



Health and Safety in Surveying ~ Field and Office ~

Health and Safety in Surveying – Field and Office

I. Safety in General

- Developing a culture of safety
- Taking personal responsibility
- Resources – Publications and Websites
- Insurance, Regulatory and Client Considerations and Metrics
 - Workers Compensation Insurance
 - OSHA 300 and 300A Logs
 - EMR
 - DART
 - TRIR

II. Taking Steps to Mitigate Hazards

- Websites
- Training opportunities
- Job Hazard Analyses
- Weekly Tool Box talks
- Personal protective equipment
- Emergency action plans
- Hazard communication
- First aid and CPR
- OSHA 10-hour Construction Safety
- OSHA 30-hour Construction Safety and Health
- Being aware



III. Some Outdoor Hazards

- "One-man" field crews
- Cold stress
- Heat illnesses
- Lyme Disease
- Giant Hogweed
- West Nile disease, Chikungunya, Zika
- Snakes
- Traffic
- Fall protection
- Trenches and excavation
- Confined space
- Blood borne pathogens

NOTE – This program and handout are not intended to provide definitive regulatory or legal advice related safety issues, but rather to provide for general awareness on a variety of safety-related topics for field survey personnel. There are many OSHA publications and other resources including consultants and attorneys that should be consulted for specific guidance.

2

Health and Safety in Surveying – Field and Office

Safety in General

Safety on the job is really a function of just two primary things: promoting a **culture of safety** and taking **personal responsibility** for your safety and for those around you.

While we can, and will, talk about all of the factors that can go into a safety program – training, safety plans, equipment, safety manuals, hazard communication and so on - none if it matters if the company and/or the employees do not care.

Aside from the obvious wish to return safely to our families every night, there are practical concerns that companies and individuals need to consider. These include:

- Fines for noncompliance of laws and regulations
- Insurance ratings that will prevent you from taking on certain jobs
- Liability to third parties for your unsafe actions

Resources

U.S. Department of Labor - OSHA

The Federal Department of Labor's Occupational Health and Safety Administration (OSHA) has a tremendous number of resources on their website. Their webpage listing all of their publications one can find a fact sheet addressing the life-threatening condition of Heat Stroke. A copy of this fact sheet is on the three pages of Appendix A towards the end of this handout.

Insurance, Regulatory and Client Considerations and Metrics

Even though you may work on a field crew, it is important to know that accidents and injuries

H & M Surveying, LLC

"Accuracy First, Customers Always"



can have a serious adverse impact on your employer's ability to capture work and even to stay in business.

There are a number of metrics that clients and insurance companies (especially Workers Compensation) monitor as an indication of the safety-mindedness of your company. These include:

- OSHA 300 and 300A logs (See Appendix B)
 - Must be field out annually by companies having over 10 employees
 - Experience Modification Rating (EMR)
 - Compares your company's workers' compensation claims to other companies of similar size and which operate in the same industry
 - If your company's workers' comp premiums exceed \$3,000 annually, it will likely receive an EMR rating from its insurance company
 - Ratings over 1.0 are typically looked at unfavorably by safety-conscious clients.
 - 3
 - Rating are primarily affected by injuries or illnesses that result in treatment, time off work or job reassignment
 - Tracks the company's record on a running three-year basis – a serious incident will have a very negative effect on a company's EMR for the next three years
 - Total Recordable Incident Rate (TRIR)
 - Total number of OSHA recordable injuries and illnesses times 200,000 divided by number of hours worked by all employees
 - Numbers are reported on OSHA 300 log and 300A Summary
 - Days Away, Restrictions and Transfers (DART)
 - Similar to TRIR and using the same equation, but only includes the number of recordable injuries and illnesses that resulted in in lost or restricted days or job transfer
 - This number will be less than your TRIR unless every recordable injury or illness resulted in lost or restricted days or reassignment, in which case they will be equal
- Some companies and industries, such as pipe line companies, are extremely sensitive to metrics and a company can, in fact, be 'blacklisted' for having even one metric that is outside the allowable range. For a small company, one serious incident can be devastating; and serious incident can occur in the blink of an eye.

Taking Steps to Mitigate Hazards

Websites

There are hundreds of websites that have a huge amount of helpful information including many that have free information for tool box talks. And even if you do not have tool box talks, the material can be used as reminders and to give basic guidance and guidelines related to safety issues.

Some such websites include:

<http://www.asa.net/Education/Safety/Toolbox-Talks>

http://www.safetybob.com/shoppingcart/index_video.aspx

<http://www.safetybob.com/Toolbox/index.shtml>

H & M Surveying, LLC

"Accuracy First, Customers Always"



<https://www.osha.gov/pls/publications/publication.AthruZ?pType=AthruZ#D>
<http://www.toolboxtopics.com/Gen%20Industry/Gen%20Indus%20Contents.htm>
<http://www.oshatraining.com/Toolbox-Talks.php>
<http://www.safetytoolboxtalks.com/Files-Resources/>
<http://www.toolboxtopics.com/Construction/index.htm>
<http://safetytoolboxtopics.com/Behavioral-Safety/>
<http://www.alliedbarton.com/Security-Resource-Center/Security-Awareness-Tips>
<https://www.osha.gov/confinedspaces/faq.html>
<https://safety.cat.com/cda/layout?m=355419&x=7>
<http://www.utexas.edu/safety/fire/extinguishers/quiz.php>

4

<http://diseasemaps.usgs.gov/mapviewer/>

Of course, there are literally thousands of other web-based resources including, as mentioned previously, OSHA.

Training Opportunities

Seeking out and taking advantage of training opportunities will strengthen one's knowledge of safety-related issues and hazards and lessen the chance of incurring a debilitating injury or illness. Training is available live, in-person at many providers.

The Occupational Safety and Health Administration has four offices in New Jersey. The website is a tremendous resource for training, consultation and guidelines/models for safety programs.

<https://www.osha.gov/oshdir/nj.html>

Providers such as Red Cross also offer valuable training especially First Aid, CPR and AED.

Job Hazard Analysis

One very beneficial and easy tool to utilize in the work place is the Job Hazard Analysis (sometimes referred to as a job hazard assessment or by other names). The JHA help employees set up a systematic way of assessing what hazards may be encountered on a project and how those hazards might be mitigated or eliminated.

A sample of the JHA used by The Schneider Corporation's survey department in Indianapolis is attached as Appendix C. A review of the document – which is set up as a fill-in-the-blank PDF – will show its use and application to be self-explanatory.

Weekly Tool Box Talk

Aside from some clients requiring them (with documentation) a weekly tool box talk on a timely subject is a great way to communicate concern about safety issues and to give reminders. For example, as winter approaches, a tool box talk on driving in snowy weather would be appropriate. When school starts (now in early August), a tool box talk about school bus safety and driving in the vicinity of schools.

Some clients require safety talks annually on certain topics, usually – but not always - related to avoiding common injuries and illnesses. Such mandatory topics might include:

- Lifting and back care
- Personal protective equipment
- Slips, Trips and Falls
- Hazard Recognition



- Emergency Action Plans
- Trenching and Excavation
- Heat Stress

Tool box talks are designed to be only a few minutes in length, not full-blown training sessions. An example of the written materials for a tool box talk from The Schneider Corporation is included in Appendix D. A pre-printed sign-in sheet is also included.

5

Personal Protective Equipment

Personal protective equipment (PPE) is the term used to describe protective clothing, helmets, goggles, or other garments or equipment designed to protect the wearer's body from injury or infection. The hazards that are mitigated by protective equipment can include physical, electrical, heat, chemicals, biohazards, and airborne particulate matter.

PPE is mandatory on many job-sites and under many conditions. At The Schneider Corporation field crews and anyone working in the field are required to wear safety boots/shoes 100% of the time. Job site requirements or conditions might require, for example, hardhats, gloves, hearing protection, or eye protection. In some cases, employers must provide PPE at no cost, in other cases, they must make sure it is provided. Appendix A at page 40 in OSHA's publication (see below) explains this.

OSHA's publication on PPE can be found at <https://www.osha.gov/Publications/osh3151.html> and is very helpful. Following are some excerpts:

Introduction

Hazards exist in every workplace in many different forms: sharp edges, falling objects, flying sparks, chemicals, noise and a myriad of other potentially dangerous situations. The Occupational Safety and Health Administration (OSHA) requires that employers protect their employees from workplace hazards that can cause injury.

