



Safety Benchmarking in the oil and gas industry in Latin America and the Caribbean (2018 data)


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Safety Benchmarking in the oil and gas industry in Latin America and the Caribbean; 2018 statistics for ARPEL member companies

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Authors

This report was prepared upon request of ARPEL and its Environment, Health and Safety Committee by Pablo Ferragut, Project Manager at ARPEL.

Review

This document was reviewed by the ARPEL Safety Benchmarking Project Team the EHS Committee.

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Introduction

- The Safety Benchmarking Annual Report is a compilation of safety statistics of ARPEL member companies.
- It analyzes four reactive indicators (total incidents, gravity, frequency of incidents with lost workdays and fatalities) and two proactive indicators (safety training intensity and task planned observations). Data is broken down by business line (E&P, refining, pipelines, distribution and others) and by category (company and contractors), and also including historical data for the last 5 years.

Sources and Methodology

Data collection for this report is based on voluntary reporting by ARPEL member companies. The definitions can be found in the User's Manual (7th edition, 2017)

<https://arpel.org/library/publication/493/>

This report collects four reactive indicators and two proactive indicators, which are detailed below:

1.1. Reactive

1. **Total incidents' rate** =
$$\frac{\text{Total recordable cases (injuries+illnesses+fatalities)}}{\text{Hours worked (in millions)}}$$
2. **Incidents gravity rate** =
$$\frac{\text{Number of days away from work}}{\text{Hours worked (in millions)}}$$
3. **Incidents' frequency rate with lost workdays** =
$$\frac{\text{cases with lost workdays}}{\text{Hours worked (in millions)}}$$
4. **Fatalities' rate** =
$$\frac{\text{Number of fatalities}}{\text{Hours worked (in millions)}}$$

1.2. Proactive

5. **TPO Indicator** =
$$\frac{\text{Number of Task Planned Observations (TPO) recorded}}{\text{Average number of workers}}$$
6. **Safety Training Intensity** =
$$\frac{\text{Total number of safety training hours}}{\text{Hours worked (in millions)}} * 100$$

Scope

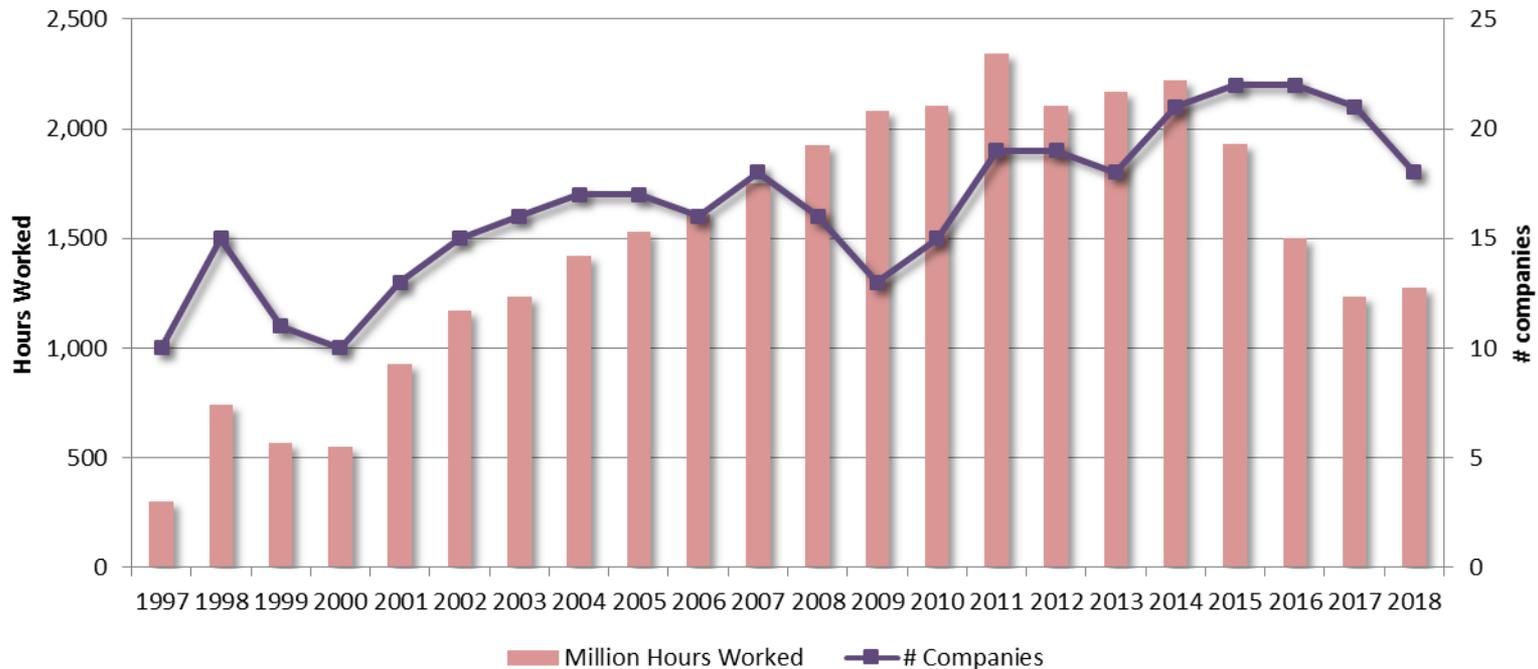
- For this report, 18 companies submitted data, including operations in 13 different countries of the region.

ANCAP (Uruguay)	Pan American Energy (Argentina)	RECOPE (Costa Rica)
Chevron (Argentina, Brazil, Colombia and Venezuela)	PCJ (Jamaica)	REPSOL (Bolivia, Ecuador and Peru)
COGA (Peru)	PEMEX (Mexico)	STAATSOLIE (Suriname)
ENAP (Chile, Argentina, Ecuador)	PETROBRAS (Brazil)	TECPETROL (Argentina)
EP PETROECUADOR (Ecuador)	PETROPERU (Peru)	YPF (Argentina)
Oldelval (Argentina)	PLUSPETROL (Argentina, Bolivia and Peru)	YPFB Transporte (Bolivia)

Scope

- For this report (2018 data), 18 companies submitted data and a total amount of 1,274 millions hours worked were reported.
- For the first time since 2014 there was a little increase in the hours worked reported.

Hours worked and companies



Scope

Function	# companies	Company		Contractors		Totals	
		Employees	Hours Worked (thousands)	Employees	Hours Worked (thousands)	Employees	Hours Worked (thousands)
E&P	10	62,692	150,325	148,172	388,097	210,864	538,422
Refining	11	67,077	131,636	39,969	85,378	107,046	217,014
Pipelines	11	20,488	42,922	21,172	42,804	41,660	85,726
Transport-Maritime	3	2,824	6,974	-	-	2,824	6,974
Distribution	9	27,927	62,571	16,244	31,293	44,171	93,863
Others	10	77,328	170,489	74,345	161,588	151,673	332,077
Total	18	258,336	564,916	299,901	709,160	558,237	1,274,076

- A total amount of 1,274.08 million hours worked were reported, of which 564.92 (44.3%) correspond to company workers and 709.16 (55,7%) to contractors.
- E&P is the function that reported the most hours worked with 42.3% of the total amount, followed by Others (26.1%) and Refining (17.0%)

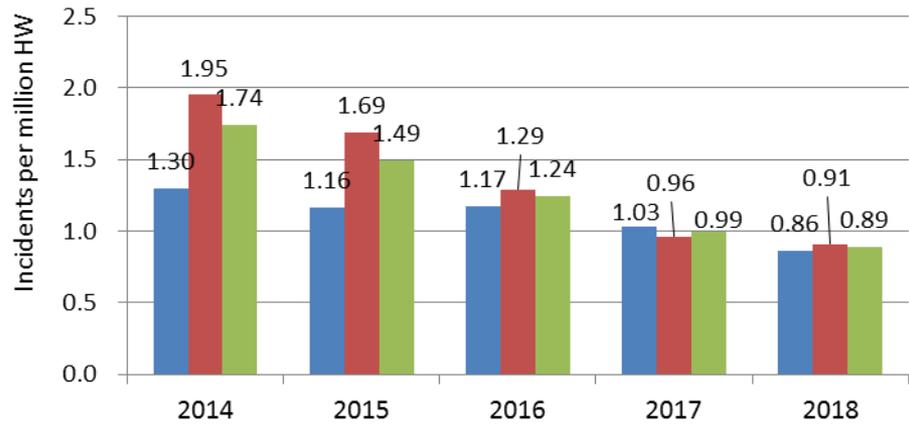
Global Reactive Indicators

- The total incidents rate continues its downward trend for the fifth year in a row. An average of 0.89 incidents per million hours worked were reported.
- The four reactive indicators decreased in comparison with 2017. The Gravity's Rate (-24%) and the Fatalities' Rate (-21%) show the largest decrease.
- All the four reactive indicators show a consistent downward trend in the last 5 years.

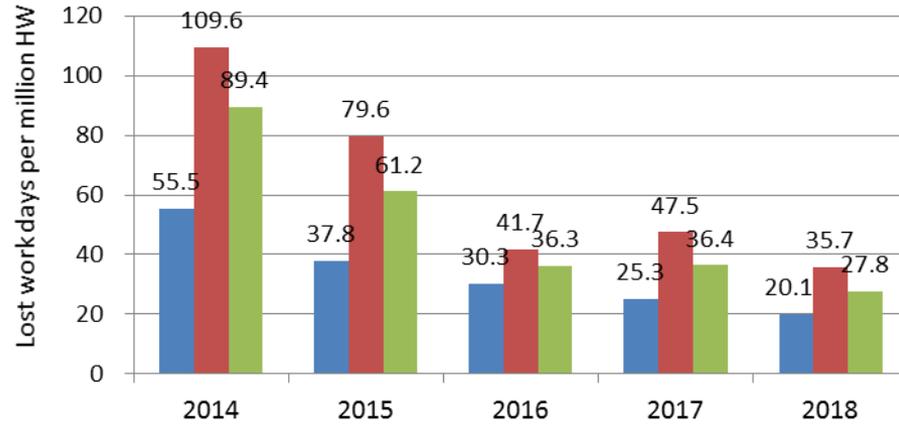
Indicator	2014	2015	2016	2017	2018	5 years average	var 17/16	2017 vs 5y avg
Total incident rate	1.74	1.49	1.24	0.99	0.89	1.27	● -11%	● -30%
Gravity rate	89.36	61.16	36.29	36.39	27.82	50.20	● -24%	● -45%
Incidents w/LWD rate	0.84	0.80	0.73	0.61	0.58	0.71	● -4%	● -18%
Fatalities rate	0.015	0.024	0.009	0.018	0.014	0.016	● -21%	● -11%

Global Reactive Indicators

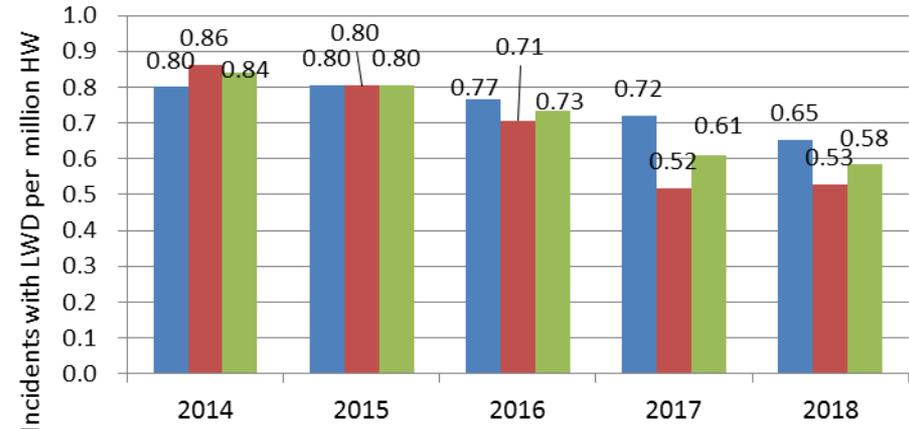
Total incidents frequency rate



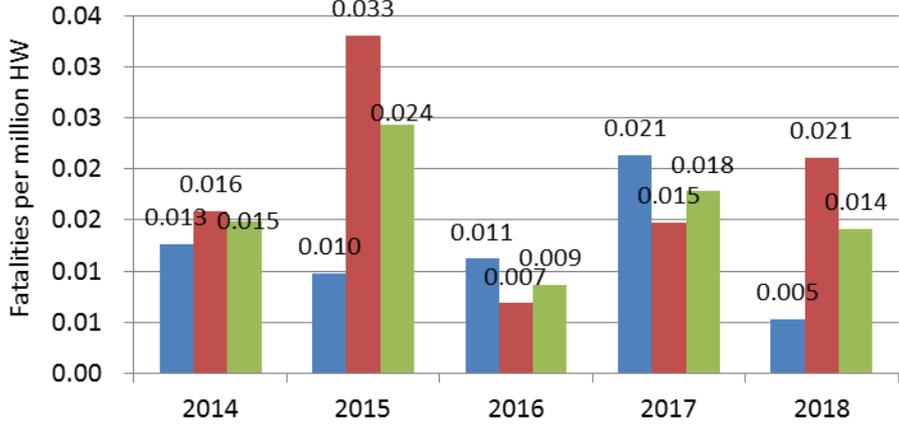
Incidents gravity rate



Lost work days cases rate



Fatalities rate



Reactive Indicators by Function

Formulario	Rubro	Función	TTI	TGRAV	TIDLDP	TFAT
OIC/PI	Compañía	E&P	0.82	28.76	0.45	0.013
OIC/PI	Compañía	Refinación	0.67	13.43	0.50	0.000
OIC/PI	Compañía	Ductos	0.89	28.77	0.75	0.023
OIC/PI	Compañía	Transporte-marítimo	0.43	17.78	0.14	0.000
OIC/PI	Compañía	Distribución	1.34	15.10	1.17	0.000
OIC/PI	Compañía	Otros	0.87	17.41	0.76	0.000
OIC/PI	Compañía	Total	0.86	20.12	0.65	0.005

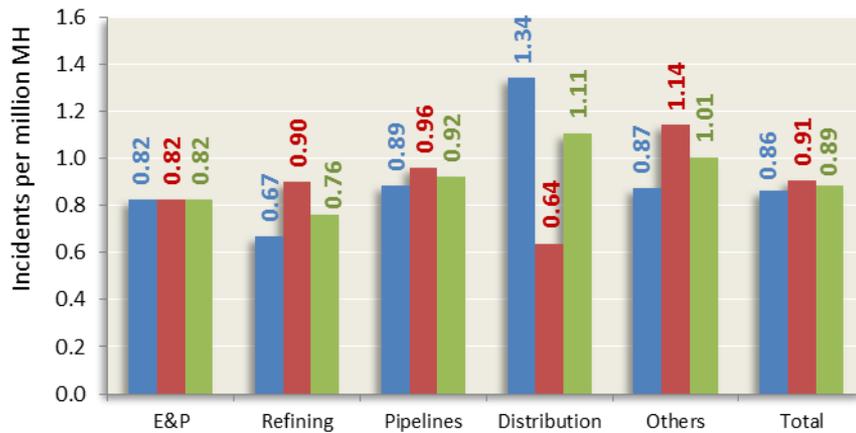
Formulario	Rubro	Función	TTI	TGRAV	TIDLDP	TFAT
OIC/PI	Contratistas	E&P	0.82	34.26	0.43	0.021
OIC/PI	Contratistas	Refinación	0.90	28.68	0.59	0.023
OIC/PI	Contratistas	Ductos	0.96	12.91	0.70	0.047
OIC/PI	Contratistas	Transporte-marítimo	NA	NA	NA	NA
OIC/PI	Contratistas	Distribución	0.64	115.39	0.32	0.032
OIC/PI	Contratistas	Otros	1.14	32.33	0.73	0.012
OIC/PI	Contratistas	Total	0.91	35.67	0.53	0.021

Formulario	Rubro	Función	TTI	TGRAV	TIDLDP	TFAT
OIC/PI	Combinado	E&P	0.82	32.18	0.44	0.019
OIC/PI	Combinado	Refinación	0.76	18.94	0.53	0.009
OIC/PI	Combinado	Ductos	0.92	20.85	0.72	0.035
OIC/PI	Combinado	Transporte-marítimo	0.43	17.78	0.14	0.000
OIC/PI	Combinado	Distribución	1.11	47.47	0.88	0.011
OIC/PI	Combinado	Otros	1.01	24.63	0.74	0.006
OIC/PI	Combinado	Total	0.89	27.82	0.58	0.014

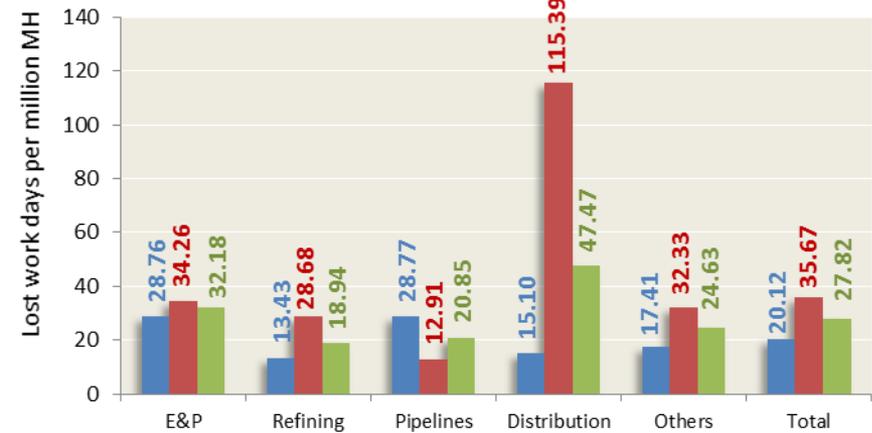
- Distribution was the function that showed less incidents per million hours worked (1.11) for the second consecutive year. At the same time it showed the highest cases with lost work days rate (0.88) and the highest gravity rate (47.47)
- The highest fatality rate average (0.035) was reported in Pipelines.

