REVIEW MATERIALS

Course 13909

Plumbing Definitions and Standards [SPS 381]
Lead in Construction
Trenching and Excavations

USCONTRACTORLICENSE LLC dba Kevin Wunderlin
PO Box 268
Platteville, Wisconsin 53818
608-348-6688

Email: michael@uscontractorlicense.com

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Credit Hours: See Below List

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Platteville, Wisconsin 53818
608-348-6688

www.uscontractorlicense.com

This course has been approved for the following licenses, registrations or certifications:

Commercial Plumbing Inspector	**12 Hours**
UDC- Plumbing Inspector	**12 Hours**
Master Plumber	**12 Hours**
Journeyman Plumber	**12 Hours**
Master Plumber-Restricted Appliance	**9 Hours**
Journeyman Plumber-Restricted Appliance	**9 Hours**
Cross Connection Control Tester	**6 Hours**
Journeyman Plumber-Restricted Service	**3 Hours**
Utility Contractor	**3 Hours**

This course is broken out into three sections and is intended to familiarize those involved in the plumbing trades with the current codes and regulations:

1. **Definitions and Standards (SPS 381)**
   Review of the current plumbing codes.
2. **Lead in Construction (OSHA)**
   Overview of the OSHA Lead Standards for construction.
3. **Trenching and Excavations (OSHA)**
   Overview of the OSHA Trenching and Excavation Rule.

Outline

SPS 381 Definitions and Standards

Definitions
Incorporation of Standards by reference

Lead In Construction

OSHA Introduction
Health Hazards of Lead Exposure
Symptoms of Chronic Overexposure

- **Reproductive Risks**
- **Chelating Agents**
- **Worker Exposure**

Construction Workers and Lead Exposure
- **Most Vulnerable Workers**
- **OSHA's Lead Standard**
- **Exposure Limits**
- **Applicability to Construction**

Employer Responsibilities
- **Elements of a Compliance Program**
- **Initial Employee Exposure Assessment**
- **Biological Monitoring Tests**
- **Pending Employee Exposure Assessment**
- **Test Results Showing No Overexposures**
- **Employee Notification of Monitoring Results**

Medical Exams
- **Medical Surveillance**
- **Information for the Examining Physician**
- **When Monitoring Shows No Employee Exposures**
- **After the Medical Examinations**
- **Medical Removal Provisions**

Worker Protections and Benefits
- **Records Requirements Involving Medical Removal**

Recordkeeping
- **Employer Requirements**
- **Exposure Assessment Records**
- **Medical Surveillance Records**
- **Documents for Employees Subject to Medical Removal**
- **Employer Requirements Related to Objective Data**
- **Documents for OSHA and NOISH Review**
- **When Closing a Business**

Exposure Reduction and Employee Protection
- **Engineering Controls**
- **Exhaust Ventilation**
- **Enclosure or Encapsulation**
- **Substitution**
- **Component Replacement**
- **Process or Equipment Modification**
- **Isolation**

Housekeeping Practices
- **Personal Hygiene Practices**
- **Change Areas**
- **Showers and Washing Facilities**
- **Personal Practices**
- **End-Of-Day Procedures**

Protective Clothing and Equipment
- **Employer Requirements**
- **Handling Contaminated Protective Clothing**
- **Preventing Heat Stress**
- **Respiratory Protection**
- **Providing Adequate Respiratory Protection**
- **Respiratory Protection Programs**
- **Selecting a Respirator**

Employee Information and Training
- **Program Requirements**
- **Warning Signs**

OSHA Assistance, Services and Products
- **State Programs**

Consultation Assistance
Safety and Health Achievement Recognition Program
Voluntary Protection Programs
Cooperative Partnerships
Alliance Program
Strategic Partnership Program
Occupational Safety and Health Training
- **Training Grants**
- **Other Assistance Materials**
- **In Case of an Emergency Or To File A Complaint**
  - **OSHA Regional Offices**
  - **Blood Lead Laboratories-Wisconsin**

Trenches and Excavations

Working Safely in Trenches
- **Dangers of Trenching and Evacuation**
- **Protect Yourself**
- **Protective Systems**
- **Competent Person**
- **Access and Egress**
- **General Trenching and Excavation Rules**

Excavations
- **Introduction**
- **Difference between Excavation and Trench**
- **Dangers**
- **OSHA Standard Rule**
- **Exemptions**

Preplanning
- **Why is it important?**
- **Utility Lines and Pipes**
- **Informing Workers**

Protective Systems
- **Preventing Cave-ins**
- **Most appropriate Protective System Design**
- **Other Safety Precautions**
- **Installation and Removal of Protective Systems**

Additional Hazards and Protections
- **Warning Systems**
- **Water Accumulation**
- **Hazardous Atmospheres**
- **Means of Egress**
- **Pier Holes**
- **Site Inspection**

OSHA Assistance, Services and Programs
- **State Plans**
- **Consultation Assistance**
- **Privacy**
- **Cost**
- **Violations**
- **Voluntary Protection Programs**
- **Strategic Partnership Program**
- **OSHA Training for Employers and Employees**
- **Training Grants**
- **Contact OSHA**

Exam

200 Questions related to the Reference Materials are used to test the attendee on their comprehension of the materials. A 70% score will need to be attained in order to pass this course.

The course attendee will receive the materials by one of the following delivery methods:

Online: The attendee will receive an email with the instructions and a link to the online course. The Reference/Instructional Materials and Exam will be available after registration is complete. The exam can be completed from the computer screen by use of "radio buttons". Answers are automatically saved. Reentry is done by the use of a personalized "resume code". Once the exam has been completed it is submitted. Grading will be done automatically by the computer program. The score and correct and incorrect answers are shown immediately.

Email: All materials are sent via email in PDF form to the attendees email address. The PDF documents can be saved to a file on the computer or they can be printed out. A bubble answer sheet needs to be printed; filled in and returned to us for grading.

Compact Disc: All PDF files are burned to a compact disc and sent to the attendee. The attendee has a choice of saving the PDF's to his/her computer desktop, just opening the files and working off the CD or printing the materials. A bubble answer sheet needs to be printed; filled in and returned to us for grading.

Printed: The Instructional/Reference Materials and Exam is sent in booklet form to the attendees' home of office. The bubble answer sheet is completed and returned to us for grading.

Chapter SPS 381

DEFINITIONS AND STANDARDS

Note: Chapter Comm 81 was renumbered chapter SPS 381 under s. 13.92 (4) (b) 1., Stats., Register December 2011 No. 672.

SPS 381.01 Definitions. In chs. SPS 381 to 387, except as otherwise specifically defined:

(1) "Accepted engineering practice" means a specification, standard, guideline or procedure in the field of plumbing or related thereto, generally recognized and accepted as authoritative documented through national standards or specifications.

(2) "Accessible" when applied to a fixture, appliance, pipe, fitting, valve or equipment, means having access for maintenance, but which first may require the removal of an access panel or similar obstruction.

(2m) "Accessory building" means a detached building, not used as a dwelling unit but is incidental to that of the dwelling.

(3) "Aerobic treatment component" means a unit for the treatment of wastewater that utilizes the principle of oxidation for biological decomposition.

(4) "Agent" means an individual or agency recognized by the department to act on the department's behalf relative to a specific activity or function.

(5) "Air–break" means a piping arrangement for a drain system where the wastes from a fixture, appliance, appurtenance or device discharge by means of indirect or local waste piping terminating in a receptor at a point below the flood level rim of the receptor and above the outlet of the trap serving the receptor.

(6) "Air–gap, drain system" means the unobstructed vertical distance through the free atmosphere between the outlet of indirect or local waste piping and the flood level rim of the receptor into which it discharges.

(7) "Air–gap, water supply system" means the unobstructed vertical distance through the free atmosphere between the lowest opening from any pipe or faucet supplying water to a tank or plumbing fixture and the flood level rim or spill level of the receptacle.

(7e) "Alternate plumbing system" means a type of plumbing system designed in such a manner that valid and reliable data shall demonstrate to the department that the plumbing system is in compliance with the intent of chs. SPS 381 to 384.

(7m) "Ambulatory surgery center" means a health care facility that accepts federal funding in accordance with 42 CFR 416 of the federal register for health care finance and where 4 or more individuals that undergo a surgical procedure for which federal reimbursement is based.

(8) "Anaerobic treatment component" means a unit for the treatment of wastewater which utilizes molecular oxygen in the absence of free oxygen for biological respiration and decomposition.

(9) "Approved" means acceptance documented in writing by the department.

(10) "Appurtenance" means a manufactured device or prefabricated assembly of component parts which is an adjunct to a plumbing product or plumbing system.

(11) "Area drain" means a receptor designed to collect storm waters from an open area.

(12) "Areawide water quality management plan" means those plans prepared by the department of natural resources, including those plans prepared by agencies designated by the governor under the authority of ss. 281.11, 281.12 (1), 281.15, and 283.83, Stats., for the purpose of managing, protecting and enhancing groundwater and surface water of the state.

Note: See ch. SPS 382 Appendix for a list of water quality management agencies and their addresses.

(13) "Aspirator" means a fitting or device supplied with water or other fluid under positive pressure which passes through an integral orifice or constriction causing a vacuum.

(14) "Autopsy table" means a fixture or table used for post–mortem examination.

(15) "Automatic fire sprinkler system" has the meaning specified under s. 145.01 (2), Stats.

Note: Section 145.01 (2), Stats., reads:
"Automatic fire sprinkler system", for fire protection purposes, means an integrated system of underground and overhead piping designed in accordance with fire protection engineering standards. The system includes a suitable water supply, such as a gravity tank, fire pump, reservoir or pressure tank or connection beginning at the supply side of an approved gate valve located at or near the property line where the pipe or piping system provides water used exclusively for fire protection and related appurtenances and to standpipes connected to automatic sprinkler systems. The portion of the sprinkler system above ground is a network of specially sized or hydraulically designed piping installed in a building, structure or area, generally overhead, and to which sprinklers are connected in a systematic pattern. The system includes a controlling valve and a device for actuating an alarm when the system is in operation. The system is usually activated by heat from a fire and discharges water over the fire area.

(16) "Backflow" means the unwanted reverse flow of liquids, solids or gases.

(17) "Back pressure" means a pressure greater than the supply pressure that may cause backflow.

(17e) "Backflow preventer" means any generic backflow prevention device or assembly.

(18) "Backflow preventer with intermediate atmospheric vent" means a type of cross connection control device which consists of 2 independently acting check valves, internally force–loaded to a normally closed position and separated by an intermediate chamber with a means for automatically venting to atmosphere where the venting means is internally force–loaded to a normally open position. The terms "backflow preventer" or "dual check valve type with atmospheric port backflow preventer" has the same meaning as backflow preventer with intermediate atmospheric vent.

(19) "Back siphonage" means the creation of a backflow as a result of negative pressure.

(21) "Backwater valve" means a device designed to prevent the reverse flow of wastewater in a drain system.

(22) "Ballcock" means a water supply valve opened or closed by means of a float or similar device used to supply water to a tank.

(23) "Bathroom group" means a water closet, lavatory and a bathtub or shower located together on the same floor level.

(24) "Battery of fixtures" means any group of 2 or more fixtures that discharge into the same horizontal branch drain.

(25) "Bedpan sterilizer" means a fixture used for sterilizing bedpans or urinals by direct application of steam, boiling water or chemicals.

(26) "Bedpan washer and sanitizer" means a fixture designed to wash bedpans and to flush the contents into the sanitary drain system and which may also provide for disinfecting utensils by scalding with steam or hot water.

(27) "Bedpan washer hose" means a device supplied with hot or cold water, or both, and located adjacent to a water closet or clinical sink to be used for cleansing bedpans.

(28) "Bedrock" means rock that is exposed at the earth's surface or underlies soil material and includes:

(a) Weathered in–place consolidated material, larger than 2 mm in size and greater than 50% by volume; and

(b) Weakly consolidated sandstone at the point of increased resistance to penetration of a knife blade.

(29) "Bell" means the portion of a pipe that is enlarged to receive the end of another pipe of the same diameter for the purpose of making a joint.

(30) "Bench mark" or "BM" means a permanently established point, the elevation of which is assumed or known, which serves as a vertical reference point, and which may also serve as a horizontal reference point.

(31) "Blackwater" means wastewater contaminated by human body waste, toilet paper and any other material intended to be deposited in a receptor designed to receive urine or feces.

(32) "BOD_5" or "biochemical oxygen demand 5 day" means a measure of the amount of biodegradable organic matter in water.

(33) "Boiler blow–off basin" means a vessel designed to receive the discharge from a boiler blow–off outlet and to cool the discharge to a temperature that permits safe entry into the drain system.

(34) "Branch" means a part of a piping system other than a riser, main or stack.

(35) "Branch interval" means a vertical measurement of distance, 8 feet or more in length, between the connections of horizontal branches to a drainage stack.

Note: See ch. SPS 382 Appendix for explanatory material.

(35m) "Branch tailpiece" means a fitting consisting of a combination tail piece and a wye.

(36) "Branch vent" means a vent serving more than one fixture drain.

(37) "B.T.U." means British Thermal Units.

(38) "Building" means a structure for support, shelter or enclosure of persons or property.

(39) "Building drain" means horizontal piping within or under a building, installed below the lowest fixture or the lowest floor level from which fixtures can drain by gravity to the building sewer.

(40) "Building drain branch" means a fixture drain which is individually connected to a building drain and is vented by means of a combination drain and vent system.

(41) "Building drain, sanitary" means a building drain which conveys wastewater consisting in part of domestic wastewater.

(42) "Building drain, storm" means a building drain which conveys storm water, clear water, or both.

(43) "Building permit" means any written permission from a municipality that allows construction to commence on a structure.

(44) "Building sewer" means that part of the drain system not within or under a building which conveys its discharge to a public sewer, private interceptor main sewer, private onsite wastewater treatment system or other point of discharge or dispersal.

(45) "Building sewer, sanitary" means a building sewer which conveys wastewater consisting in part of domestic wastewater.

(46) "Building sewer, storm" means a building sewer which conveys storm water, clear water, or both.

(47) "Building subdrain" means the horizontal portion of a drain system which does not flow by gravity to the building sewer.

(48) "Building subdrain branch" means a fixture drain which is individually connected to a building subdrain and is vented by means of a combination drain and vent system.

(49) "Burr" means a roughness or metal protruding from the walls of a pipe usually as the result of cutting the pipe.

(50) "Business establishment" means any industrial or commercial organization or enterprise operated for profit, including but not limited to a proprietorship, partnership, firm, business trust, joint venture, syndicate, corporation or association.

(51) "Campsite receptor" means the vertical drain piping and trap combination that receives wastewater from recreational vehicles.

(52) "Catch basin" means a watertight receptacle built to arrest sediment of surface, subsoil or other waste drainage, and to retain oily or greasy wastes, so as to prevent their entrance into the building drain or building sewer.

(53) "Cesspool" means an excavation which receives domestic wastewater by means of a drain system without pretreatment of the wastewater and retains the organic matter and solids permitting the liquids to seep from the excavation.

(54) "Circuit vent" means a method of venting 2 to 8 traps or trapped fixtures without providing an individual vent for each trap or fixture.

(55) "Cleanout" means an accessible opening in a drain system used for the removal of obstructions.

(56) "Clear water" means wastewater other than storm water, having no impurities or where impurities are below a minimum concentration considered harmful by the department, including but not limited to noncontact cooling water and condensate drainage from refrigeration compressors and air conditioning equipment, drainage of water used for equipment chilling purposes and cooled condensate from steam heating systems or other equipment.

(56e) "Clinic sink" means a fixture having an integral trap and a flushing rim so that water cleanses the interior surface.

Note: This fixture has flushing and cleansing characteristics similar to a water closet. A clinic sink may also be referred to as a clinic service sink, a bedpan washing sink or a flushing rim sink.

(57) "Cold water" means water at a temperature less than 85°F.

(58) "Combination fixture" means a fixture combining one sink and laundry tray or a 2– or 3–compartment sink or laundry tray in one unit.

(59) "Combination drain and vent system" means a specially designed system of drain piping embodying the wet venting of one or more fixtures by means of a common drain and vent pipe adequately sized to provide free movement of air in the piping.

(59m) "Combination private water main" means a private water main that serves a fire protection system and any number of plumbing fixtures.

(59s) "Combination water service" means a water service that serves a fire protection system and any number of plumbing fixtures.

(60) "Common vent" means a branch vent connecting at or downstream from the junction of 2 fixture drains and serving as a vent for those fixture drains.

(60e) "Community–based residential facility" has the meaning specified under s. 50.01 (1g), Stats.

Note: Section 50.01 (1g), Stats., reads:

"Community–based residential facility" means a place where 5 or more adults who are not related to the operator or administrator and who do not require care above intermediate level nursing care reside and receive care, treatment or services that are above the level of room and board but that include no more than 3 hours of nursing care per week per resident. "Community–based residential facility" does not include any of the following:

(a) A convent or facility owned or operated by members of a religious order exclusively for the reception and care or treatment of members of that order.

(b) A facility or private home that provides care, treatment, and services only for victims of domestic abuse, as defined in s. 49.165 (1) (a), Stats., and their children.

(c) A shelter facility as defined under s. 16.308 (1) (d), Stats.

(d) A place that provides lodging for individuals and in which all of the following conditions are met:

1. Each lodged individual is able to exit the place under emergency conditions without the assistance of another individual.

2. No lodged individual receives from the owner, manager or operator of the place or the owner's, manager's or operator's agent or employee any of the following:

a. Personal care, supervision or treatment, or management, control or supervision of prescription medications.

b. Care or services other than board, information, referral, advocacy or job guidance; location and coordination of social services by an agency that is not affiliated with the owner, manager or operator, for which arrangements were made for an individual before he or she lodged in the place; or, in the case of an emergency, arrangement for the provision of health care or social services by an agency that is not affiliated with the owner, manager or operator.

(e) An adult family home.

(f) A residential care apartment complex.

(g) A residential facility in the village of Union Grove that was authorized to operate without a license under a final judgment entered by a court before January 1, 1982, and that continues to comply with the judgment notwithstanding the expiration of the judgment.

(61) "Conductor" means a drain pipe inside the building which conveys storm water from a roof to the storm drain or storm sewer.

(61m) "Containment" means the installation of a cross connection control method, device or assembly to prohibit the flow of contamination from a building or facility into a water supply system.

(62) "Contaminant load" means the concentrations of substances in a wastewater stream.

(62e) "Containment tank" means a device with a valved outlet designed to temporarily hold potentially hazardous wastewater for evaluation before discharging to a POWTS or municipal sewer.

(62m) "Continuous pressure" means a pressure greater than atmospheric and exerted for a period of more than 12 continuous hours.

(62s) "Conveyance system" means that portion of a drain system that consists of a series of pipes that transport water from one area to another without providing detention.

(63) "Corporation cock" means a valve:

(a) Installed in a private water main or a water service at or near the connection to a public water main; or

(b) Installed in the side of a forced main sewer to which a forced building sewer is connected.

(64) "Critical level" means the reference point on a vacuum breaker that must be submerged before backflow can occur. When the critical level is not indicated on the vacuum breaker, the bottom of the vacuum breaker shall be considered the critical level.

(65) "Cross connection" means a connection or potential connection between any part of a water supply system and another environment containing substances in a manner that, under any circumstances, would allow the substances to enter the water supply system by means of back siphonage or back pressure.

(65m) "Cross connection control assembly" means a testable backflow preventer consisting of an arrangement of components.

(66) "Cross connection control device" means any mechanical device which automatically prevents backflow from a contaminated source into a potable water supply system.

(67) "Curb stop" means a valve placed in a water service or a private water main, usually near the lot line.

(68) "Dead end" means a branch leading from a drain pipe, vent pipe, building drain or building sewer and terminating at a developed length of 2 feet or more by means of a plug, cap or other closed fitting.

(69) "Department" means the department of safety and professional services.

(70) "Design wastewater flow" means 150% of the estimated wastewater flow generated by a dwelling, building or facility.

(70m) "Detention" means the collection and temporary storage of water for subsequent gradual discharge.

(71) "Determination of failure" has the meaning specified under s. 145.245 (1) (a), Stats.

Note: Section 145.245 (1) (a), Stats., reads:

"Determination of failure" means any of the following:

1. A determination that a private sewage system is failing, according to the criteria under sub. (4), based on an inspection of the private sewage system by an employee of the state or a governmental unit who is certified to inspect private sewage systems by the department.

2. A written enforcement order issued under s. 145.02 (3) (f), 145.20 (2) (f) or 281.19 (2).

3. A written enforcement order issued under s. 254.59 (1) by a governmental unit.

(72) "Developed length" means the length of pipe line measured along the centerline of the pipe and fittings.

(72e) "Dfu" means drainage fixture unit.

(73) "Diameter" means in reference to a pipe the nominal inside diameter of the pipe.

(74) "Disinfection unit" means a type of POWTS treatment component, excluding a soil–based POWTS treatment component, that utilizes a chemical or photoelectric process to reduce the wastewater fecal coliform contaminant load.

(75) "Dispersal zone" means a dimensional volume of in situ soil that receives wastewater for treatment or distributes final effluent for dispersal.

(76) "Distribution cell" means a dimensional zone that is part of a POWTS treatment or dispersal component where wastewater is disseminated into in situ soil or engineered soil.

(77) "Documented data" means data which is developed in accordance with scientifically valid analytical protocols including field trials where appropriate, is subjected to peer review, results from more than one study, and consistent with other credible research.

(78) "Domestic wastewater" means the type of wastewater, not including storm water, normally discharged from or similar to that discharged from plumbing fixtures, appliances and devices including, but not limited to sanitary, bath, laundry, dishwashing, garbage disposal and cleaning wastewaters.

(79) "Double check backflow prevention assembly" means a type of cross connection control assembly which is composed of 2 independently acting check valves internally force–loaded to a normally closed position, tightly closing shut–off valves located at each end of the assembly and fitted with test cocks. The term "double check valve backflow preventer" has the same meaning as double check backflow prevention assembly.

(80) "Double check detector fire protection backflow preventer–assembly" means an assembly serving a fire protection system and consisting of 2 independently acting check valves, internally forced loaded to a normally closed position, 2 tightly closing shut–off valves, and properly located test cocks which also includes a parallel flow meter to indicate leakage or unauthorized use of water downstream of the assembly.

(80m) "Double check fire protection backflow prevention assembly" means an assembly serving a fire protection system and consisting of 2 independently acting check valves, internally forced loaded to a normally closed position, 2 tightly closing shut–off valves, and properly located test cocks. The term "double check valve backflow preventer for fire protection systems" has the same meaning as double check fire protection backflow prevention assembly.

(81) "Drain" means any pipe that carries wastewater or water–borne wastes.

(82) "Drain system" includes all the piping or any portion of the piping within public or private premises which conveys wastewater to a legal point of disposal, but does not include the mains of public sewer systems or a private onsite wastewater treatment system or public sewage treatment or disposal plant.

(82e) "Dual check backflow preventer wall hydrant–freeze resistant type" means a type of hose bibb that provides protection of the potable water supply from contamination due to backsiphonage or backpressure without damage to the device due to freezing, and is field testable to verify protection under the high hazard conditions present at a hose threaded outlet.

(82m) "Dual check valve type with atmospheric port backflow preventer" has the same meaning as specified in sub. (18).

(83) "Dwelling" means a structure, or that part of a structure, which is used or intended to be used as a home, residence or sleeping place by one person or by 2 or more persons maintaining a common household, to the exclusion of all others.

(84) "Effluent" means liquid discharged from a process, device, appurtenance or piping system.

(85) "Ejector" means an automatically operated device to elevate wastewater by the use of air under higher than atmospheric pressure.

(86) "Elevation" or "EL" means the vertical distance from the datum to a point under investigation.

(87) "Enforcement standard" or "ES" has the meaning specified under s. 160.01 (2), Stats.

Note: Section 160.01 (2), Stats., reads:
"Enforcement standard" means a numerical value expressing the concentration of a substance in groundwater which is adopted under ss. 160.07 and 160.09.

(88) "Engineered soil" means a mineral product that is equivalent to in situ soil for which treatment capability has been credited under Table 383.44–3, or superior to in situ soil in its ability to treat or disperse domestic wastewater from a POWTS.

(89) "Engineered system" means a system designed to meet the intent of the code but not the enumerated specifications of the state plumbing code.

(90) "Estimated wastewater flow" means the typical quantity of domestic wastewater generated daily by a dwelling, building or facility.

(90e) "Experimental plumbing system" has the same meaning as experimental system as specified in sub. (91).

(90m) "Exam sink" means a plumbing fixture used for hand washing in health care and related facilities.

Note: An exam sink may also be referred to as a treatment sink.

(91) "Experimental system" means a type of plumbing system from which valid and reliable data are being sought to demonstrate compliance with the intent of chs. SPS 382 to 384.

(92) "Failing private onsite wastewater treatment system" has the meaning specified under s. 145.245 (4), Stats.

Note: Section 145.245 (4) reads:
"Failing private sewage system" means a private sewage system which causes or results in any of the following conditions:
(a) The discharge of sewage into surface water or groundwater.
(b) The introduction of sewage into zones of saturation which adversely affects the operation of a private sewage system.
(c) The discharge of sewage to a drain tile or into zones of bedrock.
(d) The discharge of sewage to the surface of the ground.
(e) The failure to accept sewage discharges and backup of sewage into the structure served by the private sewage system.

(93) "Farm" means a parcel of 35 or more acres of contiguous land that is devoted primarily to agricultural use, as defined under s. 91.01 (2), Stats.

Note: Section 91.01 (2), Stats., reads:
(a) Any of the following activities conducted for the purpose of producing an income or livelihood:
1. Crop or forage production.
2. Keeping livestock.
3. Beekeeping.
4. Nursery, sod, or Christmas tree production.
4m. Floriculture.
5. Aquaculture.
6. Fur farming.
7. Forest management.
8. Enrolling land in a federal agricultural commodity payment program or a federal or state agricultural land conservation payment program.
(b) Any other use that the department, by rule, identifies as an agricultural use.

(94) "Faucet" means a valve end of a water pipe by means of which water can be drawn from or held within the pipe.

(95) "Final effluent" means the effluent from the last POWTS treatment component.

(96) "Fixture drain" means the drain from a fixture to a junction with another drain pipe.

(97) "Fixture supply" means that portion of a water distribution system serving one plumbing fixture, appliance or piece of equipment.

(98) "Fixture supply connector" means that portion of water supply piping which connects a plumbing fixture, appliance or a piece of equipment to the water distribution system.

(99) "Fixture unit, drainage" or "dfu" means a measure of the probable discharge into the drain system by various types of plumbing fixtures. The drainage fixture unit value for a particular fixture depends on its volume rate of drainage discharge, on the time duration of a single drainage operation, and on the average time between successive operations.

(100) "Fixture unit, supply" or "sfu" means a measure of the probable hydraulic demand on the water supply by various types of plumbing fixtures.

Note: The supply fixture unit value for a particular fixture depends on its volume rate of supply, on the time duration of a single supply operation, and on the average time between successive operations.

(101) "Floodfringe" has the meaning specified under s. NR 116.03 (14).

Note: Section NR 116.03 (14) reads:
"Floodfringe" means that portion of a floodplain which is outside of the floodway, which is covered by flood water during the regional flood. The term "floodfringe" is generally associated with standing water rather than flowing water.

