

The Power to Perform

J-W POWER COMPANY



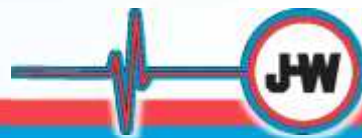
SLIP, TRIP & FALL HAZARDS IN THE FIELD GAS COMPRESSION INDUSTRY

Joe Avila, HSE Supervisor, JWPC



Objectives

- *Review data and basic requirements
- *Understand common challenges faced in the field
- *Understand direct and indirect results
- *Discuss solutions, and Success



Statistics - Nationwide

Slips, trips and falls are a major cause of workplace injuries. Unsafe conditions and behaviors, along with a lack of safety awareness, can lead to these types of accidents.

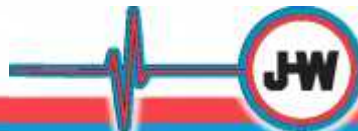


SLIPS, TRIPS & FALLS:
15% of all accidents*

SLIPS, TRIPS & FALLS
on the same level are the
2nd **LEADING
CAUSE OF
INJURY****

25,000
SLIP, TRIP & FALL
ACCIDENTS occur **DAILY**
in the US*

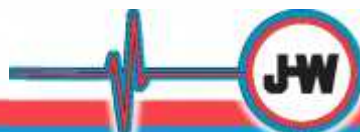
* National Safety Council ** Bureau of Labor Statistics



Statistics - Nationwide

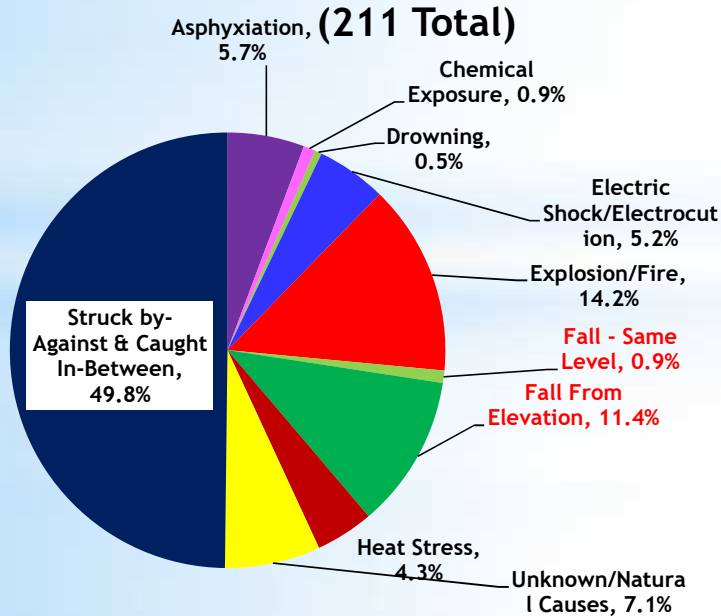
Per the Liberty Mutual Workplace Safety Index, in 2014, “falls on same level” ranked #2 as a leading cause of disabling injuries, with direct costs to U.S. industry of **\$9.19 Billion**

“Slip or trip without fall” was ranked #7, with direct costs of **\$2.17 Billion.**



Statistics – Industry Specific

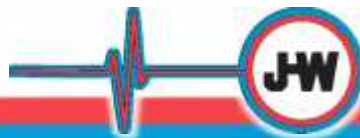
**2012-2015 OSHA Data for NAICS
211111, 213111 and 213112 Fatal
Incidents**



**Field Gas Compression is NAICS
213112**

**Fall related injuries caused 12.3% of all
fatalities during a 3-year period**

**About 1/3 of non-fatal injuries are
slip/trip/fall incidents**



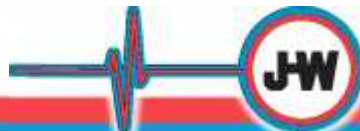
Statistics – Industry Specific

The Stats Do Not Always Reflect the Whole Picture

**Most slips/trips/falls are non-fatal OSHA-Recordable or First Aid case only
Some workers may not report at all - no injury, embarrassed**

**May be categorized by injury/result, not cause (i.e., ‘drowning’ or ‘MSD’,
but caused by a fall)**

**Many smaller oil & gas employers, who do not report data anywhere, or
report only raw TRIR data**





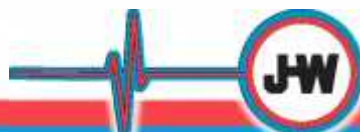
Basic OSHA Regulations

Let's Review...

