

# Process Safety Metrics Global Harmonization

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# About CCPS

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- Formed in 1985 as Chemical Engineering profession's response to Bhopal and other tragic accidents
- Organized within American Institute of Chemical Engineers (AIChE)
- >140 member companies worldwide in
  - chemical, hydrocarbon, pharmaceutical, high pressure gas and diverse manufacturing
  - government agencies, associations & contractors
- Organized as non-profit technical organization

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# CCPS Impact

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**Eliminate process safety incidents**, in all industries, by:

- Promoting process safety as a key societal **value and expectation**.
- Establishing process safety as the **foundation for responsible operations**.
- Serving as the **premier world-wide resource** for process safety and development of the “state-of-the-art” solutions.
- **Fostering knowledge, understanding and implementation** of process safety by executives, management, technicians, engineers, students, government officials and the public.
- Advancing process safety **education, technology, culture and management practices**.

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# CCPS Membership Distribution

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Continent	Headquarters	Significant Operations	Total
N. America	88	26	114
Europe	22	29	51
Asia	21	25	46
S. America	7	27	34
Australia	5	13	18
Total	143		

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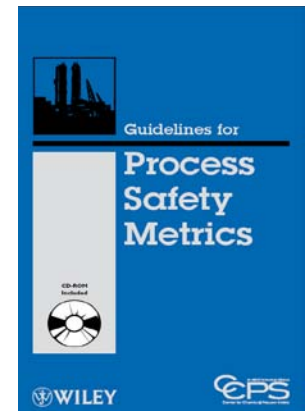
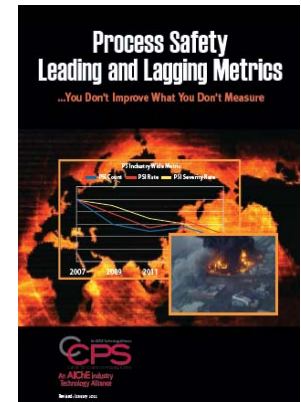
# CCPS Process Safety Metrics

## “You Don’t Improve What You Don’t Measure”

Can you answer the following questions?

- Is your company becoming safer?
- Is your company headed for a major accident?
- How does your company’s process safety performance compare to other companies?
- To other global sites in your company?
- Is the industry / country / world improving it’s process safety performance?

These metrics were released 1/2008 and updated 2/2011, with the intent that the thresholds will evolve to a Globally Harmonized Standard (GHS) based definition once GHS reaches global usage.



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# Stakeholders Represented

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- CCPS member companies in North America, Brazil, Europe, India, and Australia
- Trade Associations
- US and UK Regulators
- US Chemical Safety Board
- A chemical operator's labor union (USW)
- European Process Safety Centre (EPSC)
- CONCAWE (European HSE organization)
- Wharton Business School, Texas A&M Safety Center
- Members/staff of the Baker Panel

