



Chemical Industry Process Safety trends and developments from EPSC members



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EPSC

- EPSC is an Industry funded association of approximately 40 chemical companies (many multinational)
- EPSC has cooperative groups on
 - IEC 61511
 - LOPA
 - Buncefield Learning Experience
 - *Safety Critical Systems*
 - *'Atypical' scenarios*
 - Ageing facilities
 - Safety Culture
 - Process Safety Competence
 - *Process Safety Indicators and KPIs*
- EPSC cooperates with Competent Authorities in Technical Work Groups.
- Many EPSC member companies have been committed to the Responsible Care® programme since 1984
- Responsible Care® originated in Canada, but many EPSC companies adopted as a 'global' commitment



some key issues

- Safety Critical Equipment:
 - What can we learn from major accidents which have happened in the last few years?
 - BP Texas City, operators used an unauthorised start up procedure, critical alarms did not function
 - Buncefield, High level alarm systems failed 14 times in 4 months, High Level Trip system disabled
 - What can we learn from life-cycle approaches such as IEC 61511?
 - The elements make sense and can apply to more than control schemes and protective devices.
- ‘Atypical’ scenarios:
 - How do we find and deal with ‘Worst imaginable’ case scenarios?
 - Creativity, imagination, open mindedness.
 - Can we define what conditions have to occur for the scenario to be realised?
 - E.g. ‘reverse’ HAZOP - start with the worst that can happen, based on physical properties of materials, quantities, release conditions favouring a worst outcome. Proceed through these properties, conditions and triggers to establish strategies to eliminate or control.

Key issues = Process Safety Indicators and KPIs

- Responsible Care® codes in North America have always included a crude measure of Process Safety performance
- EPSC member companies have been providing Process Safety performance results as part of their North America Responsible Care® programs (or reported performance results based on own metrics)
- You can see from the following U.S.data that:
 - The trend indicates some challenges
 - There have been changes in the definitions which are aimed to capture more meaningful data
 - The industry is committed to disclosure of its performance



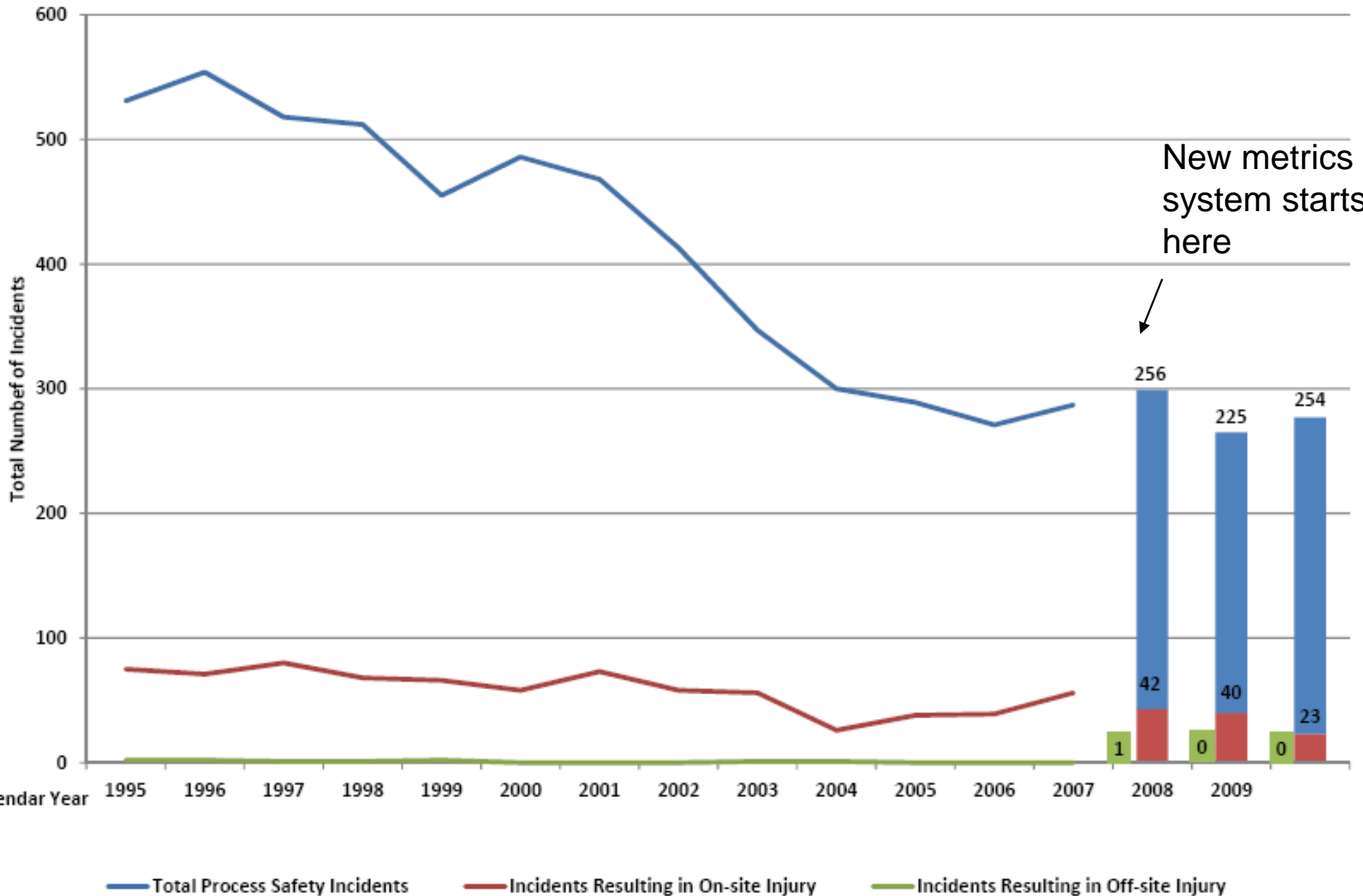
Process Safety

A process safety incident as defined by the [Center for Chemical Process Safety](#) is an unplanned event arising from the manufacturing process that results in a product spill, fire, explosion, or injury. By managing, tracking and reporting process safety incidents, Responsible Care companies can benchmark their performance and set goals for improvement. Responsible Care companies publicly report process safety incidents on an annual basis, surpassing government requirements.

