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The New Paradigm in Accident Prevention – Evaluating Serious and Fatal Risks

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Background

Safety professionals note while:

- The rate of recordable injuries has declined across many industries
- The rate of serious injuries and fatalities (SIFs) is either constant or in many cases increasing
- The pattern is obvious across many industries, including mining, at the local site level, across companies, at national and international levels

Can we shift our paradigm on accident prevention processes?

BP - USA

BP USA – 2005 to 2010 (Catastrophic Incidents)		
Year	**Class**	**Fatalities**
2005	Refinery Gas Explosion (*)	15
2010	Oil Rig - Explosion / Fire	11

(*) August 2005 – the company noted “it would do everything possible to ensure nothing like it happens again”

Texas City Refinery Disaster

On March 23, 2005, a fire and explosion occurred at BP's Texas City Refinery in Texas City, Texas, killing 15 workers and injuring more than 170 others.

Texas City Refinery Disaster - Findings

"The underlying or "root" causes of the large majority of personal and process accidents are deficiencies in the systems…"

Source : The Report of the BP U.S. Refineries Independent Safety Review Panel. Jan 2007 of the Texas City Refinery Disaster - 2005

Texas City Refinery Disaster - Findings

"The presence of an effective personal safety management system does not ensure the presence of an effective safety management system"

Source : The Report of the BP U.S. Refineries Independent Safety Review Panel. Jan 2007 of the Texas City Refinery Disaster - 2005

Texas City Refinery Disaster

The Principal Finding

Was that BP Management had not distinguished between "occupational safety" (i.e. slips-trips-and-falls, driving safety, etc.) vs. "process safety" (i.e. design for safety, hazard analysis, material verification, equipment maintenance, process upset reporting, etc.).

The metrics, incentives, and management systems at BP focused on measuring and managing occupational safety while ignoring process safety.

BP Confused Improving Trends in Occupational Safety Statistics For a General Improvement in all Types of Safety.

Source : The Report of the BP U.S. Refineries Independent Safety Review Panel. Jan 2007 of the Texas City Refinery Disaster - 2005

BP - Deepwater Horizon Disaster

The ***Deepwater Horizon*** **drilling rig explosion** occurred on April 20, 2010 in the Gulf of Mexico. The explosion killed 11 workers and injured 17 others and resulted in one of the USA's worst environmental disasters.

BP - Deepwater Horizon Disaster

Deepwater Horizon Disaster – Gulf of Mexico 2010

BP CEO Tony Hayward defended the firm's safety record as he was grilled by a committee of managing partners over the implications of the Gulf of Mexico oil spill. The outgoing BP chief executive said:

"Safety is a core value of the oil and natural gas industry. We have a strong safety performance record, and we continue to improve upon it. According to data from the Mineral Management Service (MMS), the overall safety and environmental performance on the U.S. Outer Continental Shelf (OCS) has shown steady improvement over the past decade. In fact, for combined operations on the OCS, the recordable lost workday incident rates fell from 3.39 percent in 1996 to 0.64 percent in 2008 – a reduction of more than 80 percent."

Karen Westall, the managing attorney on BP's Gulf of Mexico Legal Team noted in her letter that "all eight BP-operated Gulf of Mexico production facilities" received safety awards from MMS in 2009.

BP - USA

Fortune's investigation shows that despite efforts to change, BP never corrected the underlying weakness in its safety approach, which allowed earlier calamities such as the Texas City refinery explosion.

Perhaps the most crucial culprit: an emphasis on personal safety (such as reducing slips and falls) rather than process safety (avoiding a deadly explosion). That might seem like a semantic distinction at first glance, but it had profound consequences.

BP - USA

Consider this: BP had strict guidelines barring employees from carrying a cup of coffee without a lid -- but no standard procedure for how to conduct a "negative-pressure test," a critical last step in avoiding a well blowout. If done properly, that test might have saved the *Deepwater Horizon*.

Underground Coal Explosion

2010 – Massey Upper Big Branch (USA) mine – 29 Fatalities

Massey - Upper Big Branch Explosion

The **Upper Big Branch Mine disaster** occurred on April 5, 2010 about 1,000 feet (300 m) underground at Massey Energy's Upper Big Branch longwall operation at Montcoal in Raleigh County West Virginia. Twenty-nine out of thirty-one miners at the site were killed.

