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REGIONAL ASSOCIATION OF  
OIL, GAS AND BIOFUELS SECTOR COMPANIES  
IN LATIN AMERICA AND THE CARIBBEAN

# **SAFETY BENCHMARKING IN THE OIL AND GAS INDUSTRY IN LATIN AMERICA AND THE CARIBBEAN**

## ***2011 STATISTICS FOR ARPEL MEMBER COMPANIES***





# ARPEL REPORT

## **Safety benchmarking in the oil and gas industry in Latin America and the Caribbean**

### ***2011 Statistics for ARPEL Member Companies***

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*ARPEL, August 2012*



**ARPEL**

***Report on Safety Benchmarking in the Oil and Industry for Latin America and the Caribbean - 2011 Statistics for ARPEL Member Companies***

***ARPEL OHS Report N° 29-2012***

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Regional Association of Oil, Gas and Biofuels Sector Companies in Latin America and the Caribbean

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## 1.0 EXECUTIVE SUMMARY

One of the activities of the Environment, Health and Safety Committee of the Regional Association of Oil, Gas and Biofuels Sector Companies in Latin America and the Caribbean (ARPEL) focuses on the initiative of compiling information on occupational injuries, diseases and fatalities in the oil industry of Latin America and the Caribbean.

In this sense, the present report represents the fifteenth annual compilation of data in reference to occupational injuries, diseases and fatalities, for ARPEL Member Companies. The objective of this report is to contribute to eradicate damages to people and facilities from the oil industry's activities. The same provides a comparative analysis of the performance in occupational health and industrial safety of the oil industry, for ARPEL's member companies in 2011. This report also includes comparisons with ARPEL's data compiled in previous studies, from 1997 to now, and some of the results are compared with the OGP<sup>1</sup> Report N° 2011s on safety performance indicators for year 2011.

Four indicators of reactive nature are analyzed, considering the *total of incidents*, their *gravity* and *frequency*, and *fatal incidents*. Compiled data correspond to companies' workers and contractors separately; a "combined" result is also provided for companies' workers and contractors as a whole. These four indicators are analyzed for on-shore and offshore activities, together in a first instance; after that, a specific analysis is included for offshore activities as well. Besides the comparative analysis at the level of the oil industry as a whole, the individual reactive indicators of each Member Company of ARPEL in 2011 are also comparatively analyzed (keeping the confidentiality of these data).

This report also includes two indicators of proactive nature: *Safety Tasks Planned Observations and Safety Training Intensity*, both for company workers only. This report includes all main sectors of the oil industry, which are grouped in eight functions: Exploration and Production, Refining, Transport of liquids through pipelines (Transport – pipelines for liquids), Transport of gases through pipelines (Transport – pipelines for gases), Transport through pipelines in general (Transport – pipelines not separated), Maritime Transport (Transport – Maritime), Distribution, and Others. The definitions of such functions correspond to ARPEL User's Manual, 6<sup>th</sup> Edition (2012). Fatality causes are also analyzed for year 2011 and compared to previous years.

Seventeen ARPEL Member Companies reported Contractors data and seven reported data on offshore activities, out of nineteen ARPEL Member Companies that reported data for year 2011.

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<sup>1</sup> International Association of Oil and Gas Producers



**Table 1.0: List of companies that answered to the “2011 Safety Benchmarking in the Oil and Gas Industry in Latin America and the Caribbean”**

ANCAP	PEMEX
CHEVRON	PETROBRAS
ECOPETROL	PETROPERU
ENAP	PETROTRIN
EP-PETROECUADOR	PLUSPETROL
ESSO PETROLERA ARG.	RECOPE
HOCOL	REFIDOMSA
OCENSA	REPSOL
PCJ	STAATSOLIE
PDVSA	

### 1.1. Selected results for the year 2011

- The total Man-hours (in thousands) reported in this Report amounts to 2,344,532; considering both companies and contractors and correspond to 19 Member Companies.
- The Total Incidents Rate (for all functional units) for companies and contractors combined was of 3.29 incidents per 1,000,000 worked hours (Companies only: 4.13. Contractors only: 2.83). The function with the largest number of incidents was "Transport – pipelines for gases" for Contractors, with 10.05 incidents per 1,000,000 worked hours.
- In average for all functional units, the Companies' workers lost 68.02 days per 1,000,000 hours worked, compared to 66.16 lost workdays by Contractors.
- The incidents' Frequency rate with lost workdays considering all functional units for both Company and Contractors, corresponds to 2.22 cases of lost workdays per 1,000,000 hours. (Companies only: 4.70; Contractors only: 1.25)
- The function that registered the largest rate of fatalities in 2011 was "transport-pipelines for gases", with a Rate of 0.242 fatalities per 1,000,000 worked hours, followed by "transport-pipelines for liquids" (0.076), "distribution" (0.058), "E&P" (0.034), "refining" (0.029), "other" (0.013) and "transport-pipelines not separated" (0.010). "Transport-maritime" did not register any fatalities. The total number of fatalities registered for the year 2011 was 65.
- Fatalities occurred in 2011 were mainly caused by "Car Accidents" and "fires and explosions" (12 cases both), followed by "struck by equipment" (10), "fall" (7), "drowning" (6), "caught in or between" (5), "other transportation" (4), "electrocution" and "other" (3), and "toxic gas or liquid" (2). Finally, there is one case which cause was not reported.
- Sixteen companies reported data for proactive indicators.
- Considering all functions, 3.27 task planned observations (TPO) were carried out per employee during 2011. This value is a bit lower than the one registered in 2010 (3.70)
- The Safety Training Intensity Rate registered a global value of 0.30 training hours per 100 worked hours for the companies' workers. This value is also a bit lower than the one obtained in 2010 (0.45).



## 1.2. Selected comparative results for the term 2000/2011

- In the year 2011 a record was reached once again for both companies that sent their information for the benchmarking (19) and hours worked reported (2,345 millions).
- The Total Incident's rate (that includes diseases, injuries and fatalities) registered a general decrease for all functions in the combined category compared to 2010, however is still higher than the average values registered in the period.
- The Incidents' Gravity Rate (IGR), considering all functions for both Company and Contractors was lower in 2011 than 2010 (66.93 vs 82.39 lost workdays per 1,000,000 worked hours.)
- The Incidents' Frequency rate with Lost Workdays in 2011 showed, with no distinction of functions, an increase in comparison with 2010 (2.22 vs 1.57), mainly caused by the increase in the Company category (4.70 vs 2.74), in which the highest values for the period were registered. Regarding Contractors category, although an increase was observed, the value registered for the year 2011 (1.25) is the second lowest value of the period.
- Regarding the fatal incidents rate, although it has increased in comparison with the previous year (0.028 vs 0.023), it remains at the same level than the last four years, which is significantly lower than the values registered at the beginning of the period (around 0.05).
- "Fires and Explosions" is still the main cause of fatalities for the period 2001-2011 (99 cases, 16.2%), followed by "car accidents" (97 cases, 15.8%) and "struck by equipment" (93 cases, 15.1%).
- The Task Planned Observations Rate decreased from 3.7 (2010) to 3.3 (2011), but remained in higher levels than 2008 and the previous years.
- The Safety Training Intensity Rate, considering all functions together, decreased from 0.45 to 0.30 in comparison to the previous year, however is still higher than the average values registered in the latest years
- Following there is a graph showing the total reported Man-hours (in millions, for both the Company's workers and Contractors and including offshore activities) and the number of Member Companies that participated in each year's report for the term 1997/2011.

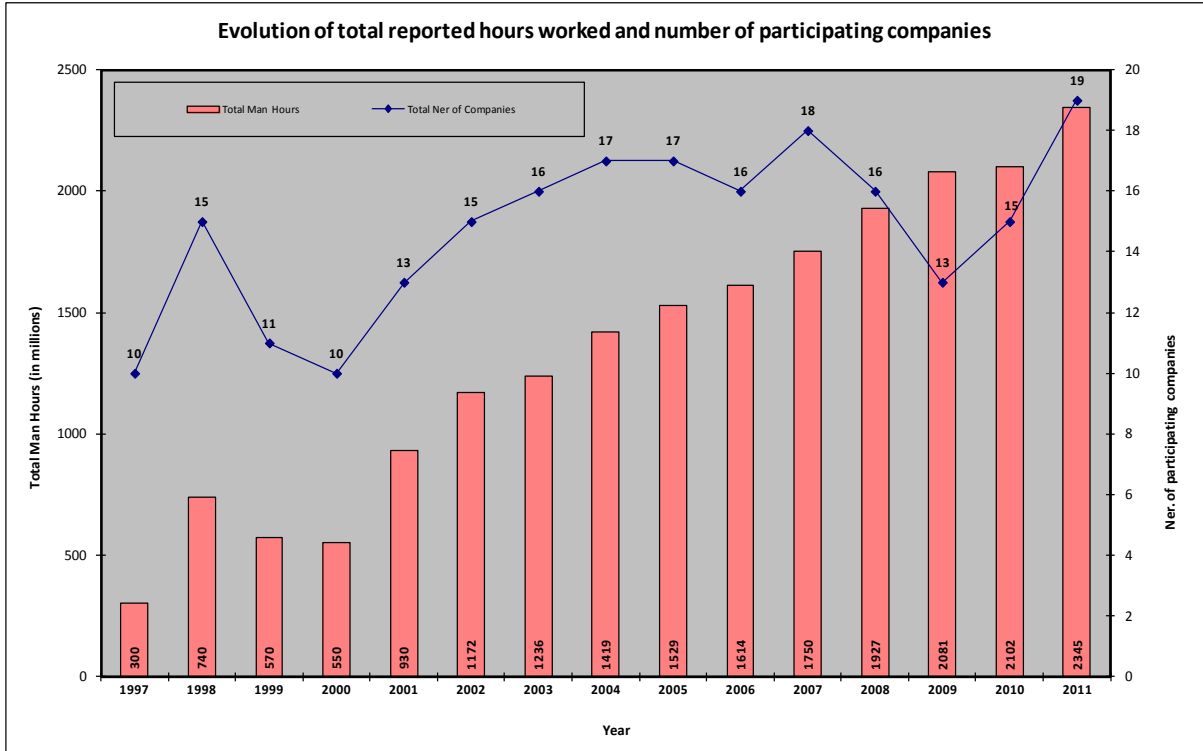


Figure 1.2



## 2.0 REACTIVE INDICATORS – onshore and offshore activities

### Explanatory notes

As is 2010 Report, all reactive indicators in this document are reported as “incidents per 1,000,000 worked hours”. For brevity’s sake, only a numeric value is provided and units are as aforementioned.

Not all companies reported data required to calculate all indicators. For this reason, and for each indicator, only those companies that reported all required data correspondent to the specific indicator were considered to calculate it. Thus, the total man-hours reported in tables 9.1 to 9.4 (appendix B) does not always match the value used to calculate the rates. The total man-hours effectively used for the calculation of each indicator are noted in each case.

### 2.1. Total incidents’ rate (per functional unit); data of year 2011

The total incidents’ rate is defined by means of the following formula:

$$\text{Total incidents' rate} = \frac{\text{Total recordable cases} \times 1,000}{\text{Worked hours in thousands}}$$

(Please refer to Chapters 6.0 and 10.0 of the User's Manual)

Function	Number of companies that reported data related to this indicator	Total reported man-hours (company and contractors) - in thousands.	Man-hours used for the calculation of this indicator (company and contractors) – in thousands
E&P	12	1,062,441	1,062,441
Refining	15	311,130	311,130
Transport – pipelines for liquids	6	26,230	26,230
Transport – pipelines for gases	2	8,279	8,279
<i>Transport – pipelines not separated</i>	4	98,142	98,142
Transport - Maritime	4	24,616	24,616
Distribution	9	103,590	103,590
Other	11	710,103	710,103
<b>Total</b>	<b>19</b>	<b>2,344,532</b>	<b>2,344,532</b>

