

**AFPM & API  
ADVANCING  
PROCESS SAFETY**

**ANSI API RP-754  
Quarterly Webinar**

**Nov 10, 2015**

*Process Safety Performance  
Indicators for the Refining and  
Petrochemical Industries*



 **AFPM**  
American  
Fuel & Petrochemical  
Manufacturers

*energy* 

# Purpose of RP 754 Quarterly Webinars

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- To support broad adoption of RP-754 throughout the Refining and Petrochemical industries
- To ensure consistency in Tier 1 and 2 metrics reporting in order to establish credibility and validity
- To share learning's regarding the effective implementation of Tier 1-4 lagging/leading metrics

# Today's Agenda

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- Status - API/AFPM 2014 PSE data reports
- ANSI API RP 754 – Public Reporting Requirements
- Status – ANSI API RP-754 2<sup>nd</sup> Edition
- Summary of RP-754 second ballot final revisions
- Overview of 2014 PSE industry data analysis
- Timing for submitting 2015 data to trade associations
- BACKUP: Suggestions for effective incident descriptions

# Status - API/AFPM 2014 PSE data reports

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- Both trade associations have issued 2014 PSE reports to participating companies
- API/AFPM will update their public websites with industry\* average 2014 PSE counts and rates as follows:
  - Tier 1 industry aggregate count and rate (for individual years 2012, 2013, and 2014)
  - Tier 1 industry three-year average count and rate (2012-2014)
  - Tier 2 industry aggregate count and rate (for individual years 2013 and 2014)
  - Tier 2 industry two-year average count and rate (2013-2014)
- “Company transparent” PSE data will NOT be published in their reports or on their websites

...what does this mean for your company?

# ANSI API RP 754 – Public Reporting Requirements

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- To be in compliance with RP-754 companies “shall” report Tier 1 and Tier 2 PSE rates in a nationwide, broadly accessible way.
- Options include:
  - Company-specific reports or websites
  - Industry Association or Professional Society reports or web sites
  - Government Agency or Other Organizations

## 10.3 Stakeholder

### 10.3.1 Broad Access (Nationwide) Public Reporting

Annually, each Company shall publicly report Tier 1 and Tier 2 PSE information specified in Table 3. It should also include other appropriate information based upon the data capture specified in 10.4. The information should be continuously available for at least five years.

Reporting may be directly from an individual company or through industry trade groups, government agencies or other means. Options for public reporting include:

- a) **Company Specific Reports or Web Sites**—When reporting information directly to the public or to other interested parties, Companies may make PSE information readily available on a publicly accessible web site, or as a written report provided upon request by any interested party.
- b) **Industry Association or Professional Society Reports or Web Sites**—API, ACC, NPRA, CCPS, UKPIA, or other petroleum or petrochemical industry associations may collect and report Tier 1 and Tier 2 PSE information. These reports may be in the form of publicly accessible web sites, or as written reports provided upon request by any interested party. The advantage of association or society reporting is that it allows interested parties to view information in one place and enables benchmarking of performance.
- c) **Government Agency or Other Organizations**—Local, state, or national government agencies, or other organizations may elect to establish reporting web sites.

**Table 3—Stakeholder Report Information**

		Industry	Company
Tier 1	PSE Count	X	See Note
	PSE Rate	X	X
Tier 2	PSE Count	X	See Note
	PSE Rate	X	X
NOTE Comparisons among companies and industries are only statistically valid on a rate basis; therefore, Company PSE counts are not reported publicly.			

### **10.3.2 Local (Site) Public Reporting**

Each Company's site should determine the appropriate methods to communicate PSE information to its employees and employee representatives, the local community, and emergency management officials.

Annually, each Company's site shall report a summary of its site-specific Tier 1, 2, 3, and 4 PSE information to its employees and employee representatives. Unattended, remote-operated or single-manned facilities are exempt from this requirement.

Annually, each Company's site shall make available a summary of site-specific Tier 1 and 2 PSE information and can report site-specific Tier 3 and 4 PSE information to the local community and emergency management officials along with information regarding measures taken to improve performance. This includes any communities that could reasonably be affected by a LOPC event. Remote sites where the worst potential-case LOPC cannot impact any public receptors are exempt from this requirement.

