



Process Safety Benchmarking in the Oil and Gas Industry in Latin America and the Caribbean (2018 data)


ARPEL Publication BE01-2019
June, 2019

Process Safety Incidents Benchmarking – in the oil and gas industry in Latin America and the Caribbean- Data 2018

Report BE01-2019

June 2019

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 professionals of the ARPEL EHS Committee, and the Safety and Process Safety Project Teams.

Copyright

The copyright of this document, whether in its printed, electronic or any other version, is held by the Regional Association of Oil, Gas and Biofuels Sector Companies in Latin America and the Caribbean (ARPEL), Any copy of this document must include this copyright notice, The user shall give – in future use of this document – full credit to ARPEL for being the source of information.

Disclaimer

Although efforts were made to ensure the accuracy of the information contained in this document, neither ARPEL nor any of its Member Companies, neither the authors or reviewers, nor the companies and institutions they represent, assume any responsibility for any use made hereof. No references made to names or trademarks of equipment manufacturers and/or processes represent any endorsement by the authors, ARPEL or any of its Member Companies.

Introducción

- The Process Safety Benchmarking Report is an annual comparative study of the ARPEL member companies performance. Its objective is helping to improve the safety performance and management of the oil and gas industry and bridge gaps by analyzing process safety incidents indicators and establishing benchmarks.
- The main references for reporting are the API recommended practice 754 and its reporting guidelines 3.0 and the CCPS document Process Safety Leading and Lagging Metrics. The definitions used in this report could be found on the User's Manual – ARPEL Database – Safety Benchmarking in the oil and gas industry in Latin America and the Caribbean, 7th edition, 2017. There is a brief methodological note in the annexes of this document.
- For this report (2018 data) only Tier 1 and Tier 2 indicators were compiled because of comparability issues. The objective is to progress towards the definition and reporting of proactive indicators (Tier 3 and Tier 4), which are in the lower part of the safety pyramid.

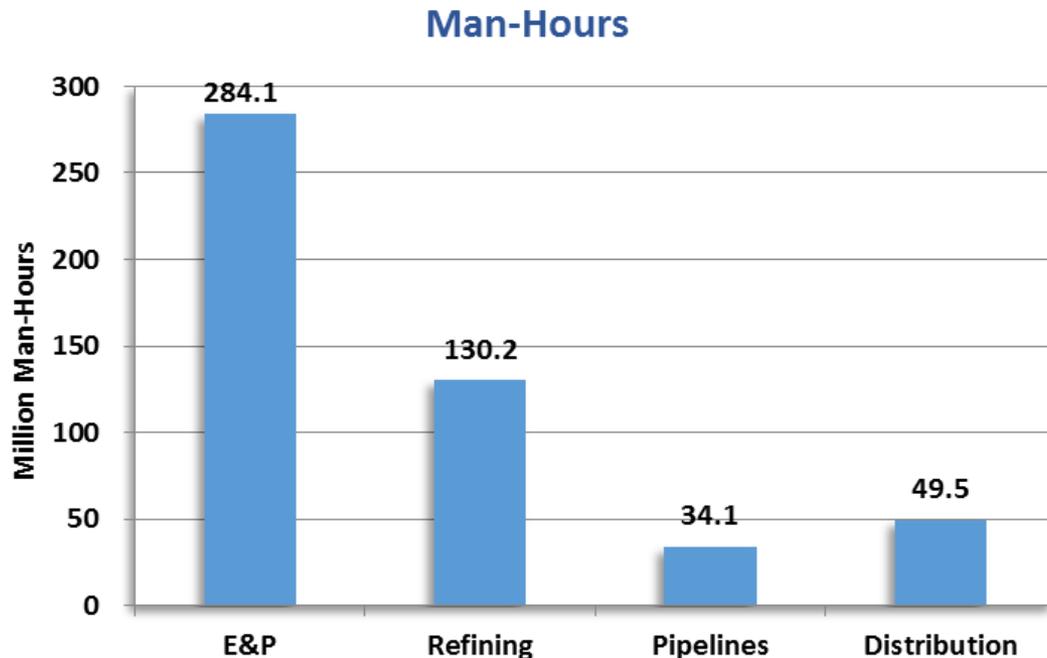
Alcance

- 13 companies coming from 11 different countries shared data for this report.

ANCAP (Uruguay)	Oldelval (Argentina)	Pluspetrol (Argentina, Bolivia and Peru)
Chevron (Argentina, Brazil, Colombia and Venezuela)	Pan American Energy (Argentina)	Repsol (Bolivia, Ecuador and Peru)
COGA (Peru)	PCJ (Jamaica)	YPF (Argentina)
ENAP (Chile)	PEMEX (Mexico)	YPFB Transporte (Bolivia)
	Petroperu (Peru)	

Scope of the Report

- Data is broken down in 4 different business lines or functions (E&P, Refining, Pipelines and Distribution)
- A total amount of 498.0 million man-hours were reported, as shown in the chart below:



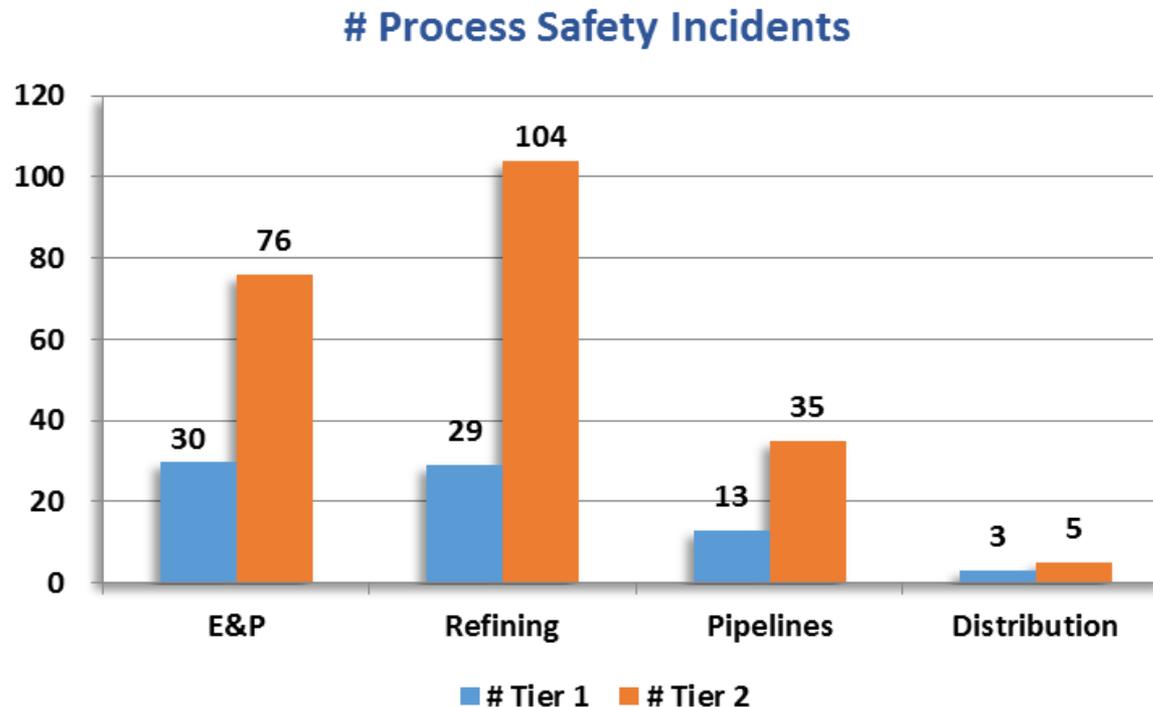
Resultados: Incidentes T1 y T2

Function	Man-hours	# Tier 1	# Tier 2	Total	# Tier 1/million MH	# Tier 2/million MH	Total/million MH
E&P	284	30	76	106	0.11	0.27	0.37
Refining	130	29	104	133	0.22	0.80	1.02
Pipelines	34	13	35	48	0.38	1.03	1.41
Distribution	49	3	5	8	0.06	0.10	0.16
Total	498	75	220	295	0.15	0.44	0.59

Function	Man-hours	# Tier 1	# Tier 2	Total	# Tier 1/200 thous. MH	# Tier 2/200 thous. MH	Total/200mil HH
E&P	284	30	76	106	0.02	0.05	0.07
Refining	130	29	104	133	0.04	0.16	0.20
Pipelines	34	13	35	48	0.08	0.21	0.28
Distribution	49	3	5	8	0.01	0.02	0.03
Total	498	75	220	295	0.03	0.09	0.12

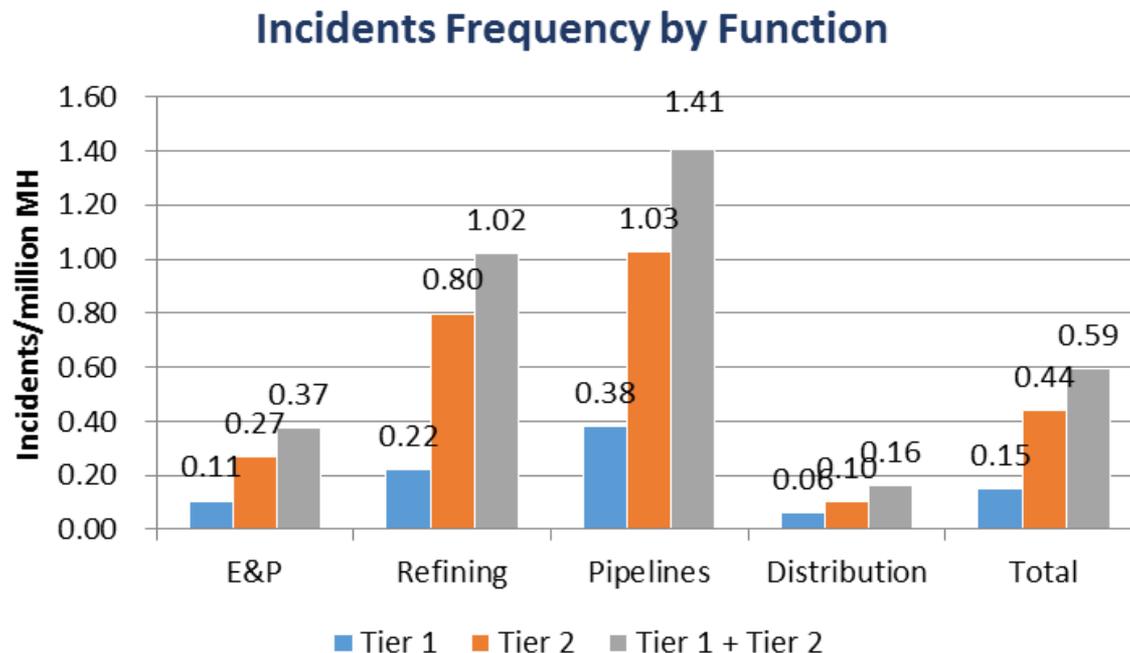
- A total amount of 75 tier 1 incidents and 220 tier 2 incidents were reported. Total incident reported were 295.
- An average of 0.15 tier 1 incidents, 0.44 tier 2 incidents and 0.59 total incidents per million hours worked were reported.
- This represents one tier 1 incident every 6.6 million hours worked; one tier 2 incident every 2.3 million hours worked and one incident tier 1 or 2 every 1.7 million hours worked.

Results: # Process Safety Incidents



- 106 incidents were reported in E&P (30 tier 1 and 76 tier 2)
- 133 incidents were reported in Refining (29 tier 1 and 104 tier 2)
- 48 incidents were reported in Pipelines (13 tier 1 and 35 tier 2)
- 8 incidents were reported in Distribution (3 tier 1 y 5 tier 2)

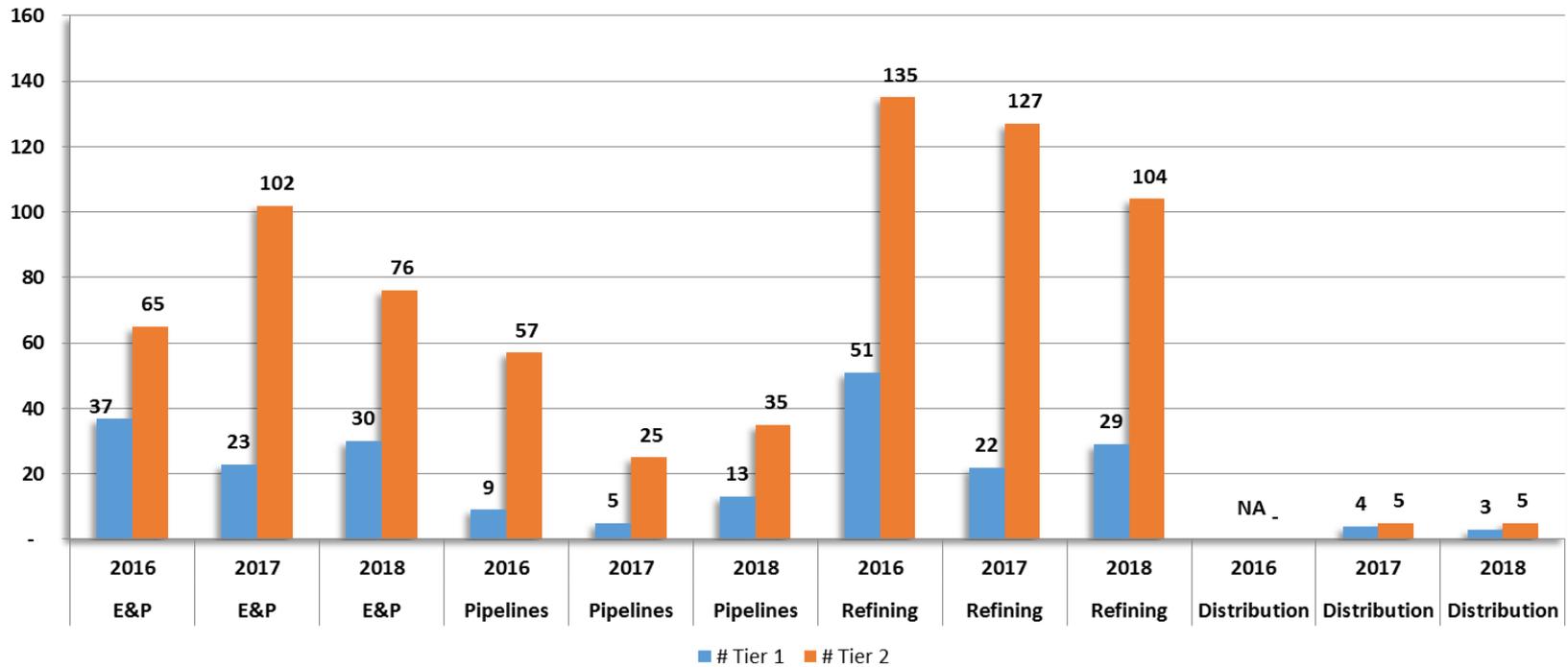
Results: T1 and T2 Incidents rate (per million man-hours worked)



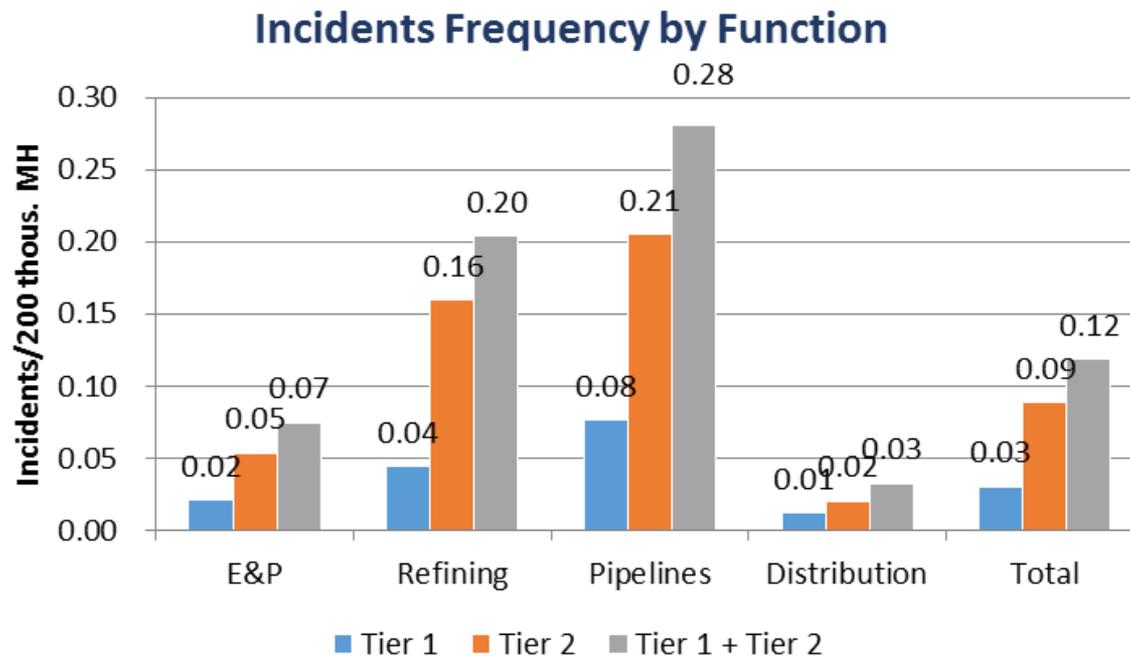
- Pipelines was the function in which the highest rate of tier 1 or 2 incidents per million hours worked were reported (1.41), followed by Refining (1.02), E&P (0.37) and Distribution (0.16).

Results: 2016-2018

Process Safety Incidents



Results: T1 and T2 Incidents rate (per 200 thousand man-hours worked)



- Pipelines was the function in which the highest rate of tier 1 or 2 incidents per two hundred thousands hours worked were reported (0.28), followed by Refining (0.20), E&P (0.07) and Distribution (0.03).