Controlling a hazard at its source is the best way to protect employees. Depending on the hazard or workplace conditions, OSHA recommends the use of engineering or work practice controls to manage or eliminate hazards to the greatest extent possible. For example, building a barrier between the hazard and the employees is an engineering control; changing the way in which employees perform their work is a work practice control.

When engineering, work practice and administrative controls are not feasible or do not provide sufficient protection, employers must provide personal protective equipment (PPE) to their employees and ensure its use. Personal protective equipment, commonly referred to as "PPE", is equipment worn to minimize exposure to a variety of hazards. Examples of PPE include such items as gloves, foot and eye protection, protective hearing devices (earplugs, muffs) hard hats, respirators and full body suits.

This guide will help both employers and employees do the following:

- Understand the types of PPE.
- Know the basics of conducting a "hazard assessment" of the workplace.
- Select appropriate PPE for a variety of circumstances.
- Understand what kind of training is needed in the proper use and care of PPE.

The information in this guide is general in nature and does not address all workplace hazards or PPE requirements. The information, methods and procedures in this guide are based on the OSHA requirements for PPE as set forth in the Code of Federal Regulations (CFR) at 29 CFR 1910.132



(General requirements); 29 CFR 1910.133 (Eye and face protection); 29 CFR 1910.135 (Head protection); 29 CFR 1910.136 (Foot protection); 29 CFR 1910.137 (Electrical protective equipment); 6

29 CFR 1910.138 (Hand protection); and regulations that cover the construction industry, at 29 CFR 1926.95 (Criteria for personal protective equipment); 29 CFR 1926.96 (Occupational foot protection); 29 CFR 1926.100 (Head protection); 29 CFR 1926.101 (Hearing protection); and 29 CFR 1926.102 (Eye and face protection); and for the maritime industry at 29 CFR 1915.152 (General requirements); 29 CFR 1915.153 (Eye and face protection); 29 CFR 1915.155 (Head protection); 29 CFR 1915.156 (Foot protection); and 29 CFR 1915.157 (Hand and body protection).

This guide does not address PPE requirements related to respiratory protection (29 CFR 1910.134) as this information is covered in detail in OSHA Publication 3079, "Respiratory Protection". There is a brief discussion of hearing protection in this publication but users should refer to OSHA Publication 3074, "Hearing Conservation" for more detailed information on the requirements to protect employees' hearing in the workplace.

The Requirement for PPE

To ensure the greatest possible protection for employees in the workplace, the cooperative efforts of both employers and employees will help in establishing and maintaining a safe and healthful work environment.

In general, employers are responsible for:

- Performing a "hazard assessment" of the workplace to identify and control physical and health hazards.
- Identifying and providing appropriate PPE for employees.
- Training employees in the use and care of the PPE.
- Maintaining PPE, including replacing worn or damaged PPE.
- Periodically reviewing, updating and evaluating the effectiveness of the PPE program.

In general, employees should:

- Properly wear PPE,
- Attend training sessions on PPE,
- Care for, clean and maintain PPE, and
- Inform a supervisor of the need to repair or replace PPE.

Specific requirements for PPE are presented in many different OSHA standards, published in 29 CFR. Some standards require that employers provide PPE at no cost to the employee while others simply state that the employer must provide PPE. Appendix A at page 40 lists those standards that require the employer to provide PPE and those that require the employer to provide PPE at no cost to the employee.

Emergency Action Plans

Emergency action plans are prepared so that conditions arising from emergencies and unanticipated natural events can be addressed in an organized and expedient manner. The emergency procedures and the organizational framework outlined in such a program is to provide protection for lives, property and operations through effective communication and use of on-site and local emergency services.

7

Emergency action plans should address actions to be taken (e.g., reporting procedures, evacuation, employee meeting areas, safe locations within a building) for such events as fires, severe weather (e.g., depending on the location tornadoes, hurricanes, earthquakes), workplace



violence, and associated training.

Hazard Communication

Hazard Communication Manuals contain important information and procedures pertaining to a company's Hazard Communication and Safety Program. Its purpose is to ensure that the company is in compliance with the OSHA Hazard Communication Standard (HCS) 29 CFR 1910.1200. All employers with hazardous chemicals in their workplaces must have labels and safety data sheets for their exposed workers, and train them to handle the chemicals appropriately.

The adoption of OSHA's Hazard Communication Standard gives the employer the responsibility to establish a written, comprehensive program which includes provisions for container labeling, safety data sheets (SDS), and employee information and training. The written program must contain a list of the hazardous chemicals in each work area, the means used to inform employees of hazards of non-routine tasks, and to chemicals to which they may be exposed.

The written Hazard Communication Program outlines the plan to establish the objectives of the standard. Each objective is defined and discussed in the plan document.

The written plan and its elements will be updated in the following situations:

1. New chemicals are introduced into the workplace.
2. When new processes involving chemicals are introduced.
3. When program job duties are changed.
4. When locations mentioned in the program are changed.
5. When other elements are changed.

Although virtually all materials are considered chemicals under this definition, the HCS identifies certain categories of chemicals that are not covered by the standard. These categories are [emphasis added]:

- Any consumer product or hazardous substance, as those terms are defined in the *Consumer Product Safety Act* and *Federal Hazardous Substances Act*, respectively, where the employer can show that it is used in the workplace for the purpose intended by the chemical manufacturer or importer of the product, and the use results in a duration and frequency of exposure which is not greater than the range of exposures that could reasonably be experienced by consumers when used for the purpose intended;
- Any hazardous waste as defined by the *Solid Waste Disposal Act* when subject to regulations issued under that Act by the Environmental Protection Agency;
- Any hazardous substance as defined by the *Comprehensive Environmental Response, Compensation and Liability Act* when the hazardous substance is the focus of remedial or

removal action being conducted under that Act in accordance with Environmental Protection Agency regulations;

- Tobacco or tobacco products;
- Wood or wood products, including lumber which will not be processed, where the chemical manufacturer or importer can establish that the only hazard they pose to employees is the potential for flammability or combustibility (wood or wood products which have been treated with a hazardous chemical covered by this standard, and wood which may be subsequently sawed or cut, generating dust, are not exempted);
- Articles, defined as a manufactured item other than a fluid or particle: (i) which is formed



to a specific shape or design during manufacture; (ii) which has end use function(s) dependent in whole or in part upon its shape or design during end use; and (iii) which under normal conditions of use does not release more than very small quantities, e.g., minute or trace amounts of a hazardous chemical, and does not pose a physical hazard or health risk to employees.

- Food or alcoholic beverages which are sold, used, or prepared in a retail establishment (such as a grocery store, restaurant, or drinking place), and foods intended for personal consumption by employees while in the workplace;
- Any drug, as that term is defined in the *Federal Food, Drug, and Cosmetic Act*, when it is in solid, final form for direct administration to the patient (e.g., tablets or pills); drugs which are packaged by the chemical manufacturer for sale to consumers in a retail establishment (e.g., over-the-counter drugs); and drugs intended for personal consumption by employees while in the workplace (e.g., first-aid supplies);
- Cosmetics which are packaged for sale to consumers in a retail establishment, and cosmetics intended for personal consumption by employees while in the workplace;
- Nuisance particulates where the chemical manufacturer or importer can establish that they do not pose any physical or health hazard covered under this section;
- Ionizing and nonionizing radiation; and
- Biological hazards.

Safety Data Sheets (2012 & 2015 Revisions)

A primary element of a Hazard Communication Manual is the inclusion of Safety Data Sheets (SDS) (formerly Material Safety Data Sheets – MSDS) for any non-excluded chemicals in the workplace.

The Hazard Communication Standard (HCS) (29 CFR 1910.1200(g)), revised in 2012, requires that the chemical manufacturer, distributor, or importer provide Safety Data Sheets (SDSs) (formerly MSDSs or Material Safety Data Sheets) for each hazardous chemical to downstream users to communicate information on these hazards. The information contained in the SDS is largely the same as the MSDS, except now the SDSs are required to be presented in a consistent user-friendly, 16-section format. This brief provides guidance to help workers who handle hazardous chemicals to become familiar with the format and understand the contents of the SDSs.