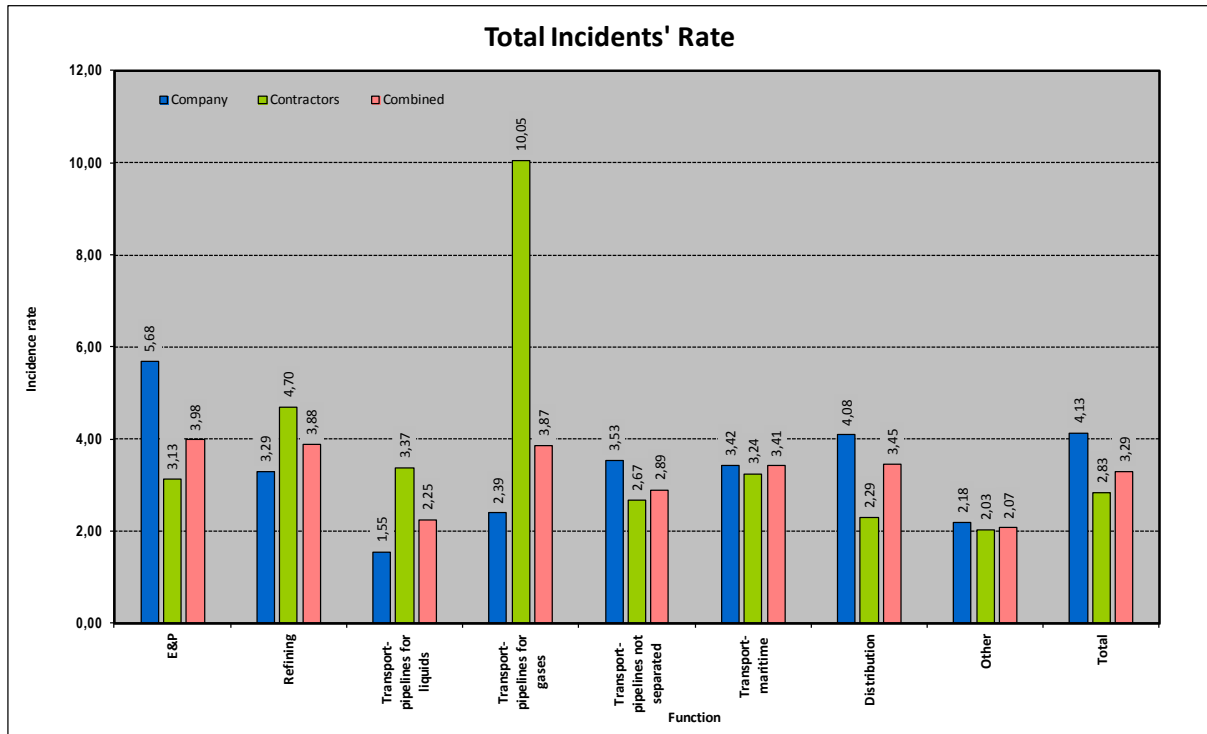


Figure 2.1

## 2.2. Evolution of the total incidents' rate (per functional unit)

### 2.2.1 Company data

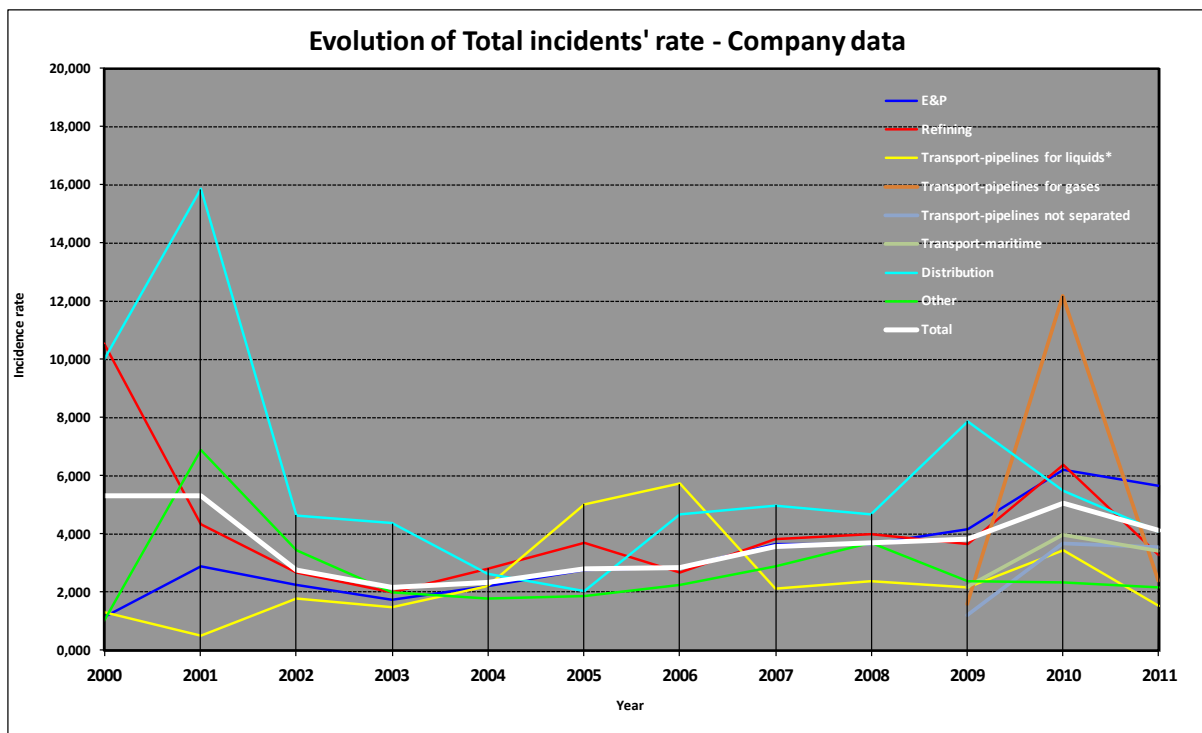


Figure 2.2.1



### 2.2.2 Contractors data

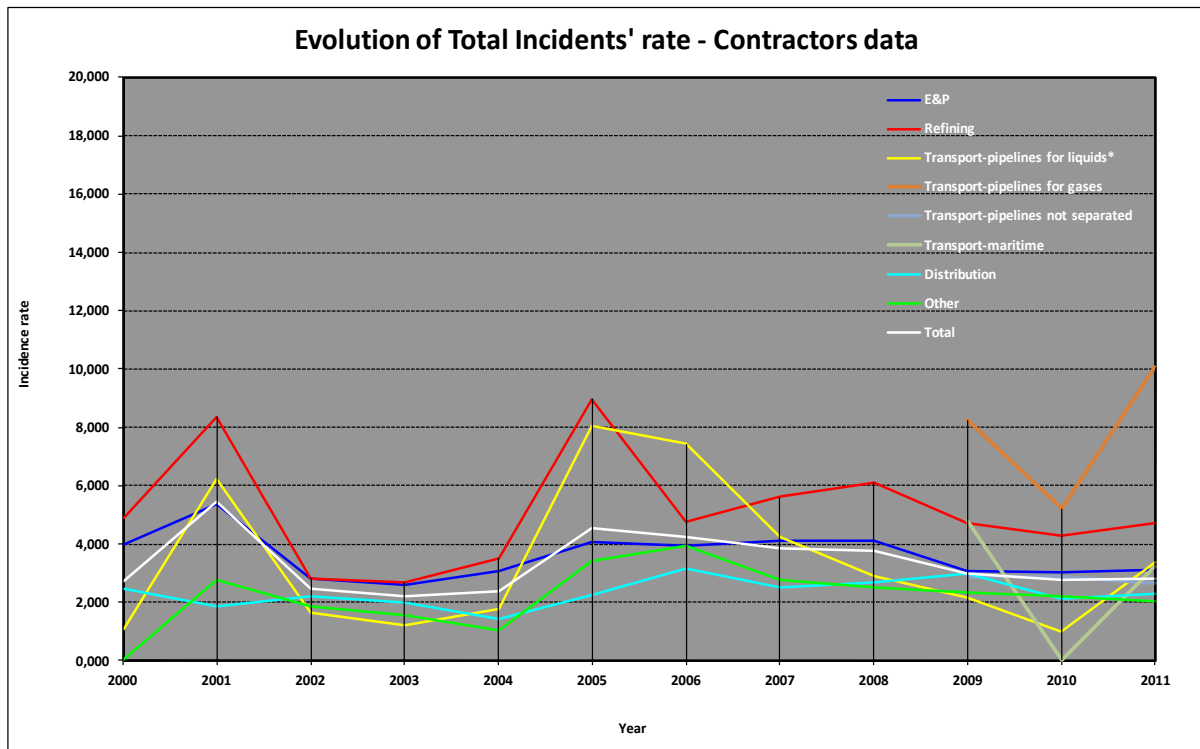


Figure 2.2.2

### 2.2.3 Combined data

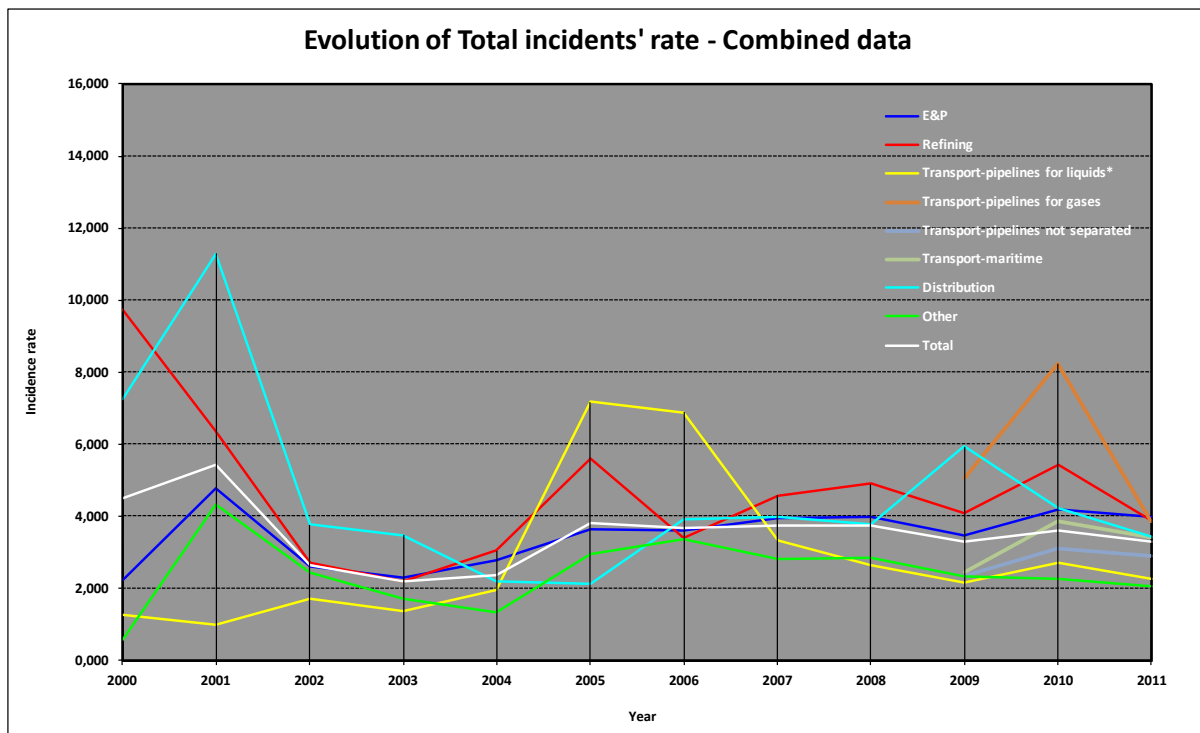


Figure 2.2.3



Figures 2.2.1 to 2.2.3 show the results for company’s employees, contractors and combined, respectively, of the total incidents’ rate for term 2000/2011, calculated as “incidents per 1,000,000 worked hours”. The corresponding tabulated results are shown in appendix A. The combined “Total” (figure 2.2.3) represents data reported by the following number of companies according to the year in consideration:

Year	Number of companies that reported data	
	For this indicator	For this report
2000	10	10
2001	11	13
2002	15	15
2003	16	16
2004	17	17
2005	17	17
2006	16	16
2007	18	18
2008	16	16
2009	13	13
2010	15	15
2011	19	19

### 2.3. Incidents’ gravity rate (per functional unit); data of year 2011

The incidents’ gravity rate is defined by the following formula:

$$\text{Incidents' gravity rate} = \frac{\text{Number of days away from work} \times 1,000}{\text{Worked hours in thousands}}$$

(Please refer to Chapters 6.0 and 10.0 of the User's Manual)

Function	Number of companies that reported data related to this indicator	Total reported man-hours (Company and Contractors) - in thousands.	Man-hours used for the calculation of the indicator (Company and Contractors) – in thousands
E&P	12	1.062.441	792.213
Refining	15	311.130	287.242
Transport – pipelines for liquids	6	26.230	23.920
Transport – pipelines for gases	2	8.279	7.427
<i>Transport – pipelines not separated</i>	4	98.142	98.142
Transport - Maritime	4	24.616	23.745
Distribution	9	103.590	100.775
Others	11	710.103	681.096
<b>Total</b>	<b>19</b>	<b>2.344.532</b>	<b>2.014.561</b>



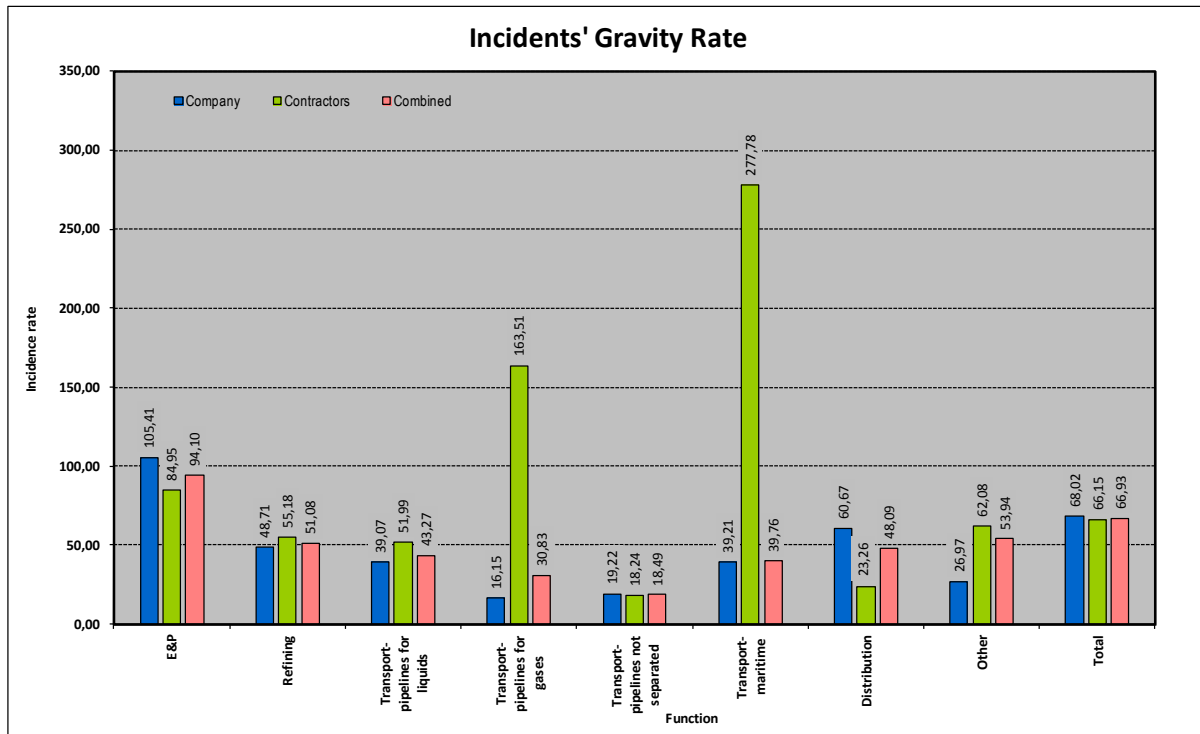


Figure 2.3

## 2.4. Evolution of the incidents' gravity rate (per functional unit)

### 2.4.1 Company data

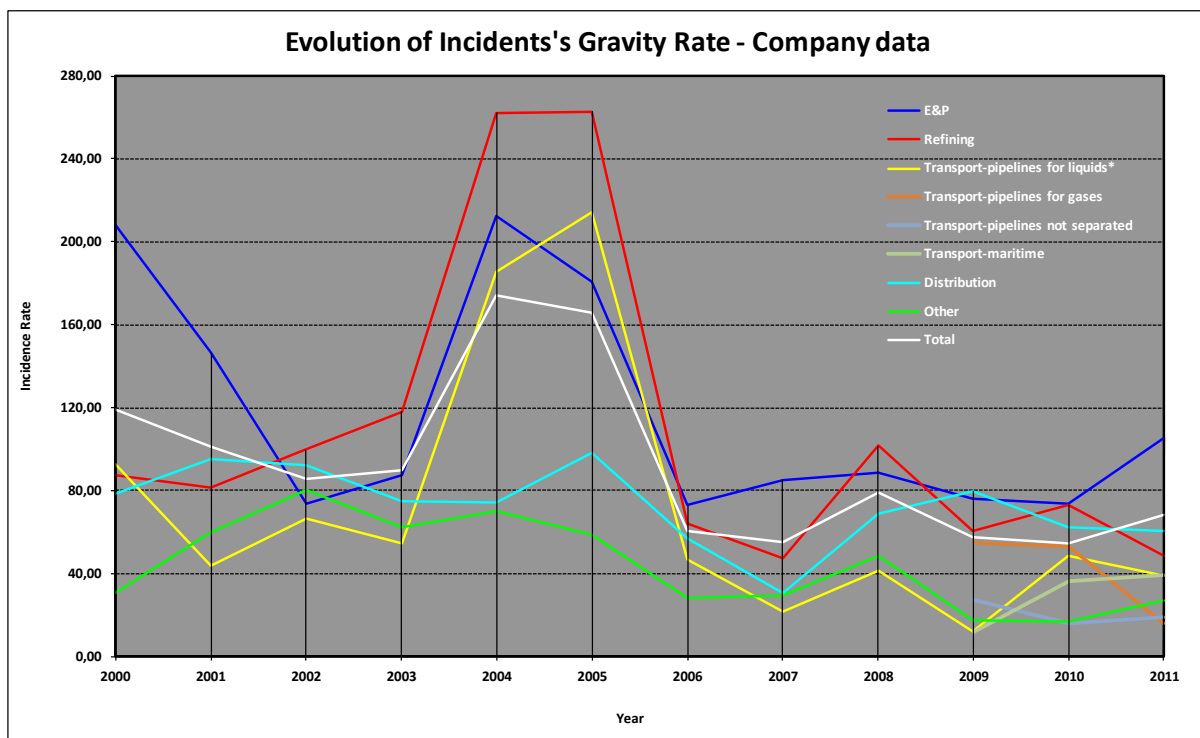


Figure 2.4.1



### 2.4.2 Contractors data

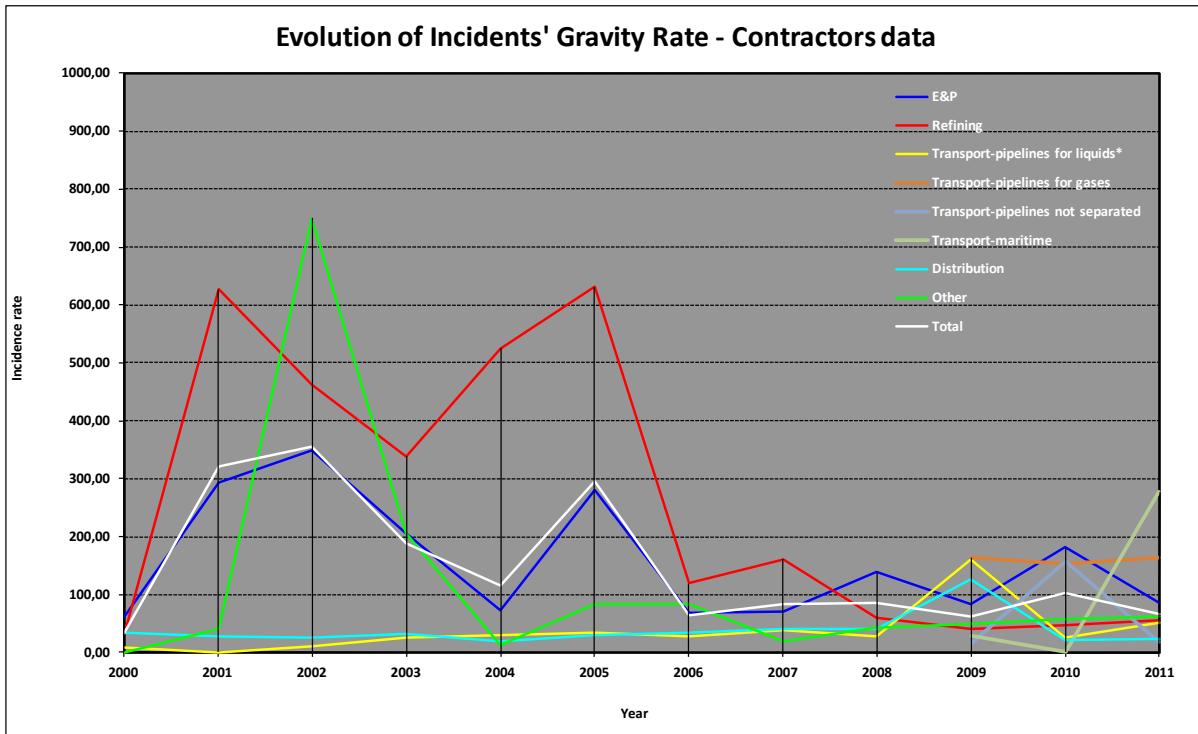


Figure 2.4.2

### 2.4.3 Combined data

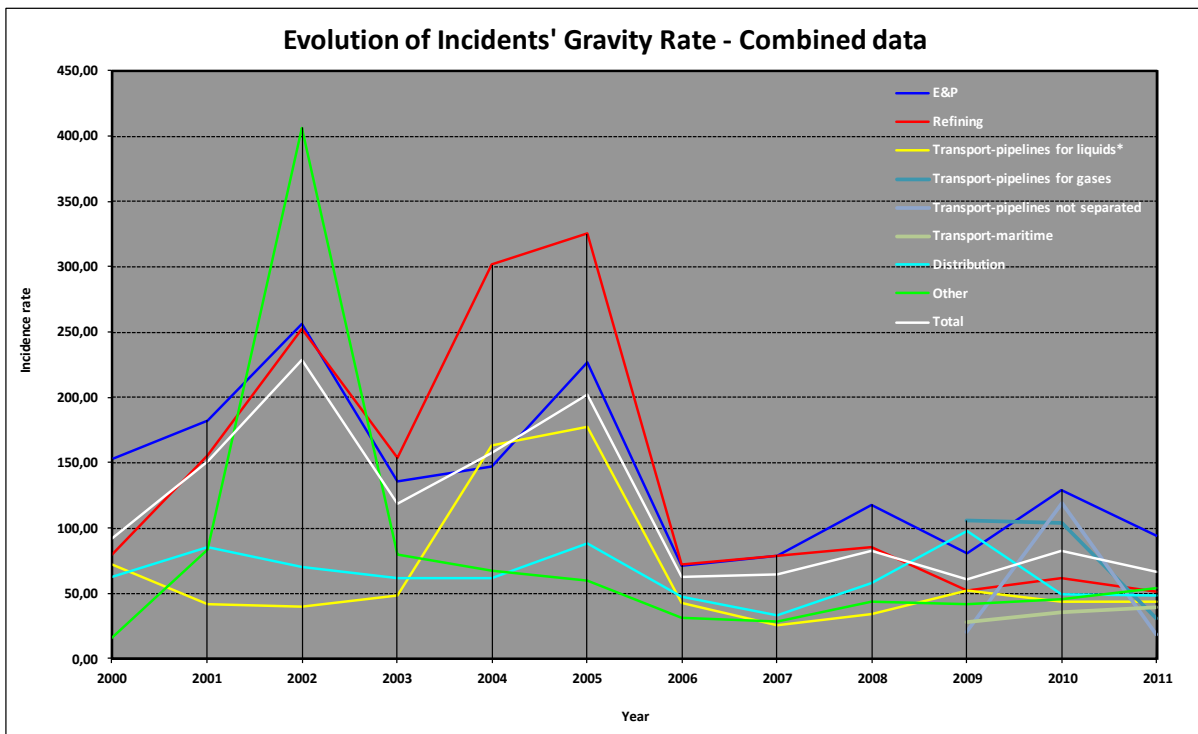


Figure 2.4.3

Figures 2.4.1 to 2.4.3 represent the results of the incidents' gravity rate for the Company's workers, Contractors and Combined, respectively, for the term 2000/2011, calculated as "incidents per 1,000,000 worked hours".