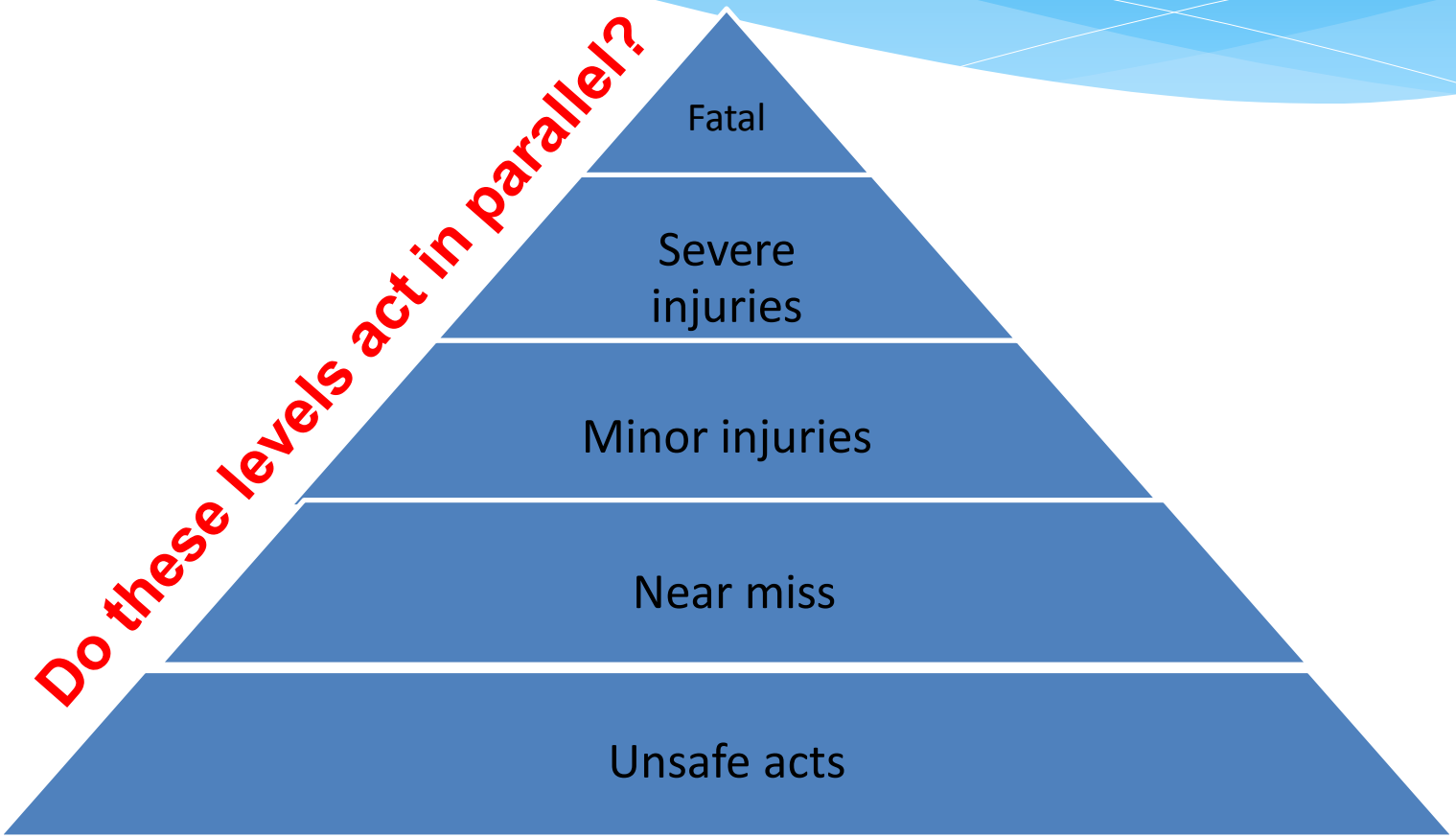
Massey - Upper Big Branch Explosion

Massey CEO stated: "Safety has always been of paramount importance at Massey and cited various statistics the amount of time lost to accidents at Massey has bested the industry average for 17 of the last 19 years."

Massey's "non-fatal days lost" record has shown consistent improvement and was better than the industry average.

Massey has spent more than US$45M since 2005 on underground safety innovations and significantly more on above ground safety and in 2009, the Mine Safety and Health Administration (MSHA) awarded the company three "Sentinels of Safety Awards" the most received by a company in a single year."

Review of the Heinrich Triangle



Heinrich Triangle Theory

Consider the Possibility

- A mine has a low injury frequency rate, which indicates low accident rates and very low loss time injuries.
- Then the mine has a single serious or fatal accident!
- How could this be possible?

Classification of Accident Potential

Serious or Fatal Potential:

- **LOW**
- **HIGH**
- Let's target prevention of accidents with the **HIGH** potential to be serious or fatal!

High Potential versus Low Potential

- HIGH Potential Accidents – Serious ignorance or breaking of life-critical rules:
  - Methane Detection, Ventilation, Lock-Out/Tag-Out, Roof Control, Fire Prevention, Lifting/Blocking, etc.
- LOW Potential Accidents – Breaking of certain basic rules:
  - PPE, Slip/Trip, Sprains/Strains, Abrasions, Minor Cuts, Burns, Broken Bones, Contusions, etc.