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# Strong Industry Support

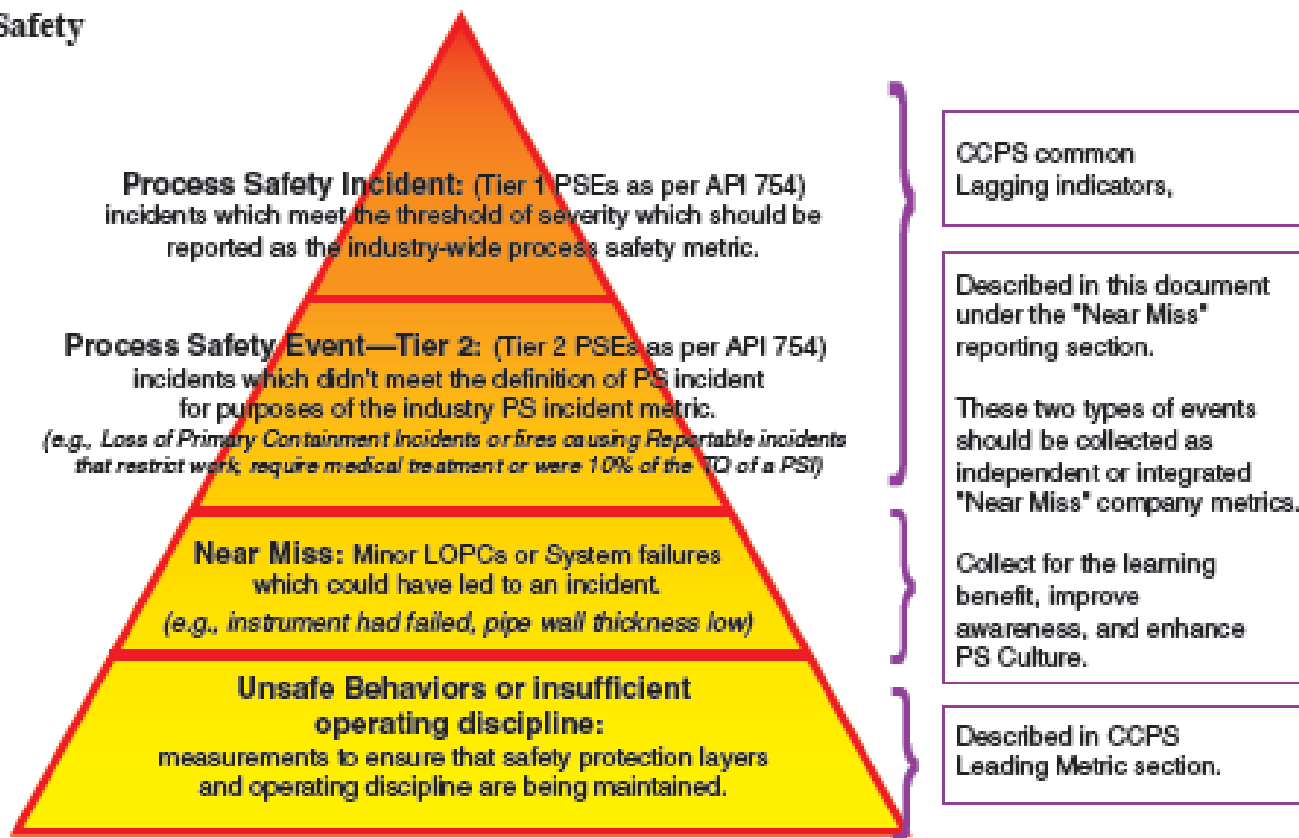
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- Trade associations in US (ACC, API), Brazil (ABIQUIM), Canada (CCPA), Japan (JPCIA)
- Support for metrics in general (International Council of Chemical Associations)
- Similar approach, to be harmonized with CCPS by Europe (CEFIC)
- Large multinationals deploying across all operations and partners
- Special recognition by technical associations by AIChE (US), IChemE (UK), EPSC (Europe), Concawe (Europe)

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# Process Safety Metrics Tiering

**Figure 1: Process Safety Metric Pyramid**



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# Incidents and Severity Categories

