



**Ombudsman for  
Injured Workers**



# **Research and Resources on Traumatic Occupational Incidents**



**March 12, 2015**

# Presenters

- **Jennifer Flood, Ombudsman for Injured Workers**
- **Illa Gilbert-Jones, OR-FACE Program Manager/Field Investigator**
- **Mike Riffe, Accident Investigator, OR-OSHA**

# Agenda

- **Injured Workers Ombudsman**
  - Role
  - Resources
  - Case examples
- **OR-FACE**
  - Mission
  - Case example
  - Resources
- **OR OSHA Accident Investigator**
  - Accident cases and models

# Ombudsman for Injured Workers

- **Role**
- **Resources**
- **Case Example**

**Number of compensable fatalities<sup>1</sup> by industry<sup>2</sup>, Oregon, 2010-2014  
(preliminary as of March 3, 2015)**

INDUSTRY (NAICS code)	Work-related compensable fatalities				
	2010	2011	2012	2013	2014
Agriculture, forestry, fishing (11)	4	7	5	9	4
Logging (113)	3	4	3	6	3
Mining (21)	-	-	-	-	-
Utilities (22)	-	1	-	-	-
Construction (23)	1	3	5	7	3
Manufacturing (31-33)	3	3	4	2	2
Wholesale trade (42)	1	2	-	-	2
Retail trade (44-45)	1	-	2	2	3
Transportation and warehousing (48-49)	3	4	5	4	4
Truck transportation (484)	3	3	4	4	3
Information (51)	-	1	-	-	-
Finance and insurance (52)	-	-	-	-	-
Real estate, rental and leasing (53)	-	-	-	-	1
Professional, scientific, tech svcs. (54)	-	-	-	1	-
Management of companies (55)	-	-	-	-	-
Admin, supp, waste mgmt, remed (56)	1	1	-	1	3
Educational services (61)	-	-	-	-	1
Health care and social assistance (62)	-	1	1	-	-
Arts, entertainment and recreation (71)	-	-	1	-	1
Accommodation and food svcs (72)	-	-	3	1	1
Other services (81)	-	2	1	1	1
State and local government (OWN 20, 30)	3	3	3	2	5
<b>Total</b>	<b>17</b>	<b>28</b>	<b>30</b>	<b>30</b>	<b>31</b>

<sup>1</sup>Compensable fatalities are claims, accepted by insurers, arising from a fatal occupational injury or disease that entitles workers, their survivors, or both to compensation.

Data exclude deaths of workers not subject to Oregon workers' compensation coverage, such as workers who were self-employed, worked in Oregon for out-of-state employers, city of Portland police and fire employees, or federal employees.

<sup>2</sup> North American Industry Classification System (NAICS), 2002 Edition

Note: Dashes indicate no claims were received.

**Counts for 2014 are preliminary and subject to change** as source data for fatalities are received throughout the year. Fatality counts for previous years are final.

Data are based on the date the Department of Consumer and Business Services received notification that the fatality claim was accepted, which may be different than the date of injury or the date of death.

Source: Central Services Division, Oregon Department of Consumer and Business Services, March 3, 2015



# Oregon

JOHN A. KIRCHBAUER, MD, GOVERNOR

## Department of Consumer and Business Services

Office of Ombudsman for Injured Workers

350 Winter St. NE, Room 160

P.O. Box 14480

Salem, OR 97309-0405

503-378-3351 or 800-927-1271

Fax: 503-373-7639

[www.oregon.gov/DCBS/OIW](http://www.oregon.gov/DCBS/OIW)

## Oregon Workers' Compensation Benefits for Accepted Fatal Injuries

**New Benefit Levels effective July 1, 2014**

*Benefits apply to Oregon injured workers subject to ORS Chapter 656 with dates of injury on or after July 1, 2014. Benefits are not due until claim acceptance.*

### **Final Disposition & Funeral expenses:**

\$17,767.60 (unpaid balance paid to worker's estate)

### **Spouse & Children:** combined max = \$5,152.48 a month

**Spouse** = \$2,576.43 a month

**Children** (up to age 18, or 23 if attending higher education)

Child – dependent on surviving spouse = \$386.45 a month

Child – NOT dependent on surviving spouse = \$966.11 a month

Child – no surviving spouse = \$966.11 a month

**Children** age 18 to 23 – *without a living parent*

\$2,576.43 a month while attending higher education

### **Other Dependents:** combined max = \$386.45 a month

\*Other Dependents\* are named relatives who were dependent, in whole or in part, on the worker. Benefit is based on 50% of average monthly support actually received from the worker during the previous 12 months.

For questions regarding Oregon Workers' Compensation:

Jennifer Flood, Ombudsman for Injured Workers

Dept of Consumer & Business Services

Toll-free: **800-927-1271 ext. 7031**

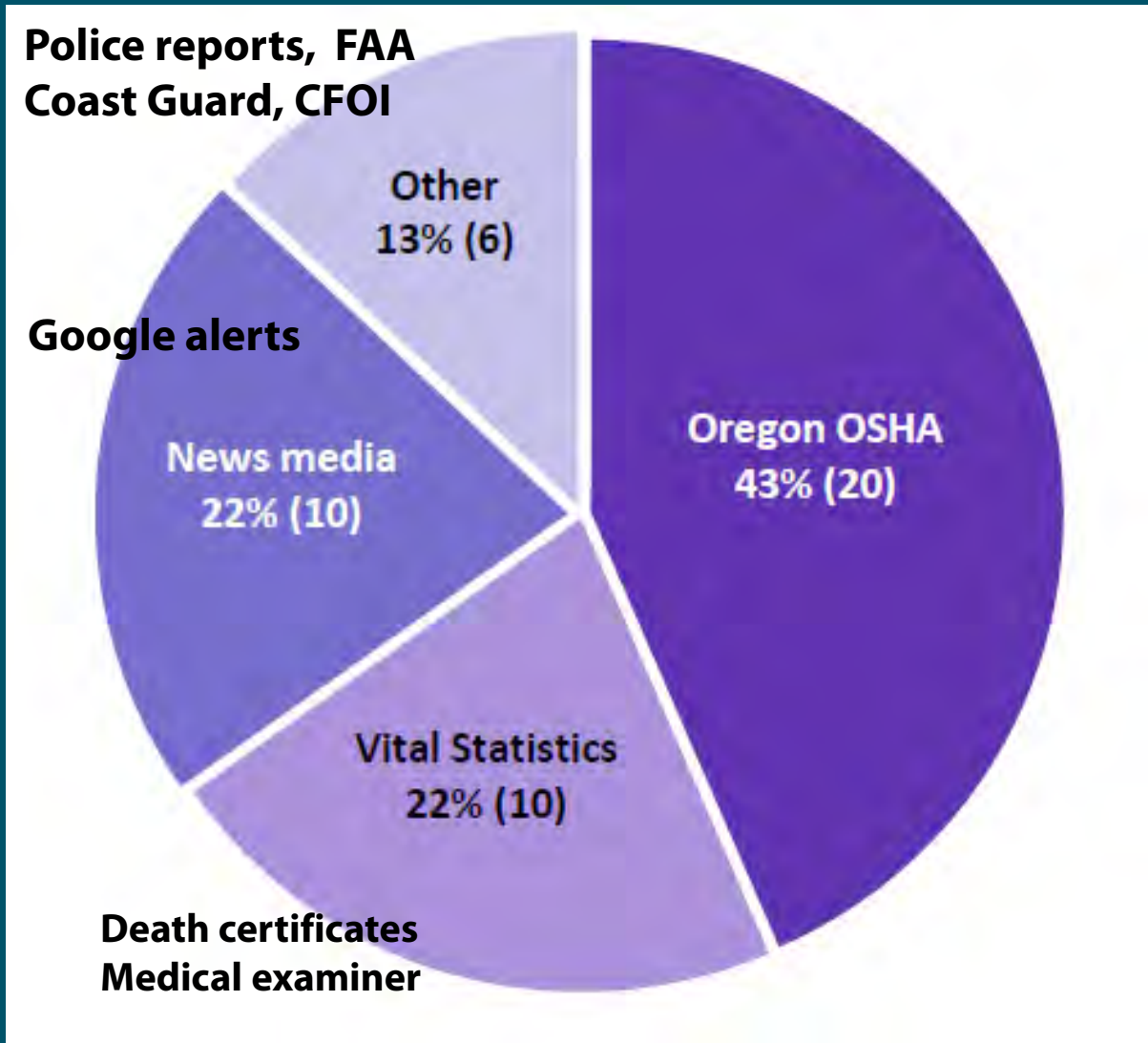
Local (Salem): 503-947-7031

Email: [jennifer.r.flood@state.or.us](mailto:jennifer.r.flood@state.or.us)

# Mission

- **Prevent traumatic work-related deaths in Oregon through**
  - **Surveillance**
  - **Targeted investigation,**
  - **Assessment**
  - **Outreach**

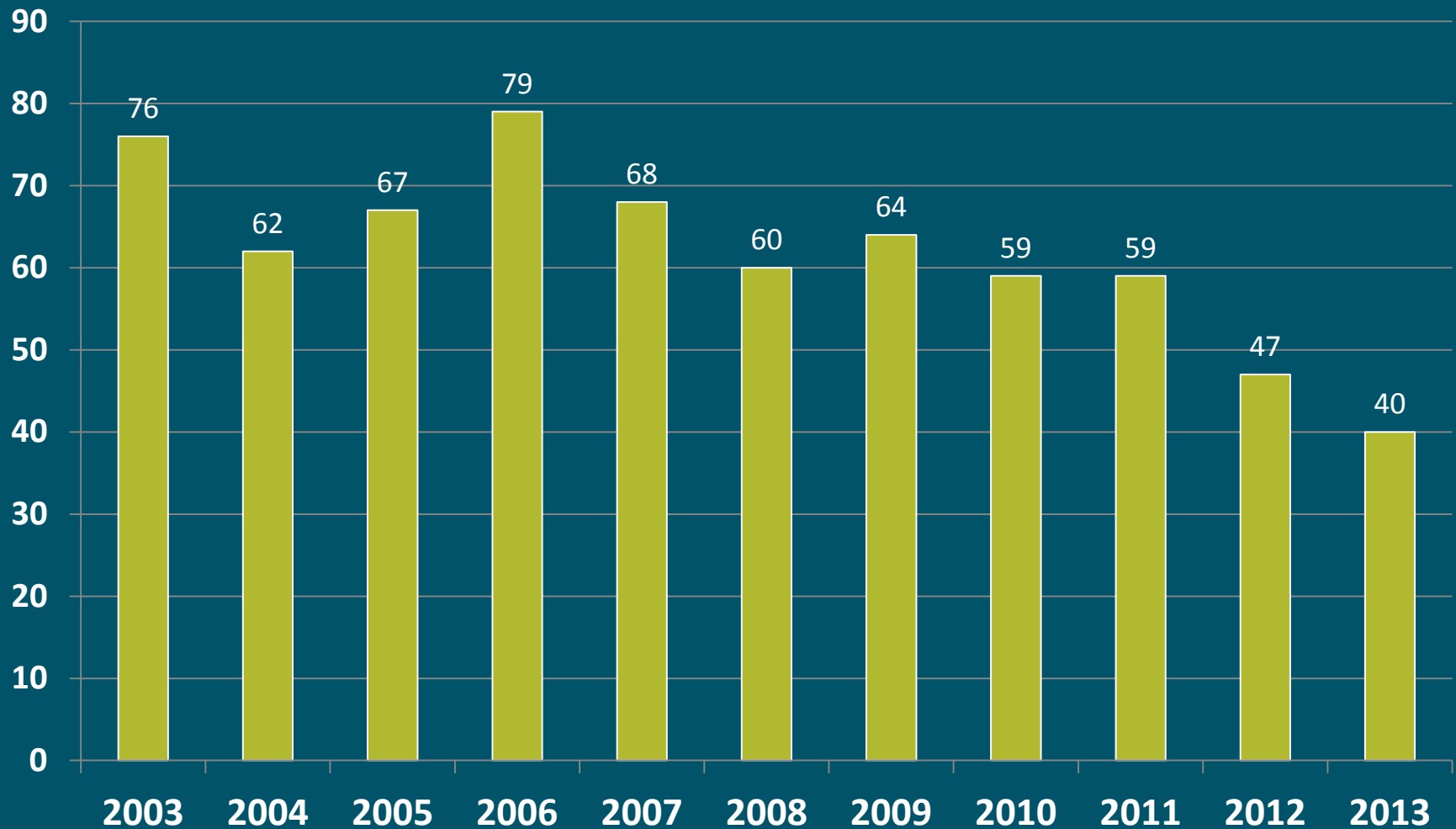
# Surveillance 2012





## Worker fatalities in Oregon (2003-2013)

### Total number of cases by year

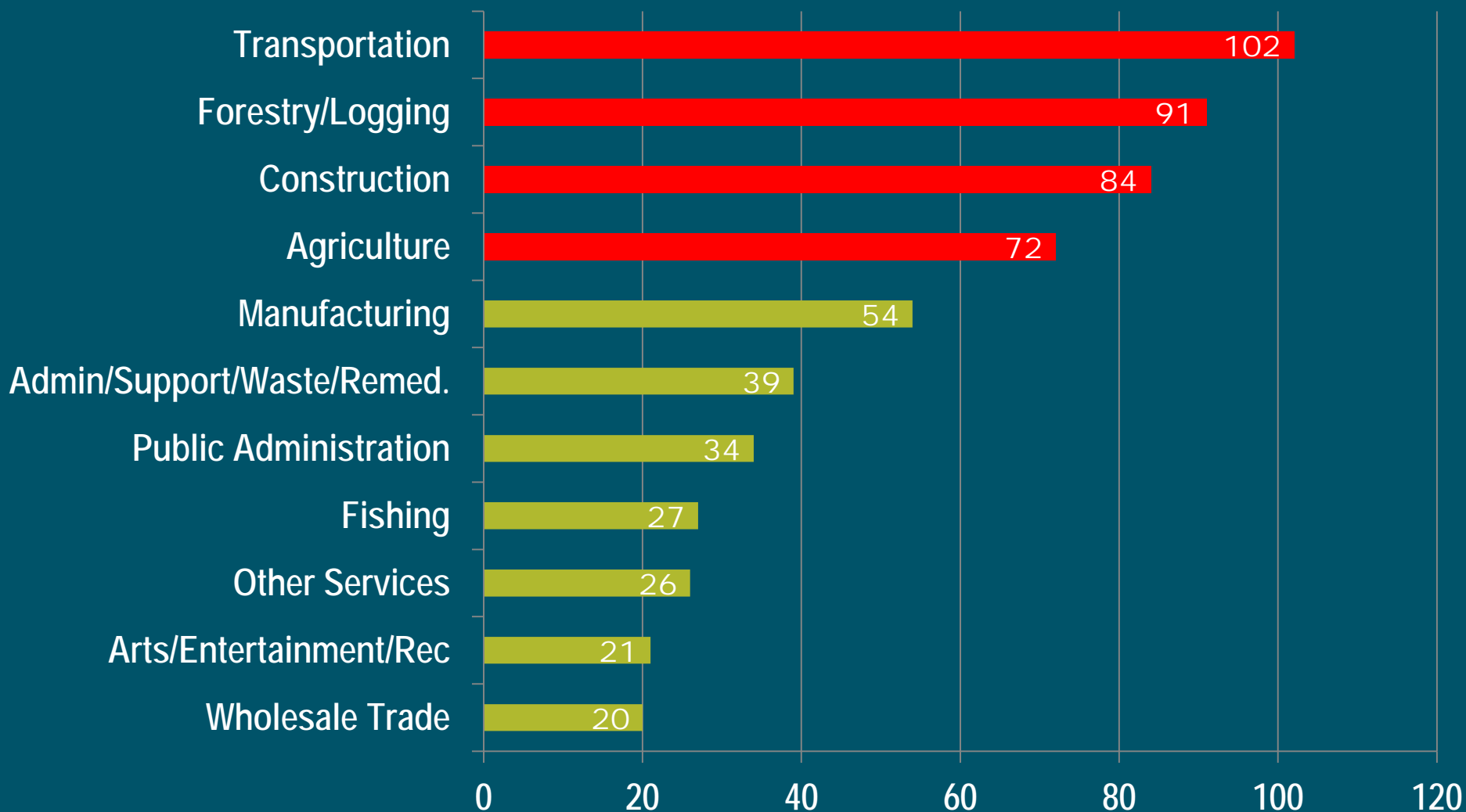




**OR-FACE**

## Worker fatalities in Oregon (2003-2013)

### Top 10 industries in total number



1. Experienced journeyman machinist killed while operating an engine lathe
2. Millwright fatality involving a hydraulic accumulator
3. Timber faller killed while working under a hung tree limb
4. Collapsed roof trusses kill carpenter foreman

