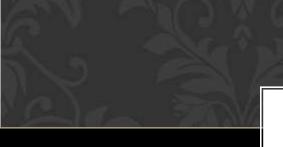


EFFECTIVEENVIRONMENTAL,

HEALTH, SAFETY AND RELIABILITY SYSTEMS – RECIPE

TO BE INDUSTRY LEADER

1



LEADERSHIP

Leadership creates an avenue for people to contribute to making something extraordinary happen.

A process of social influence where one person enlists support from others to accomplish a common

task.



between Reliability

and EHS

DURING A 3-MONTH PERIOD IN 2010 58 WORKERS WERE KILLED

AT US REFINERIES, COAL MINES, OIL DRILLING RIGS, AND POWER PLANT CONSTRUCTION SITES



10 workers were performing maintenance work at the 130,000 bpd **refinery**. "We are responding quickly to ensure the safety for our employees, contractors and the neighboring **4** community," said Bruce Smith, Tesoro's chairman, president and CEO, in a statement.* (C) 2011 JDL@MAINTRAINER.COM



UNUSUALLY

EXPENSIVE

* The most expensive safety equipment you will ever buy

is equipment you install

after a catastrophic incident.

5

AT THE NATIONAL PETROCHEMICAL AND REFINERS ASSOCIATION'S NATIONAL SAFETY CONFERENCE IN 2010, JORDAN BARAB,

DEPUTY ASSISTANT SECRETARY FOR OSHA, SAID:



UNLIKE THE REST OF US INDUSTRY, THE PETROCHEMICAL AND POWER UTILITY CULTURES ARE WELL ALONG THEIR PROCESS SAFETY PATHS.

Total

| Cases involving days away from work: | 965,000 |
|--|---------|
| Cases involving sprains, strains, tears: | 379,340 |
| Cases involving injuries to the back: | 195,150 |
| Cases involving falls: | 212.760 |

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IMAGINE FOR A MINUTE

When we fix the root causes of workers will go home to their families whole and intact.

any fatalities or injuries, more

Our organization will earn a better reputation, employees will enjoy a better quality of life, and in the end greater profitability. We will contribute to the promise that organizations will treat

people and the environment with respect.

8

BAD RELIABILITY CAN CAUSE EHSS DISASTERS

cess or

procedures.

We a

We will discuss defects in mechanical integrity and neglect of process safety

July 25, 2001

Motiva acid tank failure fire - Contract employees were reportedly

welding metal catwalks above the tanks.

This incident was an EHS disaster:

Eight people were injured 2.4 M L acid into the Delaware River



The U.S. Chemical Safety & Hazard Investigation Board questioned:

- Condition of the tank
- Hazard evaluation process
- Adequacy of maintenance procedures **9**

DL@MAINTRAINER.COM

IN MAINTENANCE WORK, ACCIDENTS ARE NOT ALWAYS PREDICTABLE BUT THERE ARE PROCEDURES TO REDUCE

PROBABILITY

 the maintenance procedure would have been worked through before it became a problem.

We

su

 Hazard would have been detected and would have been mitigated or eliminated.