(102) "Flood level rim" means the edge of the receptacle from which water overflows.

(103) "Floodplain" has the meaning specified under s. NR 116.03 (16).

Note: Section NR 116.03 (16) reads:
"Floodplain" means that land which has been or may be covered by flood water during the regional flood. The floodplain includes the floodway, floodfringe, shallow depth flooding, flood storage and coastal floodplain areas.

(104) "Floodway" has the meaning specified under s. NR 116.03 (22).

Note: Section NR 116.03 (22) reads:
"Floodway" means the channel of a river or stream, and those portions of the floodplain adjoining the channel required to carry the regional flood discharge.

(105) "Floor sink" means a receptor for the discharge from indirect or local waste piping installed with its flood level rim even with the surrounding floor.

(106) "Flow" means the volumetric measure of a liquid stream in a specified time.

(107) "Flushometer valve" means a device which discharges a predetermined quantity of water to fixtures for flushing purposes and is closed by direct water pressure.

(108) "Flush valve" means a device located at the bottom of a tank for flushing water closets and similar fixtures.

(108m) "Foundation drain" means a subsoil drain that serves the area of the foundation of a building.

(108s) "Freeze resistant sanitary yard hydrant" means a type of device serving as a hose bibb that has design features that minimize the risk of freezing, prevent groundwater contamination and provide backflow protection. The term "freeze resistant sanitary yard hydrant with backflow protection" has the same meaning as freeze resistant sanitary yard hydrant.

(109) "Garage, private" means a building or part of a building used for the storage of vehicles or other purposes, by a family or less than 3 persons not of the same family and which is not available for public use.

(110) "Garage, public" means a building or part of a building which accommodates or houses self–propelled land, air or water vehicles for 3 or more persons not of the same family.

(111) "Governmental unit" has the meaning specified under s. 145.01 (5), Stats.

Note: Section 145.01 (5), Stats., reads:
"Governmental unit responsible for the regulation of private sewage systems" or "governmental unit", unless otherwise qualified, means the county, except that in a county with a population of 500,000 or more these terms mean the city, village or town where the private sewage system is located.

(112) "Graywater" means wastewater contaminated by waste materials, exclusive of urine, feces or industrial waste, deposited into plumbing drain systems.

(113) "Grease interceptor" means a receptacle designed to intercept and retain or remove grease or fatty substances.

(114) "Groundwater" has the meaning specified under s. 160.01 (4), Stats.

Note: Section 160.01 (4), Stats., reads:
"Groundwater" means any of the waters of the state, as defined under s. 281.01 (18), occurring in a saturated subsurface geological formation of rock or soil.

(115) "Hand–held shower" means a hose and a hand–held discharge piece such as a shower head or spray connecting to a fixture fitting.

(116) "Health care and related facility" means a hospital, nursing home, community–based residential facility, county home, infirmary, inpatient mental health center, inpatient hospice, ambulatory surgery center, adult daycare center, end stage renal facility, facility for the developmentally disabled, institute for mental disease, urgent care center, clinic or medical office, residential care center for children and youth or school of medicine, surgery or dentistry.

(117) "Health care plumbing appliance" means a plumbing appliance, the function of which is unique to health care activities.

(118) "High groundwater" means zones of soil saturation which include perched water tables, shallow regional groundwater tables or aquifers, or zones that are seasonally, periodically or permanently saturated.

(119) "High groundwater elevation" means the higher of either the elevation to which the soil is saturated when observed as a free water surface, or the elevation to which the soil has been seasonally or periodically saturated as indicated by the highest elevation of redoximorphic features in the soil profile.

(120) "High hazard" means a situation where the water supply system could be contaminated with a toxic substance or solution so as to make the water unsuitable for the designated use.

(121) "Holding tank" means a watertight receptacle for the collection and holding of wastewater.

(122) "Horizontal pipe" means any pipe or fitting which makes an angle of less than 45° with the horizontal.

(123) "Horizontal reference point" means a stationary, identifiable point to which horizontal dimensions can be related.

(124) "Hose connection backflow preventer" means a type of cross connection control device which consists of 2 independent checks, force–loaded or biased to a closed position, with an atmospheric vent located between the 2 check valves, which is force–loaded or biased to an open position, and a means for attaching a hose.

(125) "Hose connection vacuum breaker" means a type of cross connection control device which consists of a check valve member force–loaded or biased to a closed position and an atmospheric vent valve or means force–loaded or biased to an open position when the device is not under pressure.

(126) "Hot water" means water at a temperature of 110° F. or more.

(127) "Hot water storage tank" means a tank used to store water that is heated indirectly by a circulating water heater or by steam or hot water circulating through coils or by other heat exchange methods internal or external to the tank.

(128) "Human health hazard" has the meaning specified under s. 254.01 (2), Stats.

Note: Section 254.01 (2), Stats., reads:
"Human health hazard" means a substance, activity or condition that is known to have the potential to cause acute or chronic illness, to endanger life, to generate or spread infectious diseases, or otherwise injuriously to affect the health of the public.

(129) "Hydrostatic test" means a test performed on a plumbing system or portion thereof in which the system is filled with a liquid, normally water, and raised to a designated pressure.

(130) "Indian lands" means lands owned by the United States and held for the use or benefit of Indian tribes or bands or individual Indians, and lands within the boundaries of a federally recognized reservation that are owned by Indian tribes or bands or individual Indians.

(131) "Indirect waste piping" means drain piping which does not connect directly with the drain system, but which discharges into the drain system by means of an air break or air gap into a receptor.

(132) "Individual vent" means a pipe installed to vent a fixture trap.

(133) "Industrial wastewater" means the liquid wastes that result from industrial processes.

(133s) "Infiltration component" means any device or method that is intended to promote the assimilation of water into in situ soil.

(134) "Infiltrative surface" means the plane within a treatment or dispersal component at which effluent is applied to in situ soil or engineered soil.

(135) "In situ soil" means soil naturally formed or deposited in its present location or position and includes soil material that has been plowed using normal tillage implements and depositional material resulting from erosion or flooding.

(136) "Interceptor" or "separator" means a device designed and installed so as to separate and retain deleterious, hazardous or undesirable matter from wastes flowing through it.

(136s) "Irrigation" means the application of water to the root zone of plants or plantings.

(137) "Laboratory faucet backflow preventer" means a type of cross connection control device which consists of 2 independently acting check valves force–loaded or biased to a closed position and, between the check valves, a means for automatically venting to atmosphere which is force–loaded or biased to an open position.

(138) "Laboratory plumbing appliance" means a plumbing appliance, the function of which is unique to scientific experimentation or research activities.

(139) "Leaching chamber" means a product designed to support soil and create a cavity for the temporary storage of effluent and to provide an infiltrative surface for the distribution cell POWTS dispersal or treatment component.

(140) "Leader" means a pipe or channel outside a building which conveys storm water from the roof or gutter drains to a storm drain, storm sewer or to grade.

(141) "Lead–free" means:

(a) When used with respect to solders and flux, containing not more than 0.2 percent lead.

(b) When used with respect to pipe and pipe fittings and fixtures, containing not more than 8.0 percent lead.

(c) When used with respect to the wetted surface material of pipe and pipe fittings and fixtures, containing a weighted average of not more than 0.25 percent lead.

Note: Calculation procedures for determining the weighted average lead concentration in a product that consists of several components are listed in NSF/ANSI Standard 61, annex G, including how to comply with amended sec. 1417(d)(2) of the federal Safe Drinking Water Act (SDWA) of 2011.

(142) "Linear loading rate" means the amount of effluent applied daily along the landscape contour expressed in gallons per day per linear foot along a site contour.

(143) "Load factor" means the percentage of the total connected fixture unit flow rate which is likely to occur at any point in a drain system.

(144) "Local station" means a National Weather Service (NWS) precipitation station or other station accepted by the department as collecting precipitation data in accordance with NWS methods.

(145) "Local waste piping" means a portion of drain piping which receives the wastes discharged from indirect waste piping and which discharges those wastes by means of an air break or air gap into a receptor.

(146) "Local vent" means a pipe connecting to a fixture and extending to outside air through which vapor or foul air is removed from the fixture.

(147) "Low hazard" means a situation where the water supply system could be contaminated with a nontoxic substance or solution so as to make the water unsuitable for the designated use.

(148) "Main" means the principal pipe artery to which branches may be connected.

(149) "Manhole" means an opening constructed to permit access by a person to a sewer or any underground portion of a plumbing system.

(150) "Manufactured dwelling" has the meaning specified under s. SPS 320.07 (52) (a).

Note: Section SPS 320.07 (52) (a) was repealed.

(151) "Manufactured home" has the meaning specified under s. 101.91 (2), Stats.

Note: Section 101.91 (2), Stats., reads:
"Manufactured home" means any of the following:
(am) A structure that is designed to be used as a dwelling with or without a permanent foundation and that is certified by the federal department of housing and urban development as complying with the standards established under 42 USC 5401 to 5425.
(c). A mobile home, unless a mobile home is specifically excluded under the applicable statute.

(152) "Manufactured home drain connector" means the pipe that joins the drain piping for a manufactured home to the building sewer.

(153) "Manufactured home community" has the meaning specified under s. 101.91 (5m), Stats.

Note: Section 101.91 (5m), Stats., reads:
"Manufactured home community" means any plot or plots of ground upon which 3 or more manufactured homes that are occupied for dwelling or sleeping purposes are located. "Manufactured home community" does not include a farm where the occupants of the manufactured homes are the father, mother, son, daughter, brother or sister of the farm owner or operator or where the occupants of the manufactured homes work on the farm.

(154) "Mechanical joint" means a connection between pipes, fittings or pipes and fittings by means of a device, coupling, fitting or adapter where compression is applied around the center line of the pieces being joined, but which is not caulked, threaded, soldered, solvent cemented, brazed or welded.

(154m) "Mixed wastewater" means a combination of domestic and non–domestic wastewater.

(155) "Multiple dwelling" means a building containing more than 2 dwelling units.

(156) "Multipurpose piping system" means a water distribution system conveying water to plumbing fixtures and appliances and automatic fire sprinklers with the intention of serving both domestic and fire protection needs.

(157) "Municipality" means any city, village, town or county in this state.

(158) "Munsell soil color" means a color classification that specifies the relative degrees of the color variables in terms of hue, value and chroma.

(159) "Navigable waters" has the meaning specified under s. NR 115.03 (5).

Note: Section NR 115.03 (5) reads:
"Navigable waters" means Lake Superior, Lake Michigan, all natural inland lakes within Wisconsin and all streams, ponds, sloughs, flowages and other waters within the territorial limits of this state, including the Wisconsin portion of boundary waters, which are navigable under the laws of this state. Under s. 281.31 (2) (d), Stats., notwithstanding any other provision of law or administrative rule promulgated thereunder, shoreland ordinances required under s. 59.692, Stats., and this chapter do not apply to lands adjacent to farm drainage ditches if:
(a) Such lands are not adjacent to a natural navigable stream or river;
(b) Those parts of such drainage ditches adjacent to such lands were nonnavigable streams before ditching or had no previous stream history; and
(c) Such lands are maintained in nonstructural agricultural use.

(160) "Negative pressure" means a pressure less than atmospheric.

(160e) "Noncontinuous pressure" means a pressure greater than atmospheric and exerted for a period of no more than 12 continuous hours.

(160m) "Non–domestic wastewater" means any wastewater that is not domestic wastewater or storm water.

(161) "Nonpotable water" means water not safe for drinking, personal or culinary use.

(162) "Nonpublic" means, in the classification of plumbing fixtures, those fixtures in residences, apartments, living units of hotels and motels, and other places where the fixtures are intended for the use by a family or an individual to the exclusion of all others.

(163) "Nontoxic" means a substance in the diluted form that meets one of the following requirements:

(a) Is listed by the National Sanitation Foundation (NSF) as meeting the NSF evaluation criteria for nonfood compounds.

(b) Is acceptable to the United States Food and Drug Administration (FDA) Title 21 section 175.300 of the Federal Regulation on Food Additives.

(c) Is acceptable for contact with potable water or is deemed non–toxic by a third party certification that is acceptable to the department.

(d) Is deemed non–toxic by the department.

(163e) "Nursing home" has the meaning specified under s. 50.01 (3), Stats.

Note: Section 50.01 (3), Stats., reads:
"Nursing home" means a place where 5 or more persons who are not related to the operator or administrator reside, receive care or treatment and, because of their mental or physical condition require access to 24–hour nursing services, including limited nursing care, intermediate level nursing care and skilled nursing services. "Nursing home" does not include any of the following:
(c) A convent or facility owned or operated exclusively by and for members of a religious order that provides reception and care or treatment of an individual.
(d) A hospice, as defined in s. 50.90 (1), Stats., that directly provides inpatient care.
(e) A residential care apartment complex.

(163s) "Occasional occupancy" means occupying a building that is served by a POWTS for less than 120 calendar days per year.

(164) "Occupancy" means the purpose for which a building, structure, equipment, materials, or premises, or part thereof, is used or intended to be used.

(165) "Oil interceptor" means a device designed to intercept and retain oil, lubricating grease or other similar materials.

(166) "Offset" means a combination of fittings or bends that makes two changes in direction bringing one section of the pipe out of line but into a line parallel with the other section.

(167) "One or 2–family dwelling" means a building containing not more than 2 dwelling units.

(168) "Open air" means outside the building.

(168m) "Open bodies of water" means those portions of Lake Michigan and Lake Superior within the boundaries of Wisconsin, all lakes, bays, rivers, streams, springs, ponds, wells, impounding reservoirs, marshes, watercourses, drainage systems and other surface water, natural or artificial, public or private within the state or under its jurisdiction.

(169) "Ordinary high–water mark" has the meaning specified under s. NR 115.03 (6).

Note: Section NR 115.03 (6), reads:
"Ordinary high–water mark" means the point on the bank or shore up to which the presence and action of surface water is so continuous as to leave a distinctive mark such as by erosion, destruction or prevention of terrestrial vegetation, predominance of aquatic vegetation, or other easily recognized characteristic. Where the bank or shore at any particular place is of such character that it is difficult or impossible to ascertain where the point of ordinary high–water mark is, recourse may be had to the opposite bank of a stream or to other places on the shore of a lake or flowage to determine whether a given stage of water is above or below the ordinary high–water mark.

(170) "Participating governmental unit" means a governmental unit which applies to the department for financial assistance

under ss. SPS 387.04 and 387.05, and which meets the conditions specified under s. 145.245 (9), Stats.

(170e) "Patient area plumbing fixture" means a plumbing fixture that is accessible to patients in a health care facility and is intended to be used for culinary, hygienic or domestic purposes.

(171) "Peak flow" means the largest anticipated recurrent wastewater discharge to a private onsite wastewater treatment system.

(171e) "Peak flow, stormwater" means the largest anticipated flow from a given storm event.

(172) "Pipe applied atmospheric type vacuum breaker" means a type of cross connection control device where the flow of water into the device causes a float to close an air inlet port and when the flow of water stops the float falls and forms a check valve against back siphonage and at the same time opens the air inlet port to allow air to enter and satisfy the vacuum.

(173) "Pit privy" means an enclosed nonportable toilet into which nonwater–carried human wastes are deposited to a subsurface storage chamber that is not watertight.

(174) "Pitch" means the gradient or slope of a line of pipe in reference to a horizontal plane.

(175) "Place of employment" has the meaning specified under s. 101.01 (11), Stats.

Note: Section 101.01 (11), Stats., reads:
"Place of employment" includes every place, whether indoors or out or underground and the premises appurtenant thereto where either temporarily or permanently any industry, trade or business is carried on, or where any process or operation, directly or indirectly related to any industry, trade or business, is carried on, and where any person is, directly or indirectly, employed by another for direct or indirect gain or profit, but does not include any place where persons are employed in private domestic service which does not involve the use of mechanical power or in farming. "Farming" includes those activities specified in s. 102.04 (3), and also includes the transportation of farm products, supplies or equipment directly to the farm by the operator of said farm or employees for the use thereon, if such activities are directly or indirectly for the purpose of producing commodities for market, or as an accessory to such production. When used with relation to building codes, "place of employment" does not include an adult family home, as defined in s. 50.01 (1), or, except for the purposes of s. 101.11, a previously constructed building used as a community–based residential facility, as defined in s. 50.01 (1g), which serves 20 or fewer unrelated residents.

(176) "Plumbing" has the meaning specified under s. 145.01 (10), Stats.

Note: Section 145.01 (10), Stats., reads:
"Plumbing" means:
(a) 1. All piping, fixtures, appliances, equipment, devices, and appurtenances in connection with water supply systems, water distribution systems, wastewater drainage systems, reclaimed water systems, and stormwater use systems, including hot water storage tanks, water treatment devices, and water heaters connected with these systems and also includes the installation thereof.
2. The construction, connection, installation, service, or repair of any drain or wastewater piping system that connects to the mains or other terminal within the bounds of, or beneath an area subject to easement for highway purposes, including private sewage systems and stormwater treatment and dispersal systems, and the alteration of any such systems, drains or wastewater piping.
3. The construction, connection, installation, service, or repair of water service piping that connects to the main or other water utility service terminal within the bounds of, or beneath an area subject to easement for highway purposes and its connections.
4. The water pressure system other than municipal systems as provided in ch. 281.
5. A plumbing and drainage system so designed and vent piping so installed as to keep the air within the system in free circulation and movement; to prevent with a margin of safety unequal air pressures of such force as might blow, siphon or affect trap seals, or retard the discharge from plumbing fixtures, or permit sewer air to escape into the building; to prohibit cross–connection, contamination or pollution of the water supply and distribution systems, and to provide an adequate supply of water to properly serve, cleanse and operate all fixtures, equipment, appurtenances and appliances served by the plumbing system.
(br) "Plumbing" does not include any of the following:
1. A rainwater gutter or downspout down to the point that it discharges into a plumbing system, a subsoil drain, or a foundation drain.
2g. A process water reuse system if the process water reuse system is not connected to any plumbing fixture or appliance.
2m. A stormwater culvert under a roadway or walkway that is placed there only to equalize the water level from one end of the culvert to the other end.
3. The practical installation of process piping within a sewage disposal plant.

(177) "Plumbing appliance" means any one of a special class of plumbing devices which is intended to perform a special function. The operation or control of the appliance may be dependent upon one or more energized components, such as motors, controls, heating elements, or pressure or temperature sensing elements. The devices may be manually adjusted or controlled by the user or operator, or may operate automatically through one or more of the following actions: a time cycle, a temperature range, a pressure range, or a measured volume or weight.

(178) "Plumbing fixture" means a receptacle or device which meets at least one of the following:

(a) Is either permanently or temporarily connected to the water supply system of the premises, and demands a supply of water from the system;

(b) Discharges wastewater or waste materials either directly or indirectly to the drain system of the premises.

(c) Requires both a water supply connection and a discharge to the drain system of the premises.

(179) "Plumbing system" includes the water supply system, the drain system, the vent system, plumbing fixtures, plumbing appliances and plumbing appurtenances that serve a building, structure or premises.

(180) "Point of standards application" has the meaning specified under s. 160.01 (5), Stats.

Note: Section 160.01 (5) Stats., reads:
"Point of standards application" means the specific location, depth or distance from a facility, activity or practice at which the concentration of a substance in groundwater is measured for purposes of determining whether a preventive action limit or an enforcement standard has been attained or exceeded.

(181) "Potable water" means water that is both:

(a) Safe for drinking, personal or culinary use.

(b) Free from impurities present in amounts sufficient to cause disease or harmful physiological effects.

(182) "POWTS" means a private onsite wastewater treatment system.

(183) "POWTS component" means any subsystem, subassembly or other system designed for use in or as part of a private onsite wastewater treatment system which may include treatment, dispersal or holding and related piping.

(184) "POWTS dispersal component" means a device or method that is intended to promote the assimilation of treated wastewater by the environment.

(185) "POWTS holding component" means any receptacle intended to collect wastewater for a period of time, including holding and dosing tanks.

(186) "POWTS treatment component" means a device or method that is intended to reduce the contaminant load of wastewater.

(186s) "Pre–development" means the condition of the topography of vegetation, including that resulting from human activities that existed prior to land disturbance for construction.

(187) "Prefabricated plumbing" means concealed drain piping, vent piping or water supply or a combination of these types of piping, contained in a modular building component, which will not be visible for inspection when delivered to the final site of installation.

(187e) "Prefabricated sump and pump system" means a simplex or duplex pump and sump designed as a combined unit.

(188) "Pressure relief valve" means a pressure actuated valve held closed by a spring or other means and designed to automatically relieve pressure at a designated pressure.

(189) "Pressure vacuum breaker assembly" means a type of cross connection control assembly which consists of an independently operating internally loaded check valve and an independently operating loaded air inlet located on the discharge side of the check valve, a tightly closing shut–off valve located at each end of the assembly, and test cocks. The term "pressure vacuum breaker" has the same meaning as pressure vacuum breaker assembly.

(190) "Pressurized flushing device" means a device that uses the water supply to create a pressurized discharge to flush a fixture exclusive of gravity type flushing systems.

(191) "Preventive action limit" or "PAL" has the meaning as specified under s. 160.01 (6), Stats.

Note: Section 160.01 (6), Stats., reads:
"Prevention action limits" means a numerical value expressing the concentration of a substance in groundwater which is adopted under s. 160.15, Stats.

(192) "Principal residence" means a residence that is occupied at least 51% of the year by the owner. Principal residence includes a residence owned by a trust or estate of an individual, if the residence is occupied at least 51% of the year by a person who has an ownership interest in the residence as a beneficiary of the trust or estate.

(193) "Private interceptor main sewer" means a sewer serving 2 or more buildings and not part of the municipal sewer system.

(194) "Private onsite wastewater treatment system" has the meaning given for 'private sewage system' under s. 145.01 (12), Stats.

Note: Section 145.01 (12), Stats., reads:
"Private sewage system" means a sewage treatment and disposal system serving a single structure with a septic tank and soil absorption field located on the same parcel as the structure. This term also means an alternative sewage system approved by the department including a substitute for the septic tank or soil absorption field, a holding tank, a system serving more than one structure or a system located on a different parcel than the structure. A private sewage system may be owned by the property owner or by a special purpose district.

(195) "Private water main" means a water main serving 2 or more buildings and not part of the municipal water system.

(196) "Public" means, in the classification of plumbing fixtures, those fixtures which are available for use by the public or employees.

(197) "Public building" has the meaning specified under s. 101.01 (12), Stats.

Note: Section 101.01 (12), Stats., reads:
"Public building" means any structure, including exterior parts of such building, such as a porch, exterior platform or steps providing means of ingress or egress, used in whole or in part as a place of resort, assemblage, lodging, trade, traffic, occupancy, or use by the public or by 3 or more tenants. When used in relation to building codes, "public building" does not include a previously constructed building used as a community–based residential facility as defined in s. 50.01 (1g) which serves 20 or fewer unrelated residents or an adult family home, as defined in s. 50.01 (1).

(198) "Public sewer" means a sewer owned and controlled by a public authority.

(199) "Public water main" means a water supply pipe for public use owned and controlled by a public authority.

(200) "Quick closing valve" means a valve or faucet that closes automatically when released manually or controlled by mechanical means for fast action closing.

(201) "Receptor" means a fixture or device that receives the discharge from indirect or local waste piping.

(202) "Redoximorphic feature" means a feature formed in the soil matrix by the processes of reduction, translocation and oxidation of iron and manganese compounds in seasonally saturated soil.

(203) "Reduced pressure detector fire protection backflow prevention assembly" means a type of reduced pressure principle type backflow preventer serving a fire protection system and which includes a parallel flow meter to indicate leakage or unauthorized use of water downstream of the assembly.

(203m) "Reduced pressure fire protection principle backflow preventer" means an assembly serving a fire protection system and consisting of 2 independently–acting check valves, internally force loaded to a normally closed position, and separated by an intermediate chamber or zone in which there is a hydraulically operated relief means of venting to atmosphere, internally forced loaded to a normally open position. The term "reduced pressure principle backflow preventer for fire protection systems" has the same meaning as reduced pressure fire protection principle backflow preventer.

(204) "Reduced pressure principle backflow preventer" means a type of cross connection control assembly which contains 2 independently acting check valves, separated by an intermediate chamber or zone in which there is a hydraulically operated means for venting to atmosphere, and includes 2 shut–off valves and 4 test cocks.

(205) "Relief vent" means a vent which permits additional circulation of air in or between drain and vent systems.

(206) "Riser" means a water supply pipe that extends vertically one full story or more.

(207) "Roof drain" means a drain installed to receive water collecting on the surface of a roof and to discharge it into a conductor.

(208) "Roughing in" means the installation of all parts of the plumbing system which can be completed prior to the installation of fixtures including drain, water supply and vent piping and the necessary fixture supports.

(209) "Rowhouse" means a building which is not more than 3 stories in height and which contains only 3 or more attached, vertically separated, side–by–side or back–to–back dwelling units, with each dwelling unit served by an individual exterior exit within 6 feet of the exit discharge grade.

(209m) "RV transfer tank" means a type of stationary container used to collect and hold wastewater discharges generated by an individual camping trailer or recreational vehicle.

(210) "Safing" means a membrane or material installed beneath a fixture to prevent leakage from escaping to the floor, ceiling or walls.

(211) "Sand interceptor" means a receptacle designed to intercept and retain sand, grit, earth and other similar solids.

(212) "Sanitary sewer" means a pipe that carries wastewater consisting in part of domestic wastewater.

(212e) "Scrub sink" means a plumbing fixture used for hand and arm washing prior to surgery or other medical procedures.

Note: A scrub sink may also be referred to as a surgeon washup sink.

(213) "Scum" means the accumulated floating solids generated during the biological, physical or chemical treatment, coagulation or sedimentation of wastewater.

(214) "Secretary" means the secretary of the department of safety and professional services or designee.

(214m) "Service sink" means a fixture designed to be used for building or facility maintenance.

Note: A service sink may also be referred to as a mop sink, mop basin or janitor's sink.

(215) "Servicing" has the meaning as specified under s. NR 113.03 (57).

Note: Under s. NR 113.03 (57), "servicing" means removing the scum, liquid, sludge or other wastes from a private sewage system such as septic or holding tanks, dosing chambers, grease interceptors, seepage beds, seepage pits, seepage trenches, privies or portable restrooms and properly disposing or recycling of the contents as provided in this chapter.

(216) "Sewage" means wastewater containing fecal coliform bacteria exceeding 200 CFU, colony forming units, per 100 ml.

(217) "Sewage grinder pump" means a type of sewage pump which macerates wastewater consisting in part of sewage.

(218) "Sewage pump" means an automatic pump for the removal of wastewater from a sanitary sump.

(219) "Slip–joint" means a connection in which one pipe slips into another, the joint of which is made tight with a compression type fitting.

(220) "Sludge" means the accumulated solids generated during the biological, physical or chemical treatment, coagulation or sedimentation of water or wastewater.

(221) "Small commercial establishment" means a commercial establishment or business place with a maximum daily wastewater flow rate of less than 5,000 gallons per day as determined from the design criteria of the state plumbing code. Small commercial establishment includes a farm, including a residence on

a farm, if the residence is occupied by a person who is an operator of the farm and if the maximum daily wastewater flow rate of the farm and the residence on the farm is less than 5,000 gallons–per–day as determined from the design criteria of the state plumbing code.