Reactive Indicators by Function

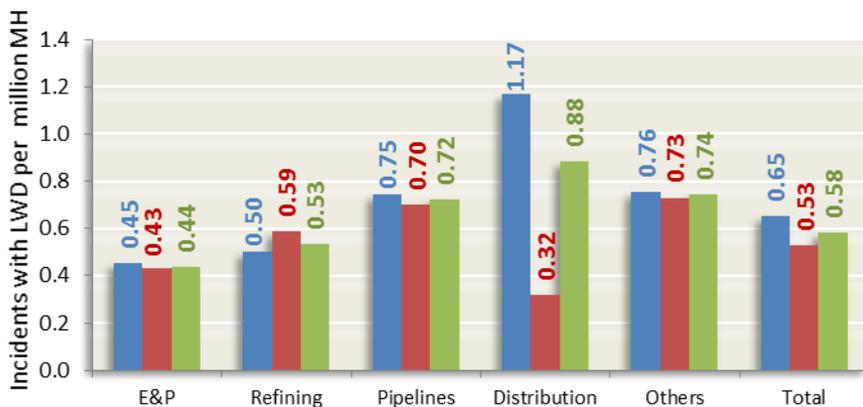
Total incidents frequency rate



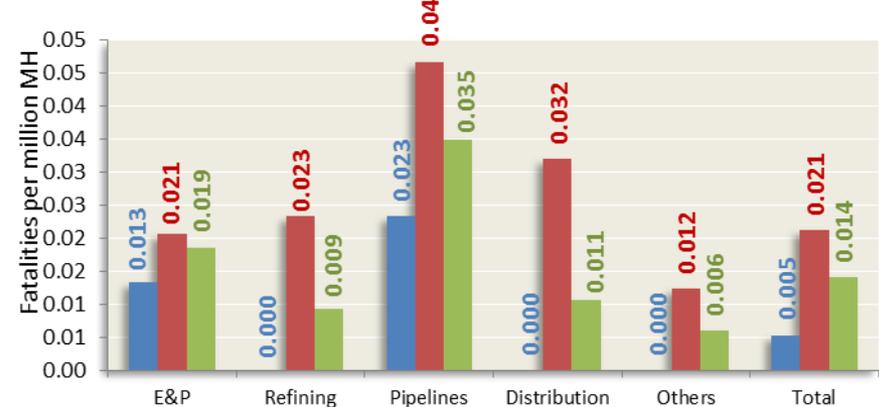
Incidents gravity rate



Cases with lost workdays frequency rate



Fatalities rate



Company Contractors Combined

Reactive Indicators by Function (total incidents rate)

Indicator	Category	Function	2014	2015	2016	2017	2018	2018/2017	2017 vs 5y avg
Total Incidents rate	Company	E&P	1.086	0.905	0.824	0.717	0.825	15%	-11%
Total Incidents rate	Company	Refining	1.895	1.560	1.898	1.126	0.669	-41%	-58%
Total Incidents rate	Company	Pipelines	1.150	1.074	0.989	1.133	0.885	-22%	-19%
Total Incidents rate	Company	Distribution	1.684	2.242	1.866	2.299	1.342	-42%	-28%
Total Incidents rate	Company	Others	0.993	0.840	0.821	0.611	0.874	43%	-10%
Total Incidents rate	Company	Total	1.296	1.164	1.173	1.031	0.860	-17%	-28%
Total Incidents rate	Contractors	E&P	2.136	1.707	1.171	0.835	0.825	-1%	-43%
Total Incidents rate	Contractors	Refining	2.097	1.486	1.389	1.075	0.902	-16%	-47%
Total Incidents rate	Contractors	Pipelines	1.411	0.984	0.925	1.008	0.958	-5%	-16%
Total Incidents rate	Contractors	Distribution	1.727	1.891	1.082	1.060	0.639	-40%	-47%
Total Incidents rate	Contractors	Others	1.763	1.933	1.674	1.205	1.145	-5%	-31%
Total Incidents rate	Contractors	Total	1.949	1.690	1.290	0.961	0.907	-6%	-39%
Total Incidents rate	Combined	E&P	1.888	1.504	1.069	0.801	0.825	3%	-38%
Total Incidents rate	Combined	Refining	1.976	1.530	1.683	1.104	0.760	-31%	-53%
Total Incidents rate	Combined	Pipelines	1.333	1.018	0.949	1.076	0.922	-14%	-19%
Total Incidents rate	Combined	Distribution	1.700	2.125	1.638	1.948	1.108	-43%	-32%
Total Incidents rate	Combined	Others	1.554	1.523	1.281	0.888	1.006	13%	-27%
Total Incidents rate	Combined	Total	1.740	1.494	1.241	0.992	0.886	-11%	-36%

Reactive Indicators by Function (incidents gravity rate)

Indicator	Category	Function	2014	2015	2016	2017	2018	2018/2017	2017 vs 5y avg
Incidents Gravity rate	Company	E&P	34.441	47.257	24.680	23.645	28.764	22%	-13%
Incidents Gravity rate	Company	Refining	113.196	42.314	43.970	24.932	13.431	-46%	-72%
Incidents Gravity rate	Company	Pipelines	20.410	24.103	16.303	43.139	28.773	-33%	7%
Incidents Gravity rate	Company	Distribution	96.943	37.791	42.911	42.864	15.103	-65%	-65%
Incidents Gravity rate	Company	Others	27.450	27.760	24.700	15.848	17.409	10%	-26%
Incidents Gravity rate	Company	Total	55.542	37.789	30.301	25.290	20.116	-20%	-41%
Incidents Gravity rate	Contractors	E&P	145.110	123.458	51.466	62.334	34.261	-45%	-58%
Incidents Gravity rate	Contractors	Refining	28.868	41.386	26.335	28.671	28.678	0%	-16%
Incidents Gravity rate	Contractors	Pipelines	15.882	21.074	18.307	10.756	12.905	20%	-34%
Incidents Gravity rate	Contractors	Distribution	458.961	32.731	17.820	26.643	115.391	333%	4%
Incidents Gravity rate	Contractors	Others	81.113	43.779	45.952	42.882	32.331	-25%	-37%
Incidents Gravity rate	Contractors	Total	109.592	79.583	41.730	47.513	35.670	-25%	-43%
Incidents Gravity rate	Combined	E&P	110.298	97.943	41.012	47.780	32.180	-33%	-50%
Incidents Gravity rate	Combined	Refining	84.822	42.004	36.994	26.386	18.942	-28%	-56%
Incidents Gravity rate	Combined	Pipelines	17.283	22.262	17.556	23.993	20.853	-13%	-9%
Incidents Gravity rate	Combined	Distribution	223.265	36.228	35.959	38.421	47.466	24%	-29%
Incidents Gravity rate	Combined	Others	65.651	37.193	35.898	28.344	24.632	-13%	-40%
Incidents Gravity rate	Combined	Total	89.356	61.160	36.293	36.394	27.816	-24%	-43%

Reactive Indicators by Function (incidents with lost workdays frequency rate)

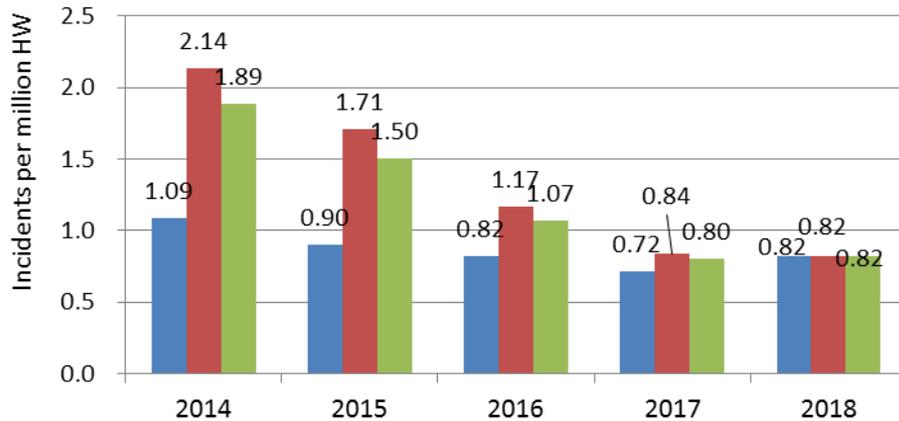
Indicator	Category	Function	2014	2015	2016	2017	2018	2018/2017	2017 vs 5y avg
LWD cases rate	Company	E&P	0.635	0.558	0.446	0.443	0.452	2%	-15%
LWD cases rate	Company	Refining	1.050	1.137	1.225	0.724	0.501	-31%	-49%
LWD cases rate	Company	Pipelines	0.767	0.710	0.710	0.994	0.746	-25%	-5%
LWD cases rate	Company	Distribution	0.943	1.274	1.328	1.383	1.167	-16%	-5%
LWD cases rate	Company	Others	0.783	0.710	0.588	0.567	0.757	34%	-1%
LWD cases rate	Company	Total	0.800	0.805	0.766	0.721	0.653	-9%	-17%
LWD cases rate	Contractors	E&P	1.143	0.958	0.727	0.451	0.430	-5%	-42%
LWD cases rate	Contractors	Refining	0.706	0.648	0.526	0.565	0.586	4%	-5%
LWD cases rate	Contractors	Pipelines	0.606	0.313	0.683	0.392	0.701	79%	32%
LWD cases rate	Contractors	Distribution	0.817	0.577	0.536	0.589	0.320	-46%	-40%
LWD cases rate	Contractors	Others	0.636	0.782	0.784	0.692	0.730	5%	2%
LWD cases rate	Contractors	Total	0.862	0.803	0.706	0.518	0.529	2%	-22%
LWD cases rate	Combined	E&P	0.983	0.826	0.619	0.449	0.436	-3%	-35%
LWD cases rate	Combined	Refining	0.934	0.974	0.942	0.657	0.535	-19%	-37%
LWD cases rate	Combined	Pipelines	0.656	0.469	0.693	0.722	0.723	0%	13%
LWD cases rate	Combined	Distribution	0.899	1.059	1.109	1.158	0.884	-24%	-10%
LWD cases rate	Combined	Others	0.678	0.752	0.692	0.625	0.744	19%	5%
LWD cases rate	Combined	Total	0.839	0.804	0.734	0.610	0.584	-4%	-19%

Reactive Indicators by Function (Fatalities Rate)

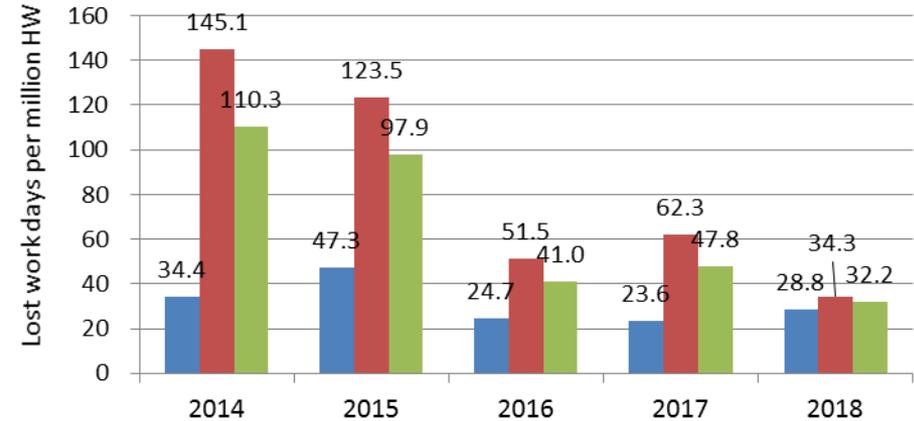
Indicator	Category	Function	2014	2015	2016	2017	2018	2018/2017	2017 vs 5y avg
Fatalities rate	Company	E&P	0.009	0.014	0.026	0.000	0.013	NA	7%
Fatalities rate	Company	Refining	0.041	0.000	0.007	0.032	0.000	-100%	-100%
Fatalities rate	Company	Pipelines	0.000	0.017	0.000	0.023	0.023	1%	119%
Fatalities rate	Company	Distribution	0.000	0.032	0.016	0.093	0.000	-100%	-100%
Fatalities rate	Company	Others	0.000	0.005	0.000	0.006	0.000	-100%	-100%
Fatalities rate	Company	Total	0.013	0.010	0.011	0.021	0.005	-75%	-54%
Fatalities rate	Contractors	E&P	0.020	0.041	0.009	0.005	0.021	297%	18%
Fatalities rate	Contractors	Refining	0.026	0.059	0.020	0.000	0.023	NA	-25%
Fatalities rate	Contractors	Pipelines	0.010	0.032	0.000	0.000	0.047	NA	129%
Fatalities rate	Contractors	Distribution	0.057	0.096	0.000	0.196	0.032	-84%	-52%
Fatalities rate	Contractors	Others	0.006	0.000	0.000	0.022	0.012	-43%	70%
Fatalities rate	Contractors	Total	0.016	0.033	0.007	0.015	0.021	43%	22%
Fatalities rate	Combined	E&P	0.017	0.034	0.014	0.004	0.019	407%	14%
Fatalities rate	Combined	Refining	0.035	0.024	0.013	0.019	0.009	-51%	-57%
Fatalities rate	Combined	Pipelines	0.007	0.026	0.000	0.013	0.035	176%	102%
Fatalities rate	Combined	Distribution	0.021	0.054	0.011	0.122	0.011	-91%	-72%
Fatalities rate	Combined	Others	0.004	0.002	0.000	0.013	0.006	-55%	26%
Fatalities rate	Combined	Total	0.015	0.024	0.009	0.018	0.014	-21%	-7%

Reactive Indicators (E&P)

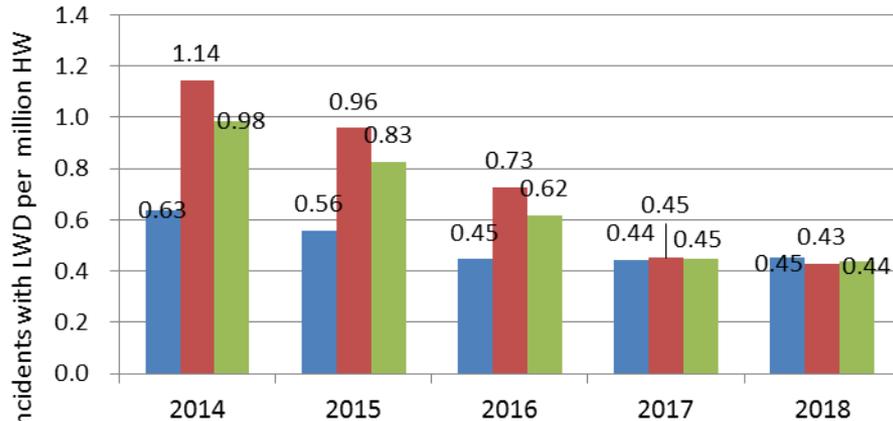
Total incidents frequency rate (E&P)



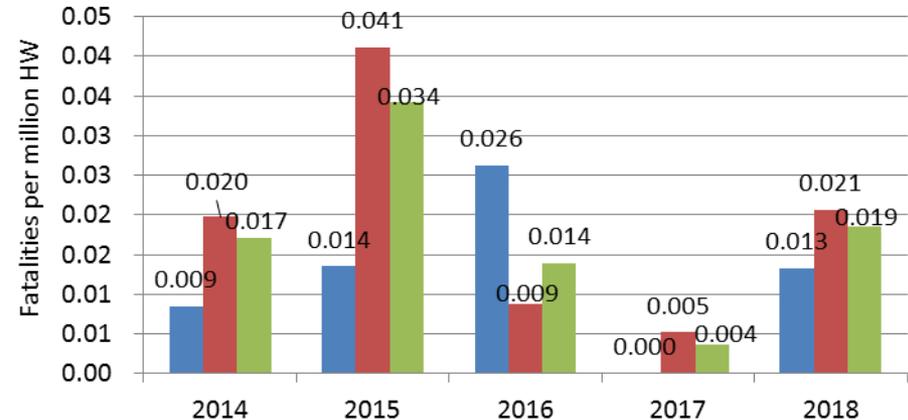
Incidents gravity rate (E&P)



Lost work days cases rate (E&P)



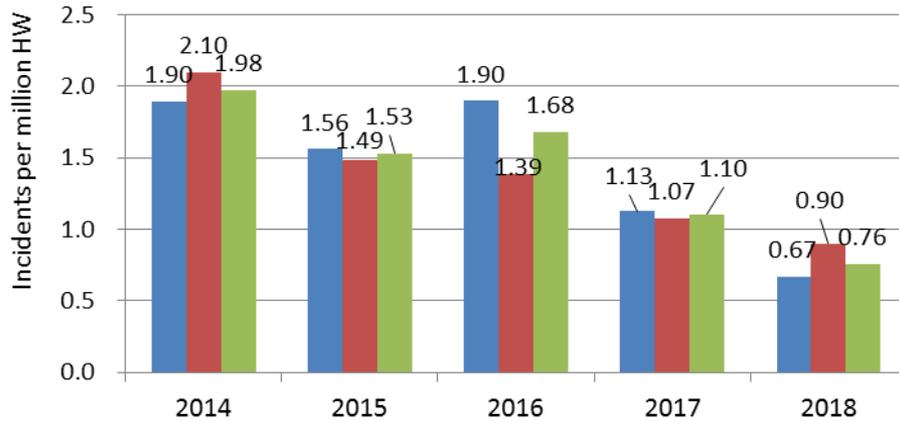
Fatalities rate (E&P)



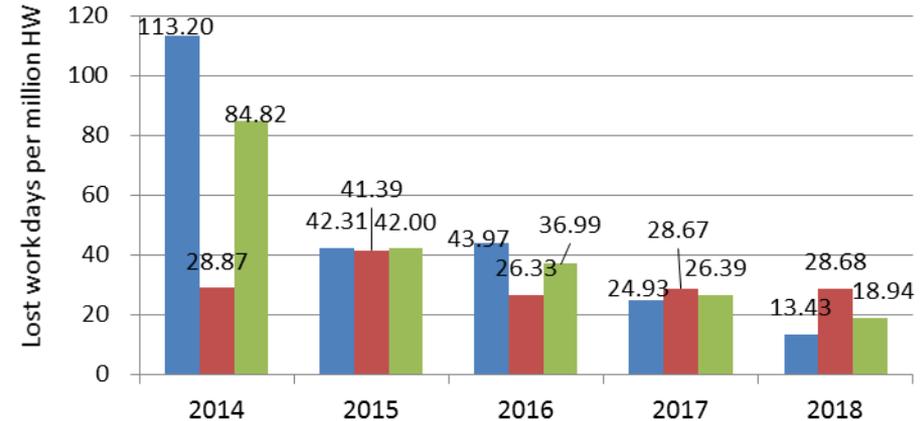
Company Contractors Combined

Reactive Indicators (Refining)

