.
- After the vehicle/equipment has been moved to a new site, set all brakes and/or locks. When grades are steep, block the wheels.

**Definitions**

**Class I**, All-terrain vehicle (ATV): A motorized off-highway vehicle, 50 in. (127 cm) or less in width, having dry weight of 800 lbs (362.9 kg) or less, and traveling on three or more low pressure tires (10 lbs [4.5 kg] psi or less), with a seat designed to be straddled by the operator.

**Class I, Category G**, ATV: An ATV intended for general recreational and utility use.

**Class I, Category U**, ATV: An ATV intended primarily for utility use.

**Class II,** ATV: A motorized off-highway vehicle with a width which exceeds 50 in. (127 cm) or having a dry weight that exceeds 800 lbs (362.9 kg), traveling on four or more low-profile, low-pressure tires (10 lbs [4.5 kg] psi or less) and having a bench seat.

**NOTE:** Utility Vehicles are designed to perform off-road utility tasks such as passenger and cargo transportation and are addressed separately below. Examples are Rangers, Rhino, M-Gators, Gators, and Mules.

Rollover Protective Structure (ROPS). A cab or frame that provides a safe environment for the tractor operator in the event of a rollover.

## ALL TERRAIN VEHICLES (ATVS)

### Qualifications

ATV operators will have completed a nationally recognized accredited ATV training course (such as provided by the Specialty Vehicles Institute of America or in-house resources that have been certified as trainers by an accredited organization) prior to operation of the vehicle.

The operator must pass an operating skills test prior to being allowed to operate an ATV. Proof of completion of this training will be maintained.

### Equipment

All ATVs shall be equipped with:

- An operable audible warning device (horn);
- Headlights (if it will be used during hours of darkness);
- Taillights; and
- Brake lights.
- Mufflers and spark arresters.

All Class II ATVs will be equipped with ROPS and seatbelts

### Operation

Only Class I and Class II ATVs with four or more wheels may be used. Class III ATV's may not be used.

The manufacturer's recommended payload will not be exceeded at any time.

Gloves and an approved motorcycle helmet with full-face shield or goggles will be worn at all times while operating a Class I ATV.

An ATV will not be driven on public roadways except to cross the roadway, and it will only be driven on a public roadway at designated crossing points or with a road guard (no paved road use unless allowed by the manufacturer).

A copy of the operator's manual will be kept on the vehicle and protected from the elements (if practicable).

Tires shall be inflated to the pressures recommended by the manufacturer.

Passengers are prohibited on Class I ATVs.

## UTILITY VEHICLES

Utility vehicles are defined as specialty Class II ATVs designed to perform off-road utility tasks such as passenger and cargo transportation. Examples are Rangers, Rhino, M-Gators, Gators, and Mules.

Utility vehicle operators shall be trained and familiar with the use of all controls; understand proper moving, stopping, turning and other operating characteristics of the vehicle. Operators must review all training materials provided by the manufacturer for the specific vehicles, and training should be in accordance with appropriate manufacturer recommendations. A copy of the operator's manual shall be kept on the vehicle at all times and protected from the elements. At a minimum, training should address:

- Basic riding tips from the manufacturer's published literature for each vehicle.
- Reading terrain.
- Climbing hilly terrain.
- Descending a hill.
- Traversing a slope.
- Riding through water.
- Cargo carriers and accessories.
- Loading and unloading.
- Troubleshooting.
- Proper preventative maintenance, (i.e., oil levels, tire pressure requirements and scheduled maintenance requirements according to the manufacturer's guidelines.).

Utility vehicles shall be equipped with:

- Operable audible warning device (horn).
- Headlights.
- Taillights.
- Brake lights.
- Seatbelts.
- ROPS.

Occupancy in utility vehicles is limited to manufacturer designated seating that has built-in seatbelts. Passengers may not ride in the vehicle's back cargo area unless the vehicle is otherwise equipped. Note: When used for emergency response, medical litters may be placed in the back cargo area but must be secured as described below.

The manufacturer's recommended load carrying capacity, personnel capacity, or maximum safe vehicle speed shall not be exceeded at any time.

Cargo items will be secured as necessary to prevent movement/tipping. All loads over fifty pounds (to include medical litters) must be securely strapped to cargo tie-downs in the rear and to the cargo shelf in the front.

Seatbelts will be worn by operators and passengers of specialty vehicles where installed by the manufacturer. Operators and passengers shall wear goggles at all times when a utility vehicle, not equipped with a windshield, is in motion.

Utility vehicles will not normally be driven on public roadways except to cross the roadway, and will only be driven on a public roadway at designated crossing points or with a road guard. Utility vehicles that are allowed to operate outside a controlled work area and/or on public roads will meet the minimum vehicle safety standards in accordance with 49 CFR 571.5, to include ROPs, seatbelts and placement of "Slow Moving Vehicle" emblems where required.

Manufacturer-installed safety equipment will be maintained in working order and used in compliance with the requirement of this regulation and in accordance with manufacturer's recommendations.

## RULES

Observe the following practices to help prevent accidents:

- Do not misuse utility vehicles.
- Reduce speed and exercise extreme caution on slopes or on rough ground.
- Do not overload vehicle and avoid shifting loads. Reduce load when operating over rough or hilly terrain.
- Do not stop or start suddenly when going uphill or downhill. Be especially cautious when changing direction on slopes.
- Stay alert for holes, rocks, and other hidden hazards in the terrain.
- Keep away from drop-offs, ditches, embankments, as well as ponds and other bodies of water. The machine could suddenly turn over if a wheel is over the edge of a cliff or ditch, or if an edge caves in.
- Keep front wheels straight at crest of hill or going over bumps.
- When descending a hill, remove foot from accelerator and apply brakes to reduce speed and maintain control.

### Transport Loads Safely

- Be sure load is evenly distributed.
- Do not load above the load guard.
- Securely anchor all loads in cargo box.
- Reduce cargo box capacity when operating on rough or hilly terrain.
- Use existing trails. Avoid terrain such as dangerous slopes and impassable swamps. Watch carefully for sharp bumps, holes, ruts, or obstacles.
- Look ahead at terrain. Know what is coming and be prepared to react. Be alert for hazards.
- Keep front wheels straight at the crest of a hill or going over bumps.
- Reduce speed according to trail, terrain, and visibility conditions.
- The passenger should always use the hand holds.

**Climbing or Descending a Hill**

- Always use the brakes when going down slopes, the utility vehicle can speed up (freewheel) going down a slope. Engine or clutch braking effect is minimal.
- Balance loads evenly and secure them. Braking could shift the load and affect vehicle stability.
- Sit on the center of the seat and keep both feet within the foot platform.
- Never drive past the limit of visibility. Slow down near the crest of a hill until getting a clear view of the other side.
- If the vehicle stops or loses power going up a hill, lock the park brake to hold the vehicle on slope. Maintain direction of travel and release the brake slowly. Back straight down hill slowly while maintaining control. Do not turn the vehicle sideways. The vehicle is more stable in a straight forward or rearward position.
- If the utility vehicle begins to tip, turn the front wheel downhill to gain control before proceeding.

**Riding Through Water**

- Avoid water whenever possible. If the drive belt becomes wet, slippage will occur and the vehicle will lose power.
- Never cross any body of water where the depth may be unknown to the operator. As an operational guideline, deep water is considered anything in excess of 152 mm (6 in.) in depth. Tires may float, making it difficult to maintain control.
- Choose a course within the waterway where both banks have a gradual incline. Cross at a point known to be safe.
- Proceed at a slow steady speed to avoid submerged obstacles and slippery rocks.
- Avoid water crossings where the operation of a utility vehicle may cause damage to waterway beds or erode waterway shoreline.

## FLD 19 WORKING OVER OR NEAR WATER

### RELATED FLDs

*FLD02 – Inclement Weather*
*FLD05 – Heat Stress Prevention and Monitoring*
*FLD06 – Cold Stress*
*FLD18 – Operation and Use of Boats*
*FLD22 – Heavy Equipment Operation*
*FLD23 – Cranes, Rigging, and Slings*
*FLD24 – Aerial Lifts/Manlifts*
*FLD25– Working at Elevation/Fall Protection*

### RECOGNITION AND HAZARD ASSESSMENT

Hazards associated with working around water include drowning, frostbite, hypothermia, and/or injury from falling into the water. Heat stress hazards may also be present. Carelessness, horseplay, or other unsafe acts could cause injury to personnel working over or near water. There are also hazards associated with untrained personnel operating equipment. Lack of personal protective equipment (PPE) or misuse of PPE could result in injury or death.

Proper precautions should be taken at all times when personnel are working over or near water. Whenever there is a body of water in close proximity to a work location, the proper safety procedures should be implemented. Requirements for equipment or procedures will be based on an evaluation of work tasks, drowning, and injury potential.

New field team members should be thoroughly indoctrinated in safe work practices pertinent to the work to which they are assigned.

### PREVENTION AND PROTECTION PROGRAM

When working over or near water where there is potential for drowning, engineering controls such as installation of guardrails, toeboards, and other PPE such as safety line systems, shall be used to prevent personnel from falling into the water. In addition, flotation devices must be worn and other lifesaving devices must be present. Personal flotation devices (PFDs) should be designed to float unconscious or helpless persons face up.

#### Safety Nets

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

- Where safety net protection is required, operations shall not be undertaken until the net is in place and has been tested.
- 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 such work surface. Nets shall be hung with sufficient clearance to prevent user's contact with the surfaces or structures below. Such clearances shall be determined by impact load testing.
- It is intended that only one level of nets be required for bridge construction.

- The mesh size of nets shall not exceed 6 inches by 6 inches. All new nets shall meet accepted performance standards of 17,500 foot-pounds minimum impact resistance, as determined and certified by the manufacturer, and shall bear a label of proof test. Edge ropes shall provide a minimum breaking strength of 5,000 pounds.

**General Safety Precautions**

Work shall be halted when significant wave action exists.

All general safety precautions will be adhered to when working over or near water to prevent accidents caused from careless behavior or horseplay.

Only personnel who are trained in the operation of marine equipment (e.g., boats, barges) will be allowed to operate the equipment.

Ramps for vehicle or personnel access to or between barges shall be of adequate strength, provided with guard rails, well-maintained and properly secured. For personnel access, a safe walkway may be substituted for the ramp. All access routes and passageways shall be kept free of ice, snow, grease, mud, and other obstructions. Nonslip surfaces shall be provided on all working decks, stair treads, ship ladders, platforms, catwalks, and walkways, particularly on the weather side of all doorways opening on deck.

