OSHA Chemical Safety and Health Standards

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What Can We Expect?

- Standards pertaining to chemical safety and health
- Process Safety Management
- Compliance assistance resources
- Questions
Top Ten Violations
Most frequently cited OSHA standards during FY 2019 inspections

1. Fall Protection – General Requirements (1926.501)
2. Hazard Communication (1910.1200)
3. Scaffolding (1926.451)
4. Lockout/Tagout (1910.147)
5. Ladders (1926.1053)
6. Respiratory Protection (1910.134)
7. Powered Industrial Trucks (1910.178)
8. Fall Protection – Training Requirements (1926.503)
10. Eye and Face Protection (1926.102)
Frequently Cited OSHA Standards

This page allows the user to list the most frequently cited Federal or State OSHA standards for a specified 6-digit North American Industry Classification System (NAICS) code. Also available is Industry Profile for OSHA Standard which lists NAICS classifications having the most occurrences of citations for a specified OSHA standard.

Select number of employees in establishment:
- All
- 1-9
- 1-19
- 1-99
- 20-49
- 20-99
- 50-99
- 100-249
- 1-249
- 250+

Federal or State Jurisdiction: Federal

NAICS: [ ]

Submit

The data shown reflects OSHA citations issued by the Federal or State OSHA during the specified fiscal year; see definitions. If you are interested in obtaining the NAICS code for a particular industry, references are available on the NAICS Manual. This manual contains descriptions of every NAICS sector.

https://www.osha.gov/pls/imis/citedstandard.html
## NAICS Code: 32 Manufacturing (part 2 of 3)

Listed below are the standards which were cited by Federal OSHA for the specified NAICS Code during the period October 2019 through September 2020, rather than initial amounts. For more information, see definitions.

<table>
<thead>
<tr>
<th>Standard</th>
<th>Citations</th>
<th>Inspections</th>
<th>Penalty</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>Total</td>
<td>3,184</td>
<td>882</td>
<td>$11,958,497</td>
<td>All Standards cited for Manufacturing (part 2 of 3)</td>
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<tr>
<td>19100147</td>
<td>495</td>
<td>285</td>
<td>$2,805,255</td>
<td>The control of hazardous energy (lockout/tagout).</td>
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<td>121</td>
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<td>203</td>
<td>141</td>
<td>$479,545</td>
<td>Powered industrial trucks.</td>
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<tr>
<td>19100212</td>
<td>200</td>
<td>189</td>
<td>$1,745,022</td>
<td>General requirements for all machines.</td>
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<tr>
<td>19100305</td>
<td>109</td>
<td>77</td>
<td>$149,933</td>
<td>Wiring methods, components, and equipment for general use.</td>
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<tr>
<td>19100095</td>
<td>105</td>
<td>53</td>
<td>$203,090</td>
<td>Occupational noise exposure.</td>
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<tr>
<td>19100132</td>
<td>105</td>
<td>84</td>
<td>$239,656</td>
<td>General requirements.</td>
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<td>19100119</td>
<td>103</td>
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<td>Process safety management of highly hazardous chemicals.</td>
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<td>19101053</td>
<td>102</td>
<td>25</td>
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</table>
NAICS Code: 325998 All Other Miscellaneous Chemical Product and Preparation Manufacturing

Listed below are the standards which were cited by Federal OSHA for the specified NAICS Code during the period October 2019 through September 2020. Penalties rather than initial amounts. For more information, see definitions.

<table>
<thead>
<tr>
<th>Standard</th>
<th>Citations</th>
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<th>Penalty</th>
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<tbody>
<tr>
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<td>19100132</td>
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<td>4</td>
<td>$47,670</td>
<td>General requirements.</td>
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<tr>
<td>19100212</td>
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<td>5</td>
<td>$21,915</td>
<td>General requirements for all machines.</td>
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<tr>
<td>19100028</td>
<td>3</td>
<td>2</td>
<td>$6,554</td>
<td>Duty to have fall protection and falling object protection.</td>
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<tr>
<td>19100095</td>
<td>3</td>
<td>1</td>
<td>$3,500</td>
<td>Occupational noise exposure.</td>
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<tr>
<td>19100178</td>
<td>2</td>
<td>2</td>
<td>$6,361</td>
<td>Powered industrial trucks.</td>
</tr>
</tbody>
</table>
Chemical Safety