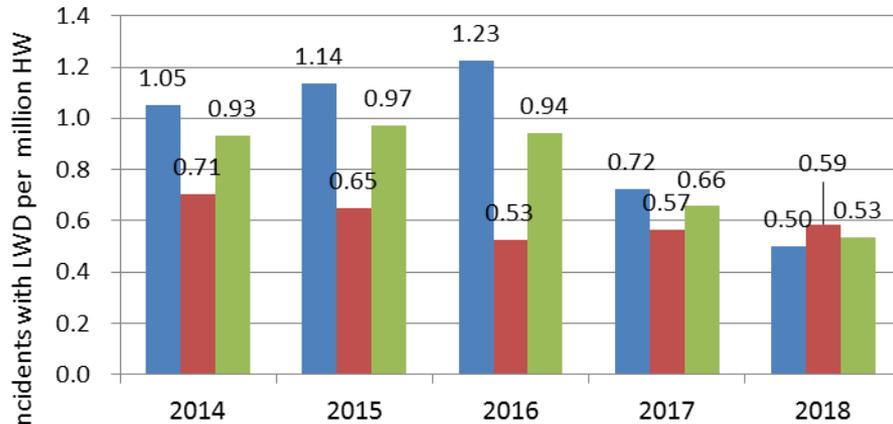
Total incidents frequency rate (Refining)



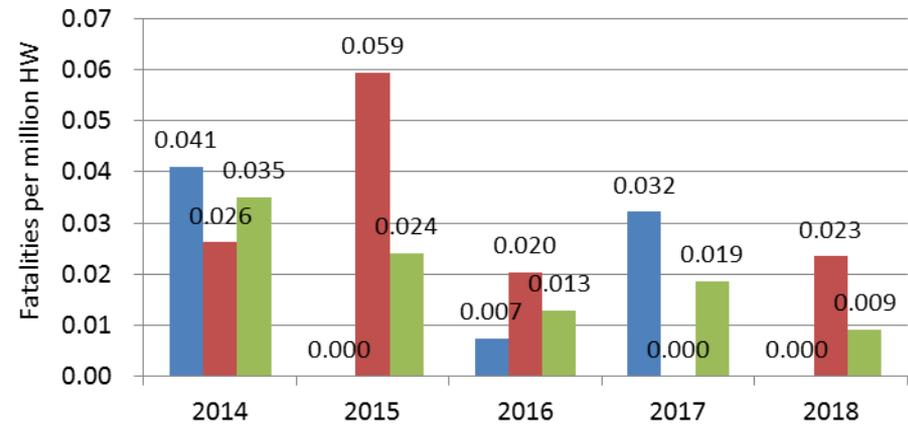
Incidents gravity rate (Refining)



Lost work days cases rate (Refining)



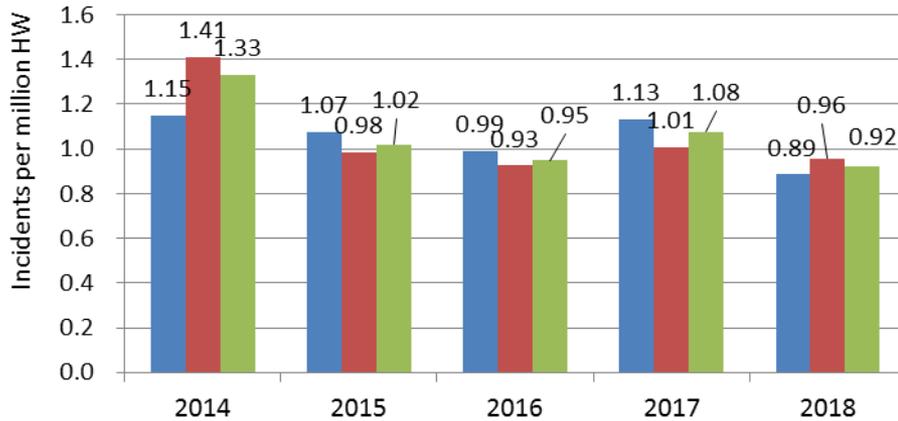
Fatalities rate (Refining)



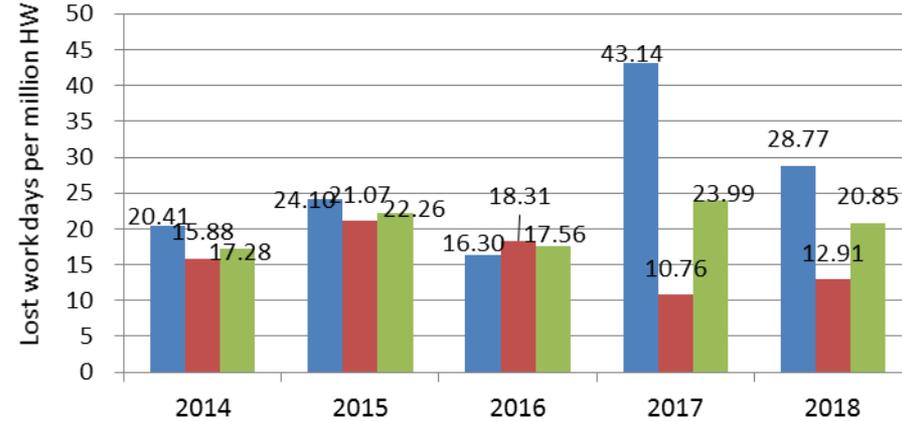
Company Contractors Combined

Reactive Indicators (Pipelines)

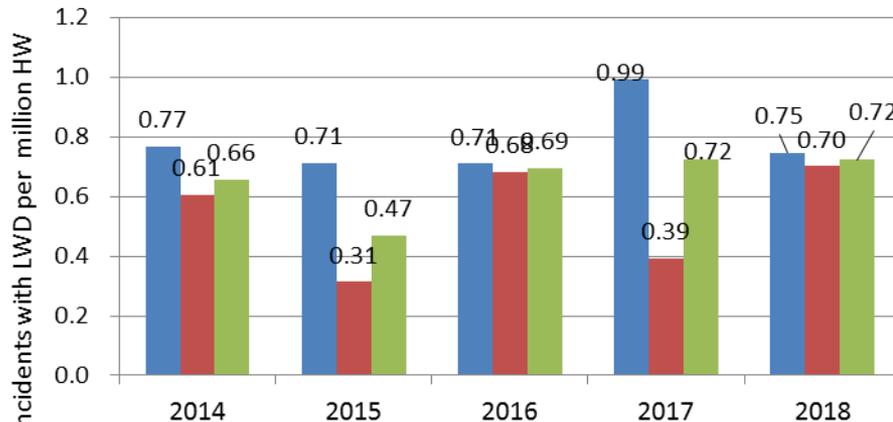
Total incidents frequency rate (Pipelines)



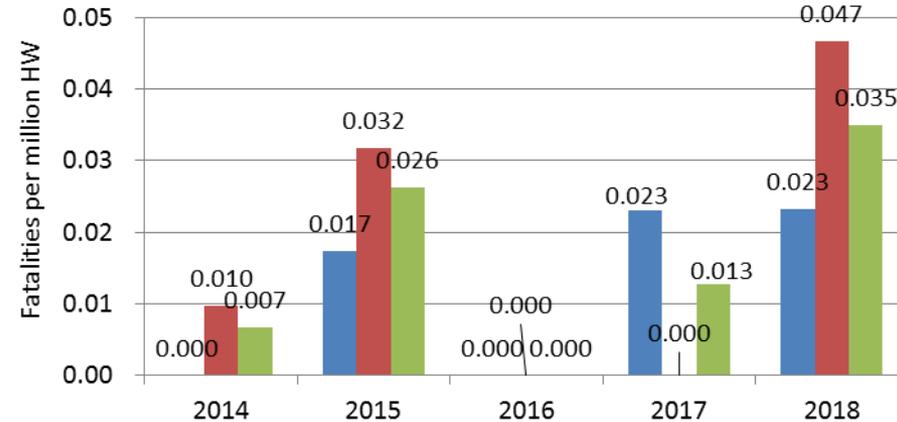
Incidents gravity rate (Pipelines)



Lost work days cases rate (Pipelines)



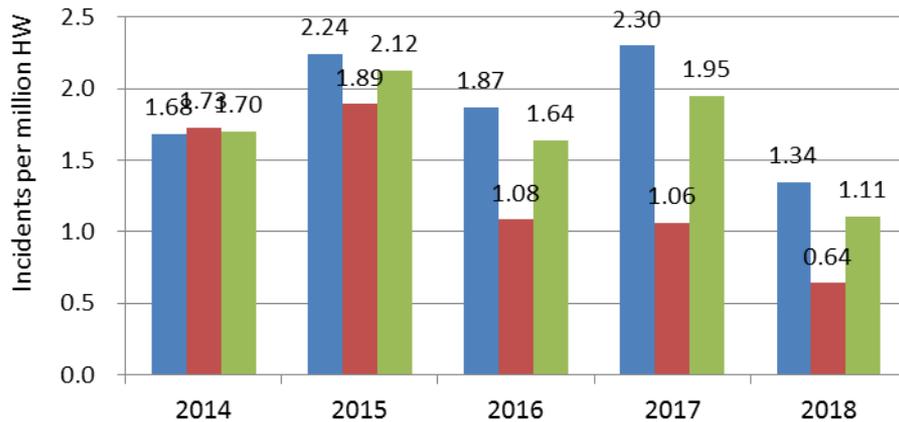
Fatalities rate (Pipelines)



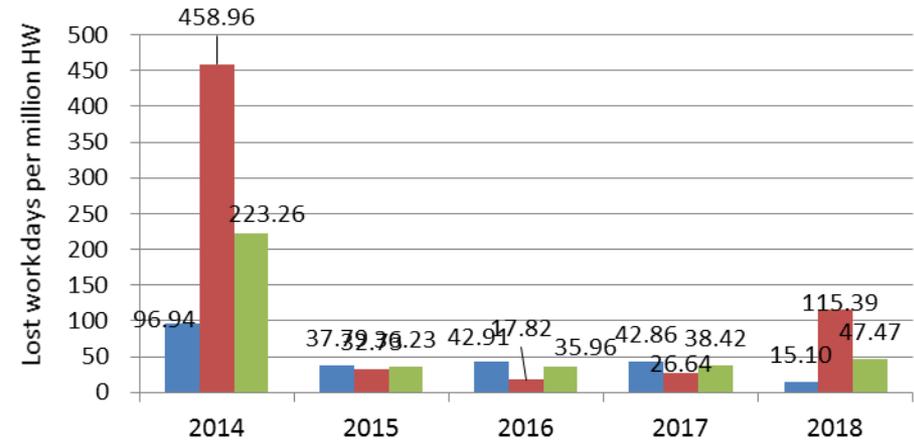
Company Contractors Combined

Reactive Indicators (Distribution)

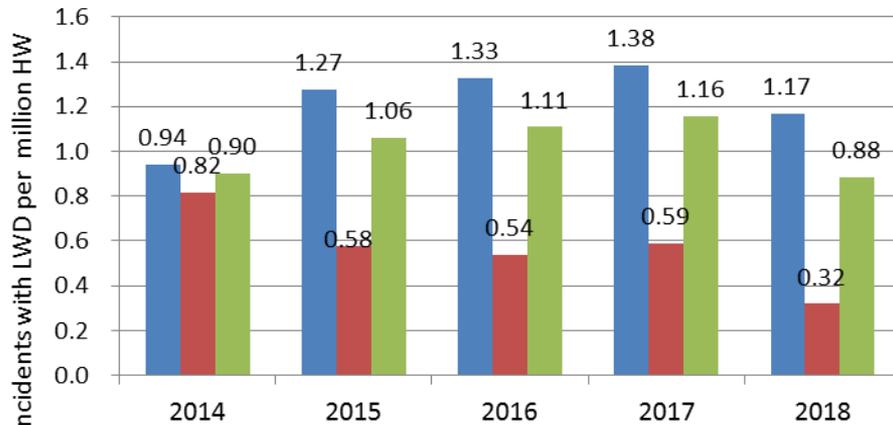
Total incidents frequency rate (Distribution)



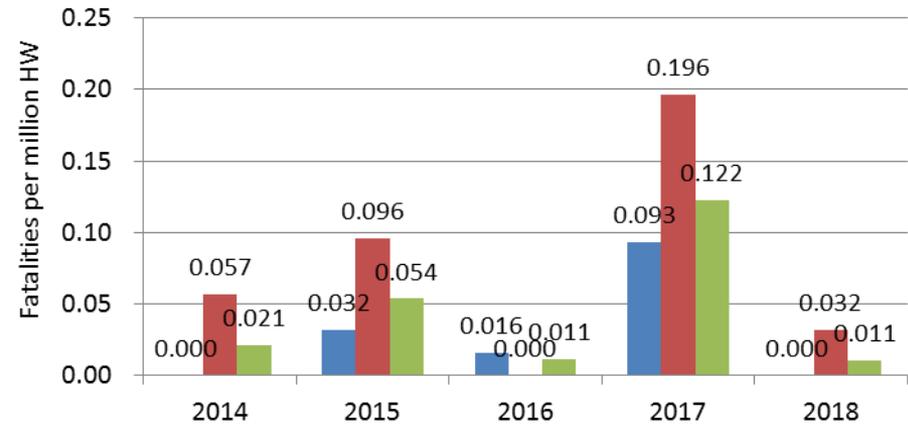
Incidents gravity rate (Distribution)



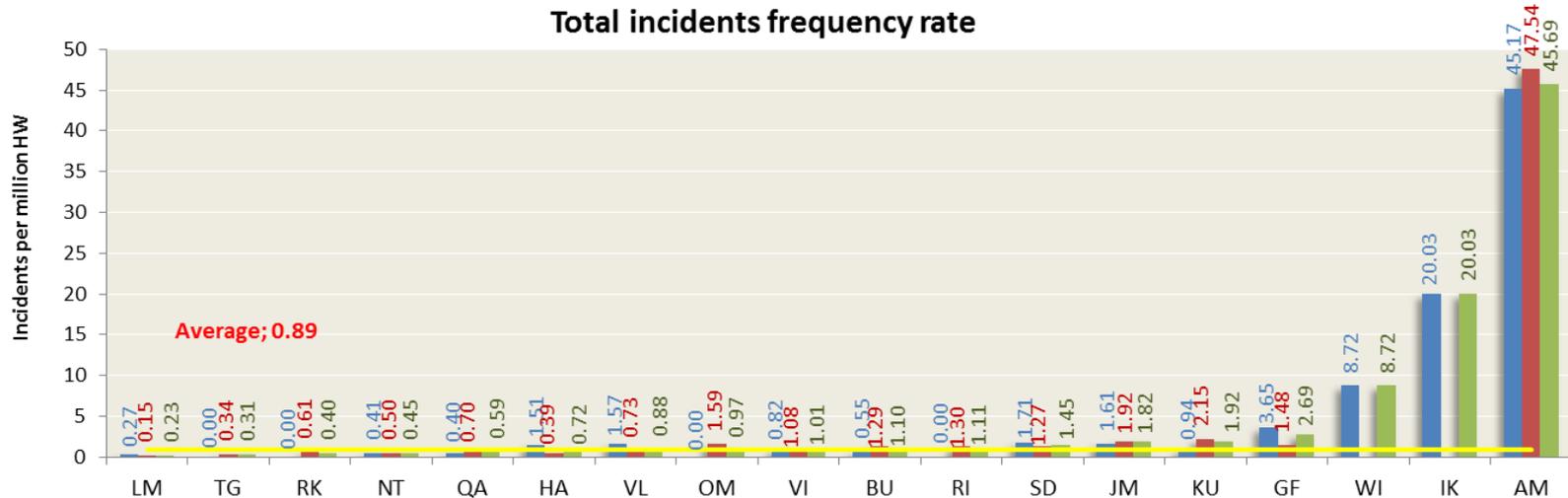
Lost work days cases rate (Distribution)



Fatalities rate (Distribution)

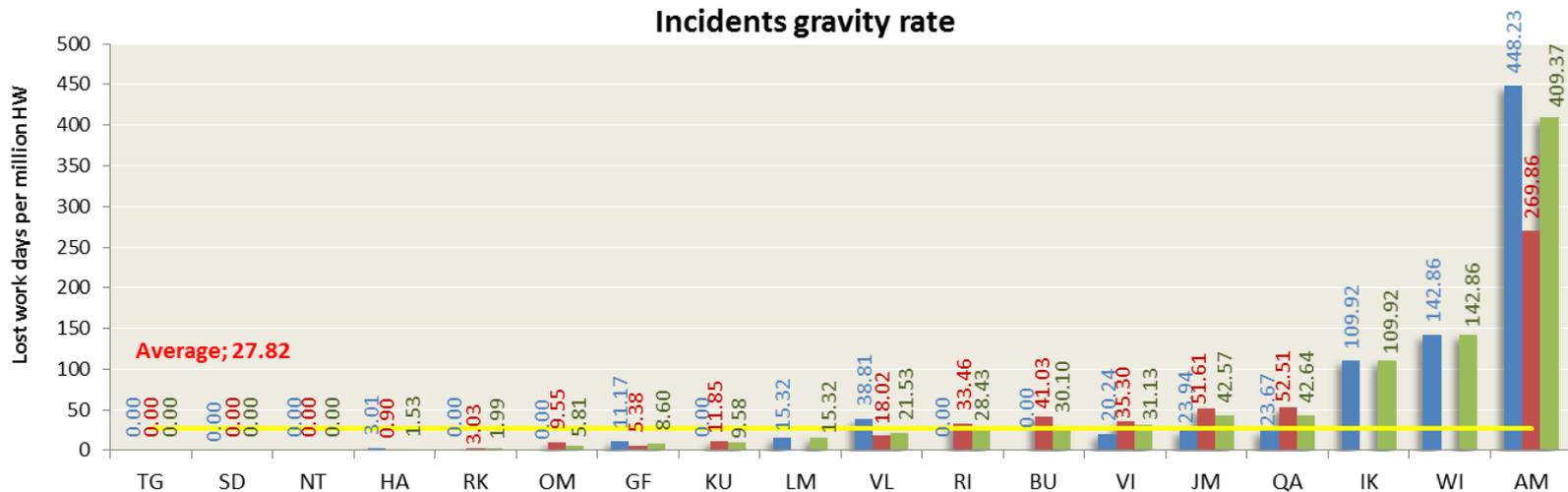


Total incidents frequency rate by company (total)