The tabulated results corresponding to the thirteen years are shown in appendix A. The combined “Total” (figure 2.4.3) represents data reported by the following number of companies according to the year in consideration:

Year	Number of companies that reported data	
	For this indicator	For this indicator
2000	10	10
2001	12	13
2002	13	15
2003	15	16
2004	17	17
2005	15	17
2006	14	16
2007	18	18
2008	16	16
2009	13	13
2010	15	15
2011	19	19

## 2.5. Incidents’ frequency rate with lost workdays (per functional unit); data of year 2011

The incidents’ frequency rate with lost workdays is defined by the following formula:

$$\text{Incidents' frequency rate with lost workdays} = \frac{\text{Lost workdays cases} \times 1,000}{\text{Worked hours in thousands}}$$

(Please refer to Chapters 6.0 and 10.0 of the User's Manual)

Function	Number of companies that reported data related to this indicator	Total reported man-hours (company and contractors) - in thousands	Man-hours used for the calculation of this indicator (company and contractors) – in thousands
E&P	10	1,062,441	657,725
Refining	14	311,130	172,273
Transport – pipelines for liquids	5	26,230	12,863
Transport – pipelines for gases	1	8,279	2,325
<i>Transport – pipelines not separated</i>	4	98,142	98,142
Transport - Maritime	3	24,616	5,115
Distribution	8	103,590	73,182
Other	10	710,103	619,533
<b>Total</b>	<b>18</b>	<b>2,344,532</b>	<b>1,641,159</b>

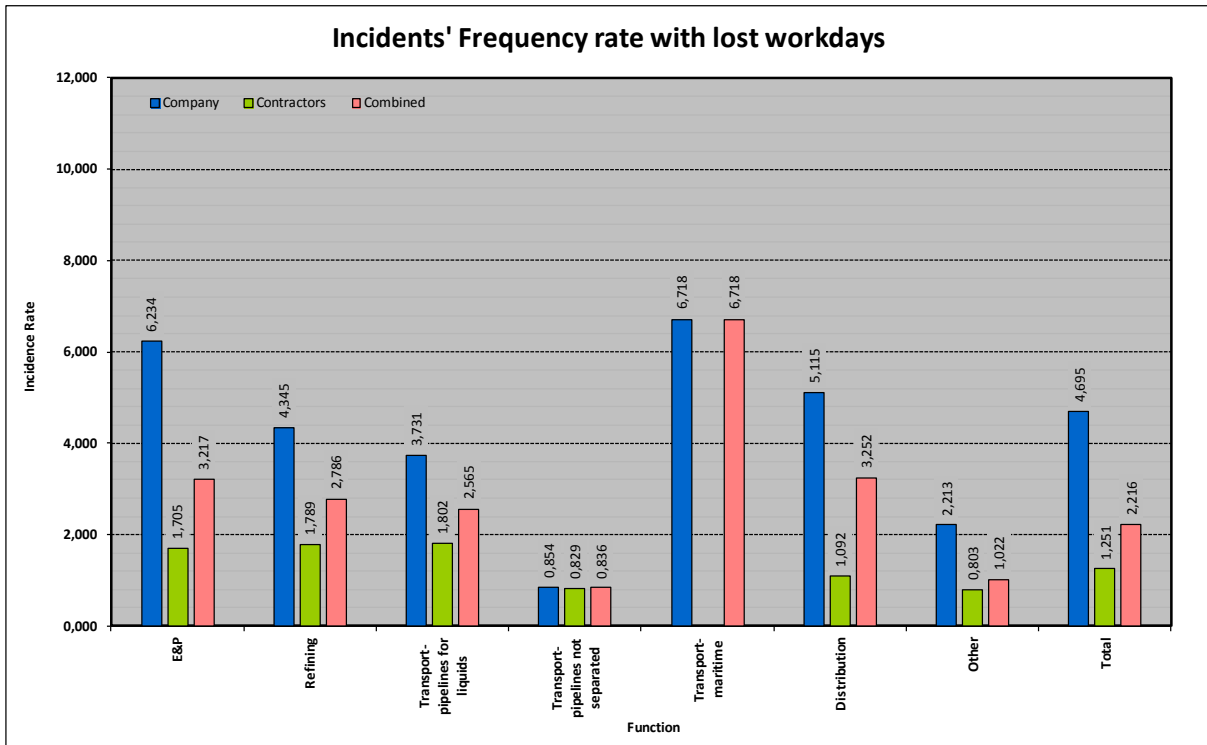


Figure 2.5

2.6. Evolution of the incidents' frequency rate with lost workdays (per functional unit)

2.6.1 Company data

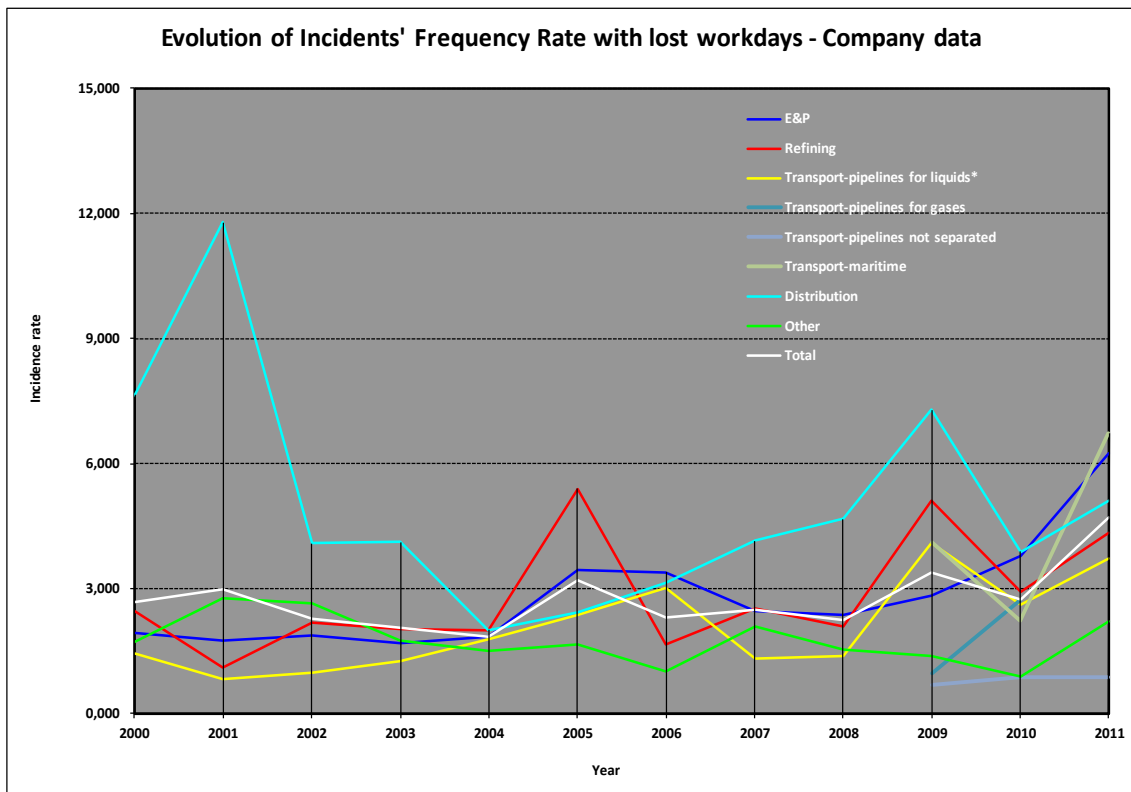


Figure 2.6.1



### 2.6.2 Contractors data

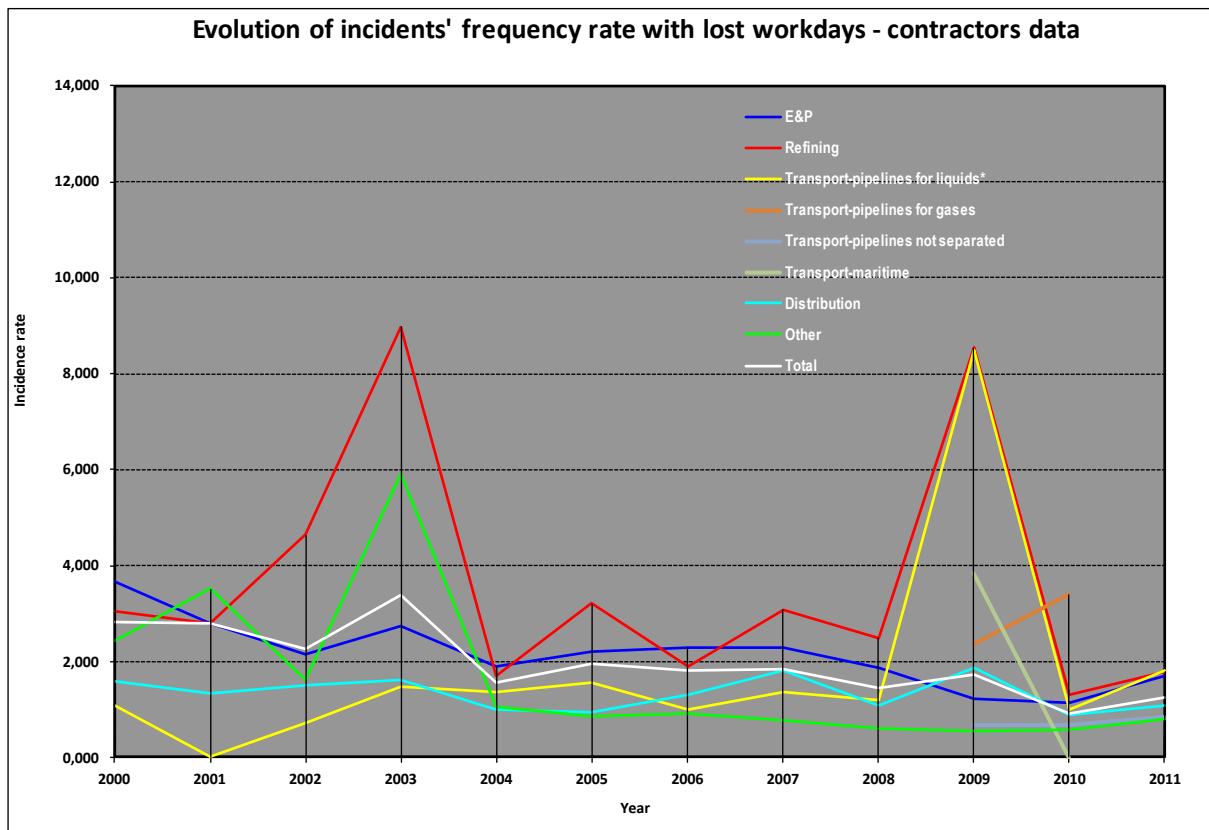


Figure 2.6.2

### 2.6.3 Combined data

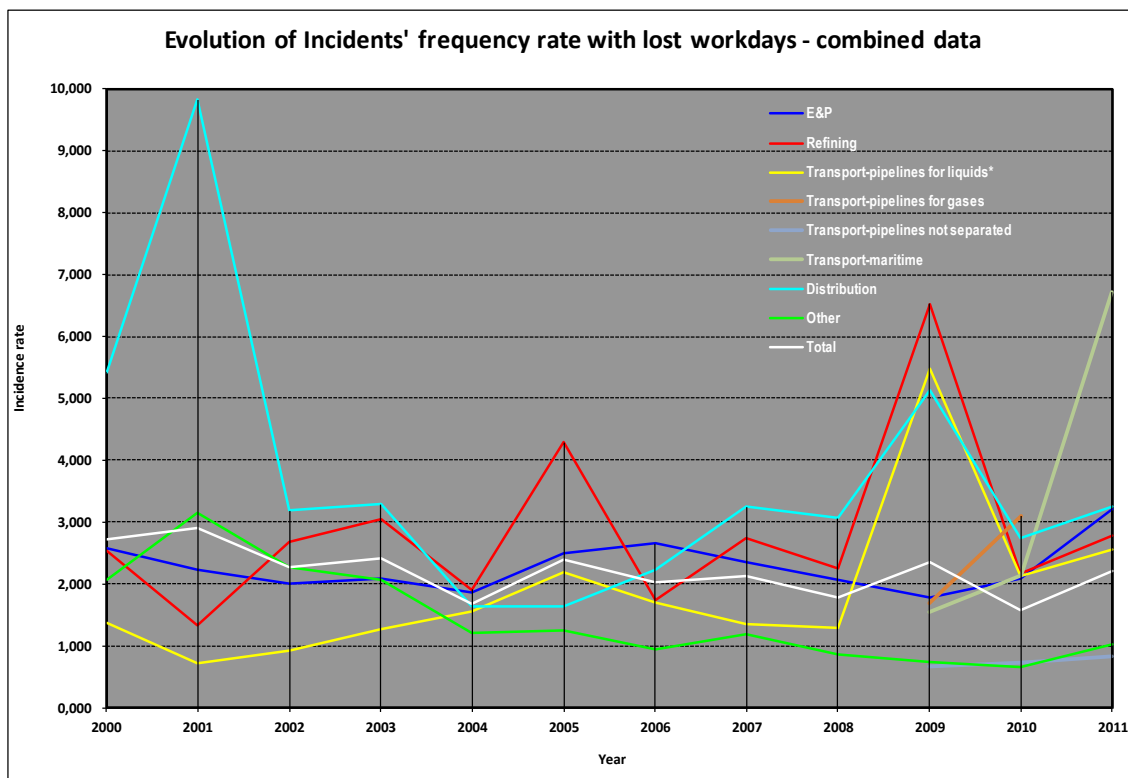


Figure 2.6.3



Figures 2.6.1 to 2.6.3 represent the results of the incidents' frequency rate with lost workdays for the term 2000/2011 for the company's workers, contractors and combined, respectively, calculated as "incidents per 1,000,000 worked hours". The corresponding tabulated results are shown in appendix A. The combined "Total" (figure 2.6.3) represents data reported by the following number of companies according to the year in consideration:

Year	Number of companies that reported data	
	For this indicator	For this indicator
2000	9	10
2001	10	13
2002	14	15
2003	15	16
2004	16	17
2005	17	17
2006	14	16
2007	18	18
2008	16	16
2009	13	13
2010	14	15
2011	18	19

## 2.7. Fatal incidents' rate (per functional unit); data of year 2011

The fatal incidents' rate is defined by the following formula:

$$\text{Fatal incidents' rate} = \frac{\text{Number of fatalities} \times 1,000}{\text{Worked hours in thousands}}$$

(Please refer to Chapters 6.0 and 10.0 of the User's Manual)

Function	Number of companies that reported data related to this indicator	Total reported man-hours (company and contractors) - in thousands.	Man-hours used for the calculation of this indicator (company and contractors) – in thousands
E&P	12	1,062,441	1,062,441
Refining	15	311,130	311,130
Transport – pipelines for liquids	6	26,230	26,230
Transport – pipelines for gases	2	8,279	8,279
<i>Transport – pipelines not separated</i>	4	98,142	98,142
Transport - Maritime	4	24,616	24,616
Distribution	9	103,590	103,590
Other	11	710,103	710,103
<b>Total</b>	<b>19</b>	<b>2,344,532</b>	<b>2,344,532</b>