**January 2017 - All New/Revised Regulations in 1910 Subpart D
Walking-Working Surfaces for General Industry, 1910.21-30**

**Most changes already required, with phase-out of fixed
ladder safety cages (>24') occurring through 2036**

Covers many industries, including O&G



General Industry Construction Maritime Agriculture Recycling Solid Waste All

1910 Full Table of Contents Printed Copies

- 1910 Subpart D - Walking-Working Surfaces
- 1910 Subpart D - Adoption and Extension of Established Federal Standards
- 1910 Subpart D - Walking-Working Surfaces
 - 1910.21 - Scope and definitions.
 - 1910.22 - General requirements.
 - 1910.23 - Ladders.
 - 1910.24 - Step bolts and manhole steps.
 - 1910.25 - Stairways.
 - 1910.26 - Dockboards.
 - 1910.27 - Scaffolds and rope descent systems.
 - 1910.28 - Duty to have fall protection and falling object protection.
 - 1910.29 - Fall protection systems and falling object protection criteria and practices.
 - 1910.30 - Training requirements.
- 1910 Subpart D - Means of Egress
 - 1910.31 - General Egress - Exit Routes, Emergency Evacuation Plans, and Fire Prevention Plans.
 - 1910.32 - Technical standards.
 - 1910.33 - Coverage and definitions.
 - 1910.34 - Compliance with applicable code books.
 - 1910.35 - Design and construction requirements for exit routes.
 - 1910.36 - Maintenance requirements and immediate action for exit routes.

Basic OSHA Regulations

Let's Review...

“All Facilities”, shops, passageways and access routes are required to be kept clean, orderly and free of surface hazards, such as loose items and holes, within walking areas.

A stairway or ladder at any point of access/travel where there is an elevation break of **19 inches** or more, railing and possibly toeboards for stairways or work platforms at **4 feet** or more in height.

Ladder safety system or personal fall arrest for ladders **24 feet** or higher.

Self closing safety gates for all fixed ladders.

Conduct Walking-Working Surface hazard assessments for all work sites.

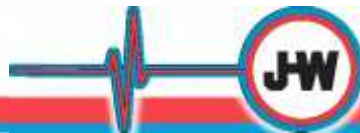
Provide one of several acceptable means of protecting workers, and training.



What if this was your office?



Or This...?



A Day at The Office



A Day at The Office



Compressor Service Technicians

Emissions Specialists

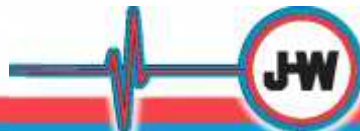
Lease / Station / Plant Operators

Component Specialists, such as CAT or GE/Waukesha



Installation crews (welders, roustabouts, crane operators/riggers, etc.)

Supervision, Sales, Engineering, Safety



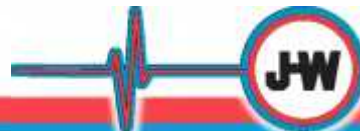
Common Challenges - General

Weather / Nature / Working Outdoors

Working Solo, Human Nature

Geography/Terrain, Remote Areas

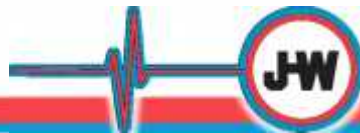
Market Stability, “Boom or Bust”



Common Challenges - Industry Specific

Industry Specific Slip/Trip/Fall Hazards:

**Two Classes - LOCATION and
EQUIPMENT**

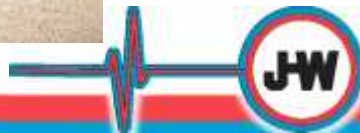


Common Challenges - Industry Specific

LOCATION HAZARDS

Contractor vs. Customer Relationship
Work Environment Not Controlled by
Those Most Affected by the Hazards

Piping, tubing, hoses run along surface
of location (#1 Cause of many incidents)



Common Challenges - Industry Specific

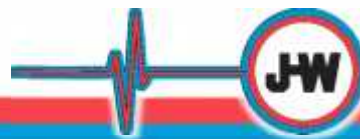
LOCATION HAZARDS

Uneven terrain, holes/trenches, wheel ruts, containment and fire walls, spill control liners,

raised or sunken compressor foundations

Tie-downs, guy wires, stakes, tarps, ground rods

Lack of lighting



Common Challenges - Industry Specific

EQUIPMENT HAZARDS

High level of Variation with gas compressors – design, packager, age, application, other factors

