Region VII
Falls and Electrocutions Task Force
Presents

A Training Guide to Preventing Electrocutions from Overhead Power Lines in the Construction Industry

United States Department of Labor
Occupational Safety & Health Administration

Introduction

Forty-two Percent (122) of the 293 Fatal and Catastrophic (fat/cats) Federal Incidents In OSHA's Region VII (KS, MO and NE), During Oct 1, 1995 Through Dec. 31, 1999 Occurred in the Construction Industry.

23 of the 122 Fat/cats Were Due to Electrocutions. 19 of the 23 Electrocutions Involved Contact With Overhead Power Lines (OHPL).

OSHA is seeking to facilitate community awareness and involvement in the prevention of fatal and injurious contact with overhead power lines in the construction industry.

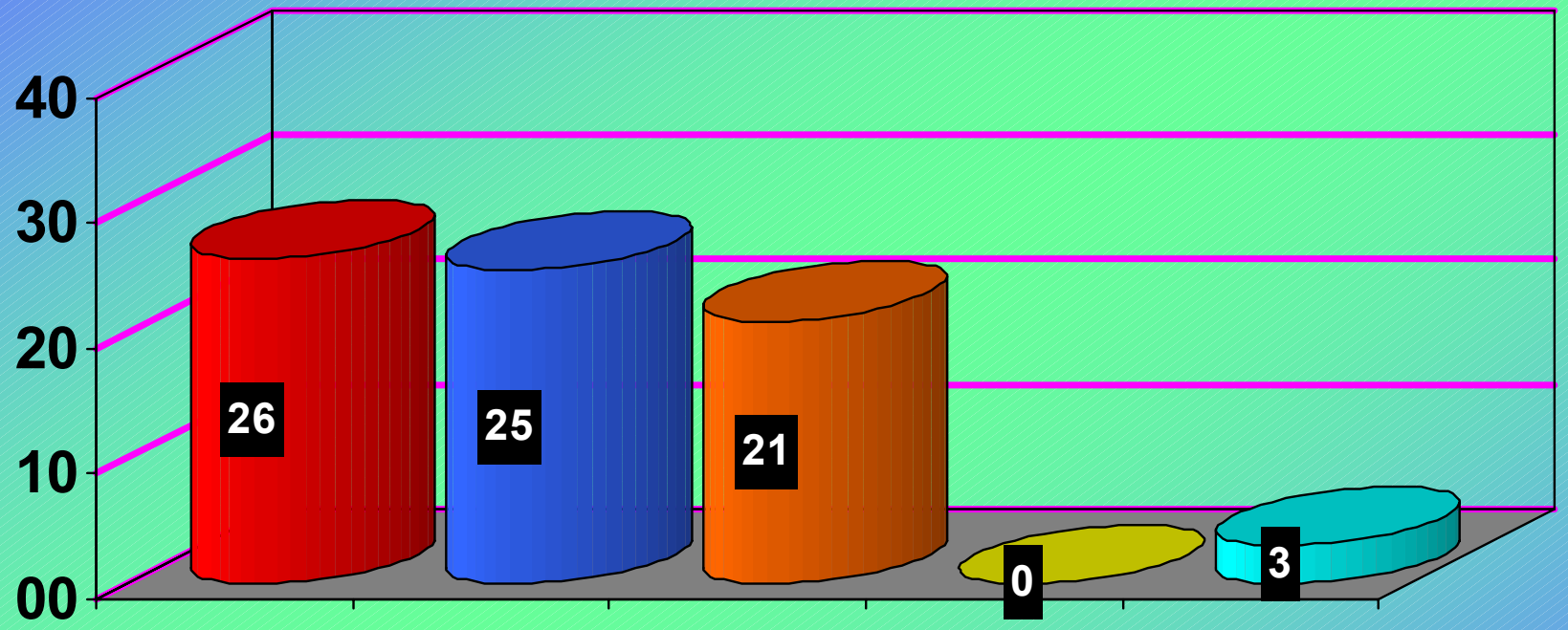
LOOK UP - LOOK OUT - FOR ELECTRICAL LINES -- IT'S THE LAW

In Kansas and Missouri, laws have been enacted to help ensure safe working conditions around overhead power lines. The state you are working in may also have similar requirements. Contact your local electric company to request additional information about these laws and their applicability to the state you are working in.

