



Shawnee State
UNIVERSITY

Construction Safety & Environmental Management Program

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The Office of Environmental Health &
Safety/Facilities**

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| Section | Page Number |
|--|--------------------|
| I. Purpose..... | 1 |
| II. Scope..... | 1 |
| III. Application..... | 1 |
| IV. Definitions..... | 1 |
| V. Responsibilities..... | 2 |
| VI. Procedures..... | 2 |
| 1. Standard Safety & Security Procedures..... | 2 |
| 2. Safety Permits & Procedures..... | 3 |
| 3. Housekeeping..... | 4 |
| 4. Accident, Incident, Injury or Illness..... | 4 |
| 5. Environmental Issues..... | 4 |
| 6. Waste Hauling..... | 5 |
| 7. Excess or Abandoned Materials..... | 6 |
| 8. Ballasts..... | 6 |
| 9. Fluorescent Bulbs..... | 6 |
| 10. Soils..... | 7 |
| 11. Pest Control..... | 7 |
| 12. CFC Containing Units..... | 7 |
| 13. Halon..... | 8 |
| 14. Biological, Chemical and Radiological Hazards..... | 8 |
| 15. Asbestos Containing Materials..... | 8 |
| 16. Asbestos Abatement Activity Requirements..... | 9 |
| 17. Construction in Occupied Buildings..... | 10 |
| 18. Mold Prevention and Remediation..... | 10 |
| VII. OSHA Safety Issues..... | 12 |

| | |
|---|----|
| 1. Right-to-Know/ Hazard Communication..... | 12 |
| 2. Personal Protective Equipment..... | 12 |
| 3. Confined Space Entry..... | 14 |
| 4. Fall Protection | 15 |
| 5. Excavation..... | 15 |
| 6. Ladder Safety..... | 17 |
| 7. Lock out / Tag out..... | 18 |
| 8. General Electrical Safety..... | 18 |
| 9. Compressed Gas Cylinders..... | 19 |
| 10. Powder-Actuated Tools..... | 20 |
| 11. Pneumatic Tools & Compressed Air Systems..... | 21 |
| 12. Hotwork | 22 |
| 13. Laser Safety..... | 23 |
| VII. References..... | 26 |

I. Purpose

The purpose of the Shawnee State University Construction Safety & Environmental Management Program is to ensure that all Contractors and University employees performing construction type work are responsible for performing the work in conformance with all environmental, health and safety laws and regulations and these University standards.

II. Scope

Contractors and University employees performing construction type work are responsible for conforming to the provisions of the Shawnee State University Construction Safety & Environmental Management Program, which has been prepared for the protection and safety of Shawnee State University students, faculty, staff, neighbors and property.

III. Application

This program applies to any University employee performing construction type work and Contractors working for Shawnee State University. Contractors include, but are not limited to the following:

- Construction Managers
- General Contractors
- Hazardous Waste / Disposal Haulers
- Laboratory Testing Contractors
- Remediation Contractors
- Service Contractors
- Sub-Contractors

In this program the term Contractor is synonymous with both University hired contractors and University employees who are performing construction type work.

IV. Definitions

Confined Space – means a space that (1) Is large enough and so configured that an employee can bodily enter and perform assigned work; (2) Has limited or restricted means for entry or exit (for example, tanks, vessels, silos, storage bins, hoppers, vaults, and pits are spaces that may have limited means of entry.); and (3) Is not designed for continuous employee occupancy.

EHS – An abbreviation for Shawnee State University's Office of Environmental Health & Safety/Facilities.

EPA – An abbreviation for the United States Environmental Protection Agency.

Hot Work – is defined as the temporary operation involving open flames or which produces heat and/or sparks. This includes, but is not limited to: Brazing, Cutting, Grinding, Soldering, Thawing Pipe, Torch Applied Roofing, Welding and the use of Heat Guns.

LASER – the term is an acronym which stands for "Light Amplification by Stimulated Emission of Radiation"

Powder Actuated Fastening Tool – a tool or machine that drives a stud, pin, or fastener by means of an explosive charge.

Project Manager – Refers to the Shawnee State University Project Manager.

Universal Waste – A universal waste is defined as a waste of any of the six types listed below that has at least one hazardous waste characteristic, per 40 CFR 261 Subpart C, must be managed as a universal waste if it is not managed as a hazardous waste.

- Batteries
- Pesticides
- Thermostats
- Cathode Ray Tubes (i.e. computer monitors)
- Mercury Containing Devices
- Mercury Containing Lamps

V. Responsibilities

All Contractors who perform any service to Shawnee State University are required to follow all federal, state and local regulations and laws as well as the policies of Shawnee State University contained within this program. This Construction Safety & Environmental Management Program has been developed for the protection and safety of Shawnee State University students, faculty, staff, neighbors and property. This program shall be provided to Contractors to aid in the communication of hazard information for University properties and to outline Shawnee State University's safety and environmental procedures.

Shawnee State University Project Managers shall help ensure Contractor compliance with all of the policies set forth by this program by including this program into project specifications and communicating problems to the Contractor when they are identified. Shawnee State University Supervisors shall ensure University employee compliance with all of the policies set forth by this program by being familiar with this program, making training mandatory for all employees and correcting identified problems.

Shawnee State University suggests that contractors implement the contents of this program through weekly safety talks with sub-contractors and their employees.

VI. Procedures

1) Standard Safety and Security Procedures

- a) The following are several reasons for temporary or permanent removal of a Contractor employee from the Shawnee State University premises.
 - i) Possession or use of alcoholic beverages or regulated drugs not prescribed by a physician.
 - ii) Possession of explosives, firearms, ammunition and/or other weapons.
 - iii) Deliberate violation of safety or security rules.
 - iv) Illegal dumping, handling, or disposal of hazardous materials.
 - v) Destruction or removal, without written permission, of any property belonging to Shawnee State University, the property owner, employee or other contractors or employees.

- vi) Intimidating, threatening, harassing, impeding or interfering with an inspector, security officer, or Shawnee State University employee, student or designated representative.
- vii) Using emergency exits other than for emergencies or blocking emergency exits.
- viii) Misuse of fire prevention and protection equipment.
- ix) Unauthorized removal or destruction of a safety barricade, handrail, guardrail, warning sign, fall protection, or other warning devices intended to protect Shawnee State University students, faculty, staff, neighbors or property.