10

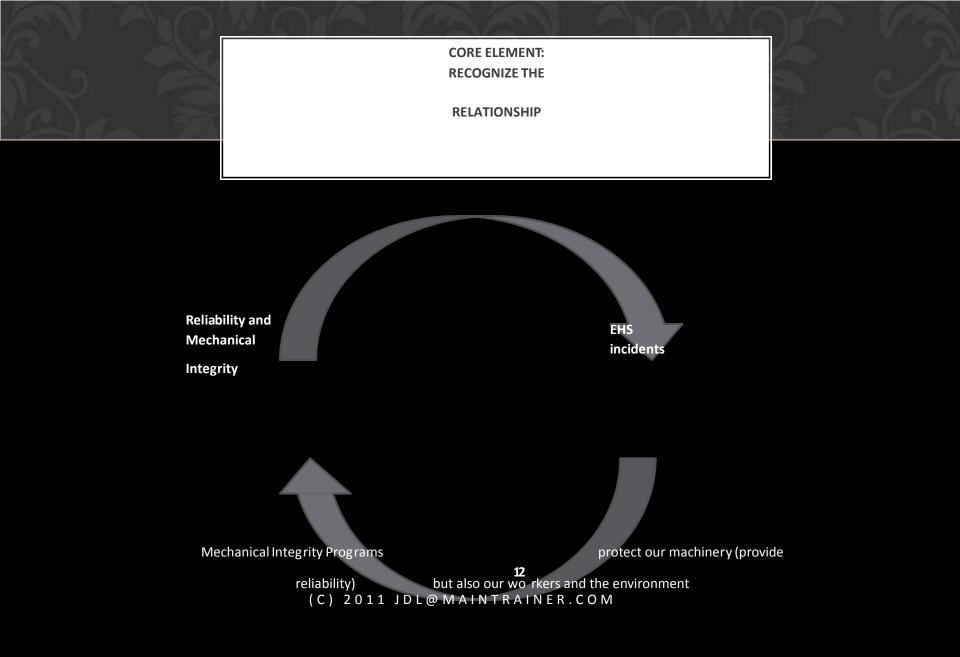


ACCIDENTS ARE GROUPED INTO 5

CATEGORIES

| <u>Categor v</u> | % accidents Specification | |
|---------------------------------|---|----|
| 44% Changes after commissioning | 20% Operations and maintenance | |
| 15% Design and implementation | 15% | |
| Installation and commissioning | 6% | |
| down | wns. A failure to manage mechanical integrity is the leading cause of brea ns and the resultant EHS iden that I N E R . C O M | ak |

11





There are patterns to many maintenance accidents:

- 1. Something breaks down and has to be repaired.
- 2. The breakdown causes a worker to be in harm's way.
- 3. Reliable equipment does not require maintenance workers to be put into harm's way.

4. The way to deal with potential harm is to eliminate its possibility by eliminating the breakdown.

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Size and scope of

repair is smaller (due to PM) making for safer repairs

- **1.** PM activity catches deterioration early in the process before failure (and reliability is impacted).
- 2. At that point the repair is smaller, safer and more manageable. Fewer EHSS incidents
- 3. It also gives managers more time to plan and deal with

hazards.

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Hazards are eliminated or mitigated in the planning process

- 1. The planner plans the job to minimize downtime
- 2. The planner is specifically trained to look for hazards to safety, health and environment.
- 3. Planners will mitigate or eliminate the hazard in the plan before the crew even leaves the shop.
- 4. Result is fewer EHS incidents with more reliable

equipment

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Planned jobs allow fewer opportunities for the maintenance worker to improvise.

- 1. Improvisation is great in comedy.
- 2. It can be deadly in maintenance.
- 3. Adequate time for job planning means having the right tools, spares, equipment, skills, and drawings when the job starts.
- 4. Results in fewer EHS incidents and better reliability

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ACTION ITEMS

- Plan most jobs: Planned and scheduled maintenance work should be maintained above 80%.
- PM integrity: Over 95% of PM jobs completed as scheduled.
- Do what you say: Schedule compliance above 85%.
- Improve reliability: MTBF for major assets should keep improving.

CHANGING A CULTURE

 Create a powerful culture for great practices in EHSS and Reliability

Keep it up through:

- Follow-through to keep people's eyes on the goal
- Resilience to get the plant back on track when the program goes off track
- Positive attitude. Don't punish honest mistakes; make sure your people learn from them.

Joel Levitt, Director International Projects <u>JLEVITT@LCE.COM</u> ng | 4360 Corporate Road Office | Charleston, SC 29405

> THANK YOU FOR YOUR ATTENTION

Joel Levitt, Director International Projects <u>JLEVITT@LCE.COM</u> Life Cycle Engineering | 4360 Corporate Road Office | Charleston, SC 29405 843.744.7110 Mobile +1-267-254-0061

www.LCE.com