The SDS includes information such as the properties of each chemical; the physical, health, and environmental health hazards; protective measures; and safety precautions for handling, storing, and transporting the chemical. The information contained in the SDS must be in English

9

(although it may be in other languages as well). In addition, OSHA requires that SDS preparers provide specific minimum information as detailed in Appendix D of 29 CFR 1910.1200. The SDS preparers may also include additional information in various section(s).

Sections 1 through 8 contain general information about the chemical, identification, hazards, composition, safe handling practices, and emergency control measures (e.g., firefighting). This information should be helpful to those that need to get the information quickly. Sections 9 through 11 and 16 contain other technical and scientific information, such as physical and chemical properties, stability and reactivity information, toxicological information, exposure control information, and other information including the date of preparation or last revision. The

H & M Surveying, LLC

"Accuracy First, Customers Always"



SDS must also state that no applicable information was found when the preparer does not find relevant information for any required element.

The SDS must also contain Sections 12 through 15, to be consistent with the U.N.'s Globally Harmonized System of Classification and Labeling of Chemicals (GHS), but OSHA will not enforce the content of these sections because they concern matters handled by other agencies. A description of all 16 sections of the SDS, along with their contents, is presented below:

The Hazard Communication Standard (HCS) requires chemical manufacturers, distributors, or importers to provide Safety Data Sheets (SDSs) (formerly known as Material Safety Data Sheets or MSDSs) to communicate the hazards of hazardous chemical products. As of June 1, 2015, the HCS will require new SDSs to be in a uniform format, and include the section numbers, the headings, and associated information under the headings below:

Section 1, Identification includes product identifier; manufacturer or distributor name, address, phone number; emergency phone number; recommended use; restrictions on use.

Section 2, Hazard(s) identification includes all hazards regarding the chemical; required label elements.

Section 3, Composition/information on ingredients includes information on chemical ingredients; trade secret claims.

Section 4, First-aid measures includes important symptoms/ effects, acute, delayed; required treatment.

Section 5, Fire-fighting measures lists suitable extinguishing techniques, equipment; chemical hazards from fire.

Section 6, Accidental release measures lists emergency procedures; protective equipment; proper methods of containment and cleanup.

Section 7, Handling and storage lists precautions for safe handling and storage, including incompatibilities.

Section 8, Exposure controls/personal protection lists OSHA's Permissible Exposure Limits (PELs); Threshold Limit Values (TLVs); appropriate engineering controls; personal protective equipment (PPE).

Section 9, Physical and chemical properties lists the chemical's characteristics.

Section 10, Stability and reactivity lists chemical stability and possibility of hazardous reactions.

Section 11, Toxicological information includes routes of exposure; related symptoms, acute and chronic effects; numerical measures of toxicity.

Section 12, Ecological information*

Section 13, Disposal considerations*

Section 14, Transport information*

Section 15, Regulatory information*

Section 16, Other information, includes the date of preparation or last revision.

New information on a substance must be incorporated on an SDS within three months following the chemical manufacturer's receipt of the information. The new SDS must then be transmitted with the next shipment of the chemical to the employer.

First Aid and CPR¹

OSHA's standard for first aid training in general industry, 29 CFR 1910.151(b), provides:

In the absence of an infirmary, clinic, or hospital in near proximity to the workplace which is used for the treatment of all injured employees, a person or persons shall be adequately trained



to render first aid. Adequate first aid supplies shall be readily available.

In the construction industry, 29 CFR 1926.50(c) provides:

In the absence of an infirmary clinic, hospital, or physician, that is reasonably accessible in terms of time and distance to the worksite, which is available for the treatment of injured employees, a person who has a valid certificate in first-aid training from the U.S. Bureau of Mines, the American Red Cross, or equivalent training that can be verified by documentary evidence, shall be available at the worksite to render first aid.

The primary requirement addressed by these standards is that an employer must ensure prompt first aid treatment for injured employees, either by providing for the availability of a trained first aid provider at the worksite, or by ensuring that emergency treatment services are within reasonable proximity of the worksite. The basic purpose of these standards is to assure that adequate first aid is available in the critical minutes between the occurrence of an injury and the availability of physician or hospital care for the injured employee.

One option these standards provide employers is to ensure that a member of the workforce has been trained in first aid. This option is, for most employers, a feasible and low-cost way to protect employees, as well putting the employer clearly in compliance with the standards. OSHA recommends, but does not require, that every workplace include one or more employees who are trained and certified in first aid, including CPR.

The other option for employers is to rely upon the reasonable proximity of an infirmary, clinic or hospital. OSHA has consistently taken the view that the reasonable availability of a trained

¹ From https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=INTERPRETATIONS&p_id=25627

11

emergency service provider, such as fire department paramedics or EMS responders, would be equivalent to the "infirmary, clinic, or hospital" specified by the literal wording of the standards. Emergency medical services can be provided either on-site or by evacuating the employee to an off-site facility in cases where that can be done safely.

However, the requirements that emergency medical services must be "reasonably accessible" or "in near proximity to the workplace" are stated only in general terms. An employer who contemplates relying on assistance from outside emergency responders as an alternative to providing a first-aid-trained employee must take a number of factors into account. The employer must take appropriate steps prior to any accident (such as making arrangements with the service provider) to ascertain that emergency medical assistance will be promptly available when an injury occurs. While the standards do not prescribe a number of minutes, OSHA has long interpreted the term "near proximity" to mean that emergency care must be available within no more than 3-4 minutes from the workplace, an interpretation that has been upheld by the Occupational Safety and Health Review Commission and by federal courts.

Medical literature establishes that, for serious injuries such as those involving stopped breathing, cardiac arrest, or uncontrolled bleeding, first aid treatment must be provided within the first few minutes to avoid permanent medical impairment or death. Accordingly, in workplaces where serious accidents such as those involving falls, suffocation, electrocution, or amputation are possible, emergency medical services must be available within 3-4 minutes, if there is no employee on the site who is trained to render first aid. OSHA exercises discretion in enforcing the first aid requirements in particular cases. OSHA recognizes that a somewhat longer response time of up to 15 minutes may be reasonable in workplaces, such as offices, where the possibility of such serious work-related injuries is more remote.

The blood borne pathogens standard at 29 CFR 1910.1030(g)(2) requires employers to provide training to any employees who have occupational exposure to blood or other potentially infectious materials, such as employees assigned medical or first aid duties by their employers. The standard at 29 CFR 1910.1030(b) defines "occupational exposure" as "reasonably anticipated skin, eye, mucous membrane, or parenteral contact with blood or other potentially infectious materials that may result from the performance of an employee's duties." If an employee is trained in first aid and identified by the employer as responsible for rendering medical assistance as part of his/her job duties, that employee is covered by the blood borne pathogens standard.

You may find these standards on OSHA's website, <http://www.osha.gov> by following the link to "standards" and searching for "first aid," "blood borne pathogens," "logging," etc.

OSHA 10-Hour Construction Safety

The OSHA 10 hour training course in construction standards was created by OSHA based on the federal OSHA 1926 construction standards and is intended to provide entry level construction workers with a basic knowledge of safety and health hazards found on many construction sites. The course is intended for workers in construction related jobs, like ground-up construction projects, demolition work, and major renovation projects.

12

The list of mandatory topics that must be taught in the OSHA 10-hour construction course are:

- Introduction to OSHA
- Focus Four (leading causes of death in construction)
 - Falls
 - Electrocution
 - Struck-By (e.g., falling objects, trucks, cranes)
 - Caught-In or Between (e.g., trench hazards, equipment)
- Personal Protective and Lifesaving Equipment

The OSHA 10 hour course is not mandatory, but OSHA recommends outreach courses as an orientation to occupational safety and health for workers. Some states; however, have enacted laws mandating the training. Also, some employers, unions, organizations or other jurisdictions will require this training.

Training is available from many private providers, and also through the OSHA Outreach Training Program. See <https://www.osha.gov/dte/outreach/construction/>.

OSHA 30-Hour Construction Safety and Health

The 30-hour outreach course provides greater depth and a variety of training on a broader list of topics associated with workplace hazards in the construction industry. It is intended for workers with some safety responsibility in the workplace.

Topics in the 30 hour course will include items in addition to the content of the 10 hour course such as (this is not an all-inclusive list) recordkeeping requirements, basic safety orientation, hazard communication, fire protection, materials handling and storage, hand and power tools, cranes and rigging, motor vehicles, stairways and ladders, confined spaces, and scaffolds.

