Ergonomics: Definition, Cost and Enforcement

November 4, 2010 Webinar

This webinar addressed Ergonomic hazards which, according to the Bureau of Labor Statistics, are the most frequently occurring health hazards on any jobsite. The costs of the potential injuries and what the future holds for potential OSHA enforcement was also covered

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Ergonomics

Definition, Costs and Enforcement

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4 Categories of Construction Health Hazards

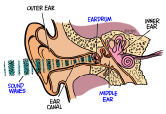
- Chemical Hazards
- Physical Hazards
- Biological Hazards
- Ergonomic Hazards

Chemical Hazards

- Products found on a construction site contain substances that can be harmful to employees
- Activities on construction sites can generate harmful chemicals
  - Examples
    - Asbestos
    - Solvents
    - Silica
    - Lead

Physical Hazards

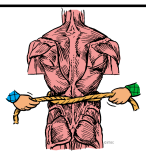
- Different types of energy that can be hazardous to workers
  - Noise
  - Vibration
  - Temperature Extremes



Biological Hazards

- Disease or illness caused by living organisms, like plants, bacteria, mold or virus, found on a worksite

Ergonomic Hazards



- Can cause painful, disabling injuries to the muscles and joints
- Common causes
  - Heavy frequent or awkward lifting
  - Repetitive tasks
  - Hand-intensive tasks
  - Using the wrong tool for a job or using the correct tool incorrectly

Ergonomic Hazards

- Most frequently occurring health hazards on a jobsite and cause the most injuries
- Lead to Musculoskeletal Disorders or MSDs
  - Strains and sprains
  - Tendonitis
  - Carpal Tunnel Syndrome
  - Low back pain
  - General fatigue

Ergonomics: Definition

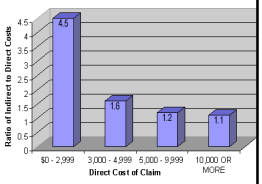
- an applied science that coordinates the design of devices, systems, and physical working conditions with the capacities and requirements of the worker.
- Main purpose is to decrease MSDs

Ergonomics: Costs

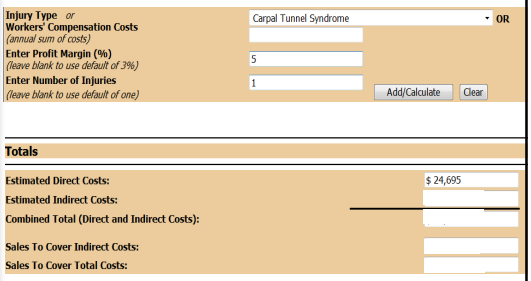
- MSDs fastest-growing category of work related injuries
  - 1.8 million annual / Up 600% over last 11 years
- Comp = $9 billion/year & $29 K/ case
- More lost workdays for MSDs
  - Average = 30 days for a Carpal Tunnel injury
- Indirect costs

Ergonomics: Indirect Costs

- damaged equipment and property
- transportation of injured worker
- lost time by fellow workers
- cost of temp help/overtime to replace the injured
- administrative costs
- payment of penalties or fines
- accident reporting time, investigation time, etc.



Ergonomics: Costs



Potential Hazardous Positions

- Floor and Ground-Level Work
- Overhead Work
- Materials Handling
- Using Tools/ Hand Intensive Work

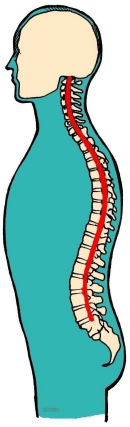
Floor and Ground-Level Work

- A great deal of work on a site requires employees to work close to the floor or ground
- This causes them to bend, stoop, kneel or squat, sometimes for long periods of time

- These positions compromise the ability to complete many job-related tasks
  - Lifting
  - Pushing
  - Pulling
- All put increased stress on various body parts

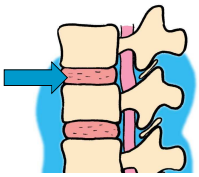
Lower Back

- Anatomy
  - Spinal cord contains the nerves of the body
    - Runs from the skull to the buttocks



Lower Back

- Surrounded by bones called Vertebrae
  - There are 33 in total
  - Separated by flexible, “jelly”-filled discs
    - Combination of vertebrae and discs allows back flexibility



Lower Back

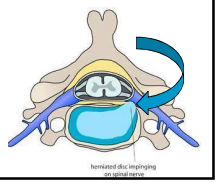
- Muscles run along the bony vertebral column allowing for the movement of bending and twisting