(General Industry Standards)

- Subpart G: Occupational Health and Environmental Control
- Subpart H: Hazardous Materials
  - PSM, Hazwoper, flammable liquids, ammonia handling, spray finish
- Subpart I: Personal Protective Equipment
- Subpart J: General Environmental Controls (Confined Space)
- Subpart K: Medical Services/First Aid (Eyewash)
- Subpart Z: Toxic and Hazardous Substances
  - Permissible exposure limits and expanded health standards
Personal Protective Equipment

- **29 CFR 1910 Subpart I** (1910.132-140)
  
  - 1910.132(d) Requires a Hazard Assessment
    - Conducted by employer
    - Assessment certified in writing
    - Select PPE
    - Communicate decisions on PPE to employees
Personal Protective Equipment

- **29 CFR 1910 Subpart I** (1910.132-140)
  - Eye and Face Protection
  - Respiratory Protection
  - Head Protection
  - Foot Protection
  - Hand Protection

Employers Must Provide and Pay for PPE

OSHAA Occupational Safety and Health Administration
Hazard Communication

- Written Hazard Communication Program
- **Labeling**
- **Safety Data Sheets**
- Training requirements
  - Upon initial assignment
  - Changes
Role of Labels

- Labels are the immediate source of information on a chemical
- New labels will have more information than current labels
- There may also be additional information (known as supplemental information) on the label that is not required—the required information should be presented together on the label
Hazard Communication

SAMPLE LABEL

Product Identifier

Company Name
Street Address
City
Postal Code
Emergency Phone Number

Supplier Identification

Keep container tightly closed. Store in a cool, well-ventilated place that is locked.
Keep away from heat/sparks/open flame. No smoking. Only use non-sparking tools.
Use explosion-proof electrical equipment. Take precautionary measures against static discharge.
Ground and bond container and receiving equipment. Do not breathe vapors. Wear protective gloves. Do not eat, drink or smoke when using this product. Wash hands thoroughly after handling. Dispose of in accordance with local, regional, national, international regulations as specified.

In case of fire: use dry chemical (BC) or Carbon Dioxide (CO2) fire extinguisher to extinguish.

First Aid
If exposed call Poison Center. If on skin (or hair): Take off immediately any contaminated clothing. Rinse skin with water.

Hazard Pictograms

Signal Word
Danger

Highly flammable liquid and vapor. May cause liver and kidney damage.

Hazard Statements

Precautionary Statements

Supplemental Information

Directions for Use

Fill weight:________ Lot Number:________
Gross weight:_______ Fill Date:________
Expiration Date:________

HCS Pictograms and Hazards

- Carcinogen
- Mutagenicity
- Reproductive Toxicity
- Respiratory Sensitization
- Target Organ Toxicity
- Aspiration
- Organic Peroxides

- Flammable
- Pyrophoric
- Self-Heating
- Respiratory Tract Irritant
- Toxicity to Dose Layer (Non-Mandatory)

- Inert Gas
- Skin Irritant
- Acute Toxicity (Inhalation)

- Explosive
- Skin Corrosion/ Burns
- Water-reactive
- Organic Peroxides
- Explosives
- Self Reactives
- Organic Peroxides

- Flammable
- Eye Damage
- Corrosive to Metals
- aquatic toxicity
- Toxicity (Inhalation)

- Oxidizers
- Aquatic Toxicity

- Skull and Crossbones
### Accident Report Detail

**Accident: 201573128** - Employee Is Poisoned After Drinking From Mislabeled Bottle

**Accident: 201573128 -- Report ID: 0830500 -- Event Date: 08/04/2006**

**Establishment Name:** Pfiiken Iron Corporation

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**Inspection:** 309005825  
**SIC:** 3446  
**Open Date:** 08/07/2006  