As with the 10 hour course, training is available from many private providers, and also through the OSHA Outreach Training Program. See <https://www.osha.gov/dte/outreach/construction/>.

Being Aware

H & M Surveying, LLC

"Accuracy First, Customers Always"



Being safe is mostly a case of being aware of the environment around you.

- Think about possible hazards
- Point them out to your co-workers
- Correct those unsafe conditions that you have control over
- Get yourself out of those unsafe situations that you cannot correct

Some basic questions such as the following should be asked constantly.

- Where will the next accident happen?
- When will the next accident happen?
- Am I alert?

13

Some Outdoor Hazards

"One-man" Field crews

There is currently an initiative in the State of California to require that survey crews have at least two persons for safety reasons. Whether that effort is successful remains to be seen.

There has been some recent activity in the State of California relating to the use of crews of one. Local 3 of the Operating Engineers Union in the Los Angeles area has floated a proposal and the state occupational safety and health agency has started hearings on the subject (see below).

14

15

Cold Stress

OSHA has a number of resources related to working in cold weather.

16

Heat Illnesses₂

Workers who are exposed to extreme heat or work in hot environments may be at risk of heat stress. Exposure to extreme heat can result in occupational illnesses and injuries. Heat stress can result in heat stroke, heat exhaustion, heat cramps, or heat rashes. Heat can also increase the risk of injuries in workers as it may result in sweaty palms, fogged-up safety glasses, and dizziness. Burns may also occur as a result of accidental contact with hot surfaces or steam.

Workers at risk of heat stress include outdoor workers and workers in hot environments such as firefighters, bakery workers, farmers, construction workers, miners, boiler room workers, factory workers, and others. Workers at greater risk of heat stress include those who are 65 years of age or older, are overweight, have heart disease or high blood pressure, or take medications that may be affected by extreme heat.

Prevention of heat stress in workers is important. Employers should provide training to workers so they understand what heat stress is, how it affects their health and safety, and how it can be prevented.

Heat Stroke

Heat stroke is the most serious heat-related disorder. It occurs when the body becomes unable to control its temperature: the body's temperature rises rapidly, the sweating mechanism fails, and the body is unable to cool down. When heat stroke occurs, the body temperature can rise to 106 degrees Fahrenheit or higher within 10 to 15 minutes. Heat stroke can cause death or permanent



disability if emergency treatment is not given.

Symptoms of heat stroke include:

- Hot, dry skin or profuse sweating
- Hallucinations
- Chills
- Throbbing headache
- High body temperature
- Confusion/dizziness
- Slurred speech

Take the following steps to treat a worker with heat stroke:

- Call 911 and notify their supervisor.
- Move the sick worker to a cool shaded area.
- Cool the worker using methods such as:
 - Soaking their clothes with water.
 - Spraying, sponging, or showering them with water.
 - Fanning their body.

² <http://www.cdc.gov/niosh/topics/heatstress/heatrelillness.html>

17

Heat exhaustion

Heat exhaustion is the body's response to an excessive loss of the water and salt, usually through excessive sweating. Workers most prone to heat exhaustion are those that are elderly, have high blood pressure, and those working in a hot environment.

Symptoms of heat exhaustion include:

- Heavy sweating
- Extreme weakness or fatigue
- Dizziness, confusion
- Nausea
- Clammy, moist skin
- Pale or flushed complexion
- Muscle cramps
- Slightly elevated body temperature
- Fast and shallow breathing

Treat a worker suffering from heat exhaustion with the following:

- Have them rest in a cool, shaded or air-conditioned area.
- Have them drink plenty of water or other cool, nonalcoholic beverages.
- Have them take a cool shower, bath, or sponge bath.

Heat Syncope

Heat syncope is a fainting (syncope) episode or dizziness that usually occurs with prolonged standing or sudden rising from a sitting or lying position. Factors that may contribute to heat

H & M Surveying, LLC

"Accuracy First, Customers Always"



syncope include dehydration and lack of acclimatization.

Symptoms of heat syncope include:

- Light-headedness
- Dizziness
- Fainting

Workers with heat syncope should:

- Sit or lie down in a cool place when they begin to feel symptoms.
- Slowly drink water, clear juice, or a sports beverage.

Heat Cramps

Heat cramps usually affect workers who sweat a lot during strenuous activity. This sweating depletes the body's salt and moisture levels. Low salt levels in muscles causes painful cramps.

Heat cramps may also be a symptom of heat exhaustion.

Muscle pain or spasms usually in the abdomen, arms, or legs.

18

Workers with heat cramps should:

- Stop all activity, and sit in a cool place.
- Drink clear juice or a sports beverage.
- Do not return to strenuous work for a few hours after the cramps subside because

further exertion may lead to heat exhaustion or heat stroke.

- Seek medical attention if any of the following apply:
 - The worker has heart problems.
 - The worker is on a low-sodium diet.
 - The cramps do not subside within one hour.

Heat Rash

Heat rash is a skin irritation caused by excessive sweating during hot, humid weather.

Symptoms of heat rash include:

- Heat rash looks like a red cluster of pimples or small blisters.
- It is more likely to occur on the neck and upper chest, in the groin, under the breasts, and in elbow creases.

Workers experiencing heat rash should:

- Try to work in a cooler, less humid environment when possible.
- Keep the affected area dry.
- Dusting powder may be used to increase comfort.

Lyme Disease³

Lyme disease is the most commonly reported vector borne illness in the United States. In 2014, it was the fifth most common. However this disease does **not** occur nationwide and is concentrated heavily in the northeast and upper Midwest. In 2015, 95% of confirmed Lyme disease cases were reported from 14 states:

- Connecticut
- Delaware



- Maine
- Maryland
- Massachusetts
- Minnesota
- New Hampshire
- New Jersey
- New York
- Pennsylvania
- Rhode Island
- Vermont
- Virginia
- Wisconsin

³ www.health.ny.gov/diseases/communicable/lyme/

19

During the period of 2005 to 2015 there was an average of over 3,200 cases of Lyme disease reported annually in New Jersey. In 2015, there were 3,932 confirmed cases with another 923 suspected. If the 923 suspected cases holds up, this would be the highest number of cases reported in the last 11 years.

The early symptoms of Lyme disease may be mild and easily missed. If you find a tick attached to your skin, remove the tick with tweezers (see tick removal instructions below), and watch for the symptoms of Lyme disease. In 60-80% of cases the first symptom is a rash that:

- Occurs at or near the site of the tick bite.
- Is a "bulls-eye" circular patch or solid red patch that grows larger.
- Appears between three days and one month after the tick bite.
- Has a diameter of two to six inches.
- Lasts for about three to five weeks.
- May or may not be warm to the touch.
- Is usually not painful or itchy.
- Sometimes leads to multiple rashes.

Ticks will attach themselves anywhere including the thighs, groin, trunk, armpits and behind the ears. If you are infected, the rash may be found in one of these areas.

Around the time the rash appears, other symptoms, such as joint pain, chills, fever and fatigue can occur, but they may seem too mild to require medical attention. As Lyme disease progresses, severe fatigue, a stiff neck, tingling or numbness in the arms and legs, or facial paralysis can occur.

The most severe symptoms of Lyme disease may not appear until weeks, months or years after the tick bite. These can include severe headaches, painful arthritis, swelling of the joints, and heart and central nervous system problems.

20

Tick Repellants⁴



Tick and insect repellents can be effective at reducing bites and, therefore, may reduce the risk of getting some diseases, such as Lyme disease and certain forms of encephalitis. Repellents commonly available to consumers contain the active ingredients DEET (N, N-diethyl-mtoluamide),

permethrin, or botanical oils. A few products containing other active ingredients (e.g. IR3535) are also available.

Using any of these repellents is not without risk of adverse reactions, especially if used in large amounts or applied improperly. Information in this brochure will help you decide when and if a repellent should be used.

Products labeled as insect repellents are regulated by the U.S. Environmental Protection Agency (EPA) and some states, and are tested for toxicity and effectiveness. The EPA does not require that all botanical repellents be tested or registered before their sale and use. The active ingredients for all products should be stated on the labels.

Children, pregnant women and repellents

- Children may be at greater risk for adverse reactions to repellents, in part, because their exposure may be greater.

- Keep repellents out of the reach of children.