Facts and Figures

Fatal/Catastrophic Incidents FY99

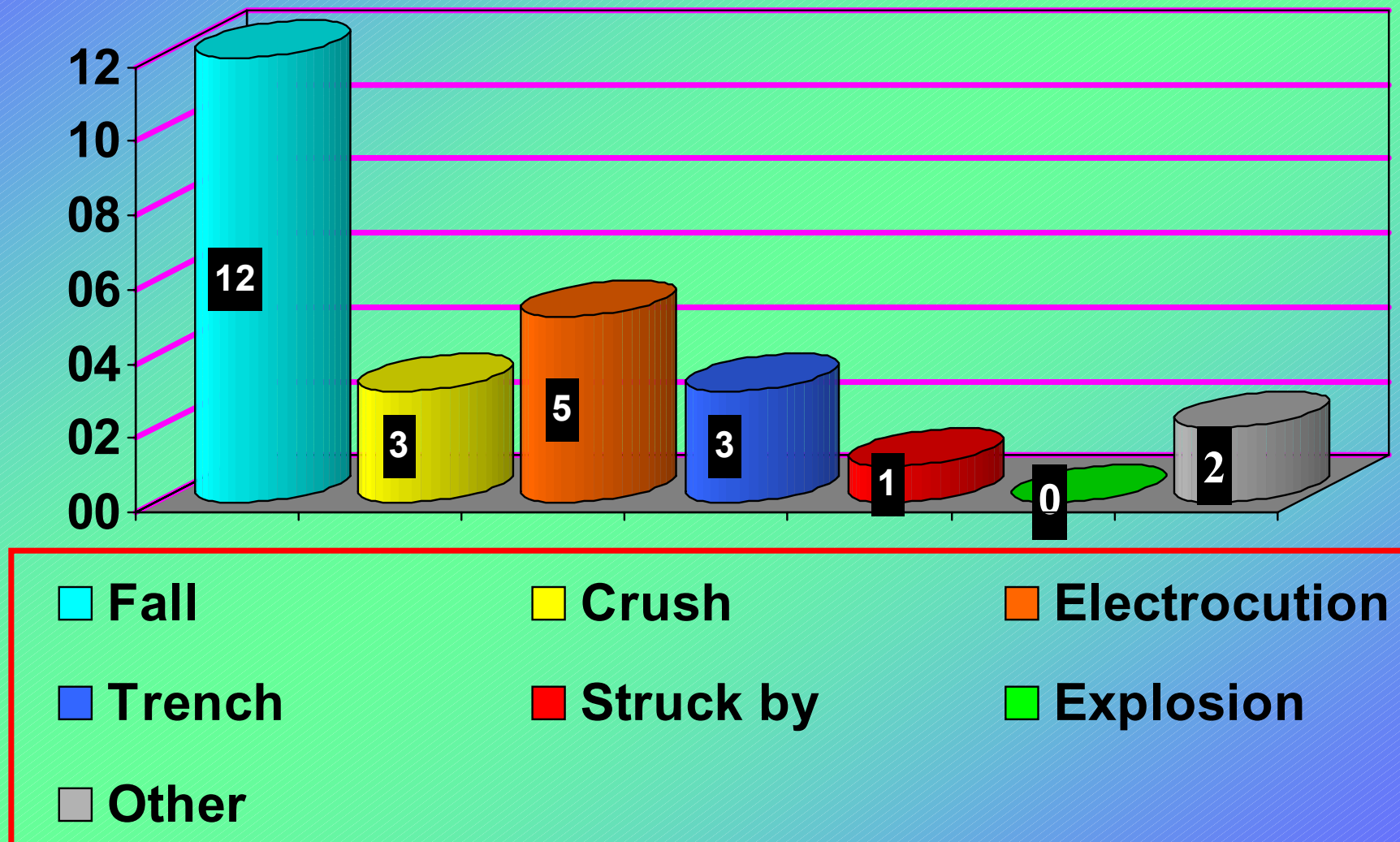
Breakdown By Industry for Region VII



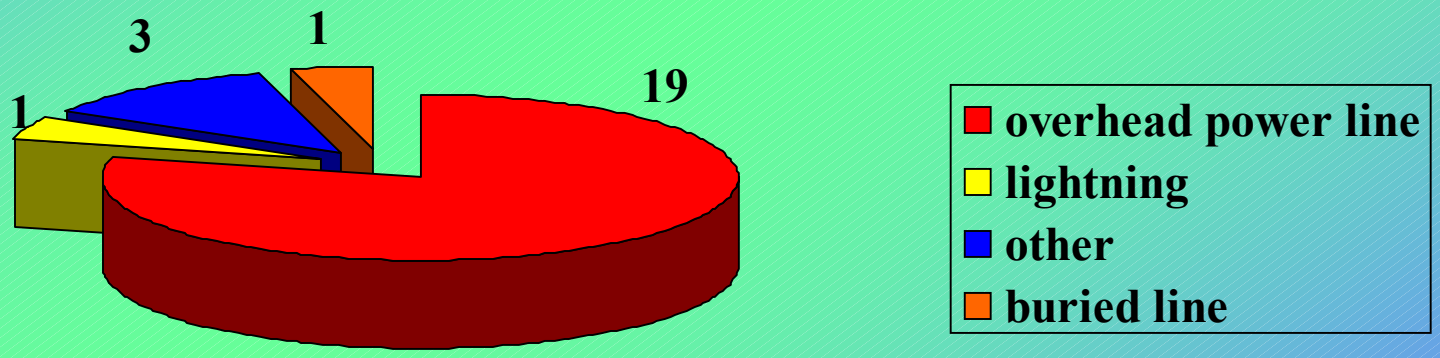
- Construction
- All General Industry (Excluding Manufacturing)
- Manufacturing
- Mining
- Agriculture, Fishing, Forestry

Fatal/Catastrophic Incidents Comparison by Type of Accident

FY 99 CONSTRUCTION ONLY - Region VII



Fatal Electrocutions in the Construction Industry
(Kansas, Missouri & Nebraska)
01 Oct 95 - 31 Dec 99



OVERHEAD POWER LINE FATALITIES
KANSAS, MISSOURI & NEBRASKA
(10/01/95-12/31/99)

SIC	*Age*	*Description*
1542	49	spreading gravel; drove raised bed of dump truck into overhead power line
1623	59	working in an elevated bucket truck; came in contact with energized line
1623	37	employees setting an aluminum trench box shield in place using a crane; loadline cable on the boom of the crane came in contact with an overhead power line; employee grabbed onto shield and was electrocuted
1623	19	performing work from a pole; climbed beyond minimum distance requirement for live-line work on utility pole
1623	19	installing fiber optic cable; rod entered inside the minimum approach distance and passed close enough to the energized electrical line for arc generation
1623	42	working from a bucket; head came in contact with energized primary wire
1623	32	installing new static wire for an overhead power line using wire cutters; cut wire came in contact with conductor end of insulator
1623	59	working from bucket of aerial lift truck; tasked with tying in de-energized overhead power line to insulators on top of a new power pole; came in contact with energized overhead power line
1731	39	performing conversion operations at a power plant substation and grabbed hot lead running to the circuit's lightning arrester
1731	38 41 24	pulling fiber optic cable; guy wires were cut or disconnected and came in contact with the power line
1731	48	performing overhead primary connection; head touched power line
1731	37 29	wrecking out a utility pole to be replaced, came in contact with energized line
1761	23	installing vinyl siding on a shed using an aluminum ladder; while positioning the ladder it came in contact with an energized overhead power line
1761	38	taking down a ladder that came in contact with overhead power line
1761	23	repositioning a mobile scaffold using a bobcat; scaffold struck overhead power line
1761	25	taking down a ladder that came in contact with overhead power line
1771	44	finishing a concrete driveway using a float with aluminum extensions; when changing positions float was raised and came in contact with an overhead power line
1771	54	holding discharge hose of cement pumper truck; boom of truck came in contact with overhead power line
1799	20	guiding an I-beam suspended by a nylon sling attached to the forks of a Loadall; I-beam made contact with overhead power line

The following slides depict some typical violations that **you** may have encountered in some of your job-sites. It is our intention, that after viewing the following program, **you** should have a better understanding of potential overhead power line hazards. If **you** witness any of these or similar conditions at **your** work site, **please implement appropriate preventive action immediately! Your life may depend on it!!**

Region VII Falls/OHPL Taskforce

After the following 10 slides, another slide will follow stating the potential violation and the location where that referenced violation can be found in the 29 Code of Federal Regulations (CFR) 1926.

Scaffolds Near Overhead Power Lines

WARNING!

Workers may be electrocuted when erecting, moving, or working from metal or conductive scaffolds near overhad power lines.

Take the following actions to protect yourself if you are erecting, moving, or working from metal or conductive scaffolds near overhead power lines.