On August 4, 2006, Employee #1 was working for a firm that manufactured architectural and ornamental metalwork. He and a coworker were at a remote jobsite prepping a metal staircase for finishing. They used a product designed to give the metal a black patina, which would then be coated with a clear sealant. This was selenium acid. The product was a clear blue liquid that they transported in a bottle that had once held Gatorade. The Gatorade label was still on the bottle. The bottle was stored in the back of a pickup truck near a cooler where Employee #1 kept his lunch. Employee #1 walked away from the work area back to the truck to get a drink. He drank from the Gatorade container before he realized that it contained not Gatorade, but the selenium acid. He spat out as much as he could, but he had already swallowed some of the liquid. He was driven to an emergency room about 30 to 40 minutes away. He died about 48 hours later. This incident is still under police investigation. A second, similar poisoning occurred on August 8, 2006. It involved the spouse of a coworker in the same company who took some of the same product home in a Gatorade bottle.

**Keywords:** metal shop, metal ladder, metal rail, chemical, poisoning

<table>
<thead>
<tr>
<th>Employee #</th>
<th>Inspection</th>
<th>Age</th>
<th>Sex</th>
<th>Degree</th>
<th>Nature</th>
<th>Occupation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>309005825</td>
<td></td>
<td></td>
<td>Fatality</td>
<td>Poisoning(Systemic)</td>
<td>Laborers, except construction</td>
</tr>
</tbody>
</table>

Subpart Z
(Toxic and Hazardous Substances)

- 1910.1000
  - Permissible exposure limits (PEL) for hundreds of chemicals
  - Engineering controls required if feasible

  - Note that in the absence of an established PEL, OSHA may apply
  other established occupation exposure limits under the general duty
  clause (Section 5(a)(1) of the OSH Act)
Subpart Z
(Toxic and Hazardous Substances)

  - Includes asbestos, silica, cadmium, benzene, lead
  - Requires employers to take action beyond just reducing exposures below the PEL
  - Often requires: exposure assessments, written programs, training, medical surveillance
Eyewash Stations

- 29 CFR 1910 Subpart K (1910.151(c))

  - Required for corrosive chemicals
  - Should be in line with ANSI standard
    - 15 minutes of continuous flow
    - Hands free operation
    - Immediately accessible
A Confined Space is...

- Large enough for an employee to enter
- Limited or restricted means for entry/exit
- Not designed for continuous worker occupancy
  - No ventilation
  - No lighting
  - Normally holds materials, water, grain, etc
What is a Permit-Required Confined Space?

- A Confined Space WITH:
  - Hazardous or potentially hazardous atmosphere;
  - Engulfment hazard;
  - Physical Hazard;
  - Other serious safety or health hazard
Examples of Confined Spaces

- Crawl Spaces
- Pits
- Vaults
- Manholes
- Storage bins
- Sewers
- Tanks
- Silos
- Attics
- Shafts
- Pipelines
An employer must conduct an evaluation of their site to determine if any permit-required confined spaces exist.
Will there be permit-required confined space entry?

- **No**: Employer must take effective action to prevent employees from entering the permit space.

- **Yes**: Employer must implement a permit program or use “alternative procedures”.

OSHA Occupational Safety and Health Administration
Written Permit Confined Space Program

- Prevent unauthorized entry
- Permits for entry
- Develop procedures for safe permit entry
- Provide necessary equipment
- Training of entrant, attendant, supervisor
- Rescue and emergency services
- Employee Participation
29 CFR 1910 Subpart H

- 1910.101 Compressed Gases
- 1910.102-05 (Acetylene, Hydrogen, O2, Nitrous Oxide)
- 1910.106 Flammable Liquids
- 1910.107 Spray Finishing
- 1910.111 Ammonia
29 CFR 1910.120 (Subpart H)
- Clean-up operations (hazardous substances) required by government
- Corrective action clean-up at RCRA sites
- Voluntary clean-up at recognized uncontrolled hazardous waste sites
- Operations involving hazardous wastes at TSD facilities
- Emergency response operations for releases (any location)
HAZWOPER

- Written safety and health program
- Medical Surveillance
- Engineering Controls
- Monitoring
- Decontamination
- Emergency Response to Hazardous Substance Releases (sec Q)
Process Safety Management Overview
What is PSM?