- Do not allow children to apply repellents to themselves.

- Use only small amounts of repellent on children.

- Do not apply repellents to the hands of young children because this may result in accidental eye contact or ingestion.

- Try to reduce the use of repellents by dressing children in long sleeves and long pants tucked into boots or socks whenever possible. Use netting over strollers, playpens, etc.

- As with chemical exposures in general, pregnant women should take care to avoid exposures to repellents when practical, as the fetus may be vulnerable.

Regardless of which repellent product you use, carefully read and follow all directions on the label before each use.

DEET and botanical products

DEET products have been widely used for many years but these products have occasionally been associated with some adverse reactions. DEET concentrations range from a low of about five percent up to 100 percent. Skin reactions (particularly at DEET concentrations of 50 percent and above) and eye irritation have been the most frequently reported adverse effects. There have been some reports of central nervous system problems, more frequently reported in children than adults, ranging from slurred speech and confusion to seizures and coma. The use of DEET products primarily results in exposure from skin contact, although unintentional exposure by breathing and ingestion can also occur.

⁴ <https://www.health.ny.gov/publications/2737/>

21

By using products with lower concentrations of DEET and by applying as little of the product as needed for your outdoor activities, you can reduce your exposure to DEET.

DEET concentrations as low as five percent have been shown to provide good, but not necessarily complete, protection from mosquito bites for periods up to about four hours⁴. Such lower concentration products may be adequate for activities like yard work or picnicking at times



when mosquito activity is low.

Less information is available on DEET's effectiveness in repelling ticks although some data suggest that ticks may be more difficult to repel than mosquitoes. Products containing higher concentrations of DEET or those with controlled-release formulations (a controlled-release product extends protection time from insects by regulating its release) may be useful when in areas with high populations of ticks or biting insects for long periods of time. Skin reactions have been associated with higher concentration products (particularly at DEET concentrations of 50 percent and above).

Under demanding conditions, a two-part approach has been used to help protect people from ticks and other biting insects. The approach uses a repellent product containing about 33 percent DEET in a controlled-release formulation on exposed skin along with clothing treated with permethrin. (See Permethrin Products below). This may meet the needs of individuals spending long periods of time in areas with high populations of active ticks or mosquitoes.

Information about DEET's effectiveness in repelling insects comes from laboratory and field experiments⁶. The data are not completely consistent about how long DEET is effective or how completely it prevents insect bites. In general, the more concentrated the DEET product, the more protection (reduction of bites and length of this reduction) is provided. Also, in general, the more DEET exposure, the greater your risk of experiencing adverse effects. To reduce your risk of adverse effects while maintaining sufficient protection, you should use as little DEET as necessary for your situation.

The amount of repellent you may be exposed to depends on:

- The concentration in the product
- In what form the product is applied
- The amount of the product put on the skin
- How carefully and how often the product is applied

The greater your exposure to the repellent, the greater the risk of health effects.

Things to consider when choosing a repellent:

- The type of pests present - ticks, mosquitoes, etc.
- The numbers and activity of pests.
- Where you are going - swamp, backyard, etc.
- Whether the area has pests carrying diseases.
- How long you will be in infested areas.
- Your tendency to be bitten.
- Age - child, adult.

22

Recommendations for proper use of DEET products

1. Particularly with children, try to reduce the use of repellents by dressing them in long sleeves and long pants tucked into socks or boots when possible or by applying repellent to clothing instead of skin. Use repellents only in small amounts, avoiding unnecessary repeat applications.
2. Do not apply repellents directly to children. Apply repellent to your own hands and then use your hands to apply repellent on the child.



3. Do not apply near eyes, nose or mouth and use sparingly around ears. Do not apply to the hands of small children because this may result in accidental eye contact or ingestion.
4. Avoid use of DEET products on skin damaged by sunburn, cuts, rashes or other skin conditions, such as psoriasis or acne.
5. Particular care should be taken to avoid breathing in DEET when applying products, especially spray products. Do not apply repellents in enclosed areas or directly to the face (products can be applied to hands and then rubbed on the face).
6. Do not use sunscreens or moisturizers that also contain DEET if the repellent is not needed.
7. Avoid prolonged and excessive use of DEET products. Use just enough repellent to cover exposed skin or clothing, and do not treat unexposed skin (skin covered by clothing).
8. After returning indoors, wash treated skin with soap and water.
9. DEET products can be applied to clothing, but may damage some synthetic fabrics and plastics, especially products with very high DEET concentrations. Launder treated clothing separately from other clothing.
10. Frequent reapplication or saturation is unnecessary for effectiveness. Use only what is required to maintain protection.

Botanical products

Insect repellent products containing botanical (plant-based) oils, such as oil of geranium, cedar, lemongrass, soy or citronella, are also available. There is limited information on the effectiveness of botanical oils individually and when combined with other ingredients to make repellent products. Available information, however, indicates that, compared to the effectiveness of DEET or permethrin, botanical oils generally do not provide the same duration of protection. While two botanical products are reported to provide some protection (one to four hours) from mosquitoes, other products evaluated provided less. Limited, unpublished information on botanical products indicates some protection from ticks.

Because many botanical oils are regulated differently than DEET and permethrin, most have not been tested for their potential to cause short-or long-term toxic or reproductive effects, birth defects or cancer. By following recommendations one through eight listed above for the proper use of DEET products, you will reduce your exposure and, hence, the risk of adverse health effects when using botanical products.

23

Permethrin products

Products containing permethrin are for use on clothing only - not on skin. Permethrin kills ticks and insects that come in contact with treated clothes. It is effective for two weeks or more if the clothing is not laundered.

There are some health concerns associated with the use of permethrin products, particularly if they are not used according to the label directions. They can cause eye irritation. In addition, animal studies indicate that permethrin may have some cancer causing potential¹². If used properly, however, the potential for adverse reactions is minimized. Some recommendations for proper use are:

A color brochure on Lyme disease is available for download at:
<https://www.health.ny.gov/publications/2813.pdf>.

Giant Hogweed

Giant hogweed *Heracleum mantegazzianum* is an invasive species of plant from the Caucasus



Mountains region of Europe and southwest Asia. According to the University of Connecticut it was first introduced to the United States in 1917 as an ornamental.

The following image from the Center for Invasive Species and Ecosystem Health at the University of Georgia shows New Jersey as an affected state.

24

Giant hogweed plants grow large quite rapidly, have large leaves and produce seeds prolifically, thus they will push out and replace native vegetation, leaving bare soil beneath which can result in soil erosion. It initially favors areas along rivers or streams, and can spread widely from those locations as seeds disperse. It grows in wet areas, on waste ground, near houses, in vacant lots, and along railways and roads. It favors moist areas and can rapidly overtake river and stream banks and in moist ravines.

How to identify giant hogweed

Giant hogweed is tall - up to 20 feet in height - but if it has been cut back or is an immature plant, it can be much smaller. The plant reaches maturity in about 2 years.

There are a number of plants that look quite similar to giant hogweed, especially cow parsnip, but also wild parsnip, angelica, and poison hemlock.

- Leaves have very deep lobes and can be up to 5 feet across.⁵ They have bristles on the underside.

- Flowers grow in white (sometimes pink) clusters up to 2½ feet across.⁶ They look like exceptionally large queen anne's lace flowers

- The stems of mature giant hogweed plants are hollow, 2 to 4 inches in diameter and blotched with purple and having white bristles or hairs at the base of the leaf stalk.⁷

- Seeds are dry, flat, oval-shaped and about 3/8 inches long. There are brown oil tubes that appear as lines running about ¾ of the length of the seed.⁸

Toxicity

Giant hogweed is highly toxic. The sap coating the plant can result in severe inflammation, painful blisters, long-term or permanent sensitivity to sunlight, scars that can last up to six years and even blindness.

Preventative Steps

- Do not touch the plant with bare skin

- Do not touch bare skin with gloves or clothes that have touched the plant

⁷ Images from New York Department of Environmental Conservation at

<http://www.dec.ny.gov/animals/72766.html>

⁸ Image from New York Department of Environmental Conservation at <http://www.dec.ny.gov/animals/72766.html>

26

- Do not clear plants yourself; call experts.

