WIND HEALTH & SAFETY ISSUES

EEI Health & Safety Conference
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US Large Wind will be the Topic
US Wind Energy Health & Safety

- US Wind Industry Growth & Projections
- US Large Wind Health & Safety
  - Wind Project Construction Safety Issues
  - Wind Operations & Maintenance Health & Safety Issues
  - Occupational Health, Fit for Duty
  - Other Safety Areas
- International Associations and Stds
- AWEA Source for Information
WindPower Growth in US: 2009
Second year in a row adding over 40% of US capacity

Total Installation in 4Q 2009: 4,041 MW

Total Installation in 2009: 9,922 MW

Total U.S. Installation through 4Q 2009: 35,159 MW

Source: American Wind Energy Association
National Wind Capacity of 35,159 MW
(installed wind by state)

State RPS

State RPS Goal

Date Source: AWEA
Alaska included in total but not represented on map

Updated January 2010
Job Projections Under 20% Report, creates Training & Safety Challenges

• Over 500,000 total jobs would be supported by the wind industry

• In 2008, wind industry added 35,000 new jobs

Source: American Wind Energy Association

Source: U.S. DOE, 20% Wind Energy by 2030
Wind Plant Siting Issues

• State, County, Federal property siting requirements vary
  • WA has State Siting guidelines as example
  • Turbine Setbacks vary from roads/homes
  • Community Noise stds
• Other Agencies’ concerns
• US F&W S developing Wind Siting guidelines
• Migratory Bird, Eagle Acts, Endangered Species: (Birds, Bats, other species) – Train Employees
  • Pre-post construction avian studies
Wind Project Construction
Construction: Civil project, tower assembly project, substation project

- Projects on leased land, farms
- Construct Gravel access roads
- Excavate (sloping), Reinforced concrete foundations built
- Tower components delivered, assembled, commissioned
- Substation, collection system installed (underground preferred), transmission interconnect

Hazards
- Delivery Traffic, vehicle safety, heavy equipment safety,
- Crane safety, critical lifting plans, unloading, moving cranes
- Fall hazards, lifting, ppe
- Electrical safety, quality control on installation
- Tool use, lack of experience especially with temp workers
- Range Fire safety, Weather, Weather
Reinforced concrete foundations: turbine bolts to it
Turbine Assembly
Critical Lifts Key Focus

Load Limiting Factors

• Not level
• Weather (Wind, Rain, Ice, Snow)
• Use of extensions, jibs and other attachments
• Limits of wire rope, slings and lifting devices
Assembly, Rotor Attachment

Everything has to Line up
Present Designs Have the Important Components Inside the Nacelle

Testing / Commissioning Systems Important Task, Risks

Source: American Wind Energy Association
Wind Operations & Maintenance
Wind Ops & Maintenance Safety & Health Program examples

- MANAGEMENT/EMPLOYEE Responsibilities
- SAFETY & HEALTH COMMITTEES
- EDUCATION AND TRAINING
  - Qualifications and Proficiency
  - Regulatory required training
  - Documentation/Recordkeeping
- RISK MANAGEMENT
  - Manufacturer’s O&M Procedures
  - Job Safety Analysis*
- 1910.269
  - Electrical qualifications
  - Electrical safety, PPE
  - LOTO
  - Enclosed / Confined Spaces
- FALL PROTECTION
  - Fall Protection
  - Rescue from Heights
- FIRE PROTECTION
  - Hot Work Procedures, Fire Extinguishers
  - Site Fire Safety
- OCCUPATIONAL HEALTH
  - Fit for Duty
  - Hazard Communication
  - Hearing Conservation (?)
- VEHICLE SAFETY
- PERSONAL PROTECTIVE EQUIPMENT
- CHEMICAL SPILLS & SPCC Plans
- MATERIAL HANDLING
  - Hoisting and Rigging
- THIRD PARTY SAFETY ISSUES
  - Visitors and Site Orientation
  - Public Safety
- EMERGENCY PREPAREDNESS
  - First Aid/CPR/BBP/AEDs
- HAZARDOUS WEATHER CONDITIONS
  - Lightning, Tornadoes, High Winds
  - Icing & Snow
Do You have Appropriate Employee Qualification & EHS Training Programs?

Technician Training
- Some good community college programs
- Manufacturer’s, Owners and 3rd party specialty trainers (ie, Fall protection/rescue) have courses

Are Employees Qualified for Work they do?
- Fall Protection & Rescue
- Technical Training on Equipment, O&M or Corrective Procedures as these apply
- Power Generation Standard (1910.269)
  - Electrical Hazard ID & Controls, Arc Flash
  - LOTO
- First Aid/ CPR, Emergency response, PPE, Weather, etc, etc, etc.
Who is Doing the Work?
Contractor Safety Management

- 3rd Party O&M Contractors Common: Manufacturers, O&M Contractors, Specialty Contractors (blade repairs, etc)
- Wide variations in oversight for 3rd party operated sites in wind:
  1) Absent Owners, 2) Owner site rep, 3) Owner issuing work permits & site access docs
- Good practice- Pre-qualify, and Safety Orientations are used to review site requirements for various safety requirements for contractors, visitors
- More detailed review for more hazardous contractor work: aerial blade repair, gearbox change
- Be Consistent in approach, Require Contractor Reporting of Key Activities:
  - Accidents, Environmental Spills, Near Misses, Avian Issues
  - Equipment Damage
Break-in Maintenance, Preventive Maintenance on a schedule. Tools/equipment generally winched up/down for work, prevent drops.