- **29 CFR 1910.119:**
  - Requirements for safe management of hazards associated with processes using, storing, manufacturing, or handling highly hazardous chemicals.
  - Emphasizes management of hazards through comprehensive program that integrates established technologies, procedures and practices.
Personal Safety vs. PSM

- **PROCESS SAFETY** incidents are low probability/high consequence events.

- Conversely, **PERSONAL SAFETY** incidents tend to arise from higher probability/lower consequence events.

- Process safety requires a strong **MANGEMENT SYSTEMS** approach to identify and control hazards.
What is covered?

- Processes including:
  - 10,000 pounds of flammable liquids or gasses
  - Threshold quantity (TQ) of a highly hazardous chemical (HHC)
    - 130+ chemicals listed in Appendix A
    - Toxic and/or reactive chemicals
<table>
<thead>
<tr>
<th>CHEMICAL NAME</th>
<th>CAS*</th>
<th>TQ**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acetaldehyde</td>
<td>75-07-0</td>
<td>2500</td>
</tr>
<tr>
<td>Acrolein (2-Popenal)</td>
<td>107-02-8</td>
<td>150</td>
</tr>
<tr>
<td>Acryloyl Chloride</td>
<td>814-68-6</td>
<td>250</td>
</tr>
<tr>
<td>Allyl Chlorid</td>
<td>107-05-1</td>
<td>1000</td>
</tr>
<tr>
<td>Allylamine</td>
<td>107-11-9</td>
<td>1000</td>
</tr>
<tr>
<td>Alkylaluminum</td>
<td>Varies</td>
<td>5000</td>
</tr>
<tr>
<td>Ammonia, Anhydrous</td>
<td>7664-41-7</td>
<td>10000</td>
</tr>
<tr>
<td>Ammonia solutions (greater than 44% ammonia by weight)</td>
<td>7664-41-7</td>
<td>15000</td>
</tr>
<tr>
<td>Ammonium Perchlorate</td>
<td>7790-98-9</td>
<td>7500</td>
</tr>
<tr>
<td>Ammonium Permanganate</td>
<td>7787-36-2</td>
<td>7500</td>
</tr>
</tbody>
</table>
What is covered?

- **Example: Ammonia**
  - TQ > 10,000 pounds for anhydrous (gas) ammonia
  - Mostly used in refrigeration
What isn’t covered?

- Retail facilities
- Oil or gas well drilling or servicing operations
- Normally unoccupied remote facilities
- Hydrocarbon fuels used solely for workplace consumption (i.e., vehicle refueling)
- Flammable liquids with flash point below 100°F and stored in atmospheric tanks and kept below boiling point without refrigeration
Process Safety Information (PSI)

- Employers must compile written process safety information (PSI)
  - Hazards of the HHCs used/produced
  - Technology of the process
  - Equipment in the process
Process Hazards
- Permissible exposure limits (PEL)
- Physical data
- Reactivity data
- Corrosivity data
- Thermal/chemical stability
- Effects of mixing
» SDS may be source
Process Technology

- Block flow diagram/process flow diagram
- Process chemistry
- Maximum intended inventory
- Safe upper/lower limits
  - temperatures, pressures, flows, compositions, pH
- Evaluation of consequences of deviation
Process Flow Diagram
- Process Equipment
  - Materials of construction
  - Piping and Instrumentation diagrams (P&IDs)
  - Electrical classification
  - Relief system design and design basis
  - Ventilation system design
  - Design codes and standards (ASME, API, ANSI, CGA, IIAR, etc)
  - Material and energy balances (built after 1992)
  - Safety systems (interlocks, detection, suppression)
The employer shall document that the equipment complies with Recognized and Generally Accepted Good Engineering Practices (RAGAGEP)

- ASME, CGA, API, ANSI, IIAR, etc
- RAGAGEP also applies to Mechanical Integrity

- RAGAGEP is for equipment design, inspection and testing, and frequency of inspection and testing
Examples of RAGAGEP

