Key Performance Indicators (KPIs) – A Key Factor in "Aiming for Zero"

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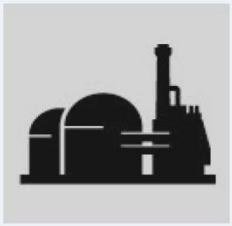
Chlorine Institute Strategic Plan

The Chlorine Institute exists to support the chlor-alkali industry in advancing safe, secure, environmentally compatible, and sustainable production, distribution, and use of its mission chemicals*.

***CI's mission chemicals: chlorine, sodium and potassium hydroxides, sodium hypochlorite; distribution and use of hydrogen chloride; and distribution of vinyl chloride monomer.**



Health, Environment, Safety and Security Issue Team

Zero releases and injuries at member facilities with a focus on process safety

Transportation Issue Team

Zero releases and injuries

Product Stewardship Issue Team

Zero releases and injuries at user facilities

Emergency Preparedness Issue Team

Minimize the impact of a release

Maintain CHLOREP Safety Net

Factors to Achieve Zero*

- Management Commitment
- Leadership
- Employee Involvement
- Accountability
- Training
- And, accurate data (KPIs)

*Greater Baton Rouge Industry Alliance

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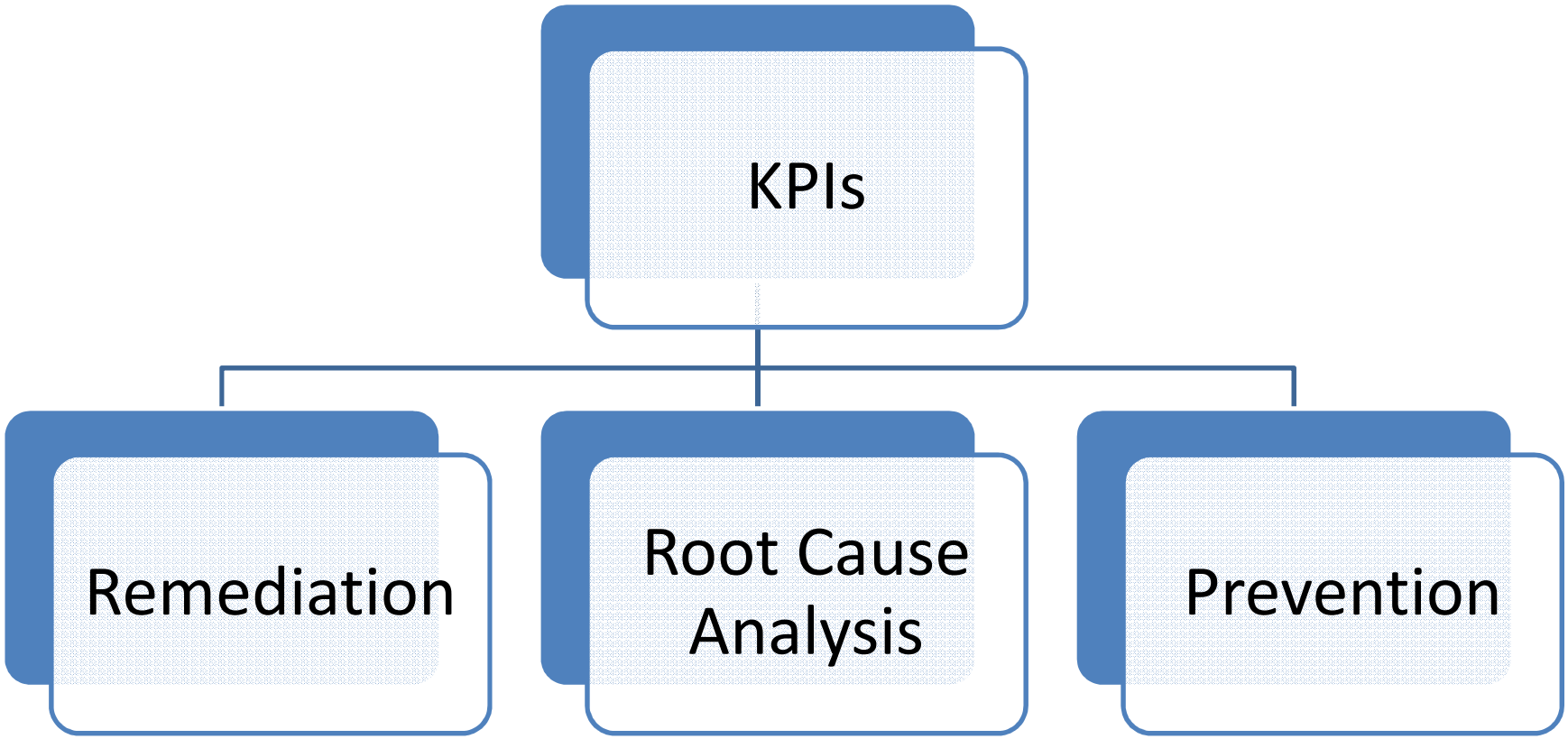
Why KPIs Matter