Source: American Wind Energy Association
Fall Protection Fundamental: Turbine Access: Ladders, Ladders with Climb Assists, Service Lifts (elevators)
Typical Generation Industry Hazards: LOTO of Hazardous Energy

Mechanical: Wind turns system
Rotor Lock, Drives, Gears

Electrical:
Generators
Converter Cabinets
Transformers

Hydraulic
Etc
Enclosed / Confined Spaces – Evaluate Hazards

Possible Hazard Assessment areas

- Hub Entry - Control Hazardous Energy prior to entry: Wind, Electrical, Mechanical, Hydraulic
- Atmospheric Evaluations- Blade Entry past hatch, extensive Hot Work & Chemical use with limited ventilation
- Hot Work – Fire and smoke issues, escape routes
How Fit is your Workforce?

- Tower Jobs Physically Demanding, 1-3 climbs/day, 60-80+ meter towers
- Many of today’s installed turbines difficult to work on
- Heavy Components, tools
  - Lifts into truck: 25 - 40+ # tool bags, tower rescue bag
  - From Truck to base of tower: Oil pump 25-30#
  - Torque wrench/pump: 71#
  - Lifts in nacelle
- Some work positions in awkward postures

Should you consider a Wind Fit for Duty Program
Issues in Establishing Medical Exam Requirements

• Implementing Pre-Employment /Periodic Medical Exam Requirements has Many Legal Requirements, Complexity and Cost
  – American with Disabilities Act
    • Job Related & Business Necessity, Non-Discriminatory
  – Privacy Requirements which vary, Medical Record Confidentiality
  – HIPPA - cannot access records under health insurance
  – Age Discrimination Issues
  – Cost – Employer pays for preparing & administering program
  – Consistently applied
  – Proactively deal with Employee concerns – not to get rid of them
  – Requires expertise in preparing and administration
Different Approaches For New Wind Hires for Working at Heights

• Programs Not One Size Fits All
  – Not Legally or regulatory required like OSHA required tests, CDL exams as specified.
• Be able to defend what you do, Legal Issues identified earlier
• D&A, Baseline Hearing test for Risk Management
• Climbing Test for new Hires & Transfers
• All CDL Drivers receive designated exam
• Medical Exam with Focus on medical conditions affecting Wind Tech work
• Detailed FFD Approach following is one way some companies perform
  – If you don’t do this, some steps may help improve your program.
Example FFD Program
Medical Examination, part 1

- All candidates receive thorough Medical Physical Exam
  - Extensive medical history evaluation
  - Physical from Occupational physician
  - Lab Work
  - Evaluate for numerous medical conditions that could affect working at heights
  - Vision and Baseline Hearing test
FFD Part 2
Fitness for Climbing
Treadmill Cardio stress test

• Test represents fitness required for climbing turbine
• Monitored by Occ Physician
• EKG, Pulse, BP, Blood Gas
FFD, Part 3 Occupational Therapy
Physical Capacity - Multiple Tests

Occupational/Physical Therapy does Tests

• Coach on lifting and body mechanics to prevent injury
• Grip, Pinch Strength
• Horizontal Push & Pulls
• Vertical Pull Tests
• Lift and Carry Tests
• Agility, Balance, & Body Mechanics
  • Heal to toe
  • Squats
  • Ladder climbing
FFD Part 4
Field Climbing Test

• Practical field test necessary for candidates to complete hiring process besides medical evaluation
• Must be performed by experienced Ops Management or Climbing Instructor
• Verifies field ability to perform climbing, address fear of heights, performance of work
• Documentation
3rd Party Climbing

Non-Ops Employees & 3rd Party Visitors

- No 3rd party climbs without business purpose
- Plant Manager or above must approve
- Most 3rd parties have OSHA compliant Fall Protection Programs, Equipment
- Train 3rd party on climbing, safety hazard, must pass all aspects, Monitor climb closely
- Non-company employees must sign Waiver, Health Self Certification
First Aid & Rescue Scenarios

First Aid Plan, Important features
• First Aid Supplies and tower rescue equipment need to be immediately available for quick response
• With crew makeup and typical site remoteness, all field technicians must be certified in First Aid/CPR/BBP~ 8hr.
• When doing electrical work, FA/CPR required to be available within 4 minutes.

Tower Rescue
• If there is no one tower rescue trained on crew, no climbing.
• Tower Rescue Bag & FA Kit go up tower for substantial work
• Periodic rescue refreshers
• Many rural volunteer fire departments not well equipped or trained to respond
Thunderstorm Predictor, Warning and Alert Zones
Security, Public Safety

Security
- Wind Plants Highly Visible, Curiosity
  - Public Safety
  - Vandalism
  - Theft
- Metal theft risk, Copper wire / turbine cables

Public Safety
- Landowners / permit / access requirements may mandate:
  - Reduced Signage - Keep Out, Safety Warnings
  - Reduced or Limited Fencing
  - Farming needs to avoid plant equipment
- Recreational area plants increase public access concerns: snowmobiling/ice fall, ATVs, motorcycles, hunting
AWEA & OSHA DISCUSSIONS

- Ongoing discussions between AWEA and OSHA on Safety and Training in the Industry
  - OSHA 10 Hour and 30 Hour,
  - OSHA Fact Sheets
  - Region V Training Program shared with AWEA members
  - Special Emphasis programs in some areas
INTERNATIONAL SAFETY CONTACTS

- European Stds source for most turbine designs
- Parallel Wind Associations in Europe to US
- BWEA - UK has very active Safety and Health Committee, Good guidance on offshore
  - Regular meetings, conferences
  - Offshore guidelines
- AEE – Spain – European Wind Risk Conf.
- EWEA – Europe
- Many good turbine safety rules, sometimes hard to translate to US OSHA regulatory requirements
Everyone Goes Home Safe &
We Don’t Harm the Environment

??Questions??

Thank you for your attention!

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