Guardrails, bulwarks, or taut cable guardlines shall be provided for deck openings, elevated surfaces, and similar locations where persons may fall or slip. They shall be at least 42 inches high and have an intermediate rail.

If a Jacob's ladder is used, it will be of the double-rung or flat-tread type. It will be well-maintained and properly secured. The ladder will either hang without slack from its lashings or be pulled up entirely. When the upper end of the access-way rests on or is flush with the top of the bulwark (side of the ship above the upper deck), steps, properly secured and equipped with at least one hand rail approximately 33 inches in height, shall be provided between the top of the bulwark and the deck.

Obstructions will not be laid on or across gangways. The access-way will be adequately illuminated for its full length. All attempts will be made to place the access-way in a position that the load will not pass over personnel.

Any obstruction in a passageway that restricts normal passage shall be posted with warning signs or distinctively marked. Employees shall not be permitted to pass fore and aft, over or around the deck loads unless there is a safe passage. Decks and other working surfaces will be maintained in a safe condition and adequate safe walkways will be maintained for passage around the deck. All deck fittings and other obstructions that present stumbling hazards shall be painted yellow or marked with yellow trim.

Personnel will not walk along the sides of covered barges with coamings (raised frame to keep out water) more than 5 feet high unless there is a 3-foot clear walkway, a grab rail, or a taut handline.

Unless railings or other suitable protection exists, all personnel will use suitable protection against falling and/or drowning.

First-aid supplies should be aboard all lifesaving craft (or readily accessible) and arrangements for ambulance service should be made as location changes.

Personnel should be discouraged from jumping to or from any craft which is not secured, and from jumping between craft when a gangplank should be used.

Fall protection should be provided when working over or near water where there is a potential for falling or slipping into the water.

In areas subject to tidal flow or rising water levels, the Field Safety Officer (FSO) will monitor the water level to ensure that employees will not be trapped between a work area and the water level.

**Life Saving Equipment**

Equipment and procedures will conform to U.S. Coast Guard (USCG) and/or Occupational Safety and Health Administration (OSHA) requirements and applicable local regulations.

Personnel working over or near water shall be provided with USCG-approved PFDs (life jackets or buoyant work vests), which shall be worn whenever there is potential drowning hazard. PFDs should be designed to float unconscious or helpless persons face up.

Prior to and after each use, PFDs and life preservers shall be inspected for defects which would alter their strength or buoyancy (e.g., rips, tears, holes). All defective units shall be removed from the site and replaced. At no times will defective units be used.

USCG-approved life rings (rope attachment not required) and ring buoys (rope attachment required) should have attached at least 90 feet of 3/8-inch solid braid polypropylene rope or equal. The life rings or ring buoys shall be readily available for emergency rescue operations. Distance between ring buoys shall not exceed 200 feet. One ring buoy or life ring shall be provided on each lifesaving skiff.

Lights conforming to 16 CFR 161.012 will be required whenever there is a potential need for life rings to be used after dark. Lights on life rings are required only in locations where adequate general lighting (e.g., floodlights) is not provided.

In locations where waters are rough or swift, or where manually-operated boats are not practical, a power boat suitable for the waters shall be provided and equipped for lifesaving.

The maximum number of passengers and weight that can safely be transported shall be posted on all launches, motorboats, and skiffs. This number shall not be exceeded and in no case shall the number of passengers (including crew) exceed the number of PFDs aboard. Outboard motors and skiffs shall meet the minimum flotation requirements of the USCG. A certification tag affixed to the hull is satisfactory evidence of compliance. An efficient whistle or signal device shall be provided on all powered vessels to give signals required by the navigation rules applicable to the waters on which the vessel is operated.

Any vessel, except those easily boarded from the water, shall provide at least one portable or permanent ladder of sufficient length to rescue a person overboard.

## FLD 34 UNDERGROUND UTILITIES

## PURPOSE

This Field Operation Procedure (FLD) provides requirements for identification, location, and avoidance of underground utilities, appurtenances, and structures during intrusive activities. The FLD also addresses actions to be taken in response to encountering or contacting underground utilities. These requirements are applicable to all Weston Solutions, Inc. (WESTON) operations. The procedures address the requirements and recommendations for identifying and locating, working around, and encountering or contacting underground utilities.

## DEFINITIONS

### Aggressive Methods

The use of mechanized equipment such as (but not limited to) excavators, backhoes, drill rigs, directional drilling, Geoprobe operations (including all direct push techniques), or road saws.

### Buffer Zone

As defined in this procedure, the area around a utility where only non-aggressive excavation methods may be utilized, unless specific conditions are met.

The definition cited above, and the excavation requirements and restrictions associated with it, will vary depending on the particular state regulations. WESTON requires the imposition of a **three-foot** Buffer Zone on all sides of the utility as measured from the outside edges of the utility, both horizontally and vertically. State and/or local buffer zone requirements must be verified by consulting the applicable state regulations in the event buffer zones greater than three feet are required.

The term "Buffer Zone" may be referred to as the "Tolerance Zone", "Safety Zone", or "Approximate Location of Underground Utilities" in some jurisdictions.

### Competent Person

A Competent Person has the ability to recognize hazards associated with underground utilities and the authority to stop or direct operations to ensure the safety of personnel and conformance with this procedure. The Competent Person has an understanding of this procedure, and the "One-Call" system requirements for the jurisdiction where excavation is occurring. The Competent Person must be capable of notifying One-Call agencies and maintaining and tracking One-Call Locate Numbers. Additionally, they must have knowledge of methods and work practices for excavation work and the identification, avoidance, and protection of underground utilities.

The designation of a Competent Person will be made by the Site or Project Manager and documented within the Site-specific Health and Safety Plan (HASP) or attachment to the HASP. WESTON Competent Person's are required to successfully complete Weston's internal training program on the use and application of Operation Procedure FLD 34 and possess appropriate and relevant field experience.

The names of Subcontractor Competent Persons will be documented in the Site-Specific *Subcontractor Acknowledgment: Supervisor Personnel, Competence of Personnel, and Task Understanding* form.

Subcontractor Competent Persons will be expected to follow this FLD or their company's procedures, whichever is more restrictive.

**Damage**

Damage may be considered as any undesired impact or unanticipated removal of support from an underground utility as a result of excavation or demolition. Damage may be as simple as minor contact (by any means) resulting in displacement of protective coating. The utility owner must be contacted regarding any damage or question of damage.

**De-Energize**

As applicable to a utility, to physically eliminate and/or prevent the presence, transmission, flow, or release of energy or materials which may cause harm to personnel or property.

**Excavation (Intrusive Activity)**

An operation using mechanized equipment for the purpose of movement or removal of earth, rock, or the materials in the ground, including but not limited to; digging, blasting, augering, test boring, drilling, pile driving, directional drilling, grading, plowing-in, hammering (including hammer-drill soil gas sampling tube installation), pulling-in, jacking-in, trenching, tunneling, structural demolition, milling, scraping, tree and root removal (grubbing), fence or sign post installation. Note that in some States or jurisdictions, excavation may include hand augering or use of other hand tools.

**Jurisdiction**

The Authority having legal jurisdiction for establishing and/or enforcing regulations and requirements for notification of excavation activities and associated identification and marking of underground utilities. In the United States, the States have jurisdiction, and most consider the regulations applicable when excavation is to be performed in any location, including any public or private way, any company right-of-way or easement, or any public or privately owned land or way. Note: One caveat to remember – Jurisdiction may flow to the "owner" on private or government-owned property because the State One-Call Agencies may not clear utilities on such facilities.

Note that easement boundaries may require differing methods for compliance assurance. Railroads and certain above ground utilities have easements that require specific procedures for excavation (including shoring and shielding of both the utility as well as for the track and/or poles). In these cases it may be required that an inspector or representative of the railroad or utility is present at all phases of the activity.

**Locate**

To indicate the existence of a utility by establishing a mark through the use of flags, pins, stakes, paint, or some other customary manner, that *approximately* determines the location of a line or facility.

**Locate Request**

A communication between an entity performing intrusive activities and a utility marking agency (One-Call, etc).

## Non-Aggressive Methods

Non-Aggressive methods involve the use of manual methods such as hand digging with shovels or by potholing or daylighting methods.

## Observer

The person assigned to visually monitor and, as needed, signal the operator during mechanized intrusive activity when the activity is occurring within three feet of the outside edge of the buffer zone. This person remains in close communication with the equipment operator(s) and will stop the activity if needed.

## One-Call Agency

An entity that administers a system through which a person can notify owners/operators of underground lines or utilities of the intent to perform intrusive activities in proposed public areas. **It is important to note that not all underground utility owners may be required to join the One-Call system. Additionally, some underground utility owners may not comply with State registration requirements.** The Site Manager or Competent Person is responsible to determine additional utilities that may need to be contacted individually.

## Positive Response

Verification prior to the intrusive activity, to ensure that all contacted (typically via the One-Call Agency) owner/operators have located and marked the underground utilities. The Site Manager or Competent Person is responsible to determine/verify ownership of the property where the intrusive activity will occur, including any easements.

## Potholing or Daylighting

The practice of exposing an underground facility by safe, *non-aggressive* excavation methods in order to determine the precise horizontal and vertical position and orientation of underground lines or utilities. Potholing or Daylighting are terms used to describe the excavating of buried facilities using an air or water "knife" coupled with vacuum excavation that exposes underground utilizes to the "daylight" – a positive and safe means of identification and confirmation of exact utility location.

## Target Rich Environment

Areas where multiple utilities are known or suspected of being located, areas where utility locations are in question and/or difficult to obtain information on, or areas with high risk utilities known or suspect. **Note: Military Bases (active or inactive) are to be considered "Target Rich Environments".**

## Underground Utility

An underground or submerged conductor, pipe, or structure used in transporting or providing electric, communications service, gas, oil or oil product, sewage, storm drainage, water or other service and appurtenances thereto. As used in this procedure, utility includes all underground appurtenances and structures.

The following are examples of the types of underground utilities that may be present in a given location:

- Natural gas pipelines
- Electric cables
- Water pipelines
- Fiber optic telecommunications lines
- Telephone cable lines
- Steam pipelines
- Gasoline, oil, or other fuels
- Sewer pipelines
- Vents for sewer and gasoline/diesel fueling systems
- Underground Storage Tanks (USTs)
- Abandoned underground structures containing hazardous materials, hazardous wastes, and radioactive materials

**Underground Utility Owner**

Any person, utility, municipality, authority, political subdivision or other person or entity who owns, operates, or controls the operation of an underground line/facility.