- Maintain confidentiality
- Provide facts
- Provide best practice recommendations (beyond regulatory requirements)





## OREGON FATALITY ASSESSMENT AND CONTROL EVALUATION

<http://www.ohsu.edu/croet/face>

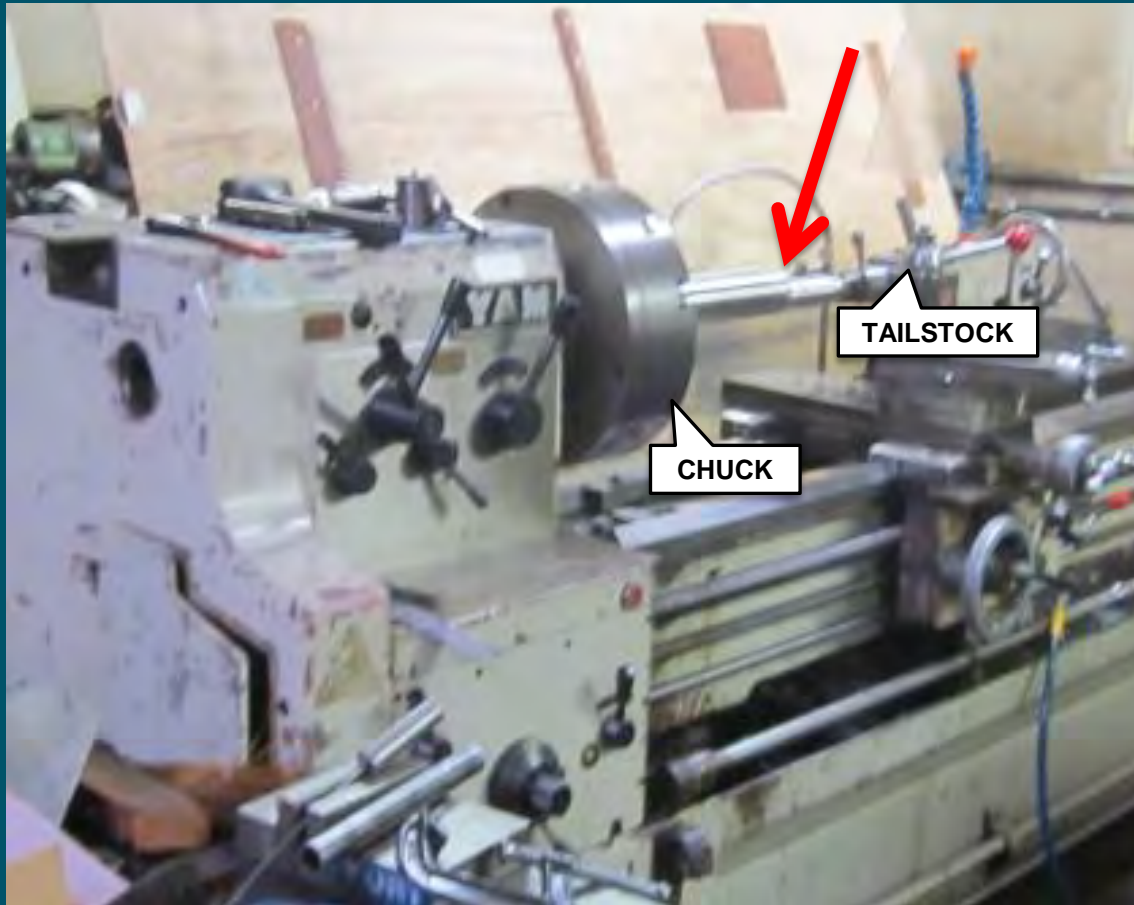
Oregon Institute of Occupational Health Sciences



### Fatality Investigation Report

OR 2012-18-1

### Experienced Journeyman Machinist Killed While Operating an Engine Lathe



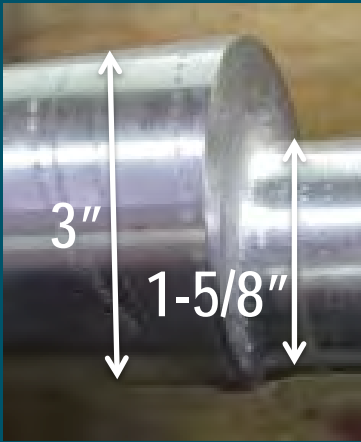
## Mechanic

- 69 years old
- Journeyman with 30+ years of experience
- New to this shop

## Worksite

- Machine shop
- Different models of machine lathes
- Six employees
- New owner

*Unfinished part*



*Finished part*

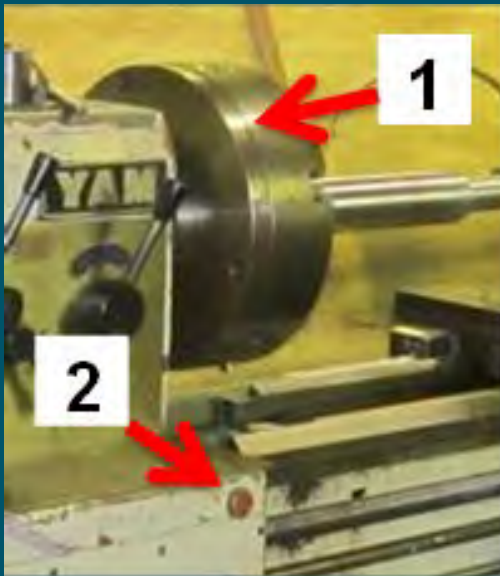


## Part

- Eccentric shaft (off set centers)
- Steel stock
- Short shaft vs long shaft
- **Radius transition**

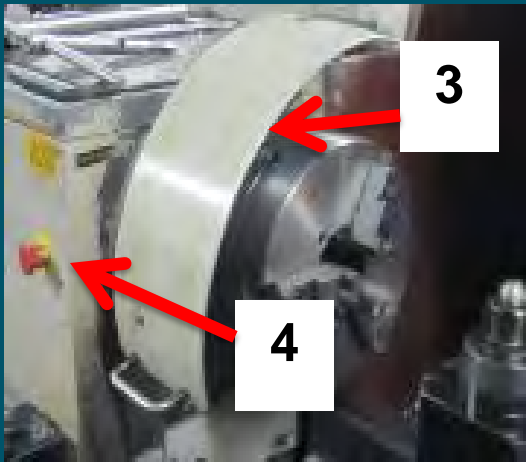
## Work practice

- Gloves to handle steel stock
- Emery cloth to smooth radius transition
- Clothing – long sleeved thermal shirt underneath cut sleeved sweatshirt



## Engine lathe involved in incident

- 40 years old
- Manufactured in Taiwan in 1968
- 1 – unguarded chuck
- 2 – red “inch” button



## Other engine lathe in shop

- 16 years old
- Manufactured in England in 1996
- 3 – guarded chuck
- 4 – red emergency stop

## **The incident**

- Machinist turning his first short length (30.5 inches long) eccentric shaft (workpiece), had completed a few longer shafts
- Rough machining completed (7 hours)
- Part slipped in chuck jaws and had damaged end
- Told to smooth radius transition using emery cloth then reverse part
- Spindle speed set at 590 rpm (supervisor sets speed at 330 rpm)
- Operator of nearby CNC machine heard “winding up” sound and pushed red button repeatedly
- Gloves found on equipment

## **CAUSE OF DEATH**

**Lacerating and penetrating injuries of neck and chest**

## Contributing Factors

- Defective tool (bent chuck key)
- New employee, high expectations, minimal guidance
- Clothing – cut-off sleeve sweatshirt
- New task - short piece
- Older equipment (different safety features)

# Recommendations

1. Employers should establish, communicate and enforce a clothing policy specific to the work environment and particularly for machine operators.
2. Employers should establish formal training on recognized hazards, injury prevention and emergency procedures, and to communicate expectations to adhere to safe practices and policies.
3. Supervision should monitor, reinforce safe behaviors, and immediately correct unsafe behaviors or conditions.

## Recommendations Cont'd

4. Job hazard analyses should be conducted by operators and supervisors and should include a review of the manufacturer's equipment/operator's manual, machine labeling, color coding, etc., especially for legacy machines.
5. Employers should implement preventive maintenance and inspection processes for hazardous machines. Where necessary, employers should install, adjust, label and/or repair appropriate controls (e.g., machine guards, emergency stops).

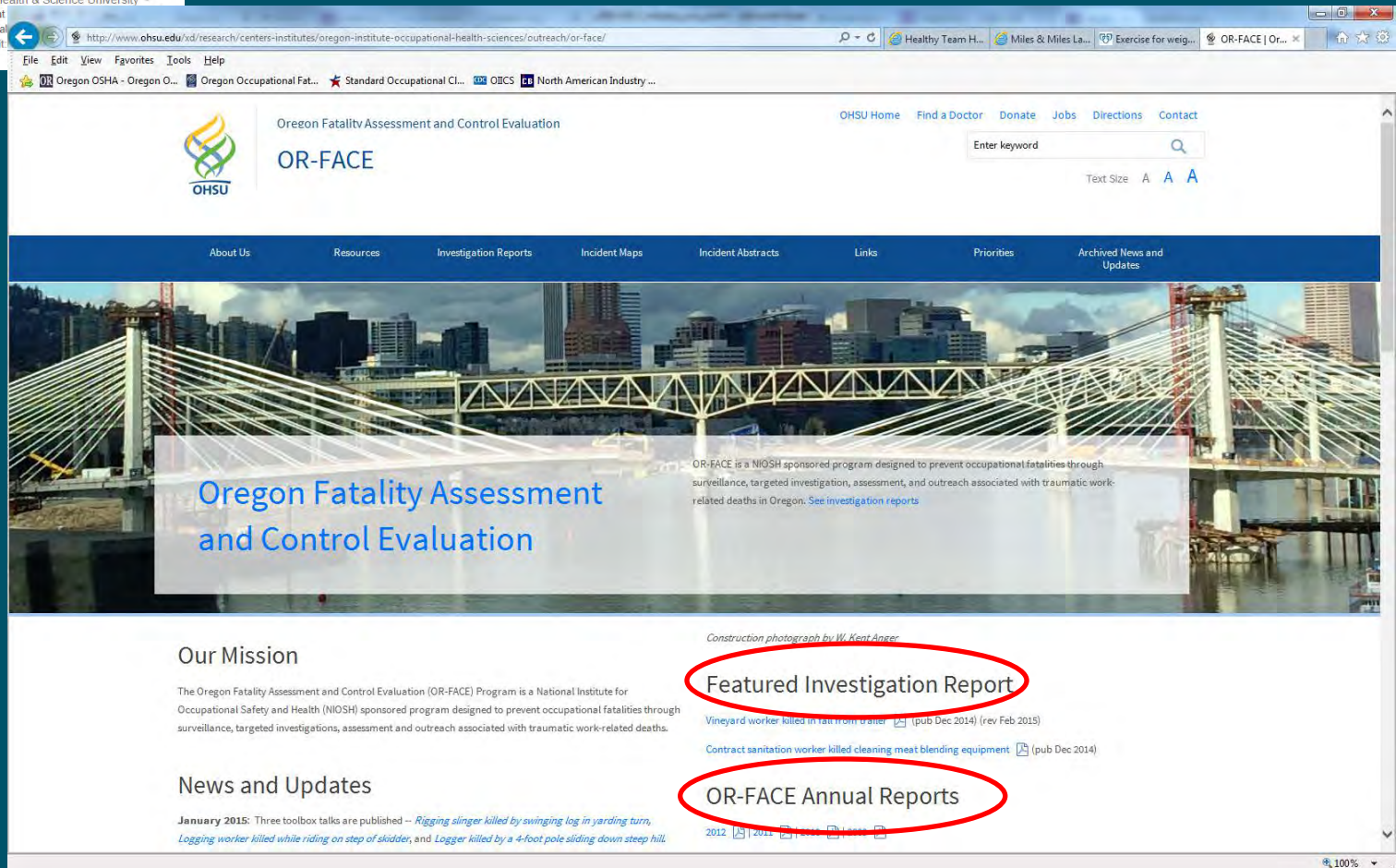
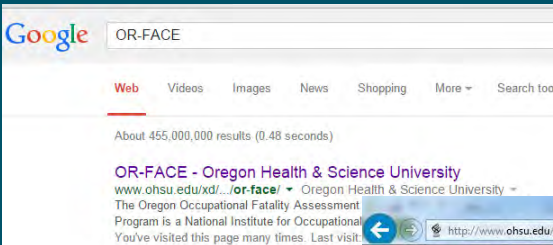
# Outreach