- Be aware of overhead power lines in your work area. **Most overhead power lines are not insulated.**
- Conduct initial and daily surveys of the worksite and implement control measures and training to address hazards at the site.
- Recognize the hazards of moving, erecting, or working from scaffolds near overhead power lines.
- Restrict the use of electrically conductive tools or materials where they may contact overhead power lines.
- Be trained in cardiopulmonary resuscitation (CPR).
- *always* maintain the following minimum clearance between scaffolds and power lines:
    - 2 feet for insulated power lines of less than 300 volts.
    - 10 feet for insulated power lines of 300 volts or more and for all uninsulated power lines

- If scaffolds must be moved in the area of overhead power lines, appoint a competent worker to observe the clearance between the power lines and the scaffold and warn others if the minimum is not maintained.
- If minimum clearance cannot be maintained when scaffolds must be erected or moved near overhead power lines, notify the utility company to de-energize the power lines or provided adequate insulation before any work is initiated.

For additional information, refer to the NIOSH Alert on Scaffolds Near Overhead Power Lines [DHHS (NIOSH) 91-110], or call 1-800-35-NIOSH. Single copies are available free from the following:

Publications Dissemination, DSDTT
NIOSH
4676 Columbia Parkway
Cincinnati, OH 45226
(513) 533-8287

Scaffolds shall not be erected, used, dismantled, altered, or moved such that they or any conductive material handled on them might come closer to exposed and energized power lines than the following:

Insulated Lines

Less than 300 volts = 3 feet
(3 feet reflects the OSHA regulation not the NIOSH recommendation)

300 volts to 50kv = 10 feet

More than 50kv = 10 ft + .4 inches for 1kv over 50kv

Uninsulated Lines

Less than 50kv = 10 feet

More than 50kv = 10 feet + .4 inches for each 1kv over 50kv

1926.451(f)(6)
This is the same standard referenced on the previous slide. It also applies to this slide.

The arrow is pointing to the lines that are running close to the scaffold

This picture, along with the following picture, are violations of 1926.451(f)(6)

(*However, some options are available to contractors who have no choice but to work within the 10 foot zone.

1. Only after utility company or electrical system operator has deenergized the lines,
2. relocated the lines, or
3. installed protective coverings.)

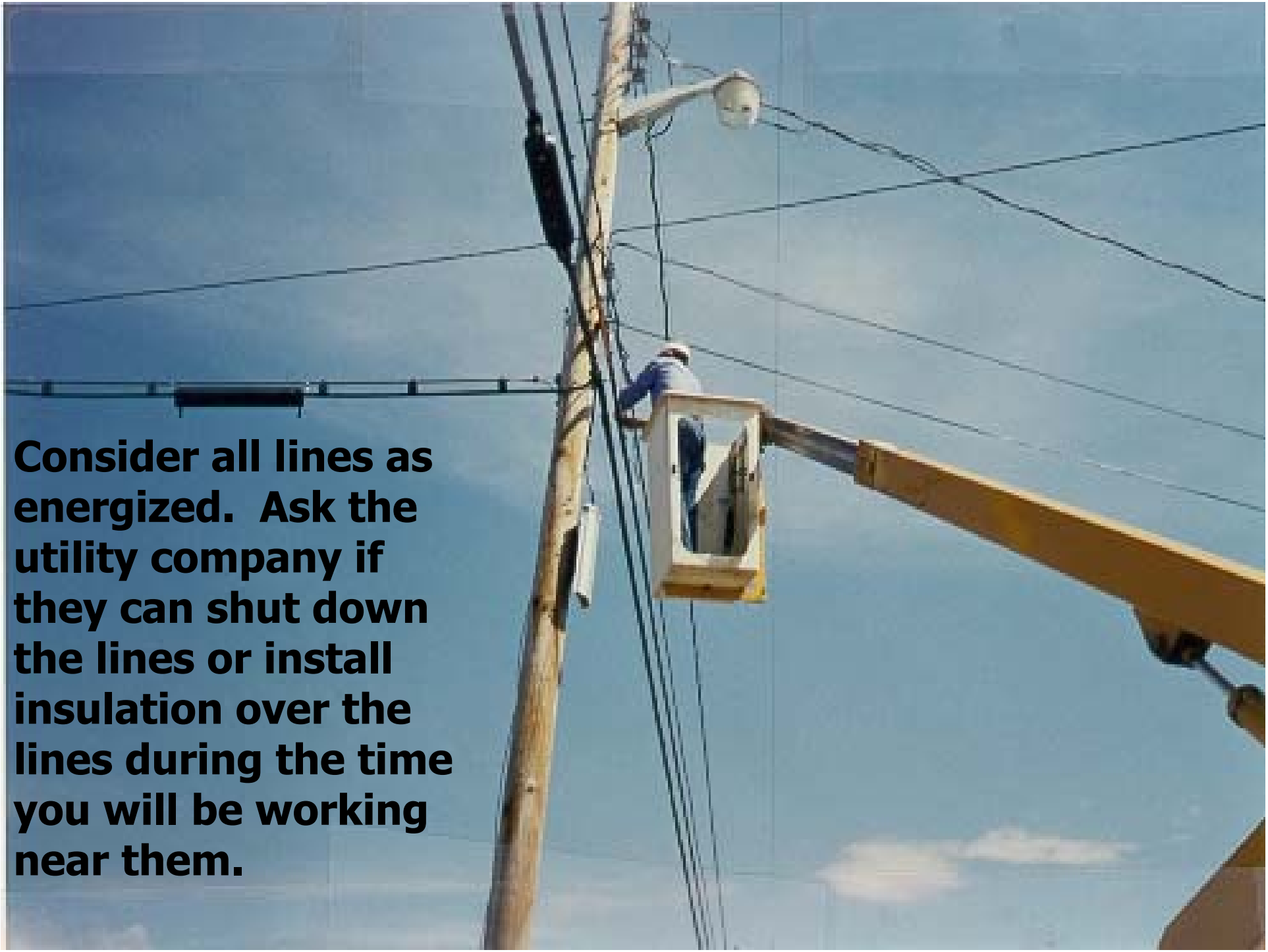
Most overhead power lines (OHPL) are not insulated.

Best safety practice, never get closer than ten feet to an overhead power line.

When working around OHPL's with cranes, refer to 1926.550(a)(15)

The same standard referenced on the previous slide, 1926.550(a)(15), also applies to this slide.

The boom on this piece of concrete pumping equipment is closer than 10 feet from this section of overhead power lines.


Consider all lines as energized. Ask the utility company if they can shut down the lines or install insulation over the lines during the time you will be working near them.

When working on or around live wires, always use the appropriate tools/machines and personal protective equipment specific to the nature of work being performed

Only use nonconductive tools properly rated for the voltage when working near overhead power lines.

Reference 1926.950(c)(1)

Employees shall not be permitted to work in such proximity to a live power circuit where employees could contact the circuit in the course of work.