Root Cause Analysis – The Key to "Zero"

Root Cause Analysis:

"A formal investigative method that attempts to identify and address the management system failures that led to an incident." *–AIChE*

- CI incident reports include root cause analyses
- This info is shared with all members

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Reporting & Root Cause Analysis

Effective Reporting and Root Cause Analysis

Safety Alerts


CI Safety Alert

Alert Date: November 2014

Type of Incident: Corrosive Material Release

Location: Chlorine Producer

Incident Description

A pump discharge line failure resulted in the release of over 6,000 lbs. of corrosive material. The leak continued for approximately 90 minutes and was discovered during an operation round. Upon discovery the pump was immediately shutdown and the area isolated until clean-up activities were completed.

Investigation Results

The investigation performed by facility personnel identified that a carbon fitting had been added to the process sample system which corroded over time and eventually failed. The process where the leak occurred requires the use of 316L stainless steel because it is in corrosive service.

Cause(s)/Contributing Factor(s)

Unit operating personnel where the incident took place had not received training on the existing facility policy concerning the appropriate material of construction to install in this particular corrosive service.

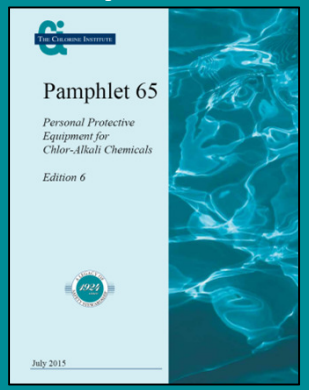
Unit operating personnel failed to use their Management of Change procedure to manage this change.

Corrective Action(s)

Unit personnel received training on the existing site material identification and MOC policy. Additionally the following procedures were updated:

- The Material of Construction Identification Program will be included in all process hazard analyses when dealing with corrosive services
- Piping specifications are to be reviewed for all piping replacements
- Precautions addressing the hazards of corrosion to be included in all procedures dealing with hazardous and/or corrosive service.
- Management reviews and self-assessments will include a review of the status (completion/documentation) of critical training for operating personnel.

Pamphlet Updates



New Videos and Updates

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OSHA Says…

- "Metrics can be used to quantify how a process has performed historically, how it might perform in the future and where improvements can be made to keep workers safe."
- In addition, CI seeks to protect our *communities, customers and the environment*
- KPIs help achieve this goal

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For CI Members, KPIs Are A Fact of Life

- "Sharing information regarding chlorine incidents is critical to each member's overall success in reducing the frequency and severity of such incidents."
- "A report on chlorine safety performance of the Institute membership shall be prepared and presented annually."
- "Chlorine safety performance measurements include chlorine incident and related injury performance."

