PIASS
Improving Safety Management

In Search of the Right Answers

John Mathis-Manager ES&H
Bechtel

Brent Landry-Manager HS&E
Bantrel
At work ON TIME. Did what I HAD TO DO. Said what I HAD TO SAY. Left ON TIME.

At home ......

Except ....

Somewhere within the 6 million work sites and of the 93 million American workers ................................………

• 17 were killed by traumatic injuries
• 137 died of occupationally related illnesses
• 17,138 were injured


Cost to friends and family? You can't measure .........................

All JUST BECAUSE . . . IT WAS A TYPICAL DAY

So, what did you do today or will you do tomorrow to make it any different?
“Making Zero Accidents a Reality”

- Construction Industry Institute (CII)
- “Getting Grounded” Construction Industry Facts
- The Journey
- Project Team “Making Zero Accidents A Reality”
- Project Team “Owners Influence Over Contractor/project Safety Performance”
- Summary and Questions
Construction Industry Institute (CII)

CII Membership

- 46 Owners
- 50 Contractors

A consortium of leading owners, contractors, suppliers, and academia who are interested in improving the constructed project and the capital investment process.
CII Knowledge Structure

- CII Identifies:
  - Best Practices
  - Pending Best Practices

- All Best Practices Validated
Construction Industry Facts

- 636,000 construction companies
- 5-6% labor force
- 13% gross national product
- >7,000,000 persons employed in construction
- 90% of the companies have 50 or less employees
Construction Industry Facts

- Construction industry (risk)
  - 20% work related deaths
  - 18% all workers compensation cases

Approximately 1,000 construction workers killed each year

Are we improving as a industry?
First CII Zero Accidents Study Findings - 1993

- High-impact zero accident techniques
  - Pre-project/pre-task planning for safety
  - Safety orientation and training
  - Written safety incentive programs
  - Alcohol and substance abuse programs
  - Accident/incident investigations
Safety Performance - LWCIR
(Owners & Contractors)

![Graph showing the comparison of Lost Workday Case Incidence Rate between Industry and CII for the years 1989 to 2001. The graph indicates a decreasing trend in both categories, with Industry showing a more rapid decrease. The Y-axis represents the Lost Workday Case Incidence Rate, ranging from 0.00 to 8.00, while the X-axis represents the Year and Work-Hours (MM) ranging from 325 to 1,115. The graph includes annotations for the years 1989 to 2001, with corresponding values for Industry and CII.

* Estimated
Safety Performance - RIR
(Owners & Contractors)

Recordable Incidence Rate

Year and Work-Hours (MM)


325 413 477 497 527 613 644 770 518 765 995 936 1,115

Industry*

CII

* Estimated
Even if you’re on the right track, you’ll get run over if you just sit there.

Will Rogers

Accident reduction has improved significantly since 1989, but we won’t just sit there. Our workers are our key core competency. We must continue to strive for Zero Accidents.
The Journey

PT-160
Making Zero Accidents a Reality

PT-190
Owners’ Role in Safety

PT-160A
Safety on Outages, Shutdowns, and Turnarounds

The Safety Journey Continues....
Zero Accidents - Revisited

5,148,000,000 jobhours worked by CII Member Companies Since 1993

51% reduction in recordable injuries

What Industry best practices have supported this improvement and are at the forefront of safety management today?

“Making Zero Accidents a Reality”
CII Project Team
Formed 1998
Making Zero Accidents a Reality Study

- **Methodology - two studies**
  - Large construction firms
  - Large construction projects

- **Survey of 400 largest construction firms in the U.S.**
  - Based on ENR 400 for 1999
  - 400 surveys sent - 106 responses
Making Zero Accidents a Reality Study

- Detailed interviews on construction projects
  - 38 Projects
    - Petrochemical
    - Industrial
    - Public works
    - Transportation
    - Hotel-Casino
    - Commercial buildings
  - U.S. wide geographic area
  - $50-$600 million
Nine Industry Best Practices

- **Getting to Zero**
  - Demonstrated management commitment
  - Staffing for safety
  - Safety planning - pre-project / pre-task
  - Safety training and education
  - Worker involvement and participation
  - Recognition and rewards
  - Subcontractor management
  - Accident/incident reporting and investigation
  - Drug and alcohol testing
Best Practice Results

- Over 30 key findings revealed companies utilizing these best practices have significantly lower recordable injury rates.