2) Safety Permits and Procedures

- a) The approval for such work typically is granted by Facilities Management, but may require specific approval from other University departments. Approvals should be requested during normal business hours and with the appropriate lead-time.
- b) Contractors must notify the Shawnee State University Project Manager prior to performing the following activities unless the project documents specifically request the activity:
 - i) Working on electrical, steam, chilled water systems or other energized systems.
 - ii) Working on heating, ventilation, or air conditioning equipment.
 - iii) Working in confined spaces on campus including but not limited to manholes, tanks, tunnels, vaults. (see the confined space section of this document)
 - iv) Working on security systems.
 - v) Moving emergency equipment (fire extinguishers, first aid kits, etc.) provided by Shawnee State University.
 - vi) Working with hazardous materials (including solvents and paints).
 - vii) Using powder actuated tools.
 - viii) Operating a power vehicle or self-propelled work platform.
 - ix) Excavation or trenching.
 - x) Working with compressed air or gases.
 - xi) Working on a roof.
- c) Contractors must obtain Shawnee State University Project Manager approval to perform the following activities:
 - i) Working on fire protection or detection systems.
 - ii) Installing a temporary electrical service.
 - iii) Using a gas, diesel, or LP (propane) powered engine indoors.
 - iv) Lifting or hoisting with cranes, derricks, hoists or helicopter.
 - v) Performing blasting operations.
 - vi) Any additional work not listed in the project documents which have a high risk of injury to the contractor and it employees or the Shawnee State University community.
- d) Contractors must obtain Shawnee State University EHS Office (863-3353) approval to perform the following activities:
 - i) Performing Hot Work which includes open flames or which produces heat and/or sparks. This includes, but is not limited to brazing, cutting, grinding,

- soldering, thawing pipe, torch applied roofing, welding and the use of heat guns.
 - ii) Disposing of hazardous wastes (including waste oil & lead-containing materials).
 - iii) Working with or impacting suspect asbestos-containing materials. (see the asbestos section of this document).
 - iv) Working on a fume hood, biological cabinet or autoclave.
 - v) Working in a solvent storage area.
- e) Special Rules for Operations Involving Utilities:
- i) Only Shawnee State University Facilities Management may shut down or start up operating utilities.
 - ii) The Contractor must contact the Shawnee State University Project Manager, who will coordinate with Facilities Management, in advance of the need for such shutdowns or startups.
- f) Special Rules for Lockout / Tagout of Machinery, Pipes, etc.:
- i) If the Contractor intends to service or maintain equipment that could potentially hurt someone if unexpectedly started, the Contractor is responsible for informing the Shawnee State University Project Manager of the lockout / tagout procedures intended to occur.
 - ii) The Contractor is also required to comply with the OSHA Standard 29 CFR 1910.147 – *Control of Hazardous Energy Sources* in order to perform such procedures.

3) Housekeeping

- a) The Contractor is responsible for ensuring and maintaining good housekeeping while at Shawnee State University. The Contractor must keep work areas neat, clean, orderly and free of excess trash debris and never block walkways, stairs, exits or create a tripping hazard. All open holes, trenches or excavations to which Shawnee State University students, faculty or staff may fall must be covered and/or guarded by a railing system. A Contractors' failure to maintain good housekeeping in a work area may result in increased potential for safety hazards and incidence of accidents and chemical spills.

4) Accident, Incident, Injury or Illness

- a) After notifying the appropriate emergency agency, Campus Security or 911, work related accidents, incidents, injuries, and illness must be immediately reported to the Shawnee State University Project Manager. The Contractor is also responsible for notifying OSHA of any incident that is reportable to that agency.

5) Environmental Issues

- a) Shawnee State University is fully committed to protecting the environment and maintaining a safe and healthy campus and workplace. The following principles have been established to clarify the University's commitment towards these goals:
 - i) Comply with all applicable environmental and safety laws and regulations and with specific University policies as contained herein.

- ii) Minimize hazards to students, faculty, staff, visitors, and the general community.
 - iii) Minimize waste through efficient use of resources and substitution.
- b) Shawnee State University EHS provides a broad range of services to the University to promote the protection of our students, staff and the public. The following summarizes the environmental issues that may be faced by contractors on-site. EHS staff is available to provide guidance in implementing these procedures.
- c) Hazardous Waste Management
 - i) The Contractor must also ensure, at a minimum, proper labeling, adequate secondary containment, segregation of incompatible materials and routine inspection of storage areas as required by law. In addition, all hazardous waste containers shall be constructed of a material that is compatible with the waste, shall be in sound condition, and shall be kept securely closed at all times. Containers and/or tanks used to store hazardous wastes must be managed in accordance with U.S. Environmental Protection Agency (EPA) and Ohio EPA.
 - ii) The Contractor, in coordination with the Office of Environmental Health & Safety (EHS) staff and the hazardous waste transporter, is responsible for completing all disposal documents, which may include, but are not limited to, waste profiles, waste analytical samples and hazardous waste manifests. Shawnee State University (Office of Environmental Health & Safety, 940 Second Street, Portsmouth Ohio 45662) shall be designated as the Generator on all documents and shall be provided with copies of all waste analyses, land disposal restriction forms and related documentation. **The Shawnee State University Environmental Compliance Officer (Joe VanDeusen 740-351-3310) or the Director of Facilities (Butch Kotcamp 740-351-3429) are the only staff allowed to sign the hazardous waste manifests for Shawnee State University.** At the time of shipment, the Contractor shall provide the bottom three copies of the manifest to the EHS representative for distribution to the appropriate agencies.

6) Waste Hauling

- a) Contractor employees must be appropriately trained in hazardous waste procedures. In the event a Contractor encounters previously unidentified material that is reasonably believed to be radioactive, volatile, corrosive, flammable, explosive, biomedical, infectious, toxic, hazardous, asbestos containing or oil-based, the Contractor shall immediately stop work in the affected area and report the condition to the Project Manager. At no time shall such material be disposed of in chutes, dumpsters, drains, pipes or any other waste container. The Contractor agrees to cooperate with the Project Manager and any consultants engaged by the Project Manager to perform services with respect to the analysis, detection, removal, containment, treatment and disposal of such regulated materials.
 - i) Waste hauling or disposal subcontractors shall be approved by SSU. Contractor must establish a contract with the proposed waste hauler for the

management of the waste prior to the commencement of the work. Any questions regarding waste hauling should be directed to the EHS office by calling (740) 351-3458.

- ii) Wastes that will be required to be hauled off-site as hazardous waste include, but is not limited to, waste oil, contaminated fuels, lead contaminated paint or debris, spill clean-up materials, used solvents, batteries, fluorescent tubes, lighting ballasts and mercury containing switches.

7) Excess or Abandoned Products

- a) Unusable product is material that cannot be used for its original purpose. Products are not considered waste unless they become contaminated, dried or otherwise unusable for their original purpose. Contractors must segregate useable products from waste products. The contractor must remove all useable products before the job is completed. Unusable products, (i.e., those that can not be used for their original purpose) must be disposed of as waste. Some of these wastes cannot be discarded with normal trash. Contractors must coordinate the disposal of waste products considered hazardous by EPA or OEPA with EHS staff and follow all hazardous waste procedures. Products must not be abandoned or otherwise left on campus unless specifically requested by the Shawnee State University Project Manager. Abandoned products include but are not limited to paints, chemicals, solvents, compressed gases, adhesives, caulking, oils, mastics, refrigerants, building materials, etc.