- CI Policy on Chlorine Safety and Security Stewardship

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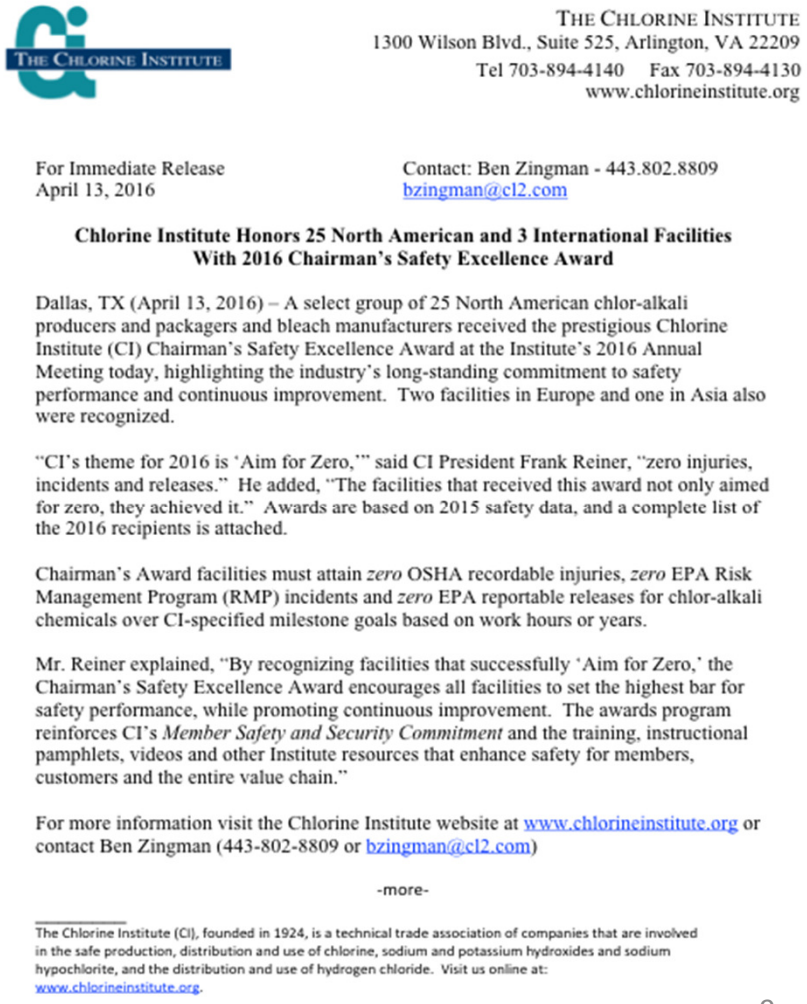
CI's KPIs For Facilities

- OSHA recordable injuries
- EPA Risk Management Program (RMP) incidents
- EPA reportable releases for chlor-alkali chemicals
- Top performing facilities are recognized annually



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Chlorine Institute Honors 25 North American and 3 International Facilities With 2016 Chairman's Safety Excellence Award

Dallas, TX (April 13, 2016) – A select group of 25 North American chlor-alkali producers and packagers and bleach manufacturers received the prestigious Chlorine Institute (CI) Chairman's Safety Excellence Award at the Institute's 2016 Annual Meeting today, highlighting the industry's long-standing commitment to safety performance and continuous improvement. Two facilities in Europe and one in Asia also were recognized.

"CI's theme for 2016 is 'Aim for Zero,'" said CI President Frank Reiner, "zero injuries, incidents and releases." He added, "The facilities that received this award not only aimed for zero, they achieved it." Awards are based on 2015 safety data, and a complete list of the 2016 recipients is attached.

Chairman's Award facilities must attain *zero* OSHA recordable injuries, *zero* EPA Risk Management Program (RMP) incidents and *zero* EPA reportable releases for chlor-alkali chemicals over CI-specified milestone goals based on work hours or years.

Mr. Reiner explained, "By recognizing facilities that successfully 'Aim for Zero,' the Chairman's Safety Excellence Award encourages all facilities to set the highest bar for safety performance, while promoting continuous improvement. The awards program reinforces CI's *Member Safety and Security Commitment* and the training, instructional pamphlets, videos and other Institute resources that enhance safety for members, customers and the entire value chain."

For more information visit the Chlorine Institute website at www.chlorineinstitute.org or contact Ben Zingman (443-802-8809 or bzingman@cl2.com)

-more-

The Chlorine Institute (CI), founded in 1924, is a technical trade association of companies that are involved in the safe production, distribution and use of chlorine, sodium and potassium hydroxides and sodium hypochlorite, and the distribution and use of hydrogen chloride. Visit us online at: www.chlorineinstitute.org.