Reference standard 1926.416(a)(1)

Frequently Violated Standards

Frequently Violated OSHA Standards
Related to
Overhead Power Lines in the Construction Industry
January 1, 1995 - February 8, 2000
(Sequential Order by Standard)

	Subpart L - Scaffolds
1926.451(f)(6)	The clearance between scaffolds and power lines shall be as follows: Scaffolds shall not be erected, used, dismantled, altered, or moved such that they or any conductive material handled on them might come closer to exposed and energized power lines than those listed in 1926.451.
1926.454(a)(1)	Training. The employer shall have each employee who performs work while on a scaffold trained by a person qualified to recognize the hazards associated with the type of scaffold and to understand the procedures to control or minimize those hazards, including the nature of any electrical hazards, fall hazards and falling object hazards in the work area.
1926.453(b)(3)	*Electrical Tests*. All electrical tests shall conform to the requirements of ANSI A92.2-1969 section 5. However equivalent d.c.; voltage tests may be used in lieu of the a.c. voltage specified in A92.2-1969; d.c. voltage tests which are approved by the equipment manufacturer or equivalent test for the purpose of this paragraph (b)(3)

	Subpart N - Cranes, Derricks, Hoists, Elevators, and Conveyors
1926.550(a)(15)	Except where electrical distribution and transmission lines have been deenergized and visibly grounded at point of work or where insulating barriers, not a part of or an attachment to the equipment or machinery, have been erected to prevent physical contact with the lines, equipment or machines shall be operated proximate to power lines only in accordance with the following: *550(a)(15)(i);(ii);(iii);(iv);(v);(vi);(vii).*
1926.550(a)(15)(i)	For lines rated 50kV. or below, minimum clearance between the lines and any part of the crane or load shall be 10 feet.
1926.550(a)(15)(ii)	For lines rated over 50 kV., minimum clearance between the lines and any part of the crane or load shall be 10 feet plus 0.4 inch for each 1 kV. over 50 kV., or twice the length of the line insulator, but never less than 10 feet.
1926.550(a)(15)(iv)	A person shall be designated to observe clearance of the equipment and give timely warning for all operations where it is difficult for the operator to maintain the desired clearance by visual means.
1926.550(a)(15)(vi)	Any overhead wire shall be considered to be an energized line unless and until the person owning such line or the electrical utility authorities indicate that it is not an energized line and has been visibly grounded.
1926.550(a)(15)(vii)(c)	Combustible and flammable materials shall be removed from the immediate area prior to operations.

For Further Information

Overhead Power Line Tips for Construction Workers

From Oct. 1, 1995 through Dec. 31, 1999, 83 % of the fatal electrocutions in the construction industry in Region VII involved contact with overhead power lines.

Don't let anyone you know become a statistic. Follow the guidelines in this program or contact your local OSHA Area Office for further information. Pocket guides, training packets and other information are available through the Area Offices listed below.

Kansas

1 800 362 2896 (KS only)

Nebraska

1 800 642 8963 (NE only)

Western Missouri

1 800 892 2674 (MO only)

Eastern Missouri

1 800 392 7743 (MO only)

OSHA'S WEB SITE

- **www.osha.gov**
- **User friendly!**
- **All OSHA information in one place**
- **Links to other sites**

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United States

OSHA Occupational Safety & Health Administration
U.S. Department of Labor

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- About OSHA
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- Regulations
- Library
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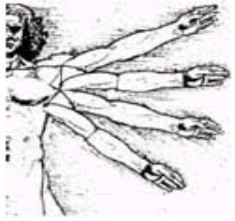
DOL Job Openings

Safe Work/ Safe Kids



OSHA Proposes New Ergonomics Standard

- Occupational Safety & Health Breakfast Series in Springfield, Mass. [More...]
- Food Processing Seminar--February 22, 2000 [More... 65K PDF File]
- 1/5 Statement by Secretary Herman on Working At Home
- OSHA Extends Public Comment Period on Ergonomics Proposal [News Release]
- 10th Annual Construction Safety Conference & Expo February 15 - 17, 2000 [More...]
- OSHA Small Business Seminar - February 17, 2000 [More...]

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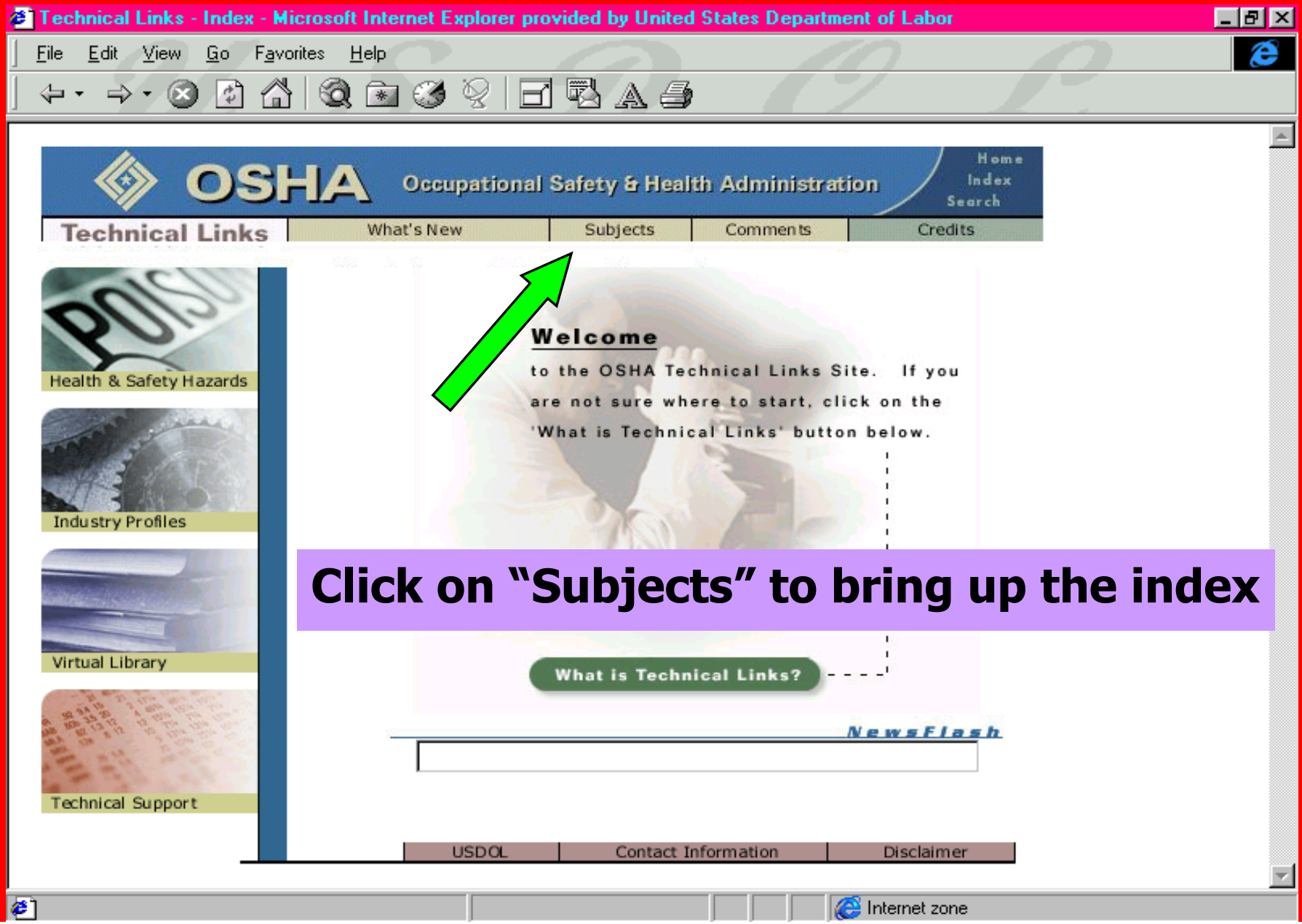
- **Word or Phrase**
- **Information Date**
- **Specified Standard**