Results: 2016-2018 (E&P)



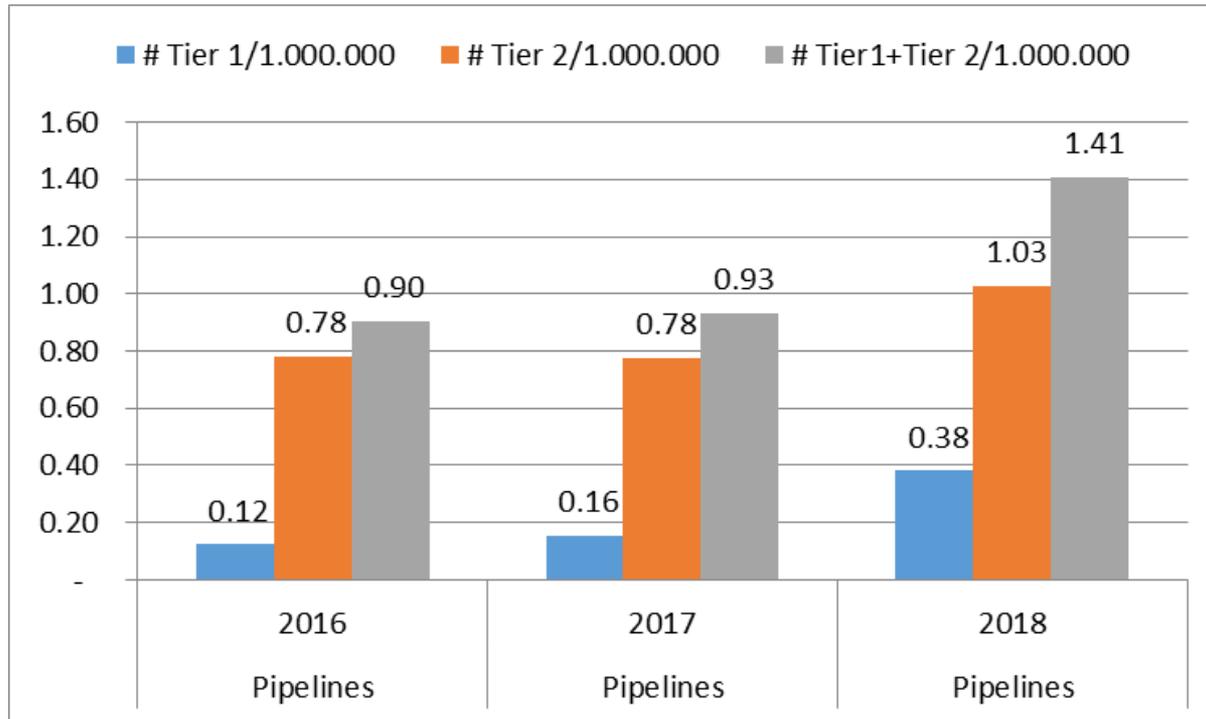
- The function E&P shows a decreasing trend in the incidents reported per million hours worked between 2016 (0.58) and 2018 (0.37).

Results: 2016-2018 (E&P)



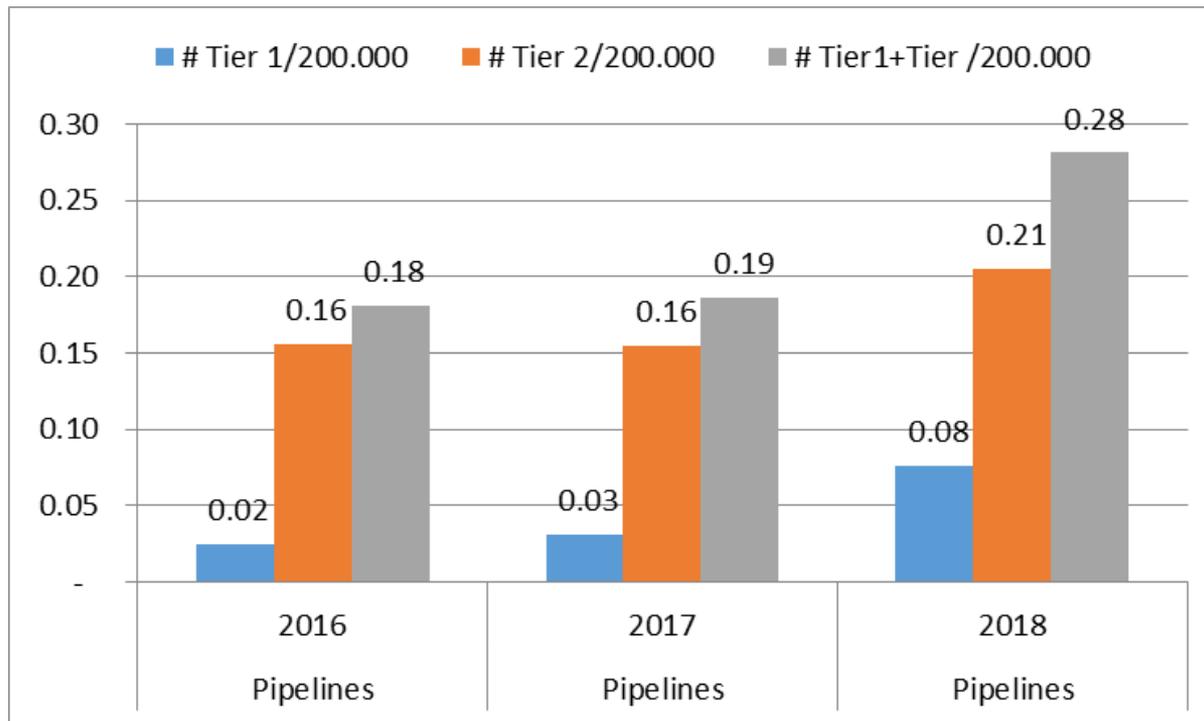
- The function E&P shows a decreasing trend in the incidents reported per two hundred thousand hours worked between 2016 (0.12) and 2018 (0.07).

Results: 2016-2018 (Pipelines)



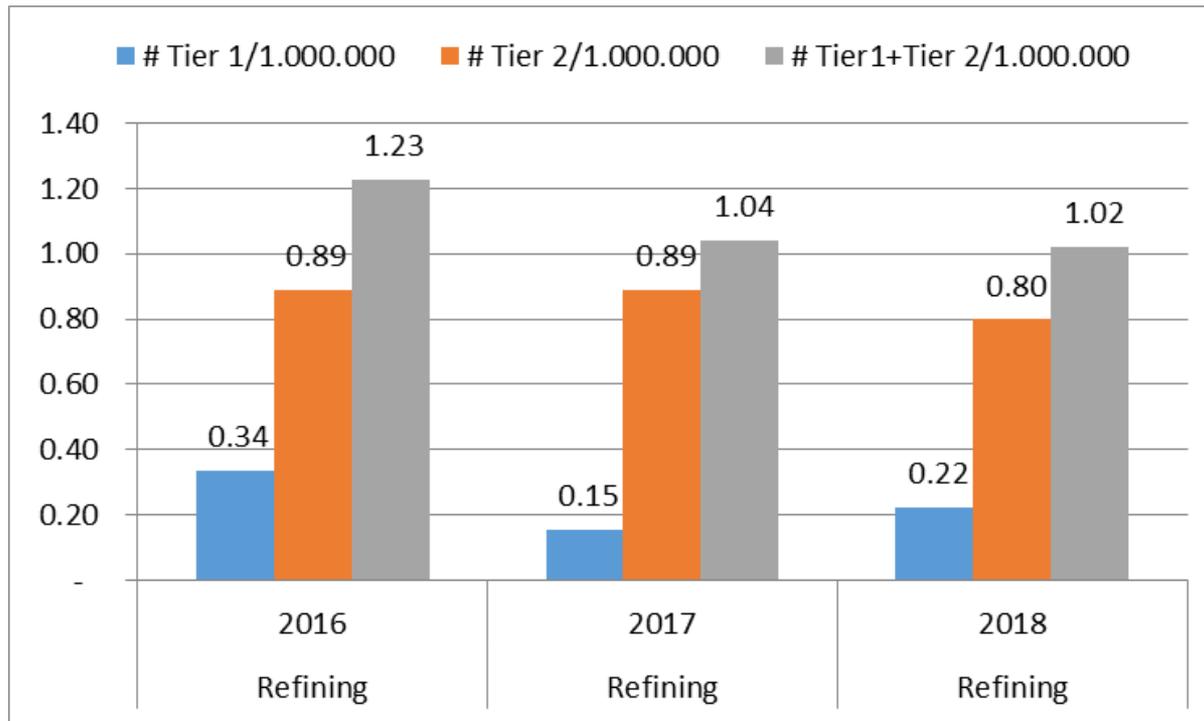
- 1.41 incidents per million hours worked were reported in Pipelines, which is 57% above 2016 figures.

Results: 2016-2018 (Pipelines)



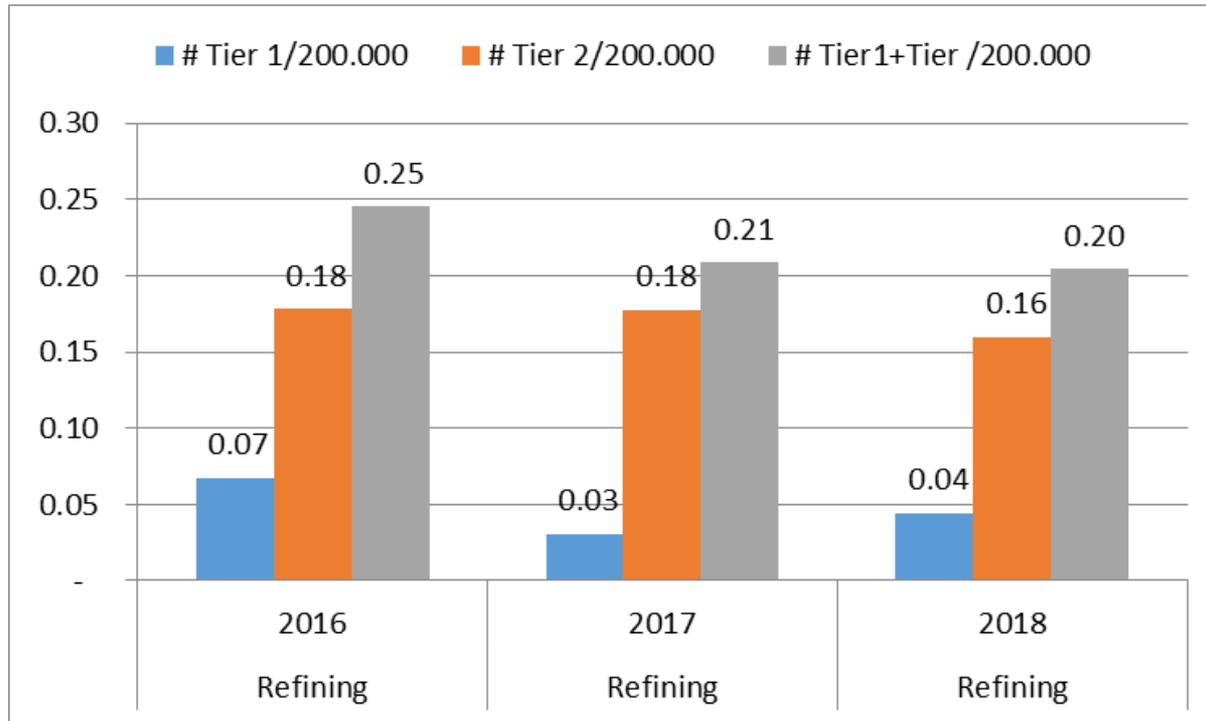
- 0.18 incidents per two hundred thousand hours worked were reported in Pipelines, which is 57% above 2016 figures.

Results: 2016-2018 (Refining)



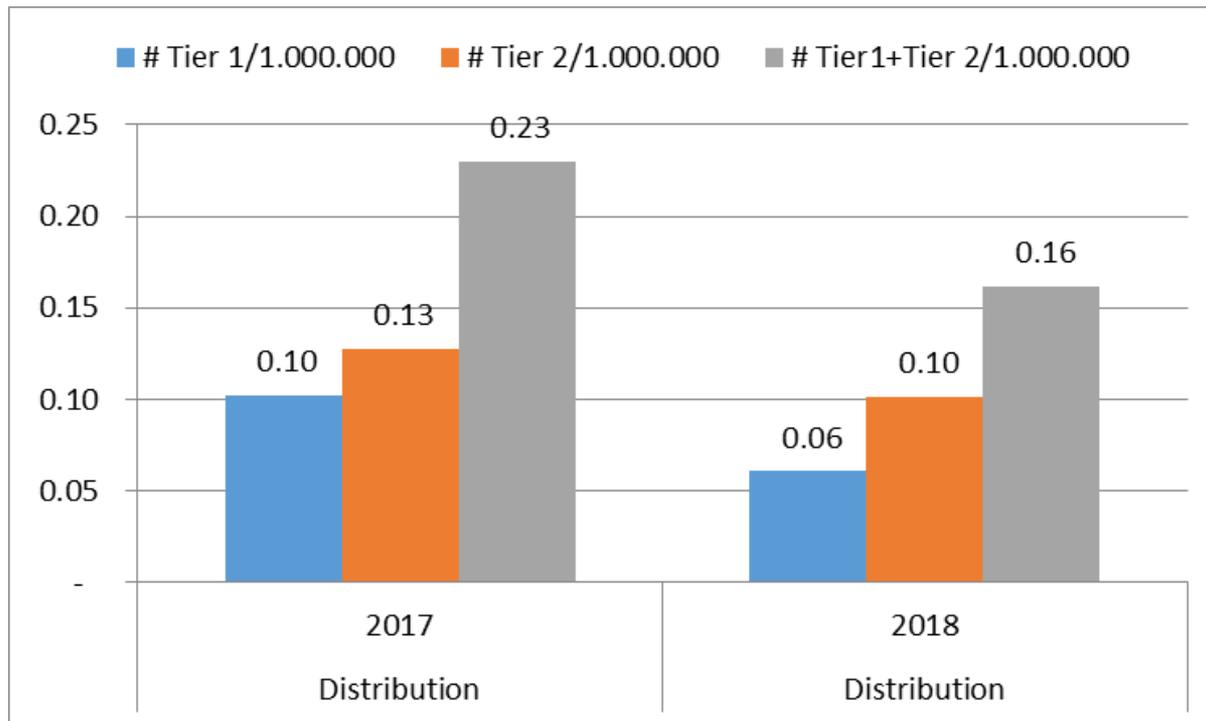
- Refining showed a stable average of incidents per million hours worked; being 1.04 in 2018 and 1.02 in 2017.

Results: 2016-2018 (Refining)



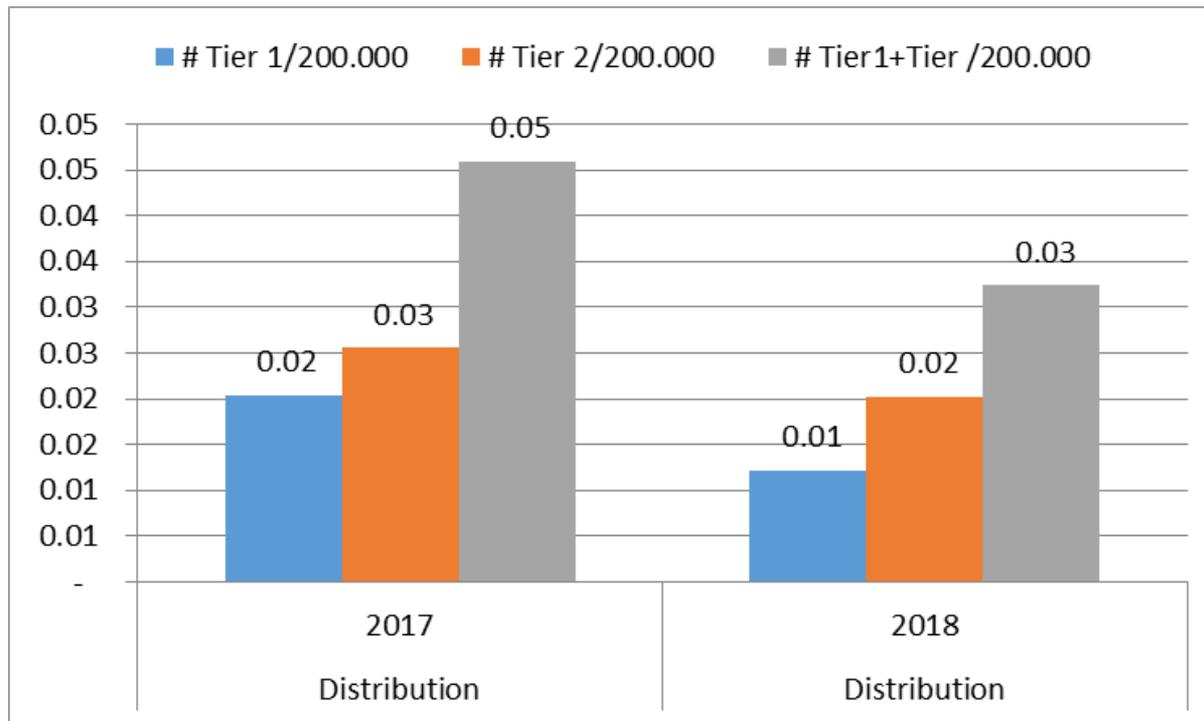
- Refining showed a stable average of incidents per two hundred thousand hours worked; being 0.21 in 2018 and 0.20 in 2017.