- Of the thirty-eight (38) construction projects interviewed, four (4) projects have achieved zero accidents.
Demonstrated Management Commitment

How frequently does top management participate in recordable incident investigation?

Company president/senior management reviews safety performance report?
Demonstrated Management Commitment

Frequency of home office safety inspections on the project

- Weekly/bi-weekly: 1.33
- Monthly/Annual: 2.63

Frequency of home office safety inspections on the project
Safety Staffing

Number of workers per safety professional

- **Up to 50**
  - Over 50: 2.35
  - Corporate/Staff: 1.38

- **Over 50**
  - Line/Project: 2.41

To whom does the safety representative report?
Safety Planning

Does the project have a site-specific safety program?

- Yes: 1.76
- No: 5.43

Are pre-task meetings held?

- Yes: 1.04
- No: 2.67
Safety Training and Education

Is safety training a line item within the budget?

Yes  No

1.38  2.63

Does every worker on site receive a safety orientation?

Yes  No

1.76  5.72
Safety Training and Education

Type of safety orientation provided to workers:
- Formal: 1.51
- Informal: 3.80

How much monthly training do workers receive after orientation?
- Over 4 Hrs: 0.96
- Up to 4 Hrs: 2.79
How much monthly training is provided to superintendents and project managers?

When are toolbox safety meetings held?
Worker Involvement and Participation

Does a formal worker to worker behavior observation program exist on the project?

Yes: 1.38
No: 2.82

Do management and supervisory personnel receive behavior overview training?

Yes: 1.38
No: 2.82
Worker Involvement and Participation

Total number of safety observation reports filed on the project:
- More than 100: 1.01
- Up to 100: 1.93

Are safety perception surveys conducted on the project?
- Yes: 1.33
- No: 2.82
Recognition and Rewards

Does the project have a formal worker incentive program?

- Yes: 3.20
- No: 2.05

How often are incentives given to workers?

- Weekly/bi-weekly: 1.33
- Quarterly: 3.29
Recognition and Rewards

Is incentive based on zero injury objective?

Are field supervisors evaluated on safety?
Recognition and Rewards

Do family members attend safety dinners?

Yes: 0.18
No: 2.35

Do family members attend safety dinners?
Subcontractor Management

Are subcontractors required to submit site-specific safety plans?

Do all subcontract workers attend a formal standard safety orientation?
How frequently do subcontractors hold safety meetings?

Are there sanctions for subcontractor non-compliance with safety standards?
Accident /Incident Reporting and Investigation

Number of near misses recorded on the project

To what extent are recordable incidents investigated by top management?
Best Practices

- **Getting to Zero**
  - Demonstrated management commitment
  - Staffing for safety
  - Safety planning - pre-project / pre-task
  - Safety training and education
  - Worker involvement and participation
  - Recognition and rewards
  - Subcontractor management
  - Accident/incident reporting and investigation
  - Drug and alcohol testing
Project Safety Performance

- Results of implementing best practices

<table>
<thead>
<tr>
<th>Jobs that Implement Most</th>
<th>Sample Mean</th>
<th>Jobs that Implement a few</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 workers per 1000</td>
<td>2.00</td>
<td>38 workers per 1000</td>
</tr>
<tr>
<td>0.17</td>
<td></td>
<td>3.84</td>
</tr>
</tbody>
</table>
The Owner’s Influence on Project/Contractor Safety Performance
Prior research has not addressed the owners influence in project/contractor safety.

NIOSH participated in the support of this study.
How the Study was Conducted

- Personal interviews on large projects:
  - Owner project management (majority)
  - Contractor project management

- Total study sample included 59 projects:
  - 49 United States
  - 7 Canada
  - 3 International
Project Size

- Average hours expended: 2.4 million
- Average project cost: $380 million

Total Project Data

- Total project hours = 143 million
- Total cost = $21 billion
Owner Involvement Makes A Difference

Projects where owners exhibited aggressive project involvement had almost six times fewer injuries per 1000 employees.
Findings

The average RIR: 1.95

- Relationship of RIR with:
- 30 Significant Findings
  - Project type
  - Selection of safe contractors
  - Contractual safety requirements
  - Project execution safety activities
Types of Projects