- **Website**
- **Publications**
- **Interventions**
- **Presentations**

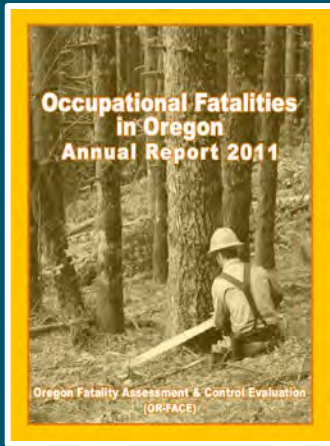
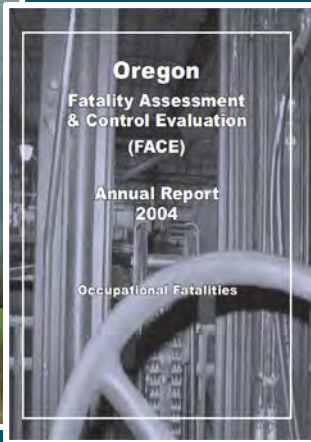
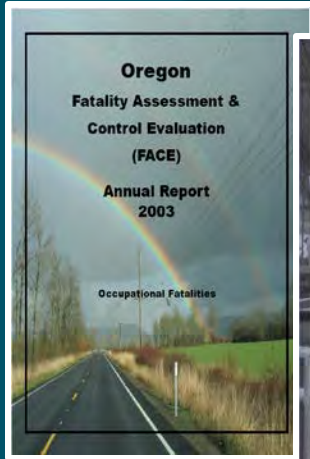


# Website

## Google OR-FACE

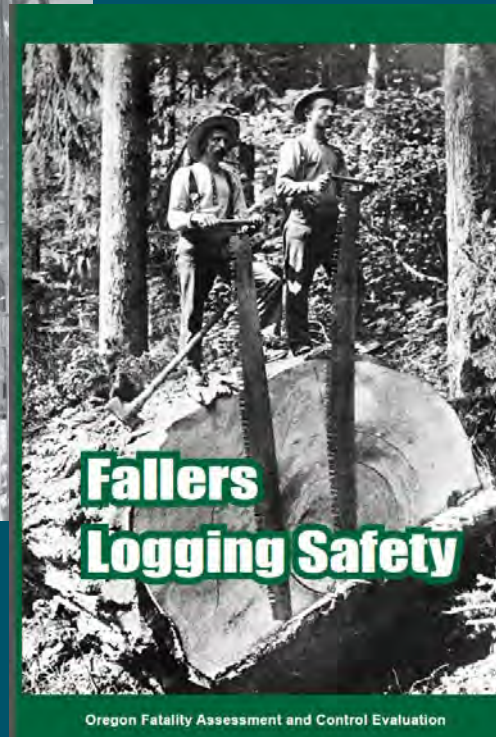
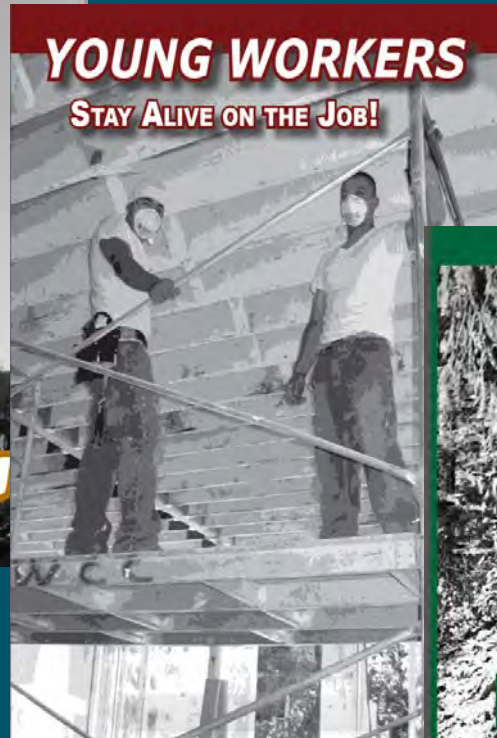


## Annual Reports



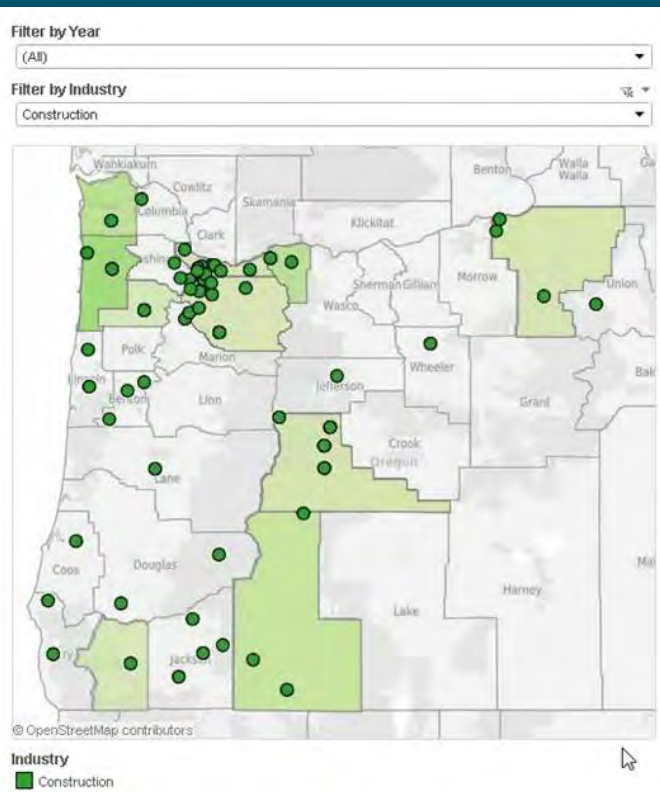
- **Published 18 months**
- **Abstract of cases**
  - **Based on report review**
    - **OSHA investigation**
    - **Police investigation**
    - **Medical examiner**
      - **Pathology**
      - **Toxicology**
    - **National Transportation Safety Board**
    - **US Coast Guard**

## Booklets

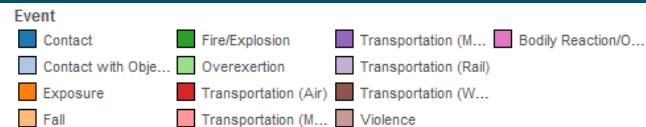
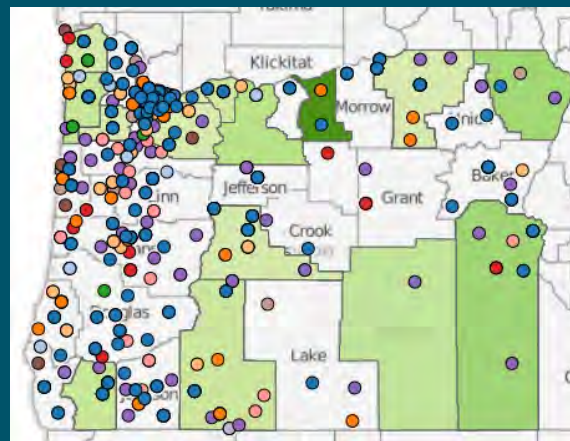


## Interactive Maps (2003-2012)

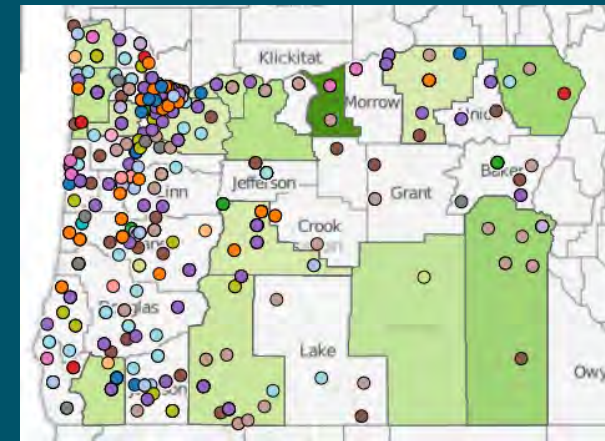
### Industry



### Event



### Occupation



## Hazard Alerts

## OR-FACE Fatality Alert

November 2003

OHSU  
OREGON  
HEALTH  
& SCIENCE  
UNIVERSITY

#1 OR2003-36-01



#2 OR2003-37-01



#3 OR2003-37-01



## Truck mounted pile driver presents fatal electrocution hazard

## Fatal Fall Alert

## Gravity Kills

In 3 years, 22 Oregon workers died in falls. Risk increases greatly over age 35, and again over age 65.

Fall hazards are everywhere. Fall

Please observe the following safety tips:

## Recommendations

- Make sure ladder is in good condition and locks are secure. Set base 1/4 length from wall, supported at top rails extending 3-4 ft above dismount.
- Three-point rule: Get a firm grip with four limbs, especially in icy conditions.
- Beware losing your balance from unexpected release of a weight you are carrying or pulling, or from overreaching.

## Fatal Stories, 2003-2005

## LADDERS

**Store ladder:** A female retail clerk fell from the sixth step in a company store room, and died 5 days later. She sustained the left knee and femur. The clerk was admitted to a local hospital and died of complications.

**Ice ladder:** A lumber yard worker was killed when he fell off a loaded semi-trailer. The worker placed an extension ladder and climbed to the top to strap it down. Ice had built up on the ladder, and the worker apparently slipped from the ladder.

**Roof exit:** A school custodian died after falling about 12 feet from a roof. The spring-loaded locks were not set properly, which caused the custodian to climb the ladder successfully, but the ladder he put his weight on it to return to the ground.

## ELEVATED LEDGE

**Concrete tank:** A construction worker died after falling from a concrete tank. The worker was removing concrete from a water treatment tank that was being dismantled, and was the last person standing on the top edge. He was either bent over or kneeling to perform his task, and apparently lost his balance and fell.

**Conveyor belt:** A miner fell 12 ft onto a concrete floor from an elevated conveyor at a sand and gravel operation. The miner was standing on a crossbeam, pulling on a rope. The rope unexpectedly came loose, causing him to fall.

OR-FACE  
PLEASE POST

## OR-FACE

## Snag Hazard Alert

From 2010 to 2013, 10 Oregon workers in the Logging and Forestry industries died after being struck by trees. Hung limbs and snags in trees are a recurring contributing factor to occupational fatalities among tree fallers in Oregon.

## Please observe the following safety tips:

- Scan for hung or snagged trees and limbs in your own and others' cutting strip and communicate with each other about these hazards.
- When faced with a hazardous situation, stop work and seek assistance from a cutting partner, or a more experienced worker.
- If a snag or hang-up is identified, after seeking assistance, work with your partner to identify the best method for alleviating the hung limb, tree or snag (OR-OSHA working under a lodged tree or the cutting of a tree where another tree is lodged).
- Employers should ensure that workers are trained and understand how to safely remove or cut hung limbs and other hazardous logging conditions.

## Fatal Stories

**Case 1:** A 28-year-old self-employed tree cutter was killed after he was struck by a dislodged tree limb and crushed between previously felled logs and underbrush. The victim had cut a small second growth tree, but it had hung up in another tree as it fell. He was attempting to fall another larger tree when the lodged tree broke free and fell on him.

**Case 2:** A 51-year-old logger was killed after he was struck by a falling snag that was caught in the tree he was cutting. He was working on a steep hillside, and his partner was 250-300 yards away. His partner searched for the victim after he had not heard the victim's saw in 40 minutes. He found the victim dead with a tree on top of him. The victim had 25 years of logging experience.

**Case 3:** A 48-year-old tree faller was killed after he was struck by a snag that was caught in the tree he was cutting. He had just felled a large tree on a hillside, which uprooted a rotten tree on its way down. The rotten

tree hit the victim from behind and pinned him underneath. He was working alone at the time. The victim died at the scene.

**Case 4:** A 41-year-old logger was killed when he was struck in the back by a falling tree while working as part of a two-person logging team. The victim was cutting a large tree on private logging land. He was working on a steep hillside, and his partner was 250-300 yards away. His partner searched for the victim after he had not heard the victim's saw in 40 minutes. He found the victim dead with a tree on top of him. The victim had 25 years of logging experience.

PLEASE POST

Oregon Fatality Assessment and Control Ev.  
503-454-2281 www.ohsu.edu

- One page
- Bulleted recommendations
- Abstract of similar cases

## OR-FACE

## Crab Fishing Hazard Alert

During 2000-2009 70% of commercial fishing deaths off the US West Coast were caused by drowning. Dungeness crab fisheries had the highest number of fatalities with a rate of 310 per 100,000 full-time equivalent workers. Falls overboard accounted for 24% of all fatalities. None of the victims of falls overboard were wearing personal flotation device.\*

\*DHHS (NIOSH) Publication Number 2011-104, Fatal Occupational Injuries in the U.S. Commercial Fishing Industry: Risk Factors and Recommendations West Coast Region



Illustration: Joseph Reardon

## Please observe the following safety tips:

- Wear personal flotation device whenever on deck and every time the bar is crossed
- Train crew on man-overboard procedures and practice at least monthly
- Use the most current weather forecasts and bar information
- Use personal locator beacons that are water activated for visibility
- Get vessel stability evaluations to aid in loading properly
- Utilize Coast Guard vessel inspections

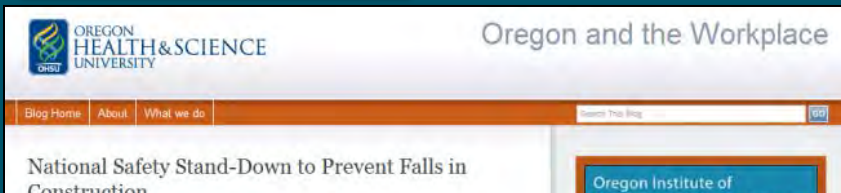
## Fatal Stories

**Case 1:** The 43-year-old crab boat captain survived when the vessel he was operating capsized but was pushed up on the jetty. Two crew members (44 and 55 years-old respectively) died after being swept overboard. None of the crew wore life vests or personal flotation devices, nor was there time to do so when the waves hit. They were attempting to cross the bar in rough seas. The victims were part of a three person crew that was preparing for the opening of crab season. When the boat was attempting to cross the bar, seas were estimated at 14 to 16 feet. As it tried to exit it got sideways to the breakers, one end was pushed up and the next wave turned it

was preparing for the opening of crab season. The boat was roughly three miles out from a bay when it became unstable and began to tilt. Before the crew could determine the problem, the boat was hit by a large wave and tipped on its side. The two deckhands were able to put on personal flotation devices and swim to a nearby boat where they were pulled onboard. The captain was apparently trapped inside the wheelhouse when the boat fully capsized and he was unable to escape.

**Case 3:** A 38-year-old commercial fisherman was killed when his fishing boat capsized. The 21-foot boat capsized in high waves after an engine failure. Witnesses called for help and reported that there were two men on the boat. Initial responders were

## Blogs



### National Safety Stand-Down to Prevent Falls in Construction

For those who aren't aware June 2-6, 2014 is the National Safety Stand-Down to prevent falls in construction. A Safety Stand-Down is a voluntary event for employees to talk directly to employees about a specific safety topic. The purpose of this National campaign is to raise awareness of fall prevention in construction. Falls from elevation continues to be the leading cause of death for construction workers. In 2012 there were 775 construction fatalities recorded and 269 of these were caused by falls from elevation.



Suggestions to prepare for the Safety Stand-Down are provided by OSHA.

In addition to the resources provided by OSHA, The Center for Construction Research and Outreach (CCRO) has toolboxes based on construction fatalities in Oregon.