**White Lining**

The practice whereby the person (in this case WESTON or a Subcontractor) who intends to perform intrusive activities, pre-marks the site with an outline of the area where intrusive activities will occur. This involves the use of white paint, flags, stakes, or a combination thereof to mark the extent of where work is to be performed. The marking may vary depending on what intrusive activities are to be conducted. For example, for general excavation, an areal outline of the excavation shall be marked, while for drilling, the individual boreholes shall be marked. Studies have shown that pre-marking is a practice that does prevent utility contact incidents. Check State or local regulatory requirements to ensure compliance.

## RESPONSIBILITIES

**Competent Person**

The Competent Person shall be responsible for:

- Obtaining a copy of, and understanding the applicable regulations for the state of jurisdiction where the excavation activities are to be performed.
- Contacting the appropriate One-Call Agency or private locating service, as applicable.
- Recording One-Call locate numbers.
- If necessary, renewing One-Call locate numbers before expiration.

- Ensuring that white-lining of the area to be excavated is performed; if another equal or better protective measure is necessary because of the nature of the work, state/local regulation or client requirements, the Health and Safety Plan should be amended to reflect the change.
- Ensuring that a "positive response" has been received from every utility owner/operator identified by the One-Call Agency (and any non-member utility as necessary) and that they have located their underground utilities and have appropriately marked any potential conflicts with the areas of planned intrusive activities prior to the start of intrusive work.
- Ensuring that appropriate means for supporting and protecting any exposed utility have been discussed with the utility owner and such means available on-site.
- Ensuring that above-ground utilities and other appurtanences will not create a problem, or be impacted by our activities. In all cases provisions for protection of any utility, structure or appurtanence must be made.
- Ensuring that provisions for emergency actions and emergency shut-off/mitigation of utilities have been discussed with utility owners and field personnel.
- Ensuring that pictures are taken before, during and after intrusive activities and placing such pictures in the project file. Pictures should provide visual documentation of actual site conditions, including but not limited to exposed utilities, methods used for bracing utilities and markings placed on the surface by utility locating services. Consideration should also include placing of a known object in the picture field to provide a "scale" for size/distance comparison.
- Completion and maintenance of the Underground Utilities Locating and Marking Checklist (Attachment A) and the Underground Utilities Management Checklist (Attachment B).
- Reviewing applicable Activity Hazard Analyses (AHAs) with all project members before work begins.
- Conducting training on communication protocols to be used by the excavation observer and equipment operator.
- Ensuring Implementation of appropriate work practices during intrusive activities (including maintaining the prescribed buffer zone for use of aggressive methods).
- Conducting daily or more frequent (due to changes in conditions) inspections of the excavation area to make sure that all markings are intact.
- Providing the Field Safety Officer (FSO) with all required documentation on a daily basis.

**Observer**

Whenever intrusive operations with mechanized equipment are being conducted *within three feet of the outside edge of the buffer zone*, horizontally and vertically, an observer must be assigned to monitor the activities. The observer is responsible for:

- Maintaining a safe vantage point relative to digging machinery, excavation edge and proximity to the hazard posed by the utility.
- Observing the operation to ensure that the operator stops operations if utilities are observed.

- Reviewing hand signals and other forms of communication with the operator. Note: hand signals should be as those identified under ANSI, OSHA or the Corps of Engineers for Crane Hand Signals, or another, equally effective and understood system.
- Properly signaling the operator.
- Stopping the operation immediately if the observer's attention must be diverted even momentarily.
- Stopping the operation immediately if a hand signal or other directive is not followed. Operations will not resume until the observer and operator mutually agree that the reason(s) for not complying with the directive(s) are/is identified and fully corrected.
- Maintaining required records, such as logbook entries, or other, as requested by line management.

## Line Management

The Project Manager (PM) or Site Manager (SM) shall be responsible for:

- Establishing the site culture with the assistance of the Field Safety Officer (FSO) that ensures compliance with this procedure, as well as providing the leadership to "do the right thing" whenever unanticipated circumstances arise.
- Providing the necessary resources, including sufficient schedule for compliance with this procedure.
- Designating a Competent Person or assuring that a subcontractor Competent Person is designated, prior to the start of work.
- Discussing intrusive activity liability with the Client prior to the start of work. Best practices for identification of underground utilities must be included with the proposal and/or Health and Safety Plan, as well as WESTON's requirement for Client (if the Client is the property owner or if the Client selects the drilling/intrusive action location) sign-off when identifying specific work locations for intrusive activities. IN CASES WHERE THE CLIENT, SUCH AS EPA, WILL OR CAN NOT SIGN OFF ON LIABILITY OR PROVIDE INDEMNIFICATION, DISCUSSIONS WITH THE APPRORIATE CLIENT REPRESENTATIVES ON INTRUSIVE ACTIVITIES WILL BE DOCUMENTED IN THE PROJECT FILE. **Note:** ***In any 'target-rich" work environment, best practices must include the requirement for potholing/daylighting or careful hand-digging – whenever possible (at least 5 feet below grade) - since these are recognized processes for visually verifying the exact location of underground utilities while minimizing the potential for utility damage.***
- **For excavations using aggressive methods in target-rich environments**, consideration should be given for establishing an agreement with an Emergency Response Contractor and/or the specific utility owner prior to the start of intrusive activities. This agreement should include specific emergency notification procedures for each utility identified to ensure timely response can be accomplished in the event of a utility strike.
- Determining/verifying ownership of the property where the intrusive activity will occur, including any easements.

- Contacting all utilities not notified directly by the utility notification center, including those known to local personnel and the property owner.
- Obtaining Profit Center Manager Approval for any deviations from this FLD, including best practices or for addressing any set of circumstances not specifically addressed in this FLD that may place WESTON or its employees at risk.

**Environmental, Health and Safety Personnel**

The Field Safety Officer (FSO) shall be responsible for:

- Providing oversight on the implementation of the requirements contained in this procedure.
- Consulting with the PM, SM, the Competent Person, the appropriate DEHSM (or Corporate EHS) on underground utility issues.
- Acting as the Competent Person or Observer as necessary and qualified.

## PROCEDURE

The following sections provide the requirements and recommendations of this procedure, which are intended to prevent injury to personnel, damage to infrastructure, and associated indirect effects associated with encountering or contacting underground utilities during intrusive work. Underground utilities present multiple potential hazards that must be recognized before and during work which occurs near them, therefore, this procedure is divided into sections addressing underground utility identification and location, working around or near underground utilities, and actions to be taken in the event that underground utilities are encountered or contacted. Hazards that may be presented by underground utilities include explosion and fire, electrocution, toxic exposures, pathogens, and drowning.

**Identifying and Locating Underground Utilities**

The potential for underground utilities or other subsurface feature (e.g., subsurface mines) must be evaluated as early as possible in the planning phase for any project, which involves intrusive activities. The following sections describe various methods for identifying and locating utilities on a site. The *Underground Utilities Locating and Marking Checklist* (Attachment A) and the *Underground Utilities Management Checklist* (Attachment B) must be completed before any activities meeting the definition of excavation are conducted. Attachment A is intended to be used as a guide during the process of locating and marking utilities in the area to be excavated. Attachment B is intended to be used as a guide in the overall process of underground utilities management during the course of the project.

**Note:** Attachments A and B or their equivalents must be used to document compliance with this operating procedure and will be subject to audit.

***Prior to excavation all underground utilities must be located and identified by at least two of the following:***

- ***The Utility Owner***
- ***The Property Owner***

- ***A Private or Public Utility Locating Service***
- ***Review of the most current utility drawing, maps or other available records by an approved WESTON Competent Person***
- ***Use of utility locating technology by a WESTON Competent Person or Subcontractor –this includes the use of Potholing or Daylighting in a "target-rich" work environment or whenever a full clearance (without restrictions) can not be obtained from a Utility Locating Service.***

As an aid in determining the potential for or existence of utilities follow the criteria outlined in Appendix C (Utilities Research Options).

**Pre-Planning and the Site HASP**

The Site-Specific Health and Safety Plan (HASP) developed for the project must:

- Identify the location and types of underground utilities that are believed to be present on the site.
- Reference this procedure (FLD 34), and describe how it will be implemented on the project.
- Contain an Activity Hazard Analysis in which the hazards associated with underground utilities are identified, as well as the measures used to control them.
- Contain any site or contract-specific requirements (e.g., Corps of Engineers, EM 385-1-1, Section 25) that may be applicable.
- Contain clear and concise procedures to be followed in the event that contact with underground utilities occurs.
- Address underground utilities and potential associated scenarios in the emergency response section of the HASP.

**"One-Call" Locating and Marking Services**

Every state has utility marking service programs having various names such as "One-Call", "Dig-Safe", "Call-Before-You-Dig", "Dig-Safely", and many others. These services will identify the types and locations of any utility that may exist in an area to be excavated, as long as the property is in the public domain.

- The appropriate One-Call service for the jurisdiction where the project is located must be contacted prior to beginning excavation work. The One-Call Agency should be given as detailed a description of the property as possible; address, cross street, utility pole numbers, physical description, etc.
- Notification to the One-Call service shall allow sufficient lead-time for the Agency to mark the utilities before excavation begins. The lead times vary, but range from two to ten days, depending on the state of jurisdiction.
- In the event the State or Local one-call service number is in question call "811" (the Federal Call before You Dig Number) for access to the appropriate locator service.

- A complete listing of One-Call agencies and telephone numbers for all states is available in the *"Call-Before-You-Dig Call Center Directory"*, which can be accessed on the Internet at the WebPage (http://underspace.com/index.htm) sponsored by *"Underground Focus"* magazine.

- Once notified, the One-Call Agency will provide the contractor with a unique "locate number" or "reference number". This reference number must be kept in the project files by the Competent Person or designee. Additionally, the reference numbers have expiration dates, which may vary depending on the particular One-Call Agency. The valid period of the locate number and required renew notification date shall be requested from the One-Call Agency.

- On a project with multiple contractors, each contractor must request a separate locate number. Under no circumstances will any other contractor or entity be allowed to "work under our locate number". Subcontractors to WESTON may excavate under the locate number secured by WESTON, provided that they are excavating within the area which was previously white-lined by WESTON and subsequently marked. **However, the One-Call Agency must be contacted and notified of this arrangement so that the subcontractor can be recorded as working under the existing locate number.** If a WESTON subcontractor will be excavating in an area not white-lined by WESTON, then the WESTON subcontractor must request a new locate. **Note: State and local requirements must be checked for local application of this procedure.**

- The area where work is to be performed shall be white-lined before the locating service goes to the site.

- It is good practice to arrange a pre-excavation meeting at the project site with the personnel performing the utility location and marking. This meeting will facilitate communications, coordinate the marking with actual excavation, and assure identification of high-priority utilities.