- ASME (American Society of Mechanical Engineers)
- ANSI (American National Standards Institute)
- CGA (Compressed Gas Association)
- API (American Petroleum Institute)
- ASTM (American Society for Testing and Materials)
- IIAR (International Institute of Ammonia Refrigeration)
- Manufacturer (Operations/Maintenance manuals)
- Internal RAGAGEP
Process Hazard Analysis (PHA)

- PHA is a thorough, systematic approach for identifying, evaluating and controlling the hazards of processes involving HHCs
  - The employer must perform a PHA on all covered processes
  - The PHA format must meet the complexity of the process
  - The PHA must identify, evaluate, and control the hazards involved in the process
PHA

- PHA Methods
  - What-if
  - Checklist
  - What-if/checklist
  - Hazard and operability study (HAZOP)
  - Failure mode and effects analysis (FMEA)
  - Fault tree analysis, or
  - An appropriate equivalent methodology

  » See OSHA publication 3133 for more information
PHA

- PHA shall address:
  - Hazards of the process
  - Prior incidents
  - Engineering and administrative controls
  - Consequences of failure of those controls
  - Facility siting
  - Human factors

- Shall be performed by a team
- Shall establish a system to address findings
- Revalidation every 5 years
Operating Procedures

- Written operating procedures for safely conducting activities in each covered process

- Covering:
  - Initial startup, normal/temporary/emergency operations, shutdowns
  - Operating limits, consequences of deviation, and steps required to correct
  - Safety/Health considerations
    - Hazards of chemicals, unique hazards, material control
    - Engineering controls, administrative controls, PPE
    - Safety systems and their functions
Operating Procedures

- Must be readily available to employees
- Reviewed as necessary to reflect current practices
- Annual certification of review
Employee Participation

- Employers must consult with employees and their reps on the development of the elements of process safety management.

- Employers shall provide employee access to all information required by the PSM standard.

- Employer shall develop a written plan regarding the implementation of employee participation.
Training

- Initial training in the process
  - Overview of process and ops procedures
  - Safety and health hazards
  - Emergency operations/shutdown
  - Safe work practices applicable to employee’s tasks

- Refresher training at least every 3 years

- Documentation of training (must state the means by which the training was shown to be effective)
Written procedures for maintaining the on-going integrity of:

- Pressure vessels
- Piping systems
- Relief and vent systems and devices
- Emergency shutdown systems
- Controls (monitoring devices, sensors, alarms, interlocks)
- Pumps
Mechanical Integrity

- Inspection and testing of equipment shall follow RAGAGEP
- Maintenance employees shall be trained
- Inspections shall be documented
- Equipment deficiencies shall be corrected in a safe and timely manner (ensure safe operation)
Rusted and broken cable to the “snappy joe” shut off valve

Rusted cable repaired by attaching new cable to old rusted piece
Missing paint and rust on ammonia piping. No flow direction or phase markings. Color?

Broken pressure gauges
Management of Change (MOC)

- Written procedures to manage changes to process chemicals, technology, equipment, and procedures that affect a covered process
  - technical basis for proposed change
  - impact of change on safety and health
  - modifications to operating procedures
  - time period for the change
  - authorization requirements for the change
- Does not include “replacements in kind”
- Requires updated PSI, op procedures, training
The other elements...

(a) Application
(b) Definitions
(c) Contractors
(i) Pre-Startup Safety Review
(k) Hot Work Permits
(m) Incident Investigation
(n) Emergency Planning and Response
(o) Compliance Audits
(p) Trade Secrets
Appendix C (1910.119)

- Non-mandatory Compliance Guidelines
  - Detailed description of each element of the standard
  - Plain language summary and recommendations
  - Good introduction to the standard
Compliance Assistance Resources

- OSHA Website ([www.osha.gov](http://www.osha.gov))
  - A-Z index, regulations, publications, e-tools and advisors

- Compliance Assistance Specialists
- OSHA Consultation
- NIOSH (National Institute of Occupational Safety and Health)
Compliance Assistance Resources

Compliance Assistance Quick Start

Follow the steps below to identify the major OSHA general industry requirements and guidance materials that may apply to your workplace. These steps will lead you to resources on OSHA’s website that will help you comply with OSHA requirements and prevent workplace injuries and illnesses.