Serious and Fatal Injury - Signals

- Precursor
  - Definition: one that precedes and indicates the approach of another
  - In Safety: an unmitigated high-risk situation that will result in a serious or fatal injury

Example: An employee's hand is lacerated due to contact with a conveyor belt roller.

Serious and Fatal Injury - Prevention

High Risk + Overlooking Precursors = Serious or Fatal Injury

- Organizations focus on precursors – what may have happened!

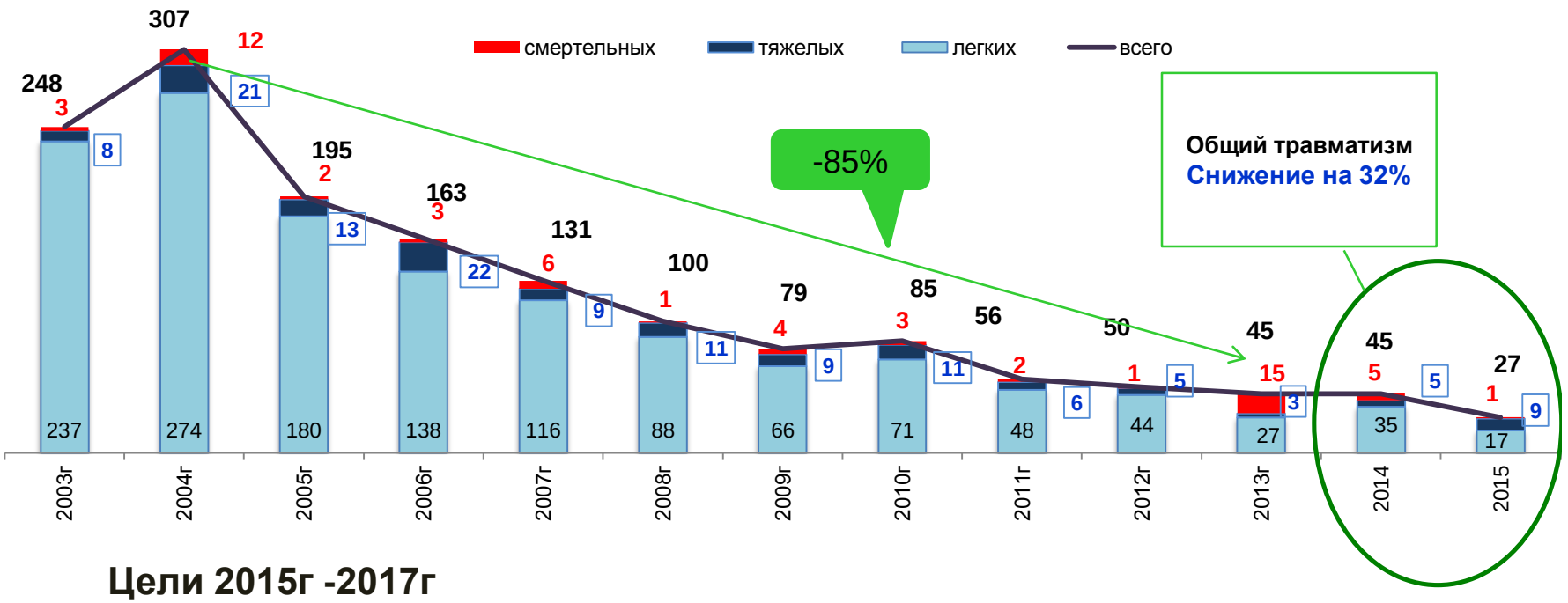
1. Educate the Organization
2. Measure Serious and High Potential Incidents together
3. Identify and Mitigate Precursors
4. Integrate the above into existing safety systems

Russian Coal Company – Experience Share

- Safety has improved with the decline in minor injuries
- The team has worked hard to improve and become better
- The company now has the opportunity to move forward with more improvement
- Moving forward with focus to reduce severe and fatal injuries while keeping minor injuries low
- Lower the risk of catastrophic exposure that may result in multiple fatalities and loss of business
- Plan to move beyond compliance as a must do to safety as a value

Incidence Rate History

Динамика травматизма с 2003г



Цели 2015г -2017г

Планомерное снижение:

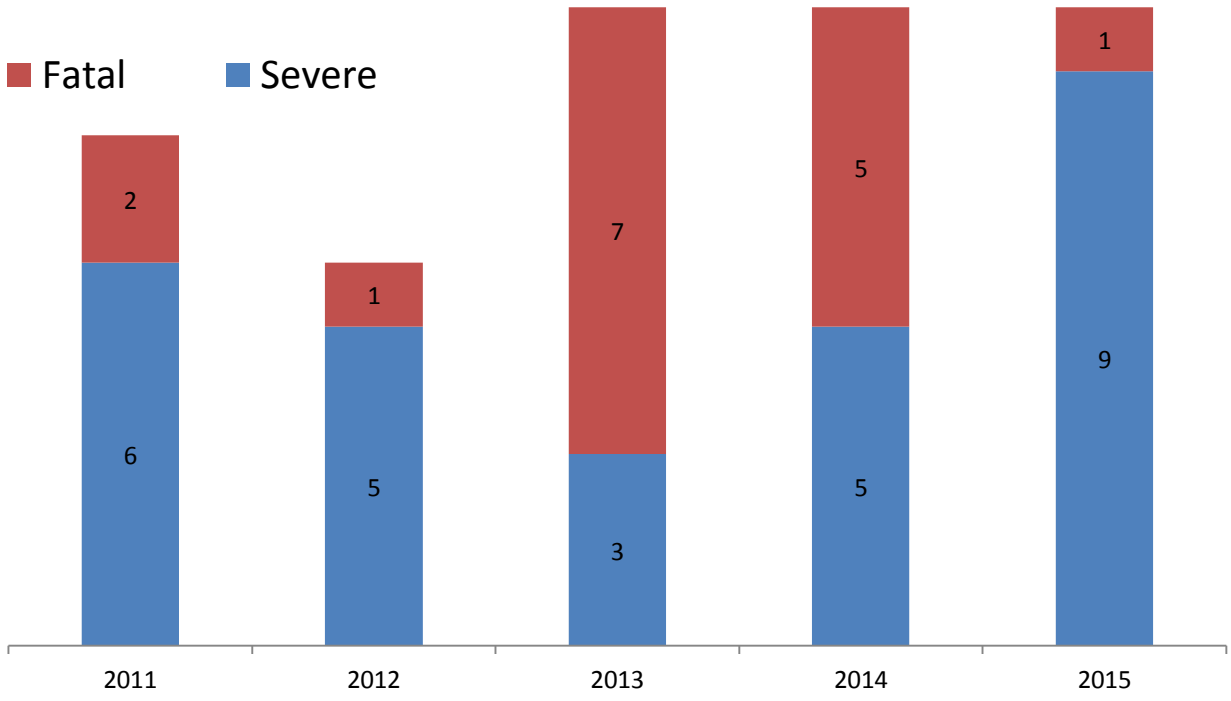
- **Индекса LTIFR на 5%**
- **Инцидентов на 5%**
- **Коэффициента профзаболеваемости на 5%**

Задачи:

- **Контроль опасных производственных ситуаций**
- **Управление опасным поведением**