For more Oregon-specific Toolbox Talks, Oregon Occupational Fatality Assessment and Evaluation (ORFACE) has toolbox talks based on construction fatalities in Oregon.

OSHA will have a webpage (active June 2 to July 15, 2012) where employees can plan Safety Stand-Down and download Certificates of Participation.

Let's all participate in preventing falls in construction by having a great Safety Stand-Down campaign, June 2-6.

SHARE



### OR-FACE Publishes More Toolbox Talk Guides



Safety communication is an integral part of maintaining an injury prevention culture. Its implementation can be in a variety of methods such as warning labels, safety trainings and meetings, hazard alerts and informal communications between supervisors, workers, and co-workers. In her ~30 years of experience as a safety and health professional, Ila Gilbert-Jones, program manager of the Oregon Fatality Assessment and Control Evaluation (ORFACE) program, has learned that increasing the level of interaction between supervisor and workers about safety positively influences safe behaviors. Moreover, if the interaction is about real world, reliable events, the impact can be significant.

Toolbox talks are a common form of safety communication, especially in construction but they have been used as daily pre-shift meetings in general industry. ORFACE has created several toolbox talk guides and recently published four. These live-page documents are based on information gathered from Oregon fatality investigations. One side of the toolbox talk is a simple line drawing for viewing from a distance and for ease in understanding the key elements of the incident. At the bottom of the line drawing are key actions to prevent a similar incident. On the other side, are instructions for leading the toolbox talk, a narrative of the incident, bullet points that reiterate the key prevention actions and a list of questions to facilitate a discussion on current practices, unsafe conditions, and commitment to an action plan.

The overarching goal of these toolbox talk guides is to provide supervisors/leaders with documents to increase interaction and positively influence safe behaviors. The format uses evidence-based safety communication principles and real-world (Oregon) reliable events.

SHARE

### Oregon Institute of Occupational Health

#### Participation Guidelines

Remember: information you share here is medical advice. Medical advice or treatment healthcare provider directly. Read our Terms and Conditions.

#### Recent Posts

2014 Q1/Q2 State-Related High-Cost Things are Looking Up for Construction Workers in Southern Oregon  
Infection Control & Staying Healthy

#### Recent Comments

Don't forget to check out the 'Staying Healthy' and 'Infection Control' guides. They are available on the 'Staying Healthy' and 'Infection Control' guides. They are available on the 'Staying Healthy' and 'Infection Control' guides. They are available on the 'Staying Healthy' and 'Infection Control' guides.

Meta

### OR-FACE presents at logging and construction safety events



Clark Vermillion thanks Ila Gilbert-Jones on behalf of the CSS.

Oregon Fatality Assessment and Control Evaluation (ORFACE) presented at the January meetings of the Washington Contract Loggers Association (WCLA) and the Portland Construction Safety Summit (CSS).

Jeffrey Wimer, OR-FACE Safety Consultant and Oregon State University Manager of Student Logging Program, presented OR-FACE logging data and resources to over 500 attendees at the annual WCLA Safety Conference held near Olympia on January 17. The resources created by Jeff and OR-FACE will contribute to the Washington State Logger Safety Initiative. The Oregon forestry/logging industry had 91 FACE cases from 2003-2013 and ranks second in the highest number of total fatalities.

The Oregon construction industry ranks third with 84 fatal occupational cases. Ila Gilbert-Jones presented OR-FACE construction data and resources to 40 members at the CSS January 20 meeting. Construction and logging are high risk industries in Oregon and providing outreach information to these two industry groups aligns with the ORFACE mission to "prevent occupational fatalities through surveillance, targeted investigation, assessment and outreach associated with traumatic work-related deaths in

Oregon." You can find both presentations and resources on the ORFACE website.

Submitted by Ila Gilbert-Jones, CIH, CSP, Oregon FACE Program Manager/Field Investigator.





# Preventing Construction Fatalities: *The Toolbox Guide Initiative*

OR-FACE  
PSU Occupational Health Psychology  
Hoffman Construction  
Fortis Construction  
SAIF Corporation



## **PLAN**

*ahead to get the job done safely.*

## **PROVIDE**

*the right equipment.*

## **TRAIN**

*everyone to use the equipment safely.*

# OR-FACE Tool Box Talk Guides: *Evidence-Based Structure*

## FRONT: Scripted Story

## BACK: Line Drawing

### Toolbox Talk Load of Lumber

#### INSTRUCTIONS side facing you

Our safety talk today is about a worker who died when a load of lumber fell on him. He was on a ladder to access a stairwell in a house while a rough bundle of lumber to weighed at least 600 pounds, the maximum possible weight, tipped over. The lumber struck the victim's head and pinned him against the ladder. He fell to the first floor and probably died from the impact.

#### So here are some things happening where we work.

- Never exceed the load or extension limits of a lift or crane. You should be trained before you operate a lift or crane, and I can make sure you get the training.
- Never work directly under a load. If you are required to be under a load, use a spotter and communication system to prevent lifts over workers.
- Use a spotter and communication system to prevent lifts over workers, advance, and to

#### ASK: "Does anyone have ideas for improving our communication systems?"

#### END WITH ACTION

- "Are there any other things we can do to make sure people are not under loads being moved?"
- "Does anyone have ideas for improving our communication systems?"
- "What do you all do to make sure people are not under loads being moved?"
- Discuss a similar situation at your current site.
- Express your commitment to training people for each machine they operate.
- Commit to follow-up at the next safety talk.

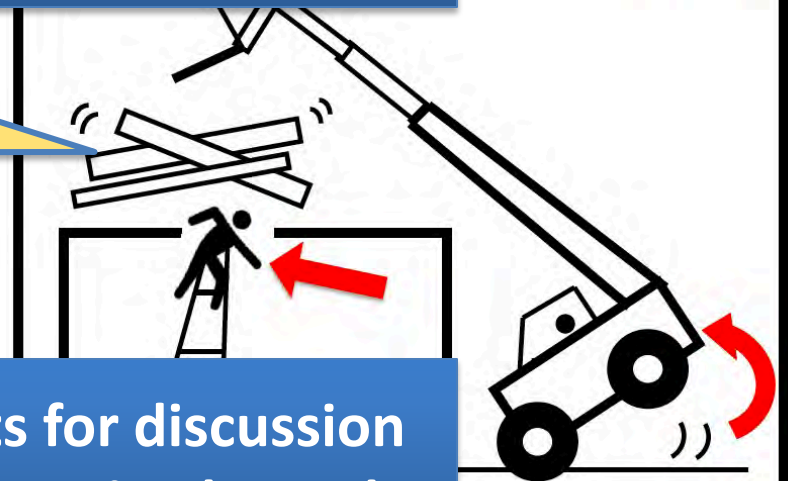
High urgency alert word  
in color

Script with instructions  
in black boxes

Line drawings increase  
understanding and  
viewing distance

Top 3 preventive actions  
in bullets

Prompts for discussion  
and correcting hazards

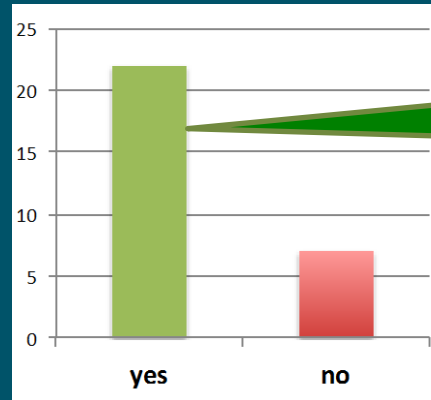


- Never exceed load or extension limits of a lift or crane
- Use a spotter and communication system to prevent lifts over workers
- Never work directly under a load

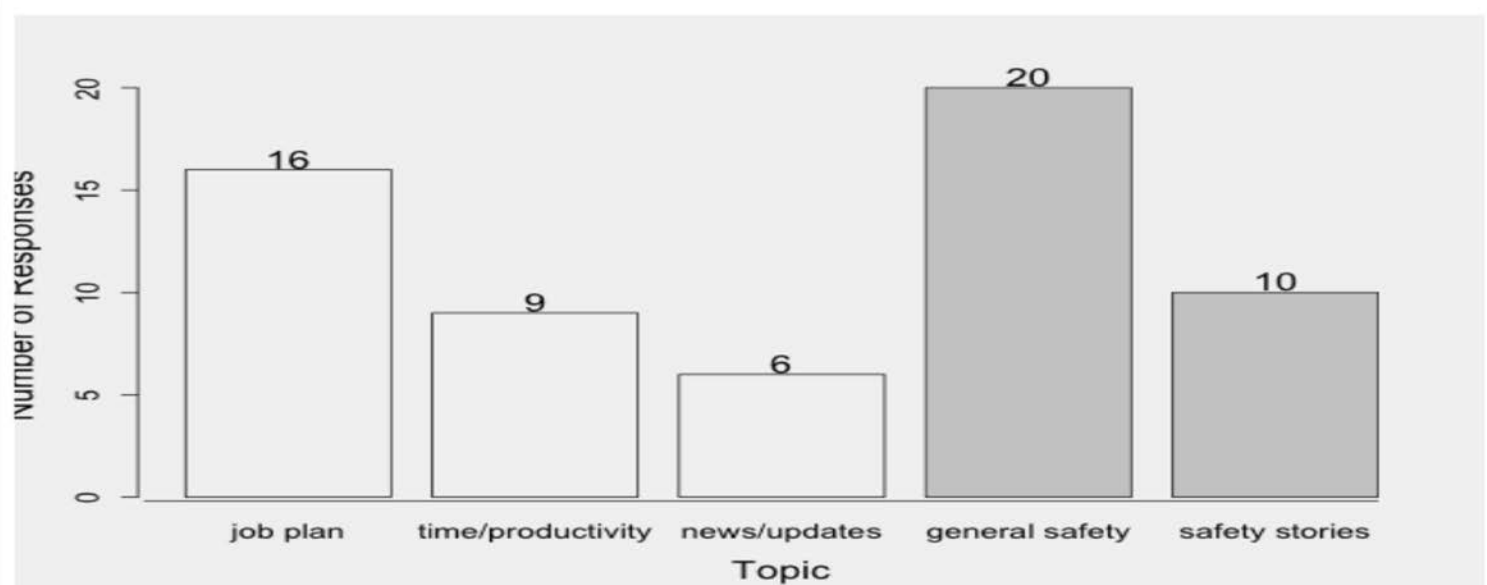
# 3 Field Studies (sample findings)

- Study 1: Current Pre-Shift Practices (n=28)

My company  
conducts  
pre-shift  
talks/briefings



frequency  
28% weekly  
32% daily



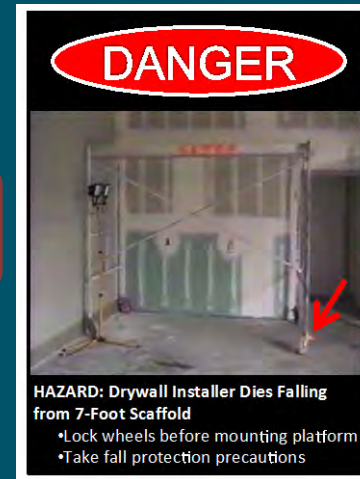
# 3 Field Studies (sample findings)

- Study 2: Image Viewing Distances (n=30)

1 to 3 M  
greater  
viewing  
distance



VS.



# Study 3: Field Test (n=119)

## Supervisors

Talk with  
FACE report

VS.