- Public: 10.2%
- Private: 89.8%
- Petrochemical: 50.8%
- Utilities: 8.5%
- Civil work: 1.7%
- Commercial: 6.8%
- Manufacturing: 32.2%
- Combined: 12%
- Renovation: 14%
- Shutdown: 19%
- New: 50%
- Merit: 35.6%
- Union: 32.2%
- Open Shop: 32.2%
- Maintenance: 5%
- Combined: 12%
- Renovation: 14%
- Shutdown: 19%
- New: 50%
- Merit: 35.6%
- Union: 32.2%
- Open Shop: 32.2%
- Maintenance: 5%
Project Type Continued

- Petrochemical
  - Construction: 1.11
  - Shutdowns: 1.83

- Other Manufacturing
  - Construction: 2.66
  - Shutdowns: 4.71
Project Type Continued

- Open Shop: 1.32
- Merit Shop: 2.07
- Union: 2.71
Project Type Continued

(Number of Worker Hours x1000)

<table>
<thead>
<tr>
<th>Category</th>
<th>RIR</th>
</tr>
</thead>
<tbody>
<tr>
<td>100-200</td>
<td>1.72</td>
</tr>
<tr>
<td>200-1000</td>
<td>2.42</td>
</tr>
<tr>
<td>1000 and Up</td>
<td>1.45</td>
</tr>
</tbody>
</table>
Selection of Safe Contractors
RIR is used to evaluate contractor safety performance.
Selection of Safe Contractors Continued

- Proactive Criteria
  - Qualifications of safety staff
  - Qualifications of project management team
  - Quality of the overall safety program
Selection of Safe Contractors Continued

Personnel qualifications reviewed when evaluating contractors’ safety
Selection of Safe Contractors

Number of proactive criteria used

- None: 3.07
- 2 or 1: 2.45
- 3: 1.58
Selection of Safe Contractors Continued

Ranking of Importance of Safety in Contractor Selection (7 is most important)

- 6 or 7: 1.69
- 5 or less: 2.33
Contractual Safety Requirements
Contractual Safety Requirements Continued

- **Key Requirements**
  - Contractor places at least one full-time safety representative on the project
  - Contractor submits the résumés of key safety personnel for the owner’s approval
  - Contractor provides specified minimum training for the workers
  - Contractor submits a site-specific safety plan
  - Contractor submits a safety policy signed by its CEO
Contractual Safety Requirements Continued

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.75</td>
<td>2.96</td>
</tr>
</tbody>
</table>

**Contract requires at least one full time safety professional on site**

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
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</thead>
<tbody>
<tr>
<td>1.52</td>
<td>3.01</td>
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</tbody>
</table>

**Owner approves contractor safety professionals**
Contractual Safety Requirements Continued

- Contractor provides specified minimum safety training to workers
- Contractor submits a site-specific safety plan
- Contractor submits a safety policy signed by CEO
Contractual Safety Requirements Continued

Number of key requirements included in the contract

- Number of requirements in the contract: 1.22, 1.99, 2.77, 5, 3 or 4, 1 or 2

Number of key requirements included in the contract: 1.22, 1.99, 2.77
Project Execution Safety Activities
Project Development and Execution Safety Activities

- Owner’s Safety Involvement Initiatives:
  - Pre-project development
  - Project safety planning
  - Participate in orientation program
  - Monitor contractor’s safety program
  - Maintain safety statistics
  - Participate in safety recognition program
  - Monitor key leading measures
Safety Program Components
• Emergency plan (medical and hazardous materials)
• Daily JSA (Job Safety Analysis) conducted on the project site
• Substance abuse program
• Specific safety training program
• Task specific PPE analysis
• Safety responsibility defined for all levels
• Emergency response team maintained on the project
Project Execution Safety Activities

- Safety Program Components continued:
  - Prime contractor’s employees to have 10-hr OSHA cards
  - OSHA specific regulations
  - Prime contractor’s supervisors have CPR and First-Aid cards
  - Training on the hazards related to the tasks
  - Pre-project safety planning
  - Conduct regular safety inspections
  - Incident reporting and investigation
  - Regular safety meetings
Project Execution Safety Activities

Continued

RIR

<table>
<thead>
<tr>
<th></th>
<th>Substance abuse program</th>
<th>Daily JSA</th>
<th>Emergency plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>1.30</td>
<td>1.21</td>
<td>1.21</td>
</tr>
<tr>
<td>No</td>
<td>3.25</td>
<td>2.59</td>
<td>2.18</td>
</tr>
</tbody>
</table>

Continued...
Project Execution Safety Activities

Owner maintains injury statistics by each contractor

Contractor injury statistics included in owner's safety performance
Project Execution Safety Activities

Owner provides extra funds (outside of the contract) to promote project safety
Project Execution Safety Activities

- Safety orientation methods
  - Contractor presentations
  - Owner presentations
  - Combination of both Owner and Contractor presentations
Who conducts presentations/orientations?