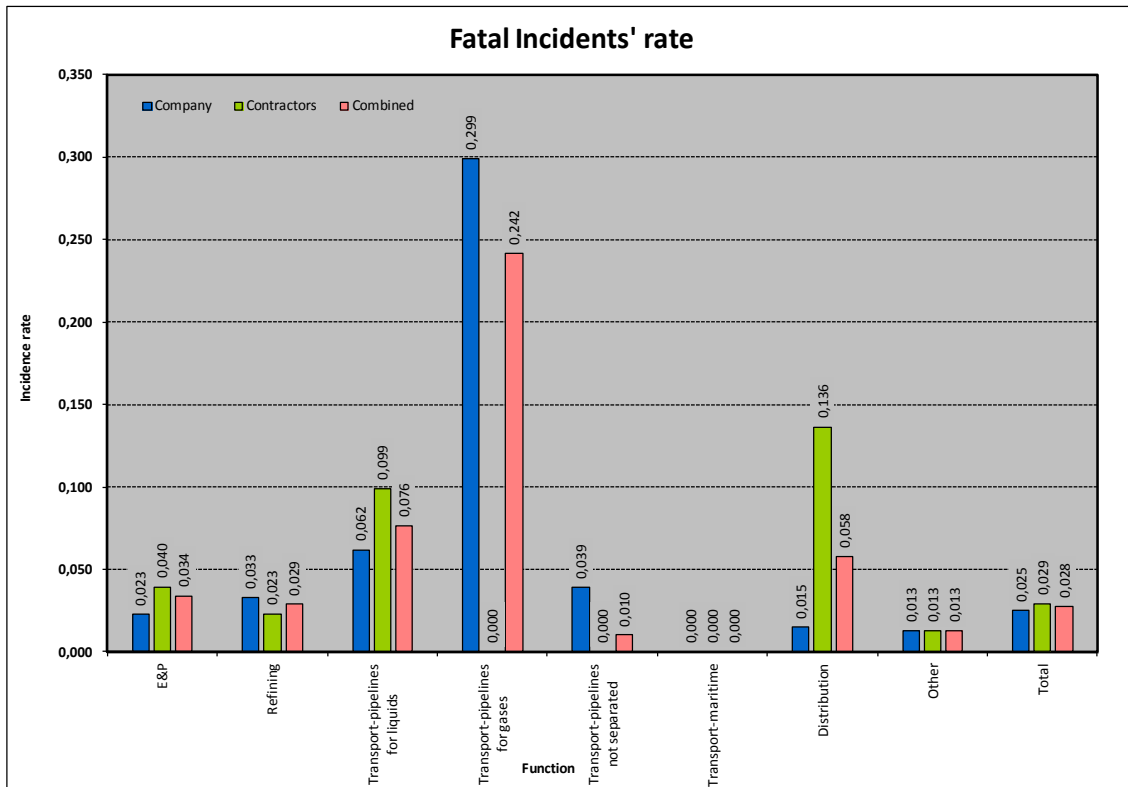


Figure 2.7

## 2.8. Evolution of the fatal incidents' rate (per functional unit)

### 2.8.1 Company data

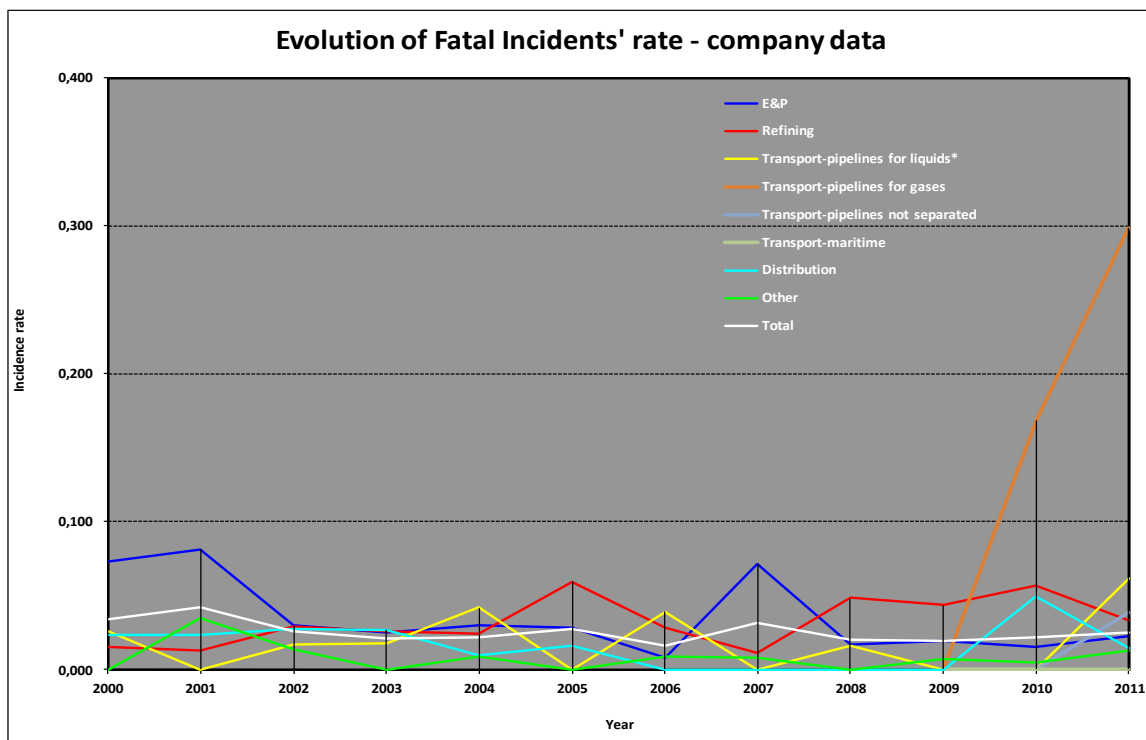


Figure 2.8.1



### 2.8.2 Contractors data

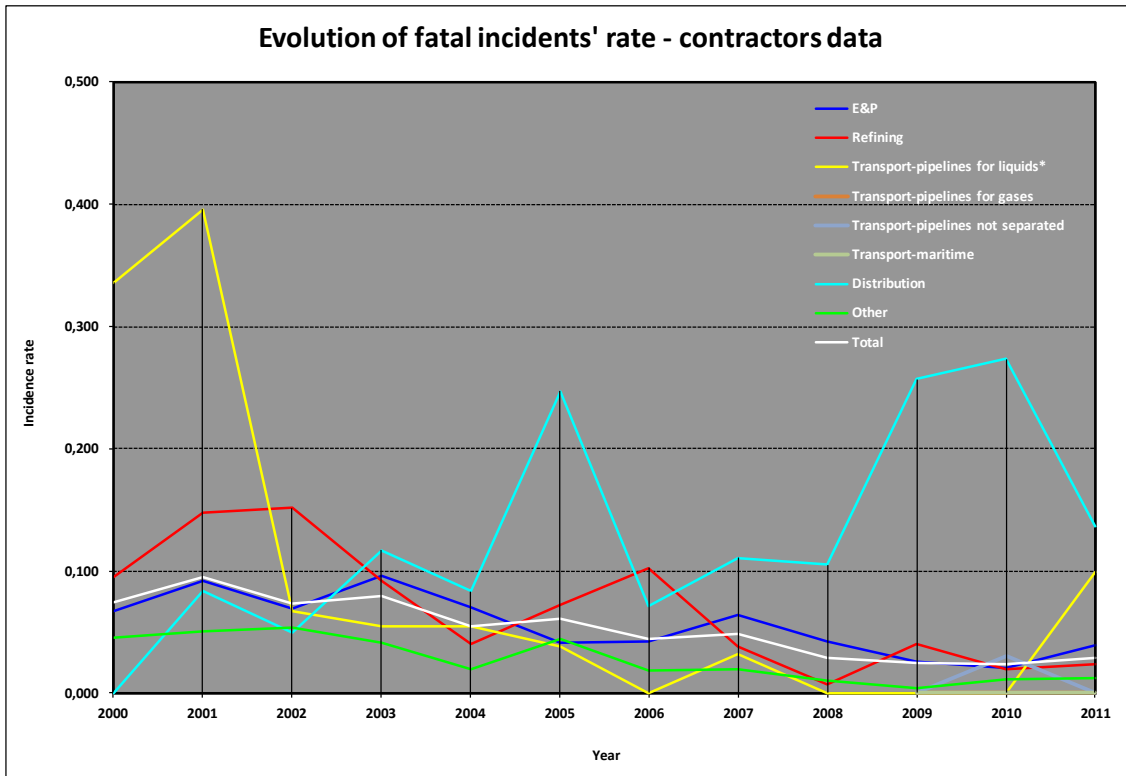


Figure 2.8.2

### 2.8.3 Combined data

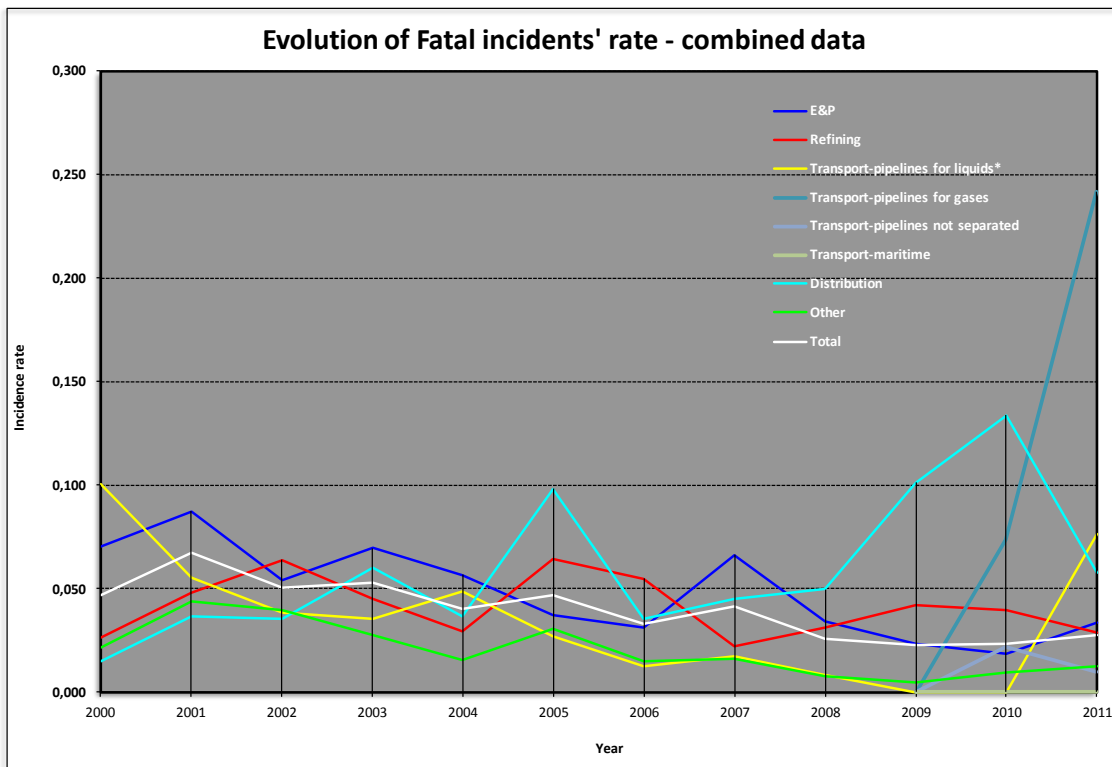


Figure 2.8.3





Figures 2.8.1 to 2.8.3 represent the fatal incidents' rate for term 2000/2011 correspondent to the company's workers, contractors and combined, respectively, calculated as "incidents per 1,000,000 worked hours". The corresponding tabulated results are shown in appendix A. The combined "Total" (figure 2.8.3) represents data reported by the following number of companies according to the year in consideration:

Year	Number of companies that reported data	
	For this indicator	For this indicator
2000	8	10
2001	10	13
2002	15	15
2003	16	16
2004	17	17
2005	17	17
2006	14	16
2007	18	18
2008	16	16
2009	11	13
2010	15	15
2011	19	19

The table below shows the OGP<sup>2</sup> fatal incidents' rate reported in its safety performance indicators Report N° 2011s for year 2011, and it is compared to the corresponding ARPEL data:

"Exploration and Production"		Category		
		Company	Contractors	Combined
Onshore and offshore	ARPEL	0,025	0,029	0,028
	OGP	0,013	0,020	0,019

## 2.9. Comparative incidence rates (per Company); data for year 2011

This chapter shows the individual codified results of companies for each of the rates seen so far, for all functional units. Each letter represents a company that reported data.

In the cases that both company data and contractors' data was provided, the combined result represents the average between company data and contractors' data. In the cases in which only company's workers data was provided, the combined result equals the result for the company.

<sup>2</sup> OGP only comprises "Exploration and Production", so this is the only function considered when comparing results with ARPEL Statistics. Moreover, this rate is originally reported by OGP as "number of fatalities per 100 million hours worked". For this reason and to make comparisons, results were converted to "number of fatalities per 1,000,000 hours worked"(ARPEL units).



### 2.9.1 Total incidents' rate per company

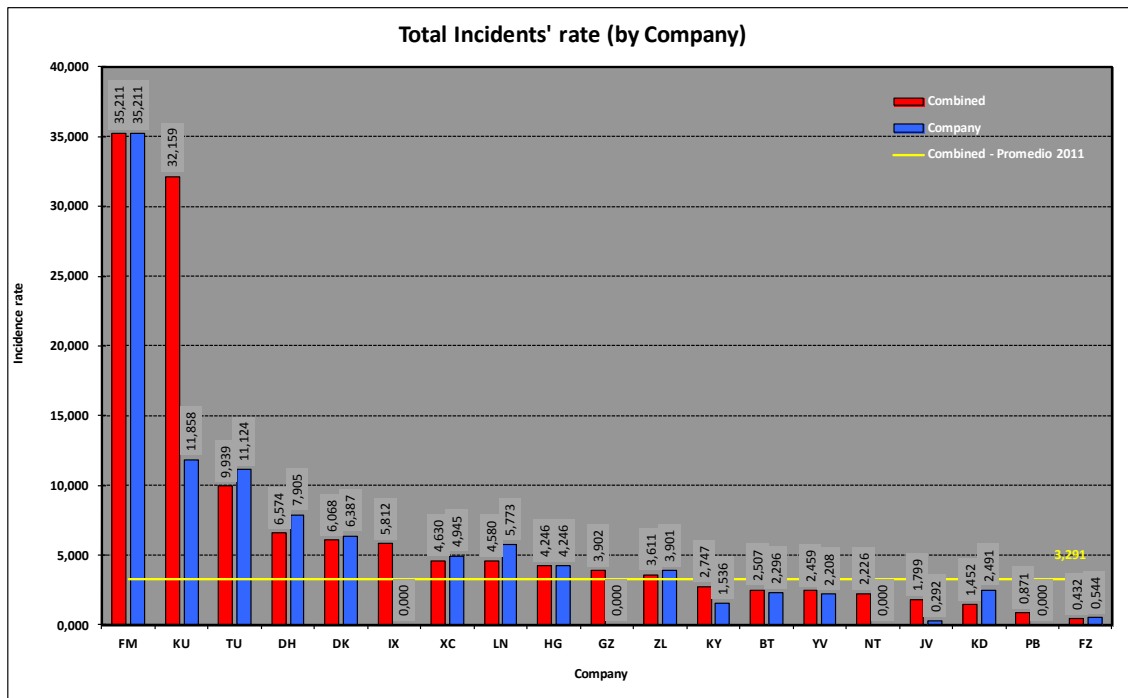


Figure 2.9.1

### 2.9.2 Incidents' gravity rate per company

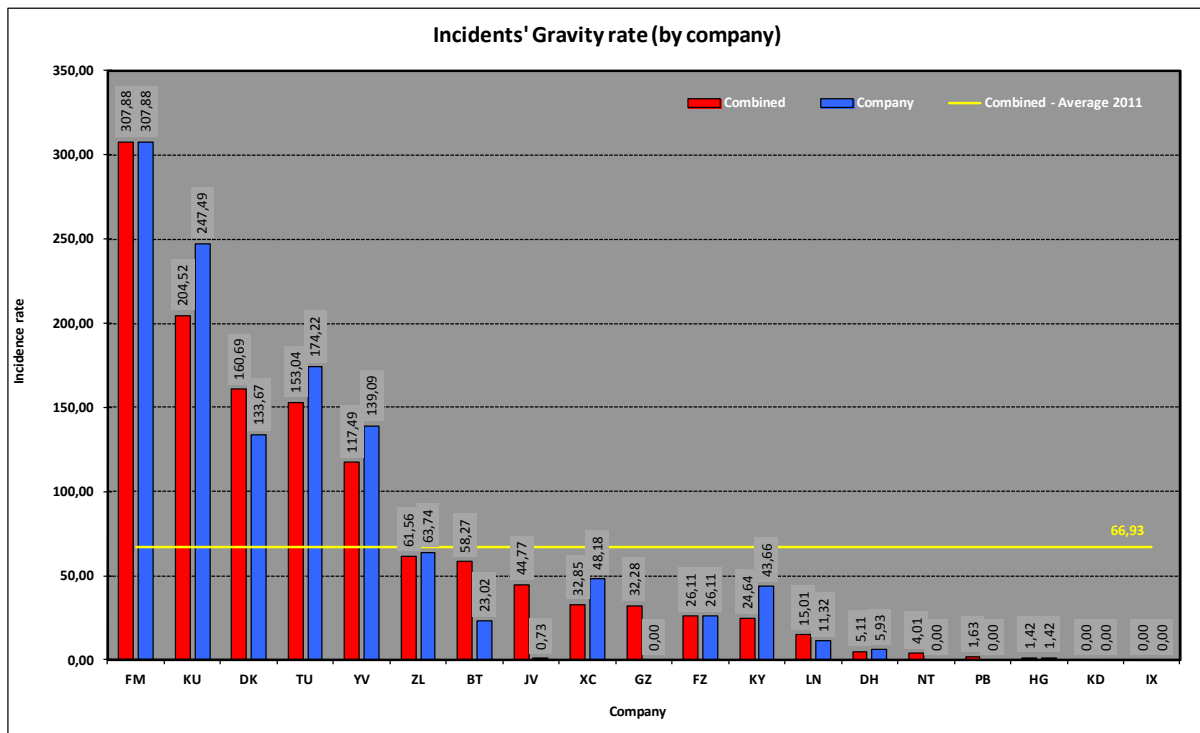


Figure 2.9.2



### 2.9.3 Incidents' frequency rate with lost workdays per company

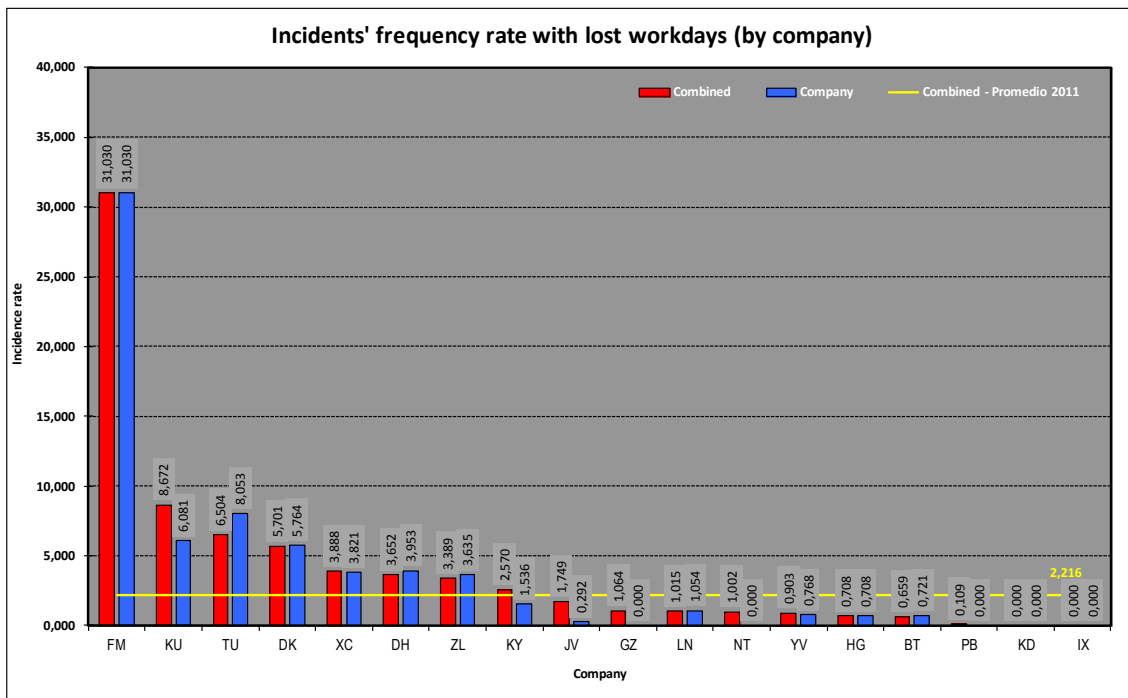


Figure 2.9.3

### 2.9.4 Fatal incidents' rate per company

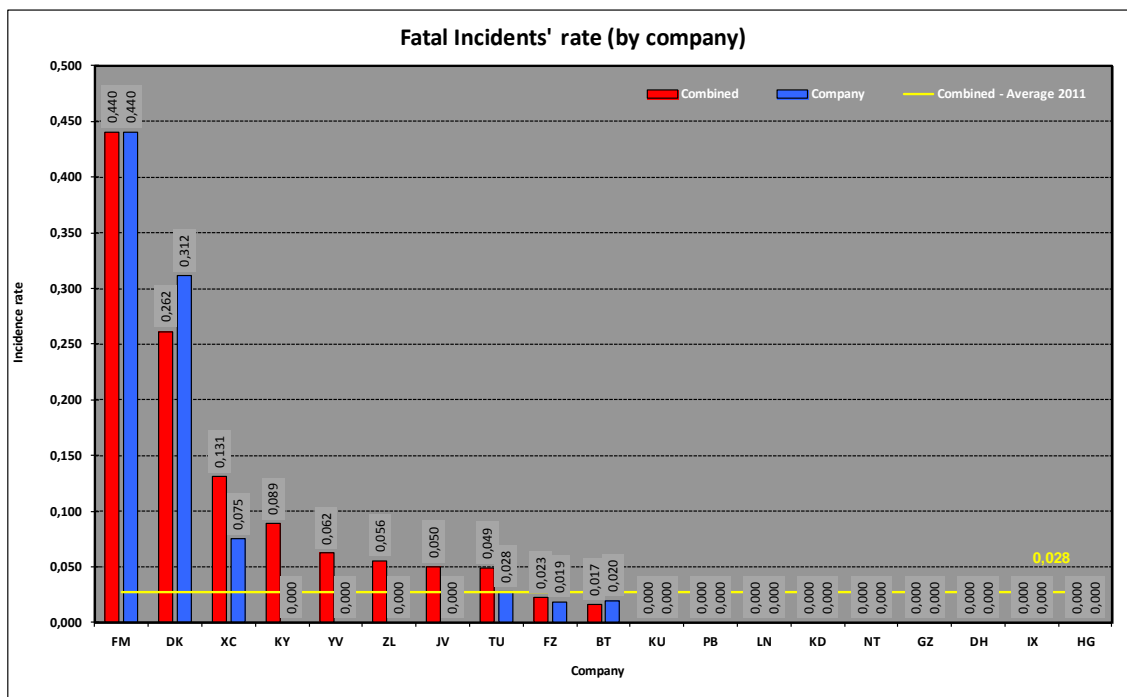


Figure 2.9.4





### 3.0 REACTIVE INDICATORS – offshore activities

The previous chapter presented the results of the four reactive indicators for all activities from those ARPEL Member Companies that reported data, including offshore activities. This chapter presents the results of the same four indicators specifically calculated to offshore activities, where the only functional unit is Exploration and Production.