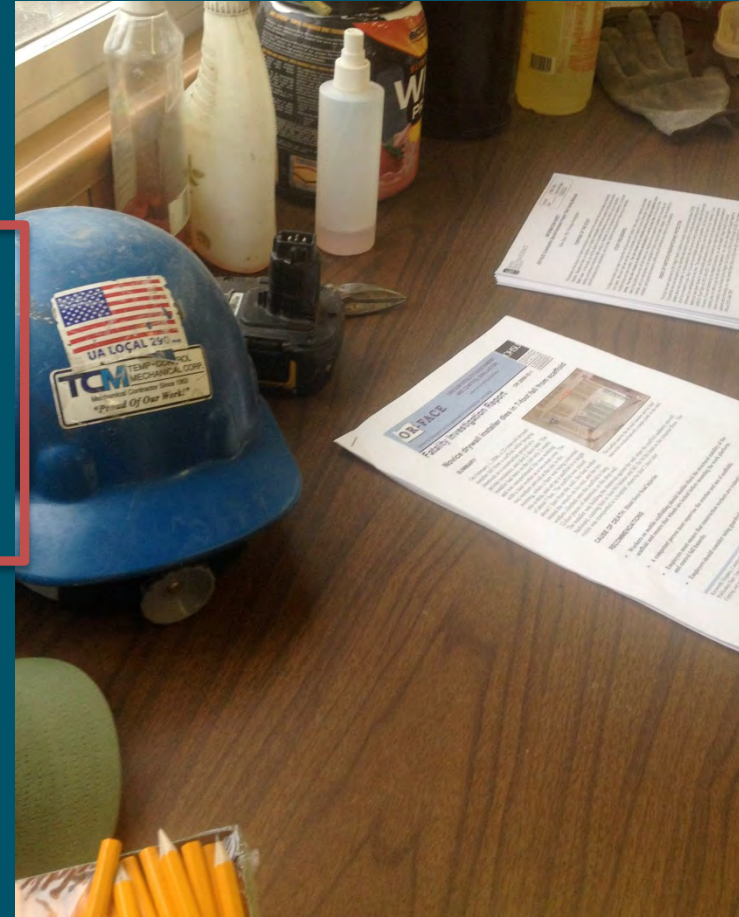
Talk with  
Tool Box  
Guide

**Preferred  
3:1**

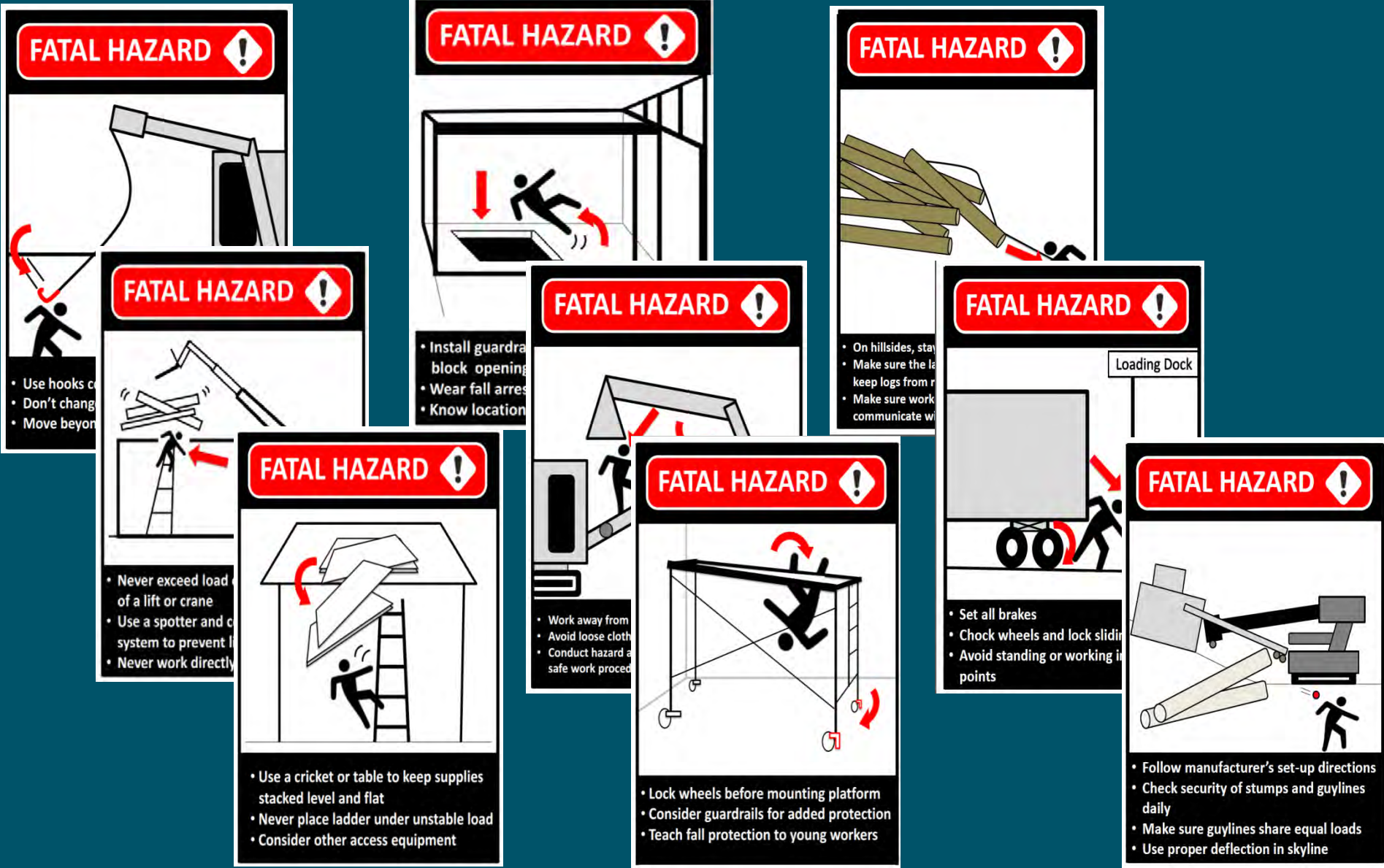
## Workers

- **Reactions**
- **Behavioral intentions**
- **Preference**

Similar positive ratings



# Publications



# Proposed Projects

- **Mobile system to promote and evaluate**
  - **toolbox talks**
  - **hazard alerts**

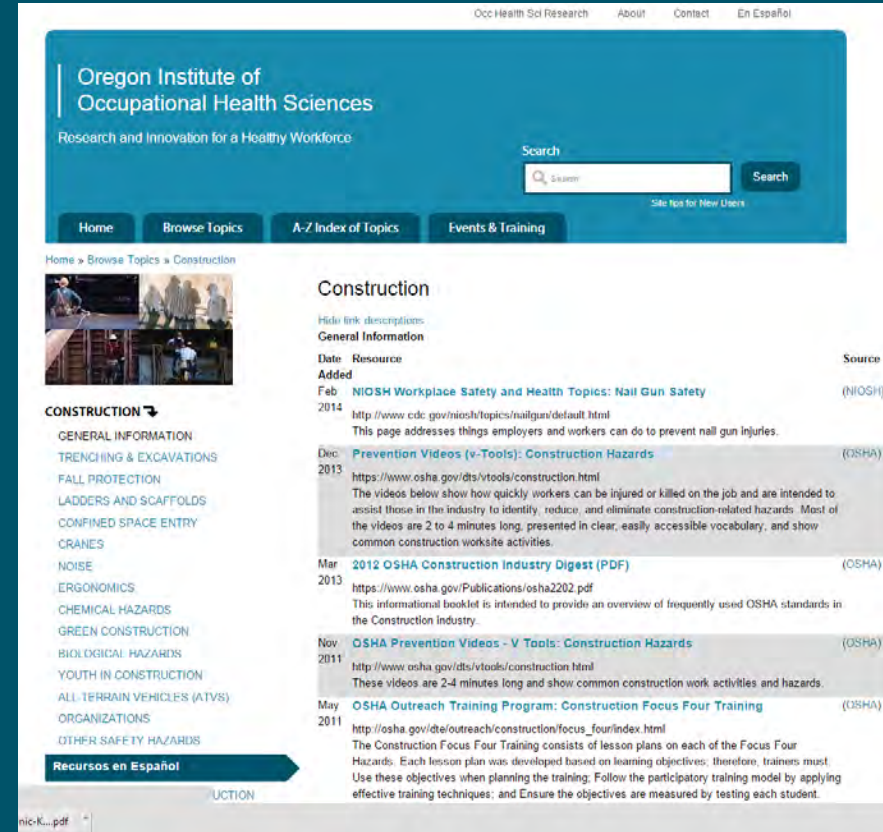


# Proposed Projects

- **Preventing falls in residential construction**
  - **Identify Participants**
    - Homebuilders Association
    - SAIF Corporation
  - **Study**
    - Experience in recent serious (non-fatal) fall from elevation will increase contractors participation in surveillance survey
    - Small grants program to supply fall prevention equipment and training.

# Other Resources

- Oregon Institute of Occupational Health Sciences
  - Safety toolbox talks
  - Online videos
  - Newsletter
  - Blog



The screenshot shows the Oregon Institute of Occupational Health Sciences website. The header includes navigation links: Home, Browse Topics, A-Z Index of Topics, and Events & Training. A search bar is located in the top right. The main content area is titled "Construction" and lists various resources. A sidebar on the left provides a detailed index of topics under the "CONSTRUCTION" heading.

**CONSTRUCTION**

- GENERAL INFORMATION
- TRENCHING & EXCAVATIONS
- FALL PROTECTION
- LADDERS AND SCAFFOLDS
- CONFINED SPACE ENTRY
- CRANES
- NOISE
- ERGONOMICS
- CHEMICAL HAZARDS
- GREEN CONSTRUCTION
- BIOLOGICAL HAZARDS
- YOUTH IN CONSTRUCTION
- ALL TERRAIN VEHICLES (ATVS)
- ORGANIZATIONS
- OTHER SAFETY HAZARDS

**Recursos en Español**

**Construction**

Hide link descriptions

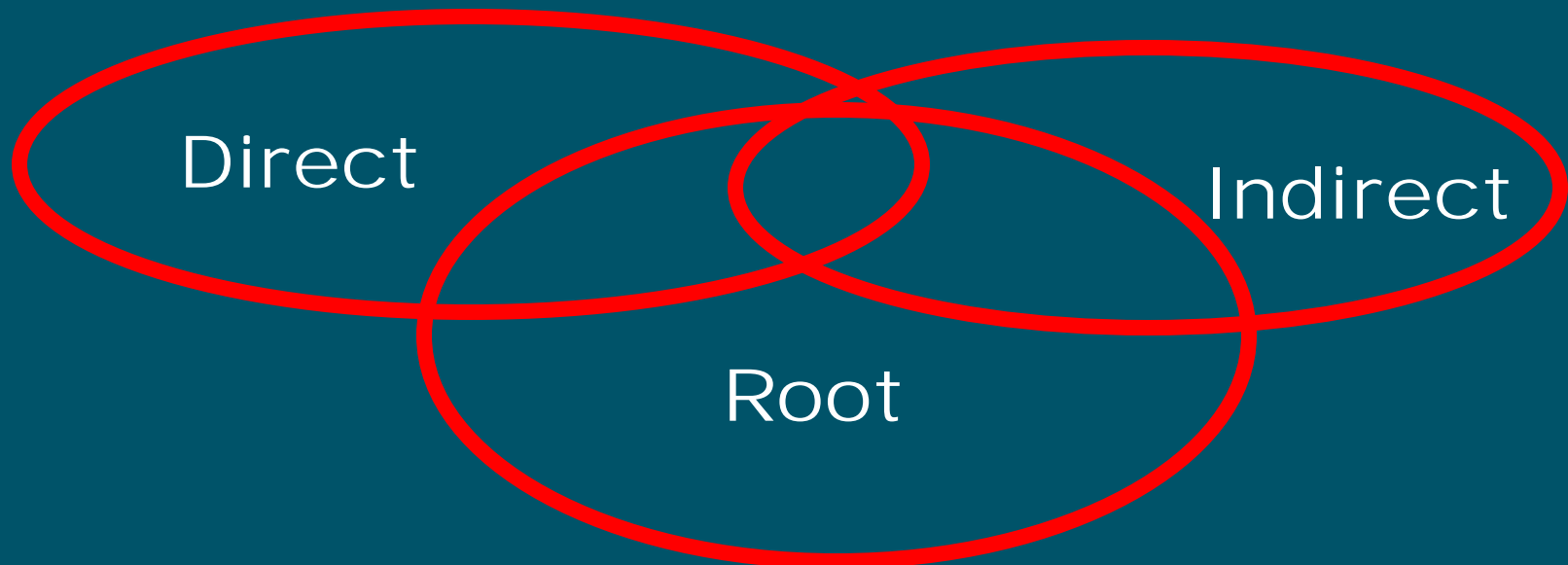
Date Added	Resource	Source
Feb 2014	NIOSH Workplace Safety and Health Topics: Nail Gun Safety <a href="http://www.cdc.gov/niosh/topics/nailguns/default.html">http://www.cdc.gov/niosh/topics/nailguns/default.html</a> This page addresses things employers and workers can do to prevent nail gun injuries.	(NIOSH)
Dec 2013	Prevention Videos (v-Tools): Construction Hazards <a href="https://www.osha.gov/dts/vtools/construction.html">https://www.osha.gov/dts/vtools/construction.html</a> The videos below 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.	(OSHA)
Mar 2013	2012 OSHA Construction Industry Digest (PDF) <a href="https://www.osha.gov/Publications/osh2202.pdf">https://www.osha.gov/Publications/osh2202.pdf</a> This informational booklet is intended to provide an overview of frequently used OSHA standards in the Construction industry.	(OSHA)
Nov 2011	OSHA Prevention Videos - V Tools: Construction Hazards <a href="http://www.osha.gov/dts/vtools/construction.html">http://www.osha.gov/dts/vtools/construction.html</a> These videos are 2-4 minutes long and show common construction work activities and hazards.	(OSHA)
May 2011	OSHA Outreach Training Program: Construction Focus Four Training <a href="http://osha.gov/dts/outreach/construction/focus_four/index.html">http://osha.gov/dts/outreach/construction/focus_four/index.html</a> The Construction Focus Four Training consists of lesson plans on each of the Focus Four Hazards. Each lesson plan was developed based on learning objectives; therefore, trainers must use these objectives when planning the training. Follow the participatory training model by applying effective training techniques; and Ensure the objectives are measured by testing each student.	(OSHA)