Owners require testing after safety orientation.
Project Execution Safety Activities

- Key measures monitored by owner
  - Near misses
  - Project inspections
Owner’s representative regularly checks project near misses.

Owner’s safety representative participates in project safety inspections.
Owner participates in both monitoring of near misses and contractor safety inspections.
Project Execution Safety Activities

- **Key Activities of Owner Involvement**
  - Participating in safety and/or toolbox meetings
  - Enforcing safety rules
  - Reviewing safety performance on site
  - Monitoring pre-task analysis programs
  - Participating in safety recognition programs
Project Execution Safety Activities

Owner's representatives participate in safety and/or toolbox meetings
Owner participates in the safety recognition program
Project Execution Safety Activities

Continued

Total number of leading indicator responsibilities of the owner’s safety representatives
Project Execution Safety Activities

<table>
<thead>
<tr>
<th>RIR</th>
<th>Zero</th>
<th>Objective greater than zero</th>
<th>No objective</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.00</td>
<td>1.38</td>
<td>1.95</td>
<td>2.60</td>
</tr>
</tbody>
</table>
Contractor’s Perspective

- Each Contractor Has a Duty To Perform
- Owner Influence Is Important
- Safety benefits from good partnering
Research Results are Clear

- Owner Involvement Significantly Influences Project/Contractor Safety Performance
  - Careful selection of contractor
  - Contractual safety requirements
  - Safety communication and involvement
  - Monitor safety performance
  - Participate in safety orientation
  - Participate in incident investigation and documentation
  - Participating in physical safety inspections
  - Participate in safety recognition program
# Owner’s Influence on Construction Safety Score Card

## Project Context:

### Selection of contractor:
(3) Is the TRIR requirement for the contractor selection less than 2.0? □ Y □ N

## Contractual Safety Requirements:
(7) Does the project use a design-build contract? □ Y □ N

## Contractor Safety Program Requirements:
Which of the following are required to be included in the contractor’s safety program?

(13) Contractor must prepare a plan for site emergencies □ Y □ N
(14) Contractor must conduct pre-task safety planning on the project site □ Y □ N
(15) Contractor must implement a substance abuse testing program □ Y □ N

## Owner’s Involvement in Project Safety Management:
(16) Does the owner's safety representative investigate near misses? □ Y □ N
(17) Are injury statistics on the projects maintained separately on each contractor? □ Y □ N

### Which of the following activities are performed by the owner’s site safety representative?

(21) Enforcing safety rules and regulations □ Y □ N
(22) Monitoring of the implementation of pre-task planning □ Y □ N
(23) Participating in safety recognition programs □ Y □ N
(24) Participating in safety and/or tool box meetings □ Y □ N
(25) Does the owner set zero injury as its safety expectation before the commencement of site work? □ Y □ N
How Influential Is Owner Involvement?

- **Aggressive Owner Involvement (>85%)**
  - Sample Mean: 0.86
  - Limited Owner Involvement (<45%)
  - Sample Mean: 1.95
  - Limited Owner Involvement (<45%)
  - Sample Mean: 4.6

- **RIR** = Scorecard Results

- **46 injuries per 1000**
- **20 injuries per 1000**
- **8 injuries per 1000**

() = Scorecard Results
Work in Progress

- Implementation Data Sheets
- Education Modules “The How To “
- Metrics(Assessment Tool)
- Overtime Research
- The Next Project Team Study
Which practice is the most important to achieving zero accidents?

The safety culture of a firm is evident in everything it does. We must be ever vigilant in our efforts as we strive for Zero Accidents.

There is no Silver Bullet
NOTICE

IF YOU’RE NOT CONFRONTING AT-RISK BEHAVIOR…
YOU’RE REINFORCING IT.
The Stakes Are High

Your personal actions will make a difference...

Be a Courageous Safety Leader