(222) "Soil" means the naturally occurring pedogenically developed and undeveloped regolith overlying bedrock.

(223) "Soil consistence" means the resistance of soil material to deformation or rupture as related to the degree of adhesion and cohesion of a soil mass.

(224) "Soil horizon" means a layer of soil material approximately parallel to the land surface and differing from adjacent genetically related layers in physical, chemical, or biologic characteristics.

(225) "Soil morphology" means the physical or structural characteristics of a soil profile particularly as related to the arrangement of soil horizons based on color, texture, structure, consistence, and porosity.

(226) "Soil profile" means a vertical section of soil containing one or more soil horizons.

(227) "Soil profile evaluation" means a determination of soil properties or characteristics as they relate to wastewater or non-water–carried human waste treatment or dispersal.

(228) "Soil structure" means the combination or arrangement of individual soil particles into definable aggregates or peds, which are characterized and classified on the basis of size, shape, and degree of distinctness.

(229) "Soil texture" means the relative proportions of sand, silt and clay (soil separates) in a soil.

(230) "Spigot" means the end of a pipe which fits into a bell or hub.

(231) "Spill level" means the horizontal plane to which water will rise to overflow through channels or connections which are not directly connected to any drainage system, when water is flowing into a fixture, vessel or receptacle at the maximum rate of flow.

(231m) "Spill resistant vacuum breaker" means a cross connection control device consisting of one check valve force loaded closed, an air inlet force loaded open to atmosphere downstream of the check valve, 2 shutoff valves and 2 test cocks.

(232) "Spring line, pipe" means the line or place from which the arch of a pipe or conduit rises.

Note: See ch. SPS 382 Appendix for an illustration depicting the spring line of a pipe.

(233) "Stack" means a drain or vent pipe that extends vertically one full story or more.

(234) "Stack vent" means a vent extending from the highest horizontal drain connected to a stack.

(235) "Standpipe" means a drain pipe serving as a receptor for the discharge wastes from indirect or local waste piping.

(236) "State" means the state of Wisconsin, its agencies and institutions.

(237) "State plumbing code" means chs. SPS 381 to 387.

(238) "Sterilizer, boiling type" means a device of nonpressure type, used for boiling instruments, utensils, or other equipment for disinfecting.

(239) "Sterilizer, instrument" means a device for the sterilization of various instruments.

(240) "Sterilizer, pressure" means a pressure vessel fixture designed to use steam under pressure for sterilizing.

Note: A pressure sterilizer is also referred to as an autoclave.

(241) "Sterilizer, pressure instrument washer" means a pressure vessel designed to both wash and sterilize instruments during the operating cycle of the device.

(242) "Sterilizer, utensil" means a device for the sterilization of utensils.

(243) "Sterilizer vent" means a separate pipe or stack, indirectly connected to the drain system at the lower terminal, which receives the vapors from nonpressure sterilizers, or the exhaust vapors from pressure sterilizers, and conducts the vapors directly to the outer air.

(244) "Sterilizer, water" means a device for sterilizing water and storing sterile water.

(245) "Storm sewer" means a pipe, other than a pipe located inside a building, that carries any of the following: storm water, groundwater or clear water.

(246) "Storm water" means wastewater from a precipitation event.

(247) "Subsoil drain" means that part of a drain system that conveys groundwater to a point of discharge or dispersal.

(248) "Sump" means a tank or pit that receives wastewater that must be emptied by mechanical means.

(249) "Sump pump" means an automatic device located in a sump, pit or low point that is designed to elevate storm water, groundwater or clear water.

(250) "Sump vent" means a vent pipe from a nonpressurized sump.

(251) "Supports" means hangers, anchors and other devices for supporting and securing pipes or fixtures to structural members of a building.

(252) "Surface water" means those portions of Lake Michigan and Lake Superior within the boundaries of Wisconsin, all lakes, bays, rivers, streams, springs, ponds, impounding reservoirs, marshes, water courses, drainage systems, and other surface water, natural or artificial, public or private within the state or under its jurisdiction, except those waters which are entirely confined and completely retained upon the property of a facility.

(253) "Swimming pool" means a structure, basin, chamber or tank containing an artificial body of water for swimming, diving or recreational bathing.

(254) "Temperature and pressure relief valve" means a combination relief valve designed to function as both a temperature relief and pressure relief valve.

(255) "Temperature relief valve" means a temperature actuated valve designed to automatically discharge at a designated temperature.

(256) "Tempered water" means water ranging in temperature from 85°F. to less than 110°F.

(256e) "Ten–year, 24–hour storm" or "10–year, 24–hour storm" means a discrete rain storm event characterized by a specific duration, temporal distribution, rainfall intensity, return frequency and total depth of rainfall.

Note: The frequency, intensity, and duration of rainfall varies considerably during a storm by geographic location. Precipitation frequency atlases, NOAA Atlas 2, have been prepared by the National Oceanic and Atmospheric Administration (NOAA), National Weather Service. In chapter SPS 382, this value may be expressed as a specific "design storm". The calculated volume of rainfall, or stormwater, may be determined from this value and used to calculate peak discharge.

(257) "Total suspended solids" or "TSS" means solids in wastewater that can be removed readily by standard filtering procedures in a laboratory and reported as milligrams per liter (mg/L).

(259) "Trap" means a fitting, device or arrangement of piping so designed and constructed as to provide, when properly vented, a liquid seal which prevents emission of sewer gases without materially affecting the flow of wastewater through it.

(260) "Trap seal" means the vertical distance between the top of the trap weir and the top of the dip separating the inlet and outlet of the trap.

(261) "Trap seal primer, water supply fed" means a type of valve designed to supply water to the trap in order to provide and maintain the water seal of the trap.

(262) "Trap weir" means that part of a trap that forms a dam over which wastes must flow to enter the drain piping.

(263) "Turf sprinkler system" means a system of piping, appurtenances and devices installed underground to distribute water for lawn or other similar irrigation purposes.

(264) "Unsaturated soil" means soil in which the pore spaces contain water at less than atmospheric pressure, as well as air and other gases.

(265) "Vacuum" means any pressure less than that exerted by the atmosphere.

(265e) "Vacuum breaker tee" means an assembly of fittings designed to eliminate the possibility of back siphonage in a system by allowing air to enter through a tee fitting.

(266) "Vacuum relief valve" means a device that admits air into the water distribution system to prevent excessive vacuum in a water storage tank or heater.

(267) "Vent" means a part of the plumbing system used to equalize pressures and ventilate the system.

(268) "Vent header" means a branch vent which connects 2 or more stack vents or vent stacks or both and extends to the outside air.

(269) "Vent stack" means a vertical vent pipe that provides air for a drain stack of 5 or more branch intervals.

(270) "Vent system" means a pipe or pipes installed to provide a flow of air to or from a drain system, or to provide a circulation of air within the system to protect trap seals from siphonage and back pressure.

(271) "Vertical pipe" means any pipe or fitting which makes an angle of 45° or less with the vertical.

(272) "Wall hydrant, freeze resistant automatic draining type vacuum breaker" means a type of device which is designed and constructed with anti–siphon and back pressure preventive capabilities and with means for automatic post shut–off draining to prevent freezing.

(273) "Wall mounted water closet" means a water closet attached to a wall in such a way that it does not touch the floor.

(273e) "Washer sanitizer" means a plumbing appliance used for washing and disinfecting equipment.

(274) "Waste" means the discharge from any fixture, appliance, area or appurtenance.

(275) "Waste sink" means a receptor for the discharge from indirect or local waste piping installed with its flood level rim above the surrounding floor.

(276) "Wastewater" means clear water, storm water, domestic wastewater, industrial wastewater, sewage or any combination of these.

(277) "Wastewater, treated" means the effluent conveyed through one or more POWTS treatment components to a POWTS dispersal component.

(277e) "Wastewater treatment device" means a device or method that is intended to beneficially alter the characteristics of wastewater.

(278) "Water closet" means a water–flushed plumbing fixture designed to receive human excrement directly from the user of the fixture.

(279) "Water conditioner" means an appliance, appurtenance or device used for the purpose of ion exchange, demineralizing water or other methods of water treatment.

(280) "Water distribution system" means that portion of a water supply system from the building control valve to the connection of a fixture supply connector, plumbing fixture, plumbing appliance, water–using equipment or other piping systems to be served.

(281) "Water heater" means any heating device with piping connections to the water supply system that is intended to supply hot water for domestic or commercial purposes other than space heating.

(282) "Water service" means that portion of a water supply system from the water main or private water supply to the building control valve.

(283) "Waters of the state" has the meaning specified under s. 281.01 (18), Stats.

Note: Section 281.01 (18), Stats., reads:
"Waters of the state" means those portions of Lake Michigan and Lake Superior within the boundaries of Wisconsin, all lakes, bays, rivers, streams, springs, ponds, wells, impounding reservoirs, marshes, watercourses, drainage systems and other surface water or groundwater, natural or artificial, public or private within the state or under its jurisdiction.

(284) "Water supply system" means the piping of a private water main, water service and water distribution system, fixture supply connectors, fittings, valves, and appurtenances through which water is conveyed to points of usage such as plumbing fixtures, plumbing appliances, water using equipment or other piping systems to be served.

(285) "Water treatment device" means a device which:

(a) Renders inactive or removes microbiological, particulate, inorganic, organic or radioactive contaminants from water which passes through the device or the water supply system downstream of the device; or

(b) Injects into the water supply system gaseous, liquid or solid additives other than water, to render inactive microbiological, particulate, inorganic, organic or radioactive contaminants.

(286) "Wetland" has the meaning given in s. 23.32 (1), Stats.

(287) "Wetland, constructed" means a man–made design complex of saturated substrates, emergent and submergent vegetation, and water that simulate natural wetlands for human use and benefits.

(288) "Wet vent" means that portion of a vent pipe that receives the discharge from other fixtures.

(288e) "Whirlpool" has the meaning as specified under s. SPS 390.03 (23) (j).

Note: Section SPS 390.03 (23) (j) reads:
"Whirlpool" means a relatively small public swimming pool that uses high temperature water (greater than 93°F) and that may include a water agitation system. A whirlpool may also be referred to as a spa.

Note: A fill and dump bathtub is not a whirlpool.

(288m) "Whirlpool bath tub" means a plumbing appliance consisting of a bathtub fixture that is equipped and fitted with a circulation piping system designed to accept, circulate and discharge bathtub water upon each use.

(289) "Yoke vent" means a vent connected to a drain stack for the purpose of preventing pressure changes in the drain stack.

History: Cr. Register, April, 2000, No. 532, eff. 7–1–00; cr. (7e), (17e), (60e), (67e), (67m), (82m), (90e), (163e), (170e), (199e), (209e), (209m), (252e), (288e) and (288m), am. (18), (20), (79), (80), (189), (203) and (204), r. and recr. (116), Register, December, 2000, No. 540, eff. 1–1–01; CR 01–139: am. (209) Register June 2002 No. 558, eff. 7–1–02; corrections in (152) and (154) made under s. 13.93 (2m) (b) 7., Stats., Register June 2002 No. 558; CR 02–002: am. (7e), (42), (44), (46), (56), (80), (84), (90e), (120), (134), (147), (178), (181), (193), (195), (210), (245), (246), (247), and (276), cr. (7m), (35m), (51m), (56e), (61m), (62m), (65m), (72e), (90m), (108m), (160m), (187e), (212e), (214m), (265e), (273e), and (277e), r. and recr. (249) Register April 2003 No. 568, eff. 5–1–03; CR 02–129: cr (2m) and (168m) Register January 2004 No. 577, eff. 2–1–04; CR 04–035: cr. (59m), (59s), (62s), (70m), (129s), (133s), (136s), (171e), (186s) and (256e), am. (234) and (269) Register November 2004 No. 587, eff. 12–1–04; CR 07–100: cr. (163s) Register September 2008 No. 633, eff. 10–1–08; correction in (288e) made under s. 13.92 (4) (b) 7., Stats., Register September 2008 No. 633; CR 08–055: am. (5), (79), (115), (120), (147), (156), (189), (204), (234), (269) and (288), r. (20), (67e), (67m), (199e), (209e), (209m), (252e) and (258), cr. (80m), (82e), (108s), (203m) and (231m), r. and recr. (80), (151) to (154), (163) and (203) Register February 2009 No. 638, eff. 3–1–09; corrections in (286) and (288e) made under s. 13.92 (4) (b) 7., Stats., and corrections to numbering of (80m), (108s) and (203m) made under s. 13.92 (4) (b) 1., Stats., Register February 2009 No. 638; CR 10–064: r. and recr. (35), am. (116), (166), renum. (160m) to be (160e), cr. (62e), (154m), (160m) Register December 2010 No. 660, eff. 1–1–11; correction in (intro.), (7e), (69), (88), (91), (170), (214), (237), (288e) made under s. 13.92 (4) (b) 6., 7., Stats., Register December 2011 No. 672; CR 11–031: r. (51), renum. (51m) to (51), cr. (209m) Register June 2013 No. 690, eff. 7–1–13; **CR 13–062: renum. (141) to (141) (intro.) and am., cr. (141) (a) to (c) Register February 2014 No. 698, eff. 3–1–14.**

SPS 381.20 Incorporation of standards by reference. (1) CONSENT. (a) Pursuant to s. 227.21 (2), Stats., the attorney general has consented to the incorporation by reference of the standards listed in sub. (3).

(b) The codes and standards that are referenced in this chapter, and any additional codes and standards that are subsequently referenced in those codes and standards, shall apply to the prescribed extent of each such reference, except as modified by this chapter.

Note: Copies of the adopted standards are on file in the offices of the department and the legislative reference bureau. Copies of the standards may be purchased through the respective organizations listed in Tables 381.20–1 to 381.20–13.

(2) ALTERNATE STANDARDS. (a) Alternate standards that are equivalent to or more stringent than the standards referenced in this code may [be] used in lieu of the referenced standards when approved by the department or if written approval is issued by the department in accordance with par. (b).

1. Upon receipt of a fee and a written request, the department may issue an approval for the use of the alternate standard.

2. The department shall review and make a determination on an application for approval within 40 business days of receipt of all forms, fees and documents required to complete the review.

Note: Review fees for standards under this paragraph are listed in ch. SPS 302.

(b) Determination of approval shall be based on an analysis of the alternate standard and the standard referenced in this code, prepared by a qualified independent third party or the organization that published the standard contained in this code.

(c) The department may include specific conditions in issuing an approval, including an expiration date for the approval. Violations of the conditions under which an approval is issued shall constitute a violation of this code.

(d) If the department determines that the alternate standard is not equivalent to or more stringent than the referenced standard, the request for approval shall be denied in writing.

(e) The department may revoke an approval for any false statements or misrepresentations of facts on which the approval was based.

(f) The department may reexamine an approved alternate standard and issue a revised approval at any time.

(3) ADOPTION OF STANDARDS. The standards referenced in Tables 381.20–1 to 381.20–13 are hereby incorporated by reference into this chapter.

Note: The tables in this section provide a comprehensive listing of all of the standards adopted by reference in this code. For requirements or limitations in how these standards are to be applied, refer to the code section that requires compliance with the standard.

(4) DEPARTMENT AUTHORITY. A department interpretation of an adopted standard under this chapter shall supersede any differing interpretation by either a lower level jurisdiction or an issuer of the adopted standard.

Table 381.20–1

AHAM	**Association of Home Appliance Manufacturers 20 North Wacker Drive Chicago, Illinois 60606 Phone: 202–872–5955 Web page: www.aham.org**
Standard Reference Number	**Title**
DW–1–2005	Household Electric Dishwashers

Table 381.20–2

	ANSI	**American National Standards Institute, Inc. 1430 Broadway New York, New York 10018 Phone: 212–642–4900 Web page: www.ansi.org**
	Standard Reference Number	**Title**
1.	Z21.22–99 (R 2004)	Relief Valves for Hot Water Supply Systems
2.	Z21.22a–2000	Relief Valves for Hot Water Supply Systems (Addenda 2000)
3.	Z21.22b–2001	Relief Valves for Hot Water Supply Systems (Addenda 2001)
4.	Z124.1.2–2005	Plastic Bath Tub and Shower Units
5.	Z124.3–2005	Plastic Lavatories
6.	Z124.4–2006	Plastic Water Closet Bowls and Tanks
7.	Z124.6–97	Plastic Sinks
8.	Z124.9–2004	Plastic Urinal Fixtures

Table 381.20–3

ARI	**Air–Conditioning and Refrigeration Institute 1815 North Fort Myer Drive Arlington, Virginia 22209 Phone: 703–524–8800 Web page: www.ari.org**

Standard Reference Number	Title
ARI–1010–2002	Self–Contained Mechanically–Refrigerated Drinking–Water Coolers

Table 381.20–3e

ASME	**American Society of Mechanical Engineers 345 East 47th Street New York, New York 10017 Phone: 800–843–2763 Web page: www.infocentral@asme.org**

	Standard Reference Number	Title
1.	A112.1.2–2004	Air Gaps in Plumbing Systems (For Plumbing Fixtures and Water–Connected Receptors)
1e.	A112.1.3–00	Air–gap Fittings for Use with Plumbing Fixtures, Appliances, and Appurtenances
2.	A112.6.1M–97 (R 2002)	Floor–Affixed Supports for Off–the–Floor Plumbing Fixtures for Public Use
2a.	A112.6.3–2001 (R 2007)	Floor and Trench Drains
3.	A112.14.1–03 (R 2008)	Backwater Valves
4.	A112.18.1–2005	Plumbing Supply Fittings
5.	A112.19.1M–94 (R 2000)	Enameled Cast Iron Plumbing Fixtures
5m.	A112.19.1M–1994	Errata November 1994 to Enameled Cast Iron Plumbing Fixtures
6.	A112.19.1M–1994	Supplement 1–1998 to Enameled Cast Iron Plumbing Fixtures
7.	A112.19.1M–1994	Supplement 2–2000 to Enameled Cast Iron Plumbing Fixtures
8.	A112.19.2–2003	Vitreous China Plumbing Fixtures and Hydraulic Requirements for Water Closets and Urinals
9.	A112.19.3–2000 (R 2004)	Stainless Steel Plumbing Fixtures (Designed for Residential Use)
10.	A112.19.3–2002	Supplement 1–2002 to Stainless Steel Plumbing Fixtures (Designed for Residential Use)
11.	A112.19.4–94 (R 2004)	Porcelain Enameled Formed Steel Plumbing Fixtures
12.	A112.19.5–2005	Trim for Water–Closet Bowls, Tanks, and Urinals
13.	B1.20.1–83 (R 2006)	Pipe Threads, General Purpose (Inch)
14.	B16.1–2005	Gray Iron Pipe Flanges and Flanged Fittings (Classes 25, 125, and 250)
15.	B16.3–1998 (R 2006)	Malleable Iron Threaded Fittings (Classes 150 and 300)
16.	B16.4–2006	Gray Iron Threaded Fittings (Classes 125 and 250)
17.	B16.5–2003	Pipe Flanges and Flanged Fittings NPS 1/2 Through NPS 24 (and addenda)
18.	B16.9–2003	Factory–Made Wrought Buttwelding Fittings
19.	B16.11–2005	Forged Fittings, Socket–Welding and Threaded
20.	B16.12–1998 (R 2006)	Cast Iron Threaded Drainage Fittings
21.	B16.15–85 (R1994)	Cast Bronze Threaded Fittings, Classes 125 and 250
22.	B16.18–2001 (R 2005)	Cast Copper Alloy Solder Joint Pressure Fittings
23.	B16.22–2001 (R 2005)	Wrought Copper and Copper Alloy Solder Joint Pressure Fittings
24.	B16.23–2002 (R 2006)	Cast Copper Alloy Solder Joint Drainage Fittings: DWV
25.	B16.24–2001	Cast Copper Alloy Pipe Flanges and Flanged Fittings: Class 150, 300, 400, 600, 900, 1500 and 2500
26.	B16.26–2006	Cast Copper Alloy Fittings for Flared Copper Tubes
27.	B16.28–94	Wrought Steel Buttwelding Short Radius Elbows and Returns
28.	B16.29–2001	Wrought Copper and Wrought Copper Alloy Solder Joint Drainage Fittings — DWV
29.	B16.42–1998 (R 2006)	Ductile Iron Pipe Flanges and Flanged Fittings (Classes 150 and 300)
30.	B16.45–1998 (R 2006)	Cast Iron Fittings for Sovent® Drainage Systems
31.	B36.19M–2004	Stainless Steel Pipe

Table 381.20–4

ASSE	**American Society of Sanitary Engineering** **P.O. Box 9712** **Bay Village, Ohio 4414** **Phone: 440–835–3040** **Web page: www.asse–plumbing.org**

	Standard Reference Number	**Title**
1.	1001–2002	Atmospheric Type Vacuum Breakers
2.	1002–1999	Anti–siphon Fill Valves (Ballcocks) for Gravity Water Closet Flush Tanks
3.	1003–2001	Water Pressure Reducing Valves
4.	1004–1990	Commercial Dishwashing Machines
5.	1006–1989	Residential Use (Household) Dishwashers
6.	1007–1992	Home Laundry Equipment
7.	1008–2006	Plumbing Aspects of Residential Food Waste Disposer Units
8.	1009–1990	Commercial Food Waste Grinder Units
9.	1010–2004	Water Hammer Arresters
10.	1011–2004	Hose Connection Vacuum Breakers
11.	1012–2002	Backflow Preventer with Intermediate Atmospheric Vent
12.	1013–2005	Reduced Pressure Principle Backflow Preventers and Reduced Pressure Fire Protection Principle Backflow Preventers
13.	1014–2005	Backflow Prevention Devices for Hand–Held Showers
14.	1015–2005	Double Check Backflow Prevention Assemblies and Double Check Fire Protection Backflow Prevention Assemblies
15.	1016–2005	Automatic Compensating Valves for Individual Showers and Tub/Shower Combinations
15m.	1017–2003	Temperature Actuated Mixing Valves for Hot Water Distribution Systems
16.	1018–2001	Trap Seal Primer Valves — Potable Water Supplied
17.	1019–2004	Vacuum Breaker Wall Hydrants, Freeze Resistant Automatic Draining Type
18.	1020–2004	Pressure Vacuum Breaker Assembly
18m.	1021–2001	Drain Air Gaps for Domestic Dishwasher Applications
19.	1022–2003	Backflow Preventer for Beverage Dispensing Equipment
20.	1023–1979	Hot Water Dispensers, Household Storage Type, Electrical
20m.	1035–2002	Laboratory Faucet Backflow Preventers
21.	1037–1990	Pressurized Flushing Devices (Flushometers) for Plumbing Fixtures
22.	1047–2005	Reduced Pressure Detector Fire Protection Backflow Prevention Assemblies
23.	1048–2005	Double Check Detector Fire Protection Backflow Prevention Assemblies
24.	1052–2004	Hose Connection Backflow Preventers
24e.	1053–2005	Dual Check Backflow Preventer Wall Hydrant Freeze Resistant Type
25.	1055–2009	Chemical Dispensing Systems
26.	1056–2001	Spill Resistant Vacuum Breakers
26e.	1066–1997	Individual Pressure Balancing In–Line Valves for Individual Fixture Fittings
27.	5013–2009[a]	Minimum Performance Requirements for Testing Reduced Pressure Principle Backflow Preventers (RP) and Reduced Pressure Principle Fire Protection Backflow Preventers (RPF)
28.	5015–2009[a]	Minimum Performance Requirements for Testing Double Check Backflow Prevention Assemblies (DC) and Double Check Fire Protection Backflow Prevention Assemblies (DCF)
29.	5020–2009[a]	Minimum Performance Requirements for Testing a Pressure Vacuum Breaker Assembly
30.	5047–2009[a]	Minimum Performance Requirements for Testing Reduced Pressure Detector Fire Protection Backflow Prevention Assemblies (RPDF)
31.	5048–2009[a]	Minimum Performance Requirements for Testing Double Check Detector Fire Protection Backflow Prevention Assemblies (DCDF)
32.	5056–2009[a]	Minimum Performance Requirements for Testing Spill Resistant Vacuum Breaker

[a] Standard is contained in the ASSE 5000 Series of standards.