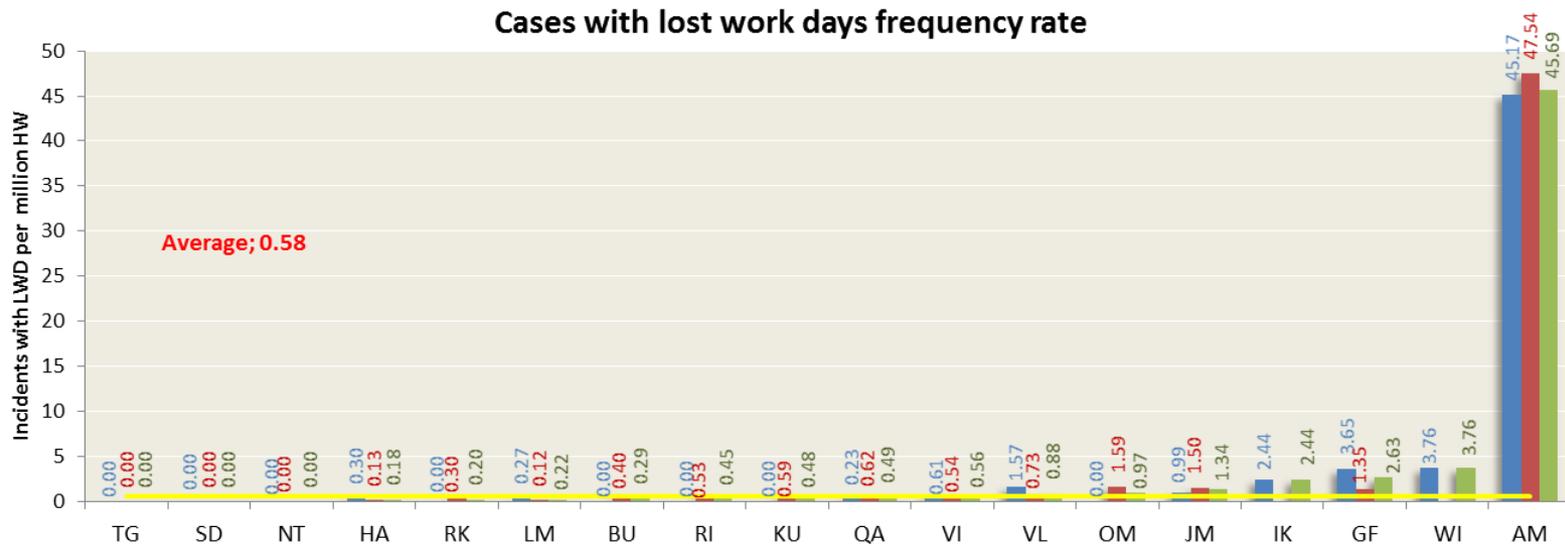
- The average incidents frequency rate was 0.89 per million hours worked.
- The company with the best performance reported 0.23 incidents per million hours worked, while there are three companies showing values much higher than the average.

Incidents gravity rate by company (total)



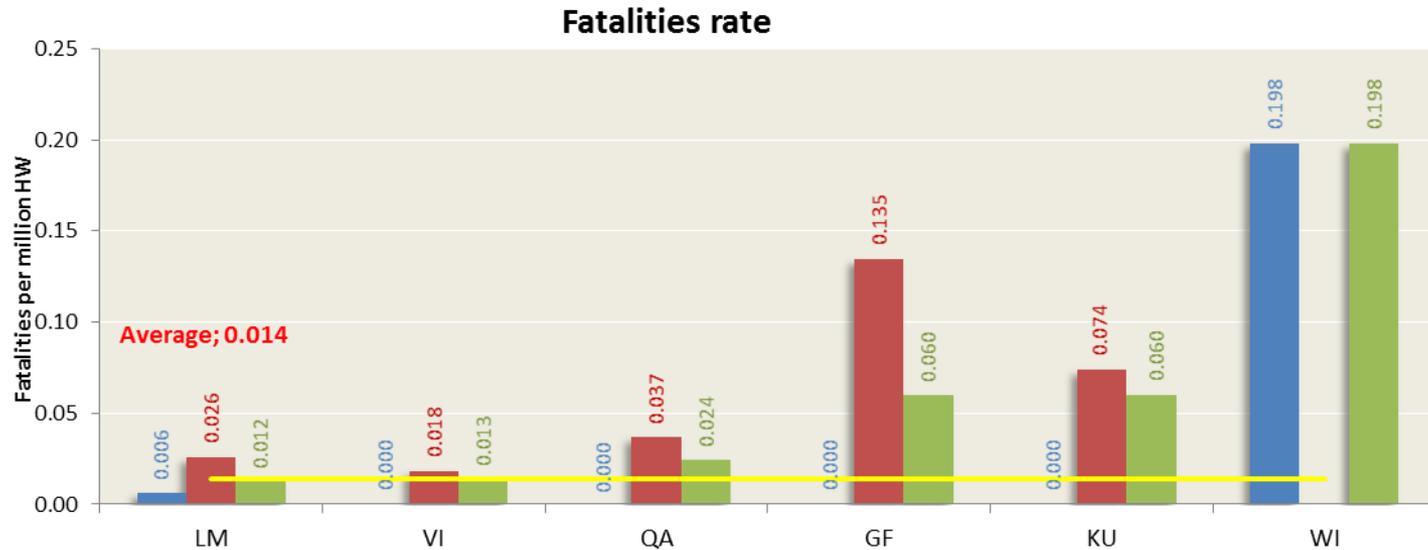
- The average lost work days per million hours worked was 27.82.
- Similar to the incidents frequency rate, there are 3 companies that show values much higher than the average. The maximum value reported was 409.37 lost work days per million hours worked.

Cases with lost work days frequency rate (total)



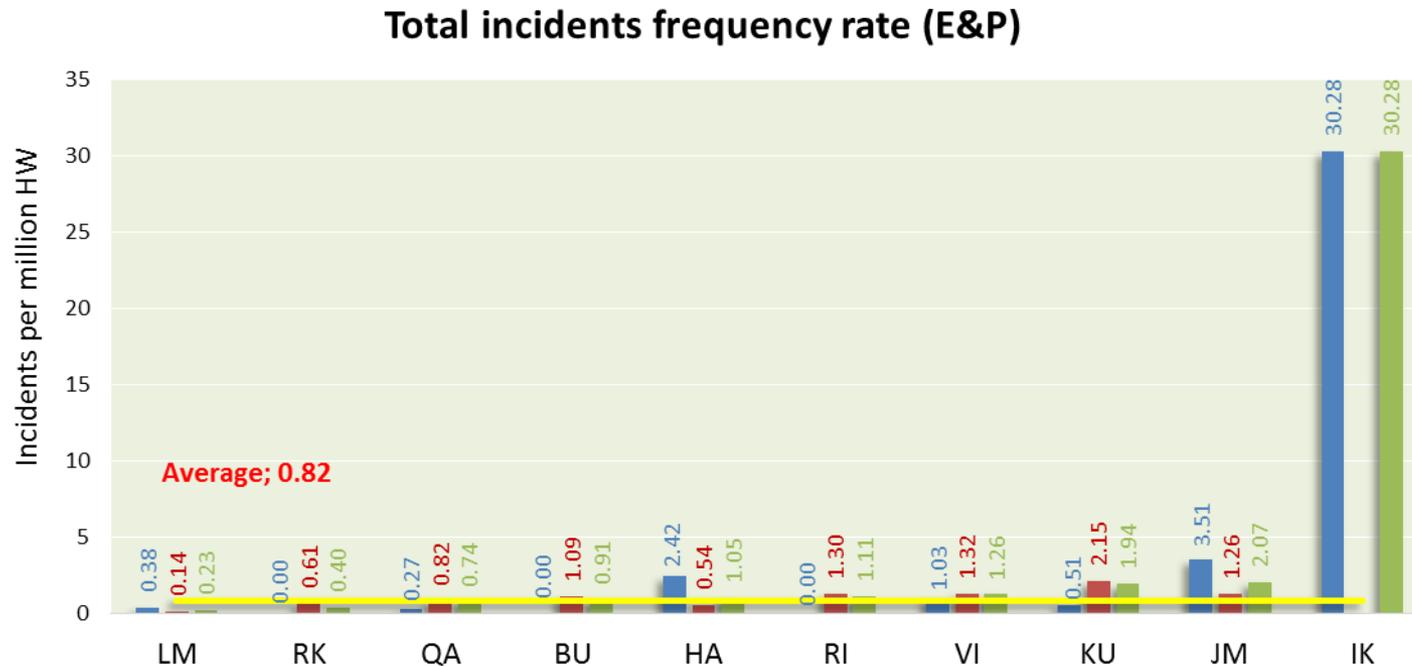
- Cases with lost work days incidents average was 0.58 per million hours worked.

Fatalities rate by company (total)



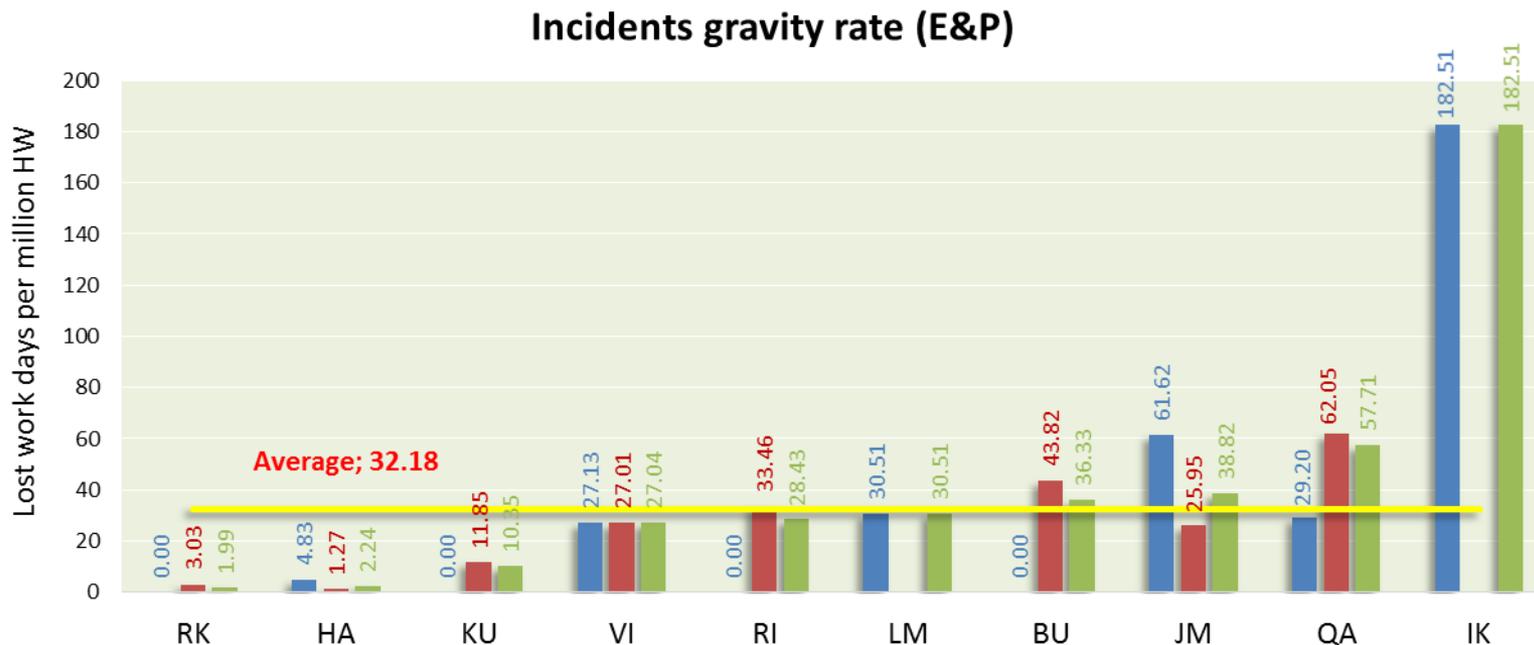
- 18 fatalities were reported in total.
- 6 out of the 18 companies that submitted data for this study reported fatalities. 2 of them reported fatalities of company employees and 5 of contractors.
- The overall average was 0.014 fatalities per million hours worked.

Total incidents frequency rate by company (E&P)



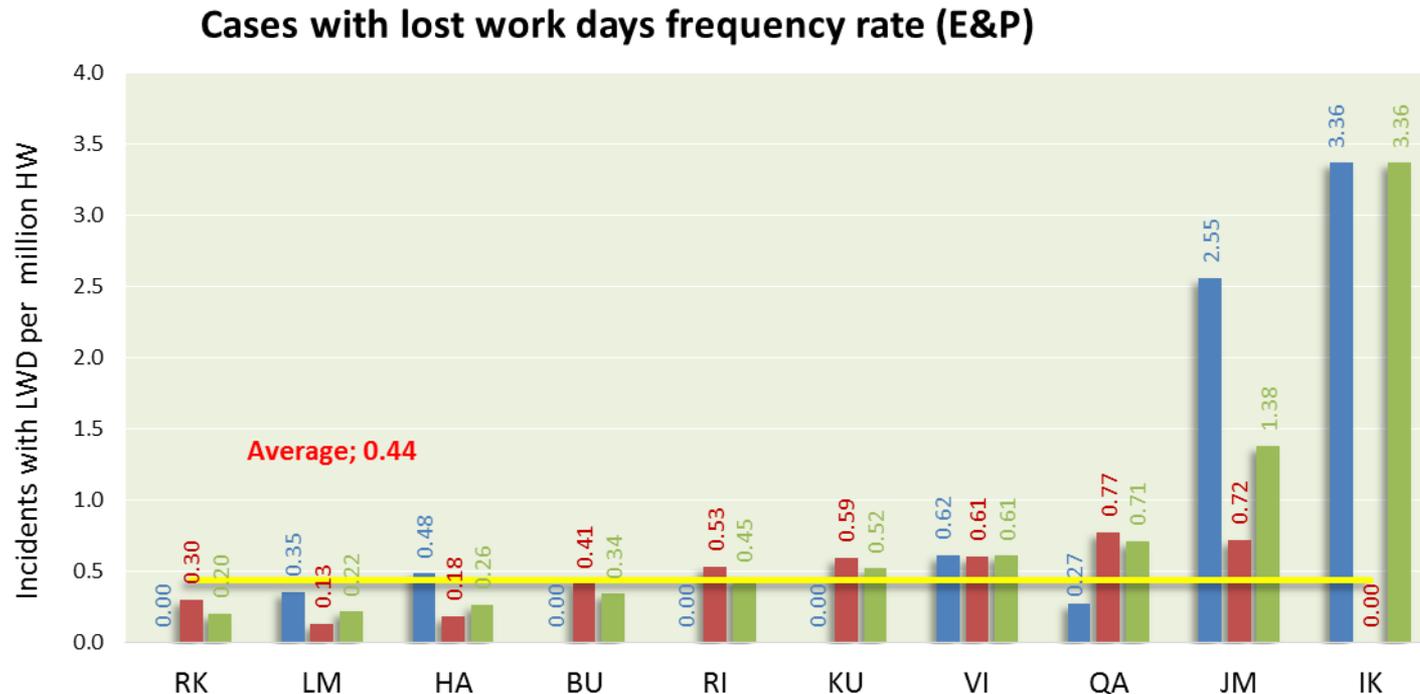
- The average incidents frequency rate in E&P was 0.82.
- There were not significant differences between company employees (0.8249) and contractors (0.8245)

Incidents gravity rate by company (E&P)



- Incidents gravity rate average in E&P was 32.18. This value is a bit higher of the overall average for all functions (28.26)
- The company that showed the best performance reported 1.99 lost work days per million hours worked.
- This indicator was 28.76 for company employees and 34.26 for contractors.

Cases with lost work days frequency rate (E&P)



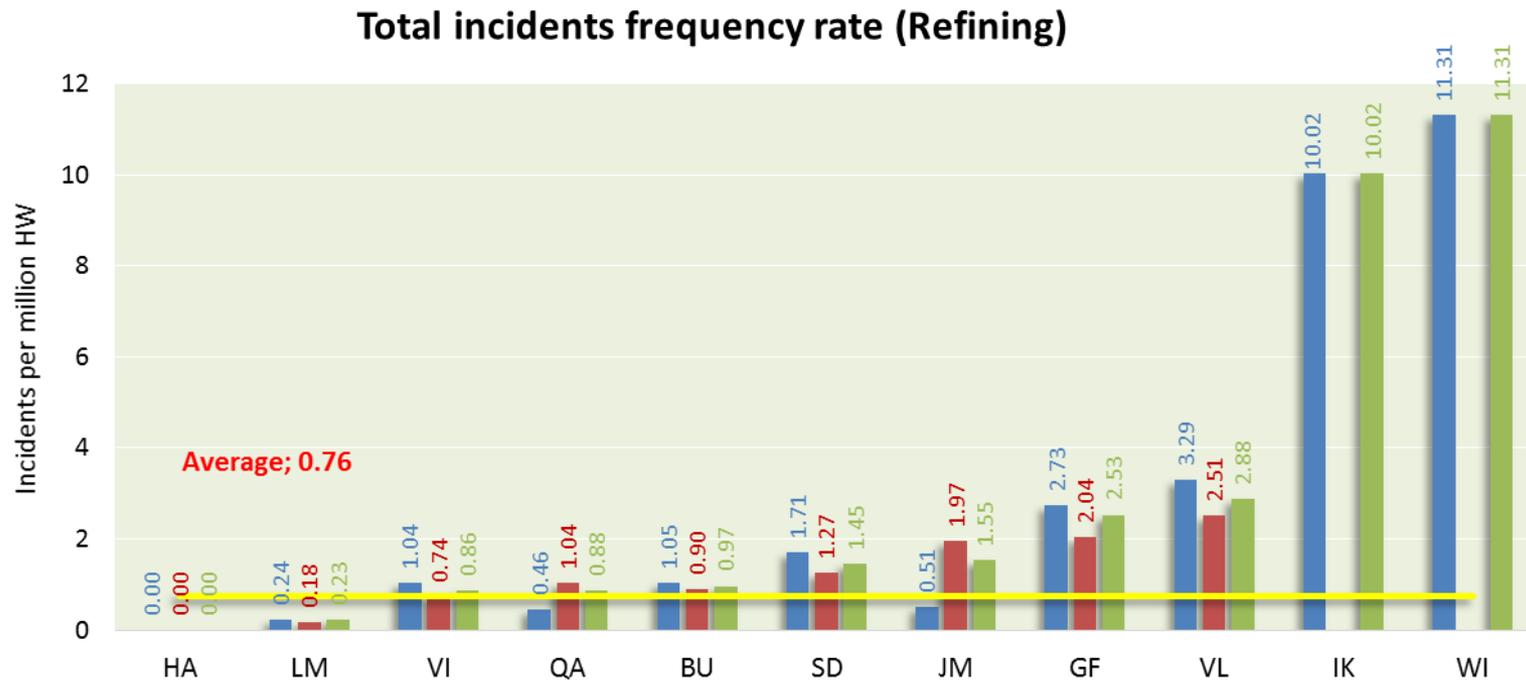
- Cases with lost work days average rate in E&P was 0.44 per million hours worked.
- The company that showed the best performance reported 0.20 incidents per million hours worked, while the maximum was 3.36.