8) Ballasts

- a) Older (pre 1980) light ballasts can contain Polychlorinated Biphenyls (PCBs). As a result, these lighting ballasts are considered hazardous waste. Ballasts manufactured after 1980 do not contain PCBs, however, it is the policy of Shawnee State University to collect these ballasts and send them off-site for recycling. Ballasts cannot be disposed of with the general trash. Ballasts that do not contain PCBs will state "No PCBs" on the ballast label. If there is no information on the label regarding PCBs it must be considered a PCB ballast. It is more expensive to dispose of PCB ballasts. As a result, PCB and non-PCB ballasts must be segregated as they are removed from the fixtures. Separate containers should be established for each type of ballast and labeled appropriately.

9) Fluorescent Bulbs

- a) Fluorescent tubes are considered hazardous waste if they are disposed. SSU considers fluorescent tubes "Universal Wastes" if the tubes are to be recycled in lieu of being disposed as hazardous waste. Fluorescent tubes cannot be disposed of with the general trash. It is the policy of Shawnee State University to recycle all spent fluorescent tubes generated on-site. Contractor must follow all procedures outline by SSU for the management of Universal Wastes.
- b) Fluorescent tubes shall be handled so that they remain unbroken. Broken fluorescent tubes must be collected, stored and disposed of as hazardous waste. Contact EHS if you generate broken bulbs. As tubes are generated, they must be

stored in cardboard boxes obtained from the proposed transporter or in those approved for use by the transporter. Boxes of tubes must be stored indoors. The contractor must repackage boxes damaged by the weather before the transporter will accept them.

- c) Fluorescent Tubes must be kept in secure containers to ensure that waste item(s) remain intact. Specifically, it is important to ensure that fluorescent lamps are protected from breaking. Boxes must be closed at all times except when waste is being added to the container. Bulbs cannot stick out of the boxes.

10) Soils

- a) Contractor shall not sample or remove any soils off-site without prior approval from EHS.

11) Pest Control

- a) If a Contractor or his/her employees see evidence of cockroaches, mice, ants or other pests during the course of their work, they must notify the Project Manager immediately.
- b) The Contractor shall not use any insecticide products on University property unless such activities are part of your contracted work and you are specifically trained and licensed to do so.

12) CFC Containing Units

CFC containing units include those containing any ozone depleting refrigerants including, but not limited to, Chlorofluorocarbons (CFC) and Hydrochlorofluorocarbons (HCFC).]

- a) Contractors shall immediately notify EHS whenever they become aware of any unintentional or intentional release of CFCs above de-minimis levels as established by EPA regulators.
- b) Contractors shall provide the following documentation to the Project Manager and EHS:
 - i) EPA certifications for any reclaimers to which CFC products evacuated from SSU systems are to be sent.
 - ii) Certifications for any CFC recycle/recovery equipment to be used at SSU.
 - iii) Technician Certifications who will work on SSU systems.
 - iv) Service records for all units containing greater than 50 pounds of refrigerant. Records must include the date and type of service and the type and quantity of refrigerant added.
- c) Contractors shall immediately notify and provide documentation to the Project Manager and EHS whenever:
 - i) A leak rate equals or exceeds 35% per year for commercial/industrial processes.
 - ii) A leak rate equals or exceeds 15% per year for comfort cooling processes.

- iii) A release occurs of >100 pounds in a 24 hour period for CFC-12, CFC-113 and R-500.

13) Halon

- a) Service providers shall immediately notify the Project Manager whenever it becomes aware of any unintentional or intentional release of halon.

14) Biological, Chemical and Radiological Hazards

- a) Some Shawnee State University operations involve the use of biological, chemical, or radioactive materials that can be hazardous to SSU's students, faculty or employees if not handled safely. Areas where work with biological, chemical, or radioactive materials is being performed will be marked with appropriate signs. Do not enter these areas and do not handle hazardous biological, chemical, or radioactive material unless it is part of your contracted work and you are specifically trained to do so.

15) Asbestos Containing Materials

- a) The Contractor shall not disturb, damage or otherwise handle any *suspect* asbestos containing material. It is recommended that the following suspect materials be assumed to contain asbestos until tested and proved otherwise:

| Suspect Asbestos Containing Materials | | |
|--|-------------------------------------|------------------------------|
| Cement Pipes | High Temperature Gaskets | Electrical Wiring Insulation |
| Cement Wallboard | Lab Hoods/Benches/Gloves | Chalkboards |
| Cement Wallboard | Fire Blankets/Curtains/Doors | Roofing Shingles and Felt |
| Flooring Backing | Elevator Equipment Panels | Base Flashing |
| Construction Mastics | Elevator Brake Shoes | Thermal Paper Products |
| Acoustical Plaster | HVAC Duct Insulation | Caulking/Putties |
| Decorative Plaster | Boiler Insulation | Adhesives |
| Textured Paints/Coatings | Breeching Insulation | Wallboard |
| Ceiling Tiles and Lay-in Panels | Pipe Insulation | Joint Compound |
| Spray-applied Insulation | Cooling Towers | Vinyl Wall Coverings |
| Blown-in Insulation | Electrical Cloth | Asphalt Floor Tile |
| Fireproofing Materials | Heating and Electrical Ducts | Vinyl Sheet Flooring |
| Taping Compounds | Electrical Panel Partitions | Vinyl Floor Tile |
| Packing Materials (wall/floor penetrations) | Ductwork Flexible Fabric Connectors | Spackling Compounds |

- b) The Contractor shall not sweep, dust, vacuum, or mop dust or debris that is the product of a suspect asbestos containing material. The Contractor shall also not pick up or throw away any suspect asbestos-containing waste or trash. If it

- material that is suspected to be asbestos containing is disturbed and becomes airborne, the Contractor shall immediately notify the Project Manager.
- c) Any suspect asbestos containing material that is observed by the Contractor to be crushed, ripped, broken or in any way damaged should be reported to the Project Manager immediately.
 - d) Contractors must immediately convey to the SSU Project Manager any newly discovered information about the presence, location and quantity of asbestos containing or potentially asbestos containing materials.
 - e) Asbestos containing building materials should not be entombed or abandoned as a solution to project cost. The material may be forgotten and overlooked in future renovations causing a potential for future exposures. Examples of entombing includes but is not limited to installing carpet over vinyl asbestos tiles, installing fiberglass pipe insulation over asbestos pipe insulation. All exceptions to this policy must be approved by the Shawnee State University. It is the policy of Shawnee State University that no asbestos containing building materials may be used in new construction or renovations on University property.