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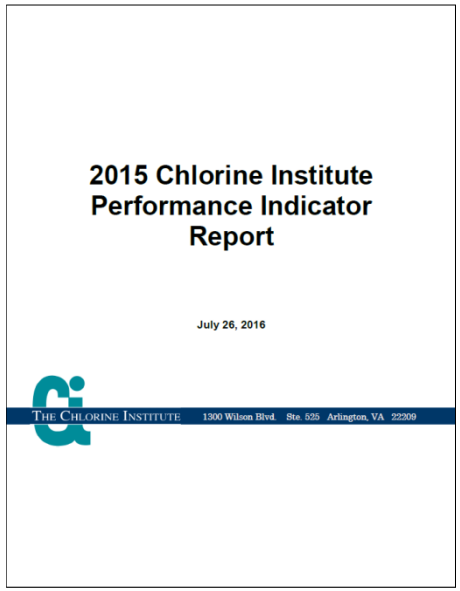
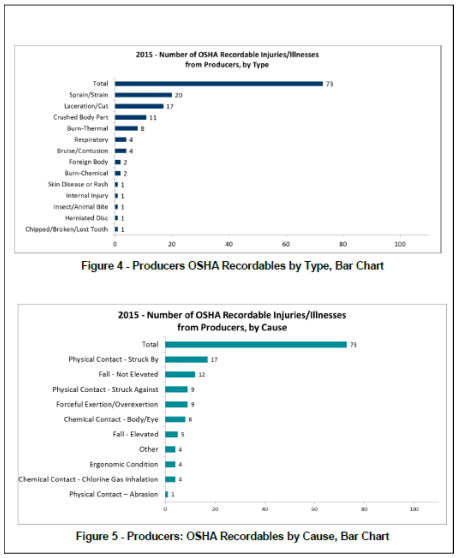
Annual Safety Reports

Annual compilation of CI member safety performance:

- Comparison of actual performance with annual goals
- Listing of incident descriptions with CI severity ratings
- Historical trends in safety of CI members





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Safety Data Uses

- Incident Descriptions as lessons learned
- Use incident descriptions to abate similar hazards in your facility
- Comparison – your facility vs. the rest of CI producing/handling members

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Comparison Example

Example: Company X, a bleach manufacturer has an OSHA recordable rate of 2.6 for 2016.

Company X knows:

- Their own injury and work-hours total
- The number of injuries and work-hours by CI members overall
- The number of injuries and work-hours by CI bleach producers

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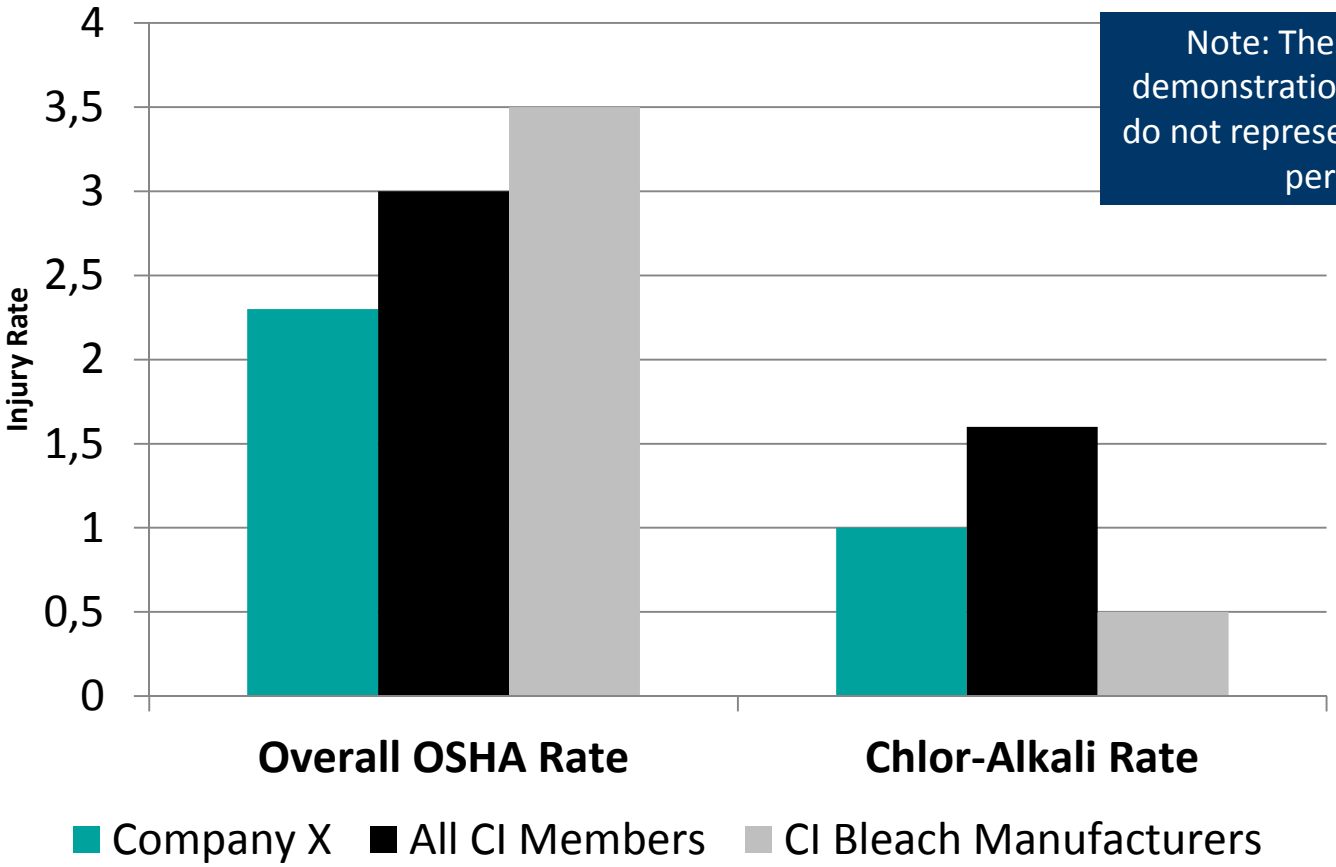
Comparison Example (2)