The table below shows the number of ARPEL Member Companies that reported specific data to offshore activities year by year.

Year	N° of companies
2002	4
2003	4
2004	4
2005	5
2006	5
2007	6
2008	5
2009	4
2010	4
2011	7

The tabulated results corresponding to this chapter's graphs are presented in appendix A.

#### 3.1. Total offshore incidents' rate

Year	Number of companies that reported data to this indicator	Total worked hours (company and contractors) - in thousands	Worked hours used to calculate this indicator (company and contractors) – in thousands
2002	4	100.880	100.880
2003	4	101.741	101.725
2004	4	70.649	70.649
2005	5	101.311	101.311
2006	5	149.545	149.545
2007	6	95.001	95.001
2008	5	82.135	82.135
2009	4	97.968	97.968
2010	4	103.632	<b>103632</b>
2011	7	127.774	127.774

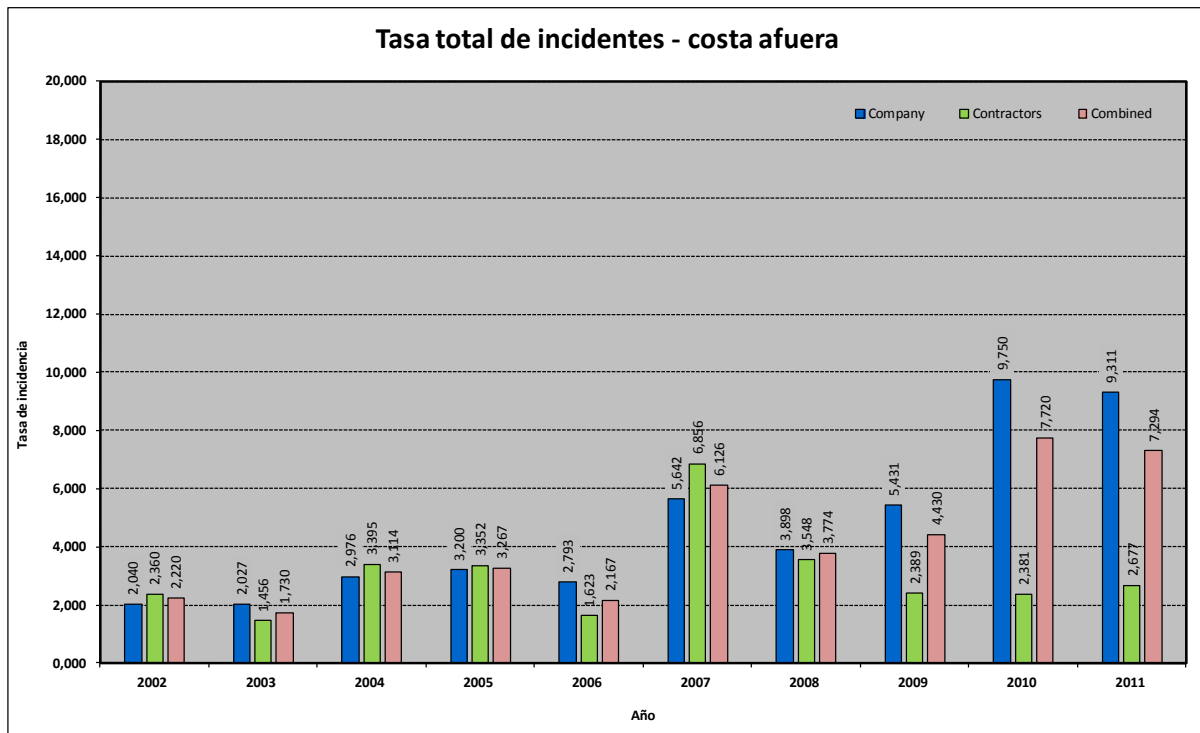


Figure 3.1

### 3.2. Offshore incidents' gravity rate

Year	Number of companies that reported data to this indicator	Total worked hours (company and contractors) - in thousands	Worked hours used to calculate this indicator (company and contractors) – in thousands
2002	2	100,880	3,450
2003	4	101,741	50,785
2004	4	70,649	49,084
2005	5	101,311	76,883
2006	5	149,545	149,545
2007	6	95,001	76,477
2008	5	82,135	63,746
2009	4	97,968	77,009
2010	4	103,632	82,897
2011	7	127,774	59,744

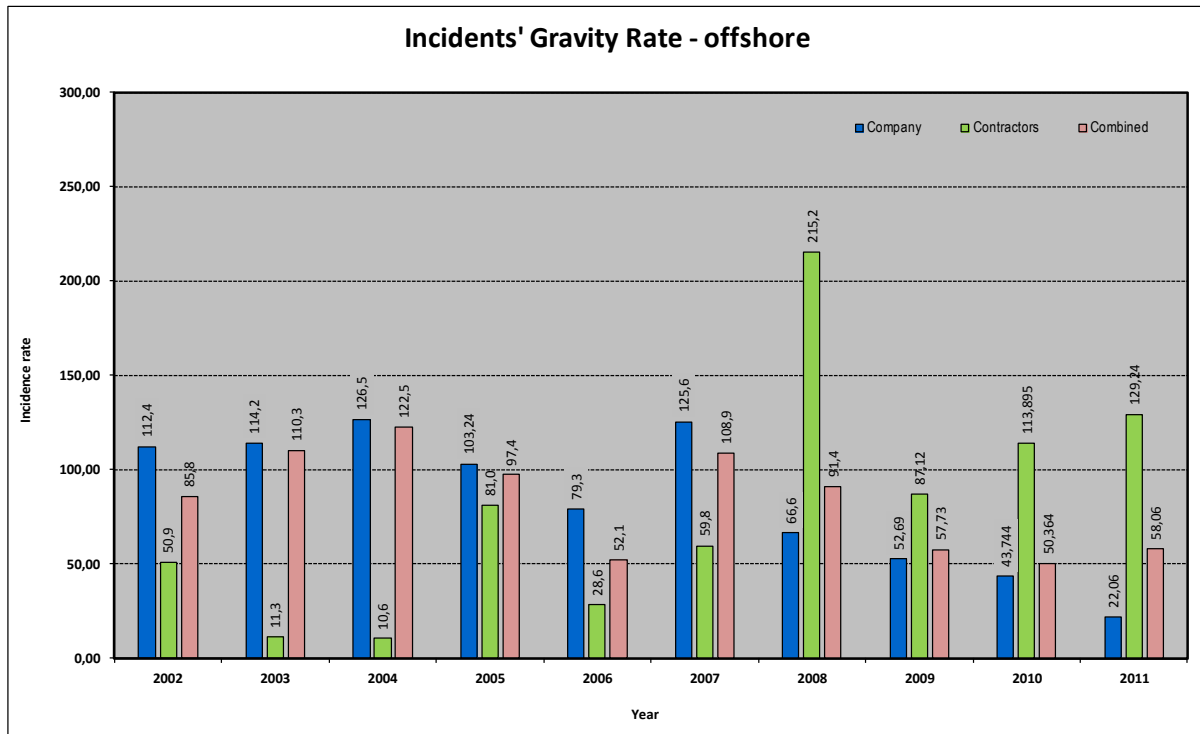
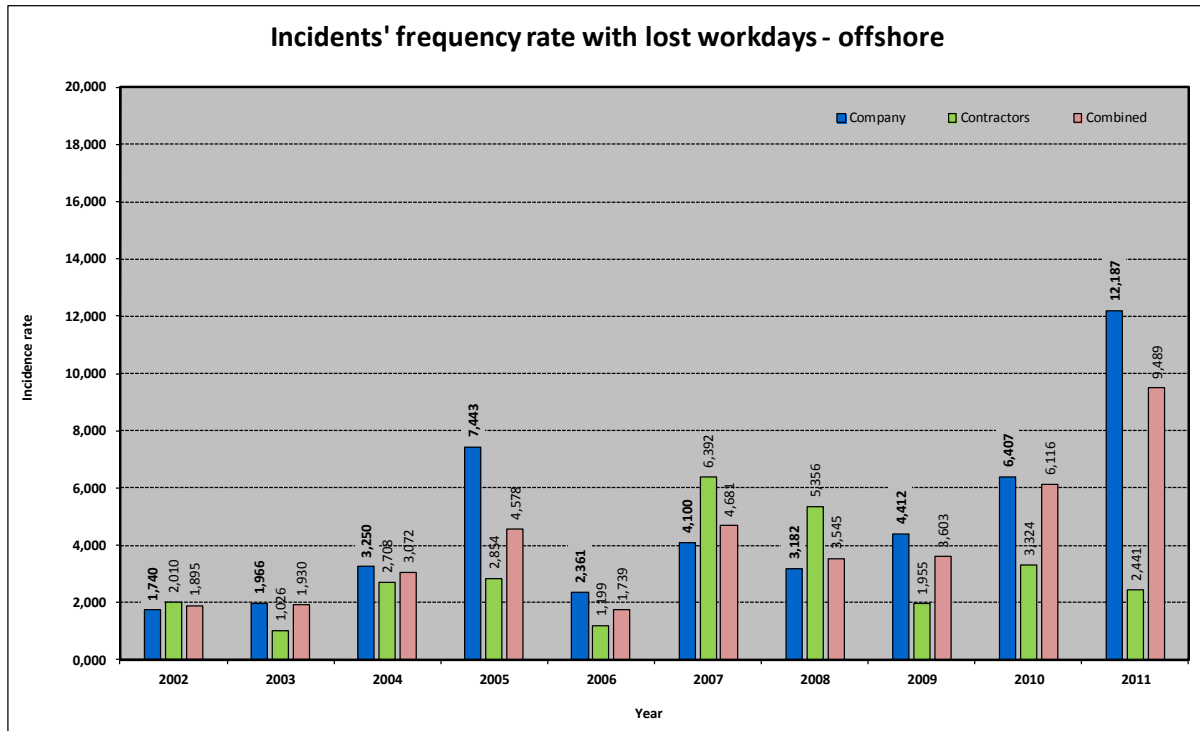


Figure 3.2

### 3.3. Incidents' Frequency Rate with lost workdays - offshore

Year	Number of companies that reported data to this indicator	Total worked hours (company and contractors) - in thousands	Worked hours used to calculate this indicator (company and contractors) – in thousands
2002	3	100.880	100.877
2003	4	101.741	50.785
2004	4	70.649	70.649
2005	4	101.311	32.549
2006	5	149.545	149.545
2007	6	95.001	76.477
2008	5	82.135	63.746
2009	4	97.968	97.968
2010	4	103.632	82.897
2011	6	127.774	72.505

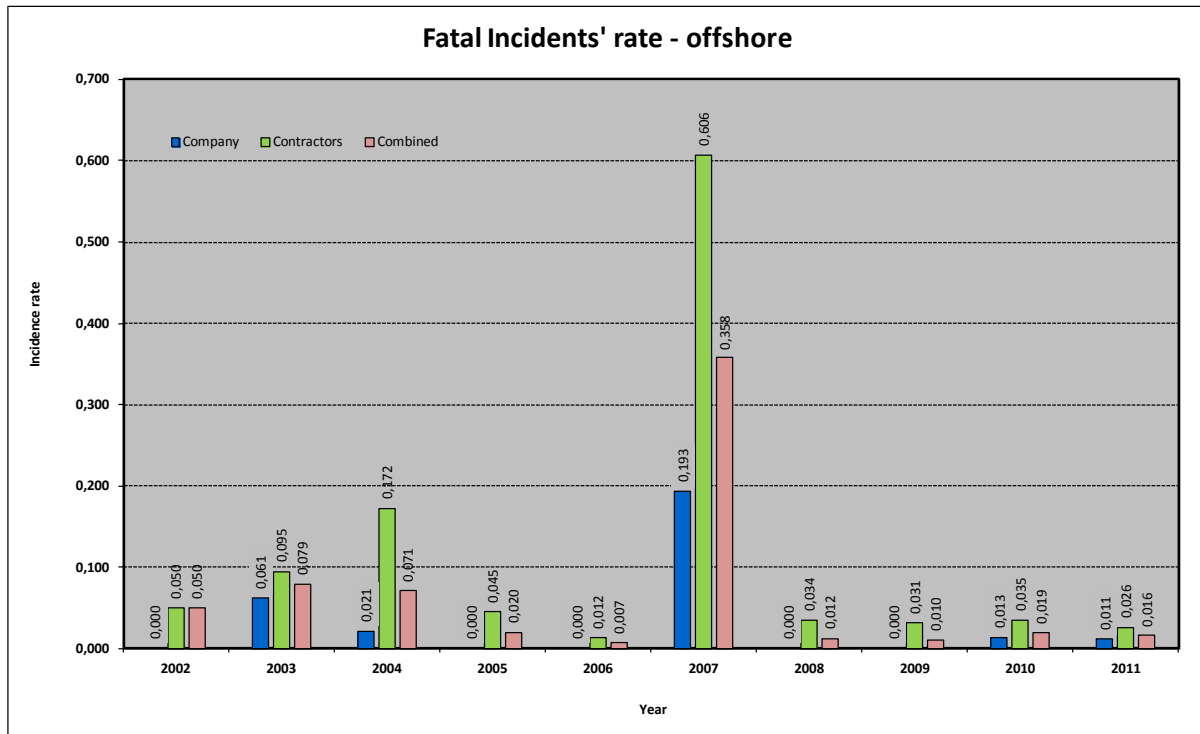


**Figure 3.3**

**3.4. Fatal incidents' rate offshore**

Year	Number of companies that reported data to this indicator	Total worked hours (company and contractors) - in thousands	Worked hours used to calculate this indicator (company and contractors) – in thousands
2002	3	100.880	100.877
2003	4	101.741	101.725
2004	4	70.649	70.649
2005	5	101.311	101.311
2006	5	149.545	149.545
2007	6	95.001	95.001
2008	5	82.135	82.135
2009	4	97.968	97.968
2010	4	103.632	103.632
2011	7	127.774	127.774





**Figure 3.4**

Comparing with the statistics in OGP Report Nº 2011s on safety performance indicators, the fatal incidents' rate for offshore activities in 2011, for company workers and contractors combined was 0.017<sup>3</sup>, whereas the same rate in ARPEL was 0.016 fatalities per 1,000,000 worked hours.

<sup>3</sup> As the original unit under which OGP reports this rate is "number of fatalities per 100 million hours worked, for comparative reasons, in this report it was converted to "number of fatalities per 1,000,000 hours worked"(ARPEL units).





## 4.0 FATALITY CAUSES

This chapter reports the several fatality causes in the oil industry corresponding to the companies included in this report for 2011. For comparative reasons, the results corresponding to the period 2001 – 2011 are presented as well.

As of year 2011, fatalities are also shown by function and activity type.

All fatal incidents were taken into account to develop the graphs shown below, either of company workers or contractors, both for onshore and offshore activities. The different causes are presented according to the (absolute and percentage) number of fatalities they caused.

### 4.1. Fatalities causes – year 2011

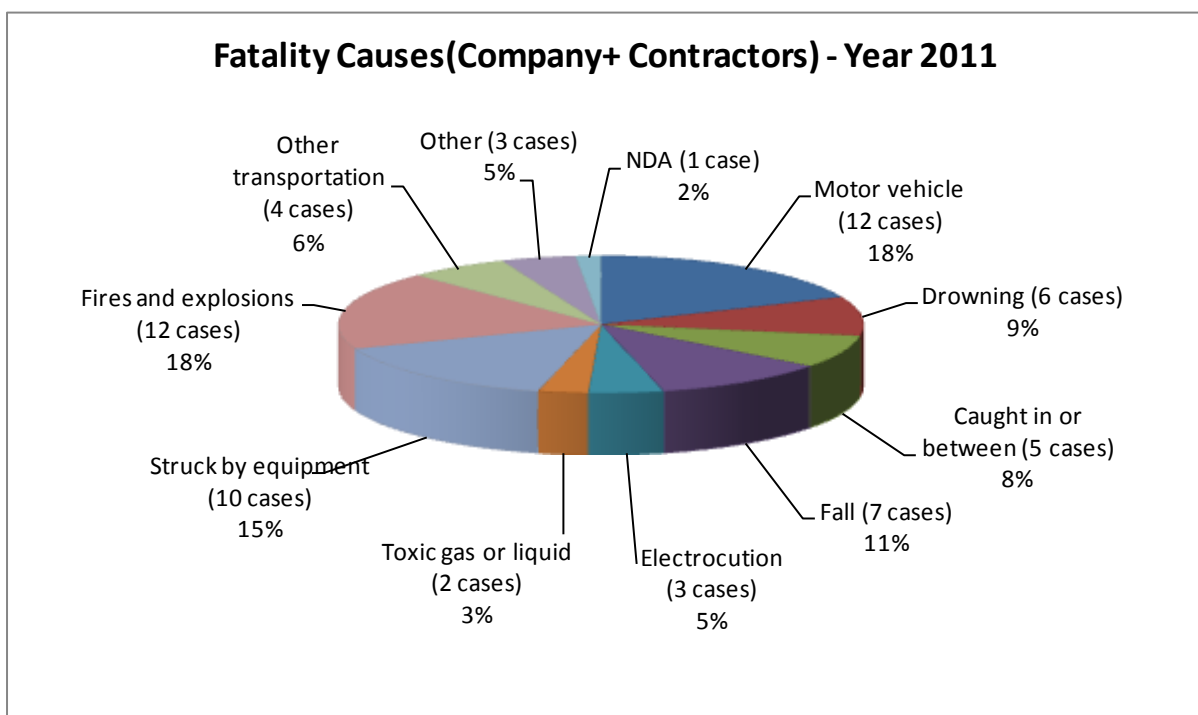


Figure 4.1



#### 4.2. Comparative – fatality causes

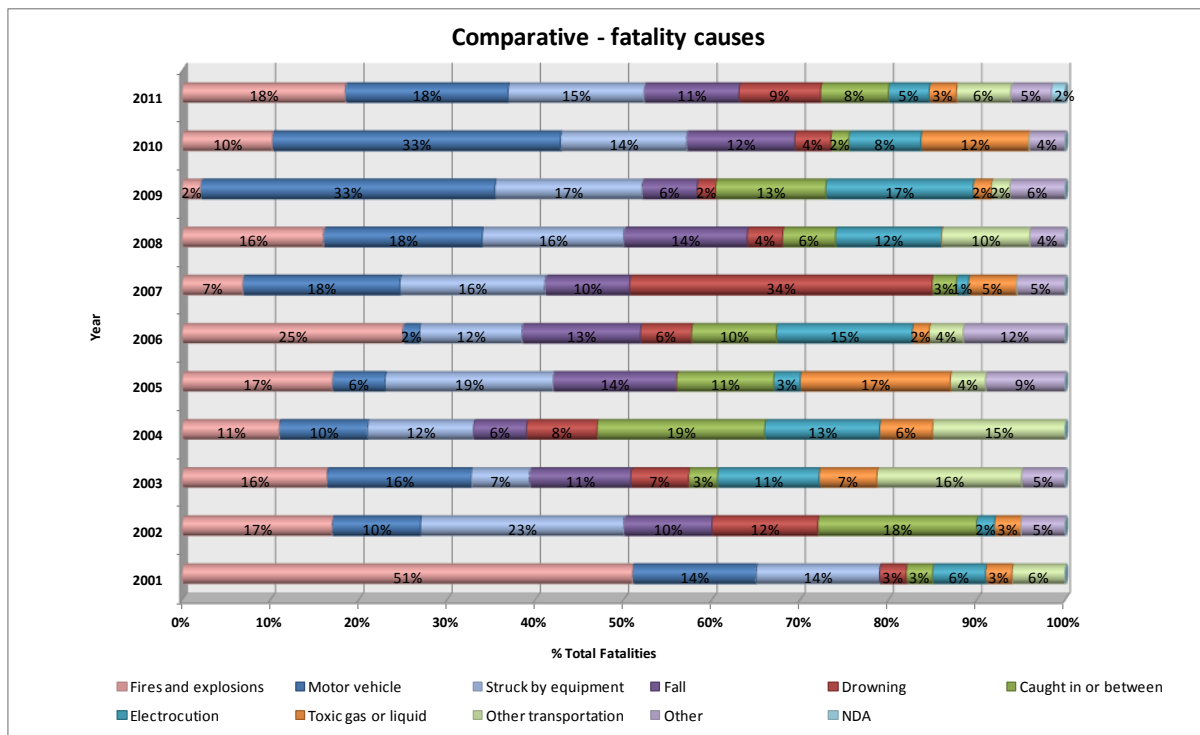


Figure 4.2

Figure 4.1 graphically represents fatality causes according to the absolute and percentage number of fatalities they caused in 2011.