Results: 2017-2018 (Distribution)



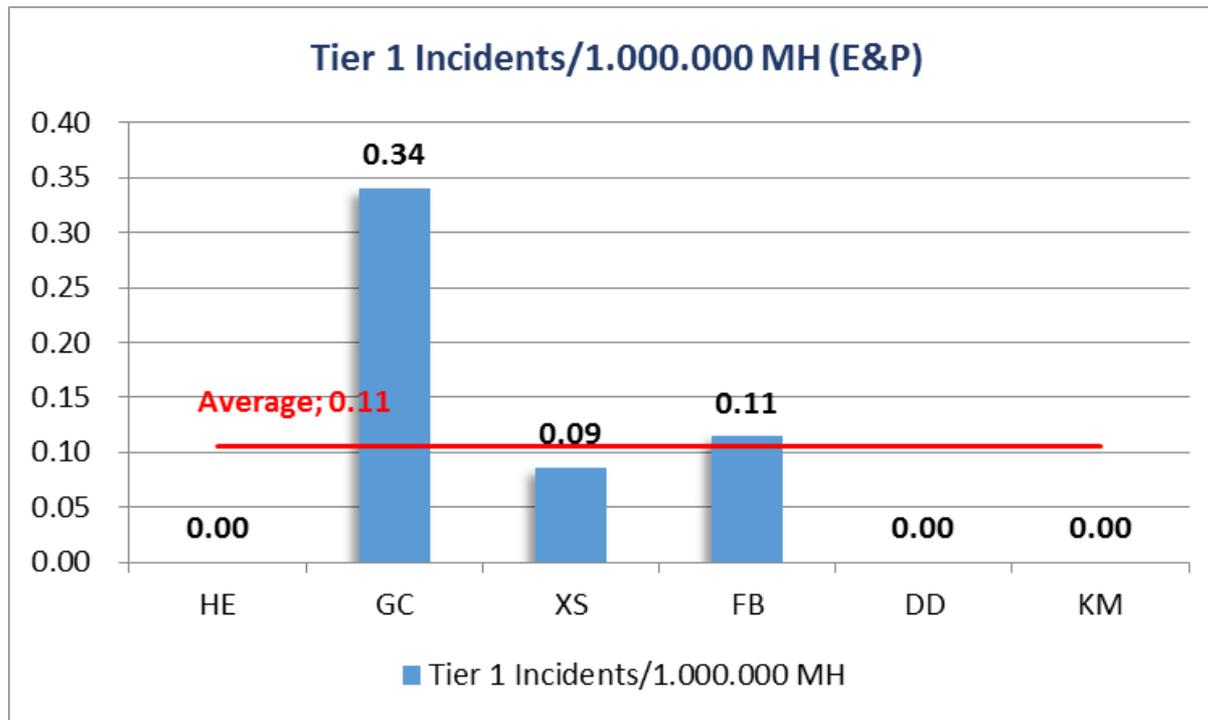
- 0.16 incidents per million hours worked were reported in Distribution in 2018, decreasing from 0.23 average incidents reported in 2017.

Results: 2017-2018 (Distribution)



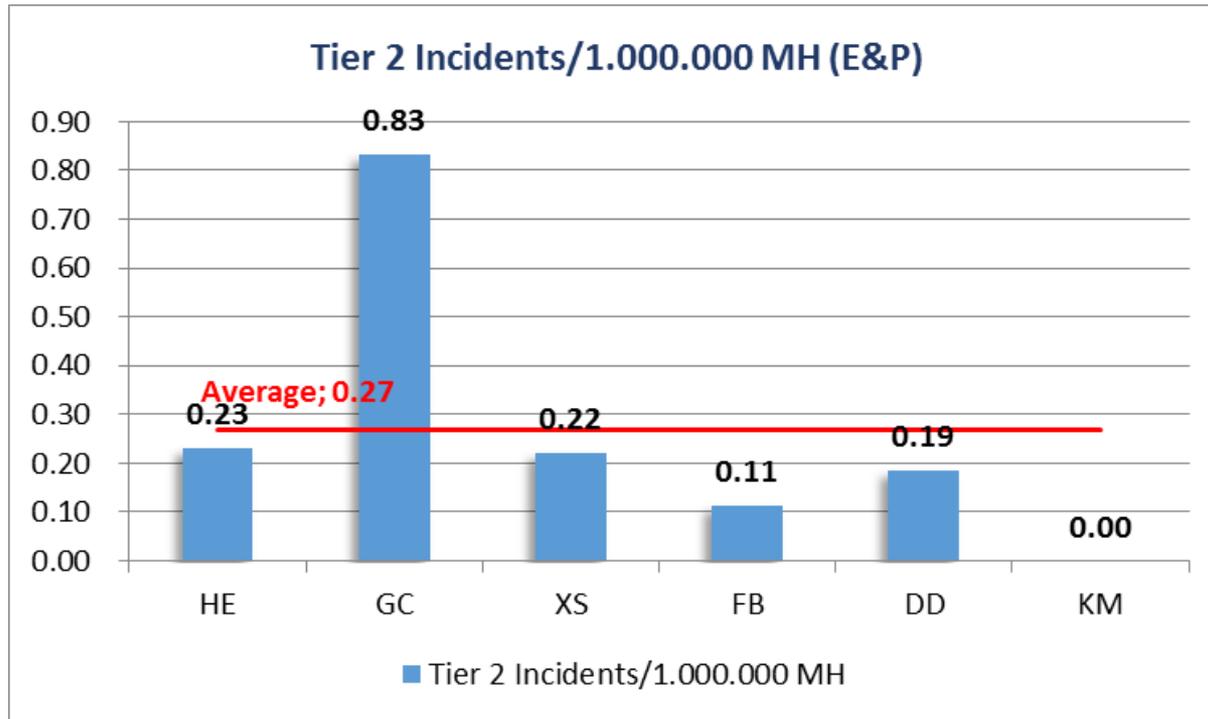
- 0.03 incidents per two hundred thousand hours worked were reported in Distribution in 2018, decreasing from 0.05 average incidents reported in 2017.

Results by company: E&P (T1 by million hours worked)



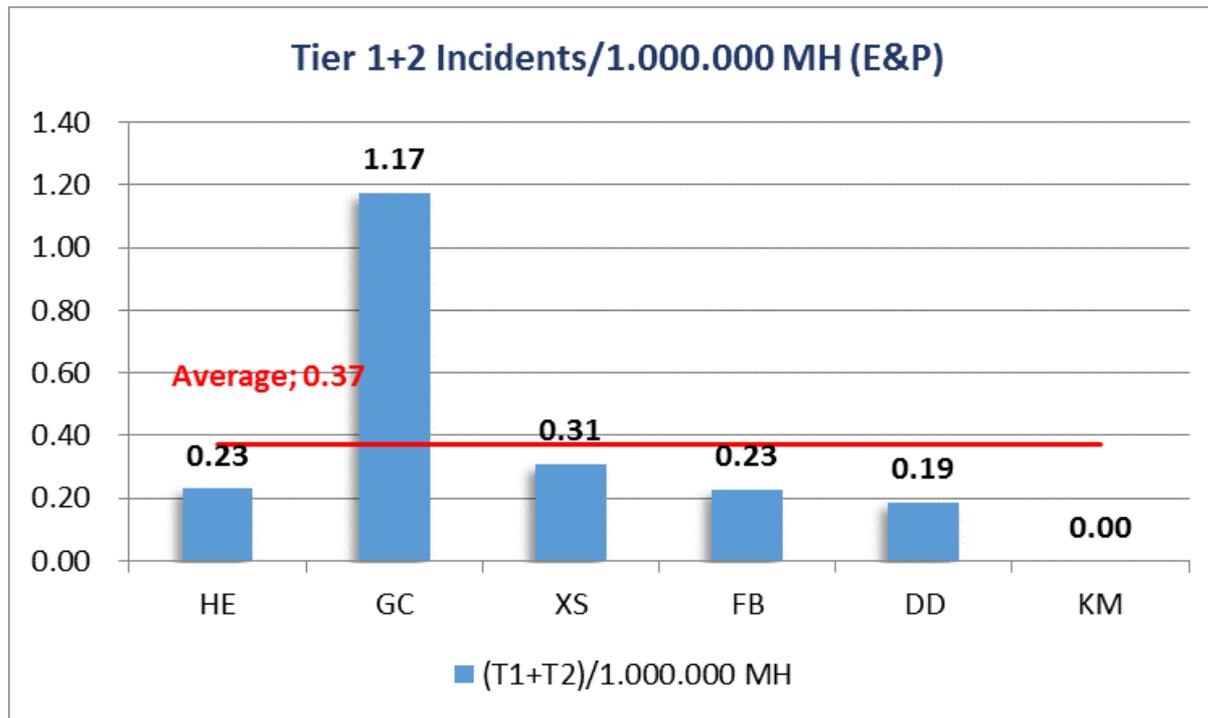
- Tier 1 incidents average in E&P was 0.11 per million hours worked.
- Three companies did not show any incidents in E&P, while the maximum value of the series is 0.34.

Results by company: E&P (T2 by million hours worked)



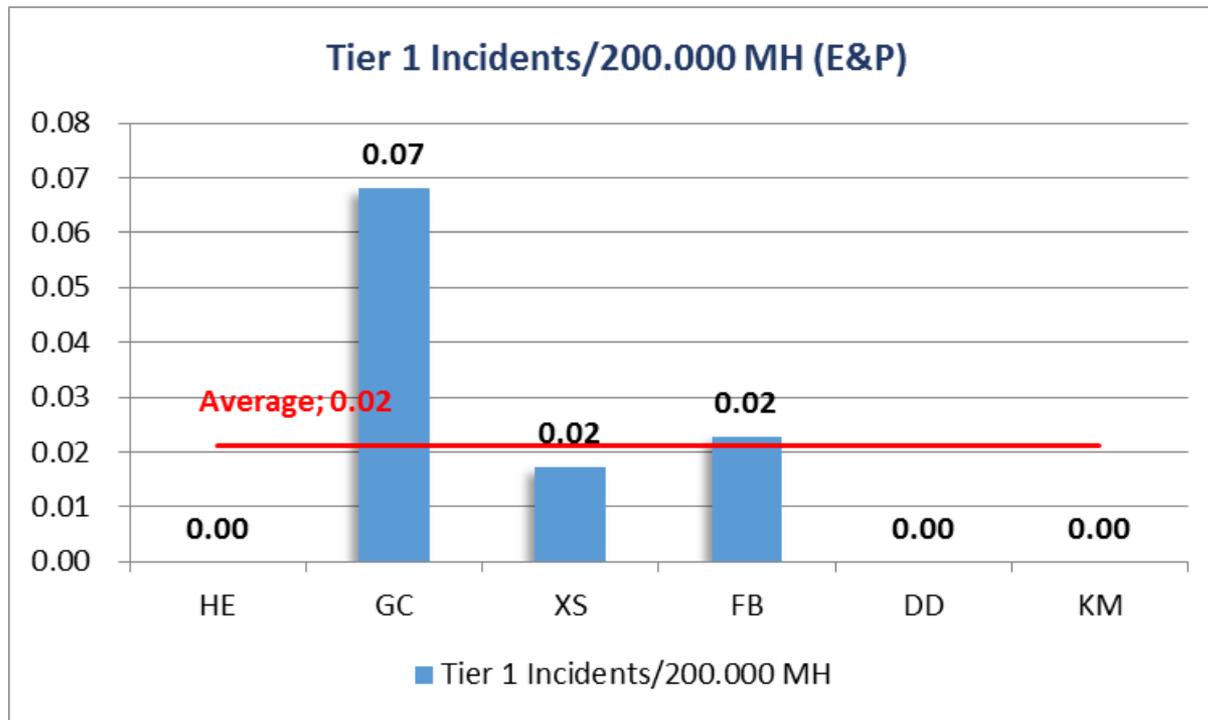
- Tier 2 incidents average in E&P was 0.27 per million hours worked.
- Only one company did not report any incidents and the maximum was 0.83.

Results by company: E&P (T1+T2 by million hours worked)



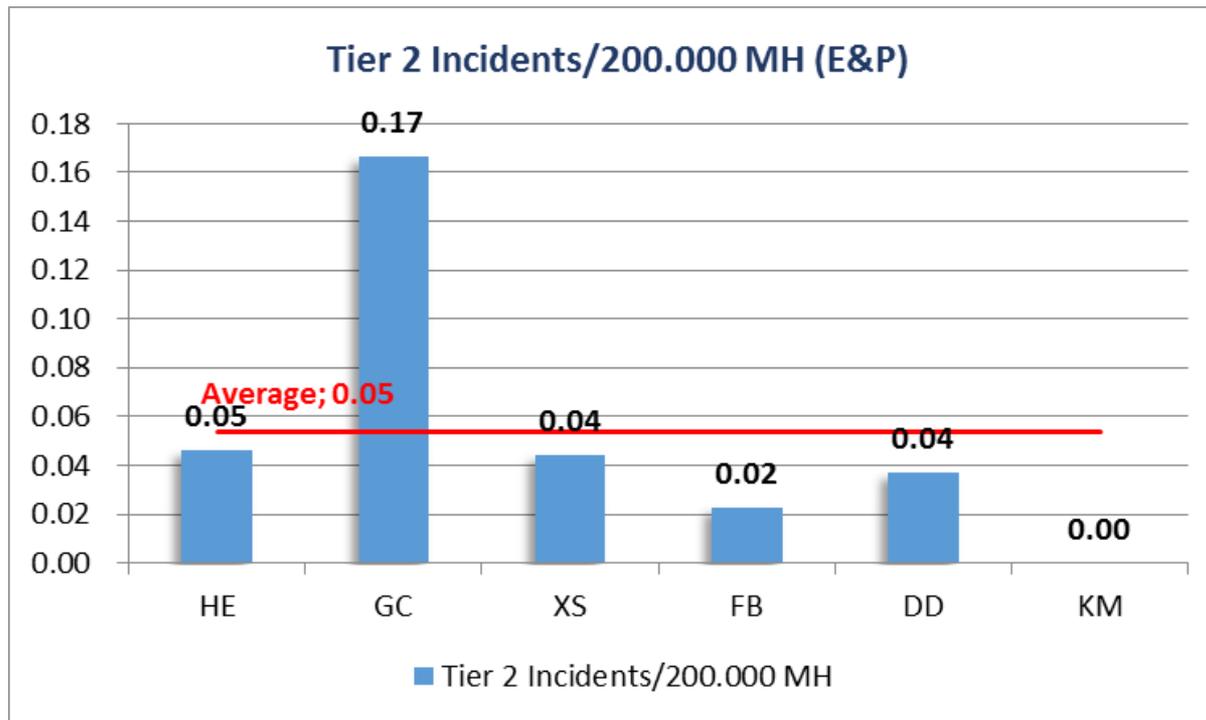
- Tier 1 and 2 incidents average in E&P was 0.37 per million hours worked.

Results by company: E&P (T1 by 200 thous. hours worked)



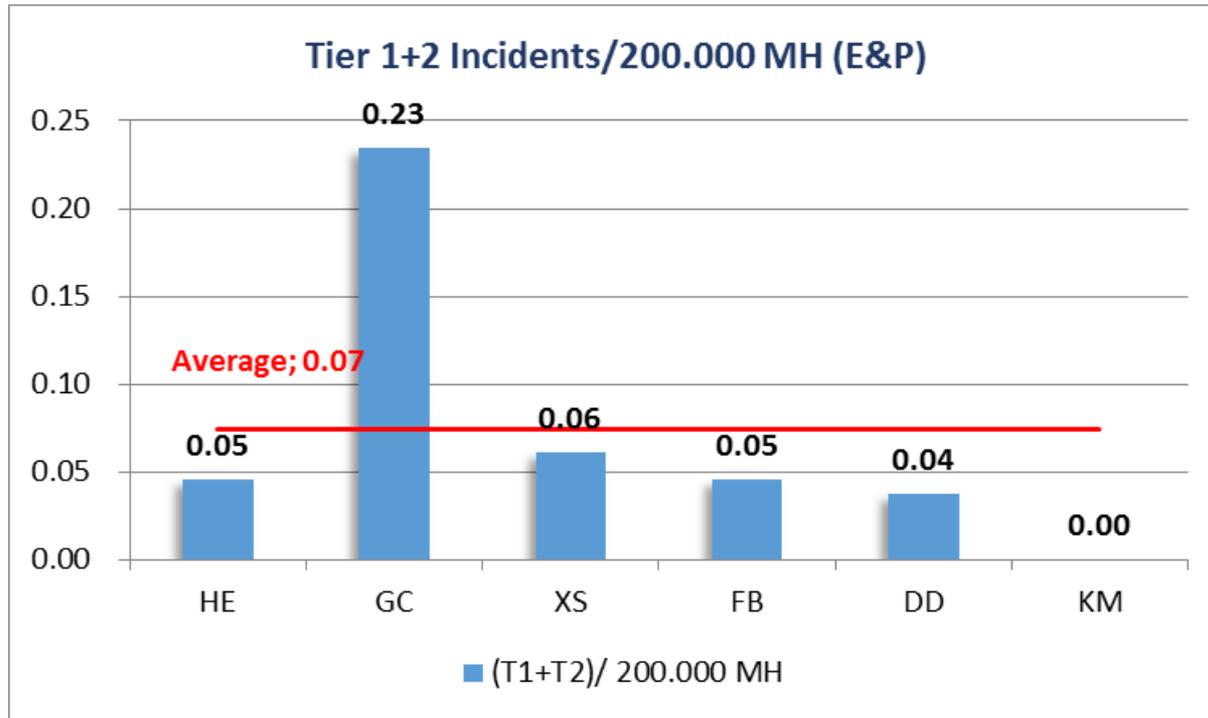
- Tier 1 incidents average in E&P was 0.02 per two hundred thousand hours worked.
- Three companies did not show any incidents in E&P, while the maximum value of the series is 0.07.