Severity Level	Safety/Human Health	Fire or Explosion	Potential chemical impact	Community/environment impact (
NA	Does not meet or exceed Level 4 threshold	Does not meet or exceed Level 4 threshold	Does not meet or exceed Level 4 threshold	Does not meet or exceed Level 4 threshold
4 (1 point used in severity rate calculations for each of the attributes which apply to the incident)	Injury requiring treatment beyond first aid to employee or contractors associated with a process safety incident.	Resulting in \$25,000 to \$100,000 of <b>direct cost</b>	Chemical released within secondary containment or contained within the unit	Short -term remediation to address acute environmental impact. No long term cost or company oversight. Examples would include spill cleanup, soil and vegetation removal.
3 (3 points used in severity rate calculations for each of the attributes which apply to the incident)	Lost time injury to employee or contractors associated with a process safety event	Resulting in \$100,000 to 1MM of <b>direct cost</b> .	Chemical release outside of containment but retained on company property <b>OR</b> flammable release without potential for vapor cloud explosives	Minor off-site impact with precautionary shelter-in-place <b>OR</b> Environmental remediation required with cost less than \$1MM. No other regulatory oversight required. <b>OR</b> Local media coverage
2 (9 points used in severity rate calculations for each of the attributes which apply to the incident)	On-site fatality - employee or contractors associated with a process safety event; multiple lost time injuries or one or more serious offsite injuries associated with a process safety event.	Resulting in \$1MM to 10MM of <b>direct cost</b> .	Chemical release with potential for injury off site or flammable release resulting in a vapor cloud entering a building or potential explosion site (congested/confined area) with potential for damage or casualties if ignited	Shelter-in-place or community evacuation <b>OR</b> Environmental remediation required and cost in between \$1MM - 2.5 MM. State government investigation and oversight of process. <b>OR</b> Regional media coverage or brief national media coverage.
1 (27 points used in severity rate calculations for each of the attributes which apply to the incident)	Off-site fatality or multiple on-site fatalities associated with a process safety event.	Resulting in <b>direct cost</b> >\$10MM	Chemical release with potential for significant on-site or off-site injuries or fatalities	National media coverage over multiple days <b>OR</b> Environmental remediation required and cost in excess of \$2.5 MM. Federal government investigation and oversight of process. <b>OR</b> Other significant community impact

# Focus on Global Metrics

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Adoption of common process safety metrics within the chemical manufacturing sector provides for:

- Broad process safety performance benchmarking.
- Continual process safety improvement.
- Mitigation and elimination of risks.
- Simplifying member recordkeeping by elimination of multiple sets of records for essentially the same data set.
- Responsible Care and ACC Conference and Expo April 29 – May 2, 2012 with Global Metrics Panel Discussion.
- CCPS Latin American Conference July 3-7, 2012 with Metrics Panel Discussion.

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# CCPS Recommendation

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1. CCPS first advanced the subject of common, global, useful Metrics and recommends a single, global set of Metrics (lagging indicators) that can be applied by chemical and petrochemical manufacturers worldwide.
2. The advantages of a global metrics scheme are numerous and include: simplified reporting and benchmarking and teachable experiences that can be disseminated across all facilities.
3. Appropriate leading indicators should also be used and CCPS has suggested a number of core leading indicators. CCPS agrees that additional leading indicators, for special situations, are needed. This is an area of continuing study.

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# CCPS Recommendation

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4. Reported lagging process safety indicators should be normalized.
5. Consideration of process safety incident severity should be a component of any global process safety metric.
6. Classification of process safety events should be based upon the hazards of that material as recognized in the Globally Harmonized System of Classification and Labeling of Chemicals (GHS). As such, threshold quantities based on the these relative hazards will need to be grouped systematically by a globally recognized methodology.

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# CCPS Recommendation

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7. CCPS, as a global process safety organization with strong representation in the Americas, Europe, Asia and Australia, is committed to actively participate in establishing the globally accepted process safety metric.
8. CCPS is working in cooperation with ACC and API to ensure that process safety metrics published by these organizations are uniform and consistent and recommends to do the same with CEFIC.
9. Based on our experience since implementing the metrics, CCPS would consider compressing the number of threshold categories to reduce granularity and simplify reporting.

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# Process Safety Metrics Global Harmonization

## CCPS / API RP 754

- Tier 1 – 7 TQs

- 5 kg
- 25 kg
- 100 kg
- 200 kg
- 500 kg
- 1,000 kg
- 2,000 kg

Public

## CEFIC

- 3 TQs

- 5 kg
- 100 kg
- 2,000 kg

- Tier 2 – 7 TQs

- 0.5 kg – 1,000 kg (optional - companies should collect Tier 2 “loss of primary containment and learn from them

Internal

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# Proposed Path Forward

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- ICCA affiliates join forces with CCPS / ACC/ API / OGP and harmonize the process safety metrics.
- Reach a compromise position based on GHS, reporting thresholds, and severity rating.
- Provide look up tool to support use of the metrics.