Status of serious and fatal injuries

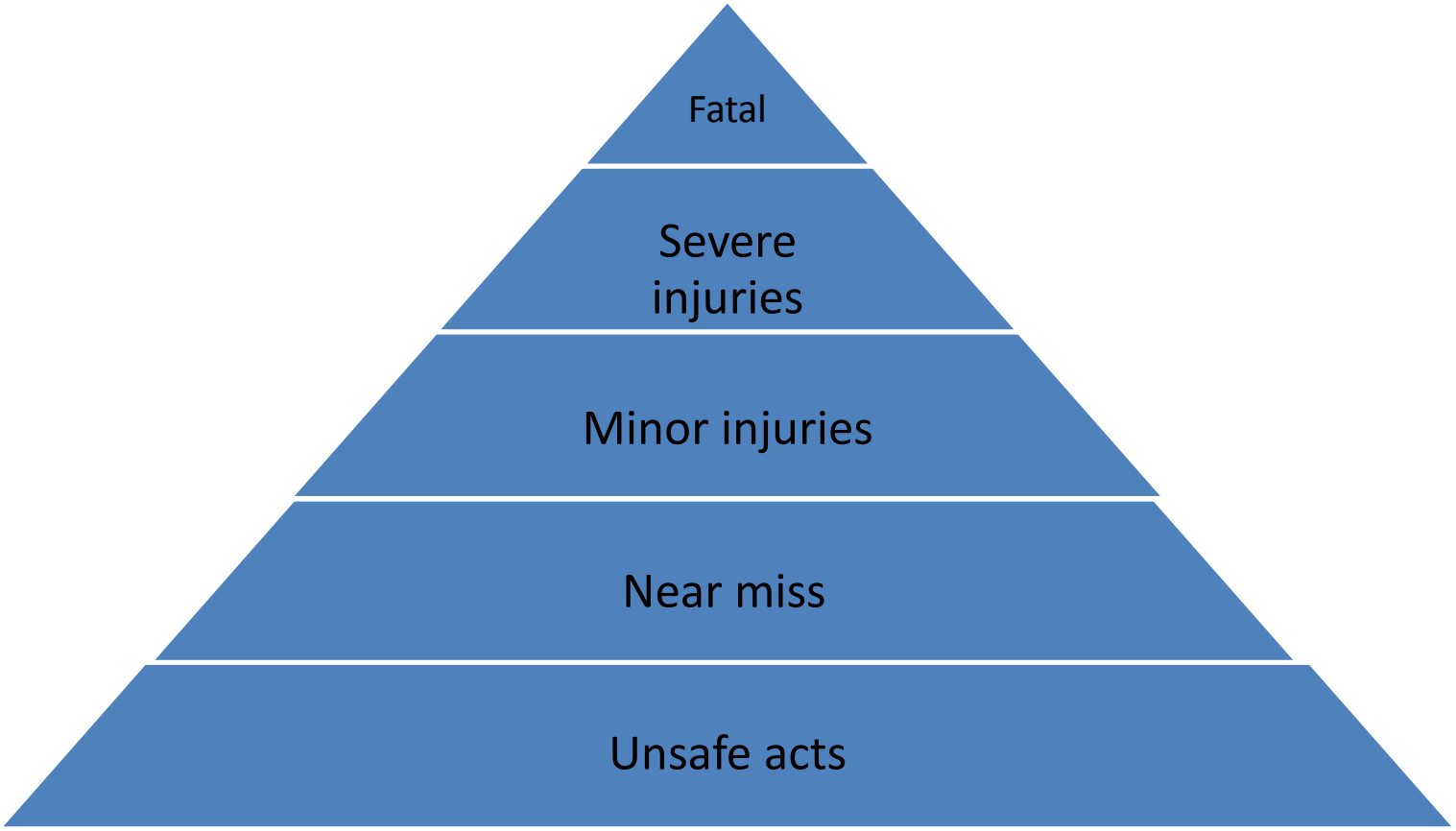
There is a need to focus on severe and fatal injuries. Severe and fatal injuries have not been reduced over the past five year period. Severe plus fatal injuries total eight to ten in each of the past five years.



* Excludes the eight fatalities in an explosion in 2013.

The root cause of individual fatalities and catastrophic are different and therefore not included here.

Review of Heinrich Triangle



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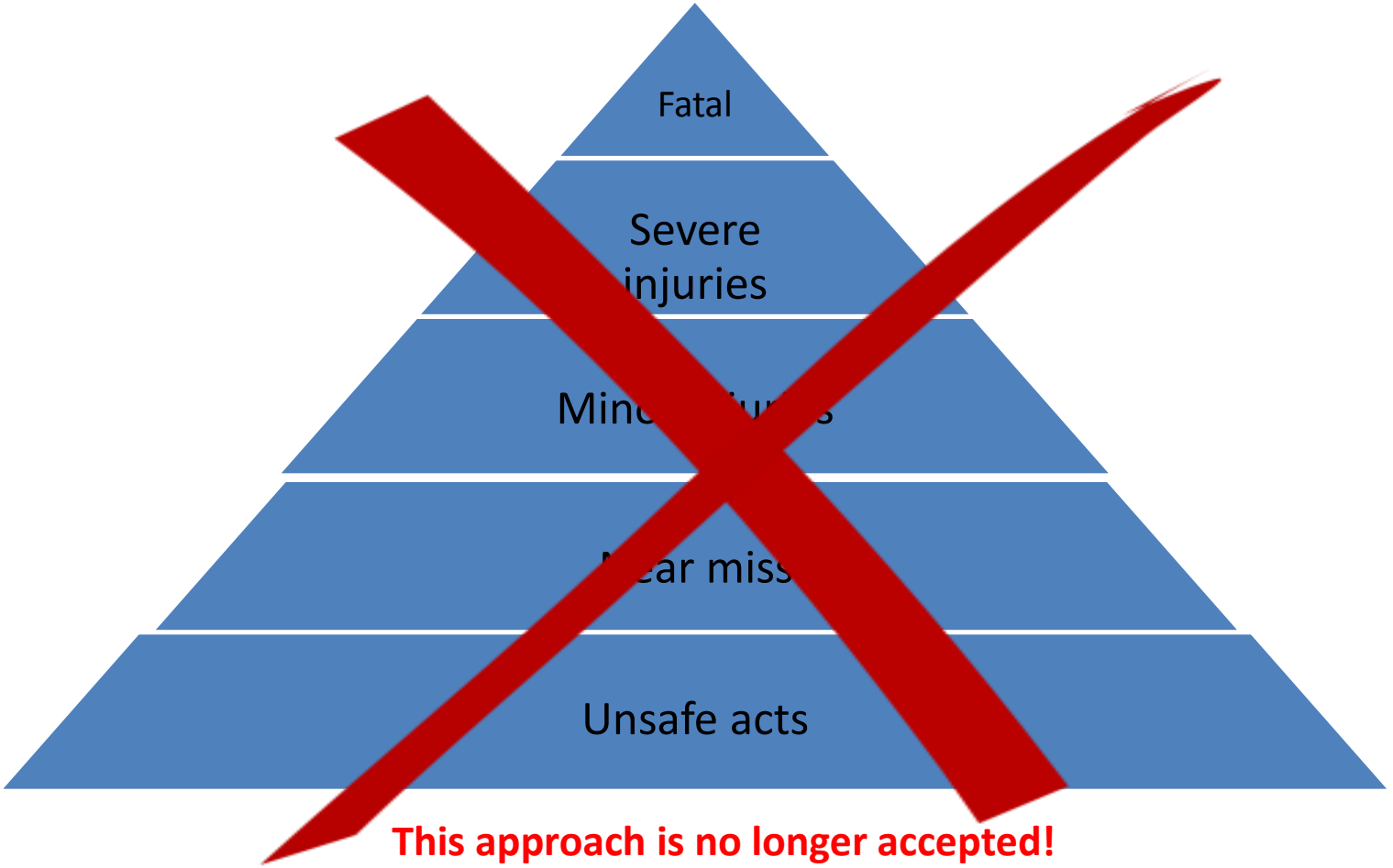