OSHA Technical Links Page



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C TOP
Cadmium
Carcinogens
Chemical Sampling Information
Cincinnati Technical Center
Commercial Diving
Competent Persons
Composites
Compressed Gas and Equipment
Confined Spaces
Construction, Concrete and Masonry
Construction, General
Control of Hazardous Energy (Lockout/Tagout)
Crane, Derrick, and Hoist Safety
Crystalline - see Silica, Crystalline

D TOP
Demolition
Dermal Exposure
Diesel Exhaust
Direct Reading Instruments
Docket Office
Dry Cleaning

E TOP
Electrical
ELF Radiation
Emergency Response
Epidemiology - see Occupational Epidemiology
Ergonomics
Ethylene Oxide

F TOP
Fall Protection
Federal Safety & Health Council
Fire Safety
Forklifts - see Powered Industrial Trucks (Forklifts)
Formaldehyde

G TOP
General Safety & Health References
General Safety & Health References - Other Resources
Grain Handling

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Home | Index | Search

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- Establishment Search
  is a query tool which locates OSHA inspections which were conducted within a particular establishment
- Search Inspections By SIC
  is a query tool which locates OSHA inspections which were conducted within a particular industry group
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  displays the industry SICs in which a specified Federal OSHA standard is most often cited. Information is shown at the SIC division and 2,3,4- digit SIC levels
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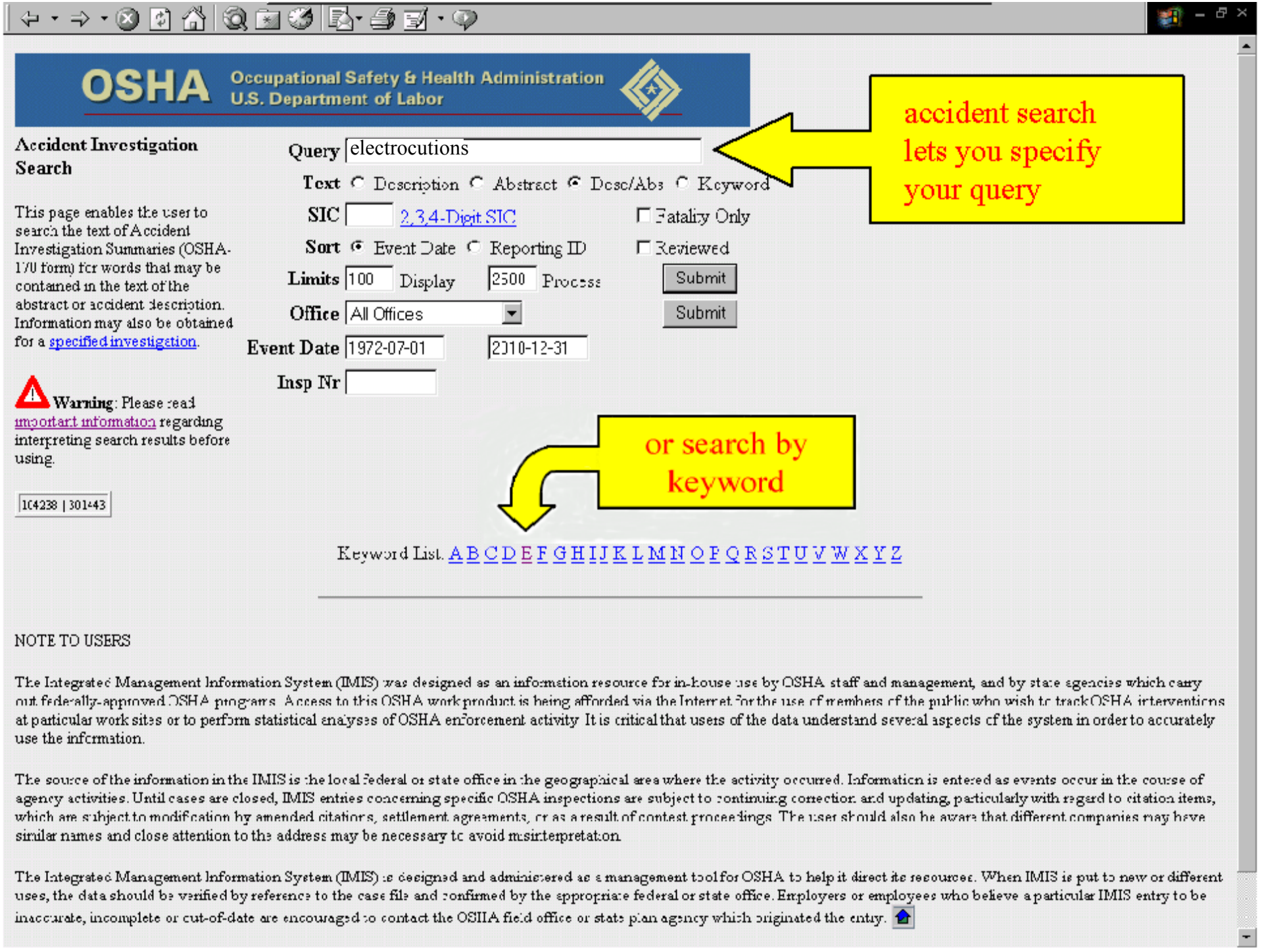
use this link to get information on how and why electrocutions happened so that similar situations can be avoided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NOTE TO USERS
The Integrated Management Information System (IMIS) was designed as an information resource for in-house use by OSHA staff and management, and by state agencies which carry out federally-approved OSHA programs. Access to this OSHA work product is being afforded via the Internet for the use of members of the public who wish to track OSHA interventions at particular work sites or to perform statistical analyses of OSHA enforcement activity. It is critical that users of the data understand several aspects of the system in order to accurately use the information.
The source of the information in the IMIS is the local federal or state office in the geographical area where the activity occurred. Information is entered as events occur in the course of agency activities. Until cases are closed, IMIS entries concerning specific OSHA inspections are subject to continuing correction and updating, particularly with regard to citation items, which are subject to modification by amended citations, settlement agreements, or as a result of contest proceedings. The user should also be aware that different companies may have similar names and close attention to the address may be necessary to avoid misinterpretation.
The Integrated Management Information System (IMIS) is designed and administered as a management tool for OSHA to help it direct its resources. When IMIS is put to new or different uses, the data should be verified by reference to the case file and confirmed by the appropriate federal or state office. Employers or employees who believe a particular IMIS entry to be inaccurate, incomplete or out-of-date are encouraged to contact the OSHA field office or state plan agency which originated the entry.