- The One-Call Agency should provide the identities of the utility owners that will be notified of the locate request. This information shall be recorded on the Underground Utility Locating and Marking Checklist (Appendix A) and maintained in the project files. The contact person and phone number for each utility owner shall also be recorded. ***Note that all utility owners are not members of the One-Call system.*** This does not eliminate the need to contact a non-member owner if you have knowledge or suspect that excavation will impact their utility.

- The utility owners should provide a "positive response" relative to the locate request, which can consist of two types of action by the utility owner. The facility owner or operator is required to 1) mark its underground utilities with stakes, paint, or flags, or 2) notify the excavator that the utility owner/operator has no underground utilities in the area of the excavation.

- The positive responses shall be recorded on the Underground Utility Locating and Marking Checklist (Appendix A) and crosschecked with the list of utility owners that the One-Call Agency stated that they would notify. If it is discovered that a utility owner has not provided a positive response, then the One-Call Agency must be notified.

- Excavation shall not be conducted until positive responses have been received from all utility owners identified by the One-Call Agency as having underground utilities on the property.

- Before beginning excavation, the excavator must verify that the location marked was correct, and the distinct, color-coded markings of all utility owners are present.

- Examine the site to check for any visible signs of underground utilities that have not been located and marked such as pedestals, risers, meters, warning signs, manholes, pull boxes, valve boxes, patched asphalt or concrete pavement, areas of subsidence, fresh sod or grass, lack of grass or vegetation, and new trench lines.

- The markings placed by the utility owners should be documented by WESTON using a still, digital, or video camera, whenever practical and reasonable. The photo-documentation shall be maintained with the project files.

- The markings placed by the utility owners or marking services typically follow the American Public Works Association Uniform Color Code as described in ANSI Standard Z 535.1. This code follows:

**American Public Works Association Uniform Color Code**

| | | |
|---|---|---|
| Red | | Electric Power Lines, Cables, Conduit |
| Orange | | Communications, Telephone, Cable TV |
| Yellow | | Gas, Oil, Steam, Petroleum or Gaseous Materials |
| Green | | Sewers and Drains |
| Blue | | Potable Water Systems |
| Purple | | Reclaimed Water, Irrigation, Slurry Lines |
| Pink | | Temporary Survey Markings |
| White | | Proposed Excavation |

**Note:** Unless otherwise specified in the utility clearance, such clearance will not be considered valid after 30 days from the date it was issued.

**Private Utility Locating and Marking Services**

- **One-Call agencies arrange for the identification and marking of underground utilities only on public property, up to the point of contact with private property.** In the event that activities are to be conducted on non-public properties, the presence, location, depth, and orientation of all underground utilities shall be ascertained through records review, including any site plot plans, utility layout plans, and as-built drawings available from the property owner, as well as through interviews with knowledgeable personnel associated with the property (See Appendix C). Additionally, for excavations using aggressive methods in target-rich environments or other situations where utility locations are in question, the information gathered from these sources shall be verified by physical detection methods (non-aggressive), performance of a geophysical survey, or by procuring the services of a private utility locating and marking service. If any detection methods are to be self-performed, the requirements within this FLD must be followed. **A list of vendors providing this service can be found in the *"Network of Underground Damage Prevention Professionals"* which can be accessed on the Internet at the *"Underspace"* WebPage (http://underspace.com/index.htm).**

**Self-Performance of Utility Locating and Marking**

The techniques and instruments used to locate and characterize underground utilities can be extremely complicated and difficult to use effectively. Additionally, interpretation of the data generated by this instrumentation can be difficult. The utility marking services, as previously described are staffed by well-

trained, experienced professionals who perform locating activities on a regular basis. For these reasons, it is most desirable that these professional services are used for utility location and marking on projects.

- In some instances on private property or in other areas not served by One-Call agencies (e.g., long-term projects where excavation is a primary task, and the presence of underground utilities is extensive) it may be prudent to self-perform locating and marking activities.
- If locating and marking is to be self-performed, all personnel using instrumentation will be trained on the use of the equipment that will be used, and the interpretation of the data.
- There are variety of locating methods which may be utilized for self-performance of utility locating as categorized below:
  - Magnetic field-based locators or path tracers
  - Buried electronic marker systems (EMS)
  - Ground penetration radar-based buried –structure detectors
  - Acoustics-based plastic pipe locators
  - Active probes, beacons, or sondes for non-metallic pipes
  - Magnetic polyethylene pipe
- Before self-performing any underground utility locating on a project, approval must be obtained from the appropriate WESTON Division EHS Manager or the Director, Corporate EHS.

## Working Near or Around Underground Utilities

After the site has been properly evaluated for the presence of; aboveground utilities, underground utilities, and other appurtanences, intrusive activities may begin. Since there is no perfect way of eliminating the hazards presented by underground utilities, an effort must be made to perform the tasks following the direction and guidance as described by the following best practices that should be implemented during the execution of the project.

### Work Site Review

Before beginning intrusive activities, a meeting shall be held between all members of the project team. This shall consist of a review of the marked utility locations with the equipment operators, observers, laborers, etc.

### Preservation of Marks

During excavation, efforts must be made to preserve the markings placed by the utility owners until they are no longer required. If any markings are obliterated, the One-Call Agency must be contacted for re-marking. No intrusive activities are to take place if markings are not visible.

### Excavation Observer

Whenever intrusive operations are being conducted within three feet of the edge of the buffer zone, an observer must be assigned to monitor the activities. The observer will be designated each day, and a review of hand signals and other forms of communication between the observer and operator will be conducted. The directives of the observer will be followed precisely and immediately by those operating equipment.

## Excavation Within The Buffer Zone

***Mechanical means of excavation may not be used within 36 inches (see Buffer Zone) of any marked or suspect utility until the utility has been exposed. Mechanical methods may be used, as necessary, for initial penetration and removal of pavement, rock or other materials requiring use of mechanical means of excavation provided a spotter is used. Once the underground utility has been exposed, further excavation must be performed employing reasonable precautions to avoid damage to the utility, including but not limited to any substantial weakening of structural or lateral support, or penetration or destruction of the utility or it's protective coatings. For purposes of this section, "mechanical means of excavation" means excavation using any device or tool powered by an engine except air vacuum or like methods of excavation.***

**A request to utilize aggressive excavation methods in the buffer zone may be made if:**

- There is no other appropriate and reasonable alternative to using aggressive methods in the buffer zone; and
- The utility has been de-energized (and purged if necessary), verified as de-energized, and locked-out; or
- The depth and orientation of the utility has been adequately and visually determined through the use of non-aggressive methods such as air/hydro/vacuum excavation, potholing, probing, hand-digging, or a combination thereof; and
- For utilities containing electrical energy, the depth of the existing water table is below the location of the utility; and
- Request for the exemption has been submitted to the appropriate Division EHS Manager and Profit Center Manger for approval.

The following conditions will apply to this request:

- Aggressive methods may be used in the buffer zone only to the extent allowed by the applicable state or other jurisdictional regulations.
- Appropriate physical protection measures for exposed utilities shall be implemented to eliminate the potential for equipment contact with utilities.
- The extent of the project excavation area to be covered by the exemption request must be specified in the request for exemption.
- When evaluating the use of aggressive excavation methods in the buffer zone, the Division EHS Manager will consider the type of utility involved and the associated risk potential. Based on this evaluation, the Profit Center Manager and/or Division EHS Manager may impose further conditions and requirements. Even if the above exemption conditions are met, the Division EHS Manager has authority to deny the request.

Unless exempted according to the above provisions of this procedure, only non-aggressive methods may be used within the buffer zone. These methods are used in order to prevent mechanical contact with

underground utilities, which could result in damage to the utility and create the potential for personal injury and property damage. Following are examples of non-aggressive excavation methods:

- Hand-digging
  - Non-conductive hand tools must be used when digging within the buffer zone surrounding underground electrical utilities.
  - If conductive hand tools must be used near electrical lines, then the FSO and/or Division EHS Manager shall be consulted to determine additional requirements relative to safe electrical practices, procedures, and equipment.
- Hydro-excavation (water pressure).
- Air excavation (air pressure).
- Vacuum extraction (soil excavation/removal).
- Air excavation/vacuum extraction combination.
- Aggressive methods may be used for the removal of pavement over a utility, if allowed by the state regulations.

**Protection of Underground Utilities**

It is very important that consideration be given to the protection of underground utilities when performing adjacent intrusive activities. This is necessary not only to prevent physical damage and associated indirect effects, but also to prevent the potential for injury to employees and the public.

- When using aggressive excavation methods within the buffer zone around exposed underground utilities, physical protection must be used as required by OSHA in 29 CFR 1926.651. Basically, this involves creation of a physical barrier between the mechanized operation and the utility. The following are some possible types of physical protective measures:
  - Heavy timbers, similar to swamp or crane mats.
  - Sheets of plywood.
  - Blasting mats.
- Once exposed, underground utilities no longer have the support provided by surrounding soil and may need to be physically supported to prevent shifting, bending, separation, or collapse, which could result in damage to the utility, and possibly personnel. Following are suggested support methods:
  - Timber shoring underneath the utility.
  - Timbers or girders over the top of the excavation fitted with hangers that support the utility.
  - Design by a PE for complicated or large applications.

- Utilities must also be protected from objects that may fall into the excavation such as rocks and equipment. This can be accomplished by following these guidelines:

  - Cast spoils as far away from the excavation as possible. Excavated and loose materials shall be kept a minimum of two feet from the edge of excavations.

  - Relocate large rocks, cobbles, and boulders away from the excavation and sloped spoils piles.

  - When vehicles and machinery are operating adjacent to excavations, warning systems such as soil berms, stop logs or barricades shall be utilized to prevent vehicles from entering the excavation or trench.

  - Scaling or barricades shall be used to prevent rock and soils from falling into the excavation.

  - Barriers shall be provided to prevent personnel from inadvertently falling into an excavation.

**De-Energizing Utilities**

Utilities can carry many types of potential energy, including electricity, flowing liquids, liquids under pressure, or gasses under pressure. A release may happen if a utility conveyance is compromised and could result in personal injury, property damage, and other indirect effects. If the white lines of the proposed excavation area overlaps or extends into the buffer zone of a known underground utility, then if at all possible, that utility should be de-energized to physically prevent the transmission, flow, or release of energy. Conversely, if the buffer zone of the known utility lies outside of the white-lined, proposed excavation area, then de-energizing is not required.

- The owner of the utility shall be contacted to determine the feasibility and methodology of de-energizing the utility. Plenty of lead-time should be provided for this since it may take utility companies weeks to de-energize some utilities.