This approach is no longer accepted!

Let's review previous slides…

Incidence Rate History

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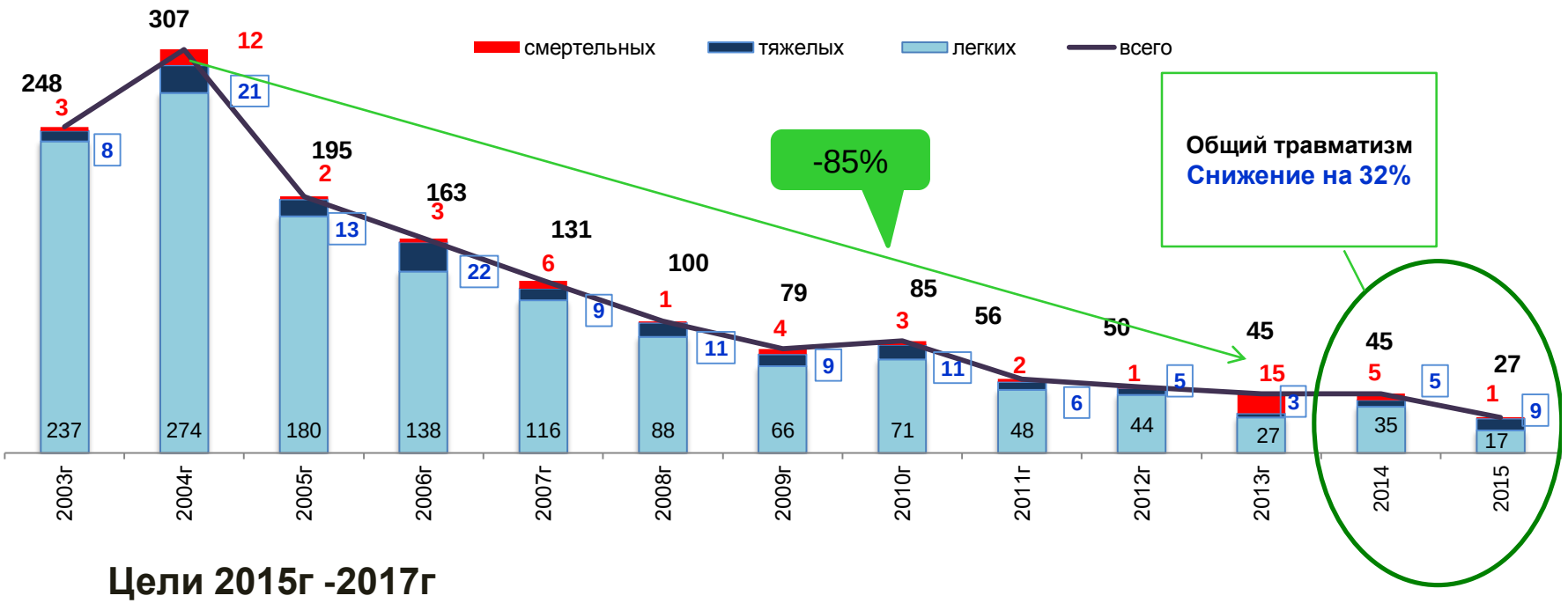