Possible Injuries/Issues

- Bending forward puts great stress on the back muscles, ligaments of these muscles
- Causes discs to get squeezed
  - This pressure can push disc out of shape, putting pressure on different parts of the spine and nerves
  - This can ultimately cause a disc to become Herniated

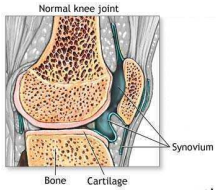
Possible Injuries/Issues

- Herniated Disc
  - Long-term pressure from bending or poor body mechanics cause the disc to weaken
  - This can result in the soft interior of the disc to be squeezed out of position
    - This puts pressure on the nerves leaving the spine causing numbness or pain



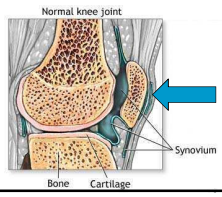
Knee

- Anatomy
  - This joint is made up of
    - Two bone ends
      - Femur
      - Tibia



Knee

- Knee cap (Patella)
- Muscles of the upper and lower leg
- Bursa
  - Fluid filled sacs between bones and tendons in high stress areas
  - Reduces friction and allows for freer movement



Possible Injuries/Issues

- Kneeling, stooping and squatting put large amounts of stress on the components of the knee

Possible Injuries/Issues

- Puts employees at increased risk for
  - Bursitis
    - Inflammation of the bursa
  - Tendonitis
    - Inflamed tendons
  - Possible arthritis
    - Wearing away of cartilage

Possible Solutions

- Anything that will limit the amount of time an employee spends bending stooping, kneeling, or squatting will reduce risk of injury
- Change materials or work processes
  - Use materials or work methods that are less labor intensive

Possible Solutions

- Provide plenty of tables, saw horses etc to allow ample elevated work space
- Change tools or equipment
  - Use handle extensions that allow the employee to stand while completing floor level tasks

Possible Solutions

- Fastening Tools that Reduce Stooping
  - Screw Gun with an extension
  - Powder-actuated Fastening Tool with a stand-up handle
    - Can be used to attach lumber to concrete and masonry
    - Fast, reliable and can be used in any weather conditions

Possible Solutions

- Benefits
  - Less time spent stooped or kneeling, less chance of developing back and knee injuries
  - Productivity is improved
- Cost
  - Stand-up screw guns- Between $200- 400
  - PAT- Between $500- 700
    - Handles can be purchased separately

Possible Solutions

- Kneeling Creepers
  - Allow employees to work at floor level while taking much of the pressure and stress off the knee
  - Some models have seats, knee supports and chest support

Possible Solutions

- Benefits
  - Provide support for knees and lower back
  - Reduce stress
  - Allow for easier, quicker movement
- Costs
  - Without chest support- $200
  - Optional adjustable chest support +$75

Overhead Work

- Much work on jobsite must be done overhead
- Requires one or both arms to be raised and most times head tilted back

Overhead Work

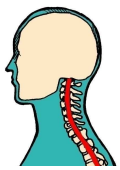
- Awkward position to hold tools, equipment or materials in
- Increased risk for repetitive motion injuries
  - Risk increased if force is also required

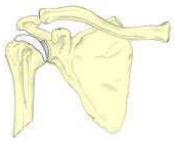
Overhead Work

- Position can decrease employees' ability to complete job efficiently and safely
  - Vision can be obstructed
  - Potential unsafe footing
  - Difficulty holding/positioning a tool

Overhead Work

- Areas of possible injury
  - Neck
  - Shoulders



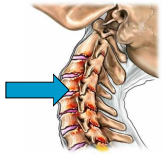


Possible Injuries/Issues

- Bending the neck or keeping it in a bent position for long periods causes
  - Muscles to work harder
  - Ligaments to flex and stretch

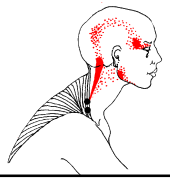
Possible Injuries/Issues

- These motions can cause ligaments to stretch or tear
  - Leads to a neck sprain



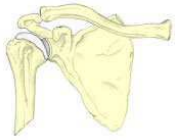
Possible Injuries/Issues

- Tension Neck Syndrome
  - pain, tenderness, fatigue and stiffness in the neck and shoulder muscles, headaches radiating from the neck
  - Results from long period looking up