16) Asbestos Abatement Activity Requirements

- a) For planned asbestos abatement projects Shawnee State University will have determined, before work is begun, the presence, location, and quantity of asbestos-containing materials that would be impacted by the work of the contract. The SSU Project Manager will provide a current asbestos inspection report to the contractor which is consistent with the scope of work. Contractors should coordinate with the Project Manager for specific requirements for asbestos abatement work. The Office of Environmental Health & Safety should be consulted as needed by the Project Manager.
- b) Shawnee State University has specific requirements during all asbestos abatements.
 - i) The asbestos abatement contractor must:
 - (1) Perform all OSHA required personnel air monitoring.
 - (2) Provide original waste shipment records to EHS for recordkeeping and copies to the SSU Project Manager.
 - (3) Provide copies of waste shipment records to the state.
- c) Under the direction of the SSU Project Manager, the Industrial Hygiene consultant shall:
 - i) Perform an asbestos inspection, take samples as appropriate and prepare a report for any affected area within the defined scope of work.
 - ii) Prepare and submit the asbestos abatement plan to EHS.
 - iii) Perform baseline air monitoring as required.
 - iv) Provide air monitoring during every work shift where abatement is performed.
 - v) Perform visual inspections and clearance air samples at the completion of abatement activities.
 - vi) Authorize re-entry once acceptable air clearance samples have been received.

- vii) Provide all analytical results, inspection reports, abatement plans and air clearance results to EHS and the Project Manager.

17) Construction in Occupied Buildings

- a) When building occupants are present during construction projects additional safeguards must be implemented to eliminate exposures and complaints. Dusts/particulates from demolition, sanding and other construction activities must be controlled by containment and negative air ventilation systems. Similar controls must be utilized for similar odorous activities including, but not limited to, carpet adhesive, painting, welding, and coatings.
- b) Control of dusts/particulates in both occupied and unoccupied buildings will also prevent the contamination of HVAC systems. The contractor must ensure that the HVAC system in each building is turned off and that the system is sealed off to prevent contamination. If an HVAC system is unprotected and contaminated by construction/demolition materials, the contractor will be held responsible for the cost of the system and other related cleaning.
- c) Negative air ventilation systems shall have appropriate filtration and exhausted outside of the building.
- d) Occupant complaints related to dust/particulates and odors during construction may interrupt the project schedule. Projects may only continue once problems have been resolved.

18) Mold Prevention & Remediation

- a) This section provides guidance for Contractors and employees who may encounter moldy or potentially moldy building materials. This section is first designed to prevent mold growth and second to ensure compliance during mold remediation activities.
- b) The following are EPA guidelines on how to prevent excessive mold growth from becoming a problem at Shawnee State University properties.
 - i) Store all raw building materials to prevent exposure to precipitation and moisture prior and during installation.
 - ii) Any newly installed materials found to contain excessive moisture must be removed and replaced at the expense of the contractor.
 - iii) Fix leaky plumbing and leaks in the building envelope as soon as possible.
 - iv) Watch for condensation and wet spots. Fix source(s) of moisture problem(s) as soon as possible.
 - v) Prevent moisture due to condensation by increasing surface temperature or reducing the moisture level in air (humidity).
 - (1) To increase surface temperature, insulate or increase air circulation.
 - (2) To reduce the moisture level in air, repair leaks, increase ventilation (if outside air is cold and dry), or dehumidify (if outdoor air is warm and humid).
 - vi) Keep heating, ventilation, and air conditioning (HVAC) drip pans clean, flowing properly, and unobstructed.

- vii) Vent moisture-generating appliances, such as dryers, to the outside where possible.
 - viii) Maintain low indoor humidity, below 60% relative humidity (RH), ideally 30-50%, if possible.
 - ix) Perform regular building/HVAC inspections and maintenance as scheduled.
 - x) Clean and dry wet or damp spots within 48 hours.
 - xi) Don't let foundations stay wet. Provide drainage and slope the ground away from the foundation.
 - xii) Minimize the use of wet extraction machines on carpets during humid seasons (i.e. summer).
- c) The following are EPA guidelines on how to safely investigate and evaluate mold and moisture problems.
- i) Contact the Office of Environmental Health & Safety if a mold problem is expected or found.
 - ii) Do not touch mold or moldy items with bare hands.
 - iii) Do not get mold or mold spores in your eyes.
 - iv) Do not inhale mold or mold spores.
 - v) Consider using PPE when disturbing mold. The minimum PPE is an N-95 respirator, gloves, and eye protection.
 - vi) Consult Table 2 of the EPA's guideline for "Mold Remediation in Schools and Commercial Buildings" for Personal Protective Equipment (PPE) and containment guidelines.
 - vii) Once mold growth has occurred Shawnee State University recommends following the U.S. EPA guidelines for mold remediation found in the publication entitled "Mold Remediation in Schools and Commercial Buildings," a guideline for mold remediation. This guideline can be viewed at the following URL: <http://www.epa.gov/iaq/molds/index.html>
- d) If the mold is a preexisting condition, Shawnee State University may have determined, before work is begun, the presence, location, and quantity of mold-contaminated materials that would be specifically impacted by the work of the contract.
- e) The SSU Project Manager will provide any available mold inspection reports for those work areas in question.
- f) The contractor shall not disturb moldy materials unless such activities are part of the contracted work and the contractor has been approved by EHS and specifically trained to do so.
- g) Mold remediation contractors should coordinate with the Project Manager and the Office of Environmental Health & Safety for specific requirements for mold remediation work.
- h) The Contractor shall prevent and remediate mold growth by following all of the applicable Environmental Protection Agency's guidelines.
- i) The Contractor shall not sweep, dust, vacuum, or mop dust or debris that is contaminated with mold. The Contractor shall also not pick up or throw away any

suspect mold-contaminated waste or trash. If the material is mold-contaminated and is disturbed and becomes airborne, the Contractor shall immediately notify the Project Manager and EHS.

- j) Contractors must, immediately, convey to the SSU Project Manager any newly discovered information concerning the presence, location and quantity of mold-contaminated materials.

VII. OSHA Safety Issues

1) Right-To-Know / Hazard Communication

- a) The Contractor shall submit an inventory of all hazardous materials that are brought on-site with accompanying Material Safety Data Sheets to the Project Manager. The Contractor shall also ensure that all containers that are brought on site for the storage of hazardous chemicals (e.g., gas, paint, etc.) are labeled and inspected in accordance with all applicable regulations. The Contractor shall remove all hazardous materials that it brings on-site when work involving a specific hazardous material is complete (see abandoned products section of this program). Be sure to remove hazardous materials in compliance with all of the requirements of the environmental section of this document. The Contractor may request and review Material Safety Data Sheets for any chemicals that are encountered on University property during the performance of its work by contacting EHS at 740-351-3458
- b) OSHA requires that employees receive initial and annual right-to-know training about the chemical hazards present in their workplace.
- c) When hazardous materials are used to complete a project scope of work, MSDS and similar information regarding these products must be provided to Shawnee State University prior to their use.
- d) Contractors must maintain MSDS's on-site.
- e) The use of hazardous materials in occupied buildings must be approved by the SSU Project Manager and following the guidelines in the "Construction in Occupied Buildings" section of this document.
- f) Use flammable solvents and materials with extreme caution.
 - i) Flammable paints and solvents must be stored in approved flammable liquid storage cabinets if inside buildings consistent with NFPA standards.
- g) The Contractor must also comply with all of the OSHA regulations regarding multi-employer workplaces.