Table 381.20–5

	ASTM	**ASTM International 100 Barr Harbor Drive West Conshohocken, Pennsylvania 19428–2959 Phone: (610) 832–9585 Web page: www:astm.org**
	Standard Reference Number	**Title**
1.	A53–02	Pipe, Steel, Black and Hot–Dipped, Zinc–Coated Welded and Seamless, Specification for
2.	A74–06	Cast Iron Soil Pipe and Fittings, Specification for
3.	A123/A123M–02	Zinc (Hot–Galvanized) Coatings on Products, Specification for
4.	A270–03a	Seamless and Welded Austenitic Stainless Steel Sanitary Tubing, Specification for
5.	A403/A403M–07	Wrought Austenitic Stainless Steel Piping Fittings, Specification for
6.	A450/A450M–04a	Carbon, Ferritic Alloy, and Austenitic Alloy Steel Tubes
7.	A888–07a	Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Pipe Applications, Specifications for
8.	B32–04	Solder Metal
9.	B42–02^{E1}	Pipe, Seamless Copper, Standard Sizes
10.	B43–98	Seamless Red Brass Pipe, Standard Sizes, Specification for
11.	B88–03	Seamless Copper Water Tube, Specification for
11m.	B88M–05	Seamless Copper Water Tube, (Metric) Specification for
12.	B152/B152M–06a	Copper Sheet, Strip, Plate, and Rolled Bar, Specification for
13.	B251/B251M–02^{E1}	Tube, Wrought Seamless Copper and Copper
14.	B302–02	Threadless Copper Pipe, Specification for
15.	B306–02	Copper Drainage Tube (DWV), Standard Specifications for
15m.	B828–02	Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings, Practice for
16.	C14–07	Nonreinforced Concrete Sewer, Storm Drain, and Culvert Pipe, Specification for
17.	C14M–07	Nonreinforced Concrete Sewer, Storm Drain, and Culvert Pipe, (Metric) Specification for
18.	C33–03	Concrete Aggregates, Specification for
19.	C76–07	Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe, Specification for
20.	C76M–07	Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe, (Metric) Specifications for
21.	C425–04	Compression Joints for Vitrified Clay Pipe and Fittings, Specification for
22.	C443–07	Specification for Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets
22e.	C443M–07	Specification for Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets (Metric)
22m.	C507/C507M–07	Reinforced Concrete Elliptical Culvert, Storm Drain and Sewer, (Metric) Specifications for
23.	C564–03a	Rubber Gaskets for Cast Iron Soil Pipe and Fittings, Specification for
24.	C700–07	Vitrified Clay Pipe, Extra Strength, Standard Strength, and Perforated, Specification for
24e.	C877/C877M–02^{E}	External Sealing Bands for Concrete Pipe, Manholes and Precast Box Sections, (Metric) Standard Specifications for
24h.	C923–07	Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes, and Laterals, Specification for
24m.	C990/C990M–06	Joints for Concrete Pipe, Manholes, Precast Box Sections Using Preformed Flexible Joint Sealants, Specifications for
24s.	C1306–05a	Hydrostatic Pressure Resistance of a Liquid–Applied Waterproofing Membrane, Standard Test Method for
25.	D1527–99 (R 2005)	Acrylonitrile–Butadiene–Styrene (ABS), Schedules 40 and 80
26.	D1785–06	Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80 and 120, Specification for
27.	D2104–03	Standard Specifications for Polyethylene (PE) Plastic Pipe, Schedule 40

Table 381.20–5 (Continued)

	ASTM	**ASTM International 100 Barr Harbor Drive West Conshohocken, Pennsylvania 19428–2959 Phone: (610) 832–9585 Web page: www:astm.org**
	Standard Reference Number	**Title**
28.	D2235–04	Standard Specifications for Solvent Cement for Acrylonitrile–Butadiene–Styrene (ABS) Plastic Pipe and Fittings
29.	D2239–03	Polyethylene (PE) Plastic Pipe (SIDR–PR) Based on Controlled Inside Diameter, Specification for
30.	D2241–05	Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe (SDR–Series)
31.	D2282–99 (R 2005)	Acrylonitrile–Butadiene–Styrene (ABS) Plastic Pipe (SDR–PR), Specification for
32.	D2321–05	Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity–Flow Applications, Practice for
33.	D2447–03	Polyethylene (PE) Plastic Pipe, Schedules 40 and 80, Based on Outside Diameter, Specification for
34.	D2464–06	Threaded Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80, Specification for
35.	D2466–06	Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40, Specification for
36.	D2467–06	Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80, Specification for
37.	D2468–96a	Acrylonitrile–Butadiene–Styrene (ABS), Plastic Pipe Fittings, Schedule 40, Specification for
38.	D2564–04^{E1}	Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Systems, Specification for
39.	D2609–02	Plastic Insert Fittings for Polyethylene (PE) Plastic Pipe, Specification for
40.	D2657–07	Heat Fusion Joining of Polyolefin Pipe and Fittings, Standard Practice of
41.	D2661–06	Acrylonitrile–Butadiene–Styrene (ABS) Schedule 40 Plastic Drain, Waste, and Vent Pipe and Fittings, Specification for
43.	D2665–07	Poly (Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings, Specification for
46.	D2680–01	Acrylonitrile–Butadiene–Styrene (ABS) and Poly (Vinyl Chloride) (PVC) Composite Sewer Piping, Specification for
47.	D2683–04	Socket–Type Polyethylene Fittings for Outside Diameter–Controlled Polyethylene Pipe and Tubing, Specification for
48.	D2729–03	Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings, Specification for
49.	D2737–03	Polyethylene (PE) Plastic Tubing, Specification for
50.	D2751–05	Acrylonitrile–Butadiene–Styrene (ABS) Sewer Pipe and Fittings, Specification for
51.	D2774–04^{E1}	Underground Installation of Thermoplastic Pressure Piping, Standard Practice for
52.	D2846/D2846M–06	Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Hot– and Cold–Water Distribution Systems, Specification for
53.	D2852–95	Styrene–Rubber (SR) Plastic Drain Pipe and Fittings, Specification for
54.	D2855–96	Making Solvent–Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings, Practice for
55.	D3034–06	Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings, Specification for
56.	D3035–06	Polyethylene (PE) Plastic Pipe (SDR–PR) Based on Controlled Outside Diameter, Specification for
57.	D3138–04	Solvent Cements for Transition Joints Between Acrylonitrile–Butadiene–Styrene (ABS) and Poly(Vinyl Chloride) (PVC) Non–Pressure Piping Components, Specifications for
59.	D3140–90	Flaring Polyolefin Pipe and Tubing, Practice for
60.	D3212–96a (R 2003)	Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals, Specification for
61.	D3261–03	Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing, Specification for
62.	D3311–06a	Drain, Waste, and Vent (DWV) Plastic Fittings Patterns, Specification for
63.	D4068–01	Chlorinated Polyethylene (CPE) Sheeting for Concealed Water–Containment Membrane, Standard Test Method for

Table 381.20–5 (Continued)

	ASTM	ASTM International 100 Barr Harbor Drive West Conshohocken, Pennsylvania 19428–2959 Phone: (610) 832–9585 Web page: www:astm.org
	Standard Reference Number	**Title**
64.	D4491–99a (R 2004)	Water Permeability of Geotextile by Permittivity, Standard Test Method for
65.	D4533–04	Trapezoid Tearing Strength of Geotextiles, Standard Test Method for
66.	D4632–91 (R 2003)	Grab Breaking Load and Elongation of Geotextiles, Standard Test Method for
67.	D4751–04	Determining the Apparent Opening Size of a Geotextile, Standard Test Method for
68.	D4833–00^{E1}	Index Puncture Resistance of Geotextile, Geomembranes, and Related Products, Standard Test Methods for
69.	F402–05	Safe Handling of Solvent Cements, Primers and Cleaners Used for Joining Thermoplastic Pipe and Fittings, Practice for
70.	F405–05	Corrugated Polyethylene (PE) Tubing and Fittings, Specification for
71.	F409–02	Thermoplastic Accessible and Replaceable Plastic Tube and Tubular Fittings, Specification for
72.	F437–06	Threaded Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80, Specification for
73.	F438–04	Socket–Type Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 40, Specification for
74.	F439–06	Socket–Type Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80, Specification for
75.	F441/F441M–02	Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe, Schedules 40 and 80, Specification for
76.	F442/F442M–99 (R 2005)	Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe (SDR–PR), Specification for
77.	F477–07	Elastomeric Seals (Gaskets) for Joining Plastic Pipe, Specification for
78.	F492–95	Propylene and Polypropylene (PP) Plastic–Lined Ferrous Metal Pipe Fittings
79.	F493–04	Solvent Cements for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe and Fittings, Specification for
80.	F628–06^{E1}	Acrylonitrile–Butadiene–Styrene (ABS) Schedule 40 Plastic Drain, Waste, and Vent Pipe with a Cellular Core, Specification for
81.	F656–02	Primers for Use in Solvent Cement Joints of Poly (Vinyl Chloride) (PVC) Plastic Pipe and Fittings, Specification for
81e.	F679–06a	Poly (Vinyl Chloride) (PVC) Large–Diameter Plastic Gravity Sewer Pipe and Fittings
81m.	F789–95a	Type PS–46 Poly (Vinyl Chloride) (PVC) Plastic Gravity Flow Sewer Pipe and Fittings
81s.	F794–03	Poly (Vinyl Chloride) (PVC) Profile Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter
82.	F810–07	Smoothwall Polyethylene (PE) Pipe for Use in Drainage and Waste Disposal Absorption Fields, Specification for
84.	F876–06	Crosslinked Polyethylene (PEX) Tubing, Specification for
85.	F877–07	Crosslinked Polyethylene (PEX) Plastic Hot– and Cold–Water Distribution Systems, Specification for
86.	F891–04	Coextruded Poly (Vinyl Chloride) (PVC) Plastic Pipe With a Cellular Core, Specification for
87.	F949–06a	Poly (Vinyl Chloride) (PVC) Corrugated Sewer Pipe With a Smooth Interior and Fittings
88.	F1281–07	Crosslinked Polyethylene/Aluminum/Crosslinked Polyethylene (PEX–AL–PEX) Pressure Pipe
89.	F1282–06	Polyethylene/Aluminum/Polyethylene (PE–AL–PE) Composite Pressure Pipe
90.	F1336–07	Poly (Vinyl Chloride) (PVC) Gasketed Sewer Fittings
91.	F1807–07	Metal Insert Fittings Utilizing a Copper Crimp Ring for SDR9 Cross–linked Polyethylene (PEX) Tubing
92.	F1866–07	Poly (Vinyl Chloride) (PVC) Plastic Schedule 40 Drainage and DWV Fabricated Fittings, Specifications for

Table 381.20–6

AWS	**American Welding Society 550 N.W. LeJune Road Miami, Florida 33126 Phone: 800–443–9353 Web page: www.aws.org/w/a**

Standard Reference Number	Title
AWS.A5.8M 2004	Filler Metals for Brazing and Braze Welding, Specification for

Table 381.20–7

AWWA	**American Water Works Association Data Processing Department 6666 West Quincy Avenue Denver, Colorado 80235 Phone: 303–794–7711 Web page: www.awwa.org**

	Standard Reference Number	Title
1.	C110–03	American National Standard for Ductile–Iron and Gray–Iron Fittings for Water
2.	C111–07	American National Standard for Rubber–Gasket Joints for Ductile–Iron Pressure Pipe and Fittings
3.	C115–05	American National Standard for Flanged Ductile–Iron Pipe with Ductile–Type Iron or Gray–Iron Pipe Threaded Flanges
4.	C151–02	Ductile–Iron Pipe, Centrifugally Cast, for Water
5.	C153–06	American National Standard for Ductile–Iron Compact Fittings, 3 in. through 16 in., for Water and Other Liquids
5c.	C220–2007	Stainless–Steel Pipe, ½ in. (13mm) and Larger
5e.	C651–05	Water Mains, Disinfecting
6.	C700–02	Cold–Water Meters — Displacement Type with Bronze Main Case (w/ 1991 Addendum)
7.	C701–07	Cold–Water Meters — Turbine Type for Customer Service
8.	C702–01	Cold–Water Meters — Compound Type
9.	C704–02	Cold–Water Meters — Propeller Type for Main Line Applications
10.	C706–96 (R 05)	Cold–Water Meters, Direct–Reading, Remote–Registration Systems for
11.	C707–05	Cold–Water Meters, Encoder–Type, Remote–Registration Systems for
12.	C708–05	Cold–Water Meters — Multi–Jet Type
13.	C710–02	Cold–Water Meters, Displacement Type — Plastic Main
14.	C900–07	Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings 4–inch to 12–inch (100mm Through 300mm) for Water Transmission and Distribution
15.	C901–02	Polyethylene (PE) Pressure Pipe and Tubing, $^1/_2$ in. (13mm) Through 3 in. (76mm) for Water Service
16.	C906–07	Polyethylene Pressure Pipe and Fittings, 4 in. through 63 in., for Water Distribution

Table 381.20–7e

	CAN/CSA	**Canadian Standards Association** **178 Rexdale Boulevard** **Rexdale (Toronto), Ontario, Canada** **M9W 1R3** **Phone: 800–463–6727** **Web page: www.csa.ca**
	Standard Reference Number	**Title**
1.	B64.1.1–07	Atmospheric Vacuum Breakers
2.	B64.1.2–07	Pressure Vacuum Breakers
3.	B64.1.3–07	Spill Resistant Vacuum Breakers
4.	B64.2–07	Hose Connection Vacuum Breakers
5.	B64.2.2–07	Hose Connection Vacuum Breakers with Automatic Draining Feature
6.	B64.3–07	Dual Check Valve Backflow Preventers with Atmospheric Port
7.	B64.3.1–07	Dual Check Valve Backflow Preventers with Atmospheric Port for Carbonators
8.	B64.4–07	Reduced Pressure Principle Backflow Preventers
9.	B64.4.1–07	Reduced Pressure Principle Backflow Preventers for Fire Protection Systems
10.	B64.5–07	Double Check Valve Backflow Preventers
11.	B64.5.1–07	Double Check Valve Backflow Preventers for Fire Protection Systems
12.	B64.7–07	Laboratory Faucet Vacuum Breakers
13.	CSA B125.1–05	Plumbing Supply Fittings
14.	B125.3–05	Plumbing Fittings
14e.	B125.3–05	Plumbing Fittings – Update No. 1 November 2006
14m.	B125.3–05	Plumbing Fittings – Update No. 2 November 2007
15.	B137.9–98	Polyethylene / Aluminum / Polyethylene Composite Pressure Pipe Systems
16.	B137.10–98	Crosslinked Polyethylene /Aluminum / Crosslinked Polyethylene Composite Pressure Pipe Systems
17.	B181.1–06	Acrylonitrile–butadiene–styrene (ABS) drain, waste, and vent pipe and pipe fittings
18.	B181.2–06	Polyvinylchloride (PVC) and chlorinated polyvinylchloride (CPVC) drain, waste, and vent pipe and pipe fittings

Table 381.20–8

	CISPI	**Cast Iron Soil Pipe Institute** **5959 Shallowford Road, Suite 419** **Chattanooga, Tennessee 37421** **Phone: 423–892–0137** **Web page: www.cispi.org**
	Standard Reference Number	**Title**
1.	301–05	Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications, Standard Specification for
2.	310–04	Coupling for Use in Connection with Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications, Specification for

Table 381.20–9

	FMRC	**Factory Mutual Research Corp.** **1151 Boston–Providence Turnpike** **Norwood, Massachusetts 02062** **Phone: 800–320–6808** **Web page: www.fmglobal.com**
	Standard Reference Number	**Title**
1680		Couplings used in Hubless Cast Iron Systems for Drain, Waste or Vent, Sewer, Rainwater or Storm Drain Systems Above and Below Ground, Industrial/Commercial and Residential, January 1989

Table 381.20–10

	NFPA	**National Fire Protection Association 11 Tracy Drive Avon, MA 02322–9908 Phone: 617–770–3000 Web page: www.nfpa.org**
	Standard Reference Number	**Title**
1.	NFPA 13D–2007	Installation of Sprinkler Systems in One– and Two–Family Dwellings and Manufactured Homes, Standard for the
2.	NFPA 24–2007	Installation of Private Fire Service Mains and Their Appurtenances, Standard for the

Table 381.20–11

	NSF	**NSF *International* 789 Dixboro Road P.O. Box 130140 Ann Arbor, Michigan 48113–0140 Phone: (800) 673–6275 Web page: www.nsf.org**
	Standard Reference Number	**Title**
1.	Standard 14–2007	Plastic Piping System Components and Related Materials
2.	Standard 40–2005	Residential Wastewater Treatment Systems
3.	Standard 41–2005	Non–liquid Saturated Treatment Systems
3m.	Standard 41–2005 Addendum 1	Non–liquid Saturated Treatment Systems
4.	Standard 44–2004	Residential Cation Exchange Water Softeners
5.	Standard 51–2007	Food Equipment Materials
6.	Standard 61–2012	Drinking Water System Components — Health Effects
7.	Standard 372–2011	Drinking Water System Components — Lead Content

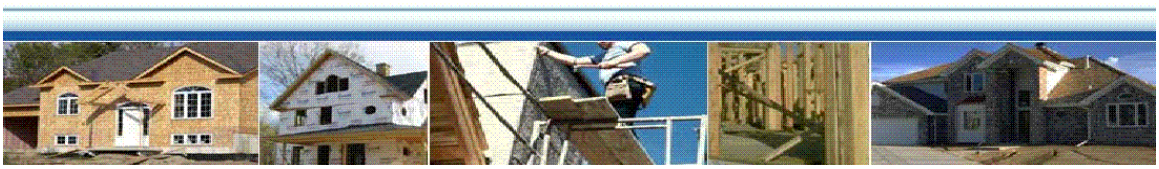
Table 381.20–12

	STI	**Steel Tank Institute 570 Oakwood Road Lake Zurich, Illinois 60047 Phone: 617–770–3000 Web page: www.steeltank.com**
	Standard Reference Number	**Title**
STI–P_3		External Corrosion Protection of Underground Steel Storage Tanks, Specifications and Manual for, 1996 edition

Table 381.20–13

	UL	**Underwriters Laboratories Inc. 333 Pfingsten Road Northbrook, Illinois 60062 Phone: 847–272–8800 Web page: www.ul.com**
	Standard Reference Number	**Title**
1.	Standard 58–1996	Steel Underground Tanks for Flammable and Combustible Liquids — Ninth Edition
2.	Standard 1746–2007	External Corrosion Protection Systems for Steel Underground Storage Tanks — Third Edition

History: Cr. Register, April, 2000, No. 532, eff. 7–1–00; r. (2), renum. (3) to be (2) and am., r. and recr. Table 81.20–2, cr. Tables 81.20–3e, 81.20–7e and 81.20–10m, am. Tables 81.20–4 to 81.20–8 and 81.20–11, r. Table 81.20–14, Register, December, 2000, No. 540, eff. 1–1–01; correction in (1) made under s. 13.93 (2m) (b) 7., Stats., Register, December, 2000, No. 540; CR 02–002: r. and recr. Register April 2003 No. 568, eff. 5–1–03; CR 02–129: am Table 81.20–8 Register January 2004 No. 577, eff. 2–1–04; CR 04–035: am. Table 81.20–4 and 81.20–10m Register November 2004 No. 587, eff. 12–1–04; CR 07–100: cr. (4) Register September 2008 No. 633, eff. 10–1–08; CR 08–055: am. (1), Tables 81.20–1 to 81.20–9 and Tables 81.20–11 to 81.20–13, r. Table 81.20–10, renum. Table 81.20–10m to be Table 81.20–10 and am. Register February 2009 No. 638, eff. 3–1–09; CR 10–064: am. Tables 81.20–2, 81.20–3e, 81.20–4, 81.20–7 Register December 2010 No. 660, eff 1–1–11; correction in (3) made under s. 13.92 (4) (b) 7., Stats., Register December 2011 No. 672; **CR 13–062: am. Table 381.20–11 Register February 2014 No. 698, eff. 3–1–14.**



Kevin Wunderlin LLC
P.O. Box 268
Platteville, WI 53818-0268
(608) 348-6688

OSHA Awareness Training – Lead In Construction

 This handout is intended for use as a reference guide to our OSHA Awareness Series.
Contact Kevin Wunderlin LLC – 608-348-6688 – if you have questions or comments.

Health Hazards of Lead Exposure

Pure lead (Pb) is a heavy metal at room temperature and pressure. A basic chemical element, it can combine with various other substances to form numerous lead compounds.

Lead has been poisoning workers for thousands of years. Lead can damage the central nervous system, cardiovascular system, reproductive system, hematological system, and kidneys. When absorbed into the body in high enough doses, lead can be toxic. In addition, workers' lead exposure can harm their children's development.

Short-term (acute) overexposure–as short as days--can cause acute encephalopathy, a condition affecting the brain that develops quickly into seizures, coma, and death from cardio respiratory arrest. Short-term occupational exposures of this type are highly unusual but not impossible.

Extended, long-term (chronic) overexposure can result in severe damage to the central nervous system, particularly the brain. It can also damage the blood-forming, urinary, and reproductive systems.

There is no sharp dividing line between rapidly developing acute effects of lead and chronic effects that take longer to develop.

SYMPTOMS OF CHRONIC OVEREXPOSURE

Some of the common symptoms include:

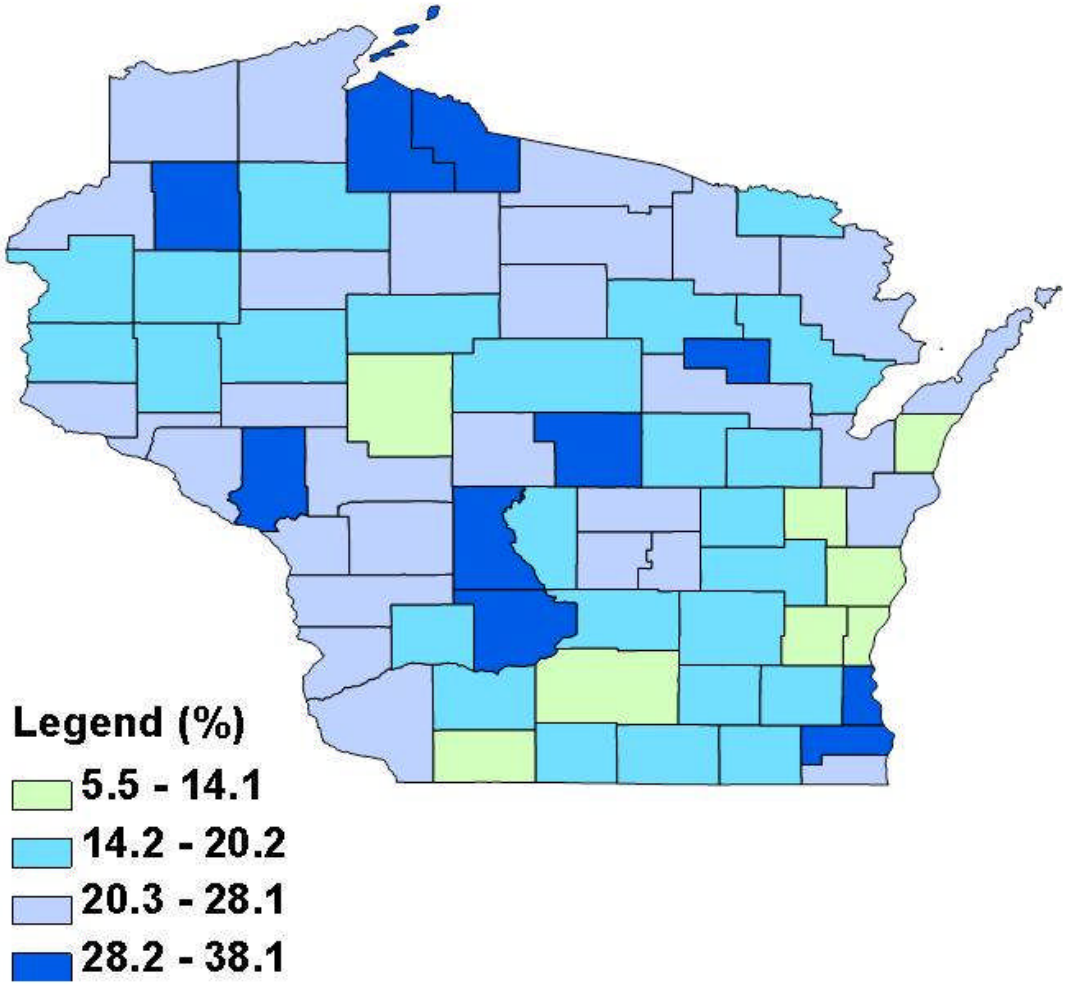
- Loss of appetite;
- Constipation;
- Nausea;
- Excessive tiredness;
- Headache;
- Fine tremors;
- Colic with severe abdominal pain;
- Metallic taste in the mouth;
- Weakness;
- Nervous irritability;
- Hyperactivity;
- Muscle and joint pain or soreness;
- Anxiety;
- Pallor;
- Insomnia;
- Numbness; and
- Dizziness.

REPRODUCTIVE RISKS

Lead is toxic to both male and female reproductive systems. Lead can alter the structure of sperm cells and there is evidence of miscarriage and stillbirth in women exposed to lead or whose partners have been exposed. Children born to parents who were exposed to excess lead levels are more likely to have birth defects, mental retardation, or behavioral disorders or to die during the first year of childhood. Workers who desire medical advice about reproductive issues related to lead should contact qualified medical personnel to arrange for a job evaluation and medical followup--particularly if they are pregnant or actively seeking to have a child. Employers whose employees may be exposed to lead and who have been contacted by employees with concerns about reproductive issues must make medical examinations and consultations available.

Healthy Homes and Lead Poisoning Prevention

Percent of Children Tested* by County
Wisconsin, 2008



*Percent of children tested: The number of children less than 72 months of age tested for blood lead divided by the total number of children less than 72 months of age based on 2000 U.S. Census data, multiplied by 100.

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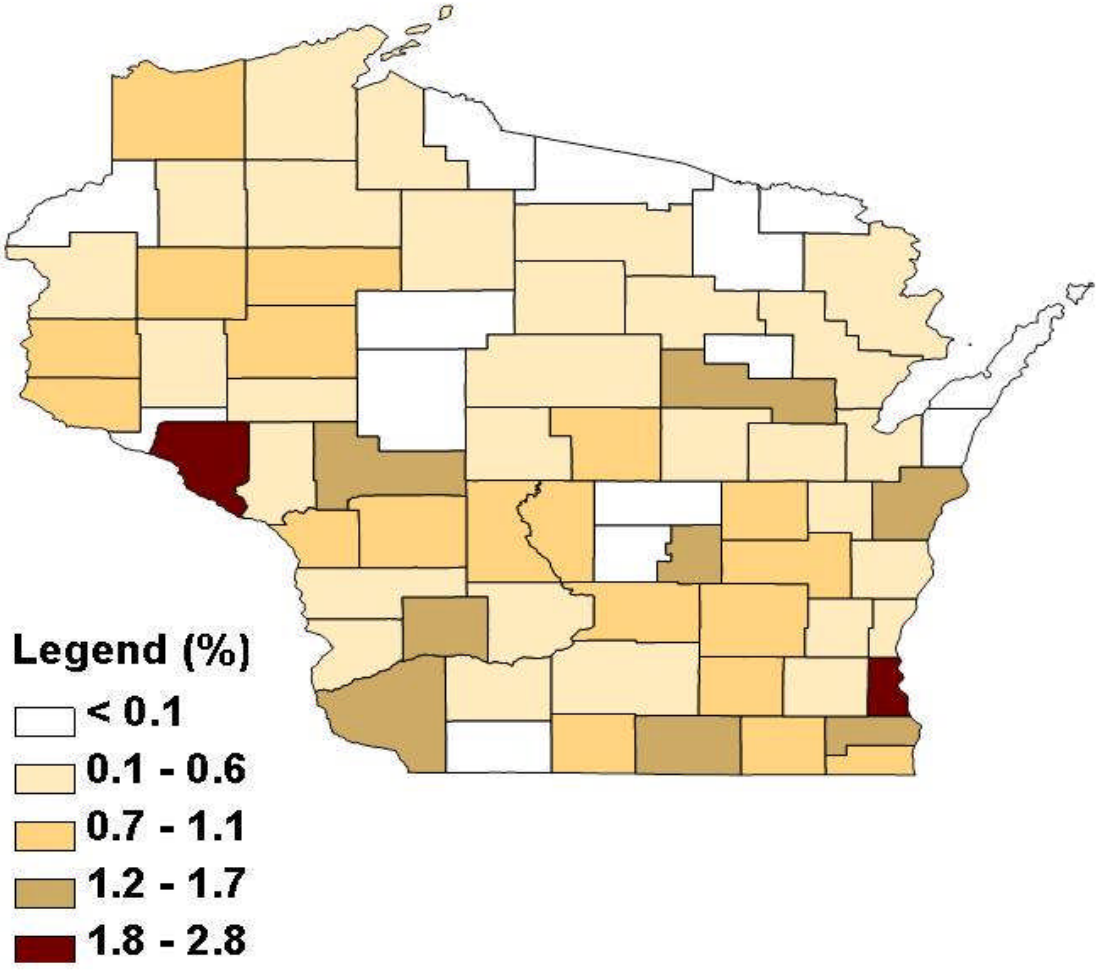
Healthy Homes and Lead Poisoning Prevention

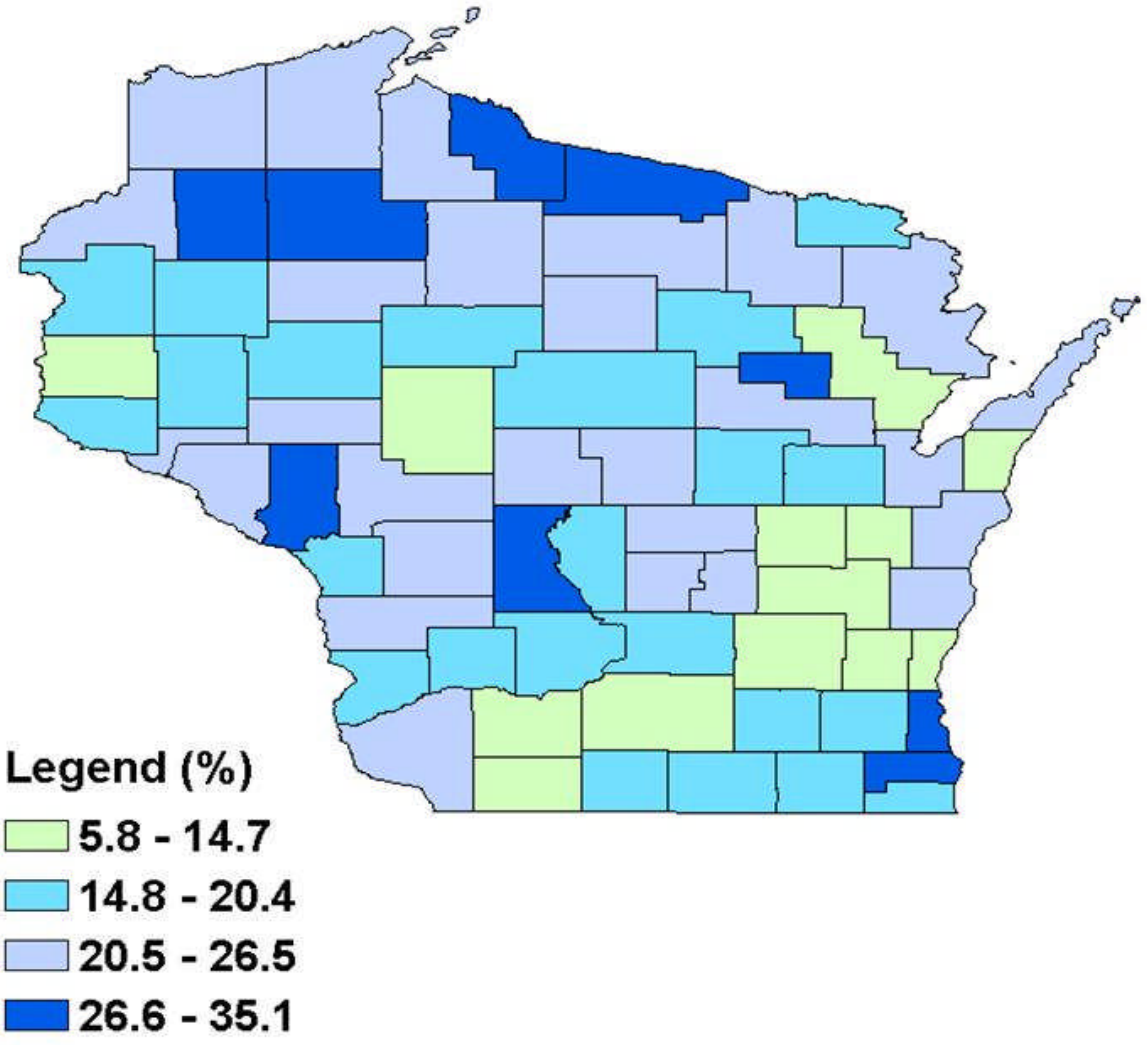
Percent of Children with Elevated Blood Lead Levels* by County Wisconsin, 2008



*Percent of children with elevated blood lead levels: The number of children less than 72 months of age with a confirmed elevated blood lead level ≥10 µg/dL divided by the number of children less than 72 months of age tested for blood lead, multiplied by 100.