Results by company: E&P (T2 by 200 thous. hours worked)



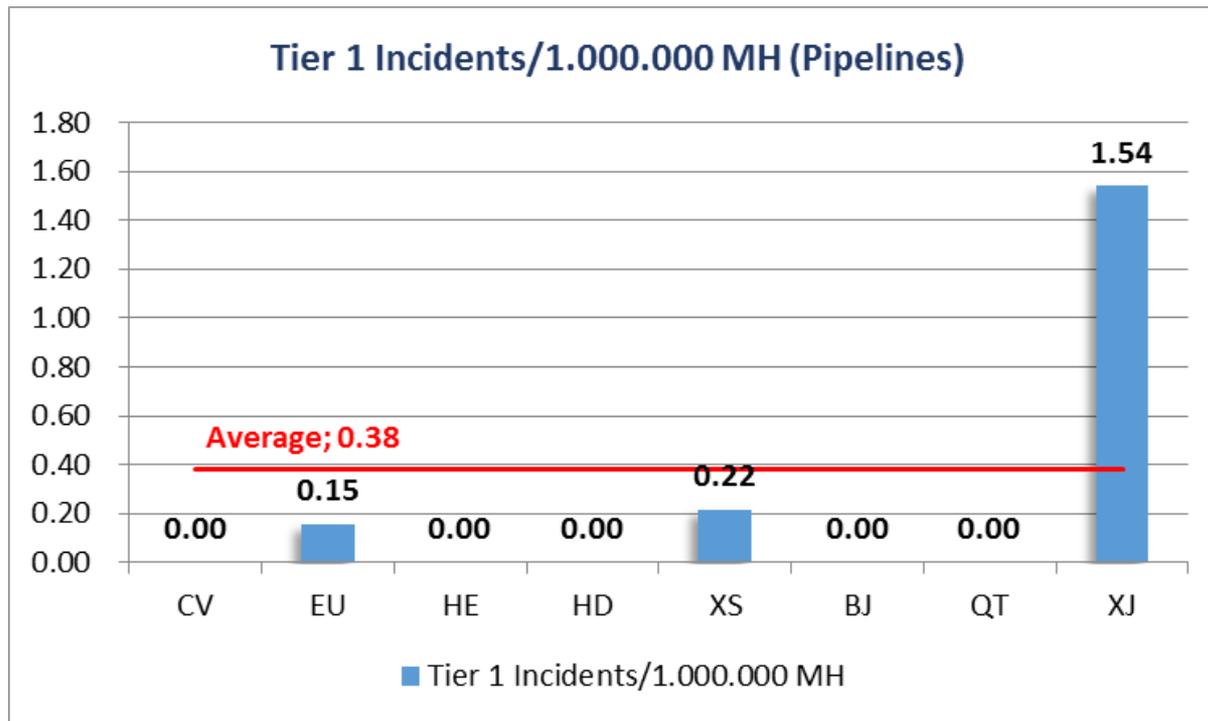
- Tier 2 incidents average in E&P was 0.05 per two hundred thousand hours worked.
- Only one company did not report any incidents and the maximum was 0.17.

Results by company: E&P (T1+T2 by 200 thous. hours worked)



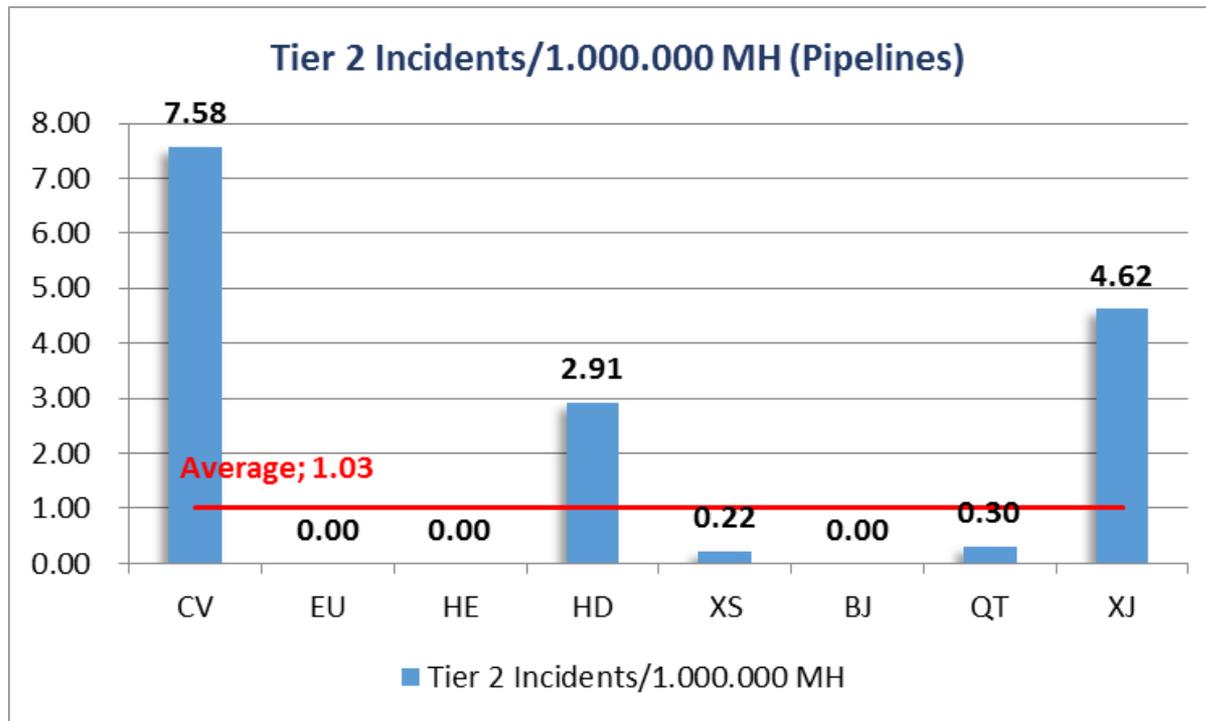
- Tier 1 and 2 incidents average in E&P was 0.07 per two hundred thousand hours worked.

Results by company: Pipelines (T1 by million hours worked)



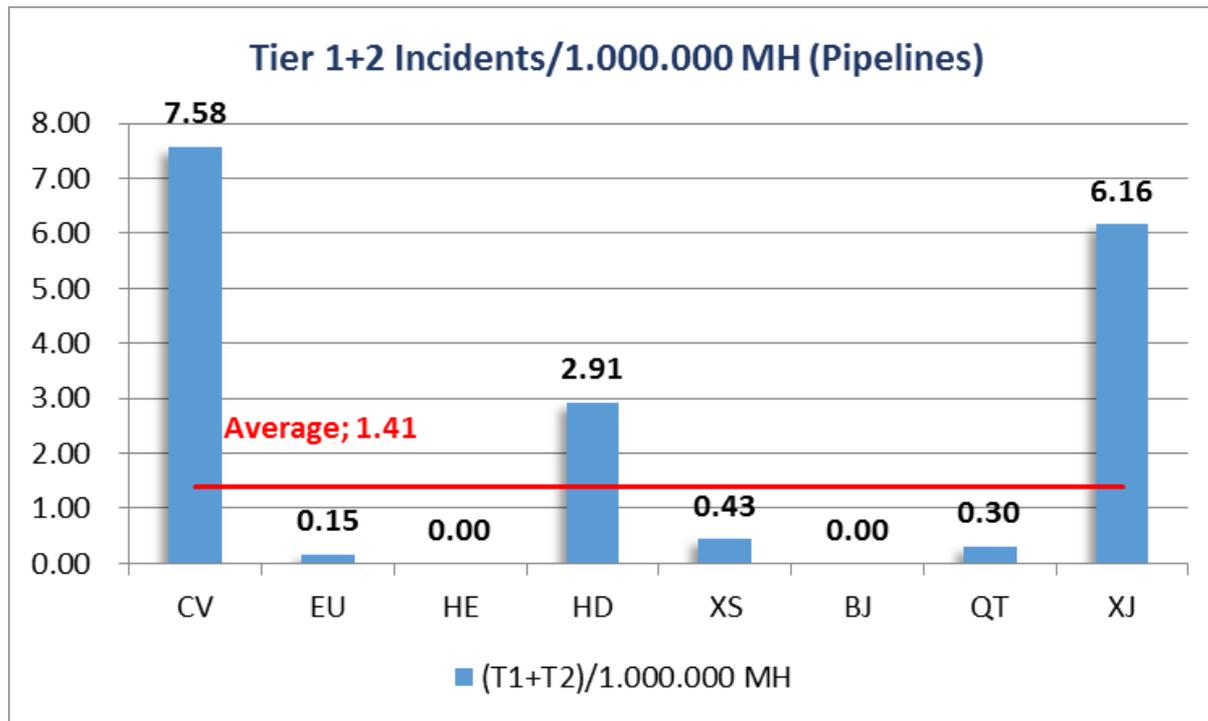
- Tier 1 incidents average in Pipelines was 0.38 per million hours worked.
- Only 3 out of 8 companies reported tier 1 incidents in Pipelines, being 1.54 the maximum value reported.

Results by company: Pipelines (T2 by million hours worked)



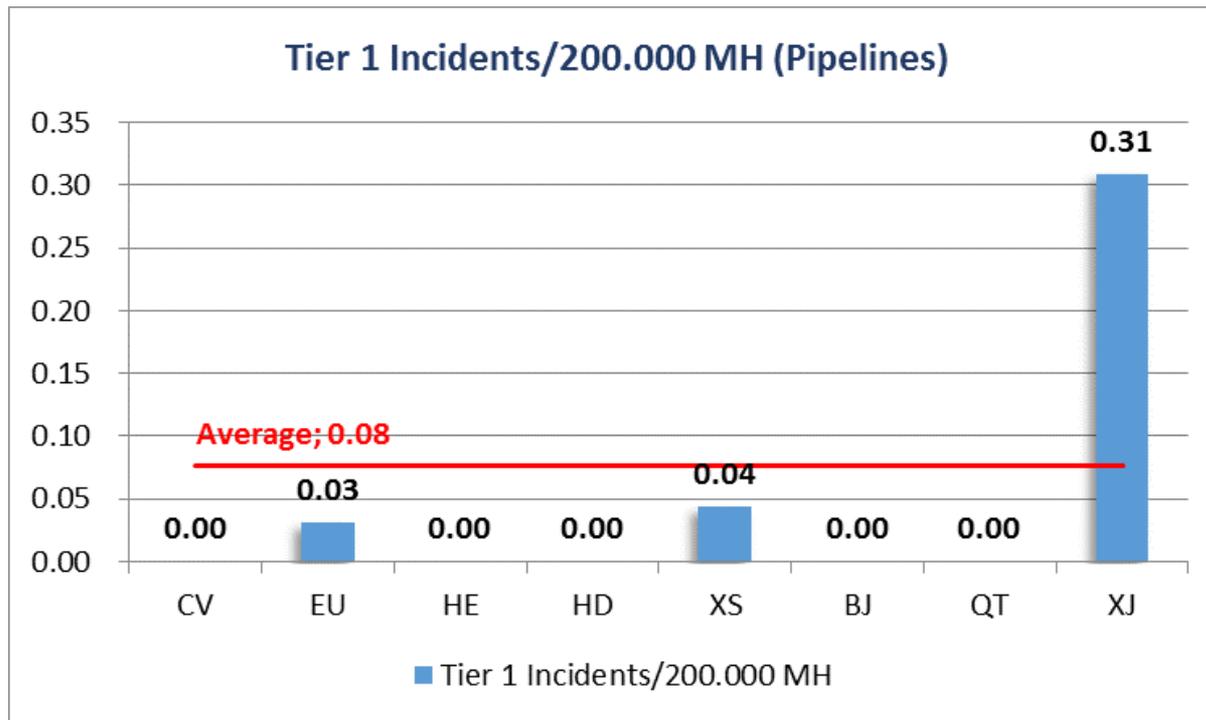
- Tier 2 incidents average in Pipelines was 1.03 per million hours worked.
- 5 out of 8 companies reported tier 2 incidents in pipelines, being 7.58 the maximum value of the series.

Results by company: Pipelines (T1+T2 by million hours worked)



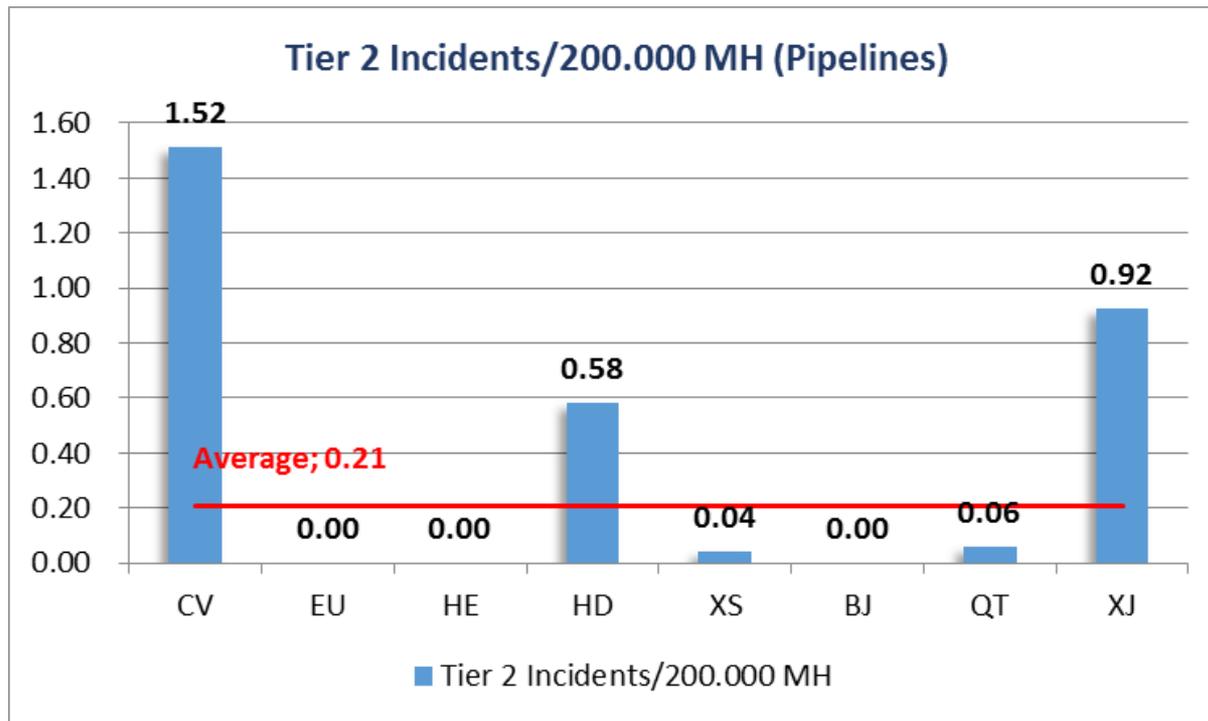
- Tier 1 and 2 incidents average in Pipelines was 1.41 per million hours worked.

Results by company: Pipelines (T1 by 200 thous. hours worked)



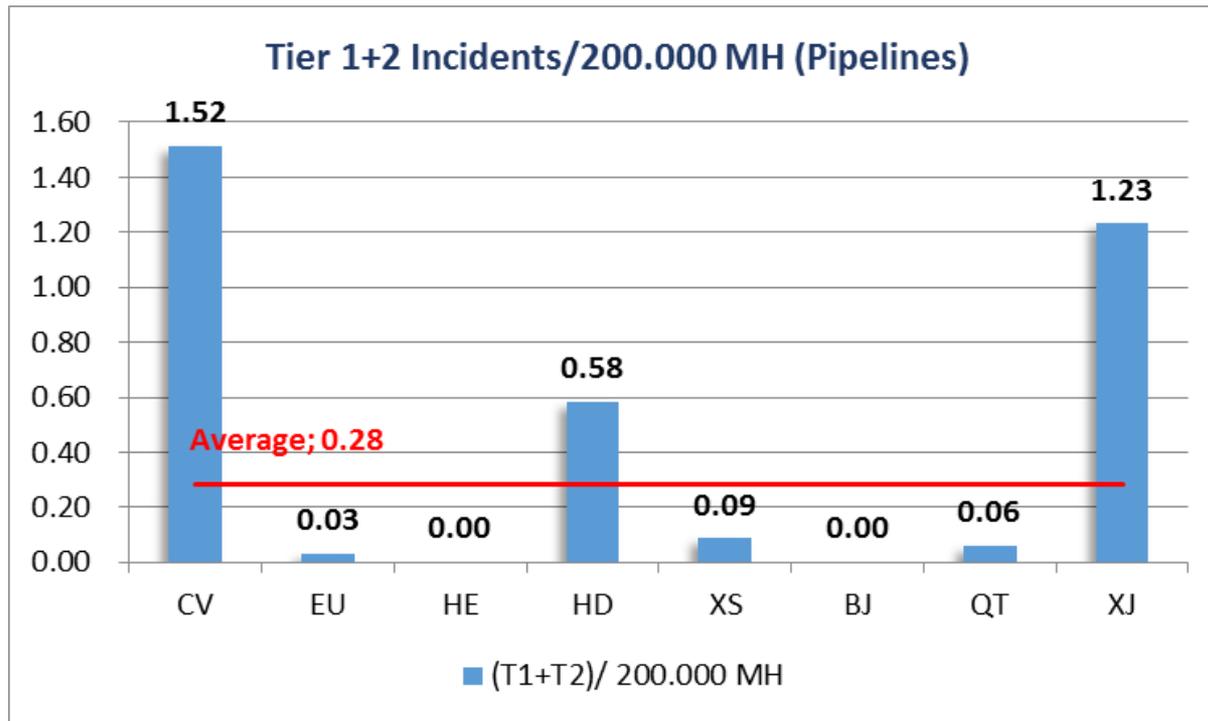
- Tier 1 incidents average in Pipelines was 0.08 per two hundred thousand hours worked.
- Only 3 out of 8 companies reported tier 1 incidents in Pipelines, being 0.31 the maximum value reported.