- If clearing the plants, stay away from others and do not use "weed-whackers" - the sap can splash up to 4 feet

- Apply sunscreen before working around giant hogweed

- Carefully launder clothes that have touched the plant

- Wash with water any equipment that has touched the plant
- Keep water, soap and eye-wash near the work area

If exposed to Giant Hogweed

- Wash affected areas with soap and cold water as soon as possible
- Keep affected areas out of sunlight for 48 hours
- Use topical steroids as soon as any reaction is observed
- If sap gets into eyes, rinse with water and wear sunglasses
- Apply sun block liberally for a few years after exposure
- See a physician

Venomous Snakes⁹

Venomous snakes found in the United States include rattlesnakes, copperheads, cottonmouths/water moccasins, and coral snakes. They can be dangerous to outdoor workers including farmers, foresters, landscapers, groundskeepers, gardeners, painters, roofers, pavers, construction workers, laborers, mechanics, and any other workers who spend time outside. According to the State of New Jersey there are two species of venomous snakes found in New Jersey.¹⁰ Those are the timber rattlesnake and the northern copperhead. Persons that might encounter them should be familiar with what each looks like and their preferred habitats and habits.

Although rare, some workers with a severe allergy to snake venom may be at risk of death if bitten. It has been estimated that 7,000–8,000 people per year receive venomous bites in the United States, and about 5 of those people die. The number of deaths would be much higher if people did not seek medical care. It is important for employers to train their workers about their risk of exposure to venomous snakes, how they can prevent and protect themselves from snake bites, and what they should do if they are bitten.

There are many species of rattlesnakes in the United States. Rattlesnakes are the largest of the venomous snakes in the United States. They can accurately strike at up to one-third their body length. Rattlesnakes use their rattles or tails as a warning when they feel threatened. Rattlesnakes may be found sunning themselves near logs, boulders, or open areas. These snakes may be found in most work habitats including the mountains, prairies, deserts, and beaches.

⁹ <http://www.cdc.gov/niosh/topics/snakes/>

¹⁰ http://www.state.nj.us/dep/fgw/ensp/pdf/snake_broch07.pdf

Signs or symptoms associated with a snake bite may vary depending on the type of snake, but may include:

- A pair of puncture marks at the wound
- Redness and swelling around the bite
- Severe pain at the site of the bite
- Nausea and vomiting
- Labored breathing (in extreme cases, breathing may stop altogether)

- Disturbed vision
- Increased salivation and sweating
- Numbness or tingling around your face and/or limbs

Employers should protect their workers from venomous snake bites by training them about:

- Their risk of exposure to venomous snakes
- How to identify venomous snakes
- How to prevent snake bites
- What they should do if they are bitten by a snake

Preventing Snake Bites

Workers should take the following steps to prevent a snake bite:

- Do not try to handle any snake.
- Stay away from tall grass and piles of leaves when possible.
- Avoid climbing on rocks or piles of wood where a snake may be hiding.
- Be aware that snakes tend to be active at night and in warm weather.
- Wear boots and long pants when working outdoors.
- Wear leather gloves when handling brush and debris.

First Aid

Workers should take the following steps if they are bitten by a snake:

- Seek medical attention as soon as possible (dial 911 or call local Emergency Medical Services.)
- Try to remember the color and shape of the snake, which can help with treatment of the snake bite.
- Keep still and calm. This can slow down the spread of venom.
- Inform your supervisor.
- Apply first aid if you cannot get to the hospital right away.
 - Lay or sit down with the bite below the level of the heart.
 - Wash the bite with soap and water.
 - Cover the bite with a clean, dry dressing.

Do NOT do any of the following:

- Do not pick up the snake or try to trap it.
- Do not wait for symptoms to appear if bitten, seek immediate medical attention.
- Do not apply a tourniquet.
- Do not slash the wound with a knife.
- Do not suck out the venom.

28

- Do not apply ice or immerse the wound in water.
- Do not drink alcohol as a painkiller.
- Do not drink caffeinated beverages.



Mosquito-borne diseases: West Nile Disease, Zika, Chikungunya

West Nile

Most people who become infected with the West Nile virus actually do not develop any symptoms or have any sign of the disease. However, if symptoms do develop, they usually appear within 3 to 15 days of exposure. Symptoms in mild cases include fever, headache, body aches and occasionally a skin rash or swollen glands (lymph nodes).

Severe case symptoms can include headache, high fever, neck stiffness, muscle weakness, altered mental status, tremors, convulsions, paralysis, inflammation of the brain or its membranes and spinal cord, or coma. Only about 1 in 150 persons infected with West Nile virus end up with a severe case and even then, death is rare and recovery typically complete.

Over the last six years the Centers for Disease Control and Prevention has reported 131 cases of West Nile Disease in New Jersey. Nationally, in 2015, there were 1,455 neuro-invasive cases and 142 deaths.

West Nile - Prevention and Treatment

There are no vaccines for West Nile virus in humans and antibiotics do not treat viral infections, thus, prevention is the best way to lower the risk of becoming infected. Keep as much of your skin as possible covered and apply insect repellent on any skin that remains exposed. Keep screens in windows and doors in good repair. Eliminate any standing water around your property.

Chikungunya

Chikungunya is also a viral infection spread by mosquitoes. According to the Centers for Disease Control and Prevention, as of December 6th seven cases had been reported in New Jersey – all travel-related. 2015 saw 895 cases nationally. At least report, it had spread locally in only in Texas.

Chikungunya is an African word that translates to “that which bends up” because people bend up with terrible joint pain, one of the most common symptoms. You can also get a high fever, back pain, headache, weariness and sometimes a rash. “If you are very unlucky, you can get massive bruising and leaky blood vessels and — uncommonly — it can kill you,” reported Dr. Aileen Marty, professor of infectious diseases at the Herbert Wertheim College of Medicine. Most people feel better after about a week.

29

Chikungunya - Prevention and Treatment

As with West Nile, there is no vaccine and only the symptoms can be treated, not the disease itself.

Zika

This author cannot add anything to the massive amount of media attention given to Zika over the last year or so. Suffice it to say that pregnant woman, in particular, should avoid exposure and Zika is a viral infection with no vaccine and no effective treatment.

According to the Centers for Disease Control and Prevention, as of December 7th, 4,575 cases had been reported in the United States with 4,389 or 96% being travel-related.

30

Traffic Safety

There are a variety of guidelines and rule as for working in traffic, some of which may even be ostensibly in conflict with each other.

The National Highway Traffic Safety Administration has resources for a wide variety of



highway traffic safety-related issues from bicycles and distracted driving to older drivers and pedestrians.¹¹

When it comes to actually working in the roadway, the New Jersey State League of Municipalities promotes work zone awareness.¹² The New Jersey Work Zone Safety Partnership is a collaboration that includes the New Jersey State Police Construction Unit, NJDOT, OSHA, the Rutgers Center for Advanced Infrastructure and Transportation, the New Jersey Local Technical Assistance Program (LTAP), the New Jersey Division of Highway Traffic Safety and the New Jersey Police Traffic Officers Association and that promotes safe work zone practices. The Partnership also sponsors the New Jersey Police Work Zone Safety Train-the-Trainer Program for municipal police officers. The program is four days in length and includes sessions on the Manual on Uniform Traffic Control Devices, traffic control planning, OSHA considerations, legal issues and the role of the police officer in work zones.

Information on and resources related to the Work Zone Safety and Mobility Rule from the Federal Highway Administration can be found at

http://ops.fhwa.dot.gov/wz/resources/final_rule.htm.

Even when all traffic control measures are taken, a confused or unaware driver can crash through a work site, or a daydreaming worker can step into the path of a speeding vehicle. Any person who has worked on a field crew for more than about a year has experienced drivers taking reckless chances or even being purposefully aggressive in work zones. Drivers will run stop signs, change lanes without signaling, and ignore flaggers and construction speed limits.

Survey field crews must be prepared for the unexpected on the road, both during and after work hours. When your worksite involves moving traffic, safety awareness should be at its peak, to protect both the public and the crew. Here are some basic safety procedures:

Planning: All traffic control must be carefully planned and preferably approved by governing authorities before work begins. The person responsible for this planning should drive through the traffic pattern before any work starts to insure that the public will understand how to control their vehicles appropriately. If there is any possibility of driver confusion in the pattern, change it.