Figure 4.2 compares the relative influence (as a percentage of the total number of fatalities considered each year) of the different fatality causes for the period 2001 – 2011. The table below shows the total number of fatalities with a reported cause per year.

Year	Total fatalities with reported cause
2001	35
2002	58
2003	61
2004	52
2005	70
2006	52
2007	73
2008	50
2009	48
2010	49
2011	64*

\* 65 cases were reported in total, but in one of these cases the cause was not reported.



“Fires and Explosions” is the main cause of fatalities for the period 2001-2011 (99 cases, 16.2%), followed by “car accidents” (97 cases, 15.8%) and “struck by equipment” (93 cases, 15.1%). The tabulated results corresponding to this chapter's graphs are presented in appendix A.

The table below shows the fatality causes reported by OGP<sup>4</sup> in its safety performance indicators Report N° 2011s for 2011, and they are compared to those corresponding to ARPEL:

Function “Exploration & Production” Combined result – onshore and offshore				
	Total fatalities	Fatality # 1	Fatality # 2	Fatality # 3
<b>ARPEL 2011</b>	39	“Struck by equipment” (25.6%)	“Motor vehicle” (17.9%)	“Drowning” (12.8%)
<b>OGP 2011</b>	65	“Caught in or between” (25%)	“Struck by” (18%)	“Other” (12%)

Below are shown the graphs 4.3 and 4.4 which corresponds to fatalities by function and activity type.

### 4.3. Comparative – Fatalities by function

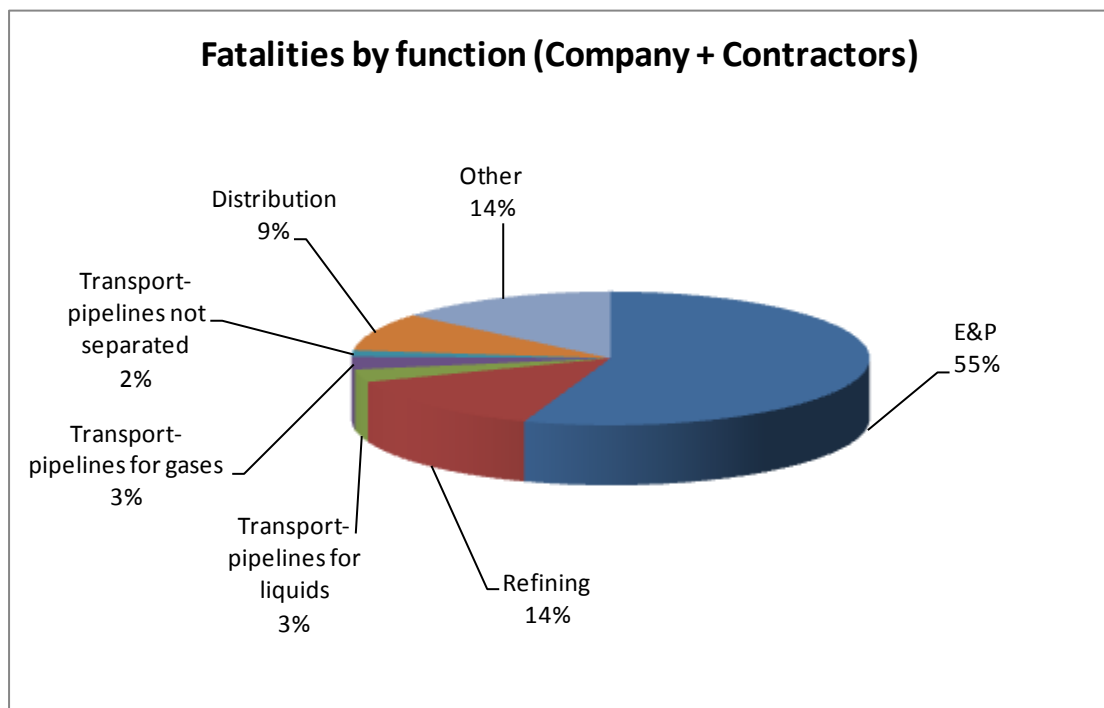


Figure 4.3

<sup>4</sup> OGP only comprises “Exploration and Production”, so this is the only function considered when comparing results with ARPEL Statistics.



Function	Company	Contractors	Total	%
E&P	8	28	36	55%
Refining	6	3	9	14%
Transport-pipelines for liquids	1	1	2	3%
Transport-pipelines for gases	2	0	2	3%
Transport-pipelines not separated	1	0	1	2%
Distribution	1	5	6	9%
Other	2	7	9	14%
<b>Total</b>	<b>21</b>	<b>44</b>	<b>65</b>	<b>100%</b>

#### 4.4. Comparative – Fatalities by type of activity

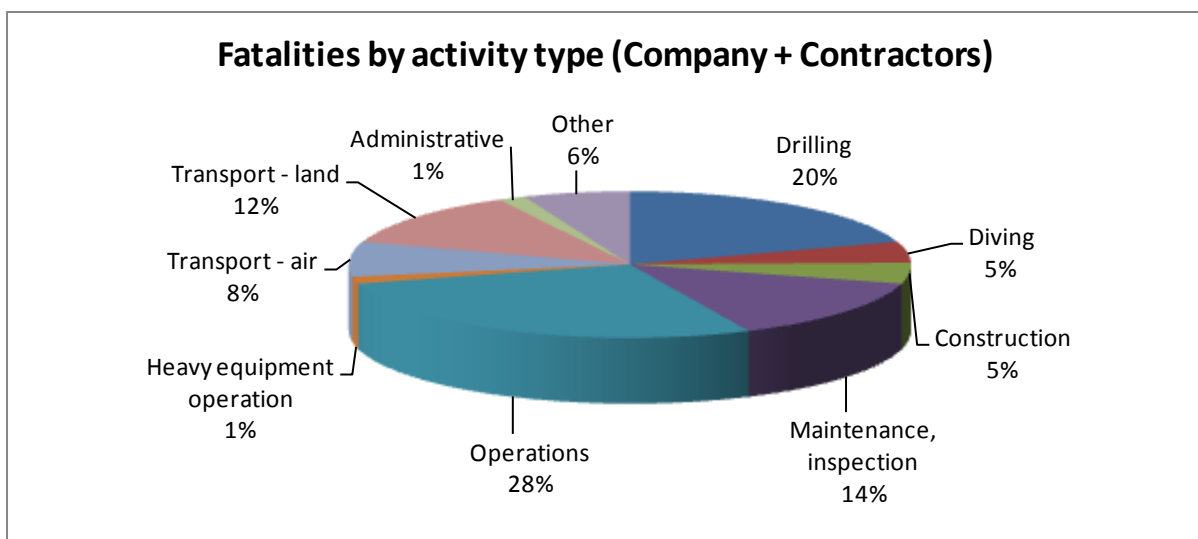


Figure 4.4

Type of activity	Company	Contractors	Total	%
Drilling	2	11	13	20.0%
Diving	1	2	3	4.6%
Construction	1	2	3	4.6%
Maintenance, inspection	3	6	9	13.8%
Operations	9	9	18	27.7%
Heavy equipment operation		1	1	1.5%
Transport - air	1	4	5	7.7%
Transport - land	1	7	8	12.3%
Administrative	1		1	1.5%
Other	2	2	4	6.2%
<b>Total general</b>	<b>21</b>	<b>44</b>	<b>65</b>	<b>100%</b>



## 5.0 SAFETY PROACTIVE INDICATORS

### 5.1. Tasks planned observations' rate

The tasks planned observations Rate (TPO) is defined by the following formulae:

$$\text{TPO Rate} = \frac{\text{Number of tasks planned observations cumulative of the year}}{\text{Average number of workers in the period}}$$

(Please refer to chapters 6.0 and 10.0 of the User's Manual)

Function	Number of companies that reported data to this indicator	Average reported number of total workers (company)	Average number of workers used to calculate this rate (company)
E&P	10	165,853	93,859
Refining	13	81,370	70,207
Transport – pipelines for liquids	5	6,848	5,190
<i>Transport – pipelines not separated</i>	4	12,430	12,430
Transport - Maritime	3	13,591	11,153
Distribution	8	30,400	19,563
Others	9	72,788	35,358
<b>Total</b>	<b>16</b>	<b>386,608</b>	<b>250,296</b>

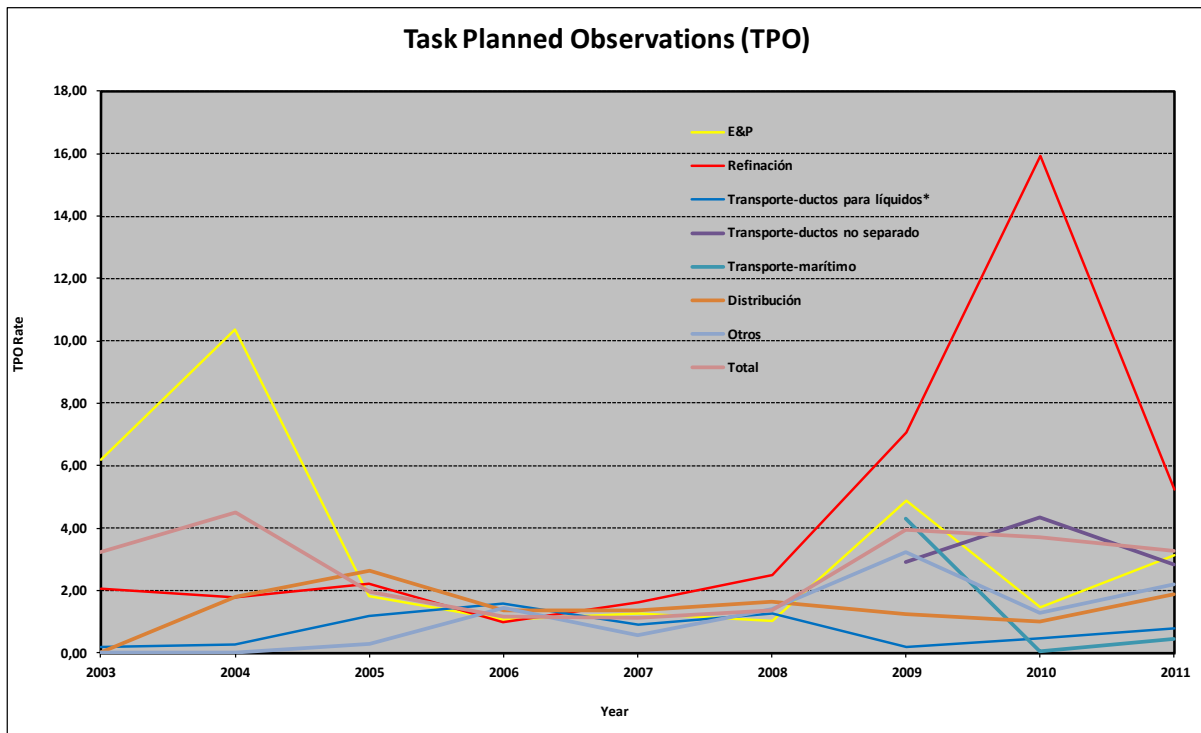


Figure 5.1

## 5.2. Safety training intensity rate

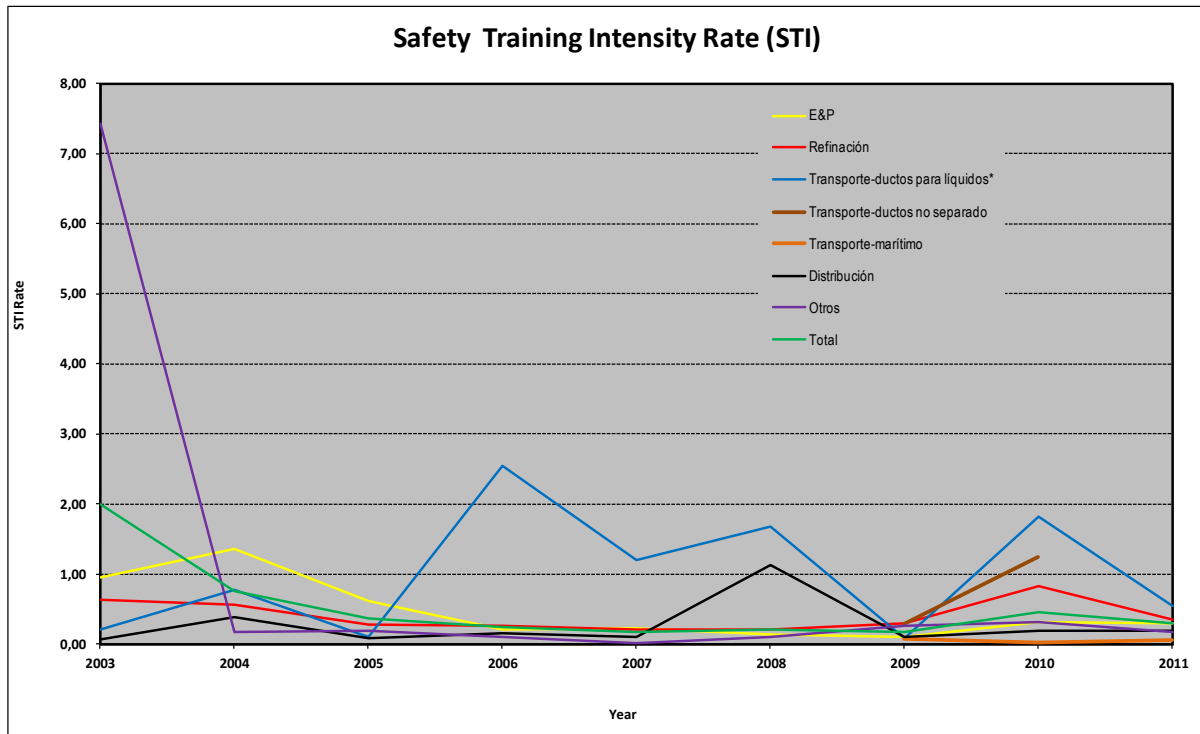
The safety training intensity rate (STI) is defined by the following formulae:

$$\text{STI Rate} = \frac{\text{Nº of cumulative hours of safety training of the year} \times 100}{\text{Hours worked in the same period}}$$

(Please refer to chapters 6.0 and 10.0 of the User's Manual)

Function	Number of companies that reported data to this indicator	Total worked hours (company) - in thousands	Worked hours used to calculate this indicator (Company) – in thousands
E&P	7	354,078	158,607
Refining	12	182,172	43,546
Transport – pipelines for liquids	4	16,150	5,075
Transport - Maritime	2	23,691	4,923
Distribution	4	66,891	29,622
Others	6	157,795	36,502
<b>Total</b>	<b>13</b>	<b>833,223</b>	<b>282,535</b>





**Figure 5.2**

Figures 5.1 and 5.2 represent the tasks planned observations rate and safety training intensity rate respectively for years 2003 to 2011, solely for company workers<sup>5</sup>. The corresponding tabulated results are shown in appendix A.

<sup>5</sup> One company reported data for the calculation of the safety proactive indicators for the combined result (company and contractors) during years 2003 and 2004. Since 2005, it could start reporting data only referred to the company's workers.





## 6.0 GLOSSARY OF TERMS ACCORDING TO ARPEL CRITERIA

### a) Case involving lost workdays

All non fatal cases that result in the worker being away from work at least one business day after the day of the injury or disease. The day on which the worker goes home before the end of his workday is not considered in this item. Fatalities, as well as restricted labor activity days are excluded, since they are recorded separately.

### b) Case involving medical treatment

All treatment cases of injuries / diseases administered by doctors, registered professionals or non-medical personnel. The medical treatment does not include first aids (one single treatment and the following observation of scratches, cuts, burns, splinters, and other episodes without gravity that generally do not require medical attention) even if a doctor or a registered professional provides them.

### c) Case involving restricted workdays

All non-fatal cases implying days of restricted activity of the usual tasks after the day of the injury or disease. Fatalities must be excluded.

### d) Company worker

Any person employed by the reporting company or included in its payroll.

### e) Contractor

Any person directly involved in the execution of an assigned work for the reporting company, according to a contract.

### f) Fatal incidents' rate

Total fatalities per 1,000,000 worked hours (see formulae 4 in appendix C).