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Details for the accident summaries listed below may be obtained in two ways. The first method is simply following the accident summary number link. The second method is marking the check boxes for selected summaries and pressing the *Get Detail* button. Information relevent to the selected accidents will be returned and may then be browsed or printed.

then click here to see the cases

use ✓ to select the cases you want to look at

Search Options				
SIC	Date Range		RID	Limits
	1972-07-01	2010-12-31	All	100/5000

Get Detail | + | All | Reset

#2 -- Found 2700 -- Processed 2700 -- Selected 2697 -- Displayed 100

	Summary Nr	Event Date	Report ID	Fat	SIC	Event Description	
☐ 1	014392328	10/06/1997	0625700	X	7363	Electric Shock - Ground Fault in Hand Lamp	x
☑ 2	000951251	09/05/1997	0355111	X	2833	Electric Shock - Contact With Overhead Line Thru Dump Truck	x
☐ 3	014407464	06/23/1997	0626700	X	1791	Electric Shock - Direct Contact With Energized Parts	x
☑ 4	014392211	06/10/1997	0625700	X	1799	Electric Shock - Contact With Overhead Line Thru Boom	x
☑ 5	014372882	06/10/1997	0523300	X	4953	Electric Shock - Direct Contact With Overhead Line	x
☑ 6	014392187	06/04/1997	0625700	X	5051	Electric Shock - Contact With Overhead Line Thru Boom	x
☐ 7	000518944	05/09/1997	0935000	X	1771	Electric Shock - Direct Contact With Energized Parts	x
☐ 8	000566737	05/04/1997	0636900	X	1731	Electric Shock - Direct Contact With Energized Conductor	x
☐ 9	000951228	05/01/1997	0355111	X	1542	Electric Shock - Contact With Live Parts Thru Fish Tape	x
☑ 10	000700807	03/20/1997	0522000	X	1794	Electric Shock - Contact With Overhead Line Thru Load Line	x
☑ 11	014410922	03/18/1997	0626700	X	1542	Electric Shock - Contact With Overhead Line Thru Ladder	x
☑ 12	171016264	03/13/1997	0855610	X	4911	Electric Shock - Contact With Overhead Line Thru Conductor	x
☑ 13	000979666	03/07/1997	0950411	X	1721	Electric Shock - Contact With Overhead Line Thru Ladder	x
☐ 14	014303549	03/04/1997	0257240	X	3961	Electric Shock - Contact With Energized Parts	x
☑ 15	000937086	01/31/1997	0112600	X	4841	Electric Shock - Direct Contact With Overhead Line	x
☑ 16	000897546	01/27/1997	0355112	X	1721	Electric Shock - Contact With Overhead Line Thru Ladder	x
☑ 17	014408223	01/21/1997	0626700	X	1623	Electric Shock - Contact With Overhead Line Thru Boom	x

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Accident Search Detail

Accident 000951251 - Electric Shock - Contact With Overhead Line Thru Dump Truck

Accident 000951251 -- Report ID: 0355111

Inspection: 125454991 Open: 09/08/1997 SIC: 2833 Wilson Enterprises, Inc.

A truck driver had dumped a load of manure in a pasture. He lowered the 13.7-meter-long dump truck bed as he pulled away from the manure pile. The bed contacted a 14.4-kilovolt overhead power line. The bed pulled down the power line conductors, and they fell between the bed and truck frame. After the bed had descended completely, the employee got out of the truck. He was electrocuted as he touched the ground.

Review: X Keywords: electrical,electrocuted,overhead power line ,dump truck,dump truck bed,e gi ia,

	Inspection	Age	Sex	Degree	Nature	Occupation
1	125454991	39	M	Fatality	Electric Shock	Truck Drivers, Heavy

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Accident 014392211 - Electric Shock - Contact With Overhead Line Thru Boom

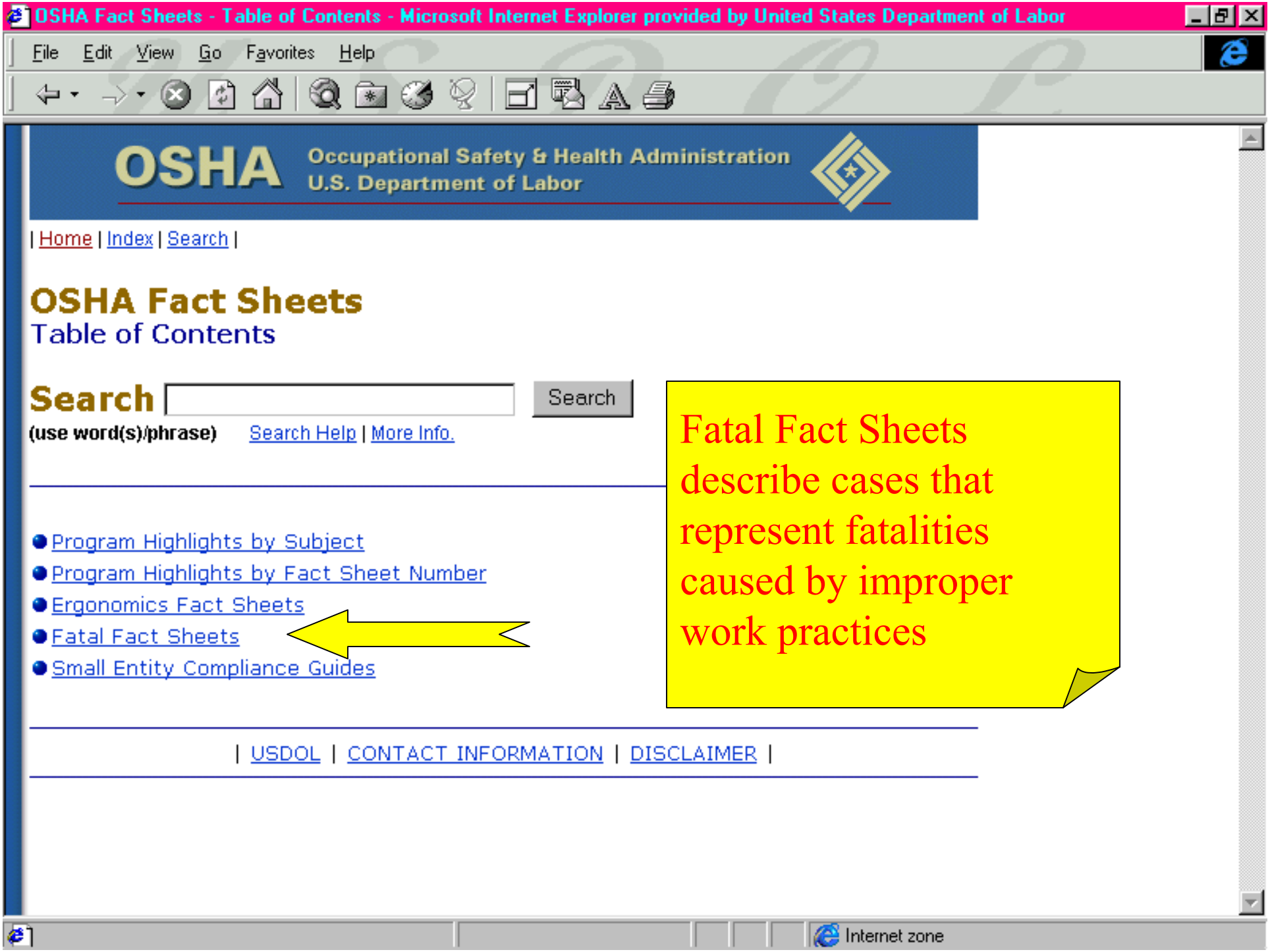
Accident 014392211 -- Report ID: 0625700