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# Process Safety Metrics Global Harmonization

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# Process Safety Metrics Global Harmonization

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## Harmonize – Why?

- ICCA Request
- API RP 754 / OGP - two year update
- CEFIC - two year trial
- Initiatives to harmonize with Globally Harmonized Systems (GHS)
  - United Nations Dangerous Goods (UNDG) has completed harmonization with GHS

**We have an opportunity!!!**

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- Tier 2 – 7 TQs

- 0.5 kg – 1,000 kg (optional - companies should collect Tier 2 “loss of primary containment and learn from them”)

## CEFIC

- 3 TQs

- 5 kg

- 100 kg

- 2,000 kg

Public

Internal

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# PS Metrics Comparison

	Tier 1	Tier 2	Not Classified	Total
GHS PSI	36	3	13	52
API PSI	20	19	13	52
Incidents classified by GHS but not API	3	3		6
Incidents classified by API but not GHS	2	4		6
Incidents not classified by either system				7
Releases to secondary containment Not a required field so this number may not be reliable.				21
Number of recordable injuries				1
Number of more serious injuries				0
Incidents with community evacuation				1
Incidents with GHS fire/explosion	5			5
Incidents with API fire/explosion	6			6
GHS rating of incidents with LTHE	19	0	2	21
API rating of incidents with LTHE	7	12	2	21
Note: One LTHE was caught by API and not GHS and one was caught by GHS and not API.				
GHS rating of incidents with environmental impact	4	0	2	6
API rating of incidents with environmental impact	3	2	1	6
Filtered on just GHS PSI	18	15	6	39
%	46.2	38.5	15.4	



# Process Safety Metrics Global Harmonization

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- Both of the methodologies examined are well suited to the purpose for which they were designed and on a technical basis there is no good reason to chose one above the other.
- The detailed exclusions in the methodologies serve to make them more complicated but in our analysis made little or no difference to the outcome.
- The challenge to achieve consistent reporting of events across different businesses and geographies is far more important than the details of the reporting methodology.

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# ACC Position

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1. ACC supports a single, global set of process safety metrics (lagging indicators) that can be applied by chemical manufacturers worldwide.
2. The advantages of a single metrics scheme are numerous and include: simplified reporting and benchmarking and teachable experiences that can be disseminated across all facilities.
3. Any global metric must give companies maximum flexibility on choosing and applying leading indicators to suit their particular industry, product mix and specifics of plant siting.

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# ACC Position

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4. Reporting of lagging process safety indicators should be done using a normalization system, ... A denominator other than employee work hours may be rates and Days Away from Work cases in the United States. utilized, but at a minimum, employee hours should be considered so that the numbers are consistent with OSHA Occupational Injury and Illness
5. Consideration of process safety incident severity should be a component of any global process safety metric.
6. Classification of process safety events should be based upon the hazards of that material as recognized in the Globally Harmonized System of Classification and Labeling of Chemicals (GHS).
  - TQs based on these relative hazards will need to be grouped systematically by a recognized methodology
  - e.g., United Nations model regulation, *Recommendations on the Transport of Dangerous Goods*.

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# ACC Position

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7. Any metrics scheme could be certified by an accredited international standards organization such as the International Organization for Standardization (ISO).
8. ACC supports the American Petroleum Institute (API) Recommended Practice 754: Process Safety Performance Indicators for the Refining and Petrochemical Industries (RP 754) as the basis for a global metric, and could encourage API to pursue certification of RP 754 as an ISO standard to facilitate its global use.
9. ACC, through its Process Safety Committee in conjunction with the Regulatory and Technical Affairs Department, should be an active participant in any effort towards establishing a globally accepted process safety metric, to ensure ACC members can adopt the metric.

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# Proposed Path Forward

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