Signage: The Manual on Uniform Traffic Control Devices (MUTCD) and local or state regulations should be followed for proper signage and barricading. Place initial warning signs at the designated minimum from traffic revisions. All signs and related equipment should be in

¹¹ <http://www.nhtsa.gov/Driving-Safety/Community-Traffic-Safety/Community-Traffic-Safety-Overview>

¹² http://www.njslom.org/magart1206_pg62.html

good condition and highly visible. In some cases, independent traffic safety contractors handle warning signs and barricades.

Barricades: Devices which guide traffic such as cones, and barrels should be highly visible and spaced relatively close together, so drivers will not deviate from an assigned traffic flow. All such barriers should be made of material that will cause little or no damage if a vehicle contacts it.

Safety Gear: All employees must wear hard hats and high-visibility orange or day-glow vests. When working at night, the vest should have light-reflective strips.

Flaggers: Roadside construction sites should have at least one individual assigned to traffic control. A highly visible sign paddle should be used during daylight hours. It should be octagonal in shape, at least 18 inches across, and have letters at least six inches high that say *STOP* on one side and *SLOW* on the other. Flaggers should have two-way radios. When flaggers



are present, a sign indicating this must be placed at the appropriate distance from the beginning of the detour. Flagging is not a job to be undertaken by someone who is not trained. We have all come upon a flagger whose motions were not clear and or was texting or talking on the phone. Vehicles: All construction vehicles should be equipped with backing alarms, two-way radios, and *Slow Moving Vehicle* signs when appropriate. Ideally, they should be painted a highly visible color and many jurisdictions also require flashing yellow beacons. All operators must be qualified and trained to operate the equipment they are using. If a vehicle will be parked alongside

the road, orange safety cones should be placed around it to alert drivers.

Night Work: If work is done at night, the entire site must be illuminated. Increase warning distances in areas of fast-moving traffic as light fails. Flaggers should have orange-cone flashlights and barricades should be equipped with flashing lights. Any excavations or utility accesses should be taped off and barricaded with flashing warning lights.

Training: All company employees and subcontractors involved in the project must receive an initial safety orientation, informing them of the potential hazards of the project, including traffic safety. Changes or unusual conditions should be communicated to workers immediately.

An entire day could easily be dedicated to traffic safety when surveying, but that is beyond the scope of this session. Suffice it to say that the following list is a non-exhaustive list of considerations when working in or along the roadway:

- Vests, hard hats, safety work shoes and safety clothing
- Safety orientation sessions
- Cease operations when conditions until unanticipated hazards are mitigated
- Safety and first aid training
- Personal responsibilities
- Vehicle warning lights
- Work zone signage (e.g., work zone, no shoulder, flag person ahead)
- Flaggers and spotters

32

- Cones

Fall Protection

In order to properly address fall protection. It is necessary to know what conditions require fall protection and what options are available to mitigate or eliminate the dangers.

Falls are the leading cause of death in the construction industry.

Fall protection is required in certain conditions outlined by OSHA¹³. *The general rule is that if an employee could fall six feet or more onto a lower level, fall protection must be provided.* The specific rules include but are not necessarily limited to conditions under which employees:

- Are on a walking/working surface that has an unprotected edge.
- Are constructing a leading edge.

- May fall through a hole in the walking/working surface.
- Are working on the face of formwork or reinforcing steel.
- Are on ramps, runways and other walkways.
- Are working at the edge of an excavation, well, pit, or shaft.
- Are working above dangerous equipment (even at less than 6 feet).
- Are performing overhand bricklaying and related work.
- Are performing roofing work.
- Are engaging in precast concrete erection (with certain exceptions).
- Are engaged in residential construction (with certain exceptions)

The options for fall protection include:

- **Personal fall arrest system**
- **Guardrails**
- **Safety net**
- In cases where the above are infeasible or if utilizing conventional fall protection

equipment creates a greater hazard, a **Fall Protection Plan** may be developed outlining measures that will be taken to reduce or eliminate fall hazards.

Personal Fall Arrest Systems

A personal fall arrest system is comprised of a variety of components – anchorage, lifeline and body harness. The body harness must be fastened to a secure anchorage so a worker cannot free fall any further than 6 feet. The anchorage must be capable of supporting at least 5,000 pounds per person relying on it. *Body belts are not acceptable personal fall arrest systems.*

Some primary requirements of a personal fall arrest system include:

- No free fall more than 6 feet.
- A procedure for prompt rescue after a fall

¹³ See the associated OSHA regulation at 29 CFR 1926.502

https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10758

33

- Inspected prior to each use
- Not be used until inspected by a competent person

A free fall of even 6 feet will be exceptionally traumatic to the body. It is desirable that any system have a braking system to prevent the sudden shock of being fall-arrested extremely quickly. It is also important that the harness have built in foot stirrups so the worker can step into them after a fall to release pressure on the legs and groin area while waiting for rescue. Many workers have suffered permanent injury not from the arrested fall, but while waiting an extended time for rescue, so a rescue plan is an integral part of the overall fall protection plan.

Guardrails

Guardrails are an acceptable method of fall protection, however, they must meet or be constructed in accordance with very specific requirements in order to provide effective protection.

H & M Surveying, LLC

"Accuracy First, Customers Always"



- The top edge of the guardrail must be 39-45 inches above the walking/working level.
- There must also be protection from falling between the top rail and the walking/working surface. Midrails, screens, mesh, or intermediate vertical members may be used for this purpose. There are specific requirements for their installation.
- Wood, chain and wire rope may be used for top rails and midrails, as long as the barriers are strong enough to support a person otherwise falling.

Safety Nets

Safety net systems are designed to catch workers that actually fall. A safety net must:

- Be strong enough to support a falling employee
- Have sufficiently small mesh openings so the employee cannot fall through the net
- Be close enough to the surface of the walking/working surface so that the fall into the safety net will not injure the employee (a maximum of 30 feet below the walking/working surface)
- Be close enough to the edge of the working surface so that the falling employee will not slip past the net (the outer edge of the net must be between 8 and 13 feet from the edge of the walking/working surface, depending on the distance down from the walking/working surface to the net)

Safety nets must be drop tested after installation and before use as a fall protection system by dropping a 400 pound bag of sand from the working surface.

Fall Protection Plans

Fall protection plans must follow OSHA rules and be prepared by a qualified person. Fall protection plans must identify locations where conventional fall protection methods cannot be used and set up controlled-access zones and any necessary safety monitoring systems (e.g., a spotter whose sole job is to monitor activities near the fall hazard).

34

Fall protection plans must:

- Be prepared by a qualified person, be site-specific and be maintained up to date.
- Be implemented under the supervision of a competent person.
- Document the reasons why the use of conventional fall protection systems (guardrail systems, personal fall arrest systems, or safety nets systems) are infeasible or why their use would create a greater hazard.
- Include a written discussion of other measures that will be taken to reduce or eliminate the fall hazard for workers who cannot be provided with protection from the conventional fall protection systems
- Identify each location where conventional fall protection methods cannot be used
- Designate the controlled-access zones
- Include a safety monitoring system when no other alternative method is implemented
- Include a statement which provides the name or other method of identification for each employee who is designated to work in controlled access zones (no other employees may enter controlled access zones)

Trenches and Excavation



While most survey companies do not conduct trenching or excavation themselves and therefore, do not have responsibility for them, survey field personnel should have a basic understanding of what constitutes obviously unsafe situations so they do not enter into them.

Some general considerations (there are many others) include:

- Work in an excavation or trench must at all times be under the immediate supervision of a qualified person. Ask the general contractor who their designated “qualified person” is.

- Safe access/egress must be provided (stairway, ladder, ramp, etc.). Access must be provided and located so no worker must laterally travel more than 25 feet to access the egress point in any trench or excavation deeper than 4 feet. The equipment must be securely fastened in place.

- ALL trenches and excavations over 5 feet in depth must be protected from cave-ins unless they are made *entirely* of stable rock. Protection can be provided by adequately sloping back the sides of the cut, installing shoring, shielding or by benching the excavation. If shoring or trench boxes are used the top of the box/shoring must extend at least 18 inches above the hole. If the hole is deeper than 6 feet, fall protection should be installed around the perimeter to protect those working on the surface.

- For all excavations 4 feet or greater in depth, adequate precautions must be taken to protect personnel where oxygen deficiency or another hazardous atmosphere exists. Conduct air quality tests as often as necessary.