- Depending on the utility and the material being conveyed, isolation points which may be suitable for de-energizing include but are not limited to the following:

  - Electrical circuit breakers
  - Slide gate
  - Disconnect switches
  - Piping flanges
  - Other similar devices

- When utilities are de-energized, it must be verified by demonstration. This can be accomplished by methods such as, testing equipment, switching on a machine or lighting, or opening a valve. For any current-carrying electrical equipment, such as cables, electrical panels successful de-energizing must be certified through the use of appropriate electrical testing equipment and qualified personnel.

- Whenever a utility is de-energized, a means of ensuring that the energy isolation device and equipment cannot be operated until the device is removed must be provided.

- When de-energizing and locking out of utilities is practiced, the provisions of FLD 42 Lockout/Tagout shall be followed, as applicable.

**Damage Discovery**

During excavation, utility damage may be discovered which is pre-existing or otherwise not related to a known contact. Disclosure to the utility owner is very important because the possibility of utility failure or endangerment of the surrounding population increases when damage has occurred. The utility may not immediately fail as a result of damage, but the utility owner or operator must be afforded the opportunity to inspect the utility and make a damage assessment and effect repairs if necessary. The following guidance applies:

- Observe and photograph the utility from a safe distance and determine if there is damage. Damage would be all breaks, leaks, nicks, dents, gouges, grooves, or other damages to utility lines, conduits, coatings, or cathodic protection systems.
- The owner of the affected utility must be contacted immediately.
- The One-Call Agency or private location service must be contacted immediately.
- A Notification of Incident (NOI) Report will be used to document such a discovery.

**Encountering Unexpected Underground Utilities**

It is possible that underground utilities will be encountered in locations that have previously been "cleared" of having underground utilities by the locating service, or are found outside of the area, which has been marked as having underground utilities. In either case, if this occurs, the following applies:

- Site personnel must be warned and moved to a safe location; equipment engines and ignition sources should be turned off, if possible, as the operator is exiting his/her equipment.
- Intrusive activities must be stopped
- The owner of the affected utility must be immediately contacted.
- The One-Call Agency or private location service must be contacted immediately
- The PM, SM and FSO must be notified
- No further intrusive activities may be conducted until:
  - The One-Call Agency/private location service and/or the subject utility owner visit the site;
  - Identification of the utility owner and the type of material/energy being conveyed by the utility has been made; and
  - The orientation and depth of the subject utility has been determined and suitably marked.
- A WESTON Notification of Incident (NOI) Report and Investigation form must be completed. The report should be accompanied by photographs clearly showing the marking(s), and the actual location, with a distance gauge to document how far off the mark the utility was encountered.

## Contacting Underground Utilities

If excavation or other equipment being used for intrusive activities makes contact with an underground utility, the following guidelines apply:

- Site personnel must be warned and moved to a safe location; equipment engines and ignition sources should be turned off, if possible, as the operator is exiting his/her equipment.
- Intrusive activities must be stopped immediately.
- Observe the utility from a safe distance and determine if there is damage. Damage would be all breaks, leaks, nicks, dents, gouges, grooves, scratched coatings, cathodic protection compromise, material leakage, obvious electrical energy.
- Move all personnel to the evacuation meeting point as described in the HASP.

  ***EXCEPTION:*** *If an electrical line has been contacted and it is your belief that equipment (such as an excavator) is electrically energized, do not approach the equipment. Order the operator to remain in the equipment until emergency personnel can de-energize the source (unless the equipment is on fire, at which time the operator should jump off of the vehicle and shuffle along the ground to a safe area). Shuffling is required because current flows outward through the soil in a ripple pattern called a power gradient, creating a pattern of high and low potential, Shuffling decreases the chance that these gradients could be bridged, causing current to flow through the body, resulting in electrocution.*

- Secure the area to prevent the public from entering.
- Contact emergency responders as specified in the HASP.
- The One-Call Agency or if known, the utility owner must be contacted immediately.
- The PM, SM, FSO and Division EHS Manager must be notified.
- No further intrusive activities may be conducted until:
  - The utility owner inspects the scene and after repairs, verifies that all danger has passed.
  - The orientation and depth of the subject utility has been determined and suitably marked.
  - Permission from the emergency responders to resume work has been given.
- A WESTON Notification of Incident (NOI) Report and Investigation form must be completed. The report should be accompanied by photographs clearly showing the marking(s), and the actual location, with a distance gauge to document how far off the mark the utility was encountered.
- State and Local regulations must be reviewed to determine if reporting to any additional agencies is required.

## ATTACHMENTS

Attachment A – Underground Utilities Locating and Marking Checklist
Attachment B – Underground Utilities Management Checklist
Attachment C – Utilities Research Options
Attachment D – Sources of Information

## FLD 34 UNDERGROUND UTILITIES - ATTACHMENT A
## UNDERGROUND UTILITY LOCATING AND MARKING CHECKLIST

*Weston Solutions, Inc.*

**To be Completed by PM and/or "Competent Person"**
**Complete Form as Location/Marking Progresses and Maintain in Site Files**

| **PROJECT INFORMATION:** | **Location:** |
|---|---|
| **Project Name:** | Task/Activity: |
| WESTON Competent Person: | Start Date of Work: |
| WESTON Subcontractor: ☐ No ☐ Yes: | Private Locating Service Required: ☐ Yes ☐ No |
| Subcontractor Competent Person: | If Not, Explain: |
| Property Owner: | |
| **NOTIFICATION:** | |
| **Locating Service Name:** | Locating Service Tel. Number: |
| Date Locating Service Notified: | Locate Ticket Number: |
| Address of Property to be Marked: | Locate Ticket Expiration Date: |
| Nearest Intersecting Street: | |
| Are There Any Utilities on the Properties That the Locating Service Will Not Contact? ☐ Yes ☐ No | |
| Specify: | |
| *Enter Utility Information in Table 1 Below. In Addition to Utility Locating Services, Consult Client, Utility Owners, Drawings, Facility Personnel, Maintenance Personnel, Municipalities (See Appendix C).* | |

*TABLE 1*

*ON-SITE UTILITY INFORMATION*

| NAME OF UTILITY COMPANY | TYPE OF UTILITY | COLOR CODE | UTILITY PRESENT ON-SITE? | EMERGENCY PHONE NUMBER | DATE MARKS COMPLETED |
|---|---|---|---|---|---|
| | Electric | RED | | | |
| | Communications, Phone, CATV | ORANGE | | | |
| | Gas, Oil, Steam, Petroleum | YELLOW | | | |
| | Sewers, Drains | GREEN | | | |
| | Potable Water | BLUE | | | |
| | Reclaimed Water, Irrigation | PURPLE | | | |
| | Temporary Survey Markings | PINK | | | |
| To be performed by excavator prior to utility mark-out. | Proposed Excavation | WHITE | | | |

White-Lining Completed? ☐ No Explain: _____ ☐ Yes: Date: _____ By Whom? _____

**LOCATING AND MARKING:**

Have All Utilities Identified in Table 1 Been Marked? ☐ Yes ☐ No (If Not, Contact Locating Service for Resolution)
Problem(s) With Markings?
☐ Yes ☐ No ☐ No Marks ☐ Incorrect Location ☐ Too Wide
☐ Other: _____ ☐ Not All Utilities Marked Per Table 1 (notify marking service)
Measurements Taken: ☐ Yes ☐ No
Documentation of Marks: ☐ Photos ☐ Video ☐ Other: _____

**EXCAVATION:**

Utilities Accurately Marked? ☐ Yes ☐ No
If no, describe: _____
Were Unmarked or Mis-Marked Utilities Encountered? ☐ Yes ☐ No
If Yes, Specify: _____
Locating Service Notified? ☐ Yes ☐ No
Will Excavation Continue Past Locate Number Expiration? ☐ Yes ☐ No
If Yes, Locate Number Renewed? ☐ Yes ☐ No New Expiration Date: _____
Any Other Problems/Concerns? Specify: _____

| Form Completed By: | Signature: | Date: |
|---|---|---|

**FLD 34 UNDERGROUND UTILITIES - ATTACHMENT B**
**UNDERGROUND UTILITIES MANAGEMENT CHECKLIST**
***Weston Solutions, Inc.***
**To be Completed by PM and/or "Competent Person"**
**Complete Form as Project Progresses and Maintain in Site Files.**

| *PHASE* | | TASK | YES | NO | NA | COMMENTS Required if Response is No or NA. (Reference Item Number) |
|---|---|---|---|---|---|---|
| Pre-Planning | 1. | Excavation/Best Practices in Work Scope? | | | | |
| | 2. | Underground Utilities Identified? | | | | |
| | 3. | Competent Person Assigned? | | | | |
| | 4. | Has a Copy of the Applicable State Regulations Been Obtained, Read, Understood? | | | | |
| | 5. | EHS Plan Addresses Underground Utilities? (AHAs, Contingency Plan, State Regulations Appendix) | | | | |
| **Identifying, Locating and Marking** | 6. | Locating and Marking Checklist Initiated? (Attachment A) | | | | |
| | 7. | Identification and Address of Property Determined, Including Nearest Intersection? | | | | |
| | 8. | One-Call Agency Contacted? | | | | |
| | 9. | Additional Locating and Marking Required on Property? (One-Call agency marks to public property line only) | | | | |
| | 10. | Additional Marker/Locator Identified? | | | | |
| | 11. | Additional Marker/Locator Qualified? | | | | |
| | 12. | Weston Self-Performing Location and Marking? | | | | |
| | 13. | If Yes to 12 Above, Approval From Division EHS Manager? | | | | |
| | 14. | Area of Excavation "White-Lined" by WESTON? | | | | |
| | 15. | WESTON Present When Markings Completed? | | | | |
| | 16. | All Utilities Marked? (Refer to Attachment A, Table 1) | | | | |
| | 17. | All Markings Photo/Video Documented? | | | | |
| | 18. | Area Checked for Signs of Previous Excavation? (Subsidence, new grass, patching, etc) | | | | |
| | 19. | All Applicable Information Recorded on Attachment A? | | | | |
| | 20. | Multiple Contractors Excavating On-Site? | | | | |
| | 21. | Separate Locate Requests for All Contractors? | | | | |
| | 22. | WESTON Subcontractors Excavating in WESTON White-Lined Area(s)? | | | | |
| | 23. | If Yes to 22 Above, One-Call Agency Contacted to Determine if WESTON Subcontractor Can be Added to Existing Locate Ticket? | | | | |
| **Excavation Activities** | 24. | Meeting and Site Walkover Conducted with Project Personnel? (Managers, Equipment Operators, Laborers, Competent Person, Excavation Observer, etc) | | | | |
| | 25. | AHA and HASP Review Conducted With Personnel? | | | | |
| | 26. | Do Site Activities Have Potential to Obliterate Utility Markings? | | | | |
| **Excavation Activities – Cont'd** | 27. | If Yes to 26 Above, Have Provisions Been Made to Preserve Markings? | | | | |