Results by company: Pipelines (T2 by 200 thous. hours worked)



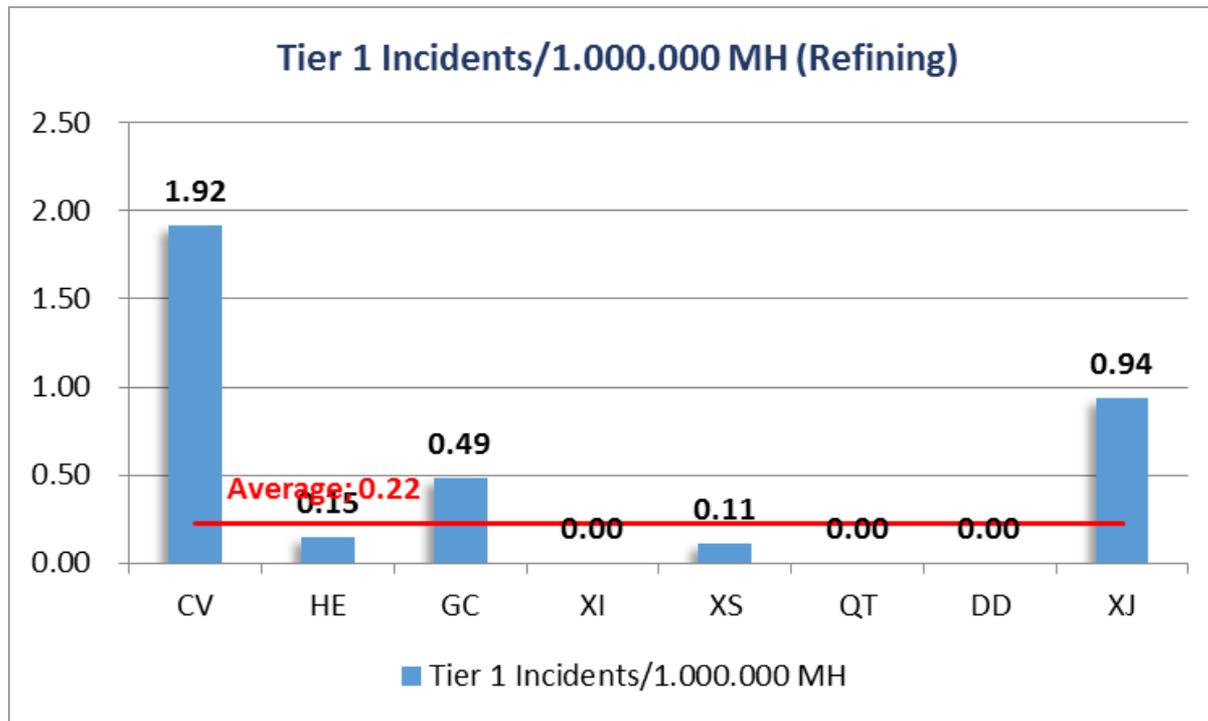
- Tier 2 incidents average in Pipelines was 0.21 per two hundred thousand hours worked.
- 5 out of 8 companies reported tier 2 incidents in pipelines, being 1.52 the maximum value of the series.

Results by company: Pipelines (T1+T2 by 200 thous. hours worked)



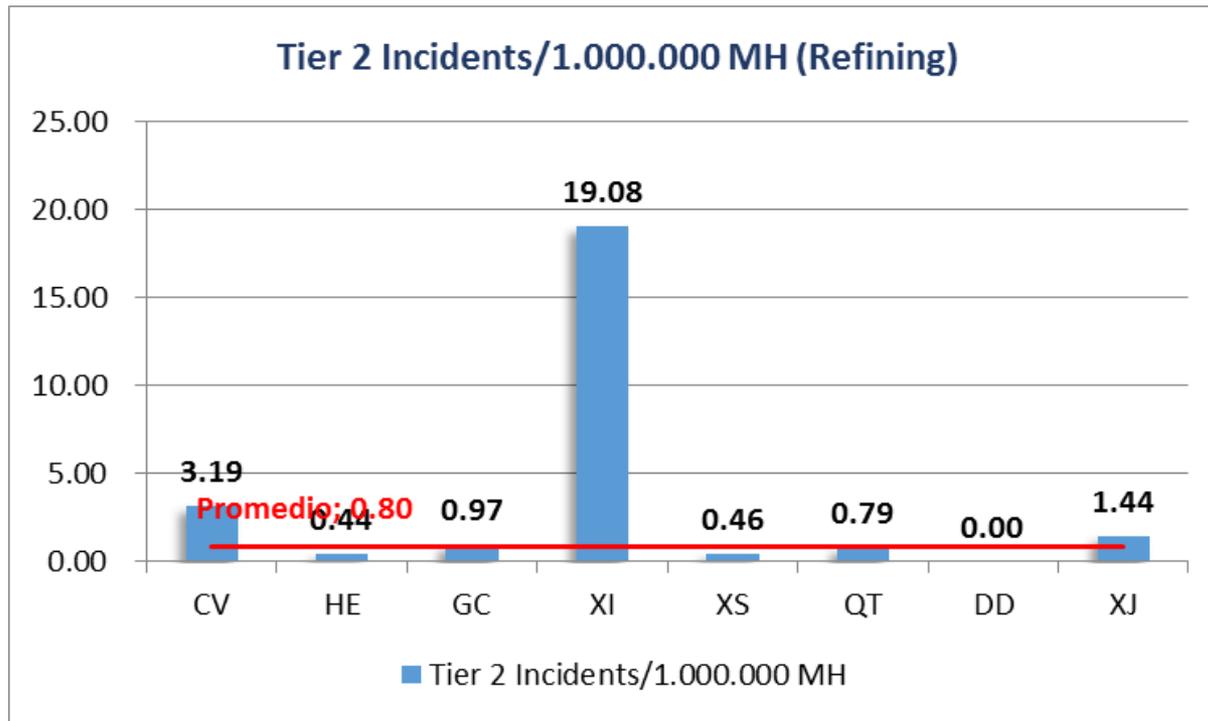
- Tier 1 and 2 incidents average in Pipelines was 1.41 per two hundred thousand hours worked.

Results by company: Refining (T1 by million hours worked)



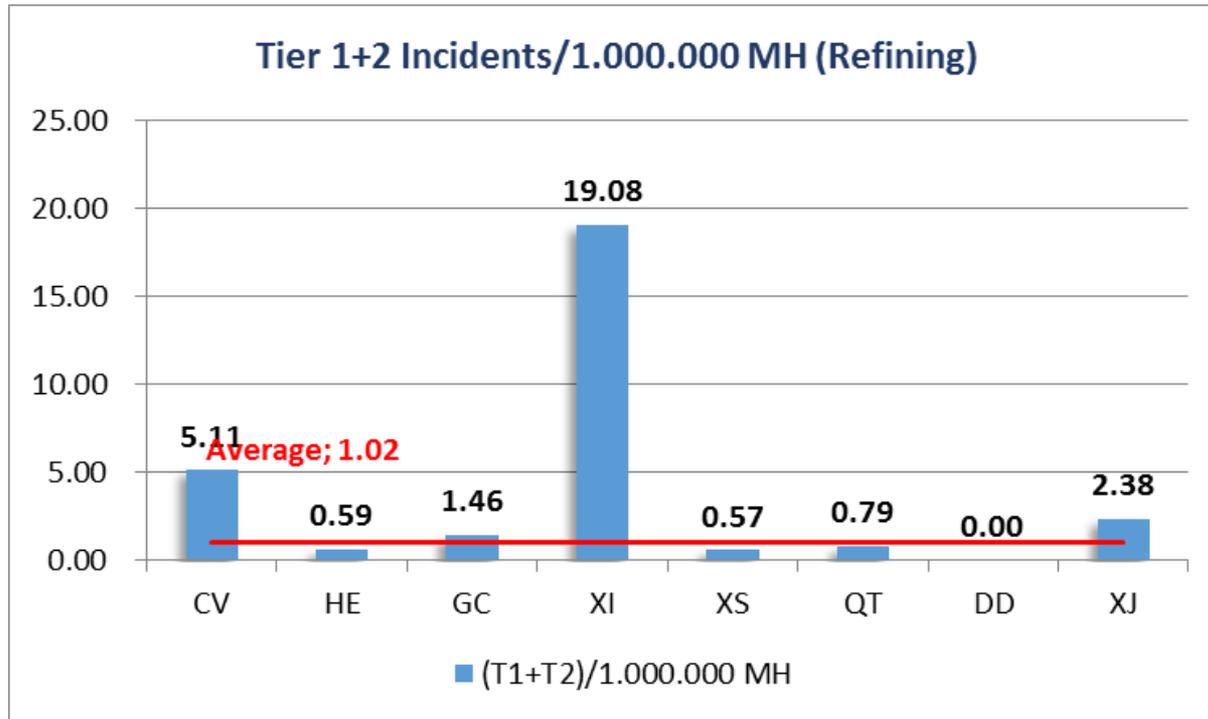
- Tier 1 incidents average in Refining was 0.22 per million hours worked.

Results by company: Refining (T2 by million hours worked)



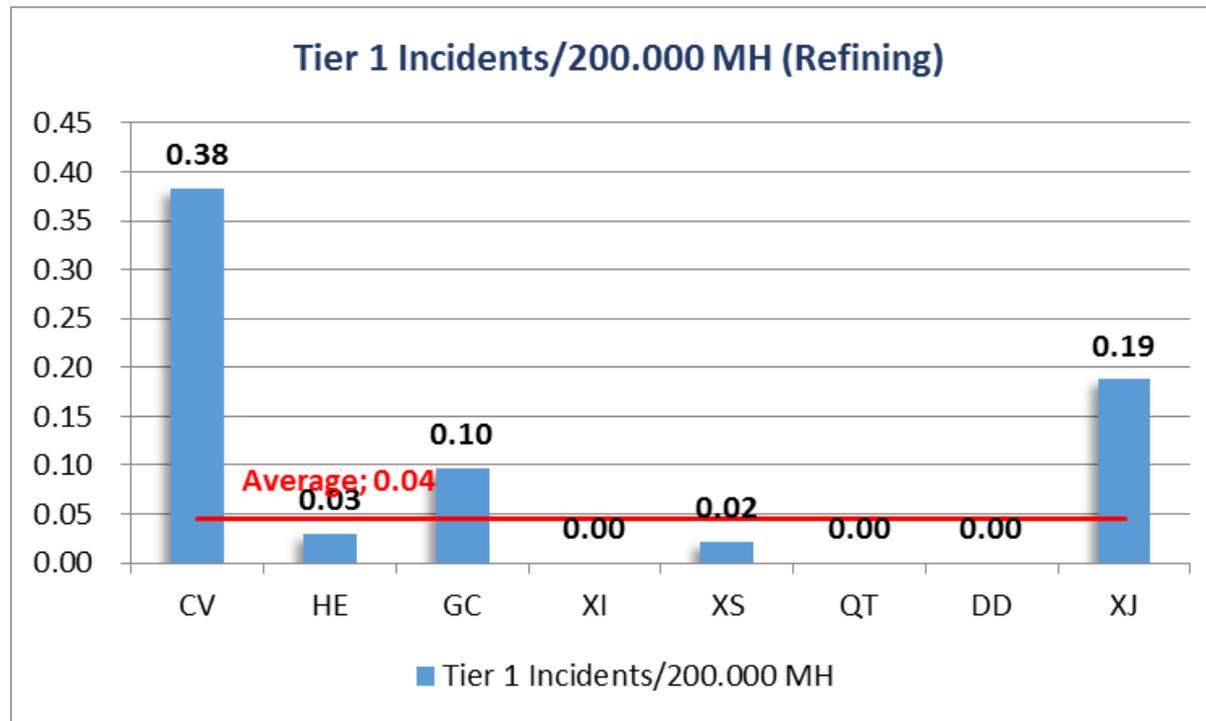
- Tier 2 incidents average in Refining was 0.80 per million hours worked.
- 3 companies show much higher results than the average, being 19.08 the maximum value of the series.

Results by company: Refining (T1+T2 by million hours worked)



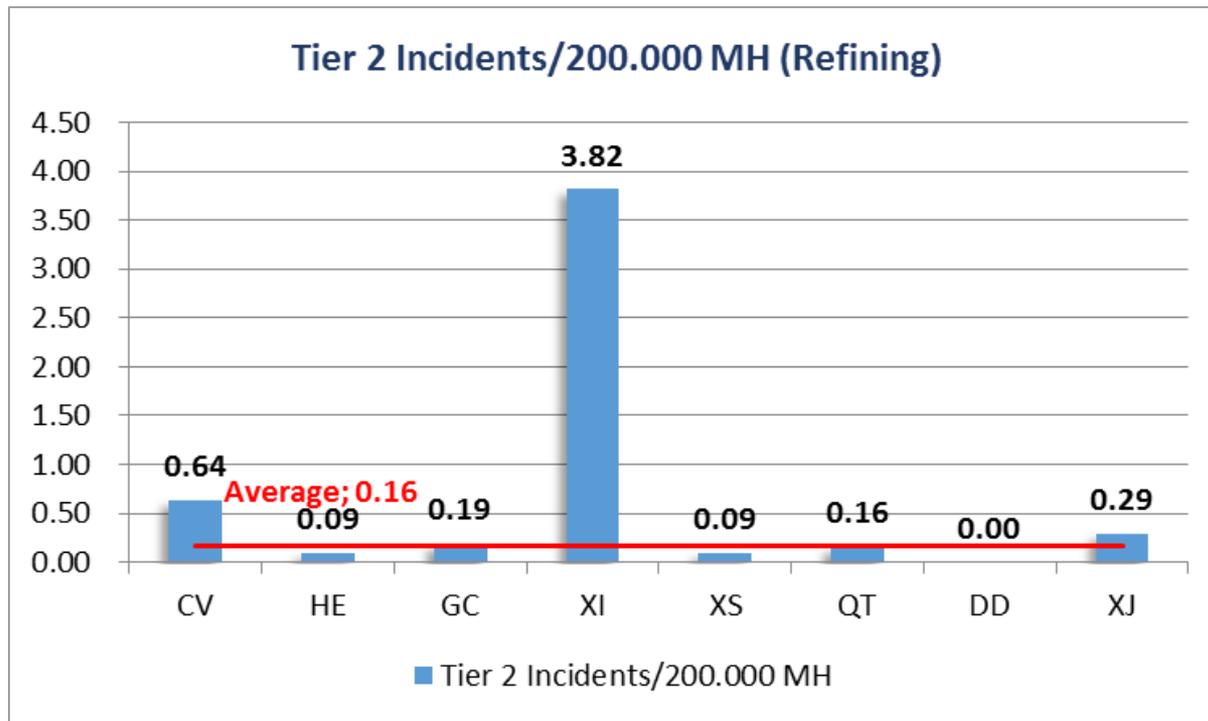
- Tier 1 and 2 incidents average in Refining was 1.02 per million hours worked.

Results by company: Refining (T1 by 200 thous. hours worked)



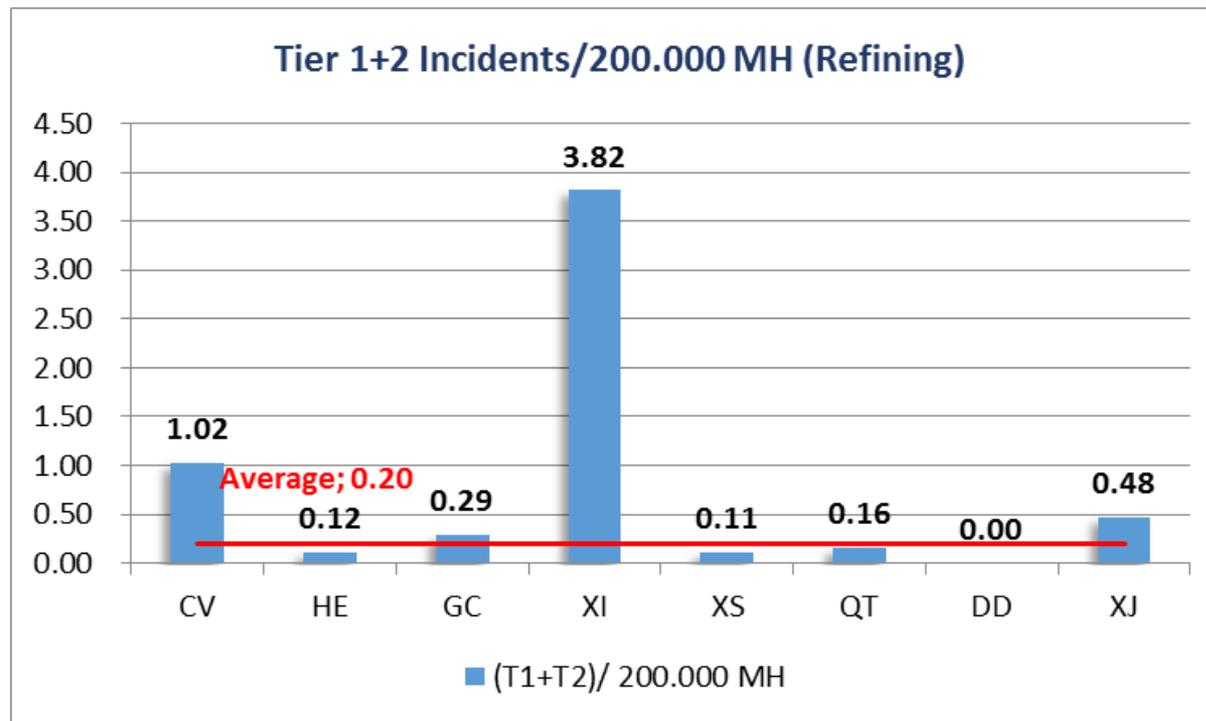
- Tier 1 incidents average in Pipelines was 0.04 per two hundred thousand hours worked.

Results by company: Refining (T2 by 200 thous. hours worked)



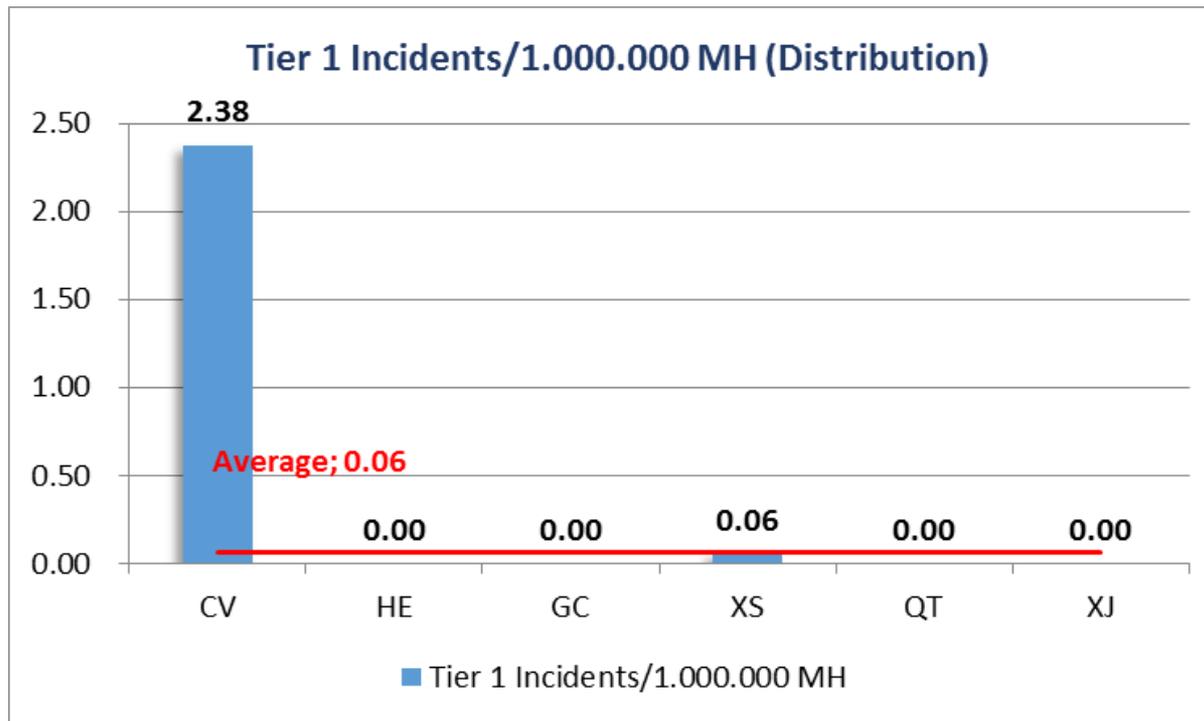
- Tier 2 incidents average in Refining was 0.16 per two hundred thousand hours worked.
- 3 companies show much higher results than the average, being 3.82 the maximum value of the series.