Note: These figures are for demonstration purposes only and do not represent actual CI member performance.

Company X can subtract their hours and injuries and create a comparison chart.

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Other Safety Data Uses

- Two CI task groups analyzed Chlor-Alkali injuries and chlorine releases, respectively.
- Their analyses raised key questions:
  - Why do chemical burns account for a large percentage of chlor-alkali injuries?
  - Is the amount of chlor-alkali experience a significant factor in predicting injuries?
  - Are incidents and injuries more likely to occur during a particular mode of operation?

Other Uses (2)

- From those task groups, changes were made:
  - Chemical burns now require a more detailed report
  - New question were added:
    - How many years of Chlor-Alkali experience did the injured person have?
    - What was the mode of operation when the incident occurred?
    - Was there a procedure for the work being performed?

Case Study 1– Large Producer KPIs

- Total number of injuries
- Number of *severe* injuries: broken bones, amputations and other life-altering injuries
- Number of losses of primary containment
- Number of Tier 1 process safety incidents (as defined by API Recommended Practice 754)
- Number of regulation violations (such as a permit exceedances)

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#1 - How Are the KPIs Used?

Incident database:

- Statistics
- Incident descriptions
- Root cause analysis summaries
- Available to all employees
- Employees able to view incident descriptions and statistics from all locations within company

#1 - How Are the KPIs Used?

Weekly email to employees:

- Short and sweet
- Shares latest KPIs
- Uses photos to deliver safety message, foster safety awareness
- Can drive safety briefings

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Case Study 2 – Small Producer KPIs

- OSHA recordable injuries
- Incident rates (comparing number of injuries to hours worked)
- Serious injury rate

Small Producer KPIs (2)

- Material releases, and
- *Reportable* material releases
- Open reports
- Fleet Safety
  - Several behavioral categories including: unsafe driving, driver fitness, etc.
  - Reportable accidents
  - Preventable accidents
  - Out of service violations

Photo from CSB report, 2006

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Small Producer KPIs (3)

- KPIs reviewed in monthly meeting with entire management staff
- Management staff brainstorms ways to effectively close out lingering post-incident investigation action items

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In Conclusion

- KPI's play a key role in both industry-wide and company-level safety improvement
- They provide valuable data and help us determine root causes
- And, KPIs help us know where we stand in relation to CI's ultimate goal

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Thank You & Questions

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