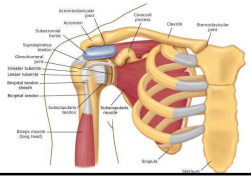
Shoulders

- Anatomy
  - This joint is made up of 3 bones
    - Clavicle
    - Scapula
    - Humerus



Shoulder

- Bones are surrounded by
  - Many muscles
  - Ligaments
  - Tendons
- Bursa
  - Reduces friction and allows for freer movement

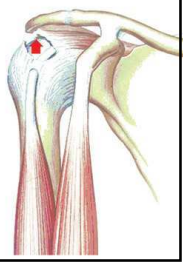


Possible Injuries/Issues

- Puts employees at increased risk for
  - Bursitis
    - Inflammation of the bursa
  - Tendonitis
    - Inflamed tendons
  - Possible arthritis
    - Wearing away of cartilage

Possible Injuries/Issues

- Rotator Cuff
  - Group of 4 muscles and their tendons
  - Allow shoulder wide range of motion
- Rotator Cuff Tear
  - Shoulder stress can cause tendons to wear and tear
  - Makes routine movement painful, if not impossible



Possible Solutions

- Change materials or work processes
  - Use materials or work methods that are less labor intensive
- Change tools or equipment
  - Use extensions to hold the tool at waist or shoulder level
  - Cost
    - Job-made- as little as $1-2
    - Pre-made- $12 for 12 inch model
      $45 for 24 inch model

Possible Solutions

- Use mechanical lifts
  - Lift and hold materials
  - Lift employee to be closer to the work

Materials Handling

- Includes many tasks found at a jobsite
  - Transporting supplies or equipment
  - Storing materials and equipment
  - Using and moving materials and equipment at the site
- Many sites of potential injury
  - Back
  - Neck and shoulders
  - Hands and wrists

Hands and Wrists

- Anatomy
  - Complex combination of
    - 27 bones
      - Carpals
      - Metacarpals
      - Phalanges
    - Many muscles
    - Tendons
    - Countless nerves
    - Blood vessels

Hands and Wrists

- Narrow passageways
- Limited space between structures increase possibility of injury
  - Many different types of injuries

Materials Handling

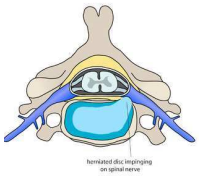
- Heavy Lifting
- Holding
- Handling Materials

Heavy Lifting

- Lifting/moving large, heavy objects
  - Weight of object
  - Awkward position/posture
  - Environmental factors
    - Cold temperatures
    - Excessive heat

Weight of Object-Possible Injuries/Issues

- Improperly lifting heavy loads puts excessive strain/stress on vertebrae system of back
  - Sprain
  - Strain
  - Herniated discs

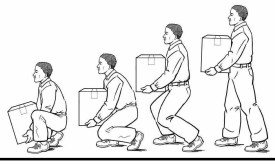


Awkward Position-Possible Injuries/Issues

- Bending and/or twisting while lifting further increases stress on lower back
- Carrying on one shoulder, under one arm or in one hand
  - Creates uneven pressure on the back

Possible Solutions

- Provide training and related programs
  - Employees need to learn the “right way” to perform a task to decrease injury rate
    - Proper lifting technique
    - Two-person lift
    - Stretch to warm-up muscles



Possible Solutions

- Use various types of mechanical means to lift
  - Forklift
  - Pallet jacks
  - Hand trucks

Possible Solutions

- Benefits
  - Reduce loads employees lift, move, carry
- Cost
  - Varies with method used

Possible Solutions

- Suction Devices
  - Lift junction boxes and other materials with smooth, flat surfaces.
  - Place a temporary handle that makes lifting easier
  - Allows flat objects to be lifted and moved into place with little employee strain

Possible Solutions

- Benefits
  - Flat panels can be installed with little employee strain
  - Keeps fingers and arms from being pinched
- Cost
  - Varies according to size and options needed

Environmental Factors-Potential Injuries/Issues

- Cold temperatures decrease muscle temperature
  - Decreases flexibility, increases likelihood of a pull, tear
- High temperatures increase risk of
  - Muscle fatigue
  - Dehydration

Possible Solutions

- Anything that limits the time employees spend lifting, holding or carrying materials or equipment reduces risk of injury
- Change work processes
  - Adjust schedules to minimize exposure
  - Stretch to warm-up muscles
  - Drink lots of water

Holding

- Holding items for long periods during installation
- Increases stress on
  - Back
  - Neck and shoulders
  - Hands and wrists