2) Personal Protective Equipment

- a) Personal protective equipment (PPE) is designed to provide additional worker protection despite efforts to eliminate the hazard through engineering controls.

Personal protective equipment can only protect a worker from hazards if the equipment is worn consistently and properly.

- b) The following is a listing of common types of PPE, which are used in the construction industry. However, this is not a complete list and other forms of PPE should be used as appropriate when working at the University. Contact the Office of Environmental Health & Safety at 740-351-3458 for additional assistance in selecting the correct PPE for the task.

i) Head Protection

OSHA specifies that any employee working in an area where there is potential danger of head injury must wear a protective hard hat. Potential dangers include injury from impact, falling objects, flying objects, or electrical shocks or burns.

- (1) All hard hats must meet the most current hard hat requirements as set forth by ANSI. The most current ANSI hard hat standard is Z89.1-2003 as of October 2003.
- (2) Daily inspections must be made on all hard hats, including the shell and suspension system.
- (3) A hard hat is not to be modified or painted unless the manufacturer's instructions allow it.
- (4) A protective hair covering (hair net) may also be prudent for individuals who have long hair. A hair net could be used to protect against chemical contamination of hair, entanglement of hair in machinery or equipment, and preventing hair from interfering with the workers vision or respiratory device. E

ii) Eye and Face Protection

- (1) Eye and face protection can be used to protect the worker from airborne dusts, mists and particles; glare; splashing liquids; ultraviolet radiation or a combination of these hazards.
- (2) Safety glasses, safety goggles, and face shields are all types of eye and face protection with specific emphasis on certain hazards.
- (3) Safety glasses are used for impact hazards, which include, but are not limited to grinding, cutting and equipment operation.
- (4) Safety goggles are used for splash and particulate hazards, which include, but are not limited to chemical application, sanding and misting.
- (5) Face shields are only to be used in conjunction with safety glasses or goggles. Use of a face shield alone is unacceptable. Face shields are to be used as additional protection for the workers face and will protect the worker from direct impact and splashes.
- (6) It is important to realize that contact lenses do not provide any protection for the eyes. Safety goggles must be worn when working with chemicals. If a something does enter your eye you must remember to remove your contact lenses to ensure a thorough flushing of your eye. If not removed a chemical can concentrate behind the contact lens and create an increased hazard.
- (7) If lasers are used during construction or engineering of a project special eye protection might be necessary.

iii) Hearing Protection

- (1) Employers are required to provide hearing protection training and medical monitoring for employees who are working in areas exceeding the OSHA

85 decibel action level. A hearing protective device with an adequate noise reduction rating is required by OSHA when workers are exposed to sound levels exceeding 90 decibels during their work shift. Activities frequently exceeding the OSHA threshold are jack hammering, grinding operations, table saw operation, hammering operations and fire alarm testing.

iv) Hand Protection

- (1) Hand protection is required by OSHA when workers are exposed to hazards such as those from skin absorption of harmful substances, severe cuts or lacerations, severe abrasions, punctures, chemical burns, thermal burns, and harmful temperature extremes.
- (2) Hand protection varies based on the type of hazard. There is a large variety of protective gloves used to protect a worker from chemical hazards. A worker must be responsible for being aware of the chemical that they are working with and whether or not the glove they are using is appropriate.
- (3) A worker should refer to the product's MSDS to determine the appropriate glove to be used for the task.

v) Protective Clothing

- (1) All employees and contractors involved in construction activities must conform to the following. Construction workers must wear, at minimum, Level D personal protective equipment. Level D PPE includes pants, long sleeve shirt (where necessary), safety boots or shoes, safety glasses or goggles and a hard hat (where necessary). Gloves or a face shield would be an example of optional Level D PPE.
- (2) A safety vest may also be required if a worker is exposed or potentially exposed to vehicular traffic. The safety vest should be reflective and brightly colored so as to alert traffic to the position of the worker during both day and evening operations.

vi) Foot Protection

- (1) Safety boots or shoes shall be designed to protect the workers feet from chemical, compression, crushing, or puncture hazards. Safety footwear may also provide electrical protection to the worker if necessary for the tasks being performed.
- (2) Safety boots or shoes used on construction sites must meet all of the requirements in both OSHA 29 CFR 1926.96 Occupational Foot Protection and OSHA 29 CFR 1910.136 Occupational Foot Protection.

vii) Respiratory Protection

- (1) Employees who respond to emergency situations, or work with or around hazardous materials, hazardous waste, or any other hazardous environment may need to use respiratory protection in cases where engineering controls cannot provide adequate protection against exposures. The proper use of respiratory protection can reduce, minimize, or eliminate the risk of injury or illness due to hazardous chemical exposure.

3) Confined Space Entry

- a) The Contractor is responsible for developing, implementing and maintaining his/her own Confined Space Entry Program, including provisions for

emergency rescue in accordance with OSHA regulations as it applies to the work of this contract.

- i) If during the course of work, the Contractor encounters a confined space that has not been previously identified by the University, it must immediately bring the space to the attention of the Project Manager and delay entry until Shawnee State University has examined the space.
- ii) When both University personnel and Contractor personnel are working in or near confined spaces, the Contractor shall coordinate all operations with the affected University personnel before entry.
- iii) Advance notification is always required. Whether you enter a confined space with a Shawnee State University employee or not, the Contractor's entry attendant must always first inform SSU's Project Manager before you enter a confined space.
- iv) The Contractor shall provide the Project Manager with:
 - (1) The exact location of the confined space;
 - (2) The time of entry and approximate entry duration; and
 - (3) The names of authorized attendants and entrants.
 - (4) *After the entry*: If you have entered a "permit-required" confined space, you must, after the entry is concluded, notify Shawnee State University of (1) the permit space program you followed and (2) any hazards you confronted or created in the space as well as the time the entry is complete and that all entrants are safely out.

4) Fall Protection

- a) The OSHA Standard "29 CFR Subpart M – Fall Protection" identifies areas or activities where fall protection is needed. These include, but are not limited to, ramps, runways, and other walkways; excavations; hoist areas; holes; formwork and reinforcing steel; leading edge work; unprotected sides and edges; overhand bricklaying and related work; roofing work; precast concrete erection; wall openings; residential construction; and other walking/working surfaces.
- b) The rule sets a uniform threshold height of 6 feet (1.8 meters), thereby providing consistent protection. This means that construction employers must protect their employees from fall hazards and falling objects whenever an affected employee is 6 feet (1.8 meters) or more above a lower level.
 - i) Protection must also be provided for construction workers who are exposed to the hazard of falling into dangerous equipment.
 - ii) Under the new standard, employers will be able to select fall protection measures compatible with the type of work being performed. Fall protection generally can be provided through the use of guardrail systems, safety net systems, personal fall arrest systems, positioning device systems, and warning line systems, among others.
 - iii) The OSHA rule clarifies what an employer must do to provide fall protection for employees, such as identifying and evaluating fall hazards and providing specific training. Requirements to provide fall protection for workers on scaffolds and ladders and for workers engaged in steel erection of buildings are covered in other subparts of OSHA regulations.