Inspection: 300396264 Open: 06/12/1997 SIC: 1799 Professional Service Industries, Inc.

An employee was operating a drilling rig mounted on the bed of a truck. As he lowered the boom of the drilling rig, it contacted a 7600-volt overhead power line. The employee received an electric shock and was knocked away from the truck. He was taken to a local hospital where he was pronounced dead. He had been electrocuted.

Review: X Keywords: electrical,electrocuted,drill rig (non-oil) ,boom,overhead power line ,e gi ia,

	Inspection	Age	Sex	Degree	Nature	Occupation
1	300396264	30	M	Fatality	Electric Shock	Occupation Not Reported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File Edit View Go Favorites Help
OSHA
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U.S. Department of Labor
| Home | Index | Search |
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Table of Contents
Search
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(use word(s)/phrase)
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Program Highlights by Fact Sheet Number
Ergonomics Fact Sheets
Fatal Fact Sheets
Small Entity Compliance Guides
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ACCIDENT REPORT
FATAL FACTS

U.S. Department of Labor
Occupational Safety
and Health Administration
No. 17

ACCIDENT SUMMARY

Accident Type	Electrocution
Weather	Sunny, Clear
Type of Operation	Steel Erection
Crew Size	3
Collective Bargaining	No
Competent Safety Monitor on Site?	Yes - Victim
Safety and Health Program in Effect?	No
Was the Worksite Inspected Regularly?	Yes
Training and Education Provided?	No
Employee Job Title	Steel Erector Foreman
Age/Sex	43/M
Experience at this Type of Work	4 months
Time on Project	4 hours

BRIEF DESCRIPTION OF ACCIDENT

Employees were moving a steel canopy structure using a "boom crane" truck. The boom cable made contact with a 7200 volt electrical power distribution line electrocuting the operator of the crane; he was the foreman at the site.

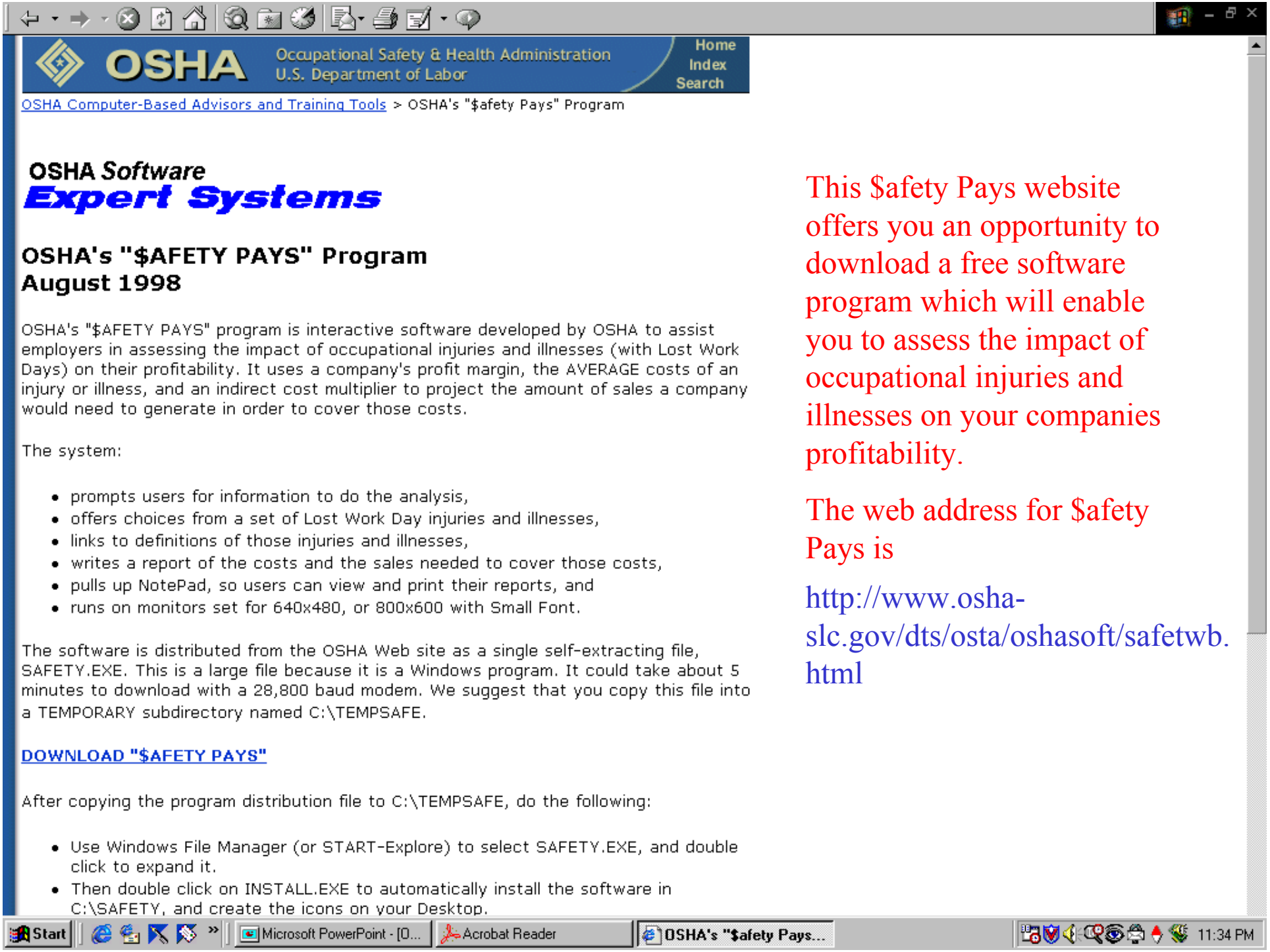
INSPECTION RESULTS

As a result of its investigation. OSHA issued citations for four serious violations of its construction standards dealing with training, protective equipment, and working too close to power lines.