### g) Incidents' frequency rate with lost workdays

The number of lost workday cases per 1,000,000 worked hours. Cases of restricted workdays and cases of medical treatment are not included (See Formulae 3 in appendix C).

### h) Incidents' gravity rate

The number of lost workdays per 1,000,000 worked hours (see Formulae 2 in appendix C). Note that ARPEL definition of lost workdays includes all calendar days (including weekends and holidays). Also see "number of days away from work" on item i.

### i) Number of days away from work

The total number of days (consecutive or not) after the day when the injury or disease occurred, on which the workers involved (according to the definition of *case involving lost workdays*) should have worked but did not, as a result of the occupational injury or



disease, until the day they get back to work. The day the person starts to work is excluded. **Weekends and holidays are included, even if the employee was not scheduled to work.**

**j) Recordable case - disease**

Any occupational incident resulting from a disease (according to the provided classification by the legislation/regulation [if applicable] of the country where the company reports its activities). Occupational diseases resulting in fatalities are included.

**k) Recordable case - fatality**

A fatality resulting from an occupational injury or disease. The fatality should be loaded to the year in which the injury occurred or the occupational disease was recorded.

**l) Recordable case - injury**

Any occupational incident resulting in an injury (according to the provided classification by the legislation/regulation [if applicable] of the country where the company reports its activities). Occupational injuries resulting in fatalities are included.

**m) Recordable cases - total**

The sum of Recordable cases – Injury, Recordable cases – Disease and Recordable cases – Fatalities.

**n) Safety training intensity (STI)**

The proportion of the total hours worked in a period dedicated to safety training.

**o) Safety training intensity rate**

The percentage of cumulative safety training hours in the year, over the total hours worked in the same period (see Formulae 6 in appendix C).

**p) Tasks planned observations (TPO)**

"Tasks planned observations" (TPO) are safety observations performed according to a systematic method. They constitute a recorded visual analysis in which the sequence of tasks, maneuvers and operations required to obtain a certain result of the service which is pre-established within the company, is studied by well trained and qualified personnel. The referred study includes hazard identification and risk management during normal task performance and comprises observations of immediate and basic aspects as well as systematic ones. Observations are recorded in a pre-established form according to a given procedure to determine all deviations that result in an increased probability of any human resources or material loss.

**q) Tasks planned observations' rate**

The quotient between the number of tasks planned observations accrued during the year and the average number of workers in the same period (see Formulae 5 in appendix C).



**r) Total incidents' rate**

The total rate (Recordable cases) of injuries, occupational diseases or fatalities per 1,000,000 worked hours (see Formulae 1 in appendix C).

**s) Work relatedness**

An injury or disease is to be considered to be work-related if an event or exposure in the work environment caused or contributed to the resulting condition or significantly aggravated a pre-existing injury or disease. Work-relatedness is defined for injuries and diseases resulting from events or exposures occurred in the work environment, defining the work environment as the physical place where one or more employees work or are present due to work reasons. The work environment includes not only physical locations, but also the equipment or materials used by the employee during the course of his/her work.

**t) Worked hours**

Hours worked by both the company workers and contractors' workers (separately recorded).





## 7.0 REFERENCES AND BIBLIOGRAPHY

The following material was used to develop the present report:

1. "European Downstream Oil Industry Safety Performance - statistical summary of reported incidents - 1996". CONCAWE Safety Management. RA 1250, Report Ner. 4/97. Brussels. December, 1997.
2. "Summary of U.S. Occupational Injuries, Illnesses, and Fatalities in the Petroleum Industry - 1996". American Petroleum Institute. API Publication #2375. Washington, DF, September, 1997.
3. ARPEL User's Manual – Safety Benchmarking in the Oil and Gas Industry in Latin America and the Caribbean – 5th edition, 2012. ARPEL. Montevideo.
4. "Occupational Safety and Health Administration – Regulations (Standards – 29CFR) - Determination of work relatedness -1904.5" - [http://www.osha.gov/pls/oshaweb/owadisp.show\\_document?p\\_table=STANDARDS&p\\_id=9636](http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9636)
5. "OGP Safety Performance Indicators – 2011 data". Report No. 2011s. May, 2012.







## 8.0 APPENDIX A

### 8.1. Tabulated results: totals for companies, contractors and combined

Data used to develop the associated graph for each rate analyzed in chapter 2.0 is presented in the tables below, for the period 2000/2011.

**Table 8.1.1: Total incidents' rate per functional unit (ARPEL 2000-2011)**

Function	Data Category	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
E&P	Company	1.167	2.875	2.266	1.742	2.202	2.779	2.865	3.663	3.648	4.184	6.234	5,680
	Contractors	3.989	5.379	2.818	2.597	3.070	4.060	3.946	4.092	4.134	3.083	3.038	3,127
	Combined	2.231	4.770	2.602	2.281	2.780	3.626	3.592	3.947	3.971	3.467	4.179	3,978
Refining	Company	10.543	4.337	2.667	1.999	2.815	3.719	2.660	3.822	4.000	3.642	6.398	3,294
	Contractors	4.872	8.356	2.832	2.699	3.523	8.967	4.741	5.613	6.118	4.706	4.272	4,699
	Combined	9.748	6.368	2.713	2.209	3.036	5.585	3.402	4.568	4.904	4.080	5.434	3,876
Transport – pipelines for liquids	Company	1.319	0.529	1.786	1.475	2.192	5.042	5.744	2.143	2.380	2.177	3.458	1,548
	Contractors	1.093	6.215	1.631	1.225	1.754	8.042	7.431	4.261	2.893	2.162	0.992	3,373
	Combined	1.265	0.975	1.719	1.353	1.956	7.169	6.877	3.321	2.635	2.173	2.723	2,249
Transport – pipelines for gases	Company	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1.606	12.170	2,393
	Contractors	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	8.229	5.218	10,050
	Combined	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	5.065	8.246	3,865
Transport – pipelines not separated	Company	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1.203	3.695	3,533
	Contractors	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	2.862	2.869	2,666
	Combined	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	2.342	3.092	2,894
Transport - maritime	Company	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	2.177	3.978	3,419
	Contractors	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	4.790	0.000	3,243
	Combined	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	2.446	3.847	3,412
Distribution	Company	10.013	15.857	4.642	4.364	2.617	2.024	4.662	4.985	4.700	7.881	5.485	4,081
	Contractors	2.483	1.867	2.203	1.991	1.439	2.266	3.162	2.530	2.691	2.970	2.104	2,289
	Combined	7.268	11.296	3.773	3.467	2.189	2.110	3.917	3.987	3.771	5.934	4.211	3,446
Others	Company	1.030	6.879	3.441	2.011	1.784	1.880	2.235	2.903	3.701	2.403	2.350	2,180
	Contractors	0.046	2.775	1.877	1.573	1.050	3.425	3.959	2.767	2.530	2.323	2.217	2,033
	Combined	0.559	4.318	2.441	1.718	1.320	2.933	3.368	2.807	2.846	2.340	2.253	2,066
Total	Company	5.320	5.319	2.784	2.167	2.351	2.811	2.869	3.579	3.723	3.835	5.061	4,130
	Contractors	2.709	5.462	2.484	2.196	2.381	4.542	4.232	3.842	3.748	2.967	2.772	2,828
	Combined	4.494	5.415	2.632	2.183	2.368	3.808	3.671	3.738	3.738	3.287	3.609	3,291

#### Notes:

1. For the year 2006, one of the companies reported the former function “Transport” and the function “Distribution” included within “Exploration and Production” and “Refining”. Therefore, for the calculation of 2006 rates, the data of this company corresponding to Transport and Distribution had to be considered as Exploration and Production and Refining instead of separately as for the rest of the companies.
2. Until 2008 inclusively, cells corresponding to the function “Transport – pipelines for liquids” represent the former function “Transport”.



**Table 8.1.2: Incidents' gravity rate per functional unit (ARPEL 2000-2011)**

Function	Data Category	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
E&P	Company	208.44	146.42	73.67	87.67	212.76	180.89	72.84	85.26	88.79	76.14	73.58	105.41
	Contractors	61.04	293.98	349.37	206.42	73.01	280.11	69.25	70.60	138.69	84.56	181.49	84.95
	Combined	152.86	182.40	256.55	135.95	147.31	226.57	70.76	78.98	117.96	80.65	129.14	94.10
Refining	Company	87.29	81.49	99.71	118.14	262.20	263.00	64.08	47.37	101.51	60.39	73.25	48.71
	Contractors	31.67	626.47	463.38	339.27	525.09	630.93	118.87	160.86	60.94	40.41	46.48	55.18
	Combined	79.49	156.03	252.28	153.95	301.47	325.39	72.03	78.75	85.39	52.66	61.54	51.08
Transport – pipelines for liquids	Company	92.63	44.05	66.45	54.43	185.34	214.10	46.92	21.50	41.12	11.88	48.25	39.07
	Contractors	8.15	0.00	10.19	26.14	29.48	33.93	27.68	38.98	27.73	159.98	25.03	51.99
	Combined	72.45	41.82	39.44	48.04	163.41	177.24	42.43	26.02	34.57	51.74	43.87	43.27
Transport – pipelines for gases	Company										54.60	52.91	16.15
	Contractors										164.62	152.09	16,51
	Combined										106.04	103.79	30.83
Transport – pipelines not separated	Company										27.37	15.67	19.22
	Contractors										16.78	158.03	18.24
	Combined										20.10	119.59	18.49
Transport - maritime	Company										11.88	36.21	39.21
	Contractors										28.37	0.00	27,78
	Combined										28.18	36.03	39.76
Distribution	Company	78.70	95.35	92.07	74.80	74.51	98.45	56.82	30.49	69.06	79.82	62.33	60.67
	Contractors	33.56	28.24	26.40	31.47	19.53	30.79	34.62	40.86	40.88	127.18	22.34	23.26
	Combined	62.25	85.83	70.10	61.74	62.09	87.95	47.46	33.28	57.87	97.95	49.75	48.09
Others	Company	30.76	59.75	80.05	62.33	70.12	58.44	28.13	29.10	48.38	17.59	16.70	26.97
	Contractors	0.00	40.31	749.65	206.38	13.80	83.38	84.50	19.15	42.26	48.34	57.39	62.08
	Combined	16.04	84.01	406.35	80.22	67.04	59.71	31.01	28.03	44.01	41.33	46.01	53.94
Total	Company	119.19	101.41	85.61	89.57	174.09	166.01	60.29	54.95	78.95	57.61	54.54	68.02
	Contractors	34.96	320.16	356.41	188.26	115.21	295.43	65.24	83.56	84.60	62.63	102.87	66.15
	Combined	92.56	150.94	228.87	118.29	157.41	202.01	62.33	64.10	82.17	60.50	82.39	66.93

Notes:

1. ARPEL includes weekends and holidays in the definition of the number of days away from work.
2. For the year 2006, one of the companies reported the former function “Transport” and the function “Distribution” included within “Exploration and Production” and “Refining”. Therefore, for the calculation of 2006 rates, the data of this company corresponding to Transport and Distribution had to be considered as Exploration and Production and Refining instead of separately as for the rest of the companies.
3. Until 2008 inclusively, cells corresponding to the function “Transport – pipelines for liquids” represent the former function “Transport”.



**Table 8.1.3: Incidents' frequency rate with lost workdays per functional unit (ARPEL 2000-2011)**

Function	Data Category	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
E&P	Company	1.937	1.754	1.858	1.674	1.829	3.447	3.385	2.446	2.355	2.813	3.775	6.234
	Contractors	3.654	2.779	2.133	2.746	1.893	2.210	2.289	2.289	1.878	1.224	1.131	1.705
	Combined	2.585	2.238	2.009	2.094	1.872	2.497	2.650	2.354	2.076	1.777	2.082	3.217
Refining	Company	2.447	1.092	2.186	2.029	2.001	5.394	1.654	2.518	2.095	5.110	2.909	4.345
	Contractors	3.057	2.788	4.638	8.981	1.707	3.206	1.897	3.085	2.497	8.543	1.299	1.789
	Combined	2.532	1.333	2.682	3.038	1.906	4.292	1.738	2.743	2.255	6.523	2.170	2.786
Transport – pipelines for liquids	Company	1.451	0.815	0.967	1.239	1.782	2.348	3.000	1.330	1.381	4.091	2.615	3.731
	Contractors	1.093	0.000	0.718	1.480	1.356	1.550	1.008	1.353	1.182	8.503	0.992	1.802
	Combined	1.365	0.707	0.920	1.276	1.549	2.185	1.694	1.343	1.284	5.477	2.131	2.565
Transport – pipelines for gases	Company										0.964	2.705	nda
	Contractors										2.351	3.392	nda
	Combined										1.688	3.092	nda
Transport – pipelines not separated	Company										0.687	0.881	0.854
	Contractors										0.667	0.667	0.829
	Combined										0.673	0.722	0.836
Transport - maritime	Company										4.091	2.210	6.718
	Contractors										3.832	0.000	nda
	Combined										1.546	2.137	6.718
Distribution	Company	7.640	11.789	4.089	4.117	2.006	2.420	3.119	4.149	4.664	7.287	3.882	5.115
	Contractors	1.572	1.339	1.497	1.601	1.004	0.946	1.314	1.811	1.093	1.880	0.881	1.092
	Combined	5.429	9.830	3.184	3.292	1.642	1.634	2.223	3.246	3.066	5.143	2.750	3.252
Others	Company	1.724	2.755	2.652	1.756	1.499	1.648	1.013	2.100	1.525	1.384	0.871	2.213
	Contractors	2.428	3.521	1.619	5.919	1.050	0.852	0.907	0.769	0.601	0.546	0.583	0.803
	Combined	2.061	3.144	2.262	2.071	1.212	1.241	0.943	1.195	0.865	0.728	0.660	1.022
Total	Company	2.668	2.973	2.276	2.054	1.838	3.183	2.313	2.479	2.226	3.387	2.738	4.695
	Contractors	2.817	2.783	2.260	3.390	1.555	1.952	1.817	1.834	1.431	1.733	0.904	1.251
	Combined	2.715	2.907	2.269	2.410	1.679	2.402	2.023	2.120	1.771	2.343	1.573	2.216

Notes:

1. For the year 2006, one of the companies reported the former function "Transport" and the function "Distribution" included within "Exploration and Production" and "Refining". Therefore, for the calculation of 2006 rates, the data of this company corresponding to Transport and Distribution had to be considered as Exploration and Production and Refining instead of separately as for the rest of the companies.
2. Until 2008 inclusively, cells corresponding to the function "Transport – pipelines for liquids" represent the former function "Transport".



**Table 8.1.4: Fatal incidents' rate per functional unit (ARPEL 2000-2011)**

Function	Data Category	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
E&P	Company	0.073	0.081	0.030	0.026	0.030	0.029	0.008	0.072	0.017	0.019	0.016	0.023
	Contractors	0.067	0.092	0.070	0.096	0.070	0.041	0.043	0.064	0.043	0.026	0.021	0.040
	Combined	0.071	0.088	0.054	0.070	0.057	0.037	0.031	0.067	0.034	0.024	0.019	0.034
Refining	Company	0.016	0.013	0.030	0.026	0.025	0.060	0.028	0.011	0.049	0.044	0.057	0.033
	Contractors	0.096	0.148	0.151	0.091	0.041	0.073	0.103	0.038	0.007	0.040	0.020	0.023
	Combined	0.027	0.048	0.064	0.045	0.030	0.064	0.055	0.022	0.031	0.042	0.040	0.029
Transport – pipelines for liquids	Company	0.026	0.000	0.017	0.018	0.042	0.000	0.039	0.000	0.017	0.000	0.000	0.062
	Contractors	0.336	0.396	0.067	0.055	0.054	0.038	0.000	0.032	0.000	0.000	0.000	0.099
	Combined	0.100	0.056	0.038	0.036	0.049	0.027	0.013	0.018	0.008	0.000	0.000	0.076
Transport – pipelines for gases	Company										0.964	2.705	5.678
	Contractors										2.351	3.392	14.865
	Combined										1.688	3.092	8.602
Transport – pipelines not separated	Company										0.687	0.881	0.854
	Contractors										0.667	0.667	0.829
	Combined										0.673	0.722	0.836
Transport - maritime	Company										4.091	2.210	6.718
	Contractors										3.832	0.000	0.000
	Combined										1.546	2.137	6.718
Distribution	Company	0.024	0.024	0.027	0.027	0.010	0.016	0.000	0.000	0.000	0.000	0.050	0.015
	Contractors	0.000	0.084	0.049	0.117	0.084	0.247	0.071	0.111	0.105	0.257	0.273	0.136
	Combined	0.015	0.037	0.035	0.060	0.036	0.098	0.035	0.045	0.050	0.101	0.134	0.058
Others	Company	0.000	0.035	0.014	0.000	0.009	0.000	0.009	0.008	0.000	0.007	0.005	0.013
	Contractors	0.046	0.051	0.054	0.041	0.020	0.045	0.019	0.020	0.011	0.004	0.011	0.013
	Combined	0.022	0.044	0.040	0.028	0.016	0.031	0.015	0.016	0.008	0.005	0.010	0.013
Total	Company	0.034	0.043	0.026	0.021	0.022	0.028	0.017	0.032	0.021	0.020	0.022	0.025
	Contractors	0.074	0.095	0.074	0.080	0.055	0.061	0.044	0.048	0.029	0.025	0.024	0.029
	Combined	0.047	0.067	0.050	0.053	0.040	0.047	0.033	0.042	0.026	0.023	0.023	0.028

Notes:

1. For the year 2006, one of the companies reported the former function “Transport” and the function “Distribution” included within “Exploration and Production” and “Refining”. Therefore, for the calculation of 2006 rates, the data of this company corresponding to Transport and Distribution had to be considered as Exploration and Production and Refining instead of separately as for the rest of the companies.
2. Until 2008 inclusively, cells corresponding to the function “Transport – pipelines for liquids” represent the former function “Transport”.



## 8.2. Tabulated results: Offshore activities for companies, contractors and combined

Data used to develop the associated graph for each rate analyzed in chapter 3.0 is presented in the tables below, for the period 2002/2011.