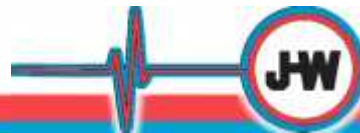
Safe access to package skid, engine, exhaust/catalysts

Lots of onboard piping, conduit/wiring, pressure vessels

Safe access/work on top of cooler when required

Most field compression Not inside a (proper) building

Trucking/shipping requirements, portability



Common Challenges - Industry Specific

EQUIPMENT HAZARDS

Smaller compressors mounted on trailers present unique hazards



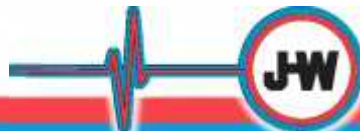
Direct Results

Multiple Types of Injuries

OSHA Recordables, First Aid, Lost Work Days

Short or even Long Term Disability

Quality of Life



Indirect Results

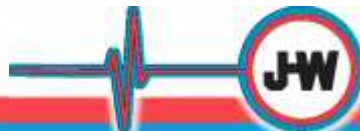
Higher TRIR and Severity Rate

Higher EMR

Competitiveness and Profitability Issues

Lower Scores in ISN, PEC, Veriforce, etc.

Morale Issues, “Set Up to Fail”, then penalized for being “Unsafe”

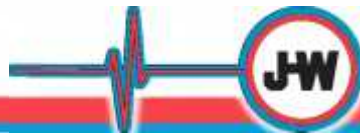


What's the Solution?

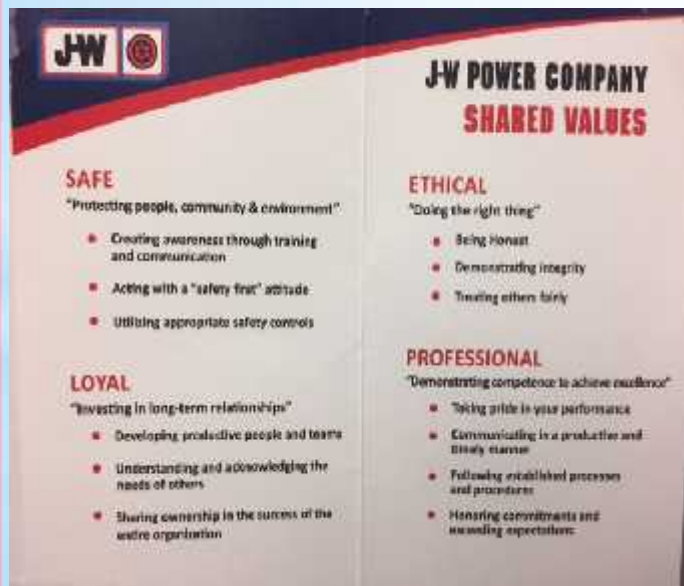
CREATE AWARENESS!!!

Get the word out.

People cannot fix problems they do not know about or fully understand.



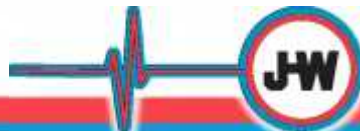
Solutions – Upper Level



1. Develop minimum standards (GCA, GMRC)

2. Agree to follow the standards (MSAs, Contracts, Policies)

3. Hold all parties accountable to the standards (Audits, JSAs, Assessments)



Solutions – Upper Level

ACI Services, Inc. GMRC High Speed Compressor Package Guideline Project

GMRC High Speed Compressor Package Guideline Project

Work Team Kick-Off

ACI Services Inc.
W. Norm Shade, PE
Nov 20/Dec 1, 2016

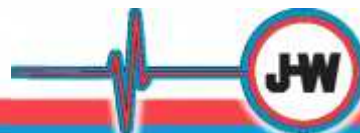


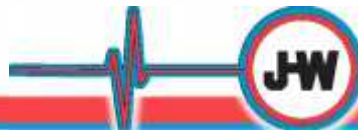
Work Team Launch / Nov 20/Dec 1, 2016

2017 Field Gas Compressor Guideline (High Speed Recip & Screw)

Developers: Gas Machinery Research Council, in partnership with the Gas Compressor Association

Intent: An Industry Standard, with field gas compressor specific content on numerous aspects, many of which affect safety