5) Excavation

- a) Prior to any excavation the contractor is responsible for notification of all applicable utility companies that excavation work is being performed. The contractor should contact the Ohio Utility Protection Service (OUPS) at least 48 hours prior to digging operations at 1-800-362-2764 as well as any other utility that cannot be contacted by calling OUPS.
- b) The contractor is also responsible for contacting the SSU Project Manager for specific Shawnee State University owned utility information prior to beginning any excavation. Contractors are also responsible for following all of the requirements in the "Soils" section of this document.
- c) Contractors must note that contacting OUPS will not cover work on private (University) property. OUPS will not locate University owned utilities except when they interface with other utilities.
- d) Contractor must verify the location of any marked utility or as-built information either prior to or during excavation.
- e) During excavation the contractor is responsible for ensuring a safe working environment for its employees and pedestrians. The contractor must ensure compliance with all the requirements of U.S. OSHA's Excavation Standard 29 CFR 1926 Subpart P. In addition Shawnee State University has additional requirements that must be completed during any excavation. They are as follows:
 - i) The contractor is responsible for submitting excavation plans to the Project Manager prior to any excavation related activities.
 - ii) Maintain a physical barrier around all excavations and machinery. Often times caution tape is insufficient, and barriers like properly supported snow fencing or temporary chain link fencing must be installed.
 - iii) All excavation sites are to be secured during off work hours to prevent unauthorized access. Unless otherwise agreed to, only Shawnee State University owned locks, keyed with contractor cores, can be utilized on construction fencing for a University excavation. Contact the Project Manager for coordination of these locks.
 - iv) If work is being performed in a public roadway the contractor is responsible for contacting the city and making all arrangements for police details and/or street closures if appropriate.
 - v) The contractor is responsible for providing the proper signage necessary to direct both vehicular and pedestrian traffic safely around or through the work area.
- f) The contractor will notify the Project Manager prior to any utility shutdown both public and private. The contractor must also notify the Project Manager immediately of any unplanned shutdown or interference with any site utility.
- g) The contractor will notify the Project Manager of any overtime hours necessary to complete the work.

- h) If work is being performed in a high traffic areas all workers must conform to OSHA paragraph 1926.651(d) for exposure to vehicular traffic.
- i) The contractor is responsible for routine inspections of all excavation equipment. The inspection is to include safety features like back-up warning sounds and appropriate lighting.
- j) The contractor is responsible to ensure that equipment operators carry the required (valid) licenses and have the necessary training to operate the equipment on site.
- k) If there is potential for a hazardous atmosphere in an excavation contractors must follow all of the requirements in OSHA paragraph 1926.651(g) to ensure workers are not exposed to hazardous substances and/or an oxygen deficient environment.
 - i) Should there be a confined space condition such as tunneling or manhole entry the contractor is to follow all OSHA confined space requirements.
 - ii) The contractor is responsible for providing a safe working environment for any employee entering any excavation. OSHA states that while the excavation is open, underground installations shall be protected, supported or removed as necessary to safeguard employees. The contractor will review and adhere to all OSHA requirements while completing the work.
 - iii) When working around City and/or University owned trees the contractor must take special precautions not to harm the tree in any way.

6) Ladder Safety

- a) A means of access is required anytime an employee or contractor needs to access a surface that is 19 inches higher or lower than the surface they are standing or working on. The access is most commonly gained through the use of a ladder. The following are guidelines for safe use of a ladder.
 - i) Portable ladders must be able to sustain four times their maximum intended load.
 - ii) For fewer than 25 people, generally only one ladder is required unless there is simultaneous traffic in both directions.
 - iii) The rungs on portable ladders should be 10 to 14 inches apart and 8 to 12 inches on step stools.
 - iv) The rungs on extension ladders should be 8 to 18 inches apart on the base sections and 6 to 12 inches on the extension sections.
 - v) The rungs should be shaped or coated so that they are slip resistant.
 - vi) The side rails on all ladders are at least 11 ½ inches apart.
 - vii) Ladders shall be maintained so that they remain free of all slipping hazards, such as grease and oils.
 - viii) Ladders are to be inspected on a regular basis.
 - ix) Ladders that are deemed unsafe must be removed from service immediately.
 - x) Ladders must be setup on level and stable ground.
 - xi) Barricades should be setup to direct pedestrian traffic away from a ladder.
 - xii) Ladders must be tied off at all times.
 - xiii) A ladders slope shall always be 4:1 (4' of height to 1' away from building)
 - xiv) The top of a ladder must always extend 3 feet higher than the roof or work platform it is resting upon. Unless it is equipped with a secure grab rail.

- xv) The areas around the top and bottom of the ladder must remain clear of debris and other objects.
- xvi) The side rails of the ladder are to be balanced equally against the upper level.
- xvii) When using a stepladder, the metal spreaders must be in the locking position.
- xviii) No work shall be performed until all ladders are properly secured.
- xix) Ensure that no electrical wires are in areas where metal ladders are being used.
- xx) While on a ladder employees or contractors must face the ladder and maintain at least three-points of contact with the ladder at all times. No awkward or excessively heavy loads are to be carried on a ladder by employees or contractors.
- xxi) Employees or contractors shall not use the rungs on an extension ladder above the landing or work area without the bottom of the ladder being secured.
- xxii) All ladders must be removed at the end of the work shift to prevent unauthorized access to elevated surfaces.

7) Lock out / Tag out

- a) Shawnee State University protects its students, faculty, employees, neighbors and property in part by complying with OSHA 29 CFR 1910.147 – Control of Hazardous Energy Sources (a.k.a. Lockout/Tagout). As part of SSU's Lockout/Tagout Program, locks and tags are used to control the start-up of equipment that is being serviced or maintained by its employees. At no time shall the Contractor or its employees override any locks or tags that they encounter during the performance of their work.
- b) The Contractor is responsible for developing, implementing and maintaining his/her own Lockout/Tagout Program in accordance with OSHA regulations as it applies to the work of this contract.
- c) The Contractor shall ensure that its Lockout/Tagout Program meets all of the requirements of OSHA's multi-employer workplace requirements.
- d) Shawnee State University Facilities Management is responsible for all shut down and start up of utility systems for all University properties.
- e) The Contractor will maintain a log of all machines and equipment that are locked out and/or tagged out during the performance of the work of this contract. This log shall identify the equipment that was worked on, the date that work was performed, and the name of the individual performing the work.
- f) The Contractor should submit this log to the Project Manager on a monthly basis when lockout/tagout work is being performed.