Healthy Homes and Lead Poisoning Prevention

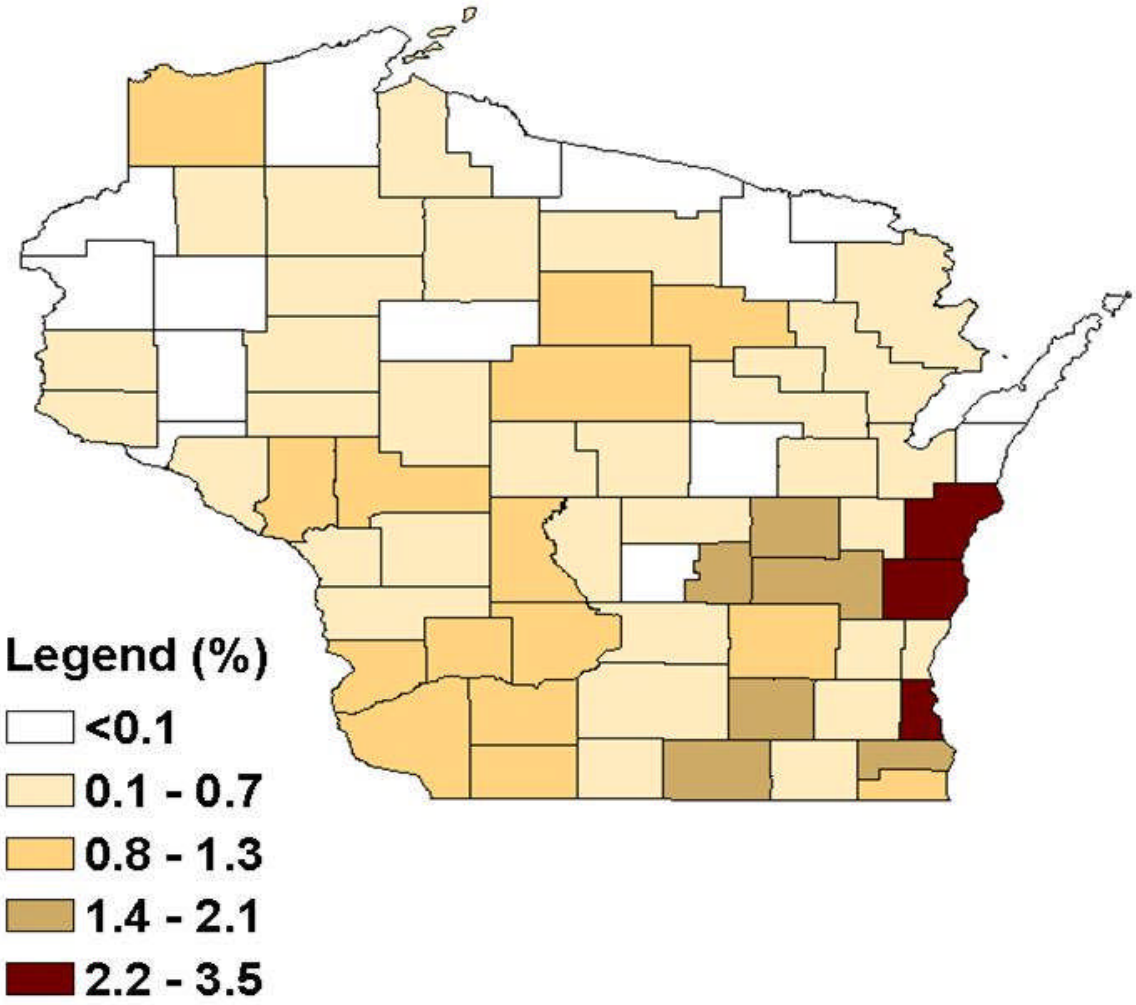
Percent of Children Tested* by County Wisconsin, 2007



*Percent of children tested: The number of children less than 72 months of age tested for blood lead divided by the total number of children less than 72 months of age based on 2000 U.S. Census data, multiplied by 100.

Healthy Homes and Lead Poisoning Prevention

Percent of Children with Elevated Blood Lead Levels* by County Wisconsin, 2007



*Percent of children with elevated blood lead levels: The number of children less than 72 months of age with a confirmed elevated blood lead level ≥10 µg/dL divided by the number of children less than 72 months of age tested for blood lead, multiplied by 100.

CHELATING AGENTS

Under certain limited circumstances, a physician may prescribe special drugs called chelating agents to reduce the amount of lead absorbed in body tissues. Using chelation as a preventive measure--that is, to lower blood level but continue to expose a worker--is prohibited and therapeutic or diagnostic chelations of lead that are required must be done under the supervision of a licensed physician in a clinical setting, with thorough and appropriate medical monitoring. The employee must be notified in writing before treatment of potential consequences and allowed to obtain a second opinion.

Worker Exposure

Lead is most commonly absorbed into the body by inhalation. When workers breathe in lead as a dust, fume, or mist, their lungs and upper respiratory tract absorb it into the body. They can also absorb lead through the digestive system if it enters the mouth and is ingested.

A significant portion of the lead inhaled or ingested gets into the bloodstream. Once in the bloodstream, lead circulates through the body and is stored in various organs and body tissues. Some of this lead is filtered out of the body quickly and excreted, but some remains in the blood and tissues. As exposure continues, the amount stored will increase if the body absorbs more lead than it excretes.

The lead stored in the tissue can slowly cause irreversible damage, first to individual cells, then to organs and whole body systems.

Construction Workers and Lead Exposure

HOW LEAD IS USED

In construction, lead is used frequently for roofs, cornices, tank linings, and electrical conduits. In plumbing, soft solder, used chiefly for soldering tinplate and copper pipe joints, is an alloy of lead and tin. Soft solder has been banned for many uses in the United States. In addition, the Consumer Product Safety Commission bans the use of lead-based paint in residences.

Because lead-based paint inhibits the rusting and corrosion of iron and steel, however, lead continues to be used on bridges, railways, ships, lighthouses, and other steel structures, although substitute coatings are available.

Construction projects vary in their scope and potential for exposing workers to lead and other hazards. Projects such as removing paint from a few interior residential doors may involve limited exposure. Others projects, however, may involve removing or stripping substantial quantities of lead-based paints on large bridges and other structures.

How widespread is Lead based paint in housing?

1. 87% of homes built before 1940 have lead based paint components.
2. 69% of homes built during 1940 to 1959 have lead based paint components.
3. 24% of homes built during 1960 to 1978 have lead based paint components.

MOST VULNERABLE WORKERS

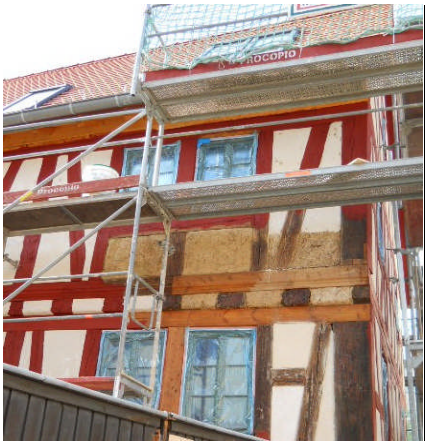
Workers potentially at risk for lead exposure include those involved in iron work; demolition work; painting; lead-based paint abatement; plumbing; heating and air conditioning maintenance and repair; electrical work; and carpentry, renovation, and remodeling work. Plumbers, welders, and painters are among those workers most exposed to lead. Significant lead exposures also can arise from removing paint from surfaces previously coated with lead-based paint such as bridges, residences being renovated, and structures being demolished or salvaged. With the increase in highway work, bridge repair, residential lead abatement, and residential remodeling, the potential for exposure to lead-based paint has become more common.

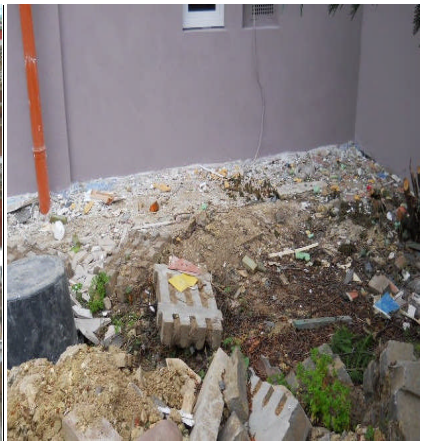
Workers at the highest risk of lead exposure are those involved in:

■ Abrasive blasting and
■ Welding, cutting, and burning on steel structures.

Other operations with the potential to expose workers to lead include:

■ Lead burning;
■ Using lead-containing mortar;
■ Power tool cleaning without dust collection systems;
■ Rivet busting;
■ Cleanup activities where dry expendable abrasives are used;
■ Movement and removal of abrasive blasting enclosures;
■ Manual dry scraping and sanding;
■ Manual demolition of structures;
■ Heat-gun applications;
■ Power tool cleaning with dust collection systems; and
■ Spray painting with lead-based paint.





Remember:

- A tiny amount of lead can be extremely harmful.
- Leaded-dust particles are often so small that you cannot see them, yet you can breathe or swallow them.
- Adults can swallow or breathe dust during work activities.

OSHA's Lead Standard

OSHA's Lead Standard for the Construction Industry, Title 29 Code of Federal Regulations 1926.62, covers lead in a variety of forms, including metallic lead, all inorganic lead compounds, and organic lead soaps.

EXPOSURE LIMITS

The standard establishes maximum limits of exposure to lead for all workers covered, including a permissible exposure limit (PEL) and action level (AL).

The PEL sets the maximum worker exposure to lead: 50 micrograms of lead per cubic meter of air (50µg/m3) averaged over an eight-hour period. If employees are exposed to lead for more than eight hours in a workday, their allowable exposure as a TWA for that day must be reduced according to this formula:

Employee exposure (in µg/m3) = 400 divided by the hours worked in the day.

The AL, regardless of respirator use, is an airborne concentration of 30µg/m3, averaged over an eight-hour period. The AL is the level at which an employer must begin specific compliance activities outlined in the standard.

APPLICABILITY TO CONSTRUCTION

OSHA's lead in construction standard applies to all construction work where an employee may be exposed to lead. All work related to construction, alteration, or repair, including painting and decorating, is included. Under this standard, construction includes, but is not limited to:

■ Demolition or salvage of structures where lead or materials containing lead are present;
■ Removal or encapsulation of materials containing lead;
■ New construction, alteration, repair, or renovation of structures, substrates, or portions or materials containing lead;
■ Installation of products containing lead;
■ Lead contamination from emergency cleanup;
■ Transportation, disposal, storage, or containment of lead or materials containing lead where construction activities are performed; and
■ Maintenance operations associated with these construction activities.

Remember!

The EPA and the Wisconsin Dept. of Health Services have specific definitions of Lead based paint as well.

Federal definition:
• 1 mg/cm2 of lead
• 0.5% lead by weight, **5,000 ppm**

Wisconsin definition:
• 0.7 mg/cm2 of lead
• 0.06% lead by weight, or **600 ppm**

Employer Responsibilities
WORKER PROTECTIONS

Employers of construction workers are responsible for developing and implementing a worker protection program. At a minimum, the employer's worker protection program for employees exposed to lead above the PEL should include:

- Hazard determination, including exposure assessment;
- Medical surveillance and provisions for medical removal;
- Job-specific compliance programs;
- Engineering and work practice controls;
- Respiratory protection;
- Protective clothing and equipment;
- Housekeeping;
- Hygiene facilities and practices;
- Signs;
- Employee information and training; and
- Recordkeeping.

Because lead is a cumulative and persistent toxic substance and health effects may result from exposure over prolonged periods, employers must use these precautions where feasible to minimize employee exposure to lead.

The employer should, as needed, consult a qualified safety and health professional to develop and implement an effective, site specific worker protection program. These professionals may work independently or may be associated with an insurance carrier, trade organization, or onsite consultation program.

What is missing here? Anyone see any worker protection? How about acceptable Lead –Safe or Abatement work practices?

ELEMENTS OF A COMPLIANCE PROGRAM

For each job where employee exposure exceeds the PEL, the employer must establish and implement a written compliance program to reduce employee exposure to the PEL or below. The compliance program must provide for frequent and regular inspections of job sites, materials, and equipment by a competent person.

Written programs, which must be reviewed and updated at least every six months, must include:

■ A description of each activity in which lead is emitted (such as equipment used, material involved, controls in place, crew size, employee job responsibilities, operating procedures, and maintenance practices);

■ The means to be used to achieve compliance and engineering plans and studies used to determine the engineering controls selected where they are required;

■ Information on the technology considered to meet the PEL;

■ Air monitoring data that document the source of lead emissions;

■ A detailed schedule for implementing the program, including copies of documentation (such as purchase orders for equipment, construction contracts);

■ A work practice program;

■ An administrative control schedule, if applicable; and

■ Arrangements made among contractors on multi-contractor sites to inform employees of potential lead exposure.

Can you use the same work practice program for the two examples below? Why or why not?

Hazard Assessment

An employer is required to conduct an initial employee exposure assessment of whether employees are exposed to lead at or above the AL based on:

■ Any information, observation, or calculation that indicates employee exposure to lead;

■ Any previous measurements of airborne lead; and

■ Any employee complaints of symptoms attributable to lead exposure.

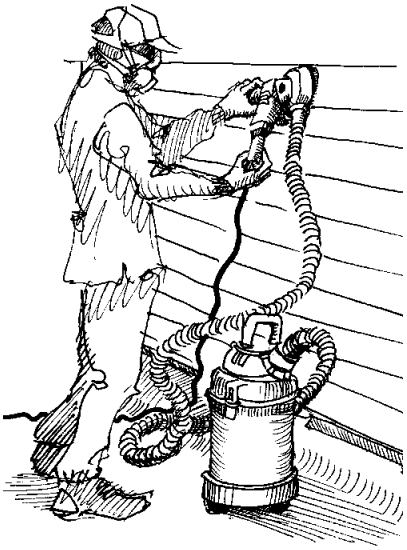
Objective data and historical measurements of lead may be used to satisfy the standard's initial monitoring requirements.

INITIAL EMPLOYEE EXPOSURE ASSESSMENT

Initial monitoring may be limited to a representative sample of those employees exposed to the greatest concentrations of airborne lead. Representative exposure sampling is permitted when there are a number of employees performing the same job, with lead exposure of similar duration and level, under essentially the same conditions. For employees engaged in similar work, the standard requires that the members of the group reasonably expected to have the highest exposure levels be monitored. This result is then attributed to the other employees of the group.

The employer must establish and maintain an accurate record documenting the nature and relevancy of previous exposure data.

Instead of performing initial monitoring, the employer may in some cases rely on objective data that demonstrate that a particular lead containing material or product cannot result in employee exposure at or above the action level when it is processed, used, or handled.



According to the Wisconsin Dept. of Health Services (DHS 163):
(67) "Lead exposure" means a level of lead in the blood of 10 or more micrograms per 100 milliliters of blood.

BIOLOGICAL MONITORING TESTS

Analysis of blood lead samples must be conducted by an OSHA approved lab and be accurate (to a confidence level of 95 percent) within plus or minus 15 percent, or 6 µg/dl, whichever is greater. If an employee's airborne lead level is at or above the AL for more than 30 days in any consecutive 12 months, the employer must make biological monitoring available on the following schedule:

■ At least every two months for the first six months and every six months thereafter for employees exposed at or above the action level for more than 30 days annually;

■ At least every two months for employees whose last blood sampling and analysis indicated a blood lead level at or above 40 µg/dl; and

■ At least monthly while an employee is removed from exposure due an elevated blood lead level.

PENDING EMPLOYEE EXPOSURE ASSESSMENT

Until the employer performs an exposure assessment and documents that employees are not exposed above the PEL, OSHA requires some degree of interim protection for employees. This means providing respiratory protection, protective work clothing and equipment, hygiene facilities, biological monitoring, and training—as specified by the standards—for certain tasks prone to produce high exposure. These include:

- Manual demolition of structures such as dry wall, manual scraping, manual sanding, and use of a heat gun where lead containing coatings or paints are present;
- Power tool cleaning with or without local exhaust ventilation;
- Spray painting with lead-containing paint;
- Lead burning;
- Use of lead-containing mortar;
- Abrasive blasting, rivet busting, welding, cutting, or torch burning on any structure where lead-containing coatings or paint are present;
- Abrasive blasting enclosure movement and removal;
- Cleanup of activities where dry expendable abrasives are used; and
- Any other task the employer believes may cause exposures in excess of the PEL.

Here are some very basic examples of respiratory protection and protective work clothing. Depending on the work practices performed, more protection may be required.

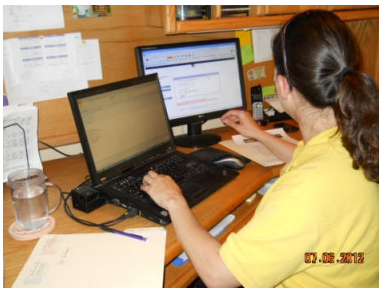
TEST RESULTS SHOWING NO OVEREXPOSURES

If the initial assessment indicates that no employee is exposed above the AL, the employer may discontinue monitoring. Further exposure testing is not required unless there is a change in processes or controls that may result in additional employees being exposed to lead at or above the AL, or may result in employees already exposed at or above the AL being exposed above the PEL.

The employer must keep a written record of the determination, including the date, location within the work site, and the name and social security number of each monitored employee.

EMPLOYEE NOTIFICATION OF MONITORING RESULTS

The employer must notify each employee in writing of employee exposure assessment results within five working days of receiving them. Whenever the results indicate that the representative employee exposure, without the use of respirators, is above the PEL, the employer must include a written notice stating that the employee's exposure exceeded the PEL and describing corrective action taken or to be taken to reduce exposure to or below the PEL.



BE AWARE OF YOUR RECORD KEEPING REQUIREMENTS:

The employer must notify each employee in writing of employee exposure assessment results within five working days of receiving them.

Medical Surveillance

When an employee's airborne exposure is at or above the AL for more than 30 days in any consecutive 12 months, an immediate medical consultation is required when the employee notifies the employer that he or she:

- Has developed signs or symptoms commonly associated with lead-related disease;
- Has demonstrated difficulty in breathing during respirator use or a fit test;
- Desires medical advice concerning the effects of past or current lead exposure on the employee's ability to have a healthy child; and
- Is under medical removal and has a medically appropriate need.

MEDICAL EXAMS

The best indicator of personal lead exposure is through a blood test to indicate elevated blood lead levels. A medical exam must also include:

- Detailed work and medical histories, with particular attention to past lead exposure (occupational and non-occupational), personal habits (smoking and hygiene), and past gastrointestinal, hematologic, renal, cardiovascular, reproductive, and neurological problems;
- A thorough physical exam, with particular attention to gums, teeth, hematologic, gastrointestinal, renal, cardiovascular, and neurological systems; evaluation of lung function if respirators are used;
- A blood pressure measurement;
- A blood sample and analysis to determine blood lead level;
    - Hemoglobin and hematocrit determinations, red cell indices, and an exam of peripheral smear morphology; and
    - Zinc protopor-phyrin; blood urea nitrogen; and serum creatinine;
- A routine urinalysis with microscopic exam; and
- Any lab or other test the examining physician deems necessary.

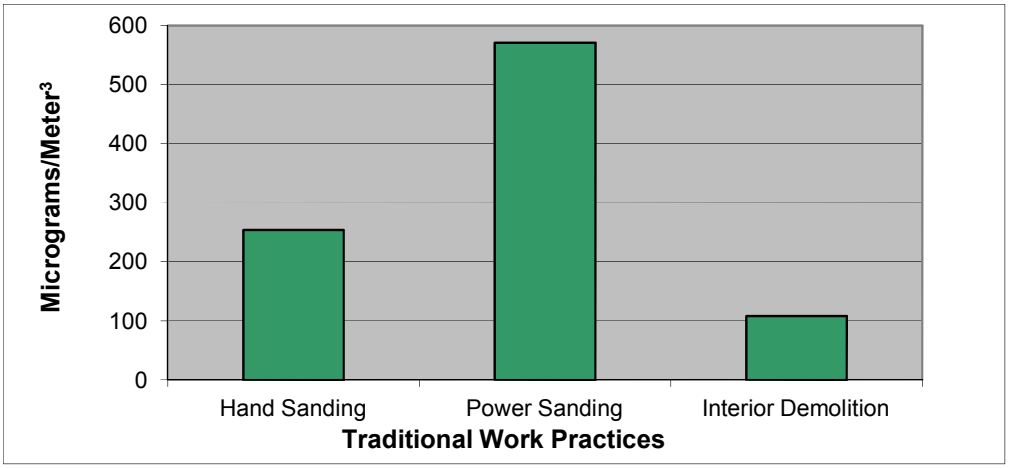
INFORMATION FOR THE EXAMINING PHYSICIAN

The employer must provide all examining physicians with a copy of the lead in construction standard, including all appendices, a description of the affected employee's duties as they relate to the employee's exposure, the employee's lead exposure level or anticipated exposure level, a description of personal protective equipment used or to be used, prior blood lead determinations, and all prior written medical opinions for the employee.

WHEN MONITORING SHOWS NO EMPLOYEE EXPOSURES ABOVE THE AL

Employers must make available, at no cost to the employee, initial medical surveillance for employees exposed to lead on the job at or above the action level on any one day per year. This initial medical surveillance consists of biological monitoring in the form of blood sampling and analysis for lead and zinc protoporyrin (ZPP) levels. In addition, a medical surveillance program with biological monitoring must be made available to any employee exposed at or above the action level for more than 30 days in any consecutive 12 months.

Traditional Renovations Create Airborne Leaded Dust



(Source: EPA RRP Training Manual)

AFTER THE MEDICAL EXAMINATION

Employers must obtain and provide the employee a copy of a written opinion from each examining or consulting physician that contains only information related to occupational exposure to lead and must include:

■ Whether the employee has any detected medical condition that would increase the health risk from lead exposure;
■ Any special protective measures or limitations on the worker's exposure to lead,
■ Any limitation on respirator use; and
■ Results of the blood lead determinations.

In addition, the written statement may include a statement that the physician has informed the employee of the results of the consultation or medical examination and any medical condition that may require further examination or treatment.

The employer must instruct the physician that findings, including lab results or diagnoses unrelated to the worker's lead exposure, must not be revealed to the employer or included in the written opinion to the employer. The employer must also instruct the physician to advise employees of any medical condition, occupational or non-occupational, that necessitates further evaluation or treatment. In addition, some states also require laboratories and health care providers to report cases of elevated blood lead concentrations to their state health departments.

Medical Removal Provisions

Temporary medical removal can result from an elevated blood level or a written medical opinion. More specifically, the employer is required to remove from work an employee with a lead exposure at or above the AL each time periodic and follow-up (within two weeks of the periodic test) blood sampling tests indicate that the employee's blood level is at or above 50 μg /dl. The employer also must remove from work an employee with lead exposure at or above the AL each time a final medical determination indicates that the employee needs reduced lead exposure for medical reasons. If the physician who is implementing the employer's medical program makes a final written opinion recommending the employee's removal or other special protective measures, the employer must implement the physician's recommendation.

For an employee removed from exposure to lead at or above the AL due to a blood lead level at or above 50 μg/dl, the employer may return that employee to former job status when two consecutive blood sampling tests indicate that the employee's blood lead level is below 40 μg /dl. For an employee removed from exposure to lead due to a final medical determination, the employee must be returned when a subsequent final medical determination results in a medical finding, determination, or opinion that the employee no longer has a detected medical condition that places the employee at increased risk of lead exposure.

The employer must remove any limitations placed on employees or end any special protective measures when a subsequent final medical determination indicates they are no longer necessary. If the former position no longer exists, the employee is returned consistent with whatever job assignment discretion the employer would have had if no removal occurred.

WORKER PROTECTIONS AND BENEFITS

The employer must provide up to 18 months of medical removal protection (MRP) benefits each time an employee is removed from lead exposure or medically limited. As long as the position/job exists, the employer must maintain the earnings, seniority, and other employment rights and benefits as though the employee had not been removed from the job or otherwise medically limited. The employer may condition medical removal protection benefits on the employee's participation in follow up medical surveillance.