OSHA's construction safety standards include several requirements which, If they had been followed here. might have prevented this fatality

ACCIDENT PREVENTION RECOMMENDATIONS

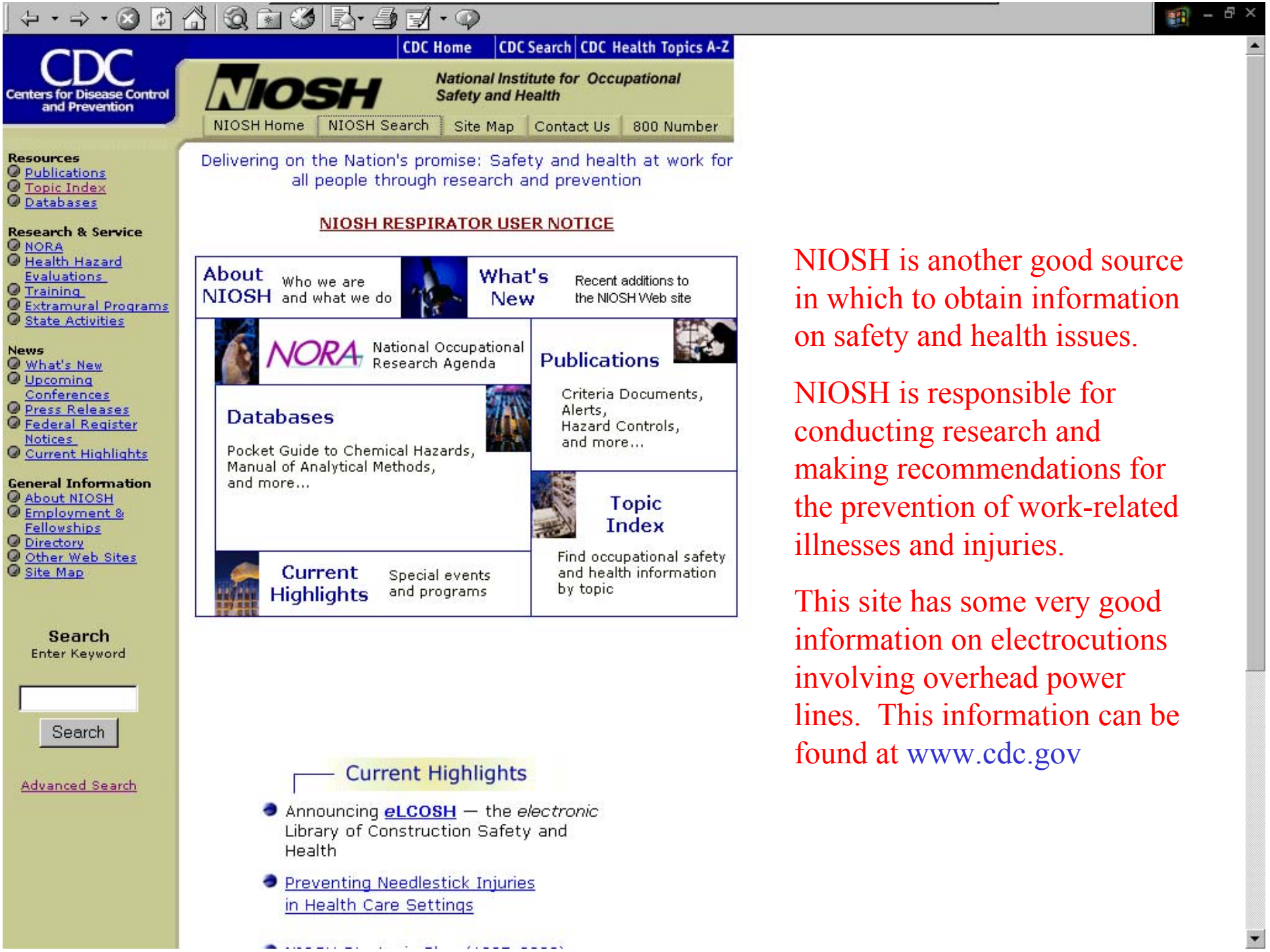
1. Develop and maintain a safety and health program to provide guidance for safe operations (29 CFR 1926.20(b)(1)).
2. Instruct each employee on how to recognize and avoid unsafe conditions which apply to the work and work areas (29 CFR 1926.21(b)(2))
3. If high voltage lines are not de-energized, visibly grounded, or protected by insulating barriers, equipment operators must maintain a minimum distance of 10 feet between their equipment and the electrical distribution or



This $afety Pays website offers you an opportunity to download a free software program which will enable you to assess the impact of occupational injuries and illnesses on your companies profitability.

The web address for $afety Pays is

http://www.osha-slc.gov/dts/osta/oshasoft/safetwb.html



NIOSH is another good source in which to obtain information on safety and health issues.

NIOSH is responsible for conducting research and making recommendations for the prevention of work-related illnesses and injuries.

This site has some very good information on electrocutions involving overhead power lines. This information can be found at www.cdc.gov

Other Sources of Information

- Government Printing Office - for copies of OSHA regulations and publications & OSHA CD-ROM (202-512-1800)
- OSHA-funded free on-site consultation services in each state
- Various S&H courses offered by the OSHA Training Institute Des Plaines, IL
- The Metropolitan Community College, Business and Technology Center, Kansas City, MO (816) 482-5200 outside Kansas City, MO (800) 841-7158

Region VII Disaster Facts Accident Reports and Newsletters are available through the Regional Office located in Kansas City, MO. To be placed on the recipient list contact Peggy Taylor at (816) 426-5230, ext 227, or email her at peggy.taylor@osha.gov.

Acknowledgements

Region VII's local emphasis program targeting overhead power line hazards was created for the protection of workers in Missouri, Nebraska, Kansas, and Iowa.

Region 7 Falls/OHPL Task Force Members:

***Corey Beacom**
Brian Drake
Leland Darrow
Marcia Drumm
Peggy Taylor
Matt Thurlby

Power Point® Overhead Power Line Hazard Training Program originally created by Doug Schneider.

*Special thanks to Corey for supplying photographs for the presentation and to Don Kallstrom for providing technical information.