Possible Injuries/Issues

- Increased strain of holding an object
  - Extra weight strains muscles, tendons of back
  - Stresses muscles of shoulders and neck
  - Stress muscles and joints of the hands and wrists

Possible Solutions

- Use mechanical lifts to hold materials in place
- Use two or more employees to lift and hold materials

Using Tools/ Hand Intensive Work

- Great deal of time is spent gripping tools, materials
- Tool use is often repetitive, physically demanding work
- Can involve many joints and body parts

Potential Injuries/Issues

- Hands: Early symptoms
  - General soreness, pain and swelling are early indicators

Potential Injuries/Issues

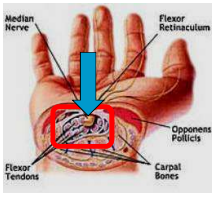
- Tendonitis
  - Tendon that connect muscles of the hand pass through the wrist
  - Can become inflamed and swollen

Potential Injuries/Issues

- Carpal Tunnel Syndrome
  - Carpal tunnel- passageway for tendons for muscles of hand and main nerve controlling the hand
  - Starts out as tendonitis
  - Leaves less space for nerve, putting pressure on it
    - Causes numbness, pain, tingling in the hand, wrist and arm

Potential Injuries/Issues

– Can cause permanent hand weakness



Possible Solutions

- Change materials or work processes
  - Use locknuts or button nuts that will reduce repeated hand-arm twisting
- Change tools and/or equipment
  - Switch a power tool for a manual tool

Possible Solutions

- Ergonomic Hand Tools
  - Fits the task
  - Fits the hand
  - Allows a good grip
  - Takes less effort
  - Doesn't require awkward body position
  - Doesn't dig into hands or fingers

Possible Solutions

- Benefits
  - Decreased risk of hand/wrist related injuries
  - Less fatigue
  - Increased productivity

- Cost
  - Varies with tool
    - Usually no more expensive than non-ergonomic tool

Enforcement

- Senate Joint Resolution 6
  - Rescinded original Ergonomics Rule
  - Under Congressional Review Act
    - OSHA prohibited from issuing another rule that is substantially the same as original

Enforcement

- OSHA has developed industry-specific guidelines for abatement of ergonomic hazards
- Target industries include:

Animal (except poultry) slaughtering
Scheduled passenger air transportation
Steel foundries (except investment)
Other nonferrous foundries (except die-casting)
Concrete pipe manufacturing
Soft drink manufacturing
Couriers
Manufactured home (mobile home) manufacturing

What if your industry NOT included?

- General Duty Clause, Section 5(a)(1)
  - Employer is obligated to keep workplace free of recognized serious hazards
    - Includes Ergonomic Hazards
  - OSHA will cite or issue Ergonomic Hazard Alert letters
  - OSHA encourages employers to implement programs or other measures to reduce ergonomic hazards

What does Enforcement Program involve?

- OSHA will
  - Assess MSD-related issues
  - Evaluate inspection findings issue General Duty Clause citations
  - Respond similarly to workers' complaints
  - Will conduct follow-up inspections or investigations within 12 months for employers that receive hazard alert letters

What about construction?

- OSHA will evaluate MSD-related issues through targeted inspections and in response to worker complaints

What is citation policy?

- Criteria used to cite under General Duty Clause include:
  - Whether there exists an ergonomic hazard
  - Whether that hazard is recognized
  - Whether the hazard is causing, or is likely to cause, serious physical harm to employees
  - Whether there is a feasible means to reduce the hazard

- It must be remembered
  - General Duty Clause applies to INDIVIDUAL workplaces
  - Efforts must be evident at each site that ergonomic hazard abatement is a priority

Enforcement

"What is OSHA going to do about ergonomics?" - let me say two things:

- First, if we look at this problem honestly, there is little doubt that musculoskeletal injuries remain one of the biggest workplace health and safety problems in American industry. Something has to be done. No agency calling itself the Occupational Safety and Health Administration can go long without addressing this issue.
- Second: I can also honestly tell you that we have not decided yet the best way to confront this problem, given the regulatory process and the complicated political issues surrounding ergonomics. "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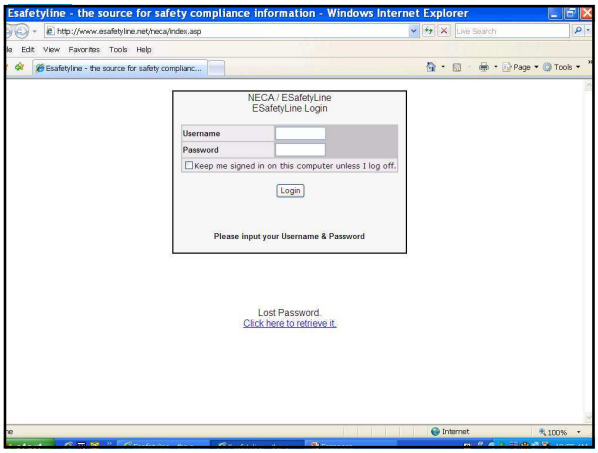
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Compliance Guide W
This guide provides instructions for using the compliance materials contained in this module.
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Model Documents
Basic Screening Tool
Caution Zone Checklist
Hazard Zone Checklist
HCP Evaluation Checklist
Training Materials
The training materials in this module will assist you in addressing the training requirements for ergonomic safety
Training Guide W
This guide provides instructions for using the training materials contained in this module. The safety talks, activities and tests will assist you in developing electrical safety training.
Talks
What are MSD's
Causes of MSD's
Preventing MSD's