If a removed employee files a worker's compensation claim or other compensation for lost wages due to a lead-related disability, the employer must continue medical removal protection benefits until the claim is resolved. However, the employer's MRP benefits obligation will be reduced by the amount that the employee receives from these sources. Also, the employer's MRP benefits obligation will be reduced by any income the employee receives from employment with another employer made possible by virtue of the employee's removal.

RECORDS REQUIREMENTS INVOLVING MEDICAL REMOVAL

In the case of medical removal, the employer's records must include:

- The worker's name and social security number,
- The date of each occasion that the worker was removed from current exposure to lead,
- The date when the worker was returned to the former job status,
- A brief explanation of how each removal was or is being accomplished, and
- A statement indicating whether the reason for the removal was an elevated blood lead level.

Recordkeeping

EMPLOYER REQUIREMENTS

The employer must maintain any employee exposure and medical records to document ongoing employee exposure, medical monitoring, and medical removal of workers. This data provides a baseline to evaluate the employee's health properly. Employees or former employees, their designated representatives, and OSHA must have access to exposure and medical records in accordance with 29 CFR 1910.1020. Rules of agency practice and procedure governing OSHA access to employee medical records are found in 29 CFR 1913.10.

EXPOSURE ASSESSMENT RECORDS

The employer must establish and maintain an accurate record of all monitoring and other data used to conduct employee exposure assessments as required by this standard and in accordance with 29 CFR 1910.1020. The exposure assessment records must include:

- The dates, number, duration, location, and results of each sample taken, including a description of the sampling procedure used to determine representative employee exposure;
- A description of the sampling and analytical methods used and evidence of their accuracy;
- The type of respiratory protection worn, if any;
- The name, social security number, and job classification of the monitored employee and all others whose exposure the measurement represents; and
- Environmental variables that could affect the measurement of employee exposure.

MEDICAL SURVEILLANCE RECORDS

The employer must maintain an accurate record for each employee subject to medical surveillance, including:

■ The name, social security number, and description of the employee's duties;
■ A copy of the physician's written opinions;
■ The results of any airborne exposure monitoring done for the employee and provided to the physician; and
■ Any employee medical complaints related to lead exposure. In addition, the employer must keep or ensure that the examining physician keeps the following medical records:
■ A copy of the medical examination results including medical and work history;
■ A description of the laboratory procedures and a copy of any guidelines used to interpret the test results; and
■ A copy of the results of biological monitoring. The employer or physician or both must maintain medical records in accordance with 29 CFR 1910.1020.

DOCUMENTS FOR EMPLOYEES SUBJECT TO MEDICAL REMOVAL

The employer must maintain--for at least the duration of employment–an accurate record for each employee subject to medical removal, including:

■ The name and social security number of the employee;
■ The date on each occasion that the employee was removed from current exposure to lead and the corresponding date which the employee was returned to former job status;
■ A brief explanation of how each removal was or is being accomplished; and
■ A statement about each removal indicating whether the reason for removal was an elevated blood level.

EMPLOYER REQUIREMENTS RELATED TO OBJECTIVE DATA

The employer must establish and maintain an accurate record documenting the nature and relevancy of objective data relied on to assess initial employee exposure in lieu of exposure monitoring.
The employer must maintain the record of objective data relied on for at least 30 years.

DOCUMENTS FOR OSHA AND NIOSH REVIEW

The employer must make all records--including exposure monitoring, objective data, medical removal, and medical records--available upon request to affected employees, former employees, and their designated representatives and to the OSHA Assistant Secretary and the Director of the National Institute for Occupational Safety and Health (NIOSH) for examination and copying in accordance with 29 CFR 1910.1020.

WHEN CLOSING A BUSINESS

When an employer ceases to do business, the successor employer must receive and retain all required records. If no successor is available, these records must be sent to the Director of NIOSH.

Exposure Reduction and Employee Protection

The most effective way to protect workers is to minimize their exposure through engineering controls, good work practices and training, and use of personal protective clothing and equipment, including respirators, where required. The employer needs to designate a competent person capable of identifying existing and predictable lead hazards and who is authorized to take prompt corrective measures to eliminate such problems. The employer should, as needed, consult a qualified safety and health professional to develop and implement an effective worker protection program.
These professionals may work independently or may be associated with an insurance carrier, trade organization, or onsite consultation program.

Training can be done on the job or in a controlled environment.
The employer should, as needed, consult a qualified safety and health professional to develop and implement an effective worker protection program.
These professionals may work independently or may be associated with an insurance carrier, trade organization, or onsite consultation program.

Engineering Controls

Engineering measures include local and general exhaust ventilation, process and equipment modification, material substitution, component replacement, and isolation or automation. Examples of recommended engineering controls that can help reduce worker exposure to lead are described as follows.

EXHAUST VENTILATION

Equip power tools used to remove lead-based paint with dust collection shrouds or other attachments so that paint is exhausted through a high-efficiency particulate air (HEPA) vacuum system. For operations such as welding, cutting/burning, or heating, use local exhaust ventilation. Use HEPA vacuums during cleanup operations.
For abrasive blasting operations, build a containment structure that is designed to optimize the flow of clean ventilation air past the workers' breathing zones. This will help reduce the exposure to airborne lead and increase visibility. Maintain the affected area under negative pressure to reduce the chances that

lead dust will contaminate areas outside the enclosure. Equip the containment structure with an adequately sized dust collector to control emissions of particulate matter into the environment.

ENCLOSURE OR ENCAPSULATION

One way to reduce the lead inhalation or ingestion hazard posed by lead-based paint is to encapsulate it with a material that bonds to the surface, such as acrylic or epoxy coating or flexible wall coverings. Another option is to enclose it using systems such as gypsum wallboard, plywood paneling, and aluminum, vinyl, or wood exterior siding. Floors coated with lead-based paint can be covered using vinyl tile or linoleum.

The building owner or other responsible person should oversee the custodial and maintenance staffs and contractors during all activities involving enclosed or encapsulated lead-based paint. This will minimize the potential for an inadvertent lead release during maintenance, renovation, or demolition.

SUBSTITUTION

Choose materials and chemicals that do not contain lead for construction projects. Among the options are:

■ Use zinc-containing primers covered by an epoxy intermediate coat and polyurethane topcoat instead of lead-containing coatings.

■ Substitute mobile hydraulic shears for torch cutting under certain circumstances.

■ Consider surface preparation equipment such as needle guns with multiple reciprocating needles completely enclosed within an adjustable shroud, instead of abrasive blasting under certain conditions. The shroud captures dust and debris at the cutting edge and can be equipped with a HEPA vacuum filtration with a self-drumming feature. One such commercial unit can remove lead-based paint from flat steel and concrete surfaces, outside edges, inside corners, and pipes.

■ Choose chemical strippers in lieu of hand scraping with a heat gun for work on building exteriors, surfaces involving carvings or molding, or intricate iron work. Chemical removal generates less airborne lead dust. (Be aware, however, that these strippers themselves can be hazardous and that the employer must review the material safety data sheets (MSDSs) for these stripping agents to obtain information on their hazards.)

Remember: Using a paint stripper containing methylene chloride is a prohibited practice in Wisconsin

COMPONENT REPLACEMENT

Replace lead-based painted building components such as windows, doors, and trim with new components free of lead-containing paint. Another option is to remove the paint offsite and then repaint the components with zinc-based paint before replacing them.

PROCESS OR EQUIPMENT MODIFICATION

When applying lead paints or other lead-containing coatings, use a brush or roller rather than a sprayer. This application method introduces little or no paint mist into the air to present a lead inhalation hazard. (Note that there is a ban on the use of lead-based paint in residential housing.)

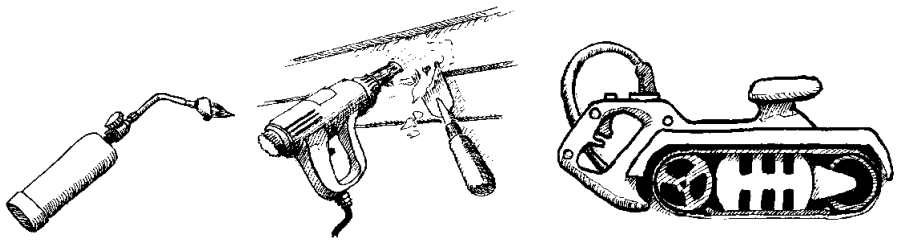
Use non-silica-containing abrasives such as steel or iron shot/grit sand instead of sand in abrasive blasting operations when practical. The free silica portion of the dust presents a respiratory health hazard.

When appropriate for the conditions, choose blasting techniques that are less dusty than open-air abrasive blasting. These include hydro- or wet-blasting using high-pressure water with or without an abrasive or surrounding the blast nozzle with a ring of water, and vacuum blasting where a vacuum hood for material removal is positioned around the exterior of the blasting nozzle.

When using a heat gun to remove lead-based paints in residential housing units, be sure it is of the flameless electrical softener type. Heat guns should have electronically controlled temperature settings to allow usage below 700 degrees F. Equip heat guns with various nozzles to cover all common applications and to limit the size of the heated work area.

When using abrasive blasting with a vacuum hood on exterior building surfaces, ensure that the configuration of the heads on the blasting nozzle match the configuration of the substrate so that the vacuum is effective in containing debris.

Ensure that HEPA vacuum cleaners have the appropriate attachments for use on unusual surfaces. Proper use of brushes of various sizes, crevice and angular tools, when needed, will enhance the quality of the HEPA-vacuuming process and help reduce the amount of lead dust released into the air.

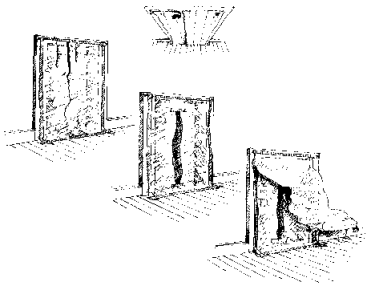


Lead-Safe Renovation (EPA & DHS) prohibited practices:

- **Open-flame burning or torching.**
- **Heat gun above 1100º F.**
- **Power sanding, power grinding, power planing, needle guns, abrasive blasting and sandblasting, without shroud or containment system equipped with HEPA vacuum**

ISOLATION

Although it is not feasible to enclose and ventilate some abrasive blasting operations completely, it is possible to isolate many operations to help reduce the potential for lead exposure.
Isolation consists of keeping employees not involved in the blasting operations as far away from the work area as possible, reducing the risk of exposure.



Housekeeping and Personal Hygiene

Lead is a cumulative and persistent toxic substance that poses a serious health risk. A rigorous housekeeping program and the observance of basic personal hygiene practices will minimize employee exposure to lead. In addition, these two elements of the worker protection program help prevent workers from taking lead contaminated dust out of the worksite and into their homes where it can extend the workers' exposures and potentially affect their families' health.

HOUSEKEEPING PRACTICES

An effective housekeeping program involves a regular schedule to remove accumulations of lead dust and lead-containing debris. The schedule should be adapted to exposure conditions at a particular worksite. OSHA's Lead Standard for Construction requires employers to maintain all surfaces as free of lead contamination as practicable. Vacuuming lead dust with HEPA-filtered equipment or wetting the dust with water before sweeping are effective control measures. Compressed air may not be used to remove lead from contaminated surfaces unless a ventilation system is in place to capture the dust generated by the compressed air.
In addition, put all lead-containing debris and contaminated items accumulated for disposal into sealed, impermeable bags or other closed impermeable containers. Label bags and containers as lead-containing waste. These measures provide additional help in controlling exposure.

Put all lead-containing debris and contaminated items accumulated for disposal into **sealed, impermeable bags or other closed impermeable containers.** Label bags and containers as lead-containing waste.

PERSONAL HYGIENE PRACTICES

Emphasize workers' personal hygiene such as washing their hands and face after work and before eating to minimize their exposure to lead. Provide and ensure that workers use washing facilities. Provide clean change areas and readily accessible eating areas. If possible, provide a parking area where cars will not be contaminated with lead. These measures:

- Reduce workers' exposure to lead and the likelihood that they will ingest lead,
- Ensure that the exposure does not extend beyond the worksite,
- Reduce the movement of lead from the worksite, and
- Provide added protection to employees and their families.

If possible, provide a parking area where cars will not be contaminated with lead.

CHANGE AREAS

The employer must provide a clean change area for employees whose airborne exposure to lead is above the PEL. The area must be equipped with storage facilities for street clothes and a separate area with facilities for the removal and storage of lead-contaminated protective work clothing and equipment. This separation prevents cross contamination of the employee's street and work clothing.

Employees must use a clean change area for taking off street clothes, suiting up in clean protective work clothing, donning respirators before beginning work, and dressing in street clothes after work. No lead-contaminated items should enter this area.

Work clothing must not be worn away from the jobsite. Under no circumstances should lead-contaminated work clothes be laundered at home or taken from the worksite, except to be laundered professionally or for disposal following applicable federal, state, and local regulations.

SHOWERS AND WASHING FACILITIES

When feasible, showers must be provided for use by employees whose airborne exposure to lead is above the permissible exposure limit so they can shower before leaving the worksite. Where showers are provided, employees must change out of their work clothes and shower before changing into their street clothes and leaving the worksite. If employees do not change into clean clothing before leaving the worksite, they may contaminate their homes and automobiles with lead dust, extending their exposure and exposing other members of their household to lead.

In addition, employers must provide adequate washing facilities for their workers. These facilities must be close to the worksite and furnished with water, soap, and clean towels so employees can remove lead contamination from their skin.

Contaminated water from washing facilities and showers must be disposed of in accordance with applicable local, state, or federal regulations.

PERSONAL PRACTICES

The employer must ensure that employees do not enter lunchroom facilities or eating areas with protective work clothing or equipment unless surface lead dust has been removed. HEPA vacuuming and use of a downdraft booth are examples of cleaning methods that limit the dispersion of lead dust from contaminated work clothing.

In all areas where employees are exposed to lead above the PEL, employees must observe the prohibition on the presence and consumption or use of food, beverages, tobacco products, and cosmetics. Employees whose airborne exposure to lead is above the PEL must wash their hands and face before eating, drinking, smoking, or applying cosmetics.

No food, beverages, tobacco products or cosmetics are allowed in areas where employees are exposed to lead above the PEL.
Employees whose airborne exposure to lead is above the PEL must wash their hands and face before eating, drinking, smoking, or applying cosmetics.

END-OF-DAY PROCEDURES

Employers must ensure that workers who are exposed to lead above the permissible exposure limit follow these procedures at the end of their workday:

■ Place contaminated clothes, including work shoes and personal protective equipment to be cleaned, laundered, or disposed of, in a properly labeled closed container.

■ Take a shower and wash their hair. Where showers are not provided, employees must wash their hands and face at the end of the work shift.

■ Change into street clothes in clean change areas.

Protective Clothing and Equipment
EMPLOYER REQUIREMENTS

Employers must provide workers who are exposed to lead above the PEL or for whom the possibility of skin or eye irritation exists with clean, dry protective work clothing and equipment that are appropriate for the hazard. Employers must provide these items at no cost to employees. Appropriate protective work clothing and equipment used on construction sites includes:

Examples of basic lead-safe renovation protective clothing. Depending on the job being performed, more protection might be needed.

■ Coveralls or other full-body work clothing;

Example of a coverall with attached hood and booties.

■ Gloves, hats, and shoes or disposable shoe coverlets;

■ Vented goggles or face shields with protective spectacles or goggles;

■ Welding or abrasive blasting helmets; and

■ Respirators.

Examples of N100 and R100 respirators for lead-safe renovation.

Clean work clothing must be issued daily for employees whose exposure levels to lead are above 200 µg/m3, weekly if exposures are above the PEL but at or below 200 µg/m3 or where the possibility of skin or eye irritation exists.

HANDLING CONTAMINATED PROTECTIVE CLOTHING

Workers must not be allowed to leave the worksite wearing lead contaminated protective clothing or equipment. This is an essential step in reducing the movement of lead contamination from the workplace into the worker's home and provides added protection for employees and their families.
Disposable coveralls and separate shoe covers may be used, if appropriate, to avoid the need for laundering. Workers must remove protective clothing in change rooms provided for that purpose.
Employers must ensure that employees leave the respirator use area to wash their faces and respirator face pieces as necessary. In addition, employers may require their employees to use HEPA vacuuming, damp wiping, or another suitable cleaning method before removing a respirator to clear loose particle contamination on the respirator and at the face-mask seal.
Place contaminated clothing that is to be cleaned, laundered, or disposed of by the employer in closed containers. Label containers with the warning: "Caution: Clothing contaminated with lead. Do not remove dust by blowing or shaking. Dispose of lead-contaminated wash water in accordance with applicable local, state, or federal regulations."
Workers responsible for handling contaminated clothing, including those in laundry services or subcontractors, must be informed in writing of the potential health hazard of lead exposure.
At no time shall lead be removed from protective clothing or equipment by brushing, shaking, or blowing. These actions disperse the lead into the work area.

PREVENTING HEAT STRESS

Workers wearing protective clothing, particularly in hot environments or within containment structures, can face a risk from heat stress if proper control measures are not used.
Heat stress is caused by several interacting factors, including environmental conditions, type of protective clothing worn; the work activity required and anticipated work rate, and individual employee characteristics such as age, weight, and fitness level.
When heat stress is a concern, the employer should choose lighter, less insulating protective clothing over heavier clothing, as long as it provides adequate protection. Other measures the employer can take include: discussing the possibility of heat stress and its signs and symptoms with all workers; using appropriate work/rest regimens; and providing heat stress monitoring that includes measuring employees' heart rates, body temperatures, and weight loss. Employers must provide a source of water or electrolyte drink in a non-contaminated eating and drinking area close to the work area so workers

can drink often throughout the day. Workers must wash their hands and face before drinking any fluid if their airborne exposure is above the PEL.

Workers wearing protective clothing, particularly in hot environments can face a risk from heat stress if proper control measures are not used. Make sure you discuss other options to prevent a heat related injury.

Respiratory Protection

Although engineering and work practice controls are the primary means of protecting workers from exposure to lead, source control at construction sites sometimes is insufficient to control exposure. In these cases, airborne lead concentrations may be high or may vary widely. Respirators often must be used to supplement engineering controls and work practices to reduce worker lead exposures below the PEL. When respirators are required, employers must provide them at no cost to workers.

The standard requires that respirators be used during periods when an employee's exposure to lead exceeds the PEL, including

■ Periods necessary to install or implement engineering or work practice controls, and

■ Work operations for which engineering and work practice controls are insufficient to reduce employee exposures to or below the PEL.

Respirators also must be provided upon employee request. A requested respirator is included as a requirement to provide increased protection for those employees who wish to reduce their lead burden below what is required by the standard, particularly if they intend to have children in the near future. In addition, respirators must be used when performing previously indicated high exposure or "trigger" tasks, before completion of the initial assessment.

PROVIDING ADEQUATE RESPIRATORY PROTECTION

Before any employee first starts wearing a respirator in the work environment, the employer must perform a fit test. For all employees wearing negative or positive pressure tight-fitting face piece respirators, the employer must perform either qualitative or quantitative fit tests using an OSHA-accepted fit testing protocol.

In addition, employees must be fit tested whenever a different respirator face piece is used, and at least annually thereafter.

Where daily airborne exposure to lead exceeds 50 µg/m3, affected workers must don respirators before entering the work area and should not remove them until they leave the high exposure area or have completed a decontamination procedure.

Employers must assure that the respirator issued to the employee is selected and fitted properly to ensure minimum leakage through the face piece-to-face seal.

Example of a half-face respirator

Example of a full-face respirator

RESPIRATORY PROTECTION PROGRAMS

When respirators are required at a worksite, the employer must establish a respiratory protection program in accordance with the OSHA standard on respiratory protection, 29 CFR 1910.134. At a minimum, an acceptable respirator program for lead must include:

- Procedures for selecting respirators appropriate to the hazard;
- Fit testing procedures;
- Procedures for proper use of respirators in routine and reasonably foreseeable emergency situations, including cartridge change schedules;
- Procedures and schedules for cleaning, disinfecting, storing, inspecting, repairing, discarding, and otherwise maintaining respirators;
- Training of employees in the respiratory hazard to which they are potentially exposed during routine and emergency situations;
- Training of employees in the proper use of respirators, including putting on and removing them, any limitations of their use, and their maintenance;
- Procedures for regularly evaluating the effectiveness of the program;
- Procedures to ensure air quality when supplied air is used;
- A written program and designation of a program administrator; and
- Recordkeeping procedures.

In addition, the construction industry lead standard stipulates medical evaluations of employees required to use respirators.

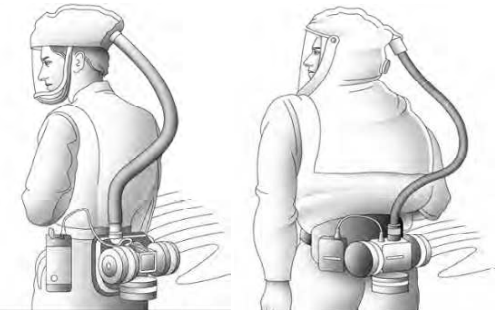
If an employee has difficulty in breathing during a fit test or while using a respirator, the employer must make a medical examination available to that employee to determine whether he or she can wear a respirator safely.

SELECTING A RESPIRATOR

The employer must select the appropriate respirator from Table 1 of the lead standard, 29 CFR 1926.62(f)(3)(i). The employer must provide a powered air-purifying respirator when an employee chooses to use this respirator and it will provide the employee adequate protection. A NIOSH-certified respirator must be selected and used in compliance with the conditions of its certification. In addition, if exposure monitoring or experience indicates airborne exposures to contaminants other than lead such as silica, solvents, or polyurethane coatings, these exposures must be considered when selecting respiratory protection.

Select type CE respirators approved by NIOSH for abrasive blasting operations. Currently, there are two kinds of CE respirators with the following assigned protection factors (APFs): a continuous flow respirator with a loose-fitting hood, APF 25; and a full face piece supplied-air respirator operated in a positive-pressure mode, APF 2,000. (Note: OSHA recognizes Bullard Helmets, Models 77 and 88 (1995); Clemco Appollo, Models 20 and 60 (1997); and 3M Model 8100 (1998) as having APFs of 1,000.)

Loose-Fitting Powered Air-Purifying Respirator (PAPR)
APF= 25



Hood PoweredAir-Purifying Respirator (PAPR)
APF= 25

For any airline respirator, it is important to follow the manufacturer's instructions regarding air quality, air pressure, and inside diameter and length of hoses. Be aware that using longer hoses or smaller inside diameter hoses than the manufacturer specifies or hoses with bends or kinks may reduce or restrict the airflow to a respirator.

Employee Information and Training

The employer must inform employees about lead hazards according to the requirement of OSHA's Hazard Communication standard for the construction industry, 29 CFR 1926.59, including-- but not limited to--the requirements for warning signs and labels, material safety data sheets (MSDSs), and employee information and training. (Refer to 29 CFR 1910.1200.)

PROGRAM REQUIREMENTS

Employers must institute an information and training program and ensure that all employees subject to exposure to lead or lead compounds at or above the action level on any day participate. Also covered under information and training are employees who may suffer skin or eye irritation from lead compounds. Initial training must be provided before the initial job assignment. Training must be repeated at least annually and, in brief summary, must include:

- The content of the OSHA lead standard and its appendices;
- The specific nature of operations that could lead to lead expo-sure above the action level;

■ The purpose, proper selection, fit, use, and limitations of respirators;
■ The purpose and a description of the medical surveillance program, and the medical removal protection program;
■ Information concerning the adverse health effects associated with excessive lead exposure;
■ The engineering and work practice controls associated with employees' job assignments;
■ The contents of any lead-related compliance plan in effect;
■ Instructions to employees that chelating agents must not be used routinely to remove lead from their bodies and when necessary only under medical supervision and at the direction of a licensed physician; and
■ The right to access records under "Access to Employee Exposure and Medical Records," 29 CFR 1910.1020.
All materials relating to the training program and a copy of the standard and its appendices must be made readily available to all affected employees.

WARNING SIGNS

Employers are required to post these warning signs in each work area where employee exposure to lead is above the PEL:
■ WARNING
■ LEAD WORK AREA
■ POISON
■ NO SMOKING OR EATING
All signs must be well lit and kept clean so that they are easily visible. Statements that contradict or detract from the signs' meaning are prohibited. Signs required by other statutes, regulations, or ordinances, however, may be posted in addition to, or in combination with, this sign.

OSHA Assistance, Services, and Products

OSHA can provide extensive help through a variety of programs, including assistance about safety and health programs, state plans, workplace consultations, voluntary protection programs, strategic partnerships, alliances, and training and education. An overall commitment to workplace safety and health can add value to your business, to your workplace, and to your life.
How does safety and health management system assistance help employers and employees?
Working in a safe and healthful environment can stimulate innovation and creativity and result in increased performance and higher productivity. The key to a safe and healthful work environment is a comprehensive safety and health management system.
OSHA has electronic compliance assistance tools, or eTools, on its website that walks users through the steps required to develop a comprehensive safety and health program. The eTools are posted at

www.osha.gov , and are based on guidelines that identify four general elements critical to a successful safety and health management system:
■ Management leadership and employee involvement,
■ Worksite analysis,
■ Hazard prevention and control, and
■ Safety and health training.

STATE PROGRAMS

The Occupational Safety and Health Act of 1970 (OSH Act) encourages states to develop and operate their own job safety and health plans. OSHA approves and monitors these plans and funds up to 50 percent of each program's operating costs. State plans must provide standards and enforcement programs, as well as voluntary compliance activities that are at least as effective as federal OSHA's. Currently, 26 states and territories have their own plans. Twenty three cover both private and public (state and local government) employees and three states, Connecticut, New Jersey, and New York, cover only the public sector. For more information on state plans, see the list at the end of this publication, or visit OSHA's website at www.osha.gov.

CONSULTATION ASSISTANCE

Consultation assistance is available on request to employers who want help establishing and maintaining a safe and healthful workplace. Funded largely by OSHA, the service is provided at no cost to small employers and is delivered by state authorities through professional safety and health consultants.

SAFETY AND HEALTH ACHIEVEMENT RECOGNITION PROGRAM

Under the consultation program, certain exemplary employers may request participation in OSHA's Safety and Health Achievement Recognition Program (SHARP). Eligibility for participation includes, but is not limited to, receiving a full-service, comprehensive consultation visit, correcting all identified hazards, and developing an effective safety and health management system.
Employers accepted into SHARP may receive an exemption from programmed inspections (not complaint or accident investigation inspections) for 1 year initially, or 2 years upon renewal. For more information about consultation assistance, see the list of consultation projects at the end of this publication.

VOLUNTARY PROTECTION PROGRAMS

Voluntary Protection Programs (VPP) are designed to recognize outstanding achievements by companies that have developed and implemented effective safety and health management programs. There are three VPP programs: Star, Merit, and Demonstration. All are designed to
■ Recognize who that have successfully developed and implemented effective and comprehensive safety and health management programs;
■ Encourage these employers to continuously improve their safety and health management programs;
■ Motivate other employers to achieve excellent safety and health results in the same outstanding way; and
■ Establish a cooperative relationship between employers, employees, and OSHA.
VPP participation can bring many benefits to employers and employees, including fewer worker fatalities, injuries, and illnesses; lost-workday case rates generally 50 percent below industry averages; and lower workers' compensation and other injury- and illness-related costs. In addition, many VPP sites

report improved employee motivation to work safely, leading to a better quality of life at work; positive community recognition and interaction; further improvement and revitalization of already-good safety and health programs; and a positive relationship with OSHA.
After a site applies for the program, OSHA reviews an employer's VPP application and conducts a VPP onsite evaluation to verify that the site's safety and health management programs are operating effectively. OSHA conducts onsite evaluations on a regular basis.
Sites participating in VPP are not scheduled for regular, programmed inspections. OSHA does, however, handle any employee complaints, serious accidents, or significant chemical releases that may occur at VPP sites according to routine enforcement procedures.
Additional information on VPP is available from OSHA regional offices listed at the end of this booklet. Also, see "Cooperative Programs" on OSHA's website.