# Accident Investigator

Mike Riffe, Fatality Investigator  
Portland Field Office  
OR-OSHA

# In Memory Of

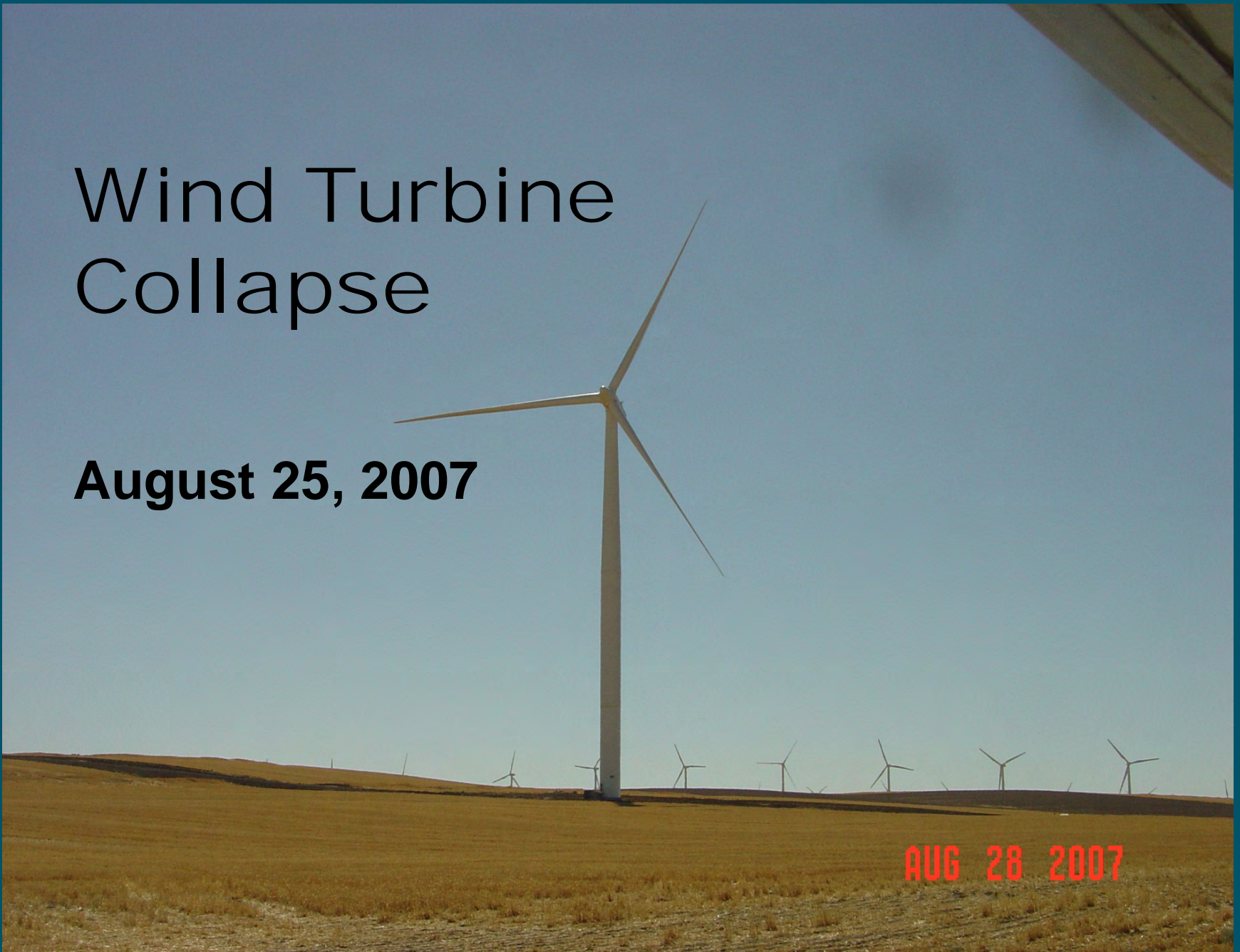


Mike Riffe, Fatality Investigator  
Portland Field Office  
OR-OSHA

# Wind Turbine Collapse

**August 25, 2007**

**AUG 28 2007**



## The Tower

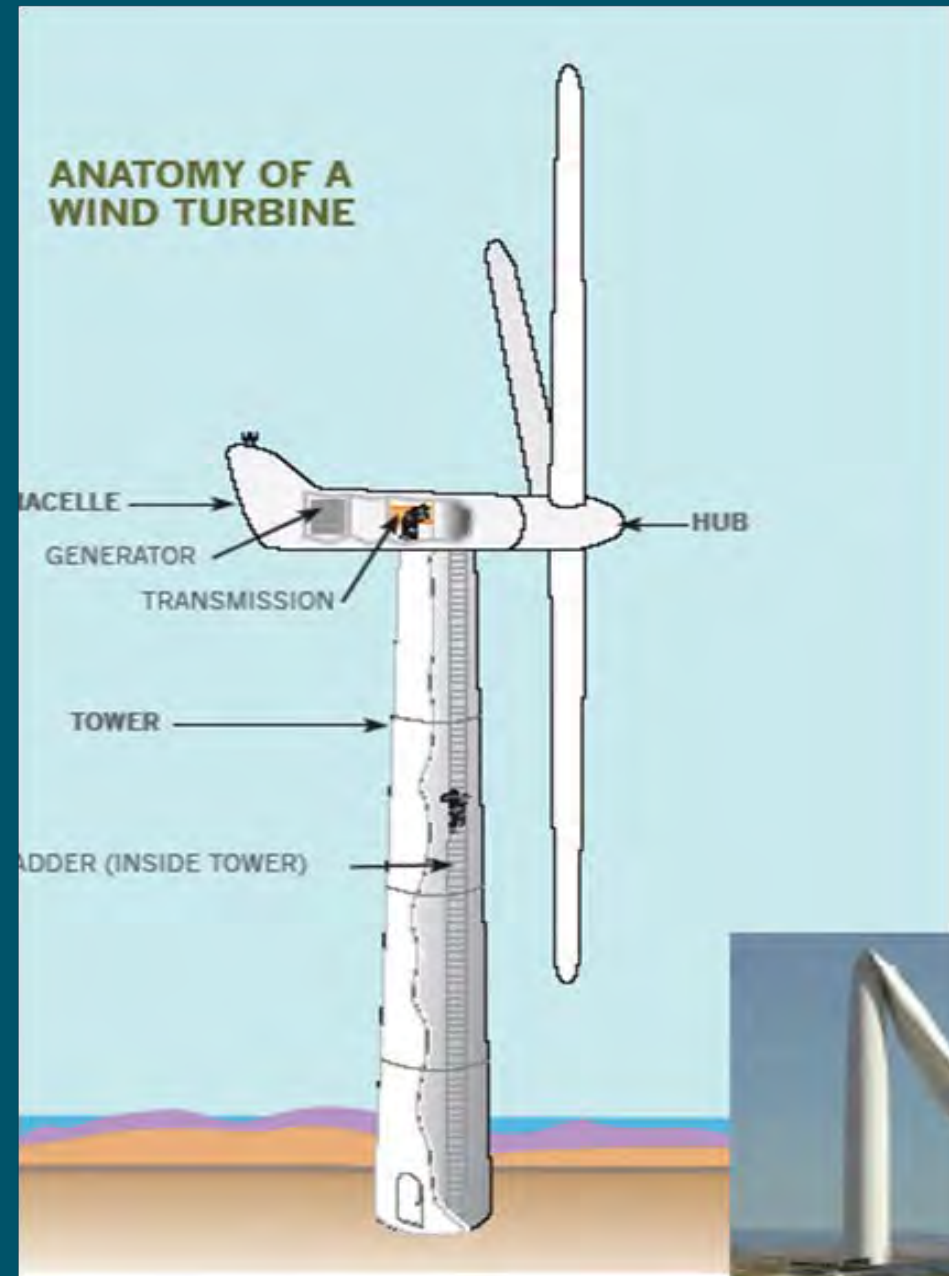
- Approx. 250 feet tall in three sections.
- Includes controls and switchgear in lower level.
- Approximately 190' single span ladder from second level to yaw deck

## The Nacelle

- Houses transmission and generator
- Includes disc brake with locking pins
- Weight – approx. 82 tons

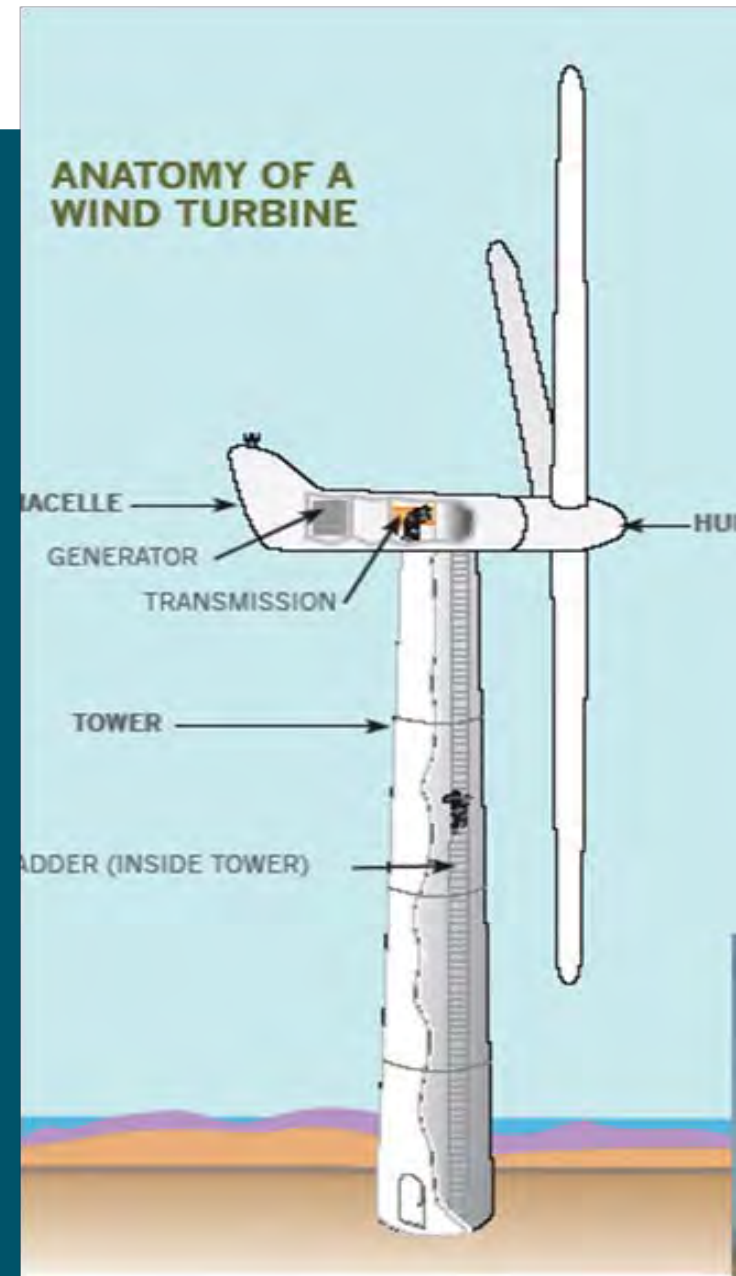
## The Hub

- Weight approximately 25 tons
- Hub entry ports
- Pitch safety valves



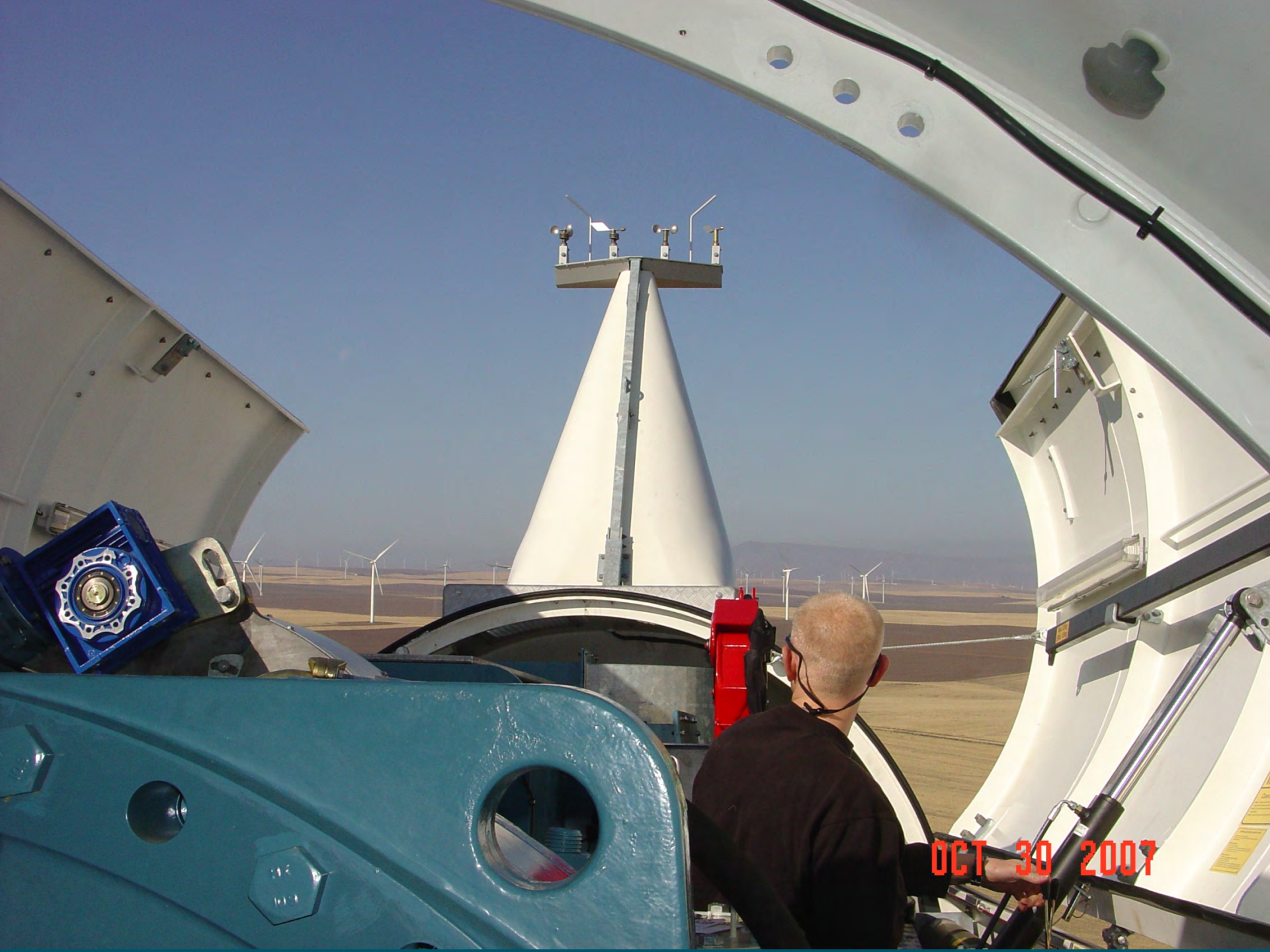
# The Assembled Turbine

- Approximately 141.9 tons balanced on top of tower
- Unit designed for blades to rotate between 14 and 16 rpm turning generator between 1400 and 1600 rpm
- Output – up to 2.3 megawatt @ 600 VAC
- Yaw – keeps unit pointed into the wind
- Pitch – adjusts blade angle to control speed





**Looking up toward second platform– inside tower**



OCT 30 2007

# Rotor Locking Pin

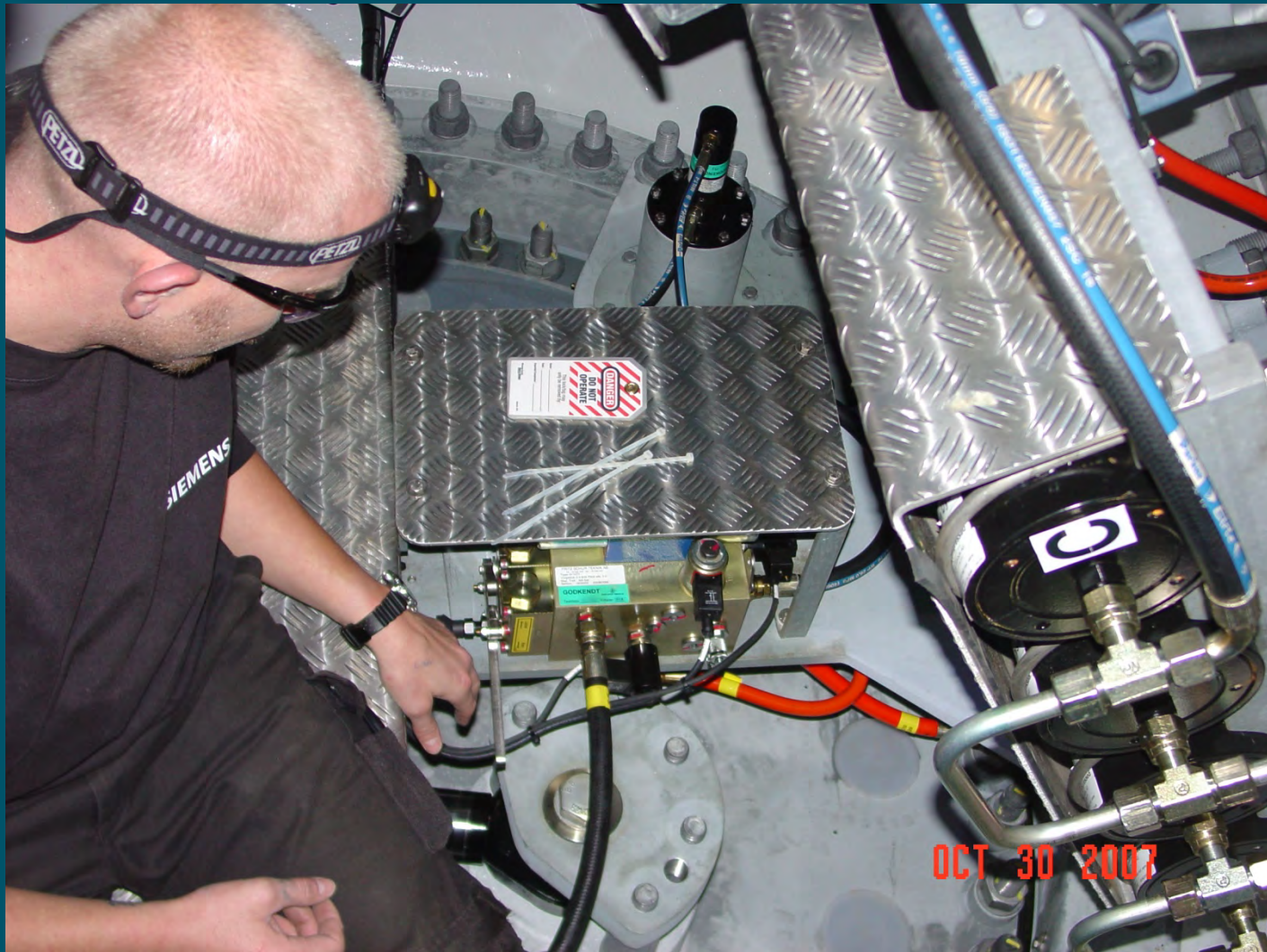


# Hub Entry Port Cover in Nacelle



# Hub Entry





**Closing one of the three pitch safety valves in the hub**

## The crew

- **Thomas – technical advisor – 7 years experience in wind energy on temporary assignment from Germany.**
- **William – apprentice wind technician – helped with construction - 7 days experience in turbine maintenance.**
- **Chad – apprentice wind technician – 1 ½ months experience.**
- **Dustin – apprentice wind technician – first day on the job.**
- **Nick – site manager – 1 ½ months with company – 3 years prior experience as technician on other brands of turbines.**

## The process

- **500 hour service**
- **Blade pitch calibration**
- **Tower section bolt torque**
- **Remove tools**

# August 25, 2009

- **7:00 am** - tailboard safety meeting Chad, Dustin, William and Nick.
- **7:43 am** – Chad, Dustin and William shut down turbine W1 and began service.
- **Approximately 11:00 am** Chad and William enter hub and perform blade calibration – leave and reseal hub entry port.
- **12:30 pm** - lunch break in nacelle. Nick, working in the office goes home for the day.
- **1:00 pm** - Dustin and William go down tower to torque tower bolts, Chad stays in tower to finish clean-up.
- **1:30 pm** – Chad discovers cell phone is missing – calls down to William and Dustin to call phone.
- **2:16 pm**- data recorder indicates blades pitched to –2 degree position.
- **3:59 pm** William in top section of tower climbing down – Dustin on the ground in the pickup – Chad in tower, releases service brake.
- **4:04 pm** collapse.