Solutions – Location Hazards



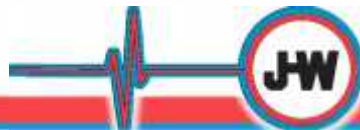
**Day tank hoses replaced
with sub-surface piping!**

**Address LOCATION Hazards During Unit Set (Install)
Not Created at the Start vs. Correcting After the Fact**

**Reps for all Parties On Site, Plus Construction Crews
and Equipment**

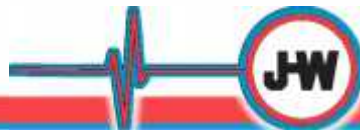
**Hot Work, 811/Dig Tess, LO/TO, etc., Likely Already
Done**

Much Easier to Install or Re-Route Piping



Solutions – Location Hazards

**On Location, cover piping/hoses with gravel or route to avoid hazards.
Ensure a clear path around equipment!**

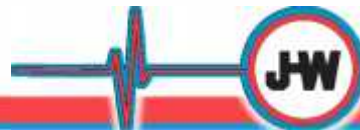


Solutions – Location Hazards

**Use bright color paints to identify permanent hazards,
plus cones, orange fencing, etc. for temporary ones.**

Provide cross-overs for piping and firewalls.

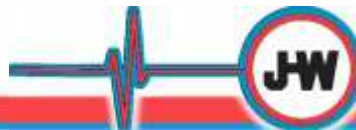
Provide lighting.



Solutions – Equipment Hazards

**Correct EQUIPMENT hazards during engine swings,
unit make-ready and other downtime opportunities.**

In-Shop Is Easier Than In-Field!

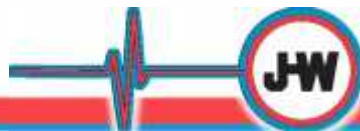


Solutions – Equipment Hazards

Provide OSHA WWS-compliant access for all parts of compressor packages.

Stairs, ladders, non-slip platforms, railing systems, toeboards, anchorage points, etc.

Maintain blowcases and fluid drain systems to keep oil on skid to a minimum!



Solutions – Ongoing

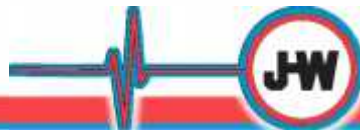


Job Safety Analysis

Behavior Based Safety Observations

**“Own” Observed Hazards! Report & Follow Up
Correct On-The-Spot When Appropriate**

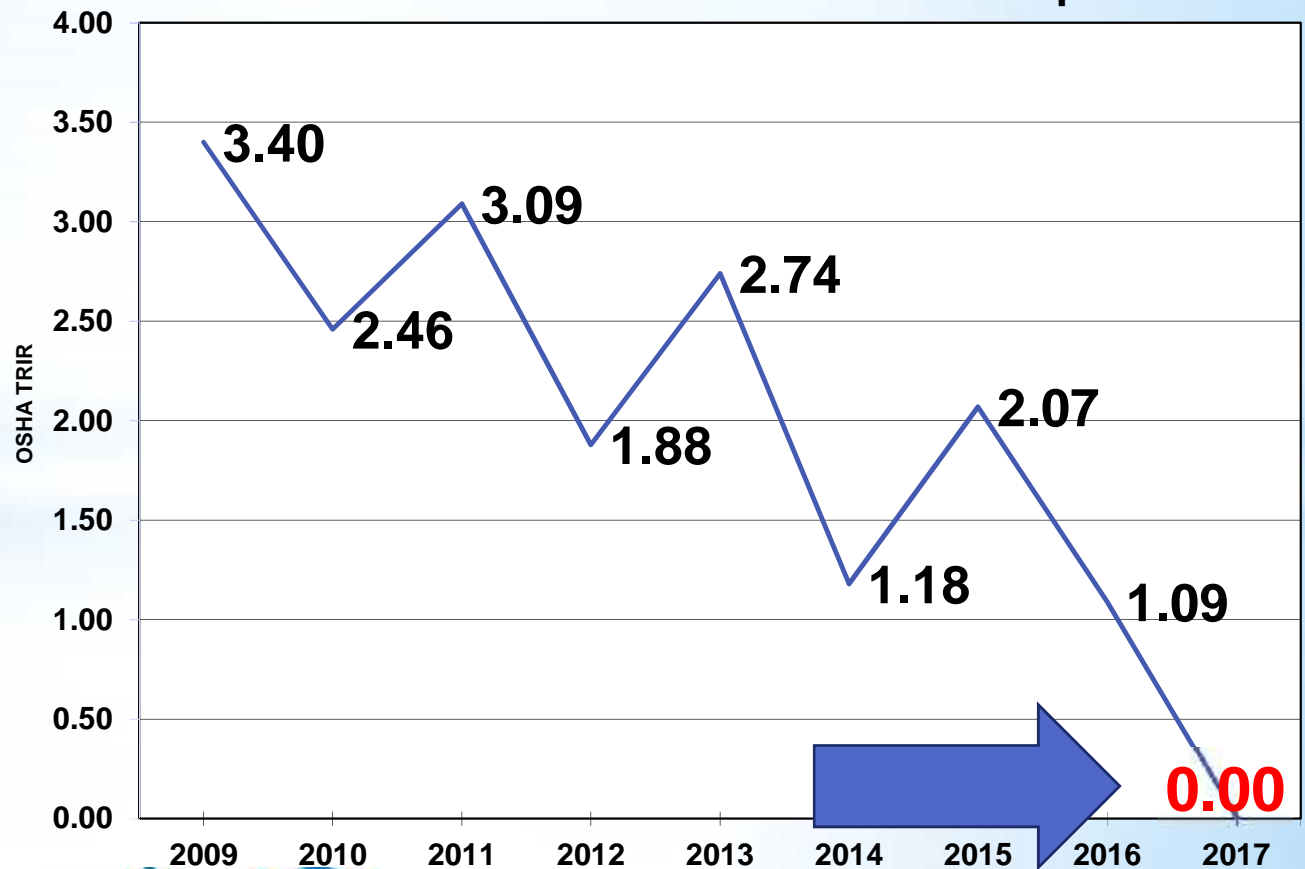
**Sales & Supervision – Establish Direct Line of
Communication to Customer Representatives**