Results by company: Refining (T1+T2 by 200 thous. hours worked)



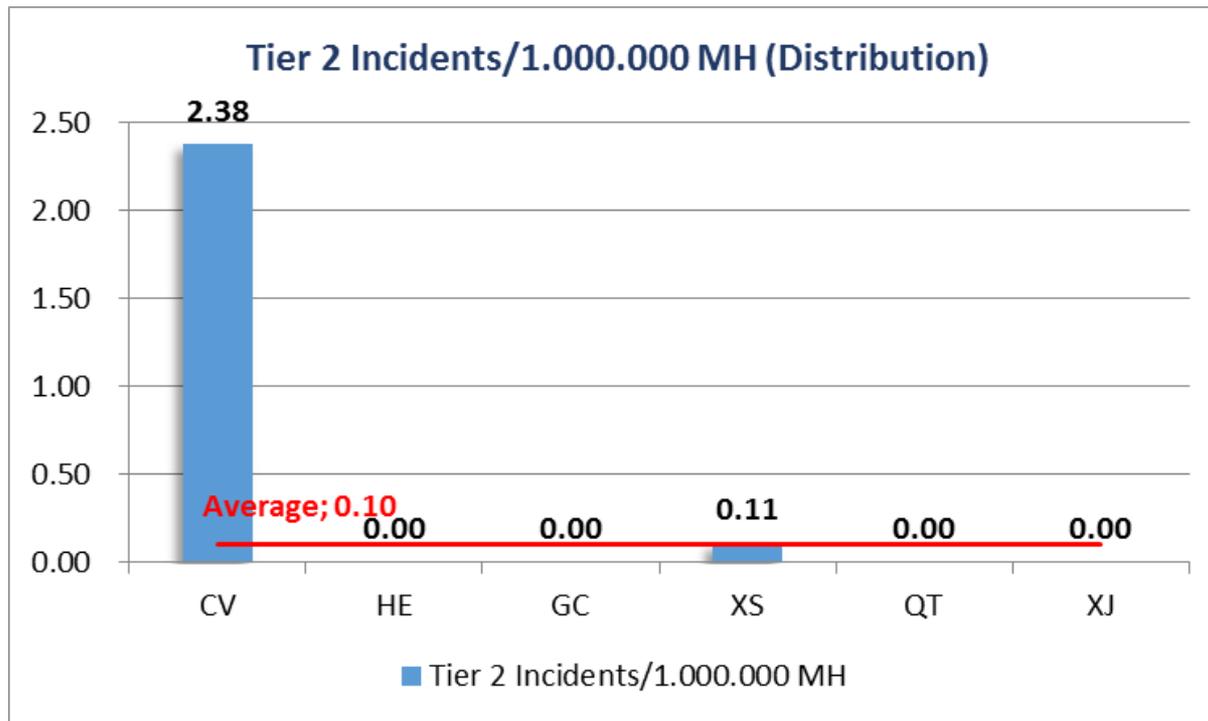
- Tier 1 and 2 incidents average in Refining was 0.20 per two hundred thousand hours worked.

Results by company: Distribution (T1 by million hours worked)



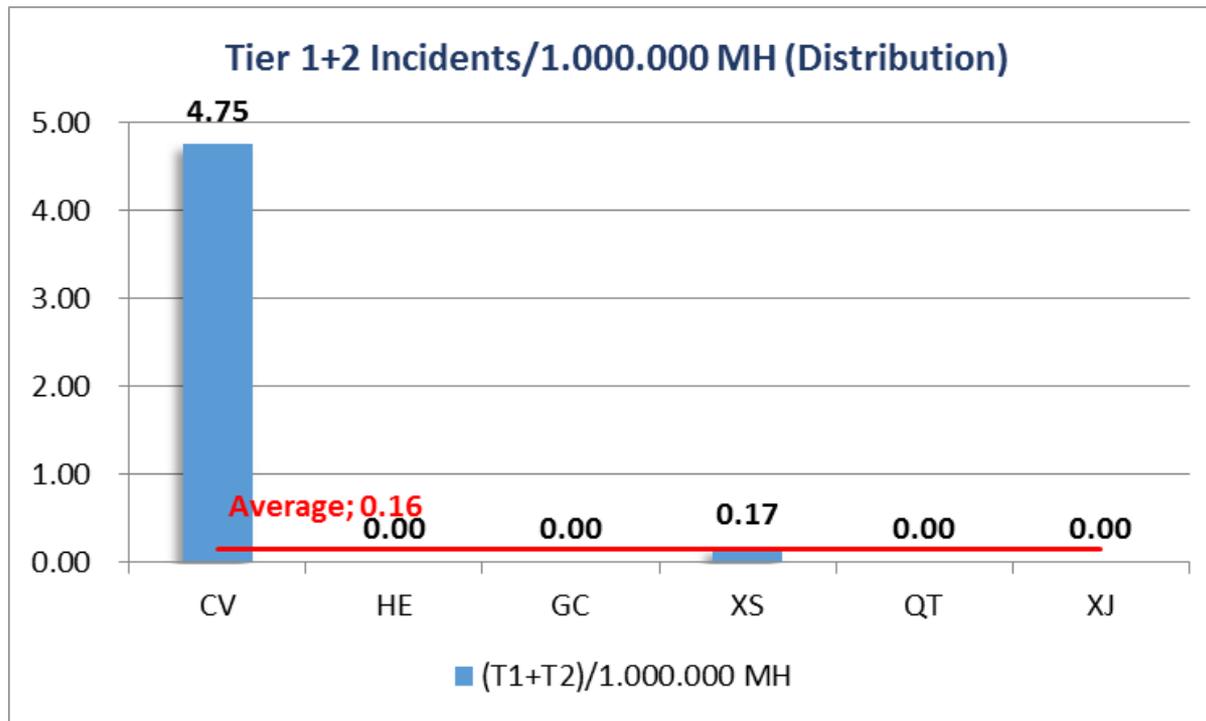
- Tier 1 incidents average in Distribution was 0.06 per million hours worked.
- Only 2 out of 6 companies reported tier 1 incidents in Distribution.

Results by company: Distribution (T2 by million hours worked)



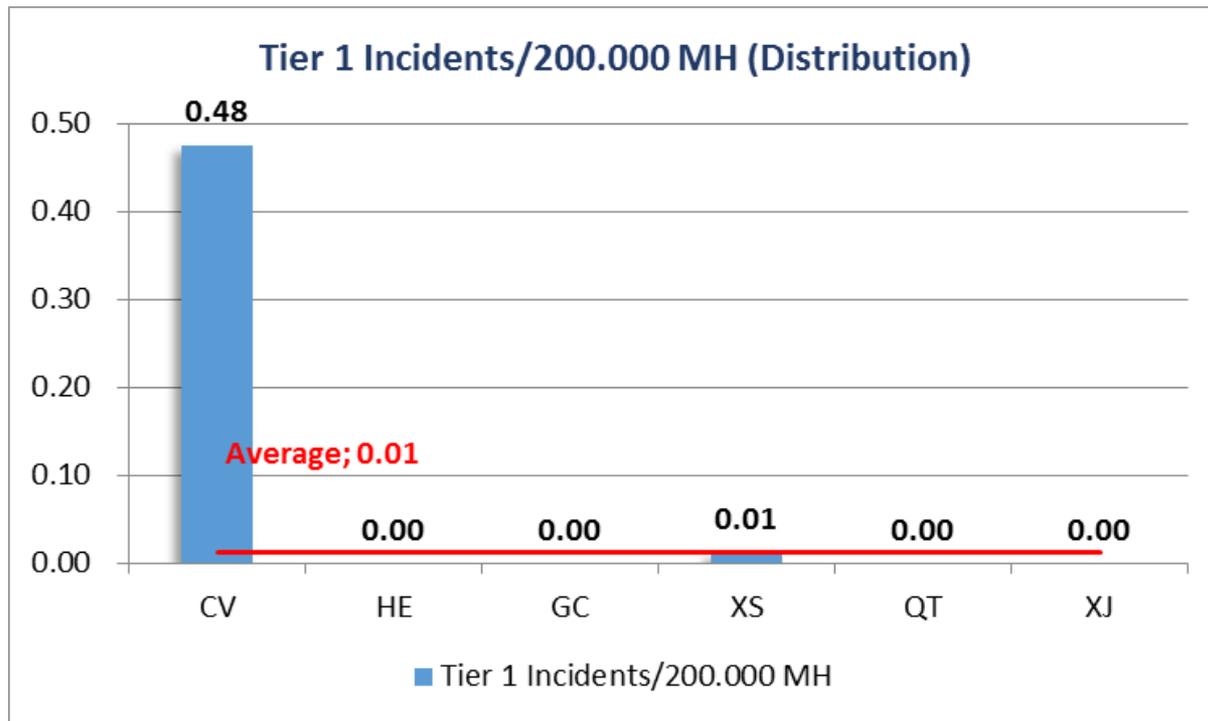
- Tier 2 incidents average in Distribution was 0.10 per million hours worked.
- Only 2 out of 6 companies reported tier 2 incidents in Distribution.

Results by company: Distribution (T1+T2 by million hours worked)



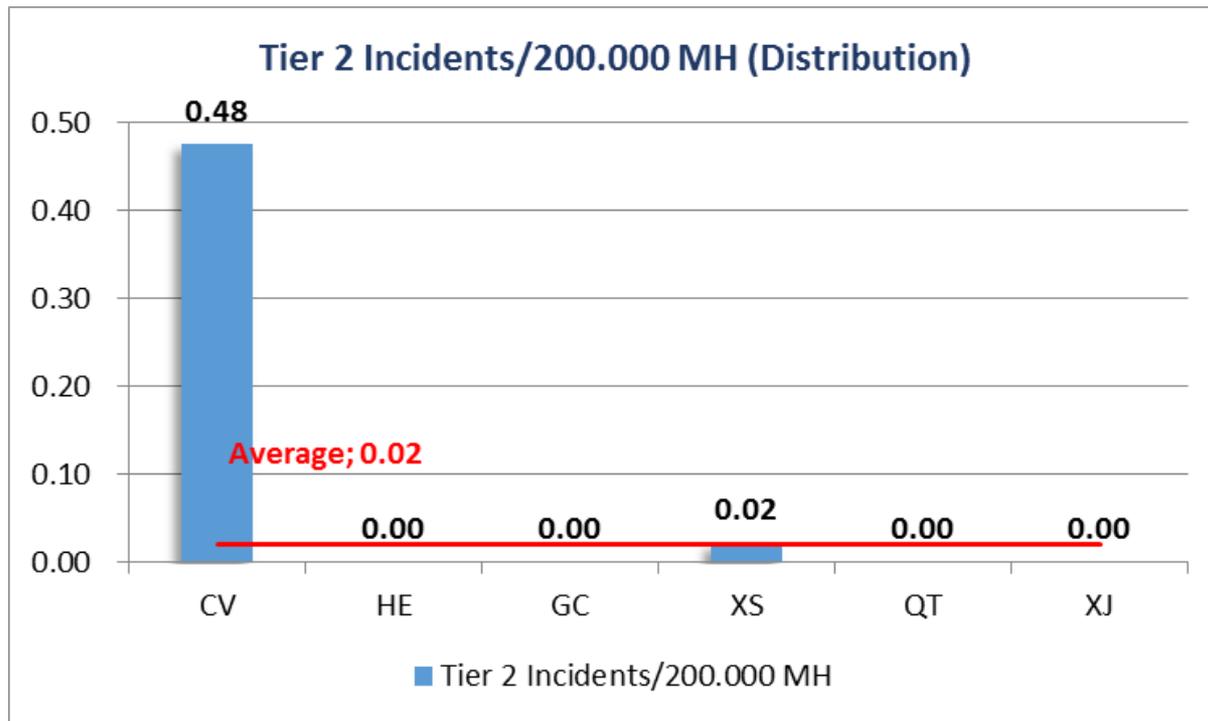
- Tier 1 and 2 incidents average in Distribution was 0.16 per million hours worked.

Results by company: Distribution (T1 by 200 thous. hours worked)



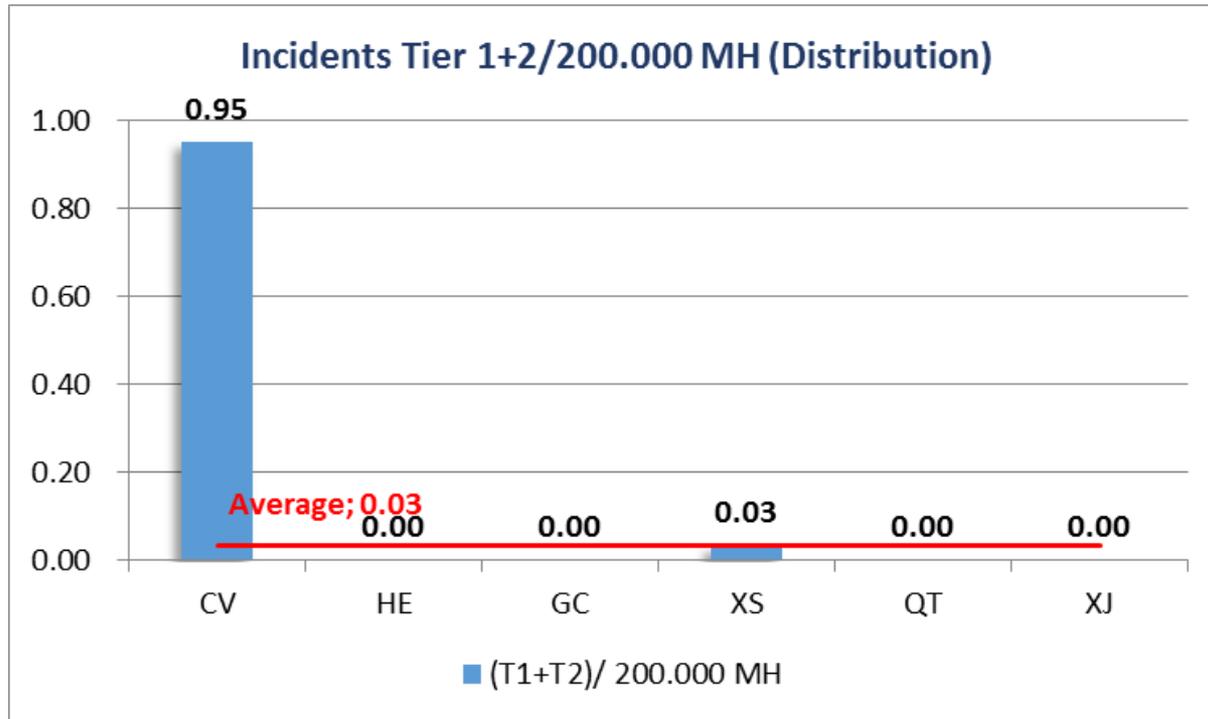
- Tier 1 incidents average in Distribution was 0.01 per two hundred thousand hours worked.
- Only 2 out of 6 companies reported tier 1 incidents in Distribution.

Results by company: Distribution (T2 by 200 thous. hours worked)



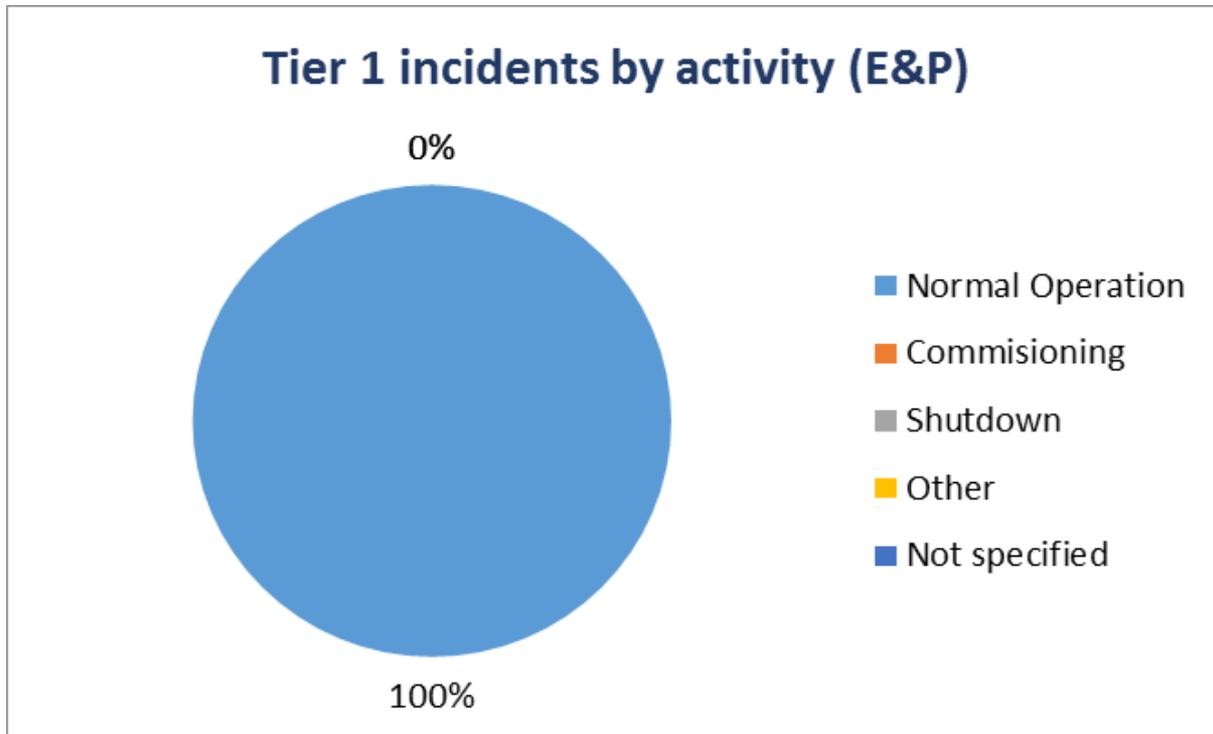
- Tier 2 incidents average in Distribution was 0.02 per two hundred thousand hours worked.
- Only 2 out of 6 companies reported tier 2 incidents in Distribution.