COOPERATIVE PARTNERSHIPS

OSHA has learned firsthand that voluntary, cooperative partnerships with employers, employees, and unions can be a useful alternative to traditional enforcement and an effective way to reduce worker deaths, injuries, and illnesses. This is especially true when a partnership leads to the development and implementation of a comprehensive workplace safety and health management system.

ALLIANCE PROGRAM

Alliances enable organizations committed to workplace safety and health to collaborate with OSHA to prevent injuries and illnesses in the workplace. OSHA and its allies work together to reach out to, educate, and lead the nation's employers and their employees in improving and advancing workplace safety and health.
Alliances are open to all, including trade or professional organizations, businesses, labor organizations, educational institutions, and government agencies. In some cases, organizations may be building on existing relationships with OSHA through other cooperative programs.
There are few formal program requirements for alliances, which are less structured than other cooperative agreements, and the agreements do not include an enforcement component. However, OSHA and the participating organizations must define, implement, and meet a set of short- and long-term goals that fall into three categories: training and education; outreach and communication; and promotion of the national dialogue on workplace safety and health.

STRATEGIC PARTNERSHIP PROGRAM

OSHA Strategic Partnerships are agreements among labor, management, and government to improve workplace safety and health.
These partnerships encourage, assist, and recognize the efforts of the partners to eliminate serious workplace hazards and achieve a high level of worker safety and health. Whereas OSHA's Consultation Program and VPP entail one-on-one relationships between OSHA and individual worksites, most strategic partnerships build cooperative relationships with groups of employers and employees.
For more information about this program, contact your nearest OSHA office or visit our website.

OCCUPATIONAL SAFETY AND HEALTH TRAINING

The OSHA Training Institute in Arlington Heights, Ill., provides basic and advanced training and education in safety and health for federal and state compliance officers, state consultants, other federal agency personnel, and private-sector employers, employees, and their representatives.

TRAINING GRANTS

OSHA awards grants to nonprofit organizations to provide safety and health training and education to employers and workers in the workplace. Grants often focus on high-risk activities or hazards or may help nonprofit organizations in training, education, and outreach.

OSHA expects each grantee to develop a program that addresses a safety and health topic named by OSHA, recruit workers and employers for the training, and conduct the training.

Grantees are also expected to follow up with students to find out how they applied the training in their workplaces.

For more information contact OSHA Office of Training and Education, 2020 Arlington Heights Rd., Arlington Heights, IL 60005; or call (847) 297-4810.

OTHER ASSISTANCE MATERIALS

OSHA has a variety of materials and tools on its website at www.osha.gov. These include eTools such as Expert Advisors and Electronic Compliance Assistance Tools, information on specific health and safety topics, regulations, directives, publications, videos, and other information for employers and employees.

OSHA also has an extensive publications program. For a list of items, visit OSHA's website at www.osha.gov or contact the OSHA Publications Office, U.S. Department of Labor, 200 Constitution Avenue, NW, N-3101, Washington, DC 20210. Telephone (202) 693- 1888 or fax to (202) 693-2498.

In addition, OSHA's CD-ROM includes standards, interpretations, directives, and more. It is available for sale from the U.S. Government Printing Office. To order, write to the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402, or phone (202) 512-1800.

IN CASE OF AN EMERGENCY OR TO FILE A COMPLAINT

To report an emergency, file a complaint, or seek OSHA advice, assistance, or products, call (800) 321-OSHA or contact your nearest OSHA regional office listed at the end of this publication. The teletypewriter (TTY) number is (877) 889-5627.

Employees can also file a complaint online and get more information on OSHA federal and state programs by visiting OSHA's website at www.osha.gov.

OSHA Regional Offices

*These states and territories operate their own OSHA-approved job safety and health programs (Connecticut, New Jersey, and New York plans cover public employees only). States with approved programs must have a standard that is identical to, or at least as effective as, the federal standard. Note: To get contact information for OSHA Area Offices, OSHA-approved state plans, and OSHA Consultation Projects, please visit us online at www.osha.gov or call us at (800) 321-OSHA.

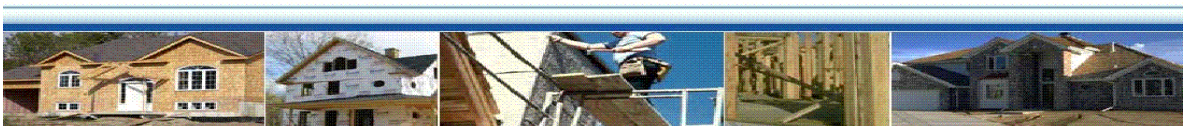
Region I (CT,* ME, MA, NH, RI, VT*) Boston, MA 02203 (617) 565-9860	**Region VI** (AR, LA, NM,* OK, TX) 525 Griffin Street, Room 602 Dallas, TX 75202 (214) 767-4731 or 4736 x224
Region II (NJ,* NY,* PR,* VI*) 201 Varick Street, Room 670 New York, NY 10014 (212) 337-2378	**Region VII** (IA,* KS, MO, NE) City Center Square 1100 Main Street, Suite 800 Kansas City, MO 64105 (816) 426-5861
Region III (DE, DC, MD,* PA,* VA,* WV) The Curtis Center 170 S. Independence Mall West Suite 740 West Philadelphia, PA 19106-3309 (215) 861-4900	**Region VIII** (CO, MT, ND, SD, UT,* WY*) 1999 Broadway, Suite 1690 PO Box 46550 Denver, CO 80202-5716 (303) 844-1600
Region IV (AL, FL, GA, KY,* MS, NC,* SC,* TN*) Atlanta Federal Center 61 Forsyth Street SW, Room 6T50 Atlanta, GA 30303 (404) 562-2300	**Region IX** (American Samoa, AZ,* CA,* HI, NV,* Northern Mariana Islands) 71 Stevenson Street, Room 420 San Francisco, CA 94105 (415) 975-4310
Region V (IL, IN,* MI,* MN,* OH, WI) 230 South Dearborn Street, Room 3244 Chicago, IL 60604 (312) 353-2220	**Region X** (AK,* ID, OR,* WA*) 1111 Third Avenue, Suite 715 Seattle, WA 98101-3212 (206) 553-5930

Blood Lead Laboratories - Wisconsin *(as of 2/17/2012)*

The OSHA Lead Standards for General Industry (29 CFR 1910.1025) and Construction (29 CFR 1926.62) require employers to provide biological monitoring for workers exposed to airborne lead above the action level. Monitoring must be provided for lead and zinc protoporphyrin (or free erythrocyte protoporphyrin) in blood. The employer is required to have these analyses performed by a laboratory that meets accuracy requirements specified by OSHA.

The OSHA List of Laboratories Approved for Blood Lead Analysis is designed to provide a source for regulated employers to locate laboratories that OSHA has determined meet the requirements of the accuracy provisions of the Lead Standards. Laboratories voluntarily provide proficiency test data to OSHA for evaluation.

ACL Industrial Toxicology Laboratory Mary J Reznicek 8901 West Lincoln Avenue P.O. Box 27167A West Allis, WI 53227]	Gundersen Lutheran Laboratory Gary Wickus 1910 South Street La Crosse, WI 54601
Bellin Hospital Laura Blecha 744 South Webster Avenue Green Bay, WI 54305 920-433-3650, x3067 920-433-5761 Fax: 920-433-5985 e-mail: lablec@bellin.org	Marshfield Med Ctr-St Josephs Robert A Carlson, MD 1000 North Oak Avenue Marshfield, WI 54449
Consultants Laboratory of Wisconsin Gary Schwefel 430 East Division Street Fon Du Lac, WI 54935	Milwaukee Health Department Ben Hui, PhD, Chemistry Supervisor 841 North Broadway, Room 205 Milwaukee, WI 53202 414-286-3931 Fax: 414-286-5098 e-mail: bhui@milwaukee.gov
Dean Clinic Laboratory Elizabeth Galle 1313 Fish Hatchery Road Madison, WI 53715 608-252-8021 Fax: 608-283-7376	Wisc State Lab of Hygiene Noel Stanton 465 Henry Mall Madison, WI 53706
Dynacare Diane Breitenseld 9200 West Wisconsin Avenue Milwaukee, WI 53226 414-805-8401	



Kevin Wunderlin LLC
P.O. Box 268
Platteville, WI 53818-0268
(608) 348-6688

OSHA Awareness Training – Trenching and Excavations

Do NOT enter an unprotected trench!

This handout is intended for use as a reference guide to our OSHA Awareness Series.
Contact Kevin Wunderlin LLC – 608-348-6688 – if you have questions or comments.

Working safely in trenches

Each employee in a trench shall be protected from a cave-in by an adequate protective system. Some of the protective systems for trenches are:

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- Sloped for stability; or
- Cut to create stepped benched grades; or
- Supported by a system made with posts, beams, shores or planking and hydraulic jacks; or

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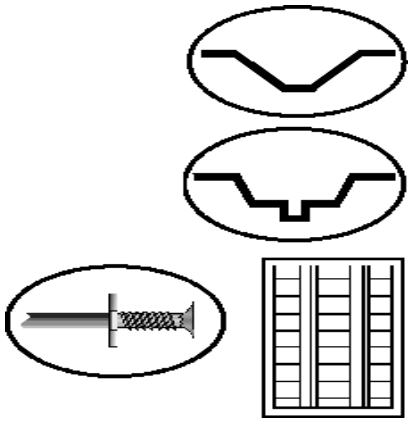
<td>  </td>
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- Supported by a trench box to protect workers in a trench.

Additionally, excavated or other materials must be at least 2 feet back from the edge of a trench; and

A safe means of egress shall be provided within 25 feet of workers in a trench.

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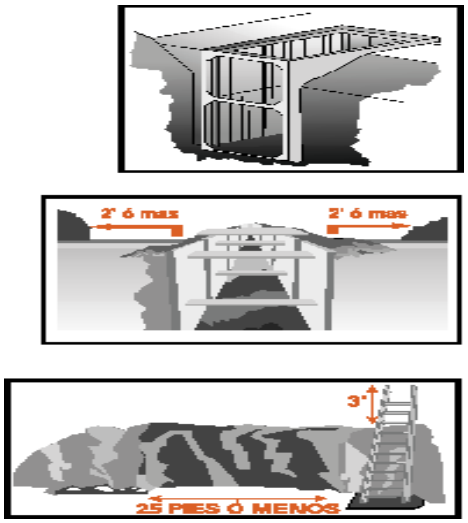
<td> 
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(Source: Trench Safety Tips Card – OSHA)

OSHA FACT SHEET - Trenching and Excavation Safety

Excavation and trenching are among the most hazardous construction operations. OSHA defines an excavation as any man-made cut, cavity, trench, or depression in the earth's surface formed by earth removal. A trench is defined as a narrow underground excavation that is deeper than it is wide, and is no wider than 15 feet (4.5 meters).

Dangers of Trenching and Excavation
Cave-ins pose the greatest risk and are much more likely than other excavation related accidents to result in worker fatalities. Other potential hazards include falls, falling loads, hazardous atmospheres, and incidents involving mobile equipment. Trench collapses cause dozens of fatalities and hundreds of injuries each year.

Protect Yourself
Do not enter an unprotected trench! Trenches 5 feet (1.5 meters) deep or greater require a protective system unless the excavation is made entirely in stable rock. Trenches 20 feet (6.1 meters) deep or greater require that the protective system be designed by a registered professional engineer or be based on tabulated data prepared and/ or approved by a registered professional engineer.

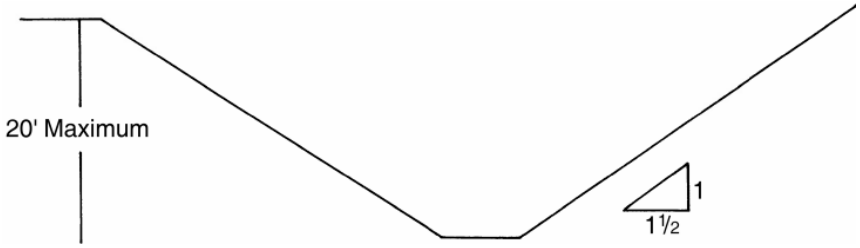
Would you say this worker is protecting himself? Why or why not!

Protective Systems
There are different types of protective systems. **Sloping** involves cutting back the trench wall at an angle inclined away from the excavation. **Shoring** requires installing aluminum hydraulic or other types of supports to prevent soil movement and caveins. **Shielding** protects workers by using trench boxes or other types of supports to prevent soil cave-ins. Designing a protective system can be complex because you must consider many factors: soil classification, depth of cut, water content of

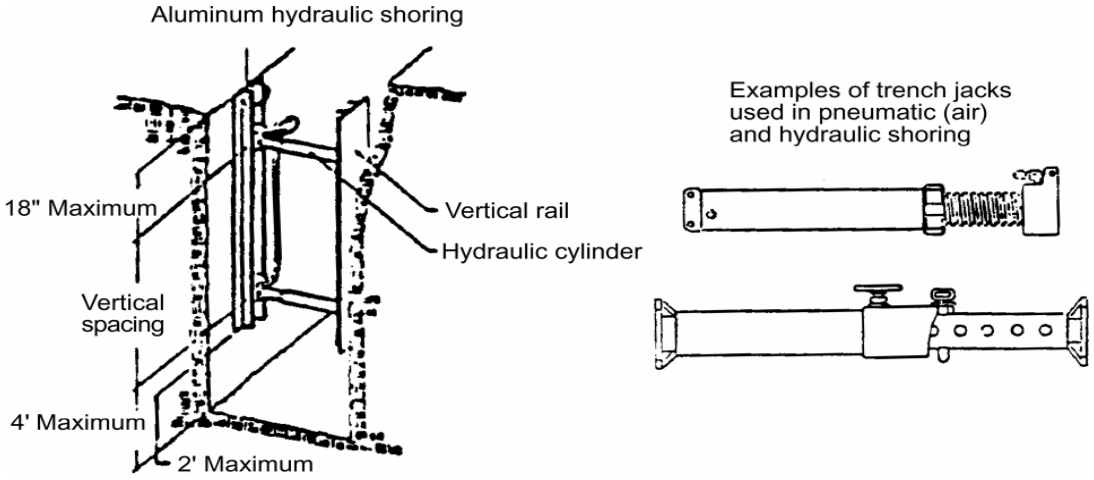
soil, changes due to weather or climate, surcharge loads (eg., spoil, other materials to be used in the trench) and other operations in the vicinity.

Examples of Sloping, shoring and shielding:

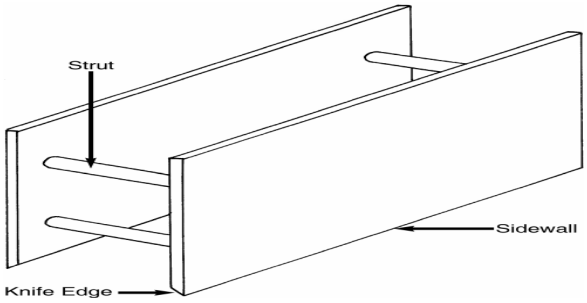
Type C Soil
Simple Slope Excavation



Air Shoring or Hydraulic Shoring



Trench Shield



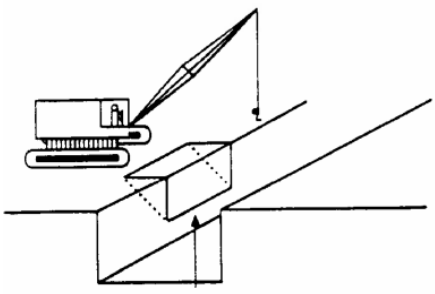
Competent Person
OSHA standards require that trenches be inspected daily and as conditions change by a competent person prior to worker entry to ensure elimination of excavation hazards. A competent person is an individual who is capable of identifying existing and predictable hazards or working conditions that are hazardous, unsanitary, or dangerous to employees and who is authorized to take prompt corrective measures to eliminate or control these hazards and conditions.

A competent person needs to inspect a trench daily and as conditions change!

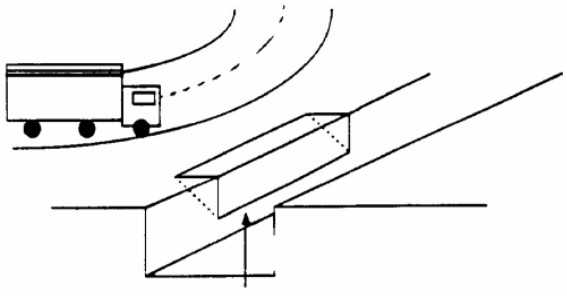
Access and Egress
OSHA requires safe access and egress to all excavations, including ladders, steps, ramps, or other safe means of exit for employees working in trench excavations 4 feet (1.22 meters) or deeper. These devices must be located within 25 feet (7.6 meters) of all workers.

General Trenching and Excavation Rules
- Keep heavy equipment away from trench edges.
- Keep surcharge loads at least 2 feet (0.6 meters) from trench edges.
- Know where underground utilities are located.
- Test for low oxygen, hazardous fumes and toxic gases.
- Inspect trenches at the start of each shift.
- Inspect trenches following a rainstorm.
- Do not work under raised loads.

Two Examples of Vibration Failures



Soil affected by the movement of the crane and susceptible to sliding



Soil affected by the movement of the truck and susceptible to sliding

Additional Information

Visit OSHA's Safety and Health Topics web page on trenching and excavation at http://www.osha.gov/SLTC/trenchingexcavation/index.html

OSHA – EXCAVATIONS

Introduction

Excavation and trenching are among the most hazardous construction operations. The Occupational Safety and Health Administration's (OSHA) Excavation and Trenching standard, Title 29 of the Code of Federal Regulation (CFR), Part 1926.650, covers requirements for excavation and trenching operations. This booklet highlights key elements of the standard, shows ways to protect employees against cave-ins, and describes safe work practices for employees.

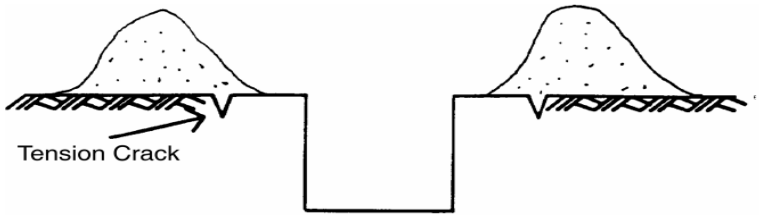
What is the difference between an excavation and a trench?

OSHA defines an excavation as any man-made cut, cavity, trench, or depression in the earth's surface formed by earth removal. This can include excavations for anything from cellars to highways. A trench is defined as a narrow underground excavation that is deeper than it is wide, and no wider than 15 feet (4.5 meters).

This worker has cut a trench to extract a tree stump.
His equipment is dangerously close and could possibly create a cave-in.

What are the dangers of trenching and excavation operations?

Trenching and excavation work presents serious hazards to all workers involved. Cave-ins pose the greatest risk and are much more likely than other excavation-related accidents to result in worker fatalities. Other potential hazards include falls, falling loads, hazardous atmospheres, and incidents involving mobile equipment.



Heavy loads such as large equipment, heavy materials or large spoil piles can be too heavy for the soil to support, resulting in cave-ins.
Tension cracks are often the first sign of a possible cave-in.

OSHA's Excavation and Trenching Standard

What does the OSHA standard cover, and what protections does it offer?
The rule applies to all open excavations made in the earth's surface, including trenches. Strict compliance with all sections of the standard will prevent or greatly reduce the risk of cave-ins as well as other excavation-related accidents.

What kinds of excavations and trenches are not covered?
The standard does not apply to house foundation/ basement excavations, including those that become trenches by definition when constructing formwork, foundations, or walls. For this exemption to apply, all the following conditions must exist:
• The excavation is less than 7-1/2 feet (2.5 meters) deep or is benched for at least 2 feet (.61 meters) horizontally for every 5 feet (1.52 meters) or less of vertical height;
• The bottom of the excavation, from the excavation face to the formwork or wall, is at least 2 feet (.61 meters) wide, and wider if possible;
• No water, surface tension cracks, or other environmental conditions reduce the excavation's stability;
• No heavy equipment is vibrating the excavation while employees are in it;
• Soil, equipment, and material surcharge loads are no closer to the top edge of the excavation than the excavation is deep. When you use front-end loaders to dig the excavations, place the soil surcharge load as far back from the edge of the excavation as possible, but never closer than 2 feet (.61 meters);
• The fewest crew members possible are performing the work; and
• Workers spend the minimum time possible in the excavation.

Do you think this work site is exempt from the OSHA standards?
Does it meet all 7 exemptions above?

This exemption does not apply to utility excavations or trenches, which are covered by 29 CFR 1926.652.

Preplanning

Why is it important to preplan the excavation work?
No matter how many trenching, shoring, and backfilling jobs you have done in the past, it is important to approach each new job with the utmost care and preparation. Many on-the-job accidents result directly from inadequate initial planning. Waiting until after the work has started to correct mistakes in shoring or sloping slows down the operation, adds to the cost, and increases the possibility of a cave-in or other excavation failure.

What safety factors should you consider when bidding on a job?

Before preparing a bid, you will want to know as much as possible about the jobsite and the materials you will need to have on hand to perform the work safely and in compliance with OSHA standards. A safety checklist may prove helpful when you consider specific site conditions such as the following:

- Traffic,
- Proximity and physical conditions of nearby structures,
- Soil,
- Surface and ground water,
- Location of the water table,
- Overhead and underground utilities, and
- Weather.

You can determine these and other conditions through jobsite studies, observations, test borings for soil type or conditions, and consultations with local officials and utility companies. This information will help you determine the amount, kind, and cost of safety equipment you will need to perform the work in the safest manner possible.

How can you avoid hitting underground utility lines and pipes during excavation work?
Before starting work, the OSHA standard requires you to do the following:

- Determine the approximate location of utility installations—sewer, telephone, fuel, electric, and water lines; or any other underground installations;
- Contact the utility companies or owners involved to inform them of the proposed work within established or customary local response times; and
- Ask the utility companies or owners to find the exact location of underground installations. If they cannot respond within 24 hours (unless the period required by state or local law is longer) or cannot find the exact location of the utility installations, you may proceed with caution.

If your excavation work exposes underground installations, OSHA regulations require you to protect, properly support, or remove them.

What should you tell workers before they start the project?
When you share the details of your safety and health program with employees, it is important to emphasize the critical role you expect them to play in keeping the jobsite safe. You may want to emphasize specific rules to help reduce the risk of on-the-job injuries. These rules may include requirements that workers
• Remove or minimize all surface obstacles at the worksite that may create a hazard,
• Wear warning vests or other reflective or high-visibility garments that you provide when they are exposed to vehicular traffic,
• Wear or use prescribed protective gear and equipment correctly,
• Operate equipment only if they have been trained properly in its use and alerted to its potential hazards, and
• Follow safe work practices.

It also is important to establish and maintain a safety and health management system for the worksite that provides adequate systematic policies, procedures, and practices to protect employees from, and allow them to recognize, job-related safety and health hazards.

Protective Systems

How can you prevent cave-ins?
OSHA requires that all excavations in which employees could potentially be exposed to cave-ins be protected by
• Sloping or benching the sides of the excavation,
• Supporting the sides of the excavation, or
• Placing a shield between the side of the excavation and the work area.

How do you choose the most appropriate protective system design?
Designing a protective system can be complex because you must consider many factors: soil classification, depth of cut, water content of soil, changes due to weather and climate, or other operations in the vicinity. You are free to choose the most practical design approach for any particular circumstance.

Once you have selected an approach, however, the system must meet the required performance criteria.
The OSHA standard describes methods and approaches for designing protective systems such as the following:
Method 1 - Slope the sides to an angle not steeper than 1-1/2:1; for example, for every foot of depth, the trench must be excavated back 1-1/2 feet. All simple slope excavations 20 feet (6.11 meters) or less deep should have a maximum allowable slope of 1-1/2:1. These slopes must be excavated to form configurations similar to those for Type C soil, as described in Appendix B of the standard. A slope of this gradation or less is safe for any type of soil.

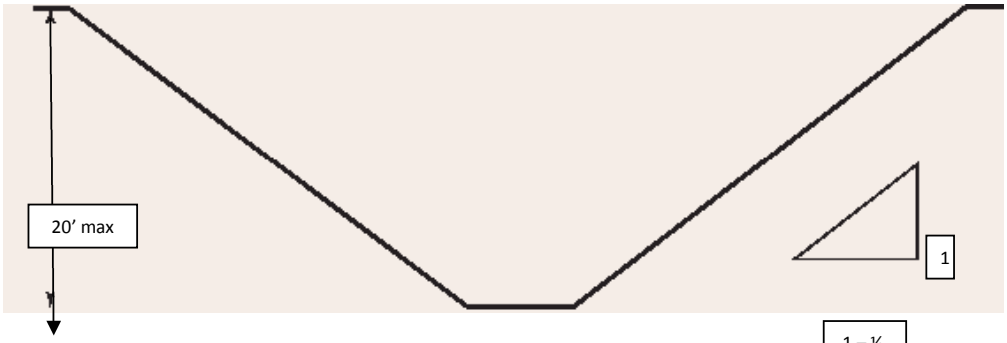


Figure 1. Excavations Made in Type C Soil

Method 2 - Use tabulated data such as tables and charts approved by a registered professional engineer to design the excavation. These data must be in writing and must include enough explanatory information, including the criteria for making a selection and the limits on the use of the data, for the user to make a selection. At least one copy of the data, including the identity of the registered professional engineer who approved it, must be kept at the worksite during construction of the protective system. After the system is completed, the data may be stored away from the jobsite, but a copy must be provided upon request to the Assistant Secretary of Labor for OSHA.

Method 3 - Use a trench box or shield designed or approved by a registered professional engineer or based on tabulated data prepared or approved by a registered professional engineer. Timber, aluminum, or other suitable materials may also be used. OSHA standards permit the use of a trench shield (also known as a welder's hut) if it provides the same level of protection or more than the appropriate shoring system.