What Does Success Look Like?



GCA TRIR for North American Service Operations



What Does Success Look Like?



Piping routed and/or covered under gravel to provide clear path of travel around the unit with minimal trip hazards. All piping painted bright, reflective color. Suction line is routed at a height of about 6 ½ feet, and painted a bright color to help keep a safe path of travel along side of unit. Light poles not visible in photos, but present.

What Does Success Look Like?

Engineered Anchorage point within armreach of cooler ladder with safety cage



Metal grating floor around entire unit



Safety Yellow railing/toeboards around all edges of barge-mounted unit



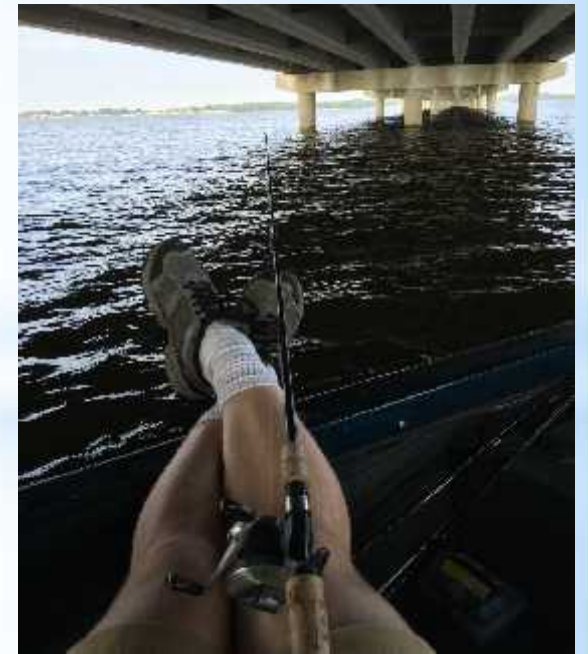
What Does Success Look Like?



Platforms, guardrail systems, steps and ladders



What IS Success, Really?



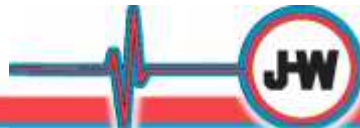
Summary

Slip, Trip and Fall incidents are a leading cause of workplace injury.

In Field Gas Compression, slip, trip and fall hazards can be abundant, affecting many oil & gas production workers.

**Safety is a Shared Responsibility, By and For All Involved.
Oil & Gas Production Companies are the Key to Location safety.
Gas Compressor Companies are the Key to Equipment safety.**

Working Together, These Hazards Can Be Controlled!





? QUESTIONS ?