- All spoil piles must be placed at least 2 feet back from the edge of the hole. This is measured from the point where the slough of the pile ends. Placing the spoil any closer exerts excessive pressure on the walls of the excavation and thus increases the chance of a wall failure.

- Water accumulation into excavation must be controlled before entering. Always consider ground water seepage as a potential cause of collapse of any trench or excavation.

35

- Tabulated data on the shoring equipment must be onsite while in use.

- Adequate precautions must be taken to ensure that vibrating equipment and vehicular traffic do not cause a cave-in.

If the field crew does not feel that an excavation or trench is properly and safely maintained, they should not enter into it.

Confined Space

Confined space in construction is newly regulated by OSHA by virtue of 29 CFR 1926.1200 et seq.¹⁴ OSHA has an excellent web page providing employers with information and guidance related to confined space at <https://www.osha.gov/confinedspaces/>.

Previously, confined space was regulated under OSHA’s general industry classification, but employees continued to be killed in confined-space accidents during construction operations, so the new regulation was developed.

In situations where the field crew’s employer is acting as a contractor or subcontractor, there are many safeguards built into the construction industry, and even the general industry, confined



space regulations. However, when field crews are out on their own and faced with potential confined space situations, there may not be the same inherent safeguards in place prior to encountering the situation. Thus, they must be informed enough to understand the hazards. A confined space is identified by three characteristics, all of which must be present. The space must:

- Be large enough and so configured that an employee can bodily enter it
- Have limited or restricted means for entry and exit
- Not be designed for continuous employee occupancy

A permit-required confined space has – in addition to the above – one or more of the following characteristics:

- Contains or has a potential to contain a hazardous atmosphere
- Contains a material that has the potential for engulfing an entering employee
- Has an internal configuration such that an employee could be trapped or asphyxiated by inwardly converging walls or by a downward-sloping floor
- Contains any other recognized serious safety or health hazard

Entry into permit-required confined space must involve an attendant stationed outside who continuously assesses the status of authorized entrants into the confined space.

Locations that field crews might find themselves faced with in which confined space may occur include, but are not limited to pits, crawlspaces, manholes of all kinds, utility vaults, storm drains, and drilled shafts.

¹⁴ https://www.osha.gov/confinedspaces/1926_subpart_aa.pdf

36

Hazards must be controlled in a confined space and there are a variety of means to do, so depending on the threat. Precautions include, *but are most certainly not limited to*, a requirement that employees must leave the space immediately if a hazard is detected, ensuring a safe means of exit and entry, verification that the space is safe for entry prior to anyone entering it, and continuous atmospheric monitoring unless it can be shown that periodic monitoring is sufficient. In construction, unlike in general industry, OSHA requires that the host employer (normally the owners of the site) must provide information to the controlling contractor as to the location and potential hazards of any known confined spaces. Precautions implemented for employee safety must also be provided. The controlling contractor must share this information with any parties that will be entering the space (subcontractors) or that could potentially introduce a hazard into the confined space.

Each subcontractor must then inform the controlling contractor of its permit space program and any anticipated hazards. Thus, no employee should enter a confined space related to construction activities unless very specific information has been provided regarding that space and the employer has communicated a plan.

The OSHA Standard also includes a requirement that a competent person evaluate the confined space. It also encourages continuous atmospheric monitoring. There must also be an early warning system that continuously monitors hazards such as flash-flooding.



Bloodborne Pathogens¹⁵

As with other work-related safety hazards, OSHA has an excellent web page providing guidance on dealing with blood borne pathogens.

A blood borne pathogen is defined as an infectious microorganism in human blood that can cause disease in humans. These pathogens include, but are not limited to, hepatitis B (HBV), hepatitis C (HCV) and human immunodeficiency virus (HIV). Workers in many occupations, including first aid team members, housekeeping personnel in some industries, nurses and other healthcare personnel may be at risk of exposure to blood borne pathogens. In surveying, there can be opportunities for contracting hepatitis such as when taking measure-downs in sanitary manholes and working on landfill sites.

When employees may be exposed to blood borne pathogens, an employer must implement an exposure control plan for the worksite with details on employee protection measures designed to reduce or eliminate the related hazards. The plan must describe how the employer will use a combination of engineering and work practice controls, ensure the use of personal protective clothing and equipment, provide training, medical surveillance, hepatitis B vaccinations, and signs and labels, among other provisions.

¹⁵ See <https://www.osha.gov/SLTC/bloodbornepathogens/>

37

Engineering controls are the primary means of eliminating or minimizing employee exposure and include – in the case of health-care workers - the use of safer medical devices, such as needleless devices, shielded needle devices, and plastic capillary tubes.

In surveying, work practice controls may provide for most protection by defining the safest ways to perform exposure-related tasks. Some routine suggestions include:

- Hand washing is one of the most important considerations and is an OSHA requirement if the risk of blood borne pathogens exists or if potentially contaminated items are encountered inadvertently.

- Cleaning the faucet nozzle after washing your hands is a good follow-up procedure to prevent recontamination or the potential passing of pathogens to others.

- Areas of contamination (e.g., counter tops, floors, shelves, desktops, sinks) should be sanitized with bleach or a similar disinfectant. Keyboards, due to the difficulty of cleaning and sanitizing, should be replaced if contaminated.

- Avoid handling needles, broken glass, or sharp objects that have blood or human tissue on them – use a brush and dust pan instead.

- Avoid placing any food items or drinks near the location of an exposure event.

- Workplace vaccinations are a good way to prevent your workforce from getting hepatitis B.

Best practices for disposal and handling of contaminated items are listed below. If you are unsure how to handle a situation, contact a health official, or the Center for Disease Control, with questions and inquiries.

- Options for disposal include taking materials to the hospital, using a burn barrel to incinerate items, or contacting a waste disposal business to have the contaminants

removed from your facility.

- Ensure that hazard signs and puncture-proof disposal containers are available for use.
- Make appropriate PPE available to those who are responsible for disposal. PPE could include the use of gloves, a mask, safety glasses, an apron, a coat, or shoe sheaths. Keep a well-stocked first aid cabinet that includes a biohazard kit. Keep towels, bandages, and disinfectants available at all times.

Facts on Blood borne Pathogens from the Center for Disease Control (CDC):

- 70,000 new cases of hepatitis B are discovered every year
- Approximately 3 million people suffer from hepatitis C
- 500,000 incidents of blood borne pathogens exposure occur annually
- Biohazard labels and materials are designated by an orange/red color coding

Symptoms for exposure to blood borne pathogens include:

- For hepatitis B and hepatitis C, exposure is typically followed by mild flu-like symptoms, jaundice (yellowing of the skin), fatigue, nausea, loss of appetite, stomach pain, and darkening of the urine.

38

- For HIV, symptoms include weakness, fever, sore throat, nausea, headaches, diarrhea, and flu-like reactions.

- As is the case with all three of these conditions, symptoms may appear and abate without warning and can lie dormant in the human body for years.

Summary

Workers have a right to a safe workplace. The law requires employers to provide their employees with safe and healthful workplaces. The OSHA law also prohibits employers from retaliating against employees for exercising their rights under the law (including the right to raise a health and safety concern or report an injury). For more information see www.whistleblowers.gov or Workers' rights under the OSH Act.

OSHA can help answer questions or concerns from employers and workers. To reach your regional or area OSHA office, go to OSHA's Regional & Area Offices webpage or call 1-800-321-OSHA (6742).

Small businesses may contact OSHA's free On-site Consultation services funded by OSHA to help determine whether there are hazards at their worksites. To contact free consultation services, go to OSHA's On-site Consultation webpage or call 1-800-321-OSHA (6742) and press number 4.

Workers may file a complaint to have OSHA inspect their workplace if they believe that their employer is not following OSHA standards or that there are serious hazards. Workers can file a complaint with OSHA by calling 1-800-321-OSHA (6742), online via eComplaint Form, or by printing the complaint form and mailing or faxing it to the local OSHA area office. Complaints that are signed by a worker are more likely to result in an inspection.

If you think your job is unsafe or if you have questions, contact OSHA at 1-800-321-OSHA (6742). Your contact will be kept confidential. We can help. For other valuable worker

H & M Surveying, LLC

"Accuracy First, Customers Always"



protection information, such as Workers' Rights, Employer Responsibilities, and other services OSHA offers, visit OSHA's Workers' page.