| PHASE | | TASK | YES | NO | NA | COMMENTS Required if Response is No or NA. (Reference Item Number) |
|---|---|---|---|---|---|---|
| | 28. | Has an Excavation Observer Been Designated to Monitor Excavation When Occurring within 3 Feet of the Buffer Zone? | | | | |
| | 29. | Have Operator and Observer Reviewed Commands and Signals? | | | | |
| | 30. | Has WESTON-Required Buffer Zone Been Marked on Either Side of Markings Placed by Locator? | | | | |
| **Excavation Within Buffer Zone** | 31. | Is Excavation Within The Buffer Zone Absolutely Necessary? | | | | |
| | 32. | If Yes to 31 Above, Can Non-Aggressive Methods Be Used For Excavation In The Buffer Zone? If Yes, Identify Appropriate Non-Aggressive Methods. | | | | |
| | 33. | If No to 32 Above, Has a Buffer Zone Exemption Request Been Approved? If No, then Aggressive Methods May Not Be Used in The Buffer Zone. | | | | |
| | 34. | If Yes to 33 Above, Has the Utility Been De-Energized, Purged, Verified/Tested, and Locked-Out? Or,<br><br>Has The Depth and Orientation of the Utility Been Adequately and Visually Determined Through The Use of Non-Aggressive Methods? | | | | |
| | 35. | If Yes to 34 Above, Have All of The Following Conditions Been Met?<br>For Utilities Containing Electrical Energy, Is The Depth of The Water Table Below The Depth of The Utility?<br>Have Regulations Been Consulted to Determine Specific State Requirements Relative to Excavating in The Buffer Zone?<br>Have Appropriate Physical Protection Measures Been Implemented to Prevent Equipment Contact With Utilities and to Prevent Damage to Utilities?<br>If No to Any of The Above Conditions, Then Only Non-Aggressive Excavation Methods May Conducted in The Buffer Zone, Since The Conditions of The Exemption Have Not Been Satisfied. | | | | |
| **Working Around Exposed Utilities** | 36. | If Necessary, Have Provisions Been Made to Support the Utility During Work Activities? | | | | |
| | 37. | Have Spoils Been Placed as far Away From the Excavation as Feasible? | | | | |
| | 38. | Has the Utility Been De-Energized?<br>(If Any Portion of the Buffer Zone around a Utility is Inside of the White-Lined Area) | | | | |
| | 39. | Has the Isolation Point for the De-Energized Utility Been Physically Locked-Out? | | | | |
| **Working Around Exposed Utilities – Cont'd** | 40. | If No to 39 Above, Has a Spotter Been Assigned to Monitor Isolation Point? | | | | |
| | 41. | If Yes to 40 Above, Does the Spotter Have Adequate Communications?<br>(Radio, Telephone, etc) | | | | |
| | 42. | Has the Isolation Point Been Tagged? | | | | |

| PHASE | | TASK | YES | NO | NA | COMMENTS Required if Response is No or NA. (Reference Item Number) |
|---|---|---|---|---|---|---|
| **Damage Discovery** | 43. | Has Pre-Existing Damage to a Utility Been Discovered During Excavation? | | | | |
| | 44. | If Yes to 43 Above, Has the One-Call Agency and/or Utility Owner Been Notified? | | | | |
| | 45. | If Yes to 43 Above, Have Photographs Been taken? | | | | |
| **Encountering or Contacting Underground Utilities** | 46. | Have Utilities Been Encountered in Locations That Have Not Been Marked? | | | | |
| | 47. | If Yes to 46 Above, Has the One-Call Agency or Other Locating Service Been Contacted? | | | | |
| | 48. | If Yes to 46 Above, Has the PM and Appropriate DSM Been Notified? | | | | |
| | 49. | If Yes to 46 Above, Has a WESTON Notification of Incident (NOI) Report Been Completed? (Include Photographs) | | | | |
| | 50. | Have Excavation Equipment Come In Contact With Underground utilities? | | | | |
| | 51. | If Yes to 50 Above, Were Intrusive Activities Immediately Curtailed? | | | | |
| | 52. | If Yes to 50 Above, Has a Damage Determination Been Made From a Safe Distance? | | | | |
| | 53. | If Yes to 50 Above, Has the Area Been Secured? | | | | |
| | 54. | If Yes to 50 Above, Have Emergency Responders Been Notified? | | | | |
| | 55. | If Yes to 50 Above, Has the Locating Agency and/or Utility Owner Been Notified? | | | | |
| | 56. | If Yes to 50 Above, Have State and Local Reporting Requirements Been Met? | | | | |
| | 57. | If Yes to 50 Above, Were Intrusive Activities Curtailed Until; Inspection From Utility Owner, Orientation and Depth of Utility Was Determined and Marked, Permission From Emergency Responders Given? | | | | |
| | 58. | If Yes to 50 Above, Has a WESTON Notification of Incident (NOI) Report Been Completed? (Include Photographs) | | | | |

CHECKLIST COMPLETED BY:

| NAME | SIGNATURE | DATE |
|---|---|---|
| NAME | SIGNATURE | DATE |

## FLD 34 UNDERGROUND UTILITIES – ATTACHEMENT C

### UTILITY RESEARCH OPTIONS

In the course of determining and verifying underground utility location it is expected that a minimum of two (2) resources will be used. As a means of assisting the search for sources, the following is offered.

Records Sources:

- ❑ Utility Section of the State DOT or other Public Agency
- ❑ One-Call Center
- ❑ Public Service Commission or similar organization
- ❑ County Clerks Office
- ❑ Landowner
- ❑ Internet or Computer database
- ❑ Visual Site Inspection
- ❑ Utility Owner

From the Above Collect:

- ❑ Previous construction plans in the area
- ❑ Conduit maps
- ❑ Direct-Buried Cable records
- ❑ Distribution maps
- ❑ Service record maps
- ❑ As-built and record drawings
- ❑ Field notes
- ❑ County, city, utility owner or other geographic information system database
- ❑ Circuit diagrams
- ❑ Oral histories (current or previous employees, residents).

Review Records and Obtain Information For:

- ❑ Indications of additional and/or other available records
- ❑ Duplicate information that lends credibility to data
- ❑ Any additional need for clarifications from owners/others

**Organizations**

- Common Ground Alliance
http://www.commongroundalliance.com/wc.dll?cga~toppage

- Center for Subsurface Strategic Action (CSSA)
http://underspace.com/cs/index.htm

- DigSafely
http://www.digsafely.com/digsafely/default.asp

- National Utility Contractors Association (NUCA)
http://www.nuca.com/

- National Utility Locating Contractors Association (NULCA)
http://underspace.com/nu/index.htm

- Underground Focus Magazine
http://underspace.com/uf/index.htm

- NUCA State Listing of One-Call centers
http://www.nuca.com/

- Utility Safety Magazine
http://www.utilitysafety.com/

**Vendors and Commercial Sites**

- RadioDetection, Inc. (Detection Instruments)
http://www.radiodee.com/

- Heath Consultants (Detection Instruments)
http://www.heathus.com/

- Ben Meadows Company (Detection Instruments)
http://www.benmeadows.com/cgi-bin/SoftCart.exe/index.html?E+scstore

- So-Deep, Inc. (Complete Utilities Services)
http://www.sodeep.com/

- Concept Engineering Group, Inc. (Air Excavation Equipment)
http://www.air-spade.com/index.html

- Rycom Instruments, Inc. (Detection Instruments)

http://www.rycominstruments.com/

- Schonstedt Instrument Company (Detection Instruments)

http://www.schonstedt.com/

- Forestry Suppliers, Inc. (Fiberglass Probe – "Fiberglass Tile Probe", Part #77543, Approx. $20.00, Telephone 800-647-5368)

http://www.forestry-suppliers.com/

## REFERENCES


- Common Ground Study of One-Call Systems and Damage Prevention Best Practices, August, 1999, Sponsored by US DOT.

## FLD 56 DRILLING SAFETY

### REFERENCES

*WESTON Corporate Environmental, Health, and Safety Program*
*Environmental Remediation Drilling Safety Guideline* (AntiEntropics, Inc., 2005)

### RELATED FLDs

*FLD02 – Inclement Weather*
*FLD03 – Hot Processes*
*FLD10 – Manual Lifting and Handling of Heavy Objects*
*FLD11 – Rough Terrain*
*FLD12 – Housekeeping*
*FLD20 – Traffic*
*FLD22 – Heavy Equipment Operation*
*FLD30 – Hazardous Materials Use and Storage*
*FLD31 – Fire Prevention and Protection Planning*
*FLD32 – Fire Extinguishers Required and Requirements*
*FLD34 – Utilities*
*FLD35 – Electrical Safety*
*FLD38 – Hand and Power Hand Tools*
*FLD47 – Clearing, Grubbing, and Logging Operations*
*FLD57 – Motor Vehicle Safety*

### INTRODUCTION

Safety is critical when working on or around a drill rig, traveling to and from a drilling site, moving the drill rig and tools from location to location on a site, or providing maintenance on a drill rig or drilling tools.

As allowed by copyright, WESTON has adopted the *Environmental Remediation Drilling Safety Guideline* (ERD Safety Guideline) for use on drilling projects. The ERD Safety Guideline addresses environmental remediation drilling and push-probe safety and is an account of work for a collective of environmental remediation industry parties. As stated in the copyright notice for the ERD Safety Guideline, "the authors of this guidance are not undertaking to meet the duties of employers, manufacturers, or suppliers to warn and properly train and equip their employees, and others exposed, concerning health and safety risks and precautions, nor undertaking their obligations under local, state, or federal laws." Additionally, "the owner of the copyright hereby grants a nonexclusive, royalty-free license to reproduce and distribute this guide subject to the following limitations:

- The document must be reproduced in its entirety without alterations.
- All copies of this document must include a cover page bearing the copyright notice and this notice.
- Copies of this document may not be sold."

WESTON personnel will use the ERD Safety Guideline in compliance with the copyright notice.

This FLD provides a roadmap to WESTON's Corporate Environmental, Health, and Safety (EHS) Program, related processes and forms to be used, and to ERD Safety Guideline information to be implemented, as applicable.