AUG 26 2007

אנדרטת דוד מלך ישראל  
אנדרטת דוד מלך ישראל  
אנדרטת דוד מלך ישראל







AUG 26 2007

DAD.  
I will  
Miss you so  
Much! you  
ake in my heart +  
Prayers... you may  
Not be here  
But you are physically  
all our hearts + souls

LOVE, w/you  
Kayla  
8:39, 07  
Never  
Be forgotten!



# Vehicle Operations

## Energy Isolation and Control (LOTO)



# Vehicle Operations





PULL PARKING BRAKE VALVE BEFORE LEAVING VEHICLE  
TRACTOR - TRAILER BRAKES WILL APPLY  
WARNING:  
SOME TRAILER BRAKES RELEASE AS  
TRAILER AIR PRESSURE DECREASES

17-02820





# Celorie Brothers



# Commercial Motor Vehicles

## Brakes





# Construction

## Power Line Contact





# Construction Material Handling



# Construction

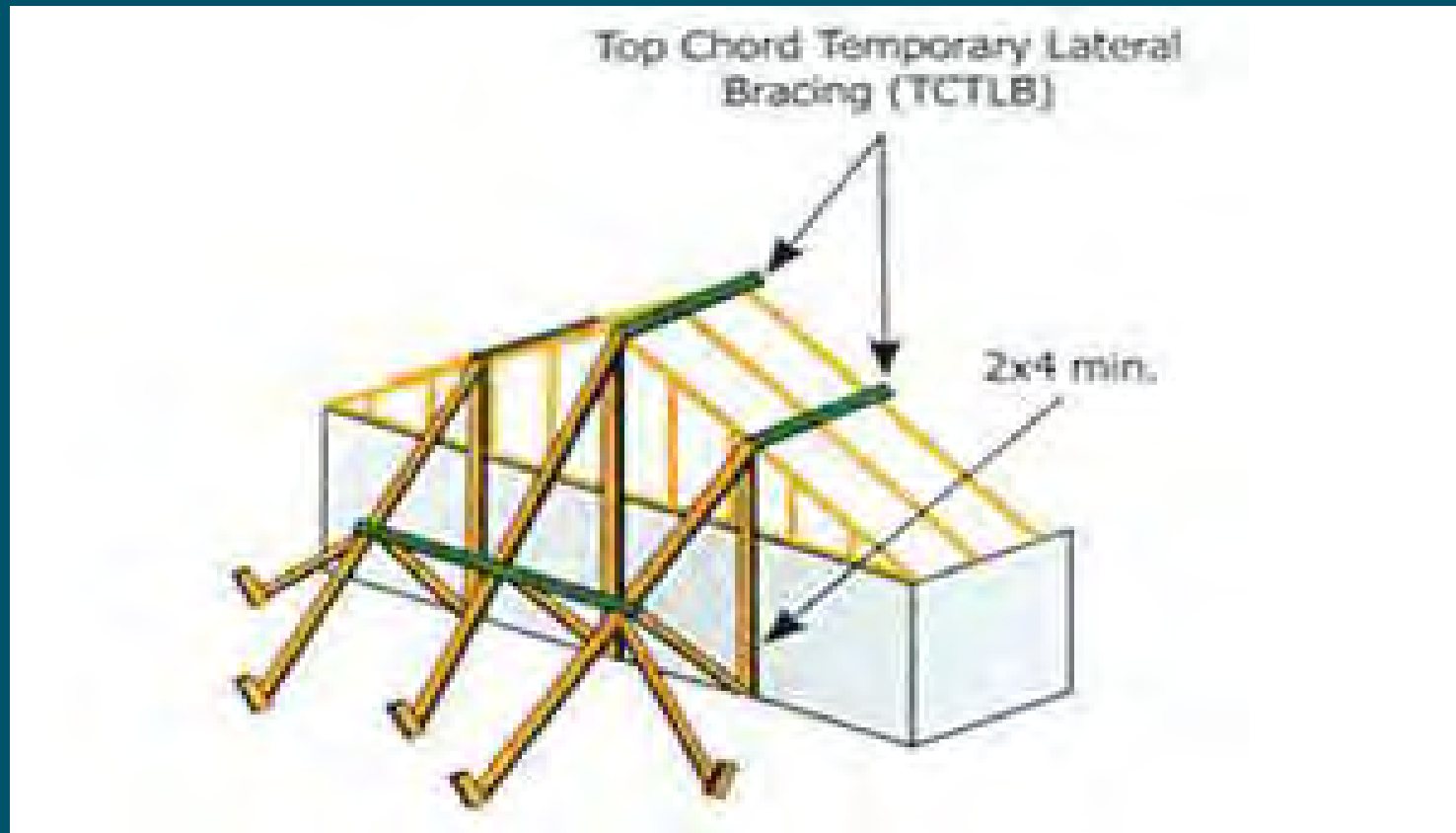
## Bracing of Structures





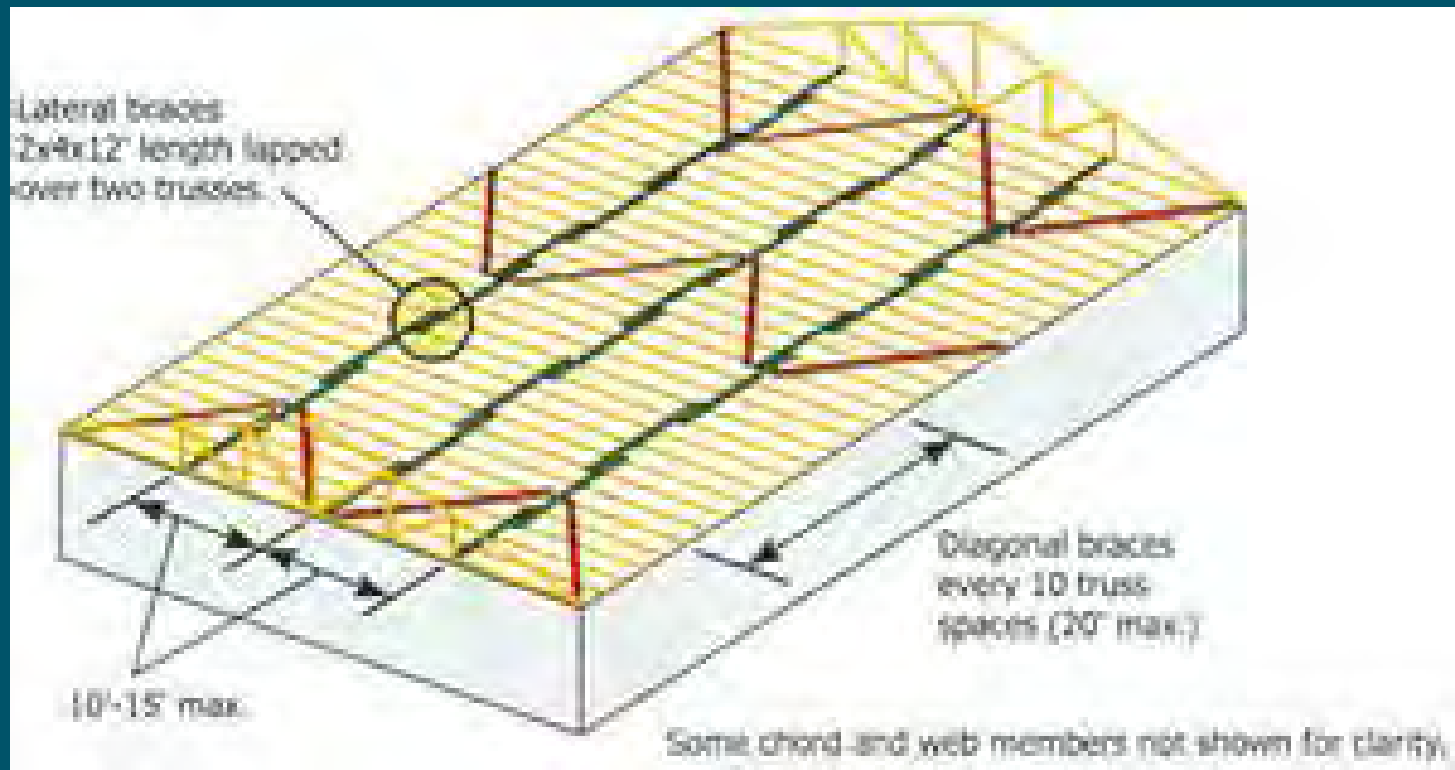
# Building Component Safety Information (BCSI)

## Guide to Good Practice for Handling, Installing, Restraining and Bracing of Metal Plate Connected Roof Trusses



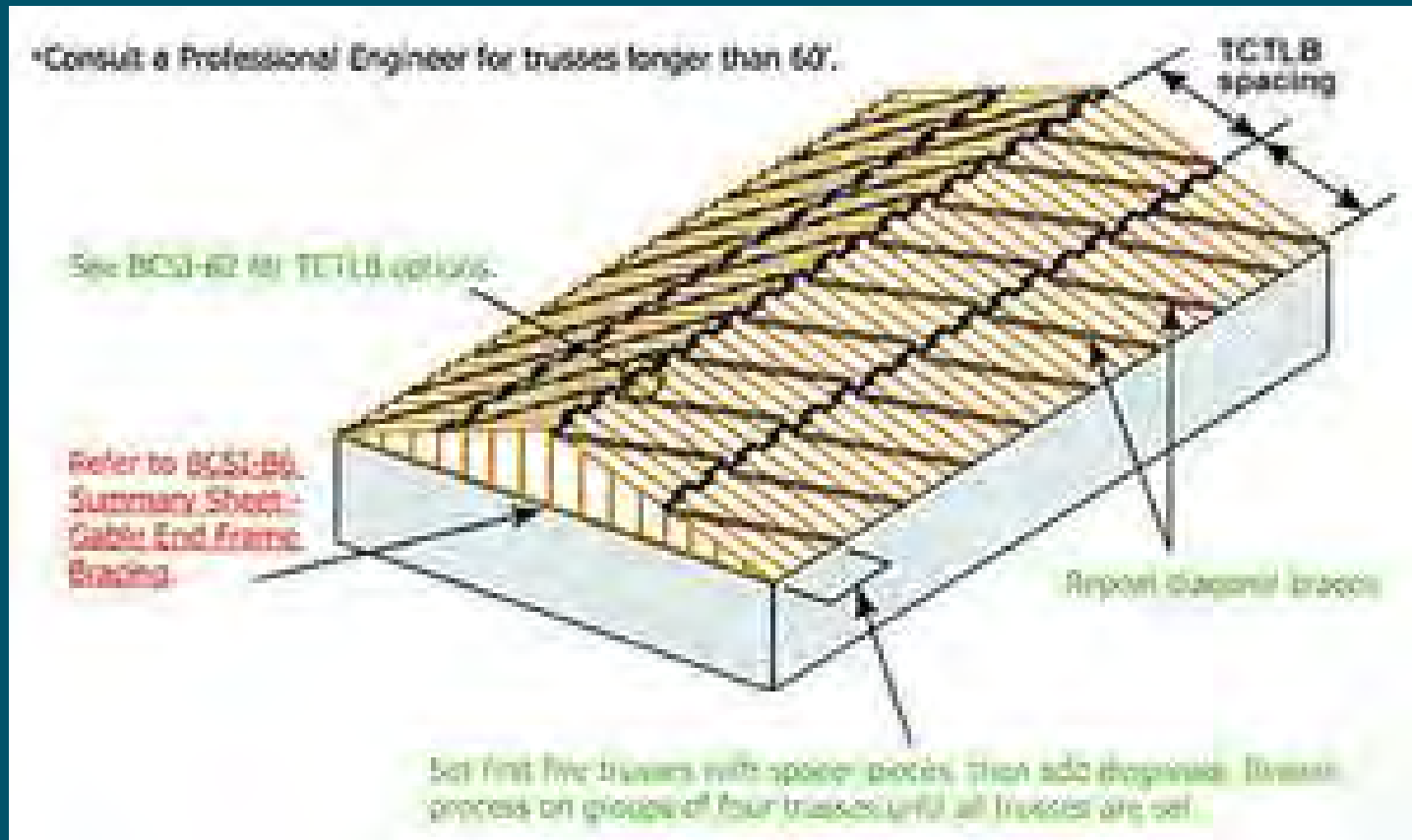
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## Guide to Good Practice for Handling, Installing, Restraining and Bracing of Metal Plate Connected Roof Trusses



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## Guide to Good Practice for Handling, Installing, Restraining and Bracing of Metal Plate Connected Roof Trusses