8) General Electrical Safety

- a) Ground Fault Circuit Interrupters (GFCI's) are to be used with any electric equipment used in wet or potentially wet environments. GFCI's can be either in the form of a "pigtail" or hard wired to the buildings electrical system.
- b) Only qualified electricians are permitted to work on electrical systems and equipment that uses or controls electrical power.
- c) Defective or modified extension cords should not be used.
- d) Do not operate electrical tools or equipment in wet areas or areas where potentially flammable dusts, vapors, or liquids are present, unless specifically approved for the location.
- e) Should a circuit breaker or other protective device "trip," ensure that a qualified electrician checks the circuit and equipment and corrects problems before resetting the breaker.
- f) Erect barriers and post warning signs to ensure non-authorized personnel stay clear of the work area.
- g) Report hazards (lack of protective guards or covers, damaged equipment, etc.) to the SSU Project Manager immediately.
- h) Do not leave electrical boxes, switchgear, cabinets, or electrical rooms open when not directly attended. Insulate energized parts when covers have been removed or doors are open. Use of cardboard, plywood, or other flammable materials to cover energized circuits is prohibited.

9) Compressed Gas Cylinders

- a) Compressed gases can pose a severe hazard to SSU's students, faculty, staff, neighbors and property. Therefore, the following measures must be taken for their protection:
 - i) Valve protection caps must be in place when compressed gas cylinders are transported, moved, or stored.
 - ii) Close cylinder valves and replace valve covers/caps when a cylinder is not actively in use, when cylinders are empty and/or when being moved.
 - iii) Secure compressed gas cylinders in an upright position in a welding cart or to a solid object (using chains, straps, or a rigid retaining bar).
 - iv) Secure compressed gas cylinders on an approved carrier while being transported.
 - v) Keep cylinders at a safe distance or shielded from welding or cutting operations. Do not place cylinders where they can contact an electrical circuit.
 - vi) Contractors must follow all OSHA, Compressed Gas Association (CGA) and applicable NFPA guidelines for compressed gas storage and use. EHS recommends that contractors keep oxygen and flammable gas regulators in proper working order and a wrench in position on the acetylene valves when in use. If not manifolded together, separate oxygen and flammable gas cylinders by 20 feet or a 5-foot high fireproof barrier.

- vii) If a leak develops in a cylinder and it cannot be immediately corrected, move the cylinder to a safe location outside the building if there is a safe means to transport the cylinder. Use of an elevator would be prohibited under such conditions. Notify the Project Manger immediately and call EHS as needed.
- viii) Use only approved spark igniters to light torches.
- ix) Cylinders must not be taken into or stored in confined spaces, including gang boxes and office/storage trailers.
- x) Do not route hoses and regulators through unventilated or closed containers or areas.
- xi) Do not leave behind partially filled or empty cylinders. Always remove them from the site promptly. Acetylene is an unstable gas and has compatibility issues with other materials including copper. No copper tubing should be used and special low copper regulators are required. It is recommended that all acetylene tanks have back flow protectors to prevent contamination. Acetylene tanks should never be tipped since there is acetone stored in the bottom of every cylinder.

10) Powder-Actuated Tools

- a) Powder-actuated tools can pose hazards to SSU's students, faculty, employees, neighbors and property. Such tools are, therefore, not permitted in occupied Shawnee State University buildings without the approval of the SSU Project Manager. If a power-actuated tool is allowed on campus, it must be operated in accordance with OSHA Standard 29 CFR 1926.302. In addition:
 - i) Contractor's who operate powder-actuated tools must be properly trained in their use and carry a valid operator's card provided by the equipment manufacturer.
 - ii) Each powder-actuated tool must be stored in its own locked container when not being used and remain unloaded until it is to be used immediately.
 - iii) A sign at least 7 inches by 10 inches with bold face type reading "POWDER-ACTUATED TOOL IN USE" must be conspicuously posted when the tool is being used.
 - iv) All Powder-actuated tool operators must have and use appropriate personal protective equipment such as hard hats, safety goggles, safety shoes and ear protectors.
 - v) Powder-actuated tools should not be used in an explosive or flammable atmosphere.
 - vi) Before using the powder-actuated tool, the worker should inspect it to determine that it is clean, that all moving parts operate freely, and that the barrel is free from obstructions.
 - vii) A powder-actuated tool should never be pointed at anybody.
 - viii) Hands should be kept clear of the barrel end. To prevent the powder-actuated tool from firing accidentally, two separate motions are required for firing: one to bring the tool into position, and another to pull the trigger. The tools must not be able to operate until they are pressed against the work surface with a force of at least 5 pounds greater than the total weight of the tool.
 - ix) If a powder-actuated tool misfires, the employee should wait at least 30 seconds, then try firing it again. If it still will not fire, the user should wait another 30 seconds so that the faulty cartridge is less likely to explode, than carefully remove the load. The bad cartridge should be put in water.

- x) The muzzle end of the powder-actuated tool must have a protective shield or guard centered perpendicularly on the barrel to confine any flying fragments or particles that might otherwise create a hazard when the tool is fired. The tool must be designed so that it will not fire unless it has this kind of safety device.
- xi) All powder-actuated tools must be designed for varying powder charges so that the user can select a powder level necessary to do the work without excessive force.
- xii) If a powder-actuated tool develops a defect during use it should be tagged and taken out of service immediately until it is properly repaired.

11) Pneumatic Tools & Compressed Air Systems

- a) Pneumatic tools are tools powered by compressed air. The compressed air creates a powerful energy which if used properly can be extremely useful in construction activities. However the compressed air can also create a hazardous condition if the proper precautions are not taken. Contractor must comply with the following when working at Shawnee State University with pneumatic tools.
 - i) Eye protection is required for any work using a pneumatic powered tool. Face protection is recommended for certain types of work.
 - ii) Hearing protection must also be used when operating pneumatic tools which create noise levels in excess of OSHA's action levels.
 - iii) A tool retainer shall be installed on each piece of utilization equipment which, without such retainer, may eject the tool.
 - iv) All pneumatically driven nailers, staplers, and other similar equipment provided with automatic fastener feed, which operate at more than 100 p.s.i. pressure at the tool shall have a safety device on the muzzle to prevent the tool from ejecting fasteners, unless the muzzle is in contact with the work surface.
 - v) Pneumatic tools shall be secured to the hose or whip by some positive means to prevent the tool from becoming accidentally disconnected.
 - vi) Hoses and hose connections used for conducting compressed air to equipment shall be designed for the pressure to which they are subjected.
 - vii) The tool/hose/component manufacturer's safe operating pressure for hoses, pipes, valves, filters, and other fittings shall not be exceeded.
 - viii) The use of hoses for hoisting or lowering tools shall not be permitted.
 - ix) All hoses exceeding ½-inch inside diameter shall have a safety device at the source of supply or branch line to reduce pressure in case of hose failure.
 - x) Protective screens shall be set up to protect nearby workers from being struck by flying fragments associated with the operation of a pneumatic tool.
 - xi) Compressed air guns should never be pointed toward anyone. The user should never "dead-end" it against themselves or anyone else.
- b) Contractor must comply with the following when working at Shawnee State University with compressed air systems.
 - i) Before any air line connection is made or removed, always turn the air supply off. Use the valve to turn off the air and never kink the hose as a short cut. Kinking a hose may damage or rupture the air hose.
 - ii) Protect air hoses from damage. Keep hoses clear of pedestrian and vehicle traffic and do not drag hoses around sharp corners.

