# Process Safety Performance Indicators for the Refining and Petrochemical Industries

**Downstream Segment**

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## Foreword

The purpose of this recommended practice (RP) is to identify leading and lagging indicators in the refining and petrochemical industries for nationwide public reporting as well as indicators for use at individual facilities including methods for the development and use of performance indicators. A comprehensive leading and lagging indicators program provides useful information for driving improvement and when acted upon contributes to reducing risks of major hazards (e.g. by identifying the underlying causes and taking action to prevent recurrence). This RP may augment a Company's existing practices and procedures.

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Shall: As used in a recommended practice, "shall" denotes a minimum requirement in order to conform to the RP.

Should: As used in a recommended practice, "should" denotes a recommendation or that which is advised but not required in order to conform to the RP.

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Suggested revisions are invited and should be submitted to the Standards Department, API, 1220 L Street, NW, Washington, DC 20005, standards@api.org.

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**Notes to First Edition**

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In developing this document, the drafting committee focused solely on indicators of process safety performance versus indicators of health, personal safety or environmental performance. Each is important and each should have its own performance indicators as part of a comprehensive and robust facility Health, Safety and Environmental program. Process safety hazards can result in major accidents involving the release of potentially dangerous materials. Process safety incidents can have catastrophic effects such as multiple injuries and fatalities, as well as substantial economic, property, and environmental damage; and can affect workers inside the facility and members of the public who reside or work nearby.

In developing this recommended practice, numerous issues including process safety indicator definitions, chemical release thresholds, data capture, statistical validity, and public reporting were considered. As it relates to chemical release threshold quantities (TQs), it is desirable to aggregate chemicals or mixtures into groupings of similar relative risks. The drafting committee chose to utilize the US DOT version of the United Nations Dangerous Goods (UNDG) hazard classification system for these groupings. A number of alternative approaches were considered (e.g. GHS, NFPA, IDLH, and ERPG), yet the DOT version of UNDG was determined to be most appropriate given that this system was unique in the treatment of toxic chemicals in terms of both relative toxicity and relative volatility to produce a more accurate ranking of relative process safety hazards.

The committee leveraged the work of others in developing this recommended practice and benefited from the lessons learned from implementation of the concepts, definitions and reporting mechanisms associated with these earlier works. These works include the following.

— American Petroleum Institute: “API Guide to Report Process Safety Incidents, Version 1.2”, Washington, D.C. 2008. [1]

— Center for Chemical Process Safety: “Process Safety Leading and Lagging Metrics”, American Institute of Chemical Engineers, New York, 2008. [4]

— UK Health and Safety Executive: “Step-by-Step Guide to Developing Process Safety Performance Indicators, HSG254”, Sudbury, Suffolk, UK, 2006. [9]

It is anticipated that this RP will yield process safety performance improvement; however, the actual results can only be determined through its use.

Due to the entirely new nature of this RP, it is anticipated that the first revision cycle will commence after two complete years of data collection. While a revision may address any aspect of the RP, the first revision will specifically evaluate beginning transparent public reporting of Tier 1 and Tier 2 process safety indicators. Public reporting of Tier 1 and Tier 2 data may not occur for the first few years while the recommended practice is being implemented and the quality of the data is being validated.

# Process Safety Performance Indicators for the Refining and Petrochemical Industries

## 1 Scope

### 1.1 General

This recommended practice (RP) identifies leading and lagging process safety indicators useful for driving performance improvement. As a framework for measuring activity, status or performance, this document classifies process safety indicators into four tiers of leading and lagging indicators. Tiers 1 and 2 are suitable for nationwide public reporting and Tiers 3 and 4 are intended for internal use at individual sites. Guidance on methods for development and use of performance indicators is also provided.

### 1.2 Applicability [1]

This RP was developed for the refining and petrochemical industries, but may also be applicable to other industries with operating systems and processes where loss of containment has the potential to cause harm. Applicability is not limited to those facilities covered by the OSHA Process Safety Management Standard, 29 *CFR* 1910.119 or similar national and international regulations.

At colocated facilities (e.g. industrial park), this recommended practice applies individually to the companies that own and operate the processes and not to the site as a whole.

Events associated with the following activities fall outside the scope of this RP and shall not be included in data collection or reporting efforts:

a) releases from pipeline transfer operations occurring outside the process or storage facility fence line;

b) marine transport operations, except when the vessel is connected to the process for the purposes of feedstock or product transfer;

c) truck or rail operations, except when the truck or rail car is connected to the process for the purposes of feedstock or product transfer, or if the truck or rail car is being used for on site storage;

d) vacuum truck operations, except on-site truck loading or discharging operations, or use of the vacuum truck transfer pump;

e) routine emissions that are allowable under permit or regulation;

f) office, shop and warehouse building events (e.g. office fires, spills, personnel injury or illness, etc.);

g) personal safety events (e.g. slips, trips, falls) that are not directly associated with on-site response to a loss of primary containment (LOPC) event;

h) LOPC events from ancillary equipment not connected to the process (e.g. small sample containers);

i) quality assurance (QA), quality control (QC) and research and development (R&D) laboratories (pilot plants are included);

j) retail service stations; and

k) on-site fueling operations of mobile and stationary equipment (e.g. pick-up trucks, diesel generators, and heavy equipment).

[1] At joint venture sites and tolling operations, the Company should encourage the joint venture or tolling operation to consider applying this RP.