Results by company: Distribution (T1+T2 by 200 thous. hours worked)

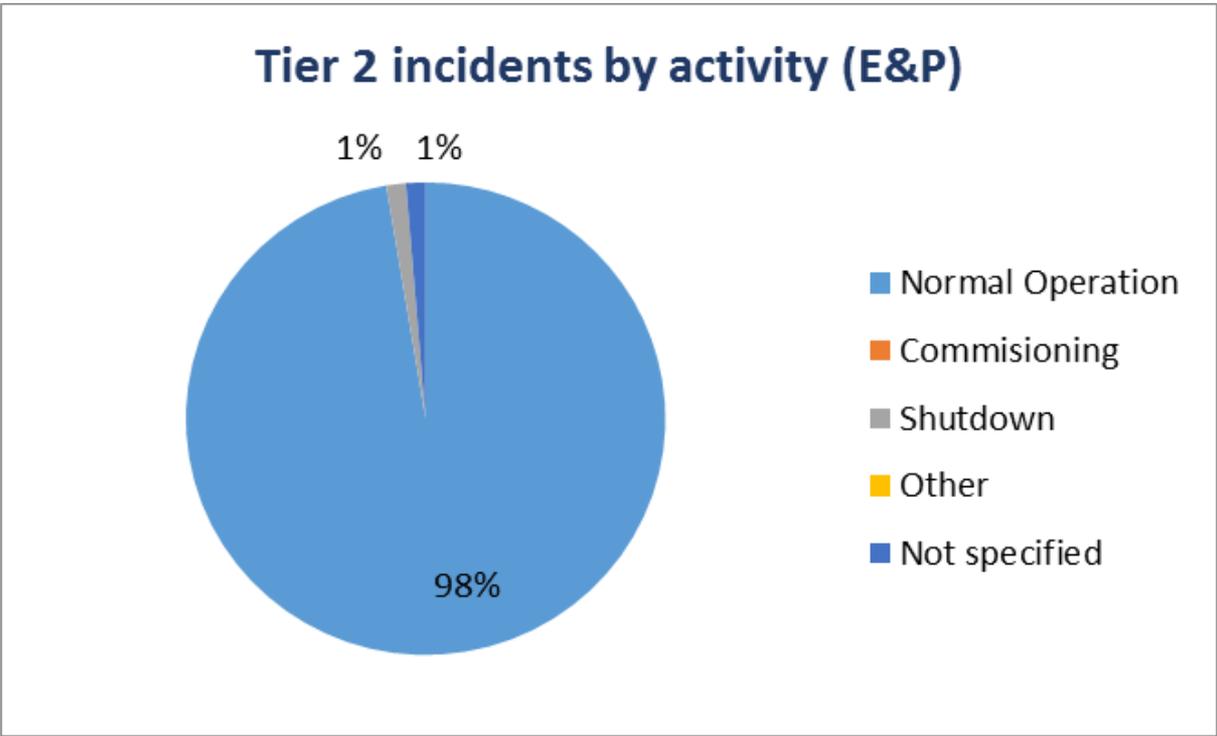


- Tier 1 and 2 incidents average in Distribution was 0.03 per two hundred thousand hours worked.