- iii) Be sure to use properly rated and sized air hoses and fittings to keep air pressure even throughout the entire system.
- iv) Keep all connections clean. Clear any dirt/debris from the nipple before connecting the hose.
- v) Maintain a clean, dry, regulated source of air to operate tools at peak performance.

12) Hot Work

- a) Any Hot Work on campus or in any University building must be permitted by Shawnee State University.
- b) Hot Work is defined as a temporary operation involving open flame or which produces heat and/or sparks. This includes, but is not limited to brazing, cutting, grinding, soldering, thawing pipe, torch applied roofing, welding and the use of heat guns. Contractors must comply with the following:
 - i) Obtain a permit from SSU Facilities Office for each separate work activity and ensure that all conditions of the permit are met at all times. Blanket Hot Work Permits may be issued for longer duration projects if approved by the SSU Facilities Office. The permit must be submitted to the SSU Facilities Office and the Project Manager a minimum of forty-eight (48) hours prior to the start of any hot work. In addition, the Contractor must also maintain its own hot work permit system in accordance with OSHA regulations.
 - ii) A Shawnee State University Hot Work Permit must be posted in the Hot Work area while the work is in progress.
 - iii) Provide a 10-pound ABC dry powder fire extinguisher, which will remain, ready to use, in the area of the Hot Work at all times.
 - iv) Remove combustible materials from the area before beginning work.
 - v) Elevate oxygen/acetylene hoses seven feet above the work area or otherwise protect them from damage.
 - vi) Install anti-flash back (safety/check) valves in both the oxygen/acetylene hoses at the regulator.
 - vii) Shield adjacent areas with welding partitions.
 - viii) Have a second person stand by with an approved fire extinguisher for welding and burning operations in accordance with OSHA regulations and permit requirements. This person should remain in the area for a minimum of 60 minutes after the hot work is completed to ensure the site is cold for areas with early warning systems and smoke detection (fire alarms) and 4 hours for areas where early warning smoke detection is not available.

13) Cranes and Rigging

- a) Each crane, rigging, or hoist brought onto Shawnee State University property must have an annual inspection performed by a certified testing agency. The SSU Project Manager must be notified of the use of a crane before operations begin on site, documentation, including a logbook, must also be provided.
- b) All operators must possess a valid hoisting license.
- c) Documentation of this license shall be provided to the SSU Project Manager upon request.

- d) At no time shall a non-licensed operator hoist loads.
- e) The contractor is responsible for daily record keeping, monitoring and equipment inspections.
- f) The operator is responsible for the proper placement of the crane in relationship to the load to be handled and the landing area so as to obtain the best-rated lift capacity, and the installation and maintenance of crane swing radius protection.
- g) Scale pans and other approved hoisting mechanisms shall be used to hoist materials on a site.
- h) Only items specifically designed to be hoisted by a crane should be hoisted.
- i) Fifty-five (55) gallon drums should not be directly hoisted by a crane or other means.

14) Laser Safety

- a) This section applies to contractors using lasers. The OSHA construction industry standard for lasers is 29 CFR 1926.54, Non-ionizing Radiation. This standard does not differentiate with respect to class of lasers and, thus, all lasers are covered by the standard.
- b) The lasers commonly used in the construction industry are used to ensure a level working environment.
- c) Lasers commonly found in construction are as follows:
 - i) General construction laser levels
 - ii) Interior leveling lasers
 - iii) Slope and machine control lasers
 - iv) Utility and pipe lasers
- d) Although the harmfulness of these lasers is extremely small, care should always be taken when using a visible beam laser in open areas. Never set a visible beam laser in an open area at a height that may strike machine operators, workers, or motorists in the eye. Most visible beam construction lasers are Class 2 and limited to 5mW total output by law. Typically infrared lasers used in construction are Class I lasers, and pose no danger from incidental eye exposure.
- e) Do not stare into the laser beams.
- f) Do not disassemble the instrument or attempt to perform and internal servicing.
- g) Repair and servicing on a construction laser must only be performed by authorized manufacturer service centers.

- h) The use of controls, adjustments, or the performance of procedures other than those specified in the owners manual may result in hazardous radiation exposure.
- i) All lasers used must comply with all applicable portions of title 21 of the Code of Federal Regulations set by the Department of Health, Education, and Welfare; the Food and Drug Administration; the Center for Devices; and the Bureau of Radiological Health.
- j) Contractors are required to train their employees in the use and safe practices of operating laser equipment. Contractors shall provide appropriate personal protective equipment to employees working with or around lasers in construction. PPE would include primarily include eyewear designed for the wavelength of the laser or device in use. Contractors must warn others by posting appropriate signage in areas where lasers are being used. OSHA has required safety training for individuals who operate laser equipment under the education requirements of 29 CFR 1926.21(b). This paragraph requires the following:
 - i) The employer shall provide for the instruction of each laser equipment operator and instructor in accordance with the applicable manufacturer's recommendations. The instruction process shall inform the operator of various hazards associated with the use of the equipment and the necessary or recommended control measures for the elimination of hazards to personnel. In addition to information from the manufacturer, the American National Standard ANSI Z136.1 could be reviewed for training information.
 - ii) Instruction should be conducted by a qualified representative of the manufacturer or by a knowledgeable individual by the employer.
- k) OSHA requirements under 29 CFR 1926.54
 - i) Only qualified and trained persons shall be assigned to install, adjust and operate laser equipment.
 - ii) Proof of qualification of the laser equipment operator shall be available and in possession of the operator at all times.
 - iii) Employees, when working in areas in which a potential exposure to direct or reflected laser light greater than 0.005 watts (5 milliwatts) exists, shall be provided with anti-laser eye protection devices as specified in 1926 Subpart E.
 - iv) Areas in which lasers are used shall be posted with standard laser warning placards.
 - v) Beam shutters or caps shall be utilized, or the laser turned off, when the laser transmission is not actually required. When the laser is left unattended for a substantial period of time, such as during lunch hour, overnight, or at change of shifts, the laser shall be turned off.
 - vi) Only mechanical or electronic means shall be used as a detector for guiding the internal alignment of the laser.
 - vii) The laser beam shall not be directed at employees.
 - viii) When it is raining or snowing, or when there is dust or fog in the air, the operation of laser systems shall be prohibited where practicable; in any event, employees shall be kept out of range of the area of source and target during such weather conditions.
 - ix) Laser equipment shall bear a label to indicate maximum output.

- x) Employees shall not be exposed to light intensities above:
 - (1) Direct Staring: 1 micro-watt per square centimeter
 - (2) Incidental Observing: 1 milliwatt per square centimeter
 - (3) Diffused Reflected Light: 2 ½ watts per square centimeter
- xi) Laser unit in operation should be set up above the heads of employees, when possible.
- xii) Employees shall not be exposed to microwave power densities in excess of 10 milliwatts per square centimeter.

VII. References

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