**Safety During Start-up and Drilling Operations**

The WESTON project manager (PM) and safety personnel are responsible for determining the appropriate procedures to be followed to ensure drilling work is performed safely and must review local, state, and federal laws and regulations that are applicable to each project. If required, client drilling guidelines and/or procedures will be implemented.

Prior to drilling, the PM and field safety officer (FSO) ensure that a site-specific health and safety plan (HASP) and activity hazards analyses have been developed in accordance with WESTON's EHS Program. Drill rigs must be operated safely in accordance with manufacturer's operating procedures. General safety information is provided in the ERD Safety Guideline. A Pre-Mobilization Checklist is provided as Attachment 1 and a Drill Rig Inspection Checklists is provided as Attachment 2. Additionally, a Borehole Clearance Review checklist (required on ConocoPhillips projects) is provided as Attachment 3 and may be modified for use on other projects.

The FSO observes drilling start-up and operations to ensure adherence to safety requirements. The operator must not attempt to exceed manufacturers' ratings of speed, force, torque, pressure, flow, etc. The drill rig and tools must be used only for the purposes that they are intended and designed.

**Utilities**

Safety requirements established in FLD 34 *Utilities* and FLD 35 *Electrical Safety* must be observed on drilling operations. Additional utility safety information specific to drilling activities is provided in the ERD Safety Guideline.

**Field Safety Officer**

Every drill crew should have a designated FSO (in most cases will be the drill rig operator). The FSO has the authority to enforce safety on the drilling site. A rig worker's first safety responsibility is to listen to the safety directions of the FSO. The FSO's general responsibilities are established in the EHS Program. Responsibilities specific to drilling include:

- The FSO should understand and communicate that proper maintenance of tools and equipment and general "housekeeping" on the drill rig will provide the environment to promote and ensure safety.
- Before drilling is started with a particular drill, the FSO must ensure that the operator (who may be the safety supervisor) has had adequate training and is thoroughly familiar with the drill rig, its controls, and its capabilities.
- The FSO should inspect the drill rig daily for structural damage, loose bolts and nuts, proper tension in chain drives, loose or missing guards or protective covers, fluid leaks, damaged hoses, and or damaged pressure gauges and pressure relief valves.
- The FSO should check and test all safety devices, such as emergency shutdown switches, at least daily and preferably at the start of a drilling shift. Drilling should not be permitted until all emergency shutdown and warning systems are working correctly.
- The FSO should ensure that emergency devices are not wire grounded, bypassed, or removed.

- The FSO should check that all gauges, warning lights, and control levers are functioning properly and listen for unusual sounds on each starting of an engine.
- The FSO should ensure that all new drill rig workers are informed of safe operating practices on and around the drill rig and should provide each new drill rig worker with a copy of the ERD Safety Guideline or the client's drilling operations safety manual, and, when appropriate, the drill rig manufacturer's operations and maintenance manual. The FSO should ensure that each new employee reads and understands the safety and operations and maintenance manuals.
- The FSO should carefully instruct a crew worker in drilling safety and observe the new worker's progress towards understanding safe operating practices.
- The FSO should ensure that there is a first-aid kit and a fire extinguisher on each drill rig and on each additional vehicle, and ensure that they are properly maintained.
- The FSO (and as many crew members as possible) should be well trained and capable of using first-aid kits, fire extinguisher, and all other safety devices and equipment.

**Personal Protective Equipment**

For most drilling projects, personal protective equipment (PPE) should include a safety hat, safety shoes, safety glasses, and close fitting but comfortable clothes, without loose ends, straps, draw strings, belts, or otherwise unfastened parts that might catch on some rotating or translating component of the drill rig. Rings and jewelry should not be worn during a work shift.

For some drilling operations, the environment or regulations may dictate that other PPE be used. The design and composition of the PPE must be determined jointly by the management of the drilling organization and the FSO. Such equipment might include face or ear protection or reflective clothing. Each drill rig worker should wear noise reducing ear protectors when appropriate. When drilling is performed in chemically-or radiological contaminated ground, special protective equipment and clothing may be required. Additional information regarding PPE is provided in the WESTON PPE Program and in the ERD Safety Guideline.

**Housekeeping and Drill Rig Maintenance**

It is critical for safe field operations that the safety supervisor understands and fulfills the responsibility for maintenance and housekeeping on and around the drill rig. General housekeeping requirements are established in FLD 12 and housekeeping inspection forms are available on the EHS Portal site. Housekeeping and maintenance recommendations specific to drilling rigs are also provided in the ERD Safety Guideline.

Drill rig maintenance must be performed in accordance with manufacturer's recommendations. Safety requirements established in FLD 57 must be observed during vehicle maintenance.

**Safe Use of Hand Tools**

Numerous and various hand tools can be used on or around a drill rig and in repair shops. "Use the tool for its intended purpose" is the most important rule of proper use. Safety requirements established in FLD 38 must be observed for the specific tool to be used on and around drill rigs.

**Clearing the Work Area**

Prior to drilling, adequate site clearing and leveling should be performed in accordance with FLD 47 *Clearing, Grubbing, and Logging Operations* to provide a safe working area for the drill rig and supplies. Additional information related to clearing and leveling is provided in the ERD Safety Guideline.

**Safe Use of Electricity**

Drilling projects sometimes require around-the-clock operations and, therefore, require temporary electrical lighting. In general, all wiring and fixtures used to provide electricity for drilling operations should be installed by qualified personnel in accordance with the National Electrical Code (NFP A70-1984) with consideration of the American Petroleum Institute's recommended practices for electrical installations for production facilities (API-RP-500B). Lights should be installed and positioned to ensure that the work area and operating positions are well lit without shadows or blind spots. The electrical safety requirements established in FLD 35 must be observed during land-bored drilling operations. Additional electrical safety information is provided in the ERD Safety Guideline.

**Safe Use of Wire Line Hoists, Wire Rope, Catheads and Hoists**

The ERD Safety Guideline provides information on wire rope, catheads, and hoisting safety.

**Safe Use of Augers and Rotary and Core Drilling Tools**

The FSO must ensure that safety precautions and procedures are followed when starting a boring with continuous flight or hallow-stem augers. The operator and tool handler should establish a system of responsibility for the series of various activities required for auger drilling, such as connecting and disconnecting auger sections, and inserting and removing the auger fork. The operator must ensure that the tool handler is well away from the auger column and that the auger fork is removed before starting rotation.

The operator ensures that special precautions are taken for safe rotary or core drilling involve chucking, joint break, hoisting, and lower of drill rods. The ERD Safety Guideline provides comprehensive safety information for these operations.

**Safety During Travel**

The individual who transports a drill rig on and off a drilling site must observe traffic safety requirements established in FLD 20 *Traffic* and guidelines specific to drill rigs provided in the ERD Safety Guideline.

**Loading and Unloading**

Safety requirements established in FLD 57 for loading and unloading vehicles or other items on a trailer or truck must be observed. Guidelines specific to loading and unloading drill rigs are provided in the ERD Safety Guideline.

**Off-Road Movement**

The safety requirements related to off-road movement established in FLD 11 should be observed. Guidelines specific to off-road movement of drill rigs are provided in the ERD Safety Guideline.

**Tires, Batteries and Fuel**

Tires, batteries, and fuel must be inspected or checked in accordance with FLD 57.

**First Aid**

A first aid kit should be available and well maintained on each drill site. At least one member of the drill crew, preferably the drilling safety supervisor, should be trained to perform first aid. WESTON's EHSTrack is used to track and identify personnel first aid training. Training should be provided or sponsored by the American Red cross or a similar organization. For drilling operations, it is particularly important that the individual responsible for first aid should be able to recognize the symptoms and be able to provide first aid for electrical shock, heart attack, stroke, broken bones, eye injury, snake bite, and cuts or abrasions to the skin.

**Drill Rig Alterations**

Alterations to a drill rig or drilling tools should only be made by qualified personnel and only after consultation with the manufacturer. Drill rigs must be inspected after any alterations. The Drill Rig Inspection Checklist is available on-line on the WESTON EHS Portal Site or through any WESTON safety officer or EHS representative.

## ATTACHMENT 1
## PRE-MOBILIZATION CHECKLIST

**(Adopted from ERD Safety Guideline Attachment 3.A)**

| Check When Completed | Checklist of Items |
|---|---|
| | Participate in boring, utility, locate and walk site |
| | Verify equipment needs and equipment staging area(s) |
| | Verify sequence of onsite mobilizations |
| | Service brakes, including trailer brake connections |
| | Service Parking (hand) brake |
| | Service Steering mechanism. |
| | Service Lighting devices and reflectors |
| | Service Tires |
| | Service Horn |
| | Service Windshield wiper or wipers |
| | Service Rear-vision mirror or mirrors. |
| | Service Coupling devices |
| | Inspect the windshield for cracks, repair or replace as necessary |
| | Verify that an appropriate, permitted fire extinguisher is within the driver's grasp and that the extinguisher is properly secured. |
| | Verify supply of sufficient flares or reflectors which can be used in the event of a breakdown while on the highway. |
| | Verify that seat belts are in good working condition. |
| | Verify all windows function properly. Repair or replace as necessary |
| | Verify all doors lock and function properly. Repair or replace as necessary. |
| | Verify back-up alarms are installed and function properly. Repair/replace as necessary. |
| | Verify that all lug nuts are properly tightened and that the wheels appear to be in good condition, the spare tire is in good condition, properly inflated, and a suitable jack and lug wrench are available. |
| | Verify the mast, jacks, deck (s), and tools are completely secured prior to moving the vehicle. |
| | Verify all tool boxes are closed and properly secured. |
| | Inspect all spools containing wire rope (cable) and verify they are secured and that the cables will not unwind while driving down the road. |

## ATTACHMENT 2
## DRILL/DIRECT PUSH TYPE RIG INSPECTION CHECKLIST
**(Adapted from the ERD Safety Guideline - Attachment 4.B)**

SITE/PROJECT NAME: _____

RIG INSPECTOR (NAME/CO.): _____

RIG INFORMATION:

Rig Type: Rotary/Auger Drilling Rig ☐ Direct Push Type (DPT) ☐

Owner: _____

Yr/Make: _____

Model: _____

VIN #: _____

Mileage: _____

Drill Hrs: _____

***INSPECTOR TO INITIAL COLUMNS BELOW AS APPROPRIATE***

| CATEGORY | INSPECTION ITEMS | PASS | FAIL | N/A | ACTION NEEDED |
|---|---|---|---|---|---|
| Emergency Switches | Kill switches are located and accessible to workers on both sides of the rotating stem. **NOTE:** Location and number of switches depend on the rig manufacturer, please refer to owner's manual (DPT typically has one switch on control panel). | | | | |
| | Kill switches installed by the manufacturer are verified to be in operable condition and all workers are familiar with the location and operation of these switches. **NEVER BYPASS, DISABLE, OR REMOVE KILL DEVICES.** | | | | |
| Protective Guards | Drive shafts, belts, chain drives, and universal joints are guarded to prevent accidental insertion of hands, fingers, or tools. | | | | |
| Cables | Cables on drill rig are free of kinks, frayed wires, birdcages, flat spots, grease, and worn or missing sections. | | | | |
| | Cables are terminated at the working end with a proper eye splice; either swaged, coupled, or using cable clamps. | | | | |
| | Cable clamps are installed with the saddle on the live or load side. Clamps are not alternated and are of the correct size and number for the cable size. | | | | |
| | Wire ropes are not allowed to bend around sharp edges without cushion material. | | | | |
| Pulleys | Pulleys are not to be bent, cracked, or broken. | | | | |
| | Pulleys operate smoothly and freely, without resistance. | | | | |
| Cable Winches | Motor is mounted in correct location and tightly secured to drill rig. | | | | |
| | Winch is capable of being placed in the free spool (unwind smoothly) and locked position correctly, demonstrating that the cable is suitable for lifting during drilling operations. | | | | |
| Safety Latches | Hooks installed on hoist cables are the safety type with a functional latch to prevent accidental separation. | | | | |
| | Safety latches are functional and completely span the entire throat of the hook and have positive action to close the throat except when manually displaced for connecting or disconnecting a load. | | | | |

| CATEGORY | INSPECTION ITEMS | PASS | FAIL | N/A | ACTION NEEDED |
|---|---|---|---|---|---|
| Flights/Augers | Flights/Augers should not be bent, cracked, or broken. **NOTE:** Flights/Augers failing inspection must be removed from jobsite. | | | | |
| | Flights should be blunt to prevent the risks of cuts. | | | | |
| | Auger keys should not be bent, have any cracks/fractures, be excessively worn, or otherwise damaged. | | | | |
| | Auger bolt holes and threads should not be damaged. | | | | |
| | Inspect flights/augers for metal burrs. **NOTE:** Burrs must be filed to flat surface. | | | | |
| | Avoid stacking augers; all should lay flat on ground. | | | | |
| | Avoid manually lifting/moving augers. Should be lifted/moved with cable lines, or, at a minimum, by two persons. | | | | |
| Drill String | Drill string should not be bent or have any cracks/fractures. | | | | |
| | Drill string connecting pins should not be bent, have any cracks/fractures, or be excessively worn. | | | | |
| Mast | Mast is free of bends, cracks, or broken sections. | | | | |
| | All mounting hardware (pins, bolts, etc.) should be in place. | | | | |
| | No moving of drill rig while mast is in vertical position. | | | | |
| | Maintenance/repairs to be performed on mast only in horizontal position. | | | | |
| Hammering Device | Hammer free of cracks, fatigue, or other signs of excessive wear. | | | | |
| | Hammer connections are secure. | | | | |
| Leveling Devices | Outriggers move in/out and up/down smoothly and freely while using controls on drill rig, with no hydraulic leaks. | | | | |
| | Outriggers are extended prior to and whenever the mast is raised off its cradle. Outriggers must maintain pressure to continuously support and stabilize the drill rig (even while unattended). | | | | |
| | Outriggers are properly supported on the ground surface to prevent settling into the soil (use of outrigger support pads). | | | | |
| Controls | Controls are intact, properly labeled, have freedom of movement, and have no loose wiring or connections. | | | | |
| | Controls are not blocked or locked into an operating position. | | | | |
| | Installed lights, signals, gauges, and alarms operate properly. | | | | |
| Lifting Devices | Slings, chokers, and lifting devices are inspected before using and are in proper working order. **NOTE:** Damaged units are to be labeled and removed from jobsite. | | | | |
| | Shackles/Clevises are in proper working order with pins/ screws in place that is to be used while lifting. | | | | |
| | Cables and lifting devices are not operated erratically or with a jerking action to overcome resistance. | | | | |
| Hydraulic System | Hydraulic lines are secure, in good condition with no signs of excessive wear, and not leaking. **NOTE:** Check while pressurized. | | | | |
| | Hydraulic lines are not in a bent or pinched position causing additional fluid restrictions/pressures. | | | | |
| | Hydraulic oil reservoir has appropriate amount of oil and not leaking. | | | | |
| | Documentation available to confirm that pressure relief valve was checked during shop maintenance activity and noted on maintenance log. | | | | |

| CATEGORY | INSPECTION ITEMS | PASS | FAIL | N/A | ACTION NEEDED |
|---|---|---|---|---|---|
| **Pump Lines (water, grout, etc.)** | Suction/Discharge hoses, pipes, valves, and fittings are secured and not leaking. | | | | |
| | High pressure hoses have a safety chain, cable, or strap at each end to prevent whipping in the event of a failure. | | | | |
| **Fire Prevention** | A fire extinguisher of appropriate size is located on drill rig and readily available/accessible for drilling crew (recommended 20 lb.). | | | | |
| | Documentation available to confirm that the drilling crew has received training on proper use of fire extinguishers. | | | | |
| **Ladders** | Drill rig has a permanently attached or proper portable ladder to be used for access to drilling platform. | | | | |
| **Tracks** | Tracks on rig are not excessively worn and free of any debris or foreign material. | | | | |
| **General** | Drill rig meets regulations for transport on state/federal highways (inspection sticker, license plate, etc.). | | | | |
| | Documentation available to verify that rig was inspected prior to arriving at ExxonMobil job sites. | | | | |
| | Does the rig size meet job requirements? | | | | |
| | Maintenance log available for previous 3 months to confirm proper maintenance/inspection. | | | | |
| **Exhaust** | Exhaust system should be free from defect and routes engine exhaust away from drill rig workers. | | | | |
| **Fuels** | Fuel stored in an approved and properly labeled container. | | | | |
| | Fuel transfer lines free from signs of excessive wear and not leaking. | | | | |
| | Refueling and transferring of fuel is performed in an approved area with sufficient containment to prevent spillage. | | | | |
| **Exclusion/ Work Zones** | The exclusion/work zone is centered over the borehole and the radius equal to or greater than the height of the mast (measured from ground level). | | | | |
| | The exclusion/work zone should be clear of tripping hazards. | | | | |
| **Overhead Obstructions** | Except where electrical distribution and transmission lines have been de-energized and visibly grounded, drill rigs will be operated proximate to under, by, or near power lines in accordance with the following:<br>* 50 KV or less - minimum clearance of 10 feet<br>* 50 KV or greater - add 0.4 inches for every KV over 50 KV<br>* If voltage is unknown, maintain at least 20 feet of clearance. | | | | |
| | While the rig is in transit, clearance from energized power lines will be maintained as follows:<br>* Less than 50 KV - 4 feet<br>* 50 thru 365 KV - 10 feet<br>* 366 thru 720 KV - 16 feet | | | | |
| **Rig Repairs** | Repairs, when possible, are conducted offsite to reduce the risk of any onsite incidents. | | | | |
| **Specialized PPE** | When working at elevated heights, workers are to wear a fall restraining device attached in a manner to restrict fall to less than six feet. | | | | |
| | When working in wet/slippery conditions, all workers have a lug-type sole or similar slip resistant sole, on their safety footwear to prevent slipping. | | | | |

*RECOMMENDED SPARE PARTS OR ITEMS TO BE SENT WITH DRILL CREW*

| | DRILL RIG | | DPT RIG |
|---|---|---|---|
| | Emergency Switch | | Emergency Switch |
| | Drive Coupling | | Drive Caps |
| | Shear pins/keys (for drive coupling) | | Cutter Head |
| | Pump Packing | | Pull Cap |
| | Pump Hoses | | Liner Cutter |
| | Auger Bolts | | Rod to Cap Pins |
| | Rod to cap pins | | Liner Holder (used while cutting) |
| | Cutter Head | | Spill Kit (5 gal. Bucket with oil dry and absorbent pads) |
| | Safety Latches, Hooks, Clamps | | |
| | Split Spoon Cutter Head | | |
| | Spill Kit (5 gal. bucket with oil dry and absorbent pads) | | |

## ATTACHMENT 3
## BOREHOLE CLEARANCE REVIEW

Site #: _____ Project #: _____

Borehole #s Reviewed: _____ Date: _____

Clearance Inspected by: _____ Reviewed by: _____ _____
(Consultant Rep) (Consultant PM Initial) (COP PM Initial)

| Yes | No | |
|---|---|---|
| ☐ | ☐ | 1. Is a scaled site plan showing the proposed borehole locations attached to this form? |
| ☐ | ☐ | 2. Are all of the proposed borehole locations at least 3 feet from any subsurface utilities shown on ConocoPhillips building plans? |
| ☐ | ☐ | 3. Are all of the proposed borehole locations at least 3 feet from any subsurface utilities shown on public right-of-way street improvement plans?<br>PM to check here ☐ if applicable to this job. |
| ☐ | ☐ | 4. Does the station manager have any knowledge of any subsurface utilities within 3 feet of the proposed borehole locations? (Review locations with the station manager). |
| ☐ | ☐ | 5. Are all of the proposed borehole locations at least 3 feet from any subsurface utilities identified during a geophysical survey?<br>PM to check here ☐ if applicable to this job. |
| ☐ | ☐ | 6. Have all underground service alert providers marked out their facilities in the vicinity of the borehole locations? |
| ☐ | ☐ | 7. Do any of the proposed borehole locations lie on a line connecting two similar looking manhole covers? |
| ☐ | ☐ | 8. Do any of the proposed borehole locations lie on a line perpendicular to the street from the water, gas, and electrical meter? |
| ☐ | ☐ | 9. Has the pavement in the vicinity of any of the proposed borehole locations subsided or does it give the appearance it may be covering a former trench? |
| ☐ | ☐ | 10. Have you hand augured or post-hole dug a hole to 6 feet below grade before using the drill rig? |
| ☐ | ☐ | 11. Is the diameter of the hand augured or post hole greater than the outer diameter of the drilling auger you will be using? |
| ☐ | ☐ | 12. Is the soil you encountered in the hand augured or post hole clean gravel, clean sand, aggregate base (gravelly sand with ~10% fines), or non-native looking material? |

Questions 1 thru 9 must be answered prior to mobilizing a drilling rig to the site. Questions 10 thru 12 should be answered prior to drilling by the field staff. DO NOT DRILL, if you answered NO to questions 1, 2, 3, 5, 6, 10, or 11 or answered YES to questions 4, 7, 8, 9, or 12. Contact your supervisor for instructions and describe the conflict on the back of this form.