- **Step 1:** OSHA Requirements That Apply to Most General Industry Employers
- **Step 2:** OSHA Requirements That May Apply to Your Workplace
- **Step 3:** Survey Your Workplace for Additional Hazards
- **Step 4:** Develop a Comprehensive Jobsite Safety and Health Program
- **Step 5:** Train Your Employees
- **Step 6:** Recordkeeping, Reporting and Posting
- **Step 7:** Find Additional Compliance Assistance Information

https://www.osha.gov/dcsp/compliance_assistance/quickstarts/general_industry/index.html
Occupational Safety and Health Administration

Directorate of Technical Support and Emergency Management / eTools, eMatrix, Expert Advisors and v-Tools

eTools, eMatrix, Expert Advisors and v-Tools

eTools and the eMatrix are "stand-alone," interactive, Web-based training tools on occupational safety and health topics. They are highly illustrated and utilize graphical menus. Some also use expert system modules, which enable the user to answer questions, and receive reliable advice on how OSHA regulations apply to their work site. Expert Advisors are based solely on expert systems and v-Tools are prevention video training tools. Selected eTools are available as downloadable files for off-line use.

Other training and reference materials are also available from the OSHA Directorate of Training and Education (DTE). In addition, OSHA also has other training videos available.

eTools

- Ammonia Refrigeration (08/2014)
- Battery Manufacturing (02/2004)
- Construction (08/2014) | Spanish (Translation Updated 02/2005)
- Electric Power Generation, Transmission, and Distribution (01/2010)
- Evacuation Plans and Procedures (09/2002)
- Eye and Face Protection (07/2002)
- Hazard Identification (07/2014)
- Hospital (02/2002)
- Lockout/Tagout (09/1999)
- Logging (10/1998)
- Machine Guarding (06/2007)
- Nursing Home (10/2000)
- Oil and Gas Well Drilling and Servicing (05/2009)
- Poultry Processing (06/2001)

Ergonomics-related eTools

- Baggage Handling (09/2003)
- Beverage Delivery (01/2001)
- Computer Workstations (08/2003)
- Electrical Contractors (07/2003)
- Grocery Warehousing (01/2001)
- Printing Industry (08/2006)
- Sewing (01/2001) | Spanish (10/2001)

Expert Advisors

- Asbestos
- Cadmium Biological Monitoring Advisor
- Confined Spaces
- Electronic Health and Safety Program (eHASP)
- Evacuation - Am I Required to have an Emergency Action Plan?

Prevention Videos (v-Tools)

Construction Hazards. The videos show how quickly workers can be injured or killed on the job and are intended to assist those in the industry to identify, reduce, and eliminate construction-related hazards. Most of the videos are 2 to 4 minutes long, presented in clear, easily accessible vocabulary, and show common construction worksite activities. The videos may be used for employer and worker training.

DISCLAIMER: Some of the Expert Advisors referenced on this page were designed several years ago and although they should function using the latest versions of Windows without problem, there may be instances where they are no longer compatible (i.e., Windows 64-bit).
https://www.osha.gov/employers/index.html
Interactive Hazard ID Safety Tool

- Helps small businesses learn how to identify workplace hazards
- Interactive features challenge users: “Can you spot all the hazards?”
- Now updated with a new healthcare scenario and two new visual inspections

osha.gov/hazfinder
In FY 2017, responding to requests from small employers looking to create or improve their workplace safety and health programs, OSHA's On-Site Consultation Program conducted approximately 26,000 visits to small business worksites covering over 1.1 million workers across the nation.
OSHA Consultation

- Free
- Non-enforcement
- Confidential
- On-site audits
- Training
- Sampling/Monitoring
- Program Review

http://csu-cvmbs.colostate.edu/academics/erhs/osha/Pages/default.aspx
OSHA Compliance Assistance

- Regional Compliance Assistance Newsletter

- Send request to olaechea.john@dol.gov to subscribe
Questions?

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