# Status – ANSI API RP-754 2<sup>nd</sup> Edition

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- First ballot was overwhelmingly accepted
- Several technical comments were submitted during the ballot process and must be (were) addressed, resulting in a second ballot
- Second ballot vote due by November 20
- Anticipate final document will publish by year-end



# RP-754 2<sup>nd</sup> Edition Summary of Changes\*

- The three “Big Items”:
  - \$25k or \$100k Tier 1 direct cost limit for fire or explosion damage  
*Result: Super majority “approved” increase to \$100,000; Tier 2 is \$2,500 - \$100,000.*
  - Mandatory or optional use of Tier 1 severity weighting  
*Result: Optional but data (i.e. total severity number per event) will be requested by API/AFPM*
  - Tier 1 and Tier 2 threshold release categories and quantities (GHS v. non-GHS)  
*Result: Super majority “approved” non-GHS option*

\* The user is cautioned to refer to the final published ANSI API RP-754, Second Edition to ensure complete and accurate information.

# RP-754 2<sup>nd</sup> Edition Summary of Changes\*

- Applicability - Addition of **informative annexes** for the application of RP-754 to Petroleum Pipelines & Terminals, Retail Service Stations, and Oil & Gas Drilling and Production Operations
- Applicability – Clarified that routine emissions from permitted or regulated sources are still out-of-scope, however **upset emissions** are evaluated for Tier 1 or Tier 2.

...an upset emission from a permitted or regulated source, of a quantity greater than or equal to the threshold quantities in Table 1 (Tier 1) or Table 2 (Tier 2) in any one-hour period, that results in one or more of the following four consequences:

- rainout;
- discharge to a potentially unsafe location;
- an on-site shelter-in-place or on-site evacuation, excluding precautionary on-site shelter-in-place or on-site evacuation;
- public protective measures (e.g., road closure) including precautionary public protective measures.

\* The user is cautioned to refer to the final published ANSI API RP-754, Second Edition to ensure complete and accurate information.

# RP-754 2<sup>nd</sup> Edition Summary of Changes\*

- Definitions -
  - Active Staging: Clarification concerning when truck or rail car exit their transportation mode. Active staging is part of transportation.
  - Active Warehouse: On-site warehouses that store raw materials, intermediates, or finished products used or produced by a refinery or petrochemical facility are part of the process
  - ~~Alternate Primary Containment: The Tier 1 and Tier 2 threshold quantity consequence is excluded for releases to alternate primary containment.~~
- Tier 1 -
  - Added a threshold release quantity for UNDG Class 2, Division 2.2 (non-flammable, non-toxic gases; i.e. asphyxiants/oxidizers) excluding air
  - Changed the indoor threshold release quantity from 50% to 10% of the outdoor release quantity
  - Changed the fire and explosion direct cost threshold from \$25,000 to \$100,000

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# RP-754 2<sup>nd</sup> Edition Summary of Changes\*

- Tier 2 -
  - Added a threshold release quantity for UNDG Class 2, Division 2.2 (non-flammable, non-toxic gases; i.e. asphyxiants/oxidizers) excluding air
  - Aligned the Tier 1 and Tier 2 threshold release categories
    - Separated TRCs 6 and 7
    - Liquids w FP >140degF released at temp below FP and Moderate acids/bases are now TRC 8 (i.e. can't be a Tier 1 PSE)
  - Added an upper bound on high flash materials released below their flashpoint [93 °C (200 °F)]
- Additional PSE clarifications –
  - A pressure relief device (PRD), safety instrumented system (SIS), or other engineered depressuring device discharge is an LOPC due to the unplanned nature of the release
  - An internal fire or explosion that causes a LOPC from a process triggers an evaluation of the Tiered consequences. The LOPC does not have to occur first
  - an officially declared community evacuation or community shelter-in-place includes precautionary evacuation or shelter-in-place

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# RP-754 2<sup>nd</sup> Edition Summary of Changes\*

- PSE Data Capture -
  - a. Added a list of petrochemical process units
  - b. Added subcategories for the normal mode of operation
  - c. Added a list of causal factors
- Tier 1 PSE Severity Weighting - Added an informative annex for calculating the severity weighting of Tier 1 Process Safety Events
- PSE Examples - Added a significant number of new examples of the informative annex

\* The user is cautioned to refer to the final published ANSI API RP-754, Second Edition to ensure complete and accurate information.