**Table 8.2.1: Incidents' rate per functional unit – offshore activities (ARPEL 2002-2011)**

Tasa	Rubro	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Total Incidents' Rate	Company	2,04	2,03	2,98	3,20	2,79	5,64	3,90	5,43	9,75	9,31
	Contractors	2,36	1,46	3,40	3,35	1,62	6,86	3,55	2,39	2,38	2,68
	Combined	2,22	1,73	3,11	3,27	2,17	6,13	3,77	4,43	7,72	7,29
Incidents' Gravity Rate	Company	112,40	114,22	126,48	103,24	79,26	125,55	66,57	52,69	43,74	22,06
	Contractors	50,90	11,29	10,58	81,04	28,58	59,84	215,16	87,12	113,89	129,24
	Combined	85,80	110,27	122,46	97,37	52,12	108,88	91,38	57,73	50,36	58,06
Incidents' Frequency Rate with lost workdays	Company	1,74	1,97	3,25	7,44	2,36	4,10	3,18	4,41	6,41	12,19
	Contractors	2,01	1,03	2,71	2,85	1,20	6,39	5,36	1,95	3,32	2,44
	Combined	1,90	1,93	3,07	4,58	1,74	4,68	3,55	3,60	6,12	9,49
Fatal Incidents' Rate	Company	n/a	0,06	0,02	0,00	0,00	0,19	0,00	0,00	0,01	0,01
	Contractors	0,05	0,09	0,17	0,04	0,01	0,61	0,03	0,03	0,04	0,03
	Combined	0,05	0,08	0,07	0,02	0,01	0,36	0,01	0,01	0,02	0,02

Notes:

- Item 2: ARPEL includes weekends and holidays in the definition of the number of days away from work.

## 8.3. Tabulated results – Safety proactive indicators

Data used to develop the associated graph for each rate analyzed in chapter 5.0 is presented in the tables below, for the period 2003/2011.

**Table 8.3.1: Tasks planned observations per functional unit - company data (ARPEL 2003-2011)**

Función	2003	2004	2005	2006	2007	2008	2009	2010	2011
E&P	6.19	10.36	1.83	1.07	1.28	1.01	4.87	1.45	3.12
Refining	2.04	1.78	2.21	0.99	1.60	2.51	7.05	15.93	5.22
Transport-pipelines for liquids	0.17	0.28	1.18	1.59	0.92	1.25	0.18	0.46	0.80
Transport-pipelines for gases							1.60		
<i>Transport-pipelines not separated</i>							2.93	4.34	2.83
Transporte-maritime							4.29	0.04	0.43
Distribution	0.01	1.80	2.63	1.36	1.38	1.64	1.24	1.01	1.88
Other	0.00	0.01	0.28	1.44	0.57	1.41	3.23	1.29	2.19
<b>Total</b>	<b>3.22</b>	<b>4.51</b>	<b>1.96</b>	<b>1.15</b>	<b>1.12</b>	<b>1.35</b>	<b>3.93</b>	<b>3.70</b>	<b>3.27</b>

**Table 8.3.2: Safety training intensity rate per functional unit - company data (ARPEL 2003-2011)**

Function	2003	2004	2005	2006	2007	2008	2009	2010	2011
E&P	0.95	1.36	0.62	0.21	0.22	0.14	0.10	0.32	0.30
Refining	0.62	0.56	0.29	0.26	0.21	0.21	0.30	0.83	0.35
Transport-pipelines for liquids	0.20	0.78	0.10	2.54	1.19	1.68	0.09	1.82	0.55
Transport-pipelines for gases							0.17		
<i>Transport-pipelines not separated</i>							0.29	1.24	
Transporte-maritime							0.08	0.02	0.06
Distribution	0.06	0.39	0.08	0.15	0.10	1.13	0.10	0.19	0.19
Other	7.43	0.17	0.19	0.11	0.02	0.10	0.26	0.32	0.18
<b>Total</b>	<b>2.00</b>	<b>0.76</b>	<b>0.36</b>	<b>0.24</b>	<b>0.18</b>	<b>0.20</b>	<b>0.17</b>	<b>0.45</b>	<b>0.30</b>



Notes:

1. For the period 2006 to 2008, one of the companies reported the former function “Transport” and the function “Distribution” included within “Exploration and Production” and “Refining”. Therefore, for the calculation of that period’s proactive rates, data of that company corresponding to Transport and Distribution had to be considered as Exploration and Production and Refining instead of separately as for the rest of the companies.
2. One company reported the data for the calculation of the safety proactive indicators for the combined result (company and contractors) during 2003 and 2004. Since 2005, it could start reporting data only referred to the company’s workers.

**8.4. Tabulated results – fatality causes – ARPEL 2001-2011**

**Table 8.4.1: Fatality causes – totals for ARPEL Member Companies and their contractors – term 2001/2011**

Fatality Causes	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Motor vehicle	14%	10%	16%	10%	6%	2%	18%	18%	33%	33%	18%
Drowning	3%	12%	7%	8%	0%	6%	34%	4%	2%	4%	9%
Caught in or between	3%	18%	3%	19%	11%	10%	3%	6%	13%	2%	8%
Fall	0%	10%	11%	6%	14%	13%	10%	14%	6%	12%	11%
Electrocution	6%	2%	11%	13%	3%	15%	1%	12%	17%	8%	5%
Toxic gas or liquid	3%	3%	7%	6%	17%	2%	5%	0%	2%	12%	3%
Struck by equipment	14%	23%	7%	12%	19%	12%	16%	16%	17%	14%	15%
Fires and explosions	51%	17%	16%	11%	17%	25%	7%	16%	2%	10%	18%
Other transportation	6%	0%	16%	15%	4%	4%	0%	10%	2%	0%	6%
Other	0%	5%	5%	0%	9%	12%	5%	4%	6%	4%	5%
NDA	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
<b>Total</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>



## 9.0 APPENDIX B

### 9.1. ARPEL Member Companies data: totals for companies – year 2011

This table gathers all data of ARPEL Member Companies that reported for 2011. The incidents' rates' indicators used are calculated.

**Table 9.1: ARPEL Member Companies data – totals for companies (including offshore activities); 2011 data**

Function	Average number of employees	Hours worked (in thousands)	Recordable cases				Extent and outcome of injuries and illnesses				Incident Rates			
			a	B	c	d	e	f	g	h	i	j	k	l
			Injuries	Illness	Fatalities	Total	Cases of:			Number of days away from work	Total	Gravity	Frequency with lost workdays	Fatalities
Restricted workdays	Lost workdays	Medical treatment												
E&P	165.853	354.078	1.863	140	8	2.011	12	1.369	506	37.325	5,68	105,41	6,23	0,02
Refining	81.370	182.172	517	77	6	600	27	292	200	8.873	3,29	48,71	4,35	0,03
Transport-pipelines for liquid	6.848	16.150	24	0	1	25	0	19	9	631	1,55	39,07	3,73	0,06
Transport-pipelines for gases	3.328	6.687	14	0	2	16	0	9	5	108	2,39	16,15	5,68	0,30
<i>Transport-pipelines not separated</i>	12.430	25.759	90	0	1	91	11	22	0	495	3,53	19,22	0,85	0,04
Transport-maritime	13.591	23.691	73	8	0	81	0	34	36	929	3,42	39,21	6,72	0,00
Distribution	30.400	66.891	269	3	1	273	8	201	88	4.058	4,08	60,67	5,11	0,01
Others	72.788	157.795	325	17	2	344	0	213	83	4.255	2,18	26,97	2,21	0,01
<b>Total</b>	<b>386.608</b>	<b>833.223</b>	<b>3.175</b>	<b>245</b>	<b>21</b>	<b>3.441</b>	<b>58</b>	<b>2.159</b>	<b>927</b>	<b>56.674</b>	<b>4,13</b>	<b>68,02</b>	<b>4,70</b>	<b>0,03</b>

Notes:

- Item 5(h) (number of days away from work) includes all calendar days (including weekends and holidays).
- Since some companies reported incomplete data, the calculation of each rate is performed only with the worked hours corresponding to such rate and which do not necessarily coincide with the value in column 3 (total reported). Therefore, it is not possible to obtain each rate's value by directly applying the calculation formulae from the data in tables 9.1 to 9.4. For example, suppose company "A" reported 10,000 total worked hours (which are added in column 3 of tables 9.1 to 9.4), but it did not report data to calculate the incidents' gravity rate; then the 10,000 hours cannot be used for the calculation of this rate (this company could not be considered to calculate the incidents' gravity rate and the worked hours this company reported were not considered to calculate the rate).
- Recordable cases (column 4): The total does not necessarily match the sums of "Injuries" + "Diseases" + "Fatalities" since there were companies that reported the total recordable cases without the corresponding splitting between Injuries, Diseases and Fatalities. Therefore, in these cases the value for the "Total" may be greater than the sum of "Injuries" + "Diseases" + "Fatalities".



**9.2. ARPEL Member Companies' contractors data: totals for contractors – year 2011**

This table gathers all data of ARPEL Member Companies' contractors that reported data for 2011. The incidents' rates' indicators used are calculated.

**Table 9.2: ARPEL Member Companies' contractor's data – totals for contractors (including offshore activities); 2011 data**

Function	Average number of employees	Hours worked (in thousands)	Recordable cases				Extent and outcome of injuries and illnesses				Incident Rates			
			a	b	c	d	e	f	g	h	i	j	k	l
			Injuries	Illness	Fatalities	Total	Cases of:			Number of days away from work	Total	Gravity	Frequency with lost workdays	Fatalities
Restricted workdays	Lost workdays	Medical treatment												
E&P	283.758	708.363	2.187	0	28	2.215	142	747	503	37.219	3,13	84,95	1,70	0,04
Refinación	52.974	128.958	603	0	3	606	57	188	251	5.798	4,70	55,18	1,79	0,02
Transporte- ductos para líquidos	4.679	10.081	33	0	1	34	10	14	11	404	3,37	51,99	1,80	0,10
Transporte- gasoductos	744	1.592	16	0	0	16	0	11	5	121	10,05	163,51	14,86	0,00
Transporte- ductos no separado	29.155	72.383	193	0	0	193	37	60	21	1.320	2,67	18,24	0,83	0,00
Transporte- marítimo	693	925	3	0	0	3	0	1	0	15	3,24	277,78	18,52	0,00
Distribución	19.572	36.700	79	0	5	84	2	37	20	788	2,29	23,26	1,09	0,14
Otros	265.795	552.308	1.116	0	7	1.123	26	420	52	32.486	2,03	62,08	0,80	0,01
<b>Total</b>	<b>657.370</b>	<b>1.511.309</b>	<b>4.230</b>	<b>0</b>	<b>44</b>	<b>4.274</b>	<b>274</b>	<b>1.478</b>	<b>863</b>	<b>78.151</b>	<b>2,83</b>	<b>66,15</b>	<b>1,25</b>	<b>0,03</b>

Notes:

1. Item 5(h) (number of days away from work) includes all calendar days (including weekends and holidays).
2. Since some companies reported incomplete data, the calculation of each rate is performed only with the worked hours corresponding to such rate and which do not necessarily coincide with the value in column 3 (total reported). Therefore, it is not possible to obtain each rate's value by directly applying the calculation formulae from the data in tables 9.1 to 9.4. For example, suppose company "A" reported 10,000 total worked hours (which are added in column 3 of tables 9.1 to 9.4), but it did not report data to calculate the incidents' gravity rate; then the 10,000 hours cannot be used for the calculation of this rate (this company could not be considered to calculate the incidents' gravity rate and the worked hours this company reported were not considered to calculate the rate).
3. Recordable cases (column 4): The total does not necessarily match the sums of "Injuries" + "Diseases" + "Fatalities" since there were companies that reported the total recordable cases without the corresponding splitting between Injuries, Diseases and Fatalities. Therefore, in these cases the value for the "Total" may be greater than the sum of "Injuries" + "Diseases" + "Fatalities".





### 9.3. ARPEL Member Companies data: offshore activities - year 2011

This table gathers all data on offshore activities of ARPEL Member Companies that reported data for 2011. The incidents' rates' indicators used are calculated.

**Table 9.3: ARPEL Member Companies' data – offshore activities; 2011 data**

Function	Average number of employees	Hours worked (in thousands)	Recordable cases				Extent and outcome of injuries and illnesses				Incident Rates			
			a	b	c	d	e	f	g	h	i	j	k	l
			Injuries	Illness	Fatalities	Total	Cases of:			Number of days away from work	Total	Gravity	Frequency with lost workdays	Fatalities
Restricted workdays	Lost workdays	Medical treatment												
E&P	52.084	88.922	827	0	1	828	1	639	190	875	9,31	22,06	12,19	0,01
<b>Total</b>	<b>52.084</b>	<b>88.922</b>	<b>827</b>	<b>0</b>	<b>1</b>	<b>828</b>	<b>1</b>	<b>639</b>	<b>190</b>	<b>875</b>	<b>9,31</b>	<b>22,06</b>	<b>12,19</b>	<b>0,01</b>

Notes:

- Item 5(h) (number of days away from work) includes all calendar days (including weekends and holidays).
- Since some companies reported incomplete data, the calculation of each rate is performed only with the worked hours corresponding to such rate and which do not necessarily coincide with the value in column 3 (total reported). Therefore, it is not possible to obtain each rate's value by directly applying the calculation formulae from the data in tables 9.1 to 9.4. For example, suppose company "A" reported 10,000 total worked hours (which are added in column 3 of tables 9.1 to 9.4), but it did not report data to calculate the incidents' gravity rate; then the 10,000 hours cannot be used for the calculation of this rate (this company could not be considered to calculate the incidents' gravity rate and the worked hours this company reported were not considered to calculate the rate).
- Recordable cases (column 4): The total does not necessarily match the sums of "Injuries" + "Diseases" + "Fatalities" since there were companies that reported the total recordable cases without the corresponding splitting between Injuries, Diseases and Fatalities. Therefore, in these cases the value for the "Total" may be greater than the sum of "Injuries" + "Diseases" + "Fatalities".



**9.4. ARPEL Member Companies’ contractors data: offshore activities - year 2011**

This table gathers all data on offshore activities of ARPEL Member Companies’ contractors that reported data for 2011. The incidents rates' indicators used are calculated.

**Table 9.4: ARPEL Member Companies’ contractors’ data – offshore activities; 2011 data**

Function	Average number of employees	Hours worked (in thousands)	Recordable cases				Extent and outcome of injuries and illnesses				Incident Rates			
			a	b	c	d	e	f	g	h	i	j	k	l
			Injuries	Illness	Fatalities	Total	Cases of:			Number of days away from work	Total	Gravity	Frequency with lost workdays	Fatalities
Restricted workdays	Lost workdays	Medical treatment												
E&P	12.950	38.851	103	0	1	104	2	49	43	2.594	2,68	129,24	2,44	0,03
<b>Total</b>	12.950	38.851	103	0	1	104	2	49	43	2.594	2,68	129,24	2,44	0,03

Notes:

1. Item 5(h) (number of days away from work) includes all calendar days (including weekends and holidays).
2. Since some companies reported incomplete data, the calculation of each rate is performed only with the worked hours corresponding to such rate and which do not necessarily coincide with the value in column 3 (total reported). Therefore, it is not possible to obtain each rate’s value by directly applying the calculation formulae from the data in tables 9.1 to 9.4. For example, suppose company “A” reported 10,000 total worked hours (which are added in column 3 of tables 9.1 to 9.4), but it did not report data to calculate the incidents’ gravity rate; then the 10,000 hours cannot be used for the calculation of this rate (this company could not be considered to calculate the incidents’ gravity rate and the worked hours this company reported were not considered to calculate the rate).
3. Recordable cases (column 4): The total does not necessarily match the sums of “Injuries” + “Diseases” + “Fatalities” since there were companies that reported the total recordable cases without the corresponding splitting between Injuries, Diseases and Fatalities. Therefore, in these cases the value for the “Total” may be greater than the sum of “Injuries” + “Diseases” + “Fatalities”.



## 10.0 APPENDIX C

### 10.1. Formula to calculate incidence rates

Formula utilized to calculate each one of the incidence rates' indicators are shown below:

1. Total incidents' rate

$$= \frac{\text{Column4}(d) * 1,000}{\text{Column3}}$$

Where:

Column 4(d) = Total recordable cases

Column 3 = Worked hours (in thousands)

2. Incidents' gravity rate

$$= \frac{\text{Column5}(h) * 1,000}{\text{Column3}}$$

Where:

Column 5(h) = number of days away from work

Column 3 = Worked hours (in thousands)

Note: ARPEL's definition of Column 5(h) includes all calendar days (including weekends and holidays).  
API's definition of Column 5(h) excludes weekends and holidays, unless the employee had to work.

3. Incidents' frequency rate with lost workdays

$$= \frac{\text{Column5}(f) * 1,000}{\text{Column3}}$$

Where:

Column 5(h) = Cases of lost workdays.

Column 3 = Worked hours (in thousands)



## 4. Fatal incidents' rate

$$= \frac{\text{Column4}(c) * 1,000}{\text{Column3}}$$

Where:

Column 4(c) = number of fatalities

Column 3 = Worked hours (in thousands)

## 5. Tasks planned observations' rate

$$= \frac{\text{Column2}(a)}{\text{Column2}(b)}$$

Where:

Column 2(a) = tasks planned observations' number (cumulative)

Column 2 (b) = average number of workers

## 6. Safety training intensity rate

$$= \left[ \frac{\text{Column3}(d)}{\text{Column3}(e) * 1000} \right] * 100$$

Where:

Column 3(d) = safety training hours (cumulative)

Column 3(e) = Worked hours (in thousands)

## Regional Association of Oil, Gas and Biofuels Sector Companies in Latin America and the Caribbean

**ARPEL** is a non-profit association gathering oil, gas and biofuels sector companies and institutions in Latin America and the Caribbean. Founded in 1965 as a vehicle of cooperation and reciprocal assistance among sector companies, its main purpose is to actively contribute to industry integration and competitive growth, and to sustainable energy development in the region.

Its membership currently represents over 90% of the upstream and downstream activities in the region and includes national, international and independent operating companies, providers of technology, goods and services for the value chain, and national and international sector institutions.

Since 1976, ARPEL holds Special Consultative Status with the United Nations Economic and Social Council (ECOSOC). In 2006, the association declared its adherence to the UN Global Compact principles.

### Mission

To foster and facilitate sector integration and development, continuous operational improvement and effective management of environmental and social issues, by:

- sharing, enhancing and disseminating best practices;
- carrying out studies that translate in information of value;
- broadening knowledge and helping build required competences;
- promoting networking, interaction and cooperation among members and stakeholders.

### Vision

A growing, competitive and integrated oil and gas industry that achieves excellence in its operations and products, and effectively contributes to a sustainable energy development in Latin America and the Caribbean.

### Value proposition

ARPEL offers a unique mean for networking, sharing knowledge, joining efforts and building synergies in favor of the sector's integration, growth and sustainability. Without any distinction, Members have the opportunity to alternatively lead activities and projects, contribute with their know-how to their development, or learn from the experiences of other members.

ARPEL's value is also reflected in its condition of strategic information center about sector activities in the region and cost-effective vehicle for the development of publications on best practices and benchmarking, as well as on sectoral studies and executive reports aimed at diverse stakeholders. The Association additionally stands out for its regional conferences, forums and seminars of high impact in the industry.

ARPEL is a recognized regional body of representation for the sector that seeks to advocate in favor of the common interests of its Membership and to enhance the industry's public image and reputation.

Socio-environmental sustainability  
**Operational excellence**  
Sectoral development  
**August 2012**

### Member Companies



### Institutional Members



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