Responsible Care companies are working to make the industry even safer for our employees and communities.

ACC member companies operate 1,500 facilities nationwide and reported 254 process safety incidents in 2010, down from 531 in 1995. More than half of ACC members had no process safety incidents in 2010. In addition, of the reported 254 incidences in 2010, only 4 percent of incidents warranted a Severity Level of 1, according to ACC's Severity Rating Index.

Total Process Safety Incidents and Incidents resulting in On-site and Off-site Injuries

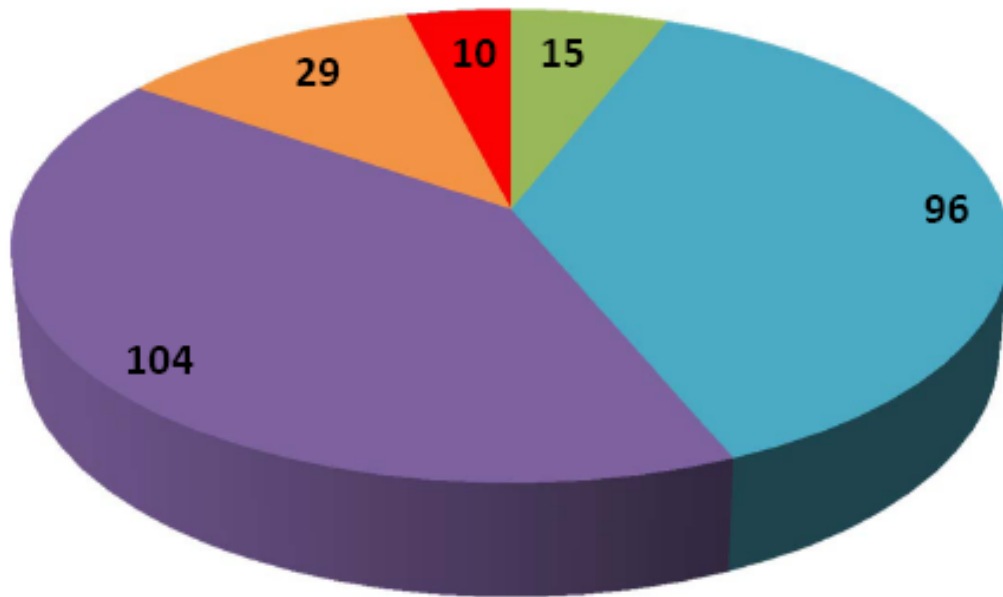


Strengths, weaknesses and necessary changes

- Major strength:
 - Good participation
 - Mandatory for American Chemistry Council members
- Major Weakness:
 - Reporting was simply based on numbers of incidents which met the standard definition
- Changes:
 - Adjustments to 'thresholds' for reporting
 - Severity assessment and reporting
 - Endorsed by American Petroleum Institute and Center for Chemical Process Safety (Bodies which did the work of upgrade)
 - Published as a standard ANSI/API 754
 - Some early results show up in the previous graph and analysis follows....

Process Safety Incidents 2010 Calendar Year

254 Total Incidents



- Severity Rating of Negligible
- Severity Rating of 4
- Severity Rating of 3
- Severity Rating of 2
- Severity Rating of 1

US Data from ACC

Sample of public reporting in U.S. (ACC website)

	<i>Total # Incidents</i>	<i>Negligible Incidents</i>	<i>Level 4 Incidents</i>	<i>Level 3 Incidents</i>	<i>Level 2 Incidents</i>	<i>Level 1 Incidents</i>
<i>Company Name</i>	<i>2010</i>	<i>2010</i>	<i>2010</i>	<i>2010</i>	<i>2010</i>	<i>2010</i>
3M	0	0	0	0	0	0
Afton Chemical Corporation	0	0	0	0	0	0
Air Liquide USA LLC	0	0	0	0	0	0
Air Products and Chemicals, Inc.	9	1	5	3	0	0
Akzo Nobel Chemicals Inc.	4	0	2	2	0	0
Albemarle Corporation	5	0	3	2	0	0
Anderson Development Company	0	0	0	0	0	0
Arch Chemicals, Inc.	0	0	0	0	0	0
Aristech Acrylics LLC						
Arkema Inc.	8	0	3	5	0	0

Now in Europe

- CEFIC has produced recommendations on collecting and reporting 'Process Safety Incidents' as a Process Safety Performance Indicator; CEFIC took specific European context into account (e.g. GHS, Seveso) and although the approach is in principle quite similar to the US approach, the reporting thresholds differ and results in one approach may not be compared with results in the other approach; EPSC expects to see efforts and progress towards future alignment
- EPSC has produced a workbook tool (FERRET) which records and classifies incidents to the:
 - CEFIC definitions
 - API definitions
 - Optionally to own company definitions
- EPSC working group 'Process Safety Indicators' is a platform for developing and sharing company experience; focuses now shifted from lagging to leading indicators;
- In 2012 (Jan. 31st/Feb. 1st) a joint CEFIC/EPSC 'Experience Exchange' event will be organized



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Thank you