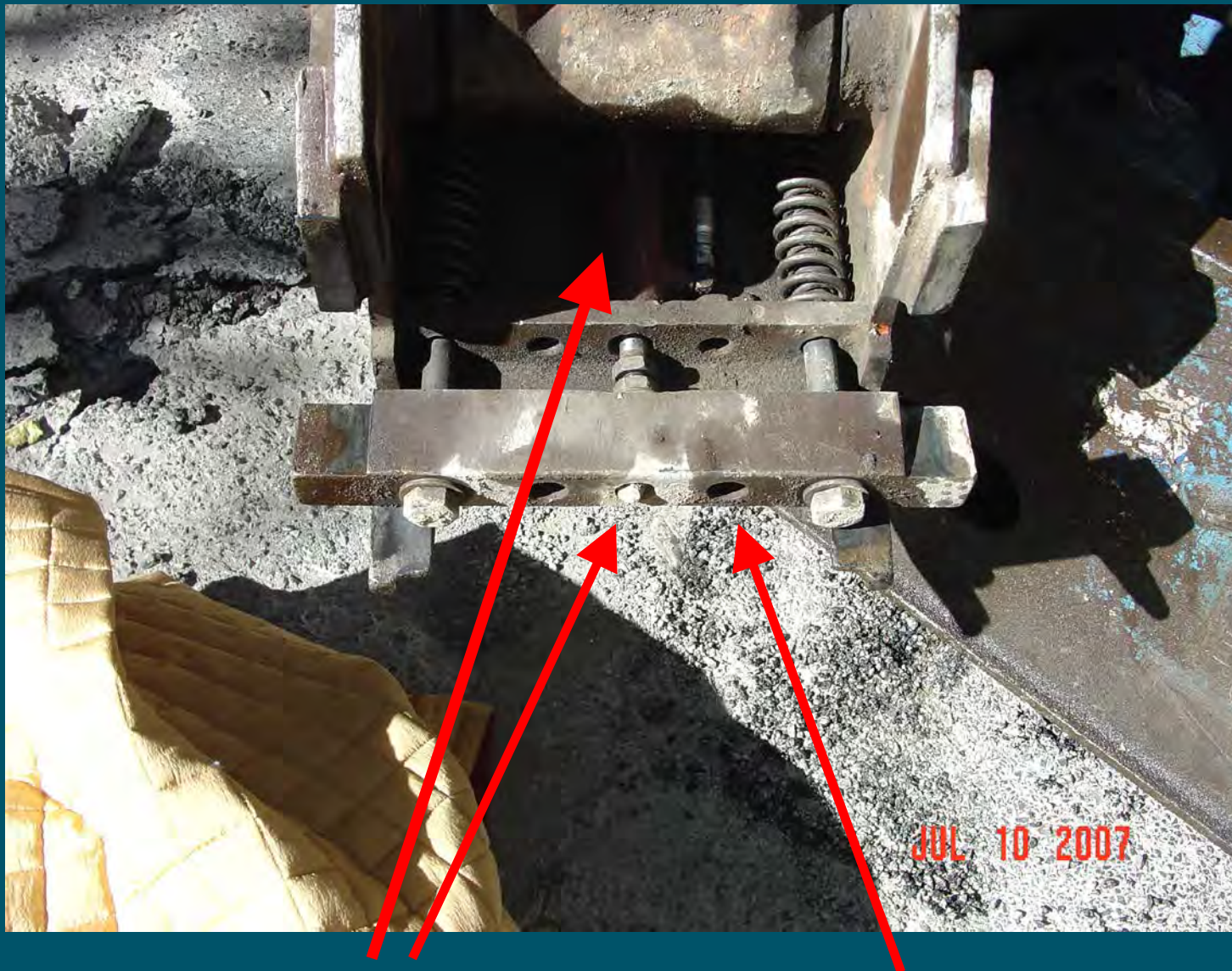


## **OAR437-003-0085**

- An unimpaired horizontal clearance of not less than 3 feet shall be maintained between the rotating superstructure of any mechanical equipment and any adjacent object or surface. If this clearance cannot be maintained, barricades shall be installed to isolate the hazardous area.**







*Missing Cover /  
Fastener*

No Safety Bolt





TOP  
M. b. p.

# MANHOLE TRENCH SHIELD CERTIFICATION

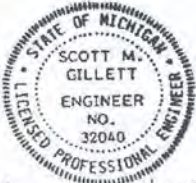
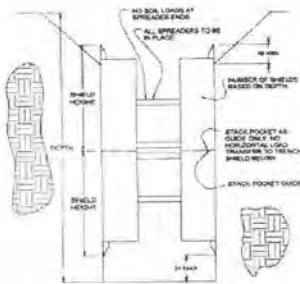
A COPY OF THIS SHEET MUST ACCOMPANY EACH CORRESPONDING TRENCH SHIELD AT EVERY JOB SITE

MODEL NUMBER WEIGHT SERIAL NUMBER SIZE  
MAN4 - 48D 3145 21953 4' HIGH X 8' LONG

SOIL	MAX DEPTH	PSF	SOIL DESCRIPTION
TYPE A	120 Feet	3000	Stiff Cohesive Soil, 25 PSF per foot, clay, silty clay, clay loam with unconfined compressive strength of 1.5 ton per square foot or greater. See note 7.
TYPE B	66 Feet	3000	Medium Cohesive to granular soil, 45 PSF per foot of depth. Clay with unconfined compressive strength greater than 0.5 TSF but less than 1.5 TSF. Cohesionless gravel, silt, silt loam or sandy loam. See note 8.
TYPE C	50 Feet	3000	Soft Cohesive to Saturated Soil, 60 PSF per foot of depth. Clay with unconfined compressive strength less than 0.5 TSF, saturated sand, clay or fractured rock that is not stable. See note 9.

## LIMITATIONS

- 1) Soil above shield must be sloped according to OSHA Subpart P. Slope must begin no less than 18" below the top of shield.
- 2) Shield may be suspended no more than 2 feet above bottom of the trench and only if there is no possible loss of soil from behind or below bottom of shield.
- 3) The sides of the excavation shall be cut vertical and narrow to prevent lateral movement of the Manhole Shield. If necessary, backfill around the Manhole Shield to a height sufficient to prevent lateral movement.
- 4) Repairs and modifications must first be approved by manufacturer or registered professional engineer.
- 5) Shields may be stacked as long as each is rated to the depth it is used and manufacturer approved stack connections are utilized.
- 6) Surcharge loads have not been included in the above depth ratings. The allowable working depth of the shield must be reduced to account for any surcharge loading which occurs within the influence line of the shield.
- 7) Not Type A if fissured. Subject to vibration, previously disturbed or part of a sloped layered system where layers dip into excavation on a slope less steep than four horizontal to one vertical (4H:1V) are Type B if material would otherwise be classified as Type B.
- 8) Previously disturbed soils may be Type B unless they would be classified as Type C. Soil that meets requirements of Type A but is subject to vibration or fissured may be Type B. Dry rock that is not stable or soil that is part of a sloped layered system where layers dip into the excavation on a slope less steep than four horizontal to one vertical (4H:1V) are Type B if material would otherwise be classified as type B.
- 9) Soil in a sloped layered system where layers dip into the excavation on a slope of four horizontal to one vertical (4H:1V) or steeper may be Type C. Saturated soil or soils from which water is freely seeping but is not standing in the trench. Conditions more severe would require dewatering or the sealing of the sides of the excavation and pumping the trench. Such severe conditions would require the services of a soils engineer to establish the design pressure. Consult the manufacturer for pressures exceeding tabulated values.
- 10) PRO-TEC shields are to be used in accordance with Federal, state and local laws. Refer to Occupational Safety and Health Administration (OSHA) rules and regulations Vol. 54, No. 209, 10/31/89. Subpart P.
- 11) Shields are for occupational safety use only. Dependent on specific site conditions, soil movement could occur. Effects on adjacent areas from potential soil movement shall be the responsibility of others.



Scott M. Gillett  
2/18/05

Usage of shields other than specified could cause failure or cave-ins resulting in serious injury or death.

Phone (517) 541-0303 - 1-800-292-1225 - Fax (517) 541-0329  
Mailing Address P.O. Box 130 - Charlotte, MI 48813 - Shipping Address 1298 Lipsey Drive - Charlotte, MI 48813

## TAB DATA SHEET

3. The sides of the excavation shall be cut vertical and narrow to prevent lateral movement of the Manhole Shield. If necessary, backfill around the manhole shield to a height sufficient to prevent lateral movement.



# Owner/Operator Manual

- **Danger – Do not wear loose fitting clothing while operating this equipment.**
- **Danger – Deactivate operator controls when workers must enter swing radius area.**



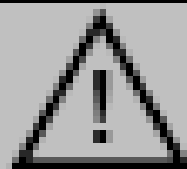
JUL 2 2007



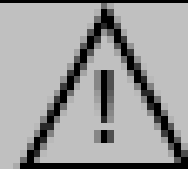
JUN 10 2005

# Closed Lifting Eye





## DANGER



Unauthorized modification to the coupler and/or any coupler components may impair function, affect performance, and affect the life of the coupler, the excavator, and/or the attachment. Unauthorized modification may impair the safety of personnel and can cause serious injury or death. Hendrix assumes no responsibility for any unauthorized modifications to the coupler and/or coupler components. Unauthorized modification voids the coupler's warranty.



# HENDRIX QUICK COUPLER USER MANUAL

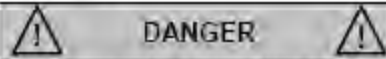
## OPERATIONS & MAINTENANCE SECTION V - ENGAGING THE ATTACHMENT

Continued...



### DANGER

CONNECTION TESTS MUST BE PERFORMED EACH AND EVERY TIME YOU ENGAGE AN ATTACHMENT. FAILURE TO PROPERLY ENGAGE AN ATTACHMENT CAN RESULT IN SERIOUS INJURY OR DEATH. THE ATTACHMENT MAY DROP WITHOUT WARNING IF THE COUPLER IS NOT PROPERLY ENGAGED WITH THE ATTACHMENT.



### DANGER

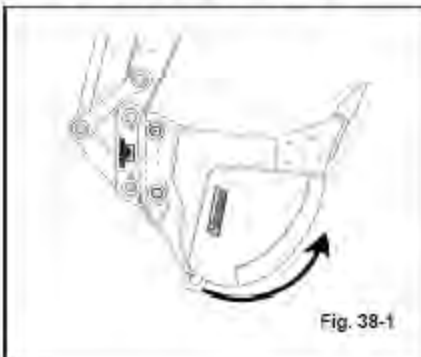
ENGAGE ATTACHMENTS COMPLETELY CLEAR OF ALL PERSONNEL.

TEST ALL CONNECTIONS AWAY FROM ALL PERSONNEL.

NEVER SWING COUPLED ATTACHMENTS OVER WORKERS' HEADS.

#### 6. CONNECTION TEST ONE

Perform away from all personnel - Test the connection to the attachment by completely curling the coupler inward (see Fig. 38-1).



#### 7. CONNECTION TEST TWO

Perform away from all personnel - Test the connection by fully cycling the coupled attachment at least twice (see Fig. 38-2).

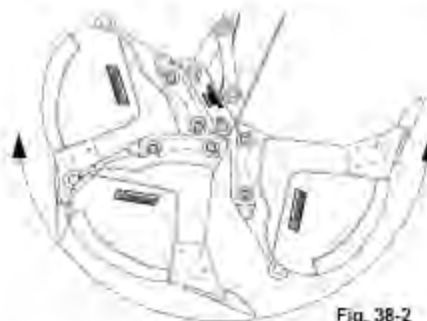


Fig. 38-2

#### 8. CONNECTION TEST THREE

Perform away from all personnel - Test the coupler connection by trying to disengage the attachment from the coupler using the machine's weight. Dig the attachment in the ground, lower the attachment against the ground to lift the excavator's tracks off the ground, and try to force the attachment off (see Fig. 38-3).

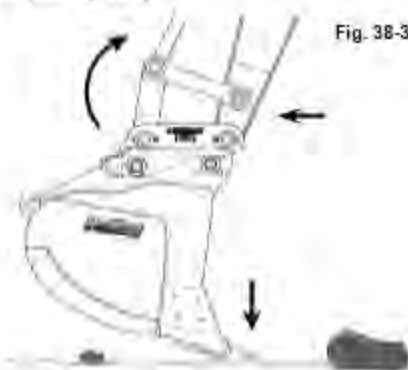


Fig. 38-3

## Connection Testing

- Attach Bucket
- Curl in
- Cycle Two Times
- Force Test



## OPERATIONS & MAINTENANCE SECTION III - 1ST GENERATION Continued...

### E. MECHANICAL LOCK PIN (1st Generation)

Later model 1st Generation Hendrix Quick Couplers are equipped with a mechanical locking pin. This pin is inserted behind the Locking Lever and is secured in place using lynch pins on each end of the pin. If you have a coupler that does not have a mechanical locking pin, Hendrix recommends that you obtain and install the mechanical locking pin. Please contact your Hendrix dealer for details.

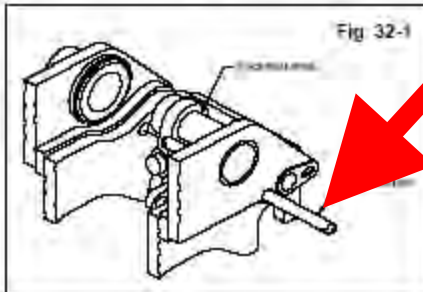


Fig. 32-1

END OF SECTION

# Mechanical Locking Pin

# Safety & Health Management Principles

# Safety & Health Management Principles

- **Commitment**

# Safety & Health Management Principles

- **Commitment**
- Accountability

# Management Principles

- **Commitment**
- Accountability
- Training

# Safety & Health Management Principles

- **Commitment**
- Accountability
- Training
- Employee Involvement

# Safety & Health Management Principles

- **Commitment**
- Accountability
- Training
- Employee Involvement
- Hazard Identification

# Safety & Health Management Principles

- **Commitment**
- Accountability
- Training
- Employee Involvement
- Hazard Identification
- Accident Investigations

# Safety & Health Management Principles

- **Commitment**
- Accountability
- Training
- Employee Involvement
- Hazard Identification
- Accident Investigations
- Program Review



# Accident Investigator Models

Company		Description	In memoriam
1	Siemens	Wind turbine collapse	<b>Chadd Mitchell</b>
2	Wilkins Trucking	Crushed under truck	<b>Glen Hibbert</b>
3	Alcides Alfaro	Failure to apply brake	<b>Pedro Sagasizado</b>
4	Alpine Courier	Failure to apply brake	<b>Mike Beyea</b>
5	Tapani Underground	Failure to apply brake	<b>Gen Stewart</b>
6	Celorie Brothers	Crushed in semi-trailer door	<b>Steve Kaufman</b>
7	Valley View Logging	Brake failure	<b>Louis “Tony” Wofford</b>
8	Coral Construction	Power line contact	<b>Luke Stinson</b>
9	Patrick Gould Construction	Overloaded forklift	<b>Noe Sanchez</b>
10	Stalcup Roofing	Truss failure	<b>Dewayne “Doug” Smith</b>
11	J.L. Jersey	Crushed by rotating superstructure	<b>Larry Fry</b>
12	Williams & Ryan Construction	Crushed, object fell off quick coupler	<b>Jeff Helgeson</b>
13	M.L. Merrill Construction	Trench cave-in	<b>Ed Manley</b>
14	North Creek Recycling	Crushed by boom	<b>Gerald Stierwaly</b>
15	Oregon Mainline Paving	Crushed between outrigger and boom	<b>David Lasley</b>
16	J.L. Jersey	Rigging failure	<b>David Johnston</b>