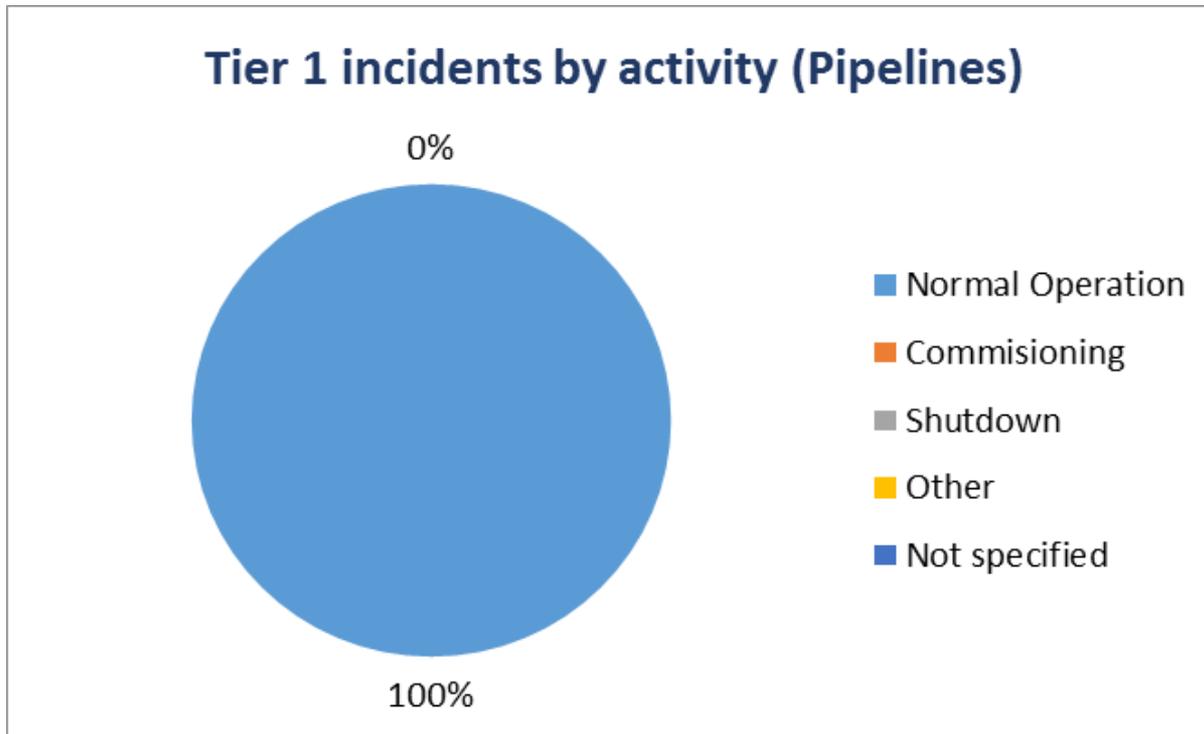
Incidents by Activity E&P T1



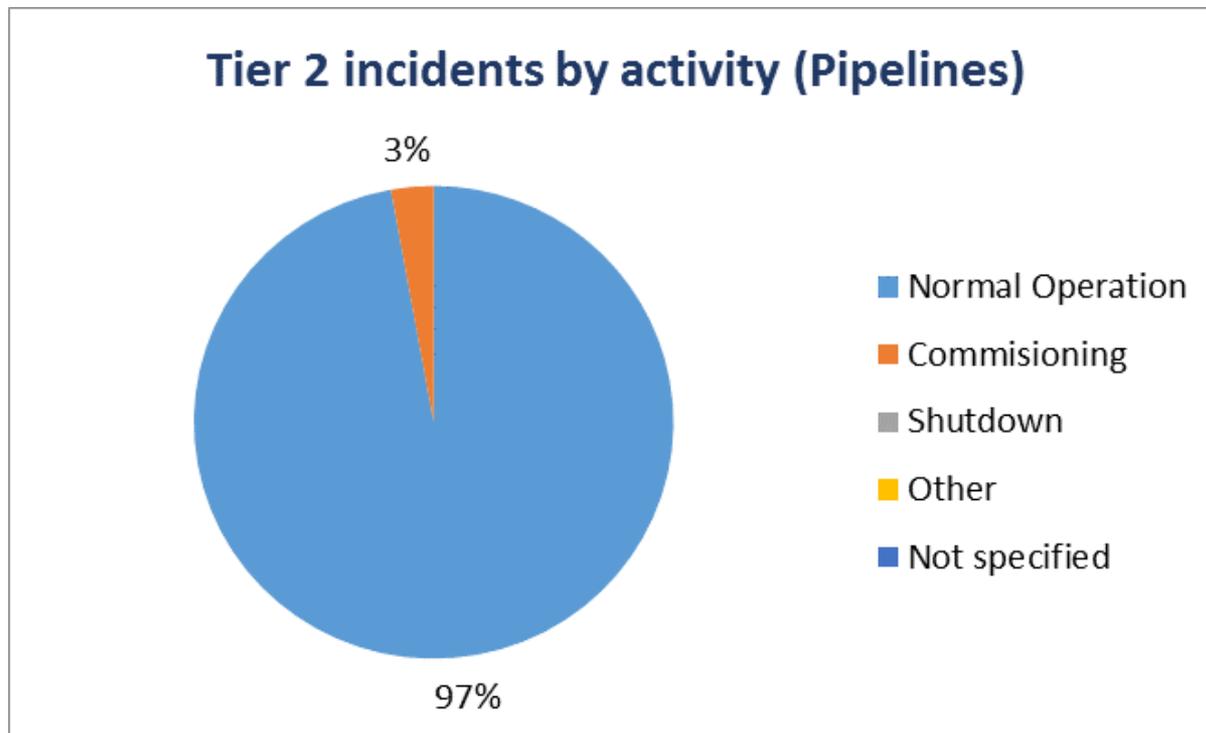
Incidents by Activity E&P T2



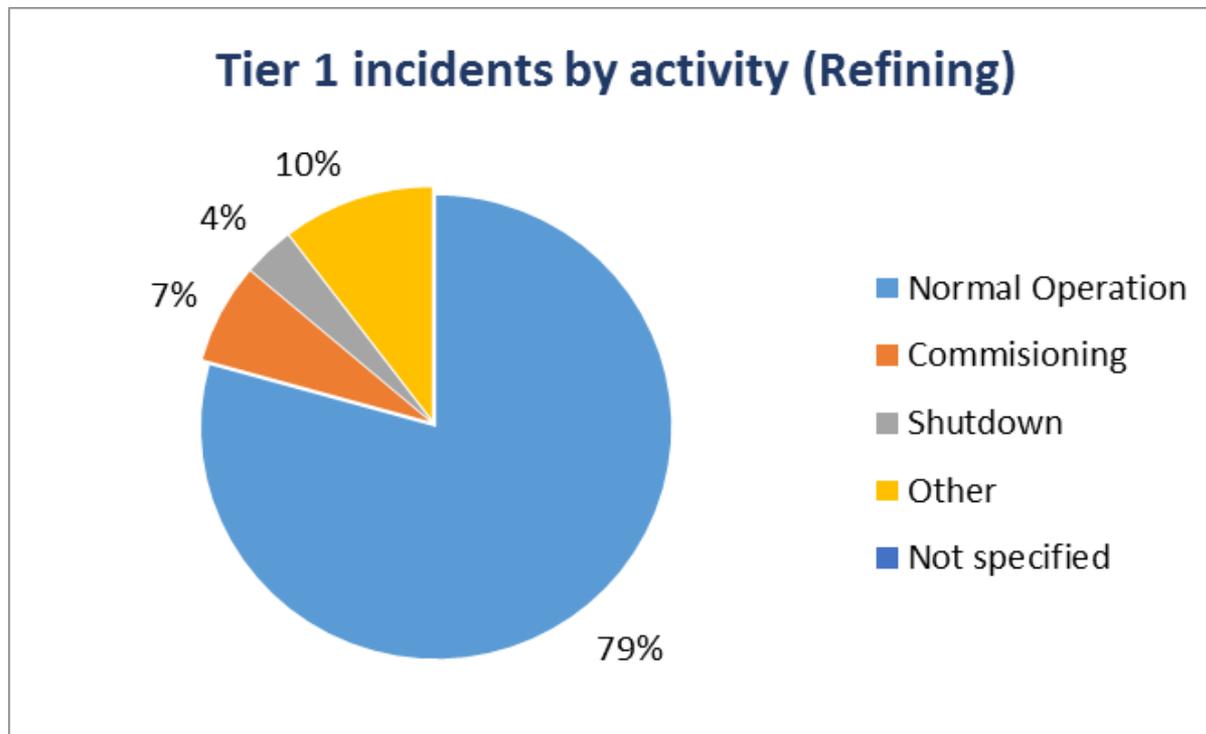
Incidents by Activity Pipelines T1



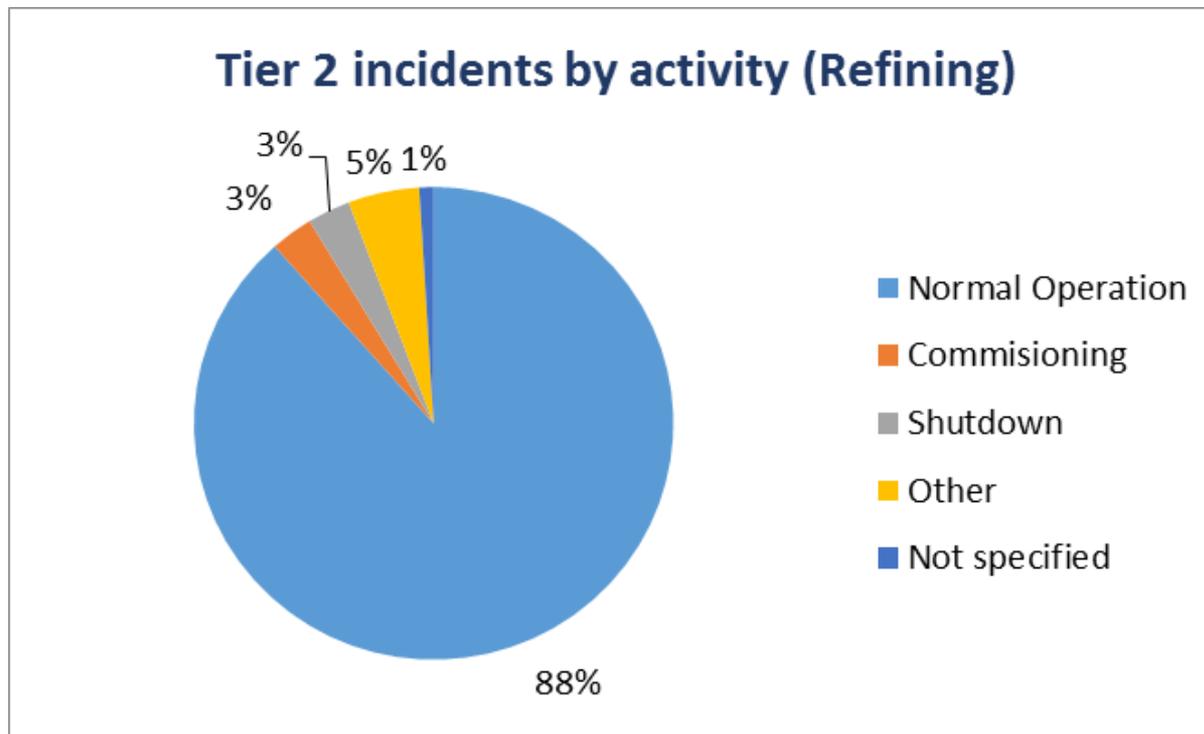
Incidents by Activity Pipelines T2



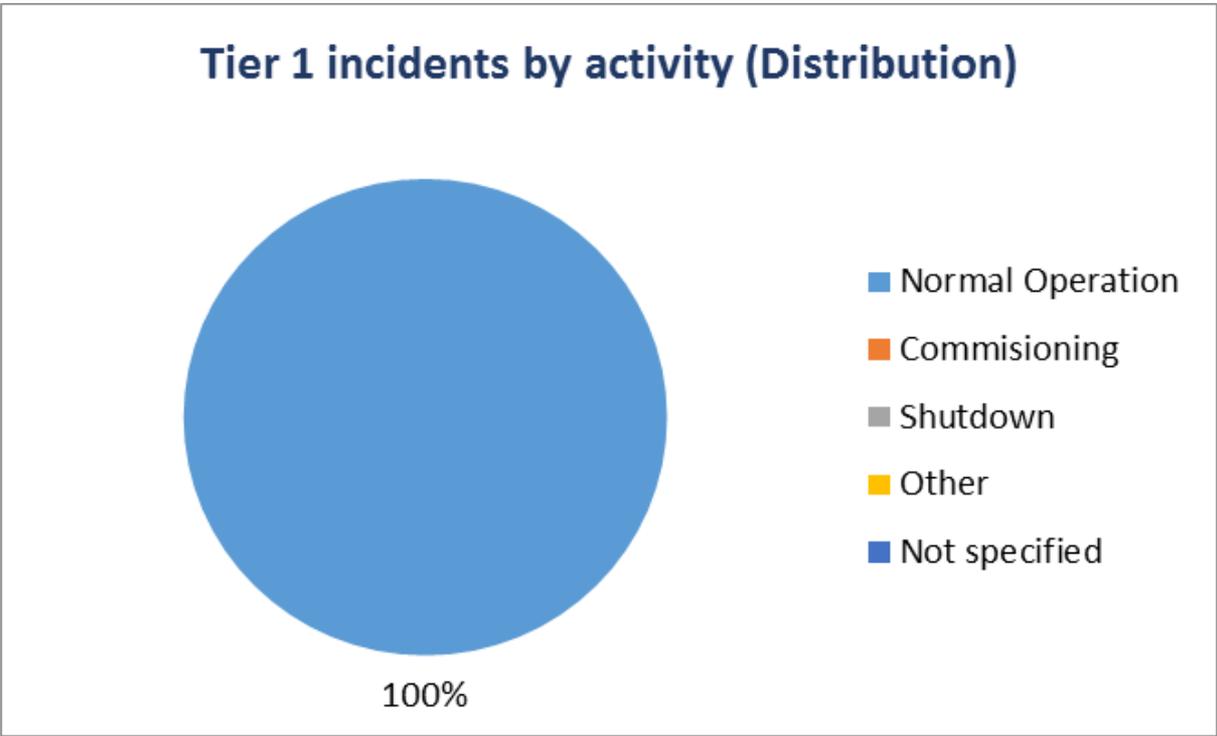
Incidents by Activity Refining T1



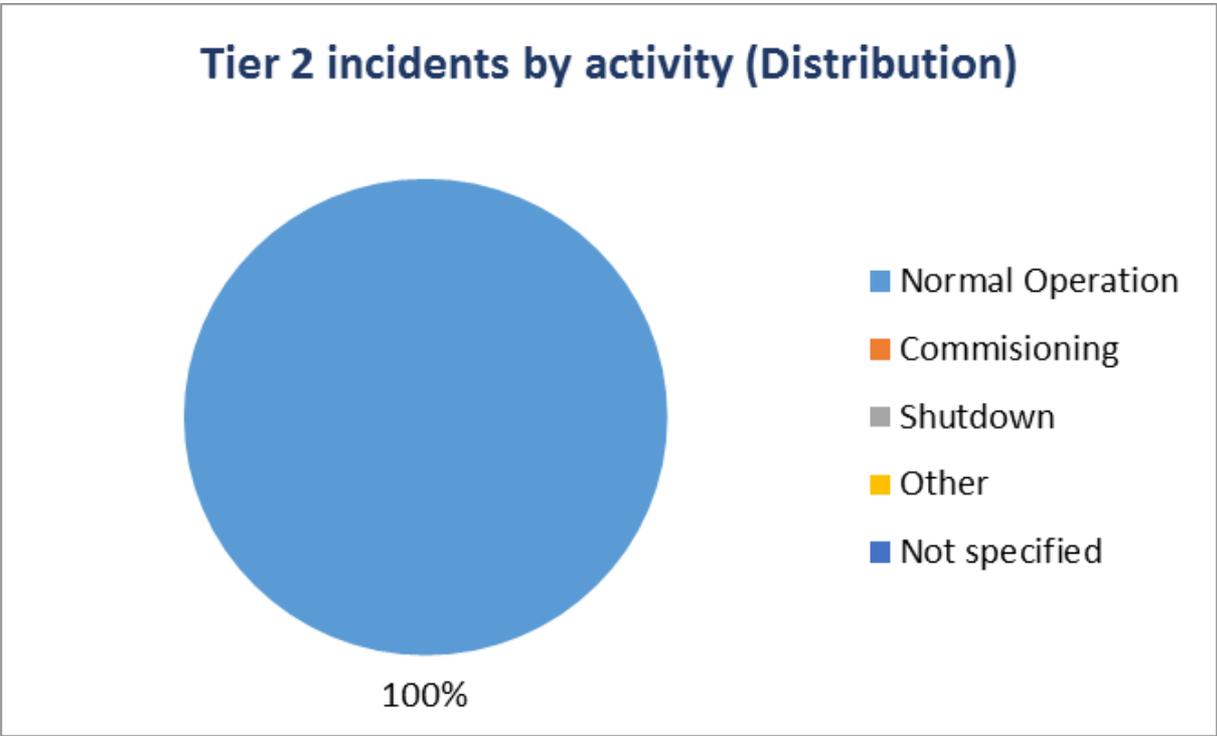
Incidents by Activity Refining T2



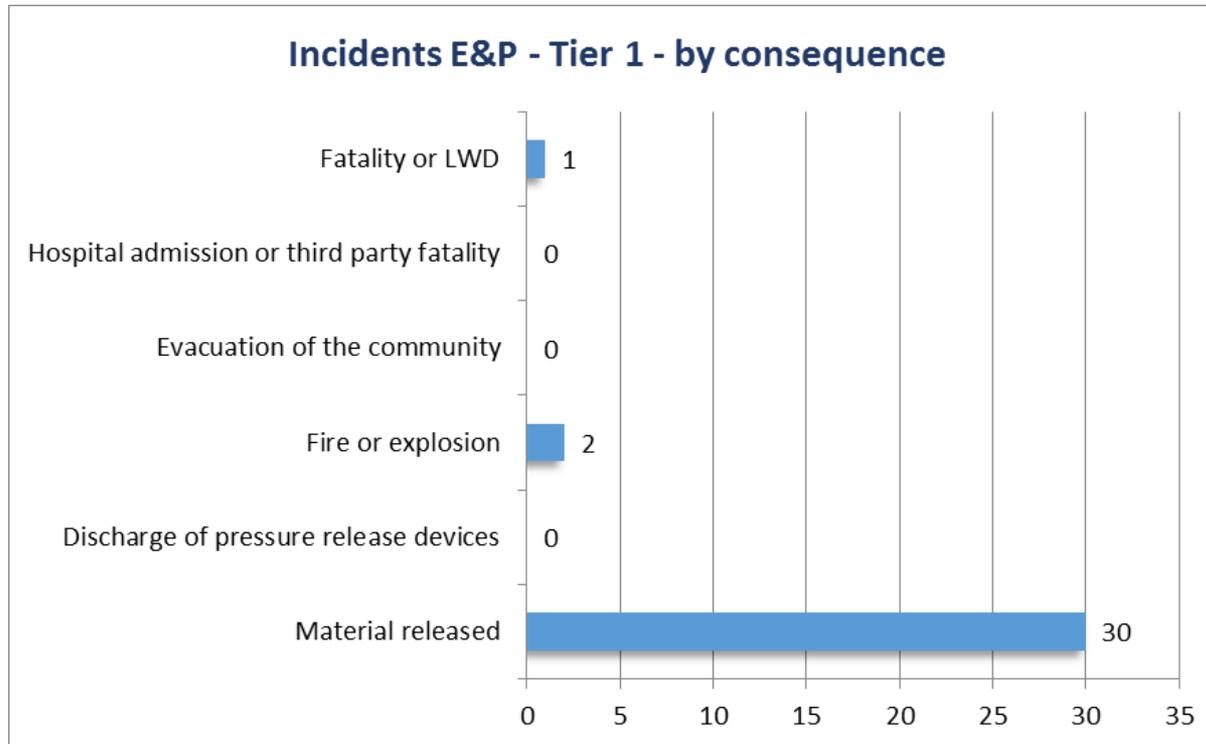
Incidents by Activity Distribution T1



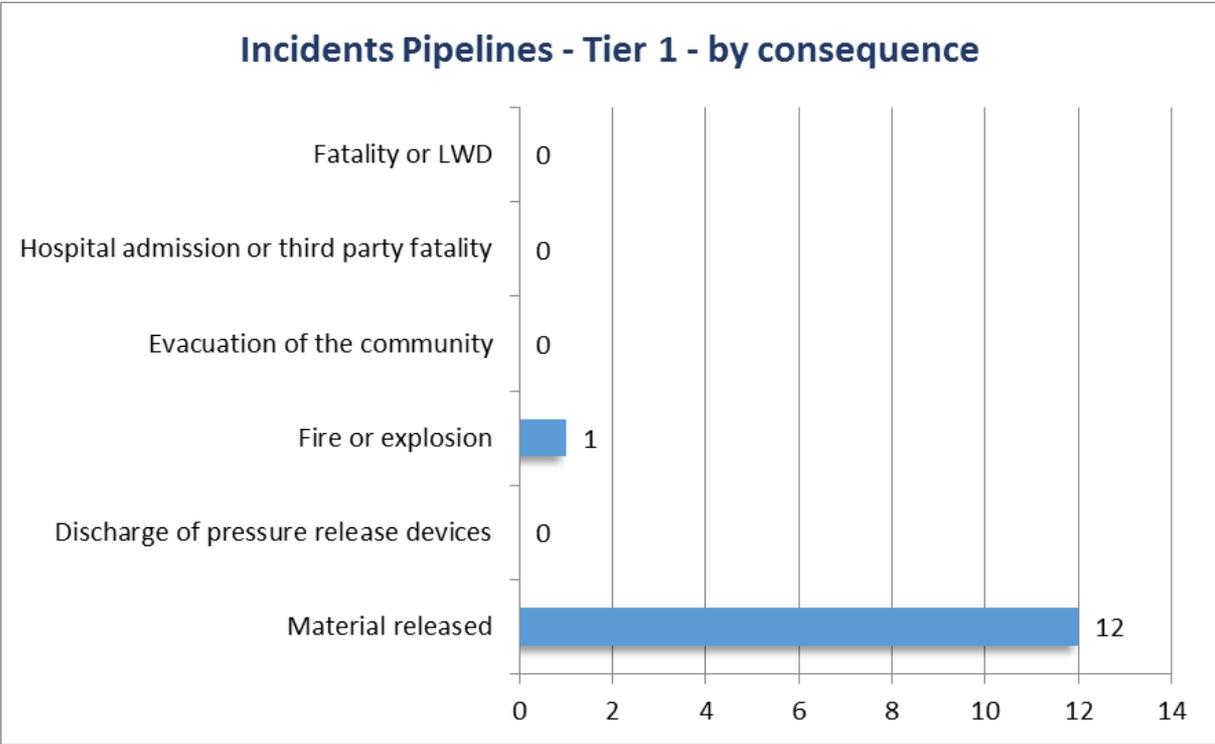
Incidents by Activity Distribution T2



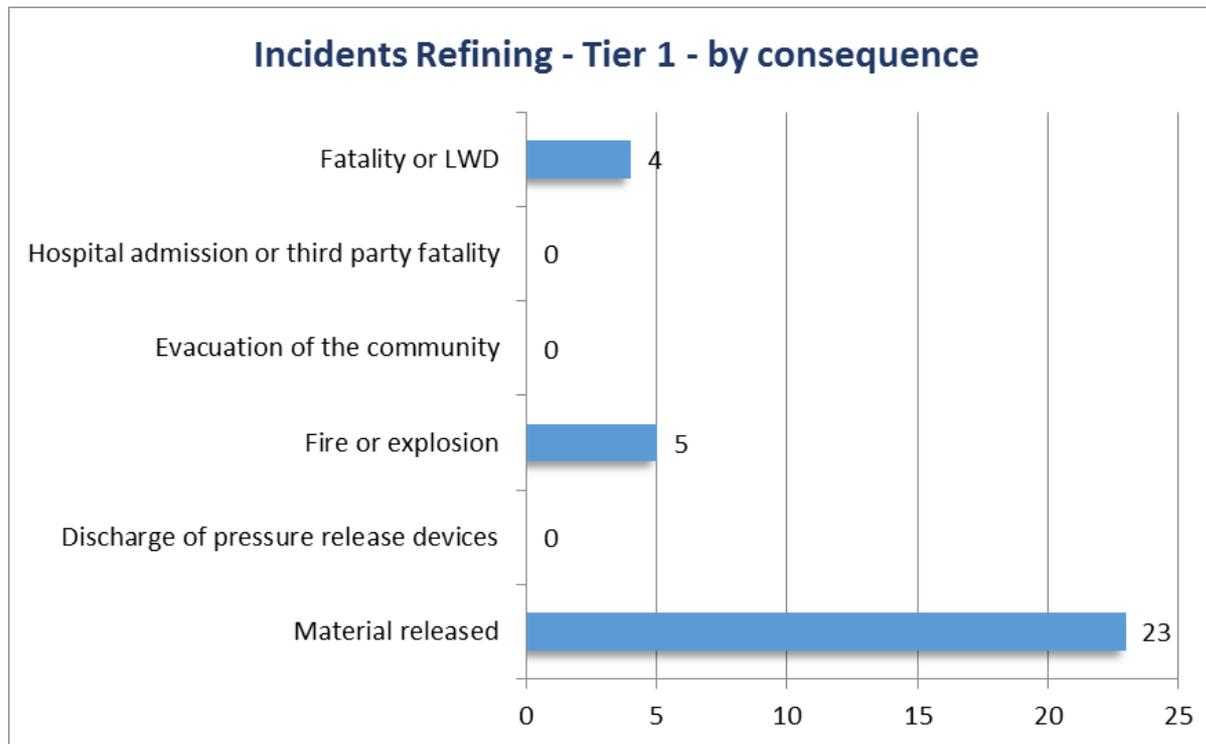
Incidents by consequence: T1 – E&P



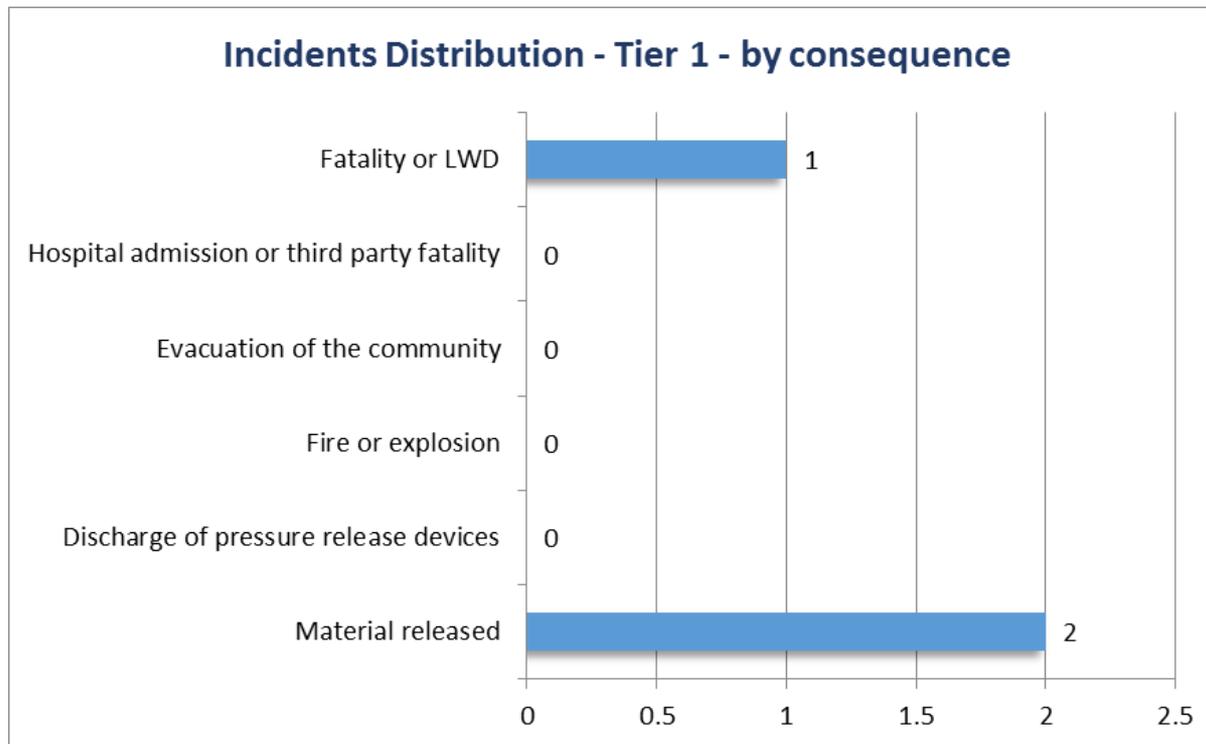
Incidents by consequence: T1 – Pipelines



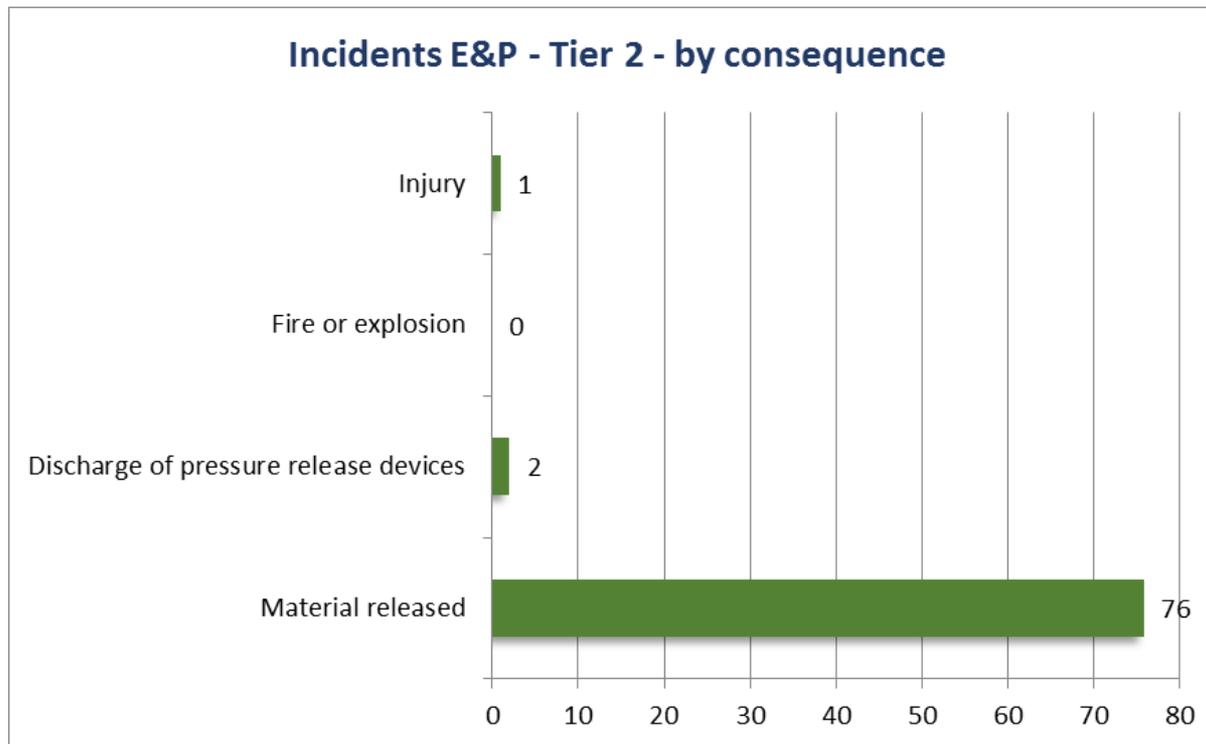
Incidents by consequence: T1 – Refining