# RP-754 2<sup>nd</sup> Edition Summary of Changes\*

- Multicomponent Releases - Added an informative annex to provide guidance on the determination of threshold release quantities for multicomponent releases
- Addition of an informative annex to provide guidance for the implementation of Tier 3 and Tier 4 indicators
- Addition of an informative annex for Tier 4 example indicators

# Overview of 2014 PSE industry data analysis

## API/AFPM Advancing Process Safety Program

# 2014 Deep Dive Data Set

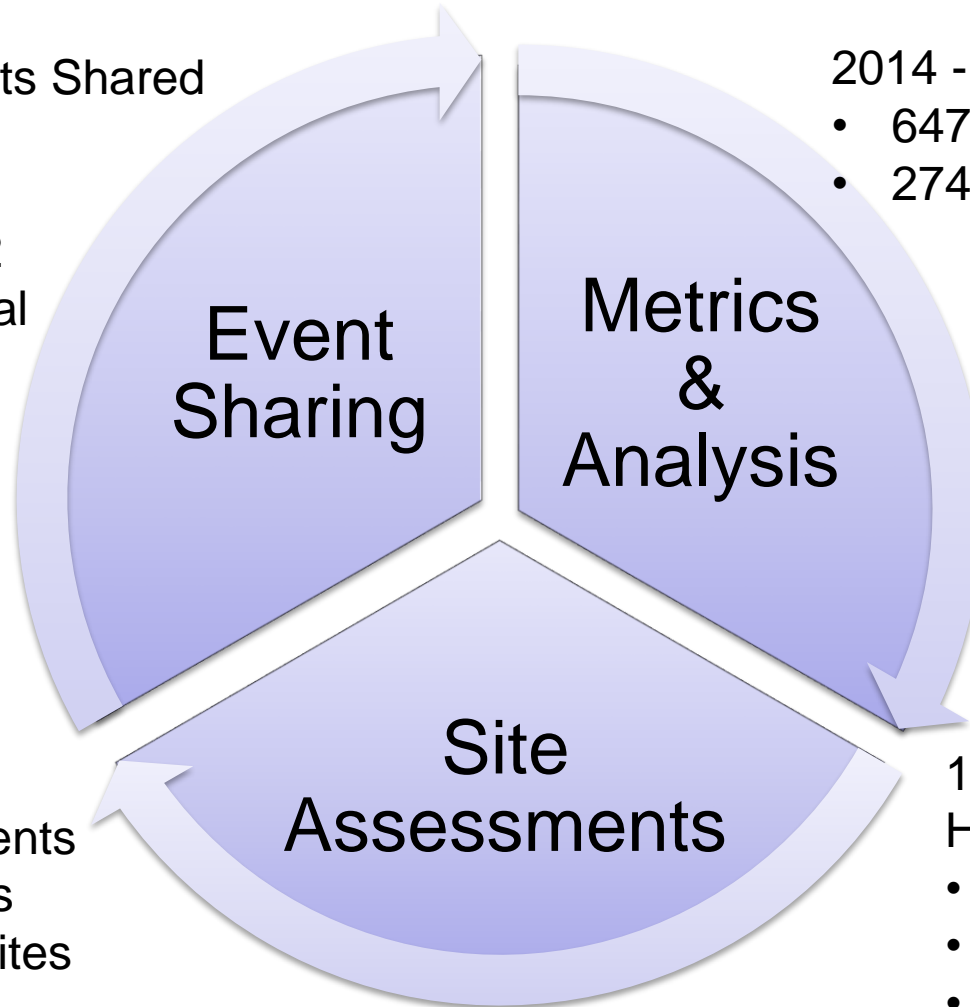
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2014 – 74 Events Shared

- Refining :
  - 50 Tier 1
  - 11 Tier 2
- Petrochemical
  - 13 Tier 1

2014 - 921 Tier 1 & 2 Events

- 647 Refining
- 274 Petrochemical



31 Cumulative  
Basic Assessments

- 19 small sites
- 10 medium sites
- 2 large sites

16 Cumulative  
HF Assessments

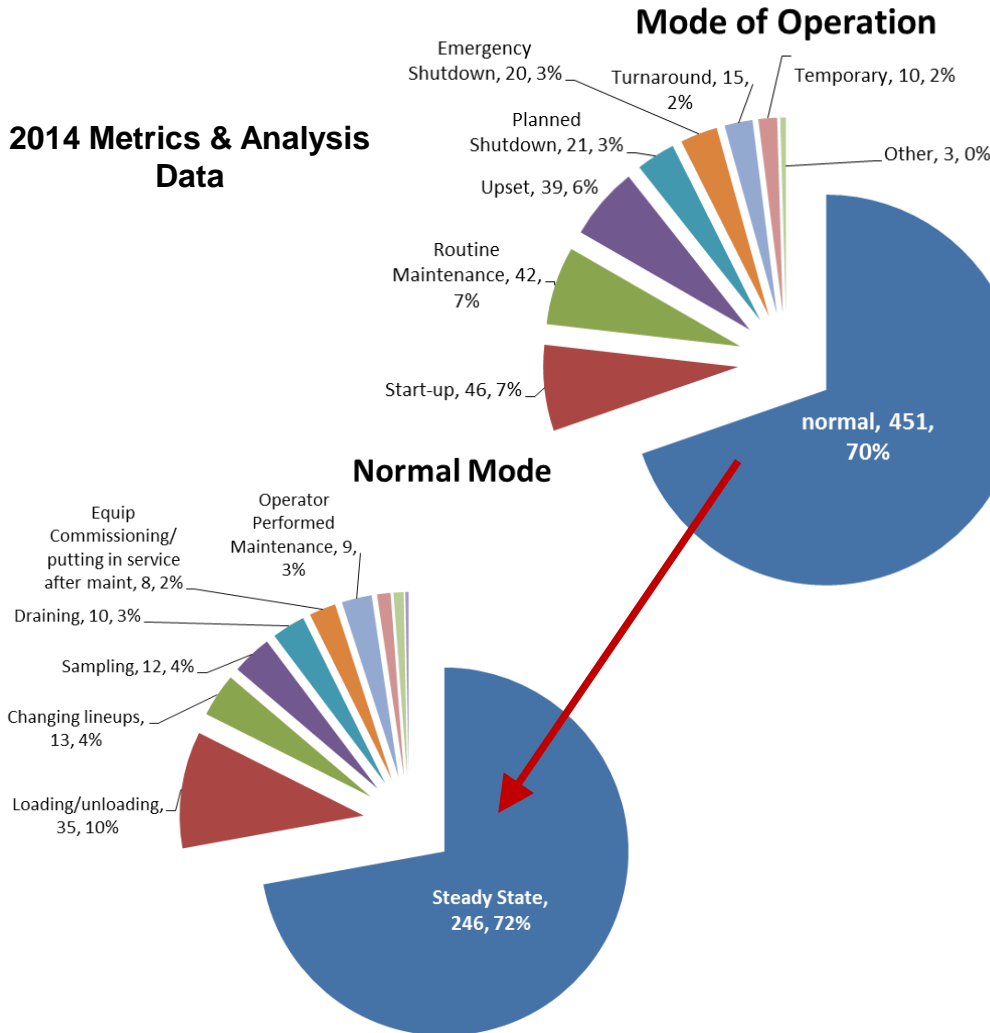
- 10 small sites
- 4 medium sites
- 2 large sites



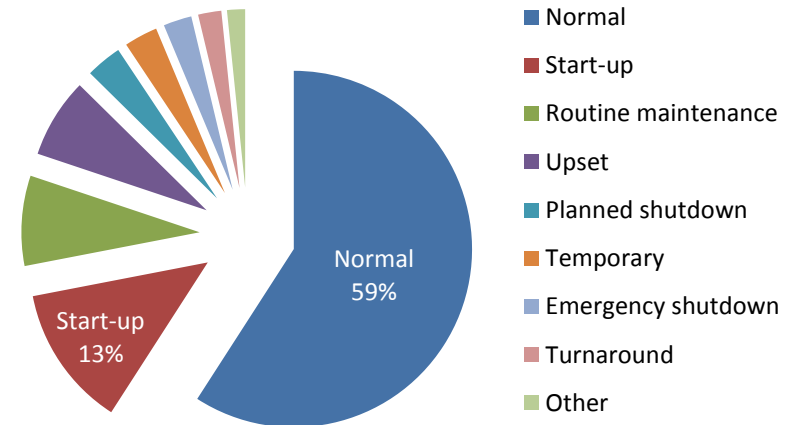
# When are Process Safety Events (PSEs) occurring?

- Highest percentage of events occur in Normal “steady state” and loading/unloading

## 2014 Metrics & Analysis Data



## Event Sharing Data

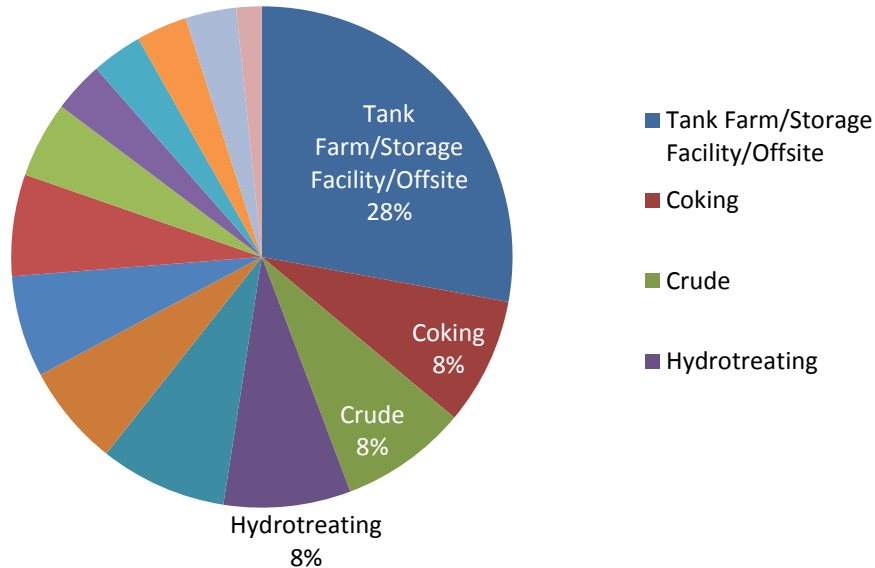


Note: This data is not “normalized” by the % of time spent in each mode.

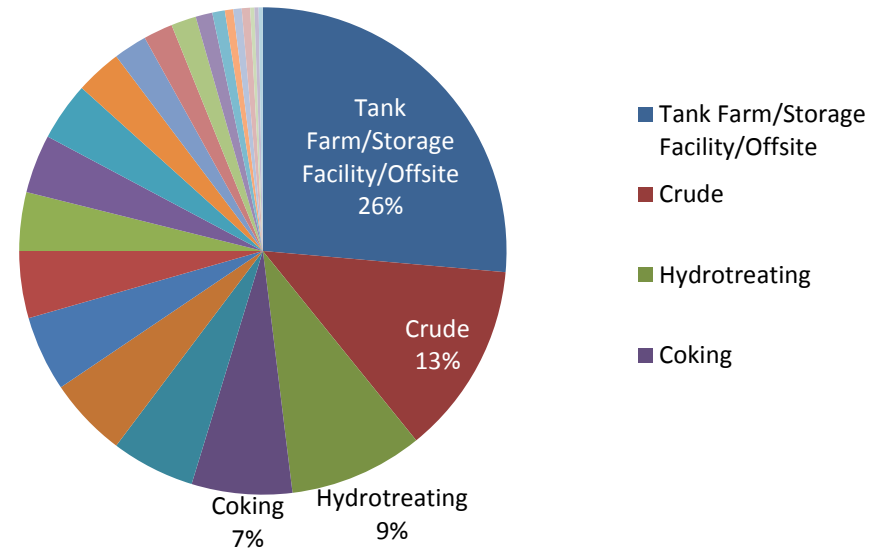
# Where are Process Safety Events occurring ?

- Highest percentage of reported events occurred in **Tank Farms**
- **Atmospheric storage tank** releases are due to overfilling, vapor/gas blow-through, and leaks
- Four process areas continue to account for the majority of events as in 2013

### 2014 Event Sharing Data



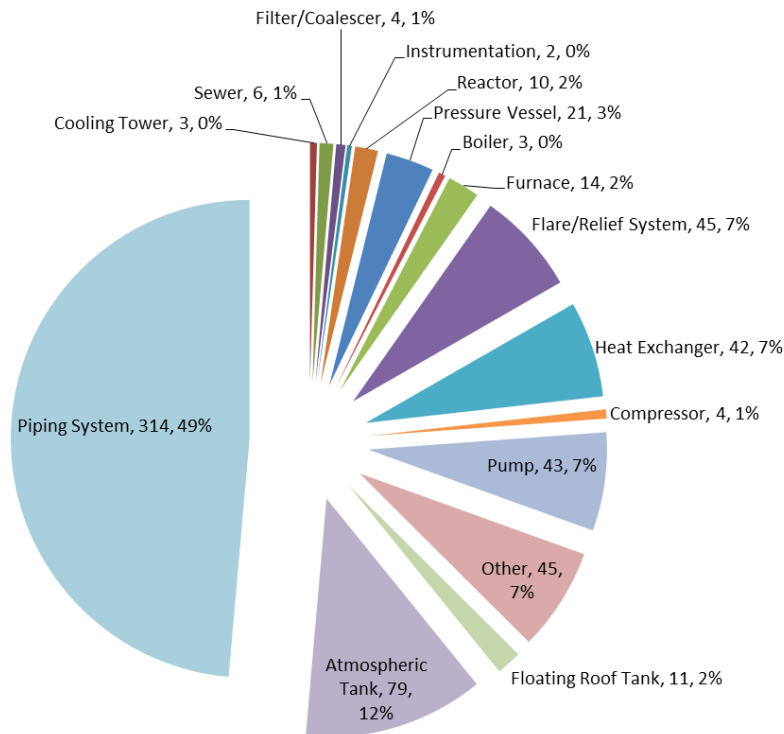
### All Event Sharing Data



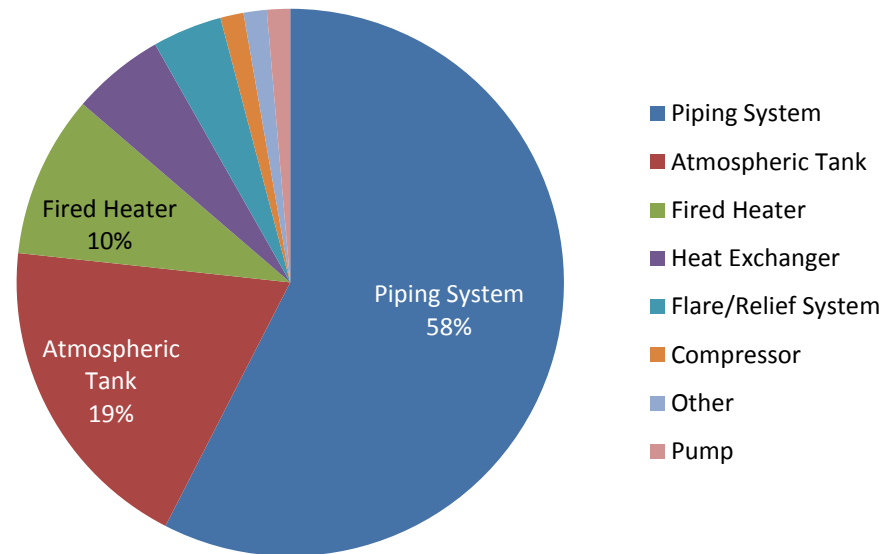
# What are the major points of release ?

- Piping systems and Atmospheric Tanks are still most frequently reported points of release as in 2013
- **Small bore piping events** continues to be a focus area ; **19%** of events involved piping or tubing 2" in diameter or less; **14%** of Metrics data submitted were small bore piping events

## 2014 Metrics & Analysis Data



## 2014 Event Sharing Data

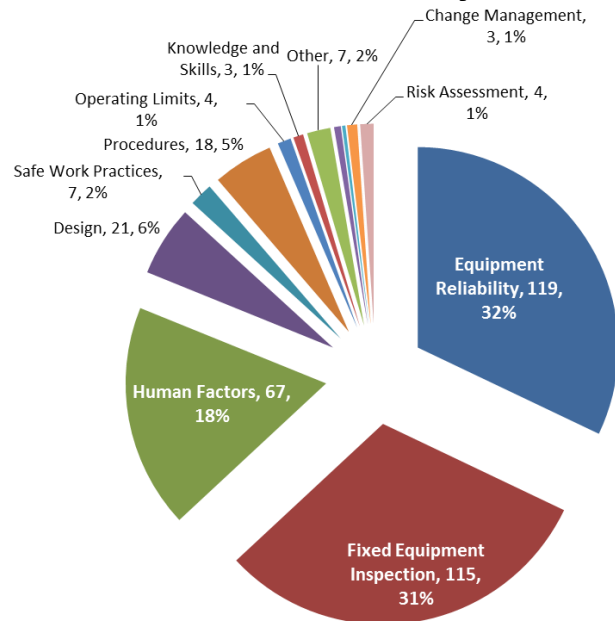


# What is causing Process Safety Events ?

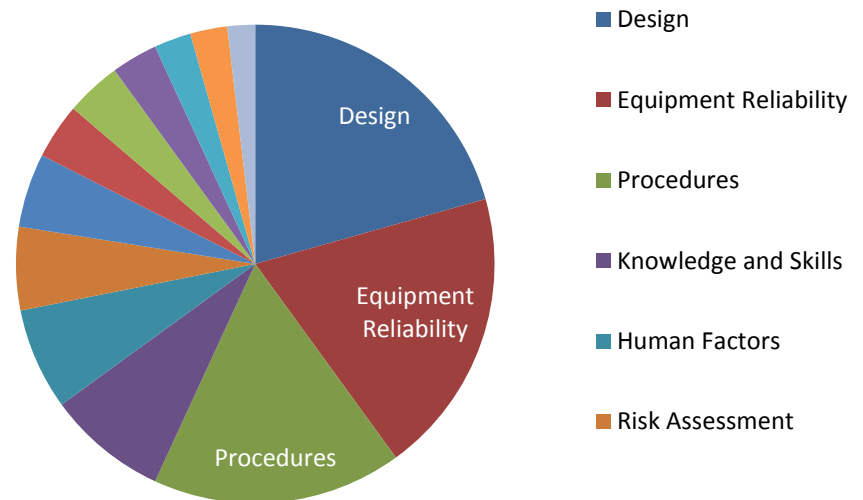
## Leading causes of incidents :

- **Fixed Equipment Mechanical Integrity** – internal and external corrosion, erosion, cracking, inspection less than adequate
- **Equipment Reliability** – premature failure, maintenance/repair less than adequate
- **Human Factors** – valves left open, open-ended lines, loading/unloading, tank filling
- **Design** – winterization, specs not adequate

## 2014 Metrics & Analysis Data



## 2014 Event Sharing Data



# A look at Human reliability

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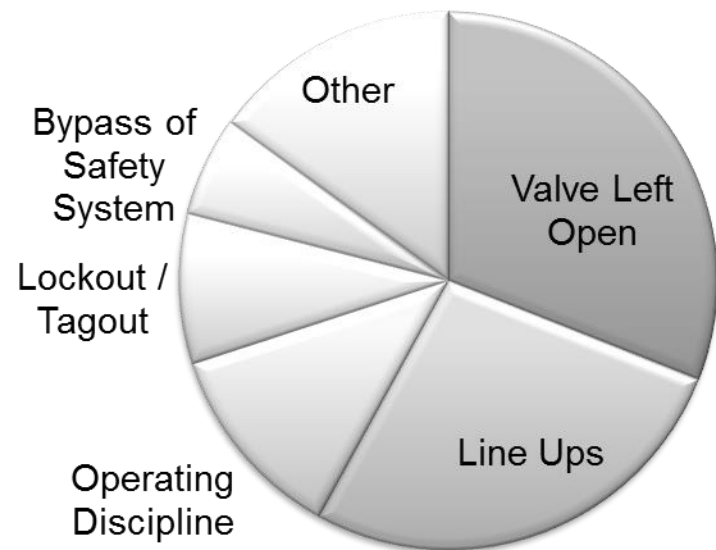
In the context of Process Safety, human reliability relates to the actions or activities of people during an event.

Human reliability causes may include valves left open, line-ups missed, operational discipline, equipment lockout/tagout, and bypassing safety systems.

21% of the events submitted to Event Sharing have causes related to human reliability.

Valves left open and line up errors are the major contributors to human reliability.

**Human Reliability Causes  
In Event Sharing Data**



# Needed: Better Incident Descriptions

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- There is still room for improving the clarity and robustness of the “**Brief Incident Descriptions**” to allow for meaningful data analysis.
  - The following slides give examples of not-so-good and good descriptions...

# Timing for 2015 PSE data submittals

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- 2015 calendar-year data is still reported based on the RP-754 First Edition, April 2010
- API/AFPM cut-off date for 2015 data – **March 18, 2016**
- Transitioning to RP-754 Second Edition
  - Trade associations will not re-cast prior year reports/data based on RP-754 Second Edition
  - Trade associations will issue a new spreadsheet this December (2015) aligned to RP-754 Second Edition for companies to use during calendar year 2016

# 2015 Tier 1 and Tier 2 PSE data submittals

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## Contacts:

### API:

- Email spreadsheet directly to Hazem Arafa at [arafah@api.org](mailto:arafah@api.org) or,
- Load data into API PSE portal located at <https://pseportal.api.org/>

### AFPM:

- Email spreadsheet directly to Anna Scherer at [safetyportal@afpm.org](mailto:safetyportal@afpm.org) or,
- Load data into AFPM Process Safety Metrics portal located at [AFPM Safety Portal](#)



# Resources

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- API
  - API RP 754 Fact Sheet
  - Series of four webinars presented in fall 2010 (available for viewing)
  - Listing of FAQ's that help you properly classify a PSE
  - API Guide to collecting PSE data
  - Read-only access to API RP 754
  - Contact Ron Chittim at [chittim@api.org](mailto:chittim@api.org) for more information
  - Website: <http://www.api.org/environment-health-and-safety/health-safety/process-safety-industry/measuring-safety-improvement.aspx>
- AFPM Safety Portal
  - Process Safety metrics searchable database
  - 2011-2013 annual Process Safety Event reports
  - AFPM Guide to reporting PSE data
  - A “Hypothetical Process Safety Metrics Story”
  - Website: <http://safetyportal.afpm.org/ProcessSafetymetrics-access.aspx>

**BACK UP SLIDES**

# Incident Descriptions that are not helpful:

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- Examples of incident descriptions that are not helpful for data analysis (i.e., need to be expanded)

Loading Rack Spill

Pipeline Leak

Fire on E-1 Exchangers

Sump vent stack vapors

Tank 143 overfill

Piping failure on west Tk-52 pump.

Charge tank was overfilled

- Others leave you wondering if the incident was even a Tier 1 or 2 event.

Power grid shut down resulting in loss of vapor recovery systems

Flared hydrogen sulfide as a result of a unit shutdown

# Better, but could be improved with a little more detail

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Hydrogen Sulfide was released due to a tubing fitting leak on the Hydrogen Recycle Compressor's discharge flow transmitter.

Why did the fitting leak?

LOPC on tank mixer packing due to loss of lubrication caused by continued use below the minimum level for mixer operation.

Why operated too low?

1" bleeder broken on exchanger head causing an LPG release and fire.

How was it broken?

# Some were really good

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A flash fire occurred in the FCC reactor when contractor employees were pulling the spectacle blind to change new gaskets on the blind. The Main Column was lined to the flare and flare gas flowed through backwards up the vapor line into the reactor catching fire. The flash fire resulted in one contractor employee receiving minor burns.

Leak on a fractionator Reflux line located in the pipe rack due to corrosion. Corrosion was caused from a leak in a process water line dripping on the reflux line. The Reflux pump was shut down and the line was isolated.

Crane struck crude unit piping at the desalter while removing sump pump. There was a crude release which found an ignition source resulting in a minor fire.

LOPC from overfilling small caustic tank due to malfunctioning level indication and backflow.

Leak on distillate line caused by corrosion/erosion.

- These offered both consequence(s) and a cause

# Conclusion

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- More detailed incident descriptions will help the annual industry data analysis.
- Please share this presentation with those in your company who submit data.
- Special note: International sites had especially short descriptions of 2013 data.
- Recommendation: Have one person in the company review all PSEs prior to submittal and expand on the descriptions where possible.