


Upstream Oil and Gas Industry Process Safety Event Data

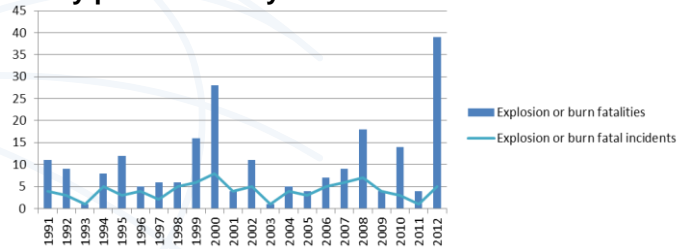
OGP Report 2012p

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- **Introduction**
 - **Theory and definitions**
 - **Data collection process**
 - **Upstream process safety data results**
 - **Industry process safety data benchmarking**
 - **Conclusions**

INTRODUCTION

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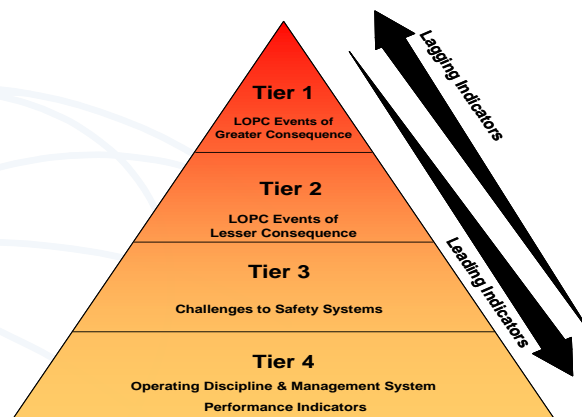
- Major process safety incidents
- Metrics to improve asset integrity and process safety performance
- Industry safety and environmental data collected but not specifically process safety



- API 754 widely implemented in downstream industry
- OGP Report No. 456 “Process Safety – Recommended Practice on Key Performance Indicators”

Theory and Definitions

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The 4 tier approach to process safety indicators (from API RP754)

DATA COLLECTION PROCESS

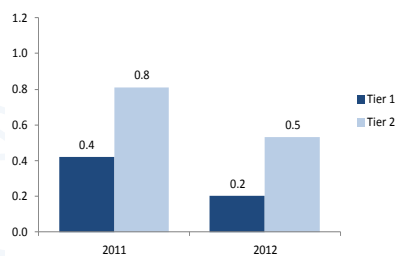
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- Pilot process in 2010 - 11 companies provided historic data
- Data reporting format developed
- Data collection:
 - 2010 – 24 companies
 - 2011 – 24 companies
 - 2012 – 33 companies
- Data validation process developed
- OGP report published in December 2013
 - Used 2011 and 2012 data
 - Data normalized against work hours to provide rates
 - Compared to safety performance database to provide an indication of the PSE database dimensions

Slide 6

RESULTS – OVERALL

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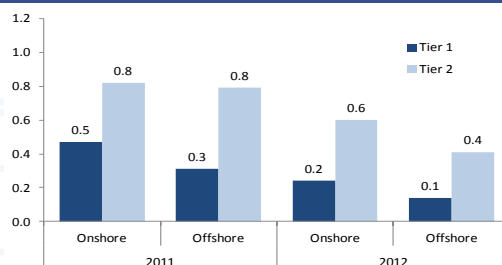
Normalized process safety events per million work hours – Tier 1 and Tier 2 (total)

	2011	2012
Number of PSE		
Tier 1 PSE	340	242
Tier 2 PSE	606	638
Number of PSE for normalized results*		
Tier 1 PSE	307	227
Tier 2 PSE	585	582

*Excludes PSE where no related drilling or production work hours were reported

RESULTS – ONSHORE AND OFFSHORE

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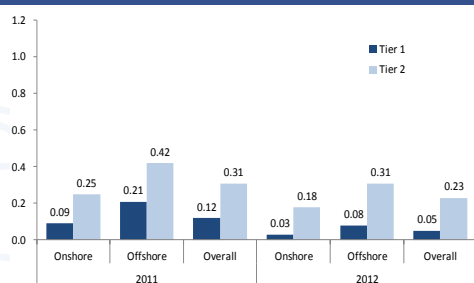
Normalized process safety events per million work hours – Tier 1 and Tier 2 (onshore and offshore)

	2011		2012	
	Tier 1	Tier 2	Tier 1	Tier 2
Number of PSE				
Onshore	280	432	185	469
Offshore	60	174	57	169
Number of PSE for normalized results*				
Onshore	247	414	174	416
Offshore	60	171	53	166

*Excludes PSE where no related drilling or production work hours were reported

RESULTS – DRILLING

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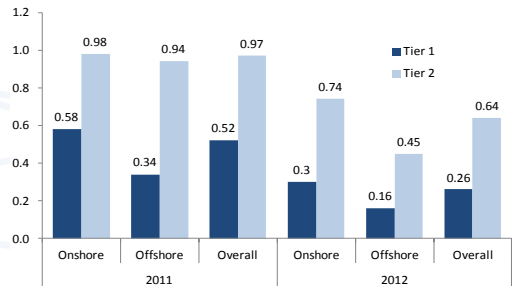
Normalized drilling process safety events per million work hours – Tier 1 and Tier 2 (onshore and offshore)

	2011	2012
Work hours with related Tier 1 PSE data	171	288
Onshore work hours with related Tier 1 PSE data	123	183
Offshore work hours with related Tier 1 PSE data	47	105
Hours with related Tier 2 PSE data	177	296
Onshore work hours with related Tier 2 PSE data	115	177
Offshore work hours with related Tier 2 PSE data	62	119

Related work hours (millions) - Drilling

RESULTS – PRODUCTION

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Normalized production process safety events per million work hours – Tier 1 and Tier 2

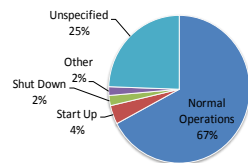
	2011	2012
Work hours with related Tier 1 PSE data	552	835
Onshore work hours with related Tier 1 PSE data	405	551
Offshore work hours with related Tier 1 PSE data	147	284
Hours with related Tier 2 PSE data	546	804
Onshore work hours with related Tier 2 PSE data	391	516
Offshore work hours with related Tier 2 PSE data	155	288

Related work hours (millions) - Production

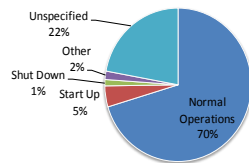
RESULTS – PRODUCTION BY ACTIVITY

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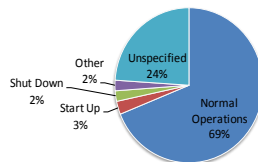
Production PSE by activity
- Tier 1 2011



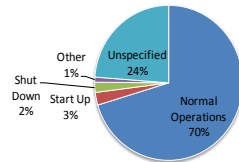
Production PSE by activity
- Tier 1, 2012



Production PSE by activity
- Tier 2, 2011



Production PSE by activity
- Tier 2, 2012



Production process safety events by activity – Tier 1 and Tier 2
(2011 and 2012)

RESULTS – BY CONSEQUENCE

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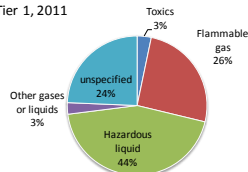
Year	Fatality or LWDC	3rd Party Hospitalization or Fatality	Community Evacuation	Fire Or Explosion	PRD Discharges	Material Release	Unspecified
Tier 1							
2011	19	0	4	28	8	296	80
2012	24	0	2	33	32	179	52

Year	Fire or Explosion	PRD Discharges	Material Release	Recordable Injury
Tier 2				
2011	20	14	542	40
2012	30	49	546	20

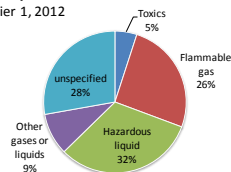
RESULTS – BY MATERIAL RELEASED

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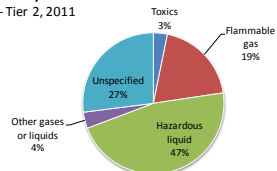
PSE by material released
- Tier 1, 2011



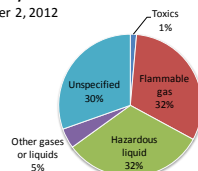
PSE by material released
- Tier 1, 2012



PSE by material released
- Tier 2, 2011



PSE by material released
- Tier 2, 2012

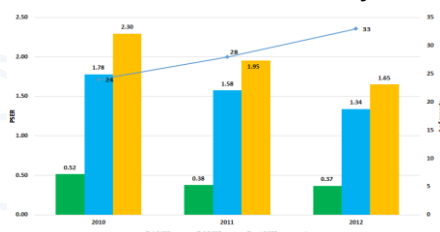


Process safety events by material released – Tier 1 and Tier 2
(2011 and 2012)

OTHER INDUSTRY PSE BENCHMARKING

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- ❑ CONCAWE published downstream industry PSE data since 2010



- ❑ API published 2011 and 2012 US refining data in 2013

Metric reported	2011	2012	2-year average
Number of companies	21	22	22
Number of refineries	81	79	80
Refinery Capacity Response Rate	86%	89%	88%
PSEs reported	166	106	136

- ❑ Centre for Offshore Safety intent to collect offshore Gulf of Mexico data

CONCLUSIONS

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- ❑ Significant advantages to aligning oil and gas industry reporting on PSE on a global basis for upstream and downstream activities:
 - Company reporting systems
 - Regulators and stakeholders
 - Industry approach to enable benchmarking of performance
- ❑ First step in aligning process safety performance metrics
- ❑ Participation in voluntary reporting is increasing

Annex

Tier 1 Indicator Definition and Consequences

A Tier 1 Process Safety Event (PSE) is a loss of primary containment (LOPC) with the greatest consequence as defined by this RP. A Tier 1 PSE is an unplanned or uncontrolled release of any material, including non-toxic and non-flammable materials (e.g., steam, hot condensate, nitrogen, compressed CO₂ or compressed air), from a process that results in one or more of the consequences listed below:

- **An employee, contractor or subcontractor “days away from work” injury and/or fatality;**
- **A hospital admission and/or fatality of a third-party;**
- **An officially declared community evacuation or community shelter-in-place;**
- **A fire or explosion resulting in greater than or equal to \$25,000 of direct cost to the Company;**
- **A pressure relief device (PRD) discharge to atmosphere whether directly or via a downstream destructive device that results in one or more of the following four consequences:**
 - liquid carryover;
 - discharge to a potentially unsafe location;
 - an onsite shelter-in-place;
 - public protective measures (e.g., road closure);
- **and a PRD discharge quantity greater than the threshold quantities in Appendix B in any one-hour; or**
- **A release of material greater than the threshold quantities described in Appendix B in any one-hour period**

Tier 2 Indicator Definition and Consequences



A Tier 2 Process Safety Event (PSE) is a LOPC with lesser consequence. A Tier 2 PSE is an unplanned or uncontrolled release of any material, including non-toxic and non-flammable materials (e.g., steam, hot condensate, nitrogen, compressed CO₂ or compressed air), from a process that results in one or more of the consequences listed below and is not reported in Tier 1:

- **An employee, contractor or subcontractor recordable injury;**
- **A fire or explosion resulting in greater than or equal to \$2,500 of direct cost to the Company;**
- **A pressure relief device (PRD) discharge to atmosphere whether directly or via a downstream destructive device that results in one or more of the following four consequences:**
 - liquid carryover;
 - discharge to a potentially unsafe location;
 - an onsite shelter-in-place;
 - public protective measures (e.g., road closure);
- **and a PRD discharge quantity greater than the threshold quantity in Appendix B in any one-hour period; or**
- **A release of material greater than the threshold quantities described in Appendix B in any one-hour period.**