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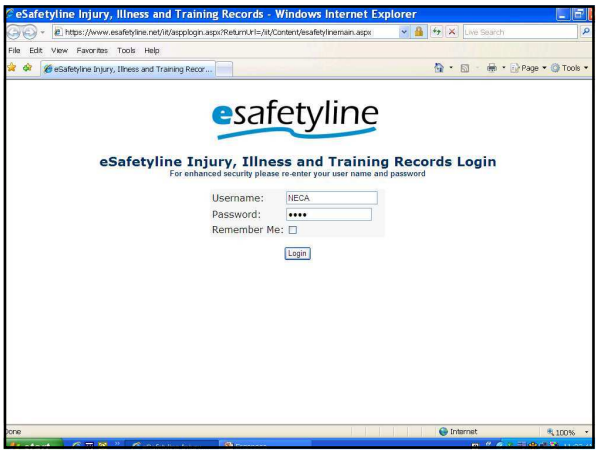
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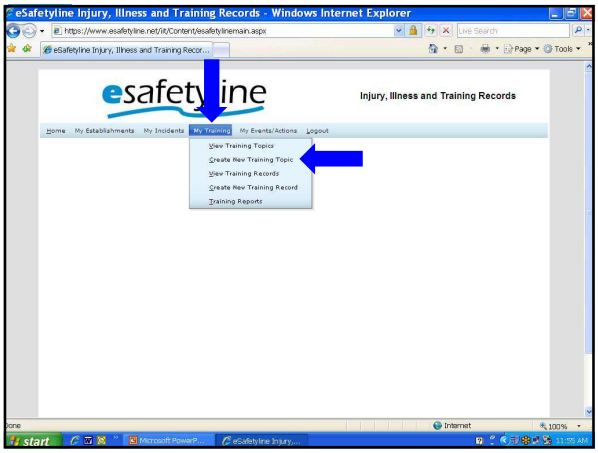
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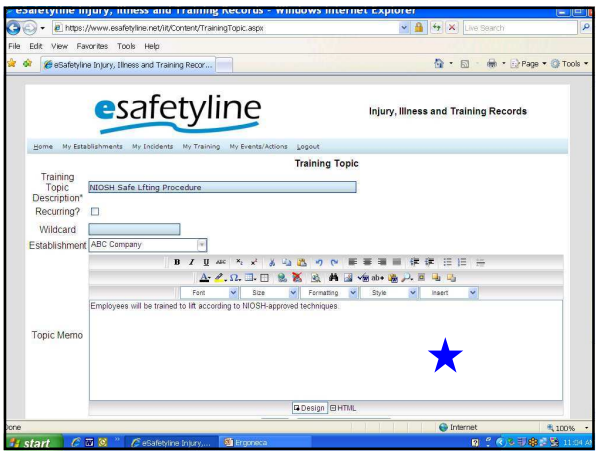
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Training Topic Description*
NIOSH Safe Lifting Procedure
Recurring?
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ABC Company
Topic Memo
Employees will be trained to lift according to NIOSH-approved techniques.
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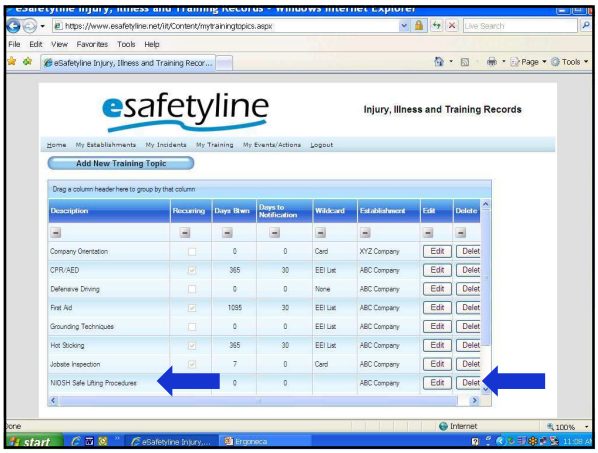
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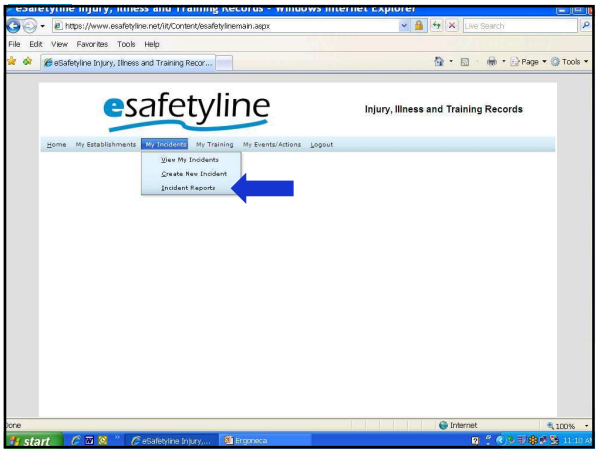
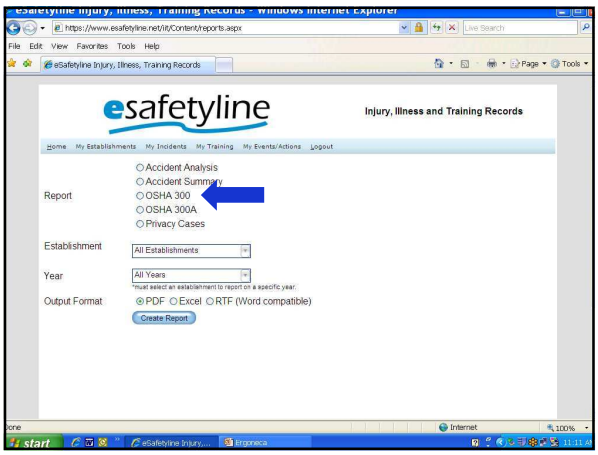
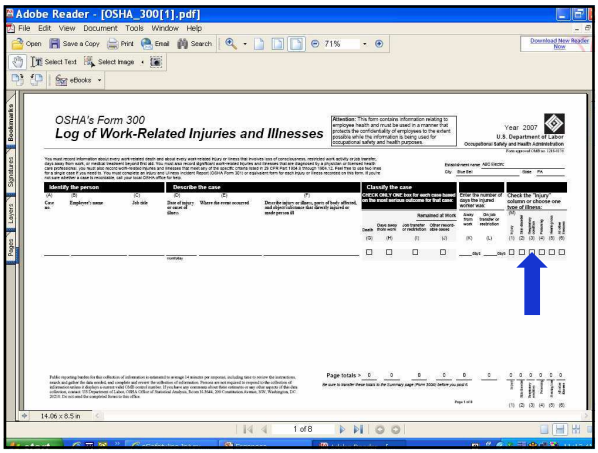
Injury, Illness and Training Records
Home
My Establishments
My Incidents
My Training
My Events/Actions
Logout
Add New Training Topic
Drag a column header here to group by that column
Description
Recurring
Days Btwn
Days to Notification
Wildcard
Establishment
Edit
Delete
Company Orientation
CPR/AED
Defensive Driving
First Aid
Grounding Techniques
Hot Stocking
Jobsite Inspection
NIOSH Safe Lifting Procedures
XYZ Company
ABC Company
Edit
Delet


esafetyline
Injury, Illness and Training Records
Home
My Establishments
My Incidents
My Training
My Events/Actions
Logout
View My Incidents
Create New Incident
Incident Reports


esafetyline
Injury, Illness and Training Records
Home
My Establishments
My Incidents
My Training
My Events/Actions
Logout
Report
Accident Analysis
Accident Summary
OSHA 300
OSHA 300A
Privacy Cases
Establishment
All Establishments
Year
All Years
*must select an establishment to report on a specific year.
Output Format
PDF
Excel
RTF (Word compatible)
Create Report



End of Session

For Help Contact

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