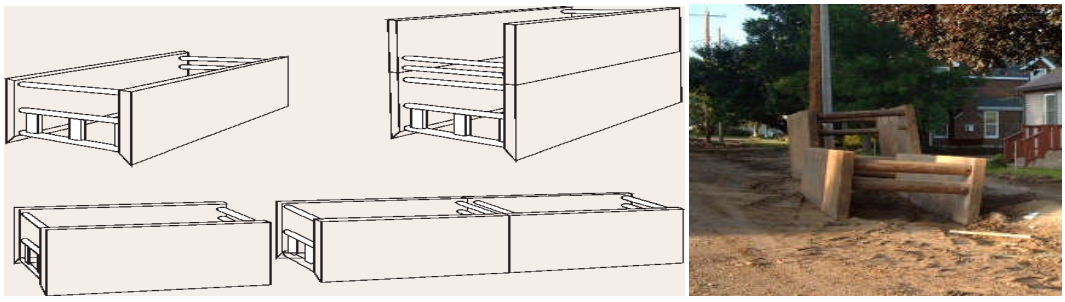


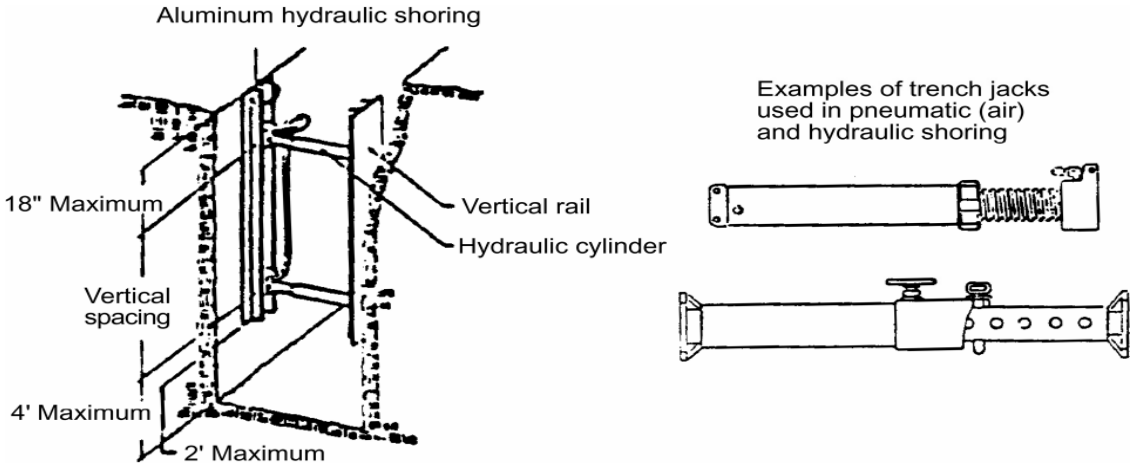
Figure 2. Trench Shields

Employers can choose the most practical method for the particular circumstance, but that system must meet the required performance criteria. The standard does not require a protective system when an excavation is made entirely in stable rock or is less than 5 feet (1.52 meters) deep, if a competent person has examined the ground and found no indication of a potential cave-in.

What other safety precautions are you required to take?
The standard requires you to provide support systems such as shoring, bracing, or underpinning to ensure that adjacent structures such as buildings, walls, sidewalks, or pavements remain stable. The standard also prohibits excavation below the base or footing of any foundation or retaining wall unless
• You provide a support system such as underpinning,
• The excavation is in stable rock, or
• A registered professional engineer determines that the structure is far enough away from the excavation and that excavation will not pose a hazard to employees.

Excavations under sidewalks and pavements are prohibited unless you provide an appropriately designed support system or another effective means of support.

Example of Air Shoring or Hydraulic Shoring



How do you safely install and remove protective systems?
The standard requires you to take the following steps to protect employees when installing support systems:
• Connect members of support systems securely,
• Install support systems safely,
• Avoid overloading members of support systems, and
• Install other structural members to carry loads imposed on the support system when you need to remove individual members temporarily.

In addition, the standard permits excavation of 2 feet (.61 meters) or less below the bottom of the members of a support or shield system of a trench if the system is designed to resist the forces

calculated for the full depth of the trench. In addition, there must be no indications, while the trench is open, of a possible cave-in below the bottom of the support system. Also, you must coordinate the installation of support systems closely with the excavation work.
As soon as work is completed, you are required to backfill the excavation when you dismantle the protective system. After the excavation is cleared, remove the protective system from the bottom up, taking care to release members slowly.

How should you maintain materials and equipment used for protective systems?
You are responsible for maintaining materials and equipment used for protective systems. Defective and damaged materials and equipment can cause failure of a protective system and other excavation hazards.
To avoid possible failure of a protective system, you must ensure that
• Materials and equipment are free from damage or defects;
• Manufactured materials and equipment are used and maintained consistent with the manufacturer's recommendations, so as to prevent employee exposure to hazards; and while in operation,
• A competent person examines any damaged materials and equipment. You must remove unsafe materials and equipment from service until a registered professional engineer evaluates and approves them for use.

Additional Hazards and Protections

What other excavation hazards do you need to protect workers against?
In addition to cave-ins and related hazards, workers involved in excavation work also are exposed to hazards involving falls, falling loads, and mobile equipment. To protect employees from these hazards, OSHA requires you to take the following precautions:
• Keep materials or equipment that might fall or roll into an excavation at least 2 feet (.61 meters) from the edge of excavations, or use retaining devices, or both.

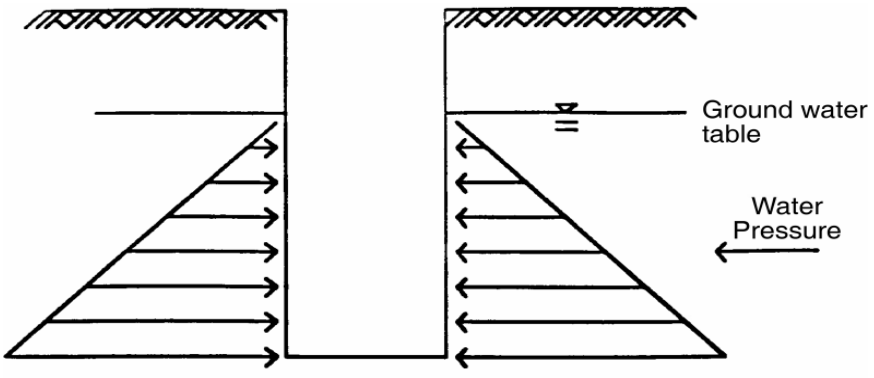
The remains of this house are a safety hazard for workers. The debris is too close to the excavation and there is no protective barricade.
Is there anything else missing?

• Provide warning systems such as mobile equipment, barricades, hand or mechanical signals, or stop logs to alert operators to the edge of an excavation. If possible, keep the grade away from the excavation.
• Provide scaling to remove loose rock or soil, or install protective barricades and other equivalent protection to protect employees against falling rock, soil, or materials.

• Prohibit employees from working on faces of sloped or benched excavations at levels above other employees unless you provide the employees at the lower levels adequate protection from the hazard of falling, rolling, or sliding material or equipment.
• Prohibit employees from standing or working under loads being handled by lifting or digging equipment. Require workers to stand away from vehicles being loaded or unloaded to protect them from being struck by any spillage or falling materials. You may permit operators to remain inside cabs of vehicles if they provide adequate protection from falling loads during loading and unloading operations.

These employees are standing or working too close to the digging equipment.

What is the effect of water accumulation on excavation safety?
Among the additional hazards stemming from water in an excavation are undermining the sides and making it more difficult to get out of the excavation. The OSHA standard prohibits employees from working without adequate protection in excavations where water has accumulated or is accumulating. If you use water removal equipment to control or prevent water accumulation, you must ensure that a competent person monitors the equipment and its operation to ensure proper use. OSHA standards also require the use of diversion ditches, dikes, or other suitable means to prevent surface water from entering an excavation and to provide adequate drainage of the adjacent area. In addition, a competent person must inspect excavations subject to runoffs from heavy rains.



Added effect of water pressure

Regardless of the soil type, as the depth of the trench increases, the magnitude of pressures on the full height of the excavation also increases. The presence of ground water adds hydrostatic pressure against the walls of the trench

How can you protect workers against hazardous atmospheres inside excavations?
A competent person must test any excavation deeper than 4 feet (1.22 meters) or where an oxygen deficiency or a hazardous atmosphere is present or could reasonably be expected, such as a landfill or where hazardous substances are stored nearby, before an employee enters it. If there are any hazardous conditions, you must provide the employee controls such as proper respiratory protection or ventilation. In addition, you are responsible for regularly testing all controls used to reduce atmospheric contaminants to acceptable levels.
If unhealthful atmospheric conditions exist or develop in an excavation, you must provide emergency rescue equipment such as a breathing apparatus, safety harness and line, and basket stretcher and ensure that it is readily available. This equipment must be attended when in use.

What means of access and egress are you required to provide?
OSHA requires you to provide safe access and egress to all excavations, including ladders, steps, ramps, or other safe means of exit for employees working in trench excavations 4 feet (1.22 meters) or deeper. These devices must be located in the excavation within 25 feet (7.62 meters) of all workers.
Any structural ramps you use in your operation must be designed by a competent person if they are used for employee access or egress, or by a competent person qualified in structural design if they are used for vehicles. Also, structural members used for ramps or runways must be uniform in thickness and joined in a manner to prevent tripping or displacement.

A safe means of egress shall be provided within 25 feet of workers in a trench

What protective equipment are employees in pier holes and confined footing excavations required to use?
An employee who enters a bell-bottom pier hole or similar deep and confined footing excavation must wear a harness with a lifeline. The lifeline must be attached securely to the harness and must be separate from any line used to handle materials. Also, while the employee wearing the lifeline is in the excavation, an observer must be on hand to ensure that the lifeline is working properly and maintain communication with the employee.

Which one of these workers is wearing his harness correctly?

The one on left … or the one on the right?

You are correct…….. the one on the right.

When should you conduct a site inspection?
The standard requires that a competent person inspect an excavation and the areas around it daily for possible cave-ins, failures of protective systems and equipment, hazardous atmospheres, or other hazardous conditions. Inspections also are required after natural events such as heavy rains or manmade events such as blasting that may increase the potential for hazards. If the inspector finds any unsafe conditions during an inspection, you must clear employees from the hazardous area until you take safety precautions.
The standard also requires that a competent person inspect excavations and the adjacent areas daily for possible cave-ins, failures of protective systems and equipment, hazardous atmospheres, and other hazardous conditions. If the competent person finds these conditions, all exposed employees must leave the hazardous area until necessary safety precautions are taken.
Larger and more complex operations should have a full-time safety official who makes recommendations to improve implementation of the safety plan. In a smaller operation, the safety official may be part-time and usually will be a supervisor.
Supervisors are the contractor's representatives on the job. Supervisors should conduct inspections, investigate accidents, and anticipate hazards. They should ensure that employees receive on-the-job safety and health training. They also should review and strengthen overall safety and health precautions to guard against potential hazards, get the necessary worker cooperation in safety matters, and make frequent reports to the contractor.

OSHA Assistance, Services, and Programs

How can OSHA help me?
OSHA can provide extensive help through a variety of programs, including assistance about safety and health programs, state plans, workplace consultations, Voluntary Protection Programs, strategic partnerships, training and education, and more.

How does safety and health program management help employers and employees?
Effective management of worker safety and health protection is a decisive factor in reducing the extent and severity of work-related injuries and illnesses and their related costs. In fact, an effective safety and health management system forms the basis of good worker protection and can save time and money—about $4 for every dollar spent—and increase productivity.
To assist employers and employees in developing effective safety and health programs, OSHA published recommended Safety and Health Program Management Guidelines (Federal Register 54(18):3904–3916, January 26, 1989).

These voluntary guidelines can be applied to all worksites covered by OSHA.
The guidelines identify four general elements critical to the development of a successful safety and health management program:
• Management leadership and employee participation,
• Worksite analysis,
• Hazard prevention and control, and
• Safety and health training.
The guidelines recommend specific actions under each of these general elements to achieve an effective safety and health program. The Federal Register notice is available online at **www.osha.gov**

What are state plans?
State plans are OSHA-approved job safety and health programs operated by individual states or territories instead of Federal OSHA. The Occupational Safety and Health Act of 1970 (OSH Act) encourages states to develop and operate their own job safety and health plans and permits state enforcement of OSHA standards if the state has an approved plan. Once OSHA approves a state plan, it funds 50 percent of the program's operating costs. State plans must provide standards and enforcement programs, as well as voluntary compliance activities that are at least as effective as those of Federal OSHA.
There are 26 state plans: 23 cover both private and public (state and local government) employment, and 3 (Connecticut, New Jersey, and New York) cover only the public sector. For more information on state plans, see the listing at the end of this publication, or visit OSHA's website at **www.osha.gov**

How can consultation assistance help employers?
In addition to helping employers identify and correct specific hazards, OSHA's consultation service provides free, onsite assistance in developing and implementing effective workplace safety and health management systems that emphasize the prevention of worker injuries and illnesses.
Comprehensive consultation assistance provided by OSHA includes a hazard survey of the worksite and an appraisal of all aspects of the employer's existing safety and health management system. In addition, the service offers assistance to employers in developing and implementing an effective safety and health management system. Employers also may receive training and education services, as well as limited assistance away from the worksite.

Who can get consultation assistance and what does it cost?
Consultation assistance is available to small employers (with fewer than 250 employees at a fixed site and no more than 500 corporatewide) who want help in establishing and maintaining a safe and healthful workplace.
Funded largely by OSHA, the service is provided at no cost to the employer. Primarily developed for smaller employers with more hazardous operations, the consultation service is delivered by state governments employing professional safety and health consultants. No penalties are proposed or citations issued for hazards identified by the consultant. The employer's only obligation is to correct all identified serious hazards within the agreed-upon correction time frame.

Can OSHA assure privacy to an employer who asks for consultation assistance?
OSHA provides consultation assistance to the employer with the assurance that his or her name and firm and any information about the workplace will not be routinely reported to OSHA enforcement staff.

Can an employer be cited for violations after receiving consultation assistance?
If an employer fails to eliminate or control a serious hazard within the agreed-upon time frame, the consultation project manager must refer the situation to the OSHA enforcement office for appropriate action. This is a rare occurrence, however, since employers request the service for the expressed purpose of identifying and fixing hazards in their workplaces.

Does OSHA provide any incentives for seeking consultation assistance?
Yes. Under the consultation program, certain exemplary employers may request participation in OSHA's Safety and Health Achievement Recognition Program (SHARP). Eligibility for participation in SHARP includes, but is not limited to, receiving a full-service, comprehensive consultation visit, correcting all identified hazards, and developing an effective safety and health management system.

Employers accepted into SHARP may receive an exemption from programmed inspections (not complaint or accident investigation inspections) for a period of 1 year initially, or 2 years upon renewal. For more information concerning consultation assistance, see the list of consultation offices or contact your regional or area OSHA office, or visit OSHA's website at **www.osha.gov** .

What are the Voluntary Protection Programs?
Voluntary Protection Programs (VPPs) represent one part of OSHA's effort to extend worker protection beyond the minimum required by OSHA standards. VPP - along with onsite consultation services, full-service area offices, and OSHA's Strategic Partnership Program (OSPP) - represents a cooperative approach which, when coupled with an effective enforcement program, expands worker protection to help meet the goals of the OSH Act.

How do the VPP work?
There are three levels of VPPs: Star, Merit, and Demonstration. All are designed to do the following:
• Recognize employers who have successfully developed and implemented effective and comprehensive safety and health management systems;
• Encourage these employers to continuously improve their safety and health management systems;
• Motivate other employers to achieve excellent safety and health results in the same outstanding way; and
• Establish a relationship between employers, employees, and OSHA that is based on cooperation.

How do VPP help employers and employees?
VPP participation can mean the following:
• Fewer worker fatalities, injuries, and illnesses;
• Lost-workday case rates generally 50 percent below industry averages;
• Lower workers' compensation and other injury- and illness-related costs;
• Improved employee motivation to work safely, leading to a better quality of life at work;
• Positive community recognition and interaction;
• Further improvement and revitalization of already-good safety and health programs; and a
• Positive relationship with OSHA.

How does OSHA monitor VPP sites?
OSHA reviews an employer's VPP application and conducts a VPP Onsite Evaluation to verify that the safety and health management systems described are operating effectively at the site. OSHA conducts onsite evaluations on a regular basis, annually for participants at the Demonstration level,

every 18 months for Merit, and every 3 to 5 years for Star. Each February, all participants must send a copy of their most recent annual evaluation to their OSHA regional office. This evaluation must include the worksite's record of injuries and illnesses for the past year.

Can OSHA inspect an employer who is participating in the VPP?
Sites participating in VPP are not scheduled for regular, programmed inspections. OSHA handles any employee complaints, serious accidents, or significant chemical releases that may occur at VPP sites according to routine enforcement procedures.
Additional information on VPP is available from OSHA national, regional, and area offices. Also, see **Outreach** on OSHA's website at **www.osha.gov**.

How can a partnership with OSHA improve worker safety and health?
OSHA has learned firsthand that voluntary, cooperative partnerships with employers, employees, and unions can be a useful alternative to traditional enforcement and an effective way to reduce worker deaths, injuries, and illnesses.
This is especially true when a partnership leads to the development and implementation of a comprehensive workplace safety and health management system.

What is OSHA.s Strategic Partnership Program (OSPP)?
OSHA Strategic Partnerships are alliances among labor, management, and government to foster improvements in workplace safety and health. These partnerships are voluntary, cooperative relationships between OSHA, employers, employee representatives, and others such as trade unions, trade and professional associations, universities, and other government agencies. OSPPs are the newest of OSHA's cooperative programs.

What do OSPPs do?
These partnerships encourage, assist, and recognize the efforts of the partners to eliminate serious workplace hazards and achieve a high level of worker safety and health.
Whereas OSHA's Consultation Program and VPP entail one-on-one relationships between OSHA and individual worksites, most strategic partnerships seek to have a broader impact by building cooperative relationships with groups of employers and employees.

What are the different kinds of OSPPs?
There are two major types:
• Comprehensive, which focus on establishing comprehensive safety and health management systems at partnering worksites; and
• Limited, which help identify and eliminate hazards associated with worker deaths, injuries, and illnesses, or have goals other than establishing comprehensive worksite safety and health programs.
OSHA is interested in creating new OSPPs at the national, regional, and local levels. OSHA also has found limited partnerships to be valuable. Limited partnerships might address the elimination or control of a specific industry hazard.

What are the benefits of participation in the OSPP?
Like VPP, OSPP can mean the following:
• Fewer worker fatalities, injuries, and illnesses;
• Lower workers' compensation and other injury- and illness-related costs;

• Improved employee motivation to work safely, leading to a better quality of life at work and enhanced productivity;
• Positive community recognition and interaction;
• Development of or improvement in safety and health management systems; and
• Positive interaction with OSHA.
For more information about this program, contact your nearest OSHA office or go to the agency website at **www.osha.gov** .

Does OSHA have occupational safety and health training for employers and employees?
The OSHA Training Institute in Des Plaines, IL, provides basic and advanced training and education in safety and health for federal and state compliance officers, state consultants, other federal agency personnel, and private sector employers, employees, and their representatives.
Institute courses cover diverse safety and health topics including electrical hazards, machine guarding, personal protective equipment, ventilation, and ergonomics. The facility includes classrooms, laboratories, a library, and an audiovisual unit. The laboratories contain various demonstrations and equipment, such as power presses, woodworking and welding shops, a complete industrial ventilation unit, and a sound demonstration laboratory.
More than 57 courses dealing with subjects such as safety and health in the construction industry and methods of compliance with OSHA standards are available for personnel in the private sector.
In addition, OSHA's 73 area offices are full-service centers offering a variety of informational services such as personnel for speaking engagements, publications, audiovisual aids on workplace hazards, and technical advice.
For more information on grants, training, and education, write: OSHA Training Institute, Office of Training and Education, 1555 Times Drive, Des Plaines, IL 60018; call (847) 297–4810; or see **Outreach** on OSHA's website at **www.osha.gov** .

Does OSHA give money to organizations for training and education?
OSHA awards grants through its Susan Harwood Training Grant Program to nonprofit organizations to provide safety and health training and education to employers and workers in the workplace. The grants focus on programs that will educate workers and employers in small business (fewer than 250 employees), training workers and employers about new OSHA standards or about high-risk activities or hazards. Grants are awarded for 1 year and may be renewed for an additional 12 months depending on whether the grantee has performed satisfactorily.
OSHA expects each organization awarded a grant to develop a training and/or education program that addresses a safety and health topic named by OSHA, recruit workers and employers for the training, and conduct the training.
Grantees are also expected to follow up with people who have been trained to find out what changes were made to reduce the hazards in their workplaces as a result of the training.
Each year OSHA has a national competition that is announced in the Federal Register and on the Internet at www.osha-slc.gov/Training/sharwood/sharwood.html .
If you do not have access to the Internet, you can contact the OSHA Office of Training and Education, 1555 Times Drive, Des Plaines, IL 60018, (847) 297–4810, for more information.

Does OSHA have other assistance materials available?
OSHA has a variety of materials and tools available on its website at **www.osha.gov** . These include eTools, Expert Advisors, Electronic Compliance Assistance Tools (e-CATs), Technical Links,

regulations, directives, publications, videos, and other information for employers and employees. OSHA's software programs and compliance assistance tools walk you through challenging safety and health issues and common problems to find the best solutions for your workplace. OSHA's comprehensive publications program includes more than 100 titles to help you understand OSHA requirements and programs.
OSHA's CD-ROM includes standards, interpretations, directives, and more and can be purchased on CD-ROM from the U.S. Government Printing Office. To order, write to the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402, or phone (202) 512–1800. Specify OSHA Regulations, Documents and Technical Information on CD-ROM (ORDT), GPO Order No. S/N 729-013-00000-5.

What do I do in case of an emergency or if I need to file a complaint?
To report an emergency, file a complaint, or seek OSHA advice, assistance, or products, call (800) 321–OSHA or contact your nearest OSHA regional or area office listed at the end of this publication. The teletypewriter (TTY) number is (877) 889–5627.
You can also file a complaint online and obtain more information on OSHA federal and state programs by visiting OSHA's website at **www.osha.gov** .

OSHA Regional and Area Offices

OSHA Regional Offices
*These states and territories operate their own OSHA-approved job safety and health programs (Connecticut, New Jersey and New York plans cover public employees only). States with approved programs must have a standard that is identical to, or at least as effective as, the federal standard.

Region I (CT,* ME, MA, NH, RI, VT*) JFK Federal Building, Room E340 Boston, MA 02203 (617) 565–9860	**Region VI** (AR, LA, NM,* OK, TX) 525 Griffin Street, Room 602 Dallas, TX 75202 (214) 767–4731 or 4736 x224
Region II (NJ,* NY,* PR,* VI*) 201 Varick Street, Room 670 New York, NY 10014 (212) 337–2378	**Region VII** (IA,* KS, MO, NE) City Center Square 1100 Main Street, Suite 800 Kansas City, MO 64105 (816) 426–5861
Region III (DE, DC, MD,* PA,* VA,* WV) The Curtis Center 170 S. Independence Mall West Suite 740 West Philadelphia, PA 19106-3309 (215) 861–4900	**Region VIII** (CO, MT, ND, SD, UT,* WY*) 1999 Broadway, Suite 1690 PO Box 46550 Denver, CO 80202-5716 (303) 844–1600

Region IV (AL, FL, GA, KY,* MS, NC,* SC,* TN*) SNAF 61 Forsyth Street SW Room 6T50 Atlanta, GA 30303 (404) 562–2300	**Region IX** (American Samoa, AZ,* CA,* HI, NV,* Northern Mariana Islands) 71 Stevenson Street, Room 420 San Francisco, CA 94105 (415) 975–4310
Region V (IL, IN,* MI,* MN,* OH, WI) 230 South Dearborn Street, Room 3244 Chicago, IL 60604 (312) 353–2220	**Region X** (AK,* ID, OR,* WA*) 1111 Third Avenue, Suite 715 Seattle, WA 98101-3212 (206) 553–5930

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OSHA Area Offices

Anchorage, AK (907) 271–5152	North Aurora, IL (630) 896–8700	Avenel, NJ (732) 750–3270	Pittsburgh, PA (412) 395–4903
Birmingham, AL (205) 731–1534	Peoria, IL (309) 671–7033	Hasbrouck Heights, NJ (201) 288–1700	Wilkes–Barre, PA (570) 826–6538
Mobile, AL (334) 441–6131	Indianapolis, IN (317) 226–7290	Marlton, NJ (609) 757–5181	Guaynabo, PR (787) 277–1560
Little Rock, AR (501) 324–6291 (5818)	Wichita, KS (316) 269–6644	Parsippany, NJ (973) 263–1003	Providence, RI (401) 528–4669
Phoenix, AZ (602) 640–2348	Frankfort, KY (502) 227–7024	Albuquerque, NM (505) 248–5302	Columbia, SC (803) 765–5904
Sacramento, CA (916) 566–7471	Baton Rouge, LA (225) 389–0474 (0431)	Carson City, NV (775) 885–6963	Nashville, TN (615) 781–5423
San Diego, CA (619) 557–5909	Braintree, MA (617) 565–6924	Albany, NY (518) 464–4338	Austin, TX (512) 916–5783 (5788)
Denver, CO (303) 844–5285	Methuen, MA (617) 565–8110	Bayside, NY (718) 279–9060	Corpus Christi, TX (512) 888–3420
Englewood, CO (303) 843–4500	Springfield, MA (413) 785–0123	Bowmansville, NY (716) 684–3891	Dallas, TX (214) 320–2400 (2558)

Bridgeport, CT (203) 579–5581	Linthicum, MD (410) 865–2055/2056	New York, NY (212) 466–2482	El Paso, TX (915) 534–6251
Hartford, CT (860) 240–3152	August, ME (207) 622–8417	North Syracuse, NY (315) 451–0808	Fort Worth, TX (817) 428–2470 (485–7647)
Wilmington, DE (302) 573–6518	Bangor, ME (207) 941–8177	Tarrytown, NY (914) 524–7510	Houston, TX (281) 591–2438 (2787)
Fort Lauderdale, FL (954) 424–0242	Portland, ME (207) 780–3178	Westbury, NY (516) 334–3344	Houston, TX (281) 286– 0583/0584 (5922)
Jacksonville, FL (904) 232–2895	Lansing, MI (517) 327–0904	Cincinnati, OH (513) 841–4132	Lubbock, TX (806) 472–7681 (7685)
Tampa, FL (813) 626–1177	Minneapolis, MN (612) 664–5460	Cleveland, OH (216) 522–3818	Salt Lake City, UT (801) 530–6901
Savannah, GA (912) 652–4393	Kansas City, MO (816) 483–9531	Columbus, OH (614) 469–5582	Norfolk, VA (757) 441–3820
Smyrna, GA (770) 984–8700	St. Louis, MO (314) 425–4289	Toledo, OH (419) 259–7542	Bellevue, WA (206) 553–7520
Tucker, GA (770) 493– 6644/6742/ 8419	Jackson, MS (601) 965–4606	Oklahoma City,OK (405) 231–5351 (5389)	Appleton, WI (920) 734–4521
Des Moines, IA (515) 284–4794	Billings, MT (406) 247–7494	Portland, OR (503) 326–2251	Eau Claire, WI (715) 832–9019
Boise, ID (208) 321–2960	Raleigh, NC (919) 856–4770	Allentown, PA (610) 776–0592	Madison, WI (608) 264–5388
Calumet City, IL (708) 891–3800	Bismark, ND (701) 250–4521	Erie, PA (814) 833–5758	Milwaukee, WI (414) 297–3315
Des Plaines, IL (847) 803–4800	Omaha, NE (402) 221–3182	Harrisburg, PA (717) 782–3902	Charleston, WV (304) 347–5937
Fairview Heights, IL (618) 632–8612	Concord, NH (603) 225–1629	Philadelphia, PA (215) 597–4955	