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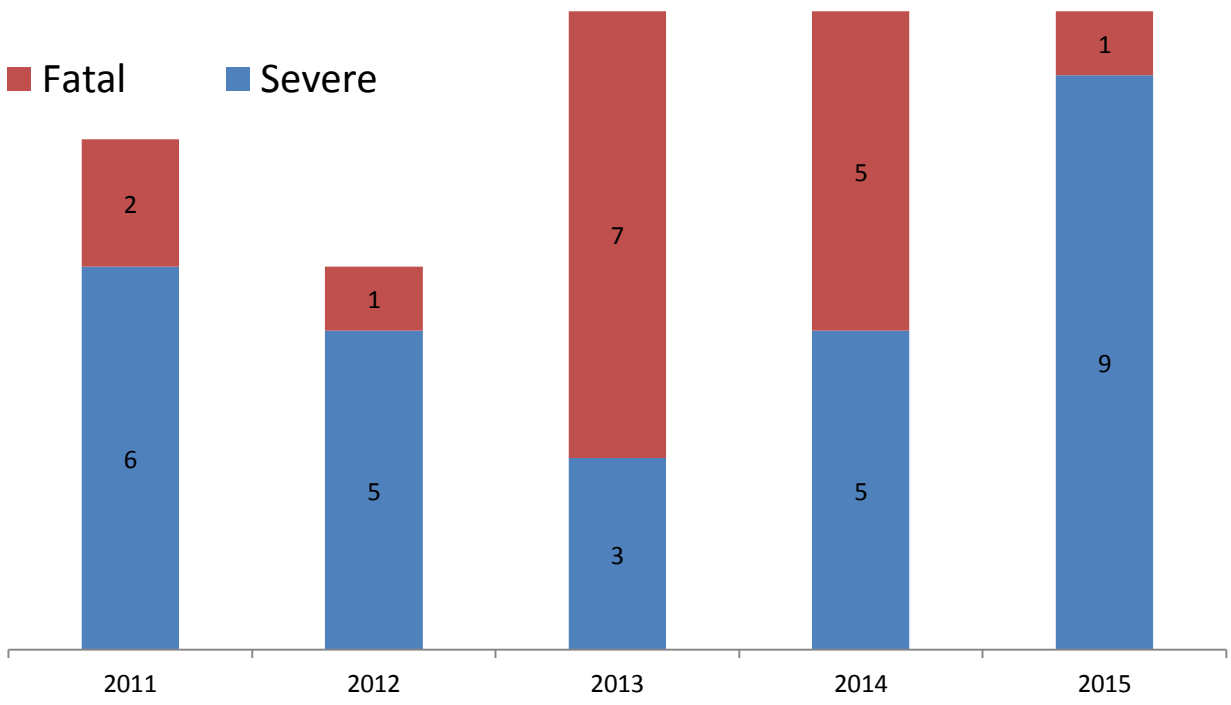

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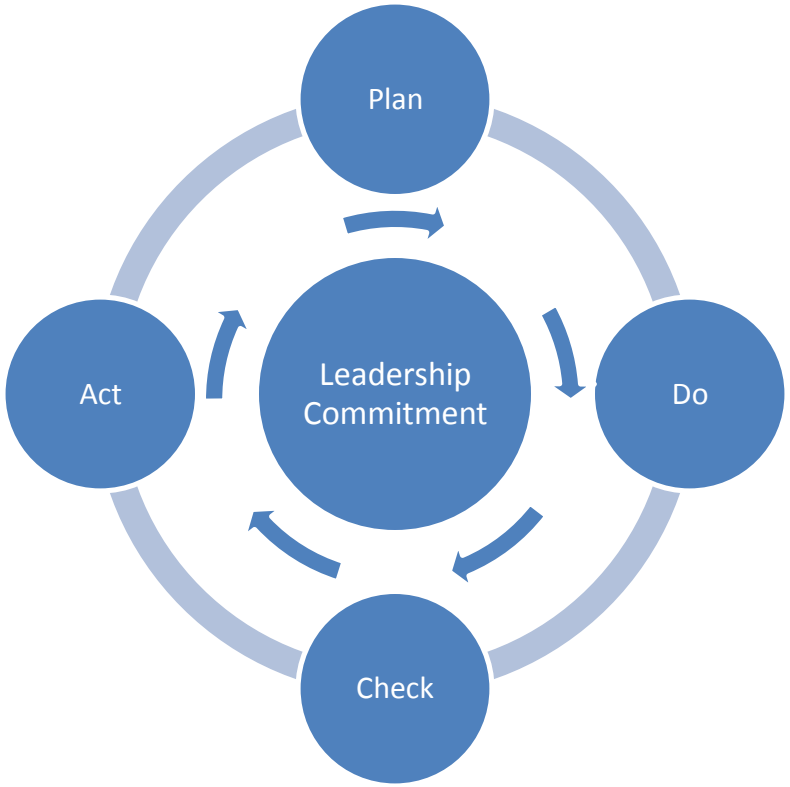
U.S.A. Coal Mining – Safety First

- Companies are now committed to continuous improvement of health and safety

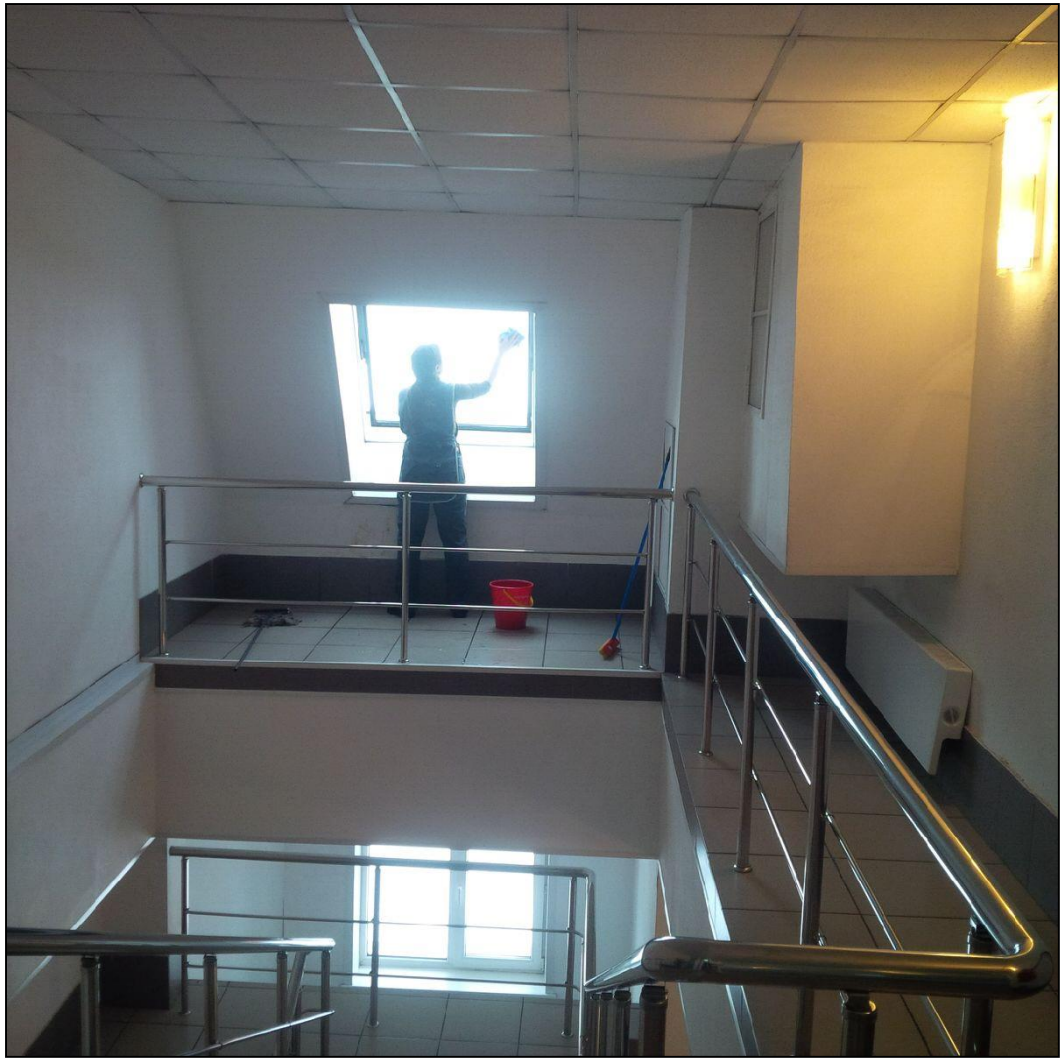
Performance is measured, is monitored, is assessed, is audited, and then continuous improvement can come back. That way, you repeat the cycle.



U.S.A. Coal Mining – Safety First

- Safety is a way of life in these companies
- Safety starts at the top with leadership commitment from CEO to hourly employee
- All meetings begin with safety discussion: report of accidents and safety sharing
- Rules of safety are displayed in meeting rooms
- Leaders observe situations and take action by "if you see something you own it and must say something to correct"

If you see something you own it



If you see something you own it

If you see something you own it

U.S.A. Coal Mining – Safety First

- Organizations realize they are a direct reflection of leadership
- Leadership has focus and commitment for safety starting at the top
- Organizations have an active culture of safety
- Leaders take time to question and correct unsafe situations and change the attitudes of safety for the organization

"Right is right even if everyone is against it and wrong is wrong even if everyone is for it."

– *William Penn*

THANK YOU

Questions?

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