Fatalities rate by company (E&P)



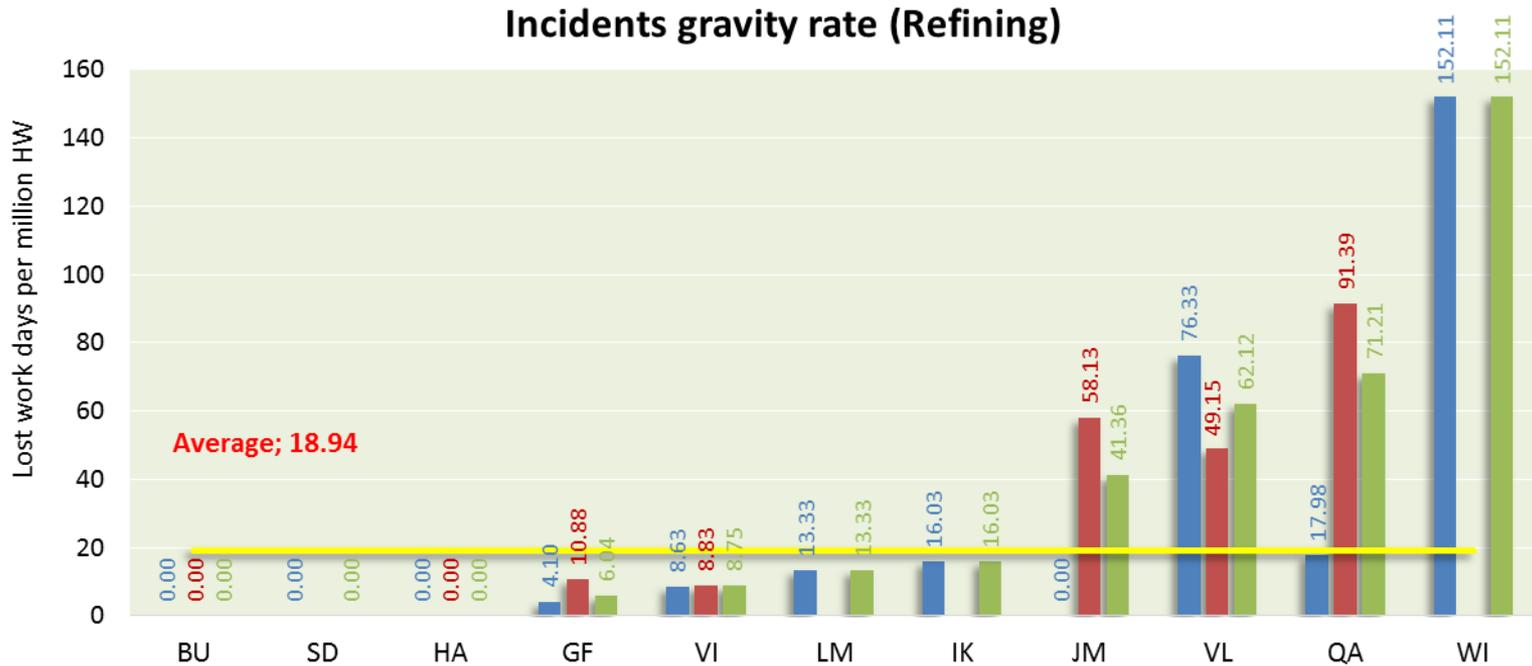
- 4 companies reported fatalities in E&P
- A total amount of 10 fatalities were reported in E&P
- The average fatalities per million hours worked in E&P was 0.019

Total incidents frequency rate by company (Refining)



- Total incidents frequency rate average for Refining was 0.76
- This indicator was 0.67 for company employees and 0.90 for contractors

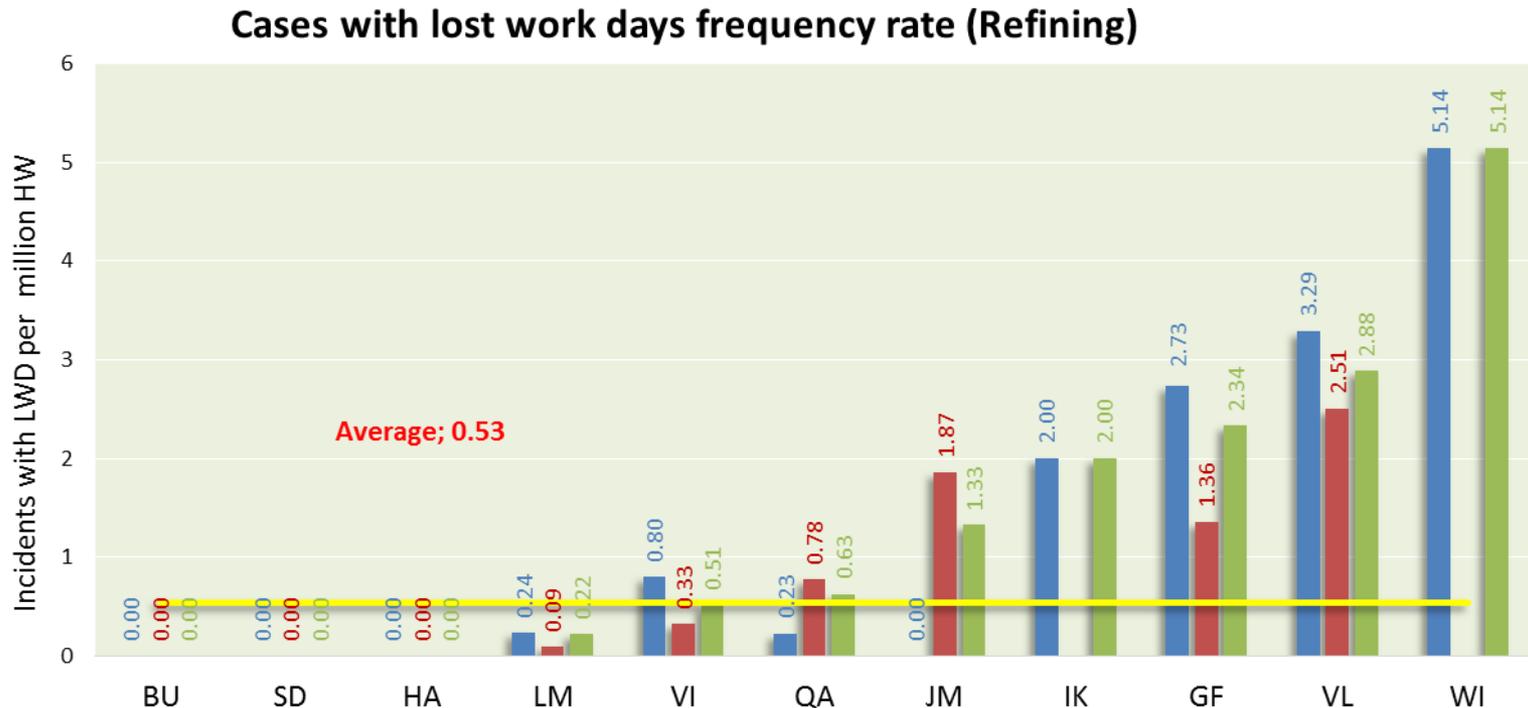
Incidents gravity rate by company (Refining)



- Incidents gravity rate for Refining was 18.94 lost work days per million hours worked.
- This is a historically low value, being 26% lower than the previous year and 56% lower than the last 5 years average.
- This indicator was 13.43 for company employees and 28.68 for contractors.

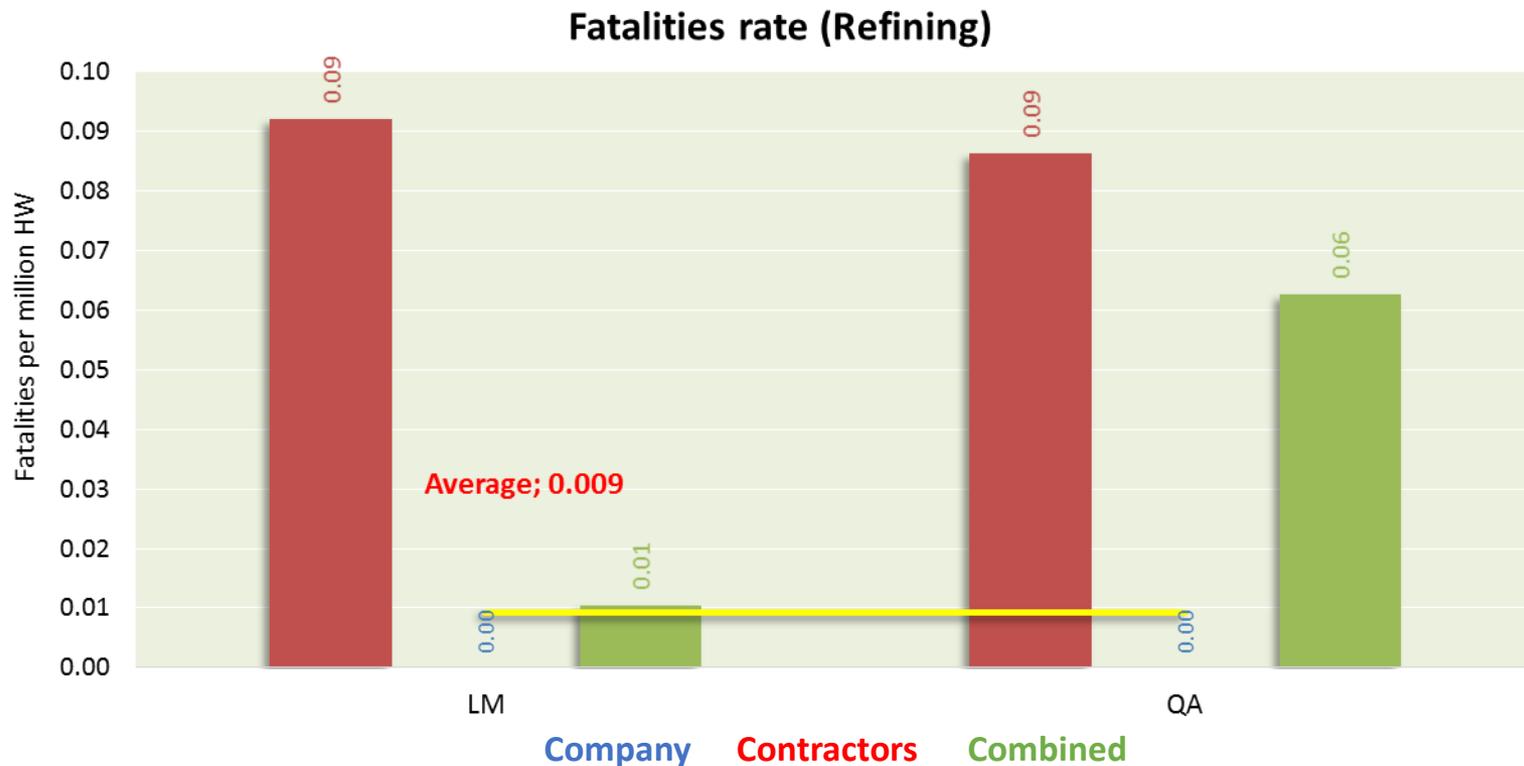
Company
 Contractors
 Combined

Cases with lost work days frequency rate (Refining)



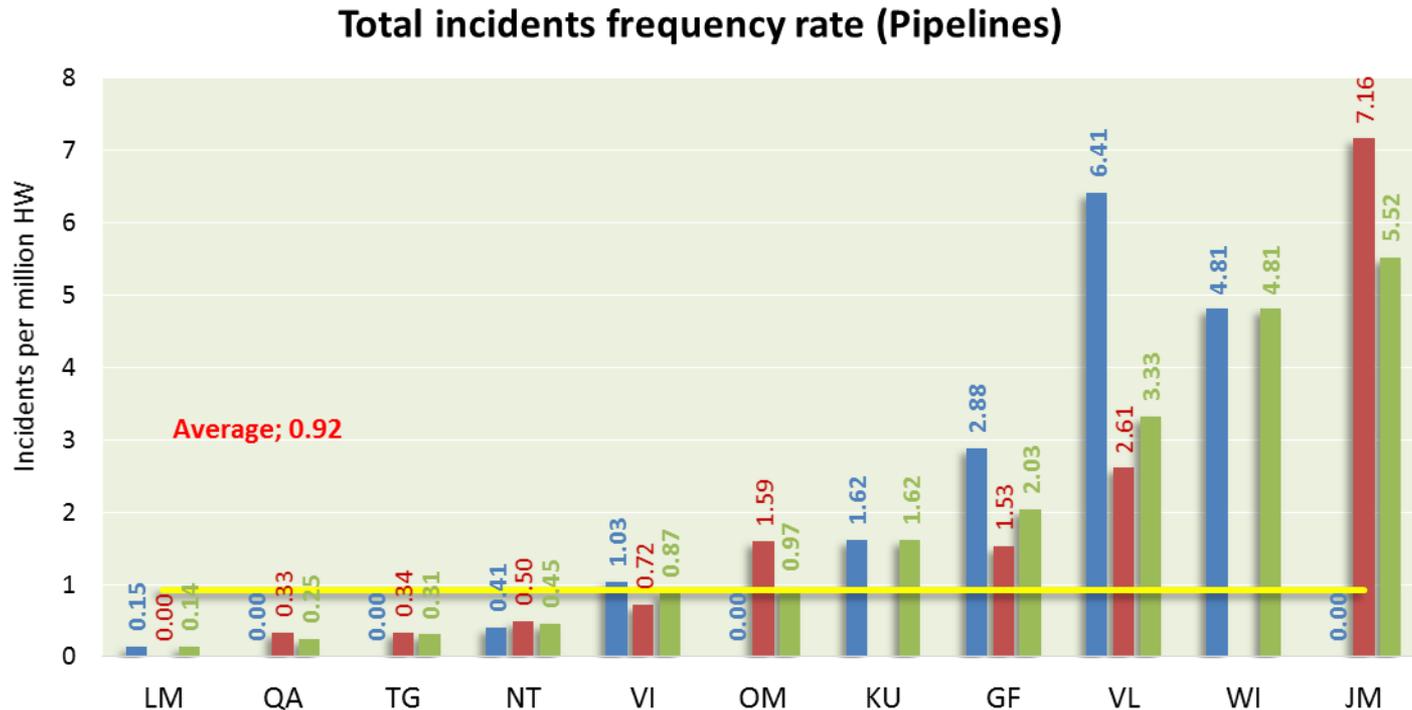
- Cases with lost work days frequency rate average in Refining was 0.53.
- This indicator was 0.50 for company employees and 0.59 for contractors.

Fatalities rate by company (Refining)



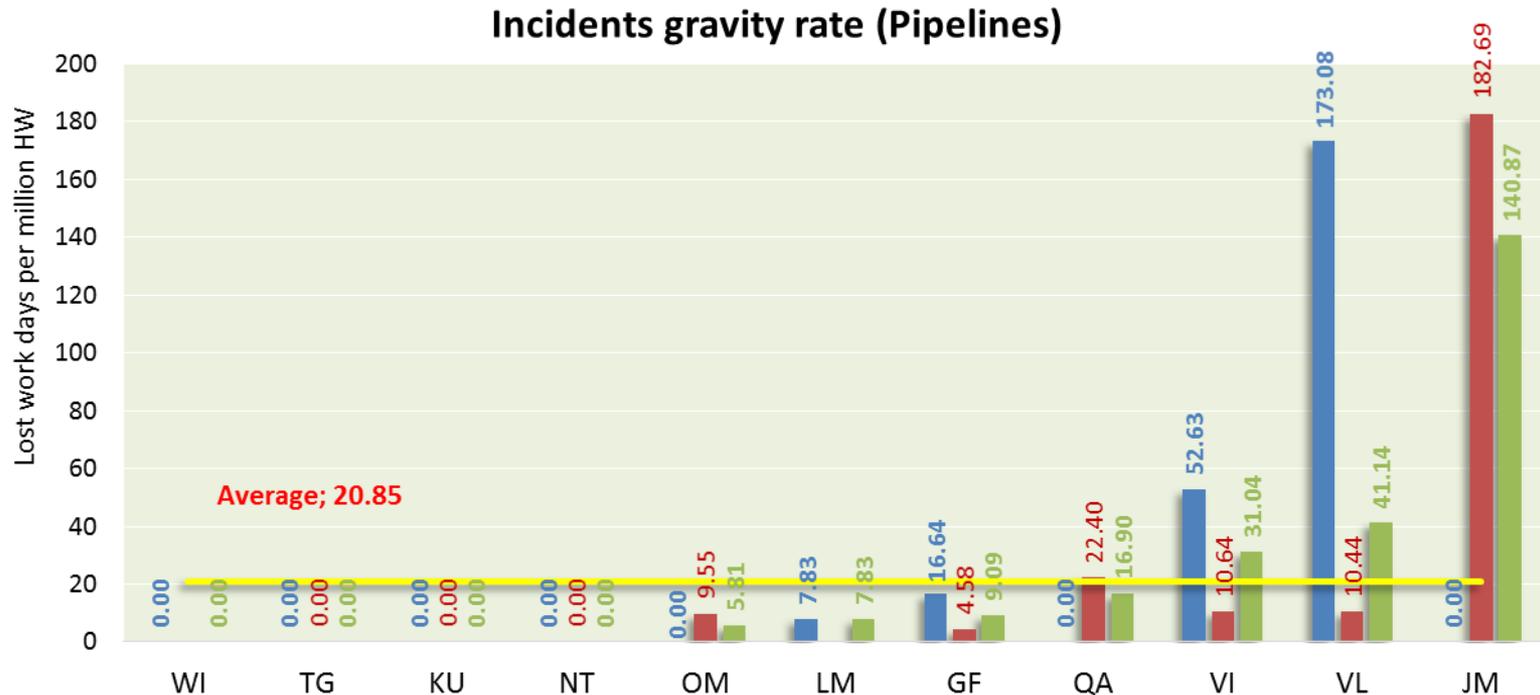
- 2 fatalities were reported in Refining.
- Both fatalities were contractors employees from two different operators.
- The overall indicator was 0.009, and 0.09 for the companies that reported fatalities.

Total incidents frequency rate by company (Pipelines)



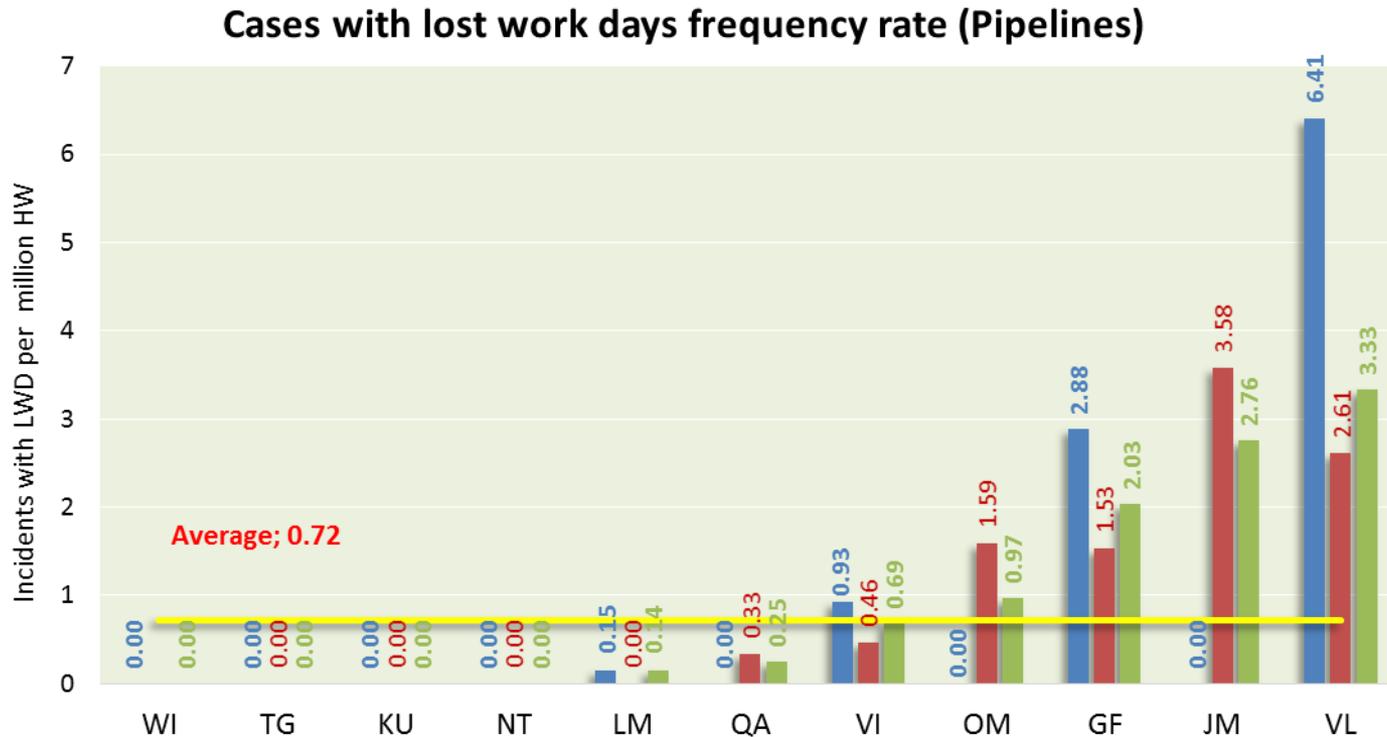
- The average incidents frequency rate in Pipelines was 0.92 per million hours worked. It was 0.89 for company employees and 0.96 for contractors.

Incidents gravity rate by company (Pipelines)



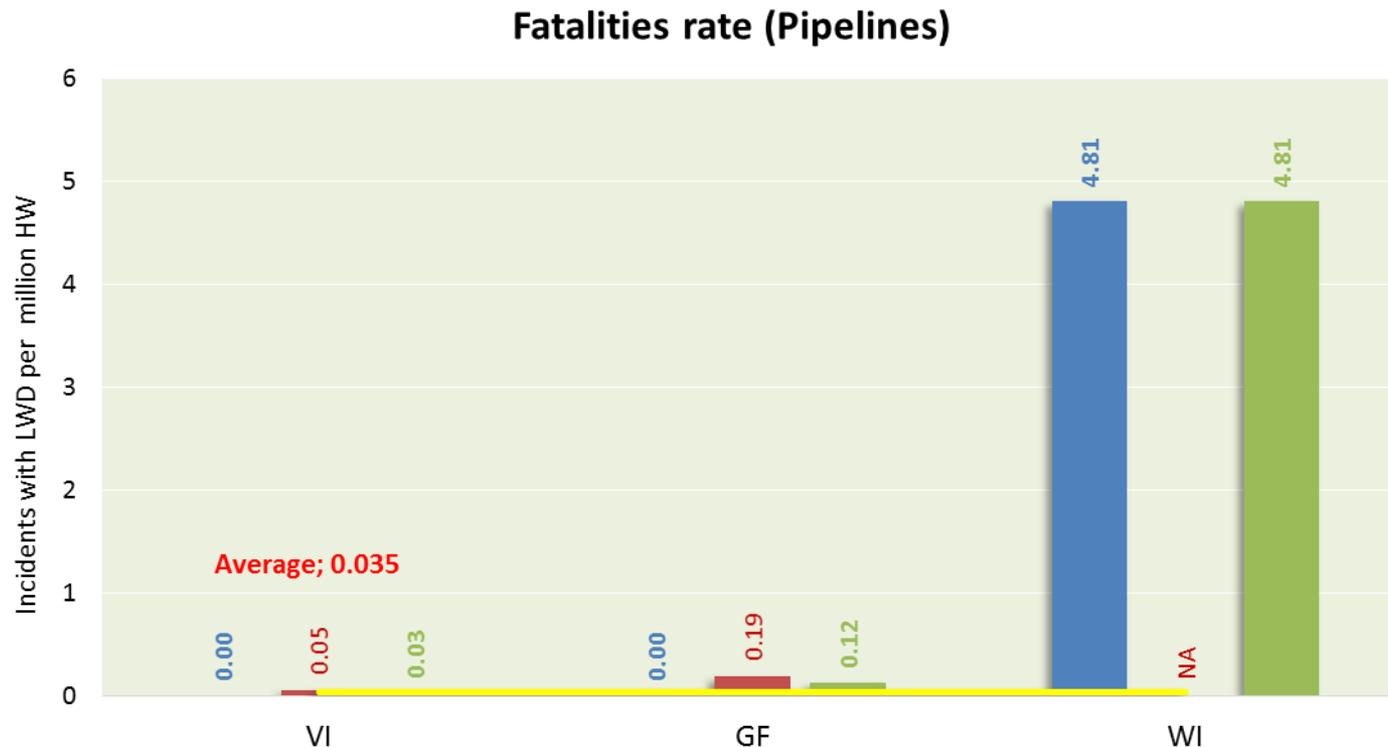
- The incidents gravity rate in Pipelines was 20.85 per million hours worked.
- This indicator was much higher for company employee (28.77) than for contractors (12.91).

Cases with lost work days frequency rate (Pipelines)



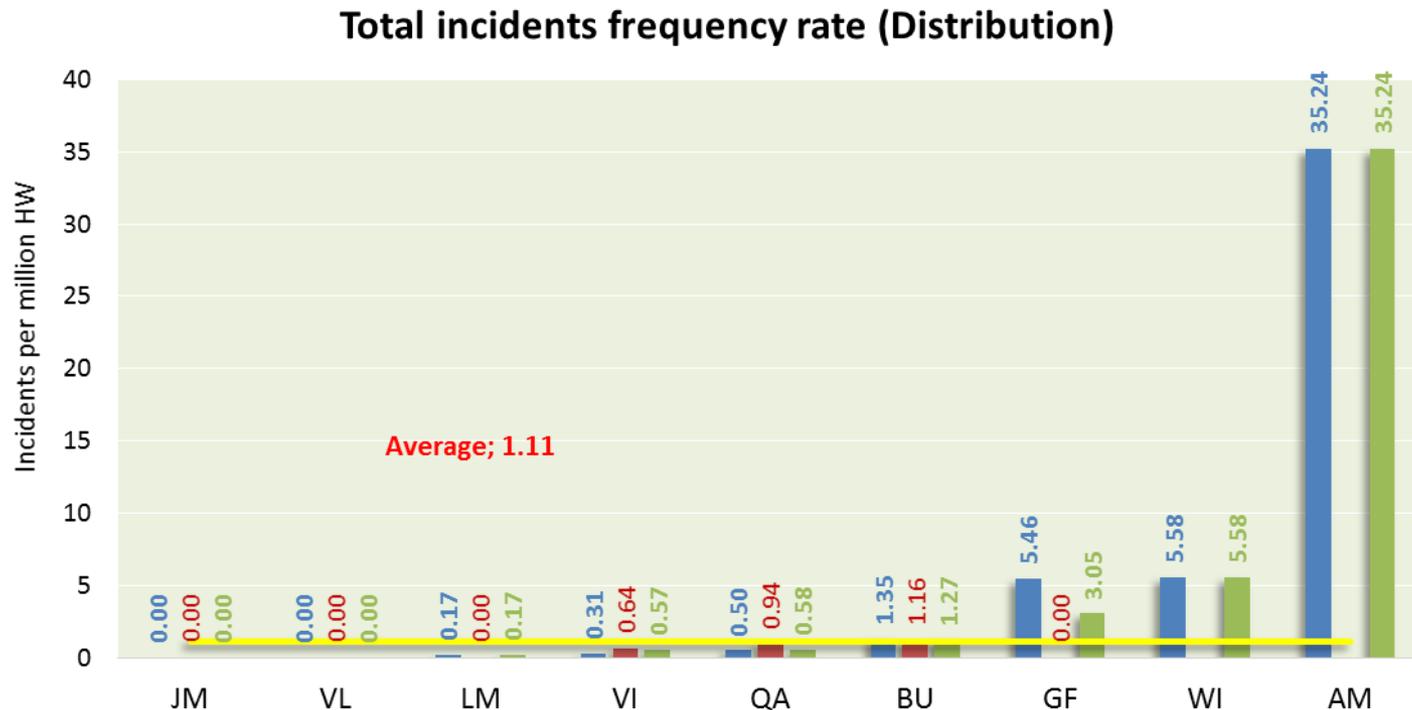
- The average cases with lost work days in Pipelines was 0.72 per million hours worked.
- Unlike the values reported for the gravity rate, similar values were reported for company employees (0.75) and contractors (0.70) in this indicator.

Fatalities rate by company (Pipelines)



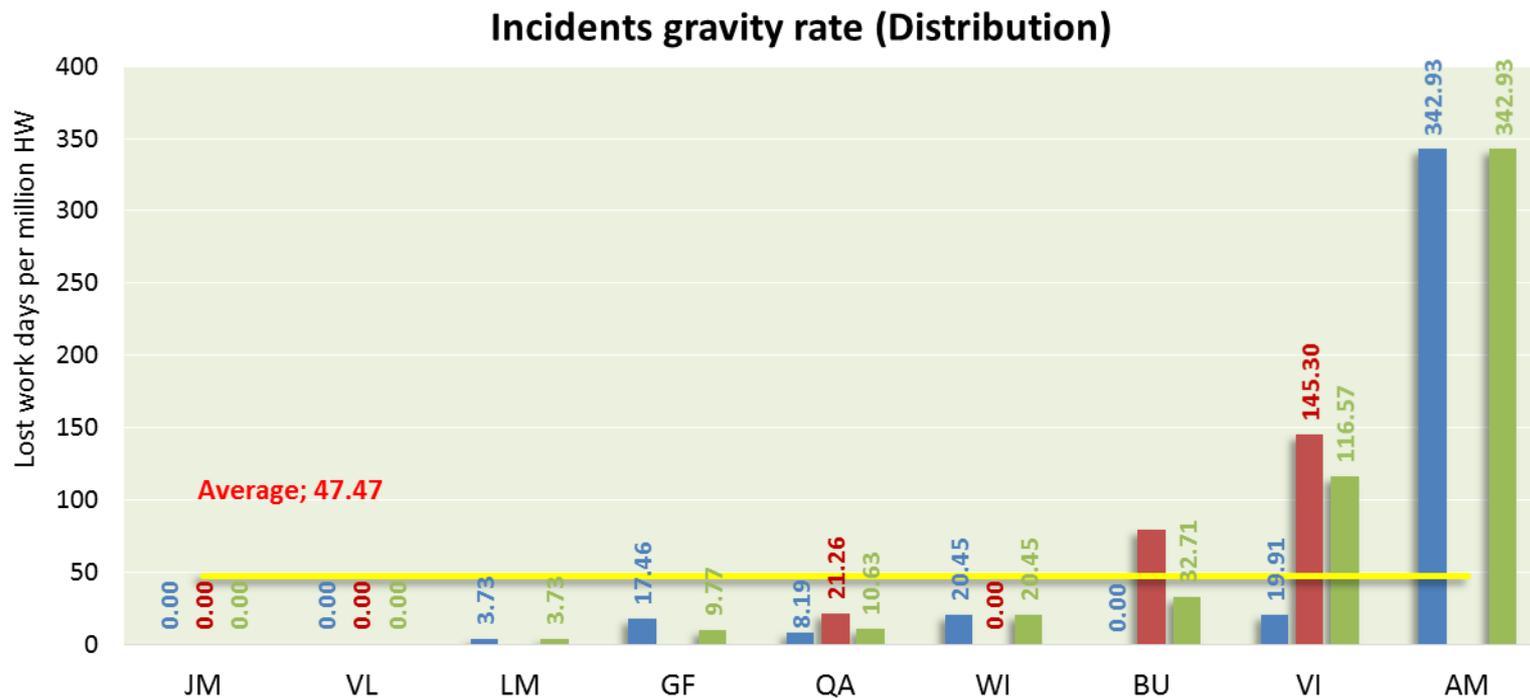
- 3 fatalities in 3 different companies were reported in Pipelines
- The overall average in Pipelines was 0.035 fatalities per million hours worked.

Total incidents frequency rate by company (Distribution)



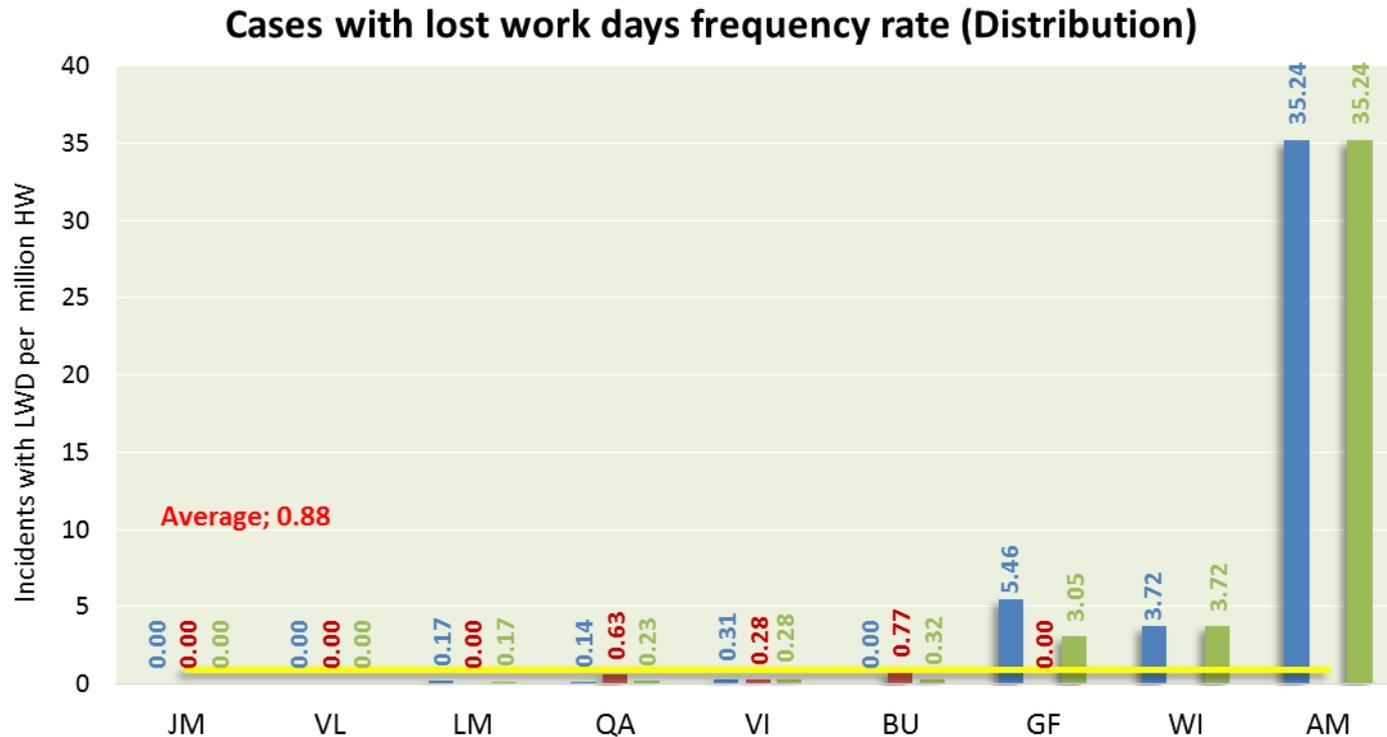
- The total incidents frequency rate for Distribution was 1.11 per million hours worked.
- This indicator was 1.34 for company employees and 0.64 for contractors.

Incidents gravity rate by company (Distribution)



- The gravity rate for Distribution was 47.47 lost work days per million hours worked, being the function with the worst results in this indicator.

Cases with lost work days frequency rate (Distribution)



- Cases with lost work days frequency rate in Distribution was 0.88
- The indicator was 1.17 for company employees and 0.32 for contractors

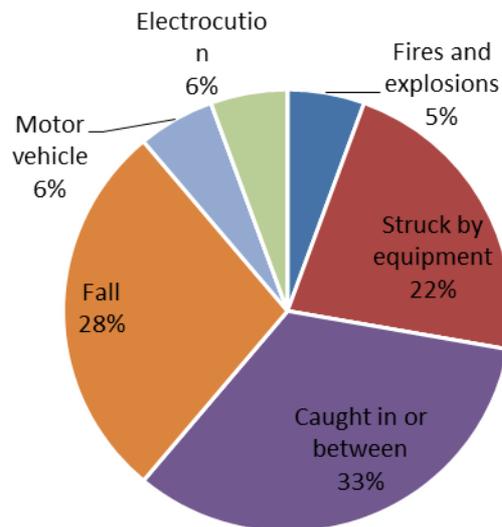
Fatalities rate by company (Distribution)

- One single fatality was reported in Distribution
- It was an employee from a contractor of the company VI
- 0.05 was the average fatality rate of the company VI.
- The overall fatality rate in Distribution was 0.011.

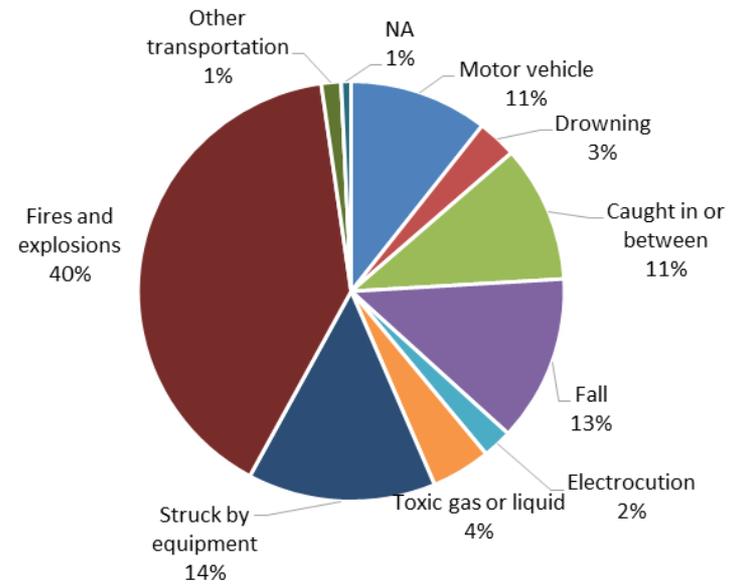
Fatalities

- 18 fatalities in 18 different incidents were reported in 2018.
- 15 fatalities correspond to contractors and 3 to company employees.
- The main causes of fatality in 2018 were: “caught in or between” (6 cases; 33%), “fall” (5 cases, 28%) and “struck by equipment” (4 cases, 22%)
- In the last 5 years, a total amount of 133 fatalities were reported. The main cause of this period was “fires and explosions” (40% of total), followed by “struck by equipment” (14%), “fall” (13%), “motor vehicle accident” (11%) and “caught in or between” (11%).

Causes of fatality 2018



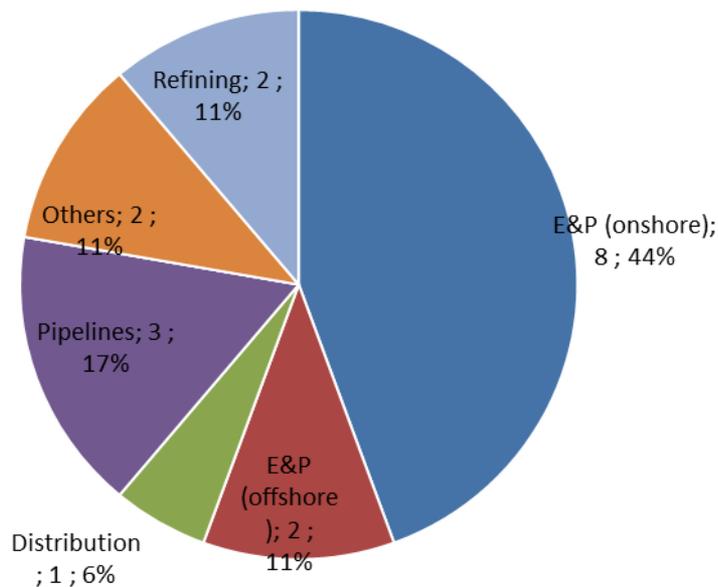
Causes of fatality 2014-2018



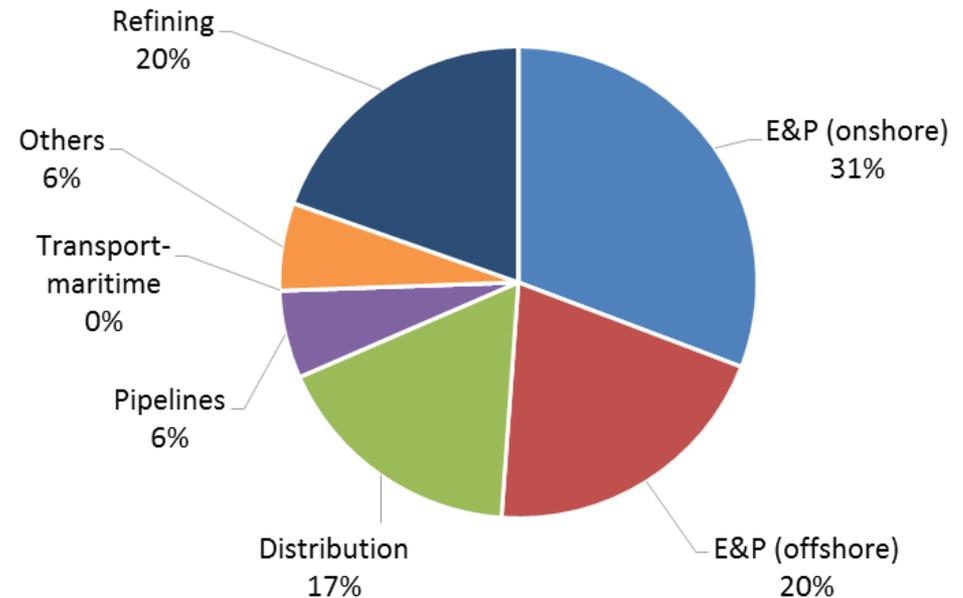
Fatalities by function

- E&P onshore was the business line that reported the highest amount of fatalities (8), which represents 44% of total fatalities reported in 2018.
- In the last 5 years 51% of the fatalities were reported in E&P and 20% in Refining.

Fatalities by function 2018



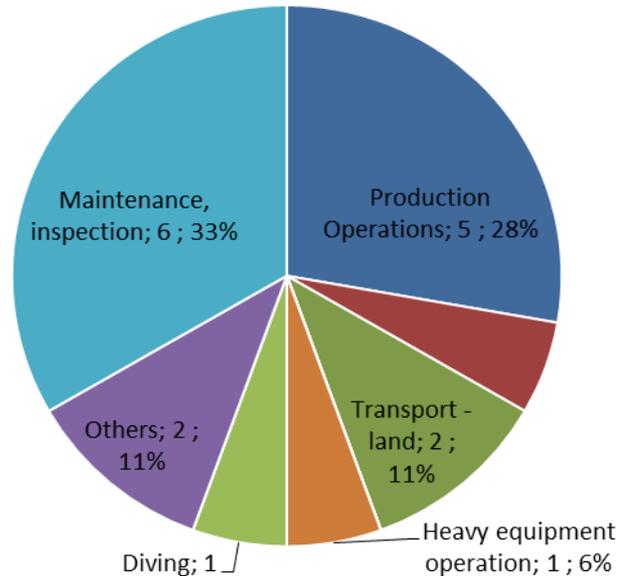
Fatalities by function 2014-2018



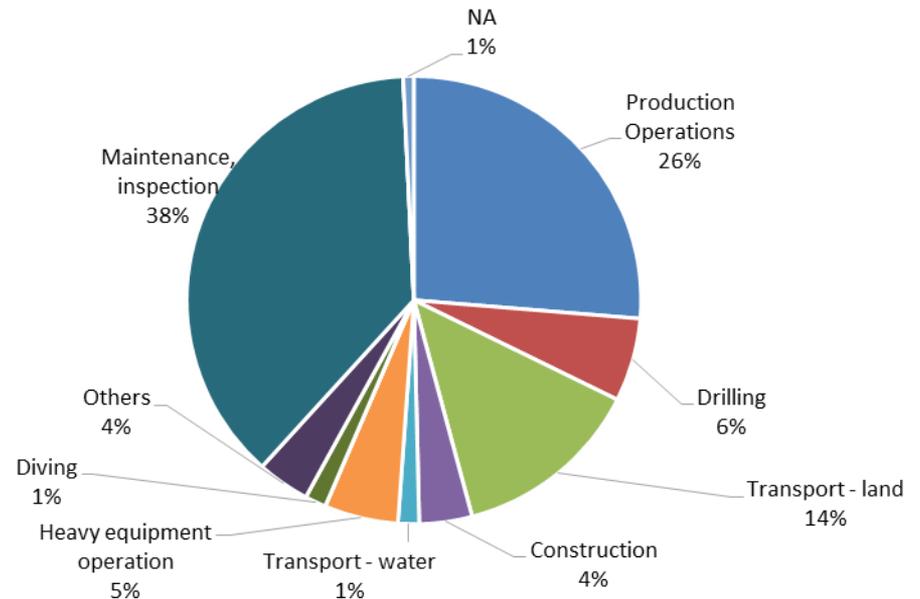
Fatalities by type of activity

- The activity that reported most fatalities was “inspection and maintenance” (6 cases, 33%), followed by production operations (5 cases, 28%)
- The incidents by type of activity reported in 2018 are similar to the historical trend. In the last 5 years, the activity that reported most fatalities was “inspection and maintenance” (38%), followed by “production operations” (26%) and “transport-land” (14%)

Fatalities by type of activity 2018

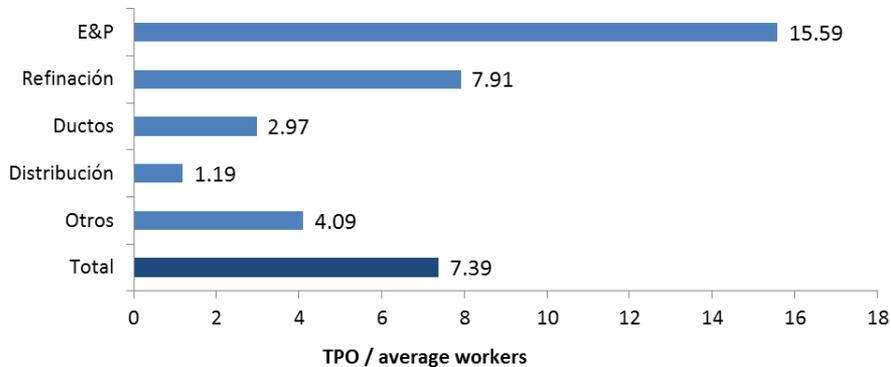


Fatalities by type of activity 2014-2018

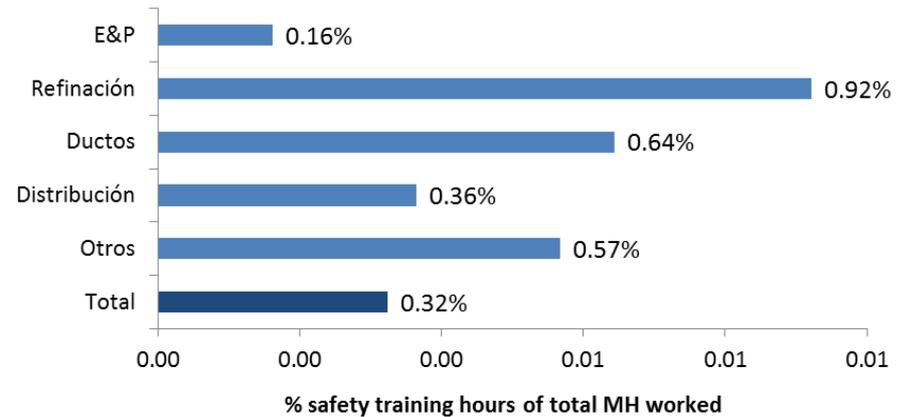


Proactive Indicators

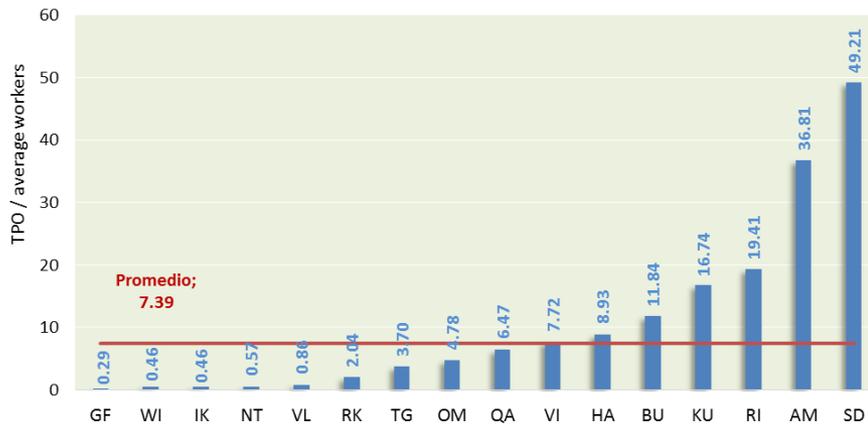
Task Planned Observations



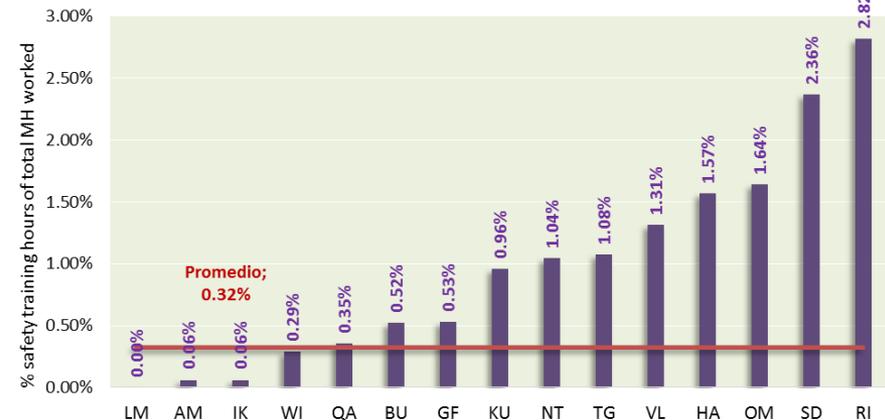
Safety training intensity



Task Planned Observations



Safety training intensity



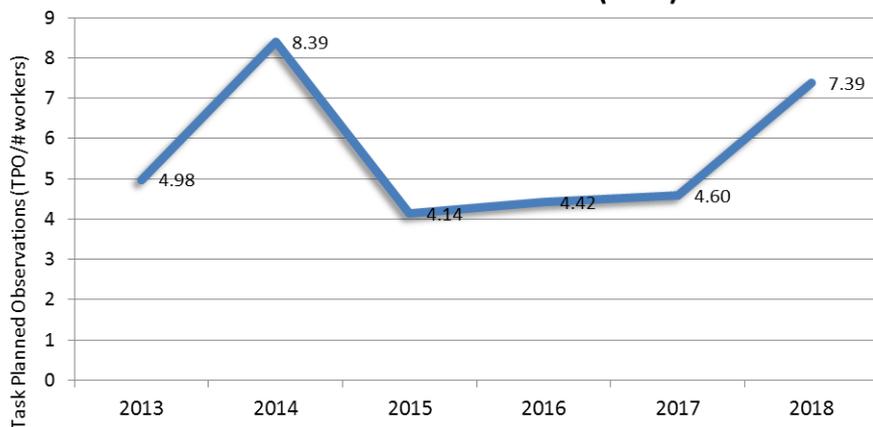
Proactive Indicators

Task Planned Observations (company)														
Function	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
E&P	1.83	1.07	1.28	1.01	4.87	1.45	3.12	8.69	7.76	17.98	6.39	8.87	11.14	15.59
Refining	2.21	0.99	1.60	2.51	7.05	15.93	5.22	4.06	5.36	6.69	4.71	4.61	3.45	7.91
Pipelines	1.18	1.59	0.92	1.25	2.42	3.81	1.98	2.05	2.56	4.16	2.97	2.53	1.35	2.97
Distribution	2.63	1.36	1.38	1.64	1.24	1.01	1.88	2.02	2.29	1.07	4.45	0.88	0.70	1.19
Others	0.28	1.44	0.57	1.41	3.23	1.29	2.19	2.56	2.98	2.64	2.16	1.99	2.02	4.09
Total	1.96	1.15	1.12	1.35	3.93	3.70	3.27	4.59	4.98	8.39	4.14	4.42	4.60	7.39

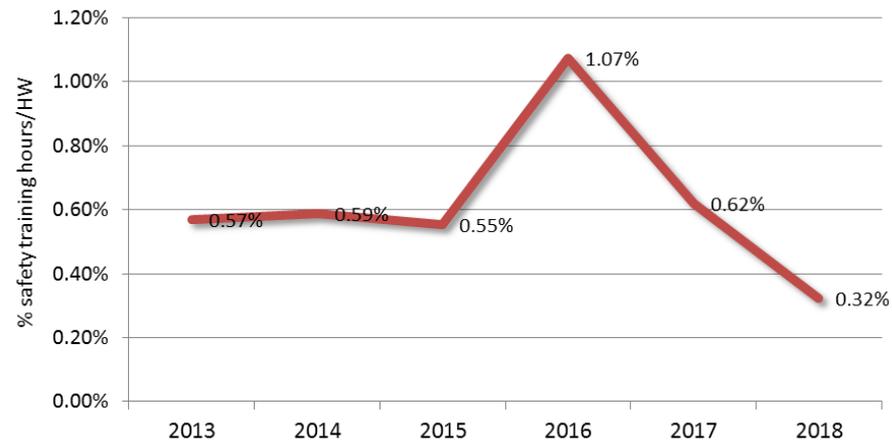
Safety Training Intensity (company)														
Function	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
E&P	0.62%	0.21%	0.22%	0.14%	0.10%	0.32%	0.30%	0.29%	0.51%	0.63%	0.40%	2.26%	1.19%	0.16%
Refining	0.29%	0.26%	0.21%	0.21%	0.30%	0.83%	0.35%	0.59%	0.80%	0.81%	0.65%	0.78%	0.38%	0.92%
Pipelines	0.10%	2.54%	1.19%	1.68%	0.16%	2.49%	0.97%	0.45%	1.00%	0.94%	1.29%	1.15%	0.75%	0.64%
Distribution	0.08%	0.15%	0.10%	1.13%	0.10%	0.19%	0.19%	0.28%	0.58%	0.58%	0.39%	0.45%	0.43%	0.23%
Others	0.19%	0.11%	0.02%	0.10%	0.26%	0.32%	0.18%	0.44%	0.62%	0.21%	0.33%	0.65%	0.41%	0.36%
Total	0.36%	0.24%	0.18%	0.20%	0.17%	0.45%	0.30%	0.42%	0.57%	0.59%	0.55%	1.07%	0.62%	0.32%

Proactive Indicators

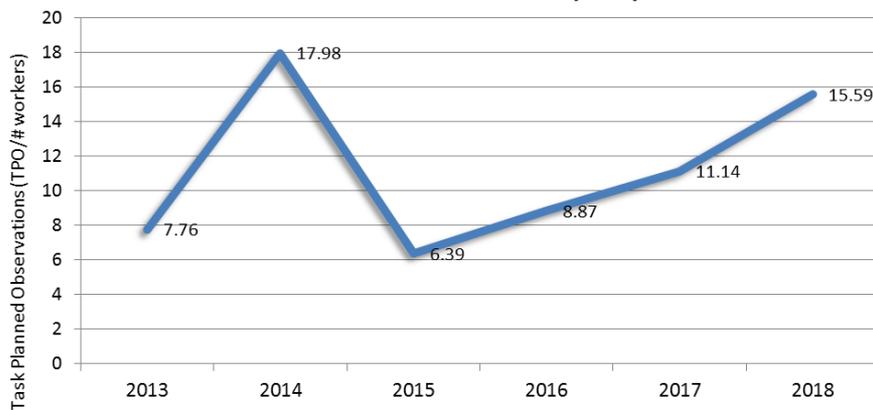
Task Planned Observations (total)



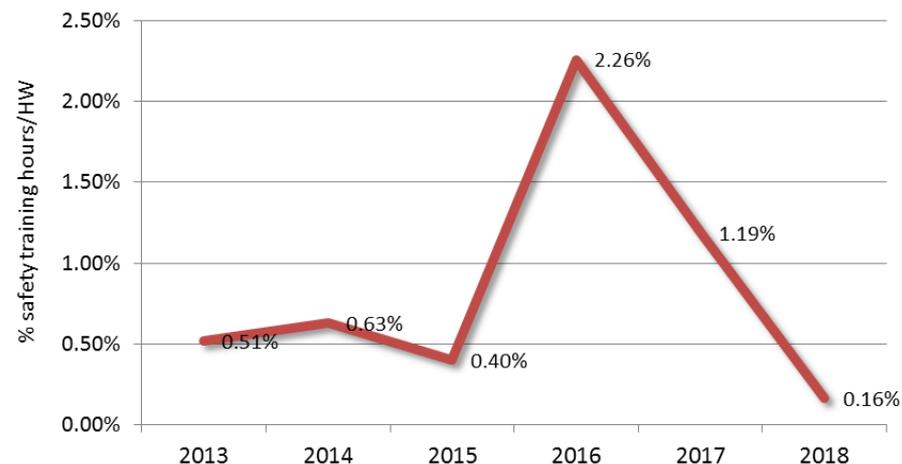
Safety Training Intensity (total)



Task Planned Observations (E&P)

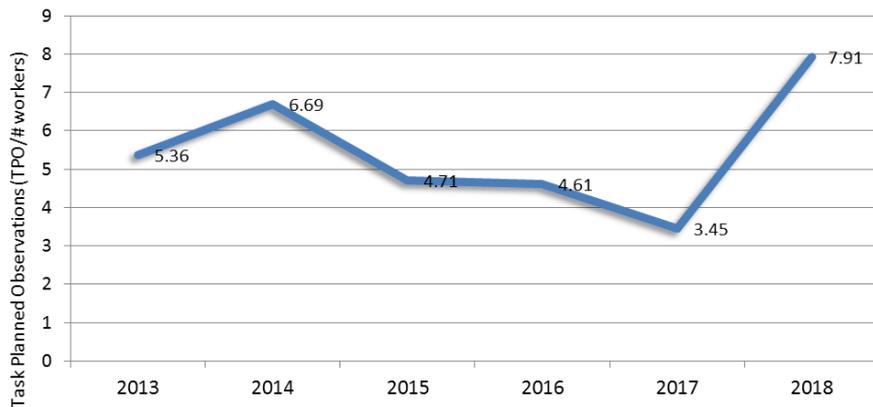


Safety Training Intensity (E&P)

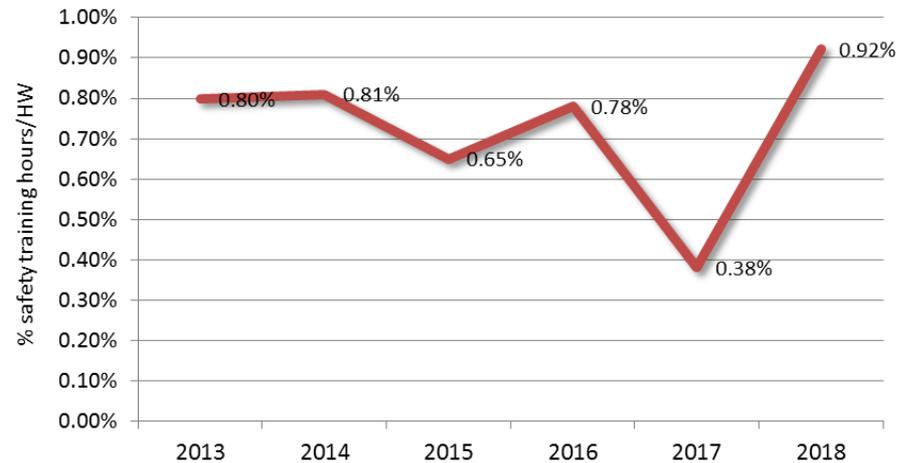


Proactive Indicators

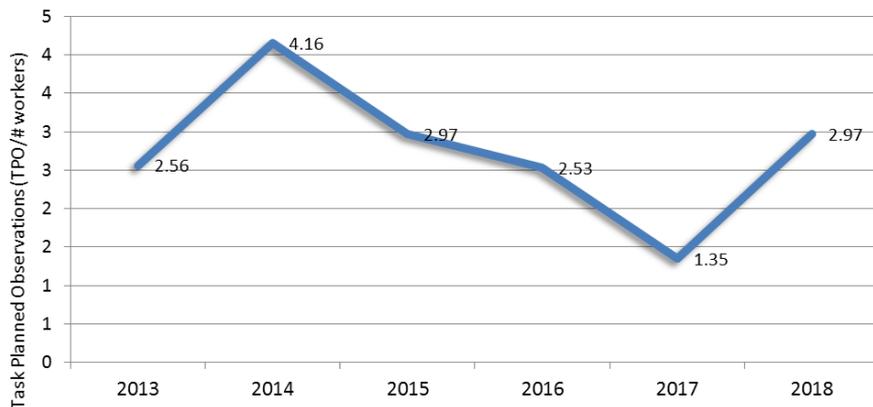
Task Planned Observations (Refining)



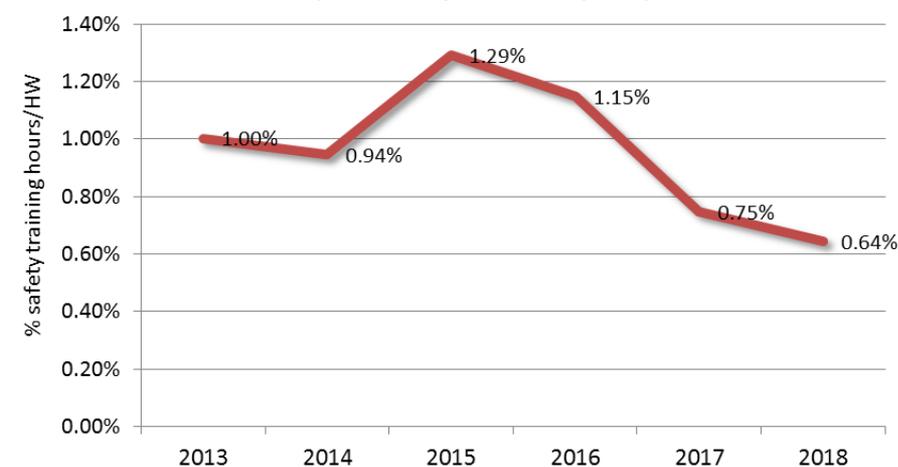
Safety Training Intensity (Refining)



Task Planned Observations (Pipelines)

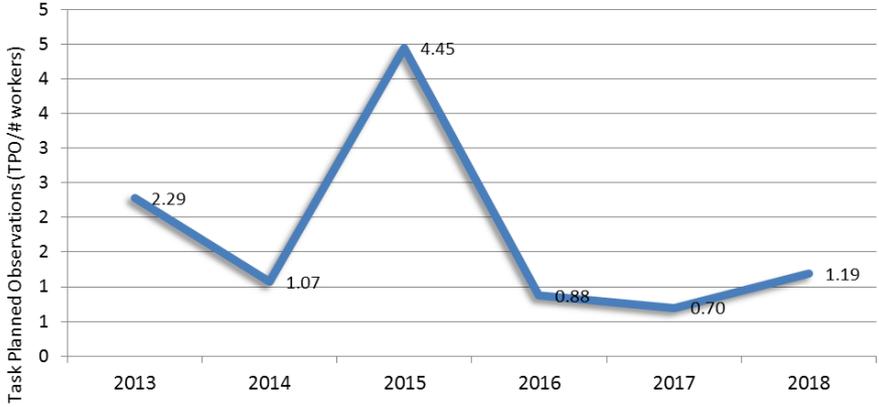


Safety Training Intensity (Pipelines)

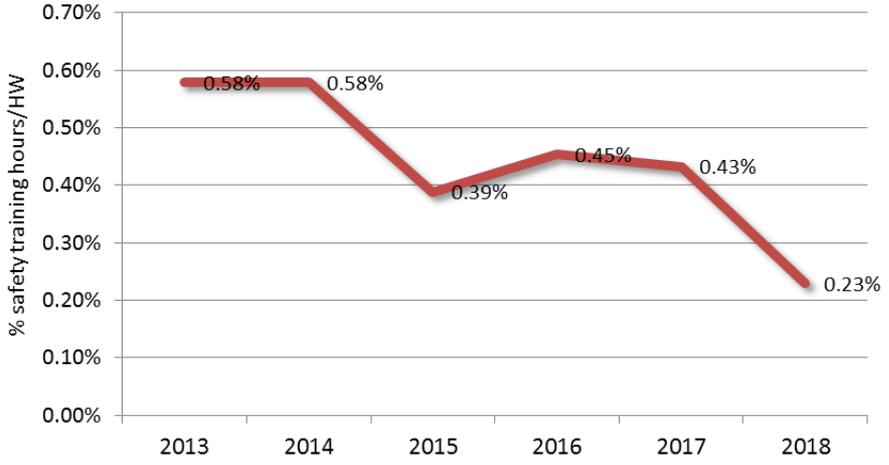


Proactive Indicators

Task Planned Observations (Distribution)



Safety Training Intensity (Distribution)



Annex: Reactive Indicators

Totals

Formulario	Rubro	Función	# empleados	# incidentes TTI	HH TTI	# dias TGRAV	HH TGRAV	# incidentes TIDL	HH TIDL	# incidentes TFAT	HH TFAT	TTI	TGRAV	TIDL	TFAT
OIC/PI	Compañía	E&P	62,692	124	150,325	4,324	150,325	68	150,325	2	150,325	0.82	28.76	0.45	0.013
OIC/PI	Compañía	Refinación	67,077	88	131,636	1,768	131,636	66	131,636	0	131,636	0.67	13.43	0.50	0.000
OIC/PI	Compañía	Ductos	20,488	38	42,922	1,235	42,922	32	42,922	1	42,922	0.89	28.77	0.75	0.023
OIC/PI	Compañía	Transporte-marítimo	2,824	3	6,974	124	6,974	1	6,974	0	6,974	0.43	17.78	0.14	0.000
OIC/PI	Compañía	Distribución	27,927	84	62,571	945	62,571	73	62,571	0	62,571	1.34	15.10	1.17	0.000
OIC/PI	Compañía	Otros	77,328	149	170,489	2,968	170,489	129	170,489	0	170,489	0.87	17.41	0.76	0.000
OIC/PI	Compañía	Total	258,336	486	564,916	11,364	564,916	369	564,916	3	564,916	0.86	20.12	0.65	0.005
				0	0	0	0	0	0	0	0				

Formulario	Rubro	Función	# empleados	# incidentes TTI	HH TTI	# dias TGRAV	HH TGRAV	# incidentes TIDL	HH TIDL	# incidentes TFAT	HH TFAT	TTI	TGRAV	TIDL	TFAT
OIC/PI	Contratistas	E&P	148,172	320	388,097	8,454	246,754	167	388,097	8	388,097	0.82	34.26	0.43	0.021
OIC/PI	Contratistas	Refinación	39,969	77	85,378	2,137	74,518	50	85,378	2	85,378	0.90	28.68	0.59	0.023
OIC/PI	Contratistas	Ductos	21,172	41	42,804	552	42,774	30	42,804	2	42,804	0.96	12.91	0.70	0.047
OIC/PI	Contratistas	Transporte-marítimo	0	0	0	0	0	0	0	0	0	NA	NA	NA	NA
OIC/PI	Contratistas	Distribución	16,244	20	31,293	3,440	29,812	10	31,293	1	31,293	0.64	115.39	0.32	0.032
OIC/PI	Contratistas	Otros	74,345	185	161,588	5,172	159,972	118	161,588	2	161,588	1.14	32.33	0.73	0.012
OIC/PI	Contratistas	Total	299,901	643	709,160	19,755	553,830	375	709,160	15	709,160	0.91	35.67	0.53	0.021
				0	0	0	0	0	0	0	0				

Formulario	Rubro	Función	# empleados	# incidentes TTI	HH TTI	# dias TGRAV	HH TGRAV	# incidentes TIDL	HH TIDL	# incidentes TFAT	HH TFAT	TTI	TGRAV	TIDL	TFAT
OIC/PI	Combinado	E&P	210,864	444	538,422	12,778	397,079	235	538,422	10	538,422	0.82	32.18	0.44	0.019
OIC/PI	Combinado	Refinación	107,046	165	217,014	3,905	206,154	116	217,014	2	217,014	0.76	18.94	0.53	0.009
OIC/PI	Combinado	Ductos	41,660	79	85,726	1,787	85,696	62	85,726	3	85,726	0.92	20.85	0.72	0.035
OIC/PI	Combinado	Transporte-marítimo	2,824	3	6,974	124	6,974	1	6,974	0	6,974	0.43	17.78	0.14	0.000
OIC/PI	Combinado	Distribución	44,171	104	93,863	4,385	92,382	83	93,863	1	93,863	1.11	47.47	0.88	0.011
OIC/PI	Combinado	Otros	151,673	334	332,077	8,140	330,461	247	332,077	2	332,077	1.01	24.63	0.74	0.006
OIC/PI	Combinado	Total	558,237	1,129	1,274,076	31,119	1,118,746	744	1,274,076	18	1,274,076	0.89	27.82	0.58	0.014

Offshore

Formulario	Rubro	Función	# empleados	# incidentes TTI	HH TTI	# dias TGRAV	HH TGRAV	# incidentes TIDL	HH TIDL	# incidentes TFAT	HH TFAT	TTI	TGRAV	TIDL	TFAT
OIO	Compañía	E&P	8,062	9	26,733	622	26,733	9	26,733	0	26,733	0.34	23.27	0.34	0.000
OIO	Contratistas	E&P	3,562	11	18,908	0	106	11	18,908	0	18,908	0.58	0.00	0.58	0.000
OIO	Combinado	E&P	11,624	20	45,641	622	26,839	20	45,641	0	45,641	0.44	23.18	0.44	0.000

Annex: Proactive Indicators

Proactive

Formulario	Rubro	Función	# OPT	# trabajadores OPT	# HFS (miles)	# HH FS	OPT	HFS
OIC/PI	Compañía	E&P	426,922	27,392	180.3	111,334	15.59	0.16%
OIC/PI	Compañía	Refinación	163,025	20,598	127.0	13,780	7.91	0.92%
OIC/PI	Compañía	Ductos	40,055	13,472	59.2	9,205	2.97	0.64%
OIC/PI	Compañía	Transporte-marítimo	15	121	0.5	239	0.12	0.23%
OIC/PI	Compañía	Distribución	14,054	11,833	70.8	19,430	1.19	0.36%
OIC/PI	Compañía	Otros	126,626	30,933	141.0	24,872	4.09	0.57%
OIC/PI	Compañía	Total	770,697	104,349	579	178,860	7.39	0.32%



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BENCHMARKING

Safety Benchmarking in the oil and gas industry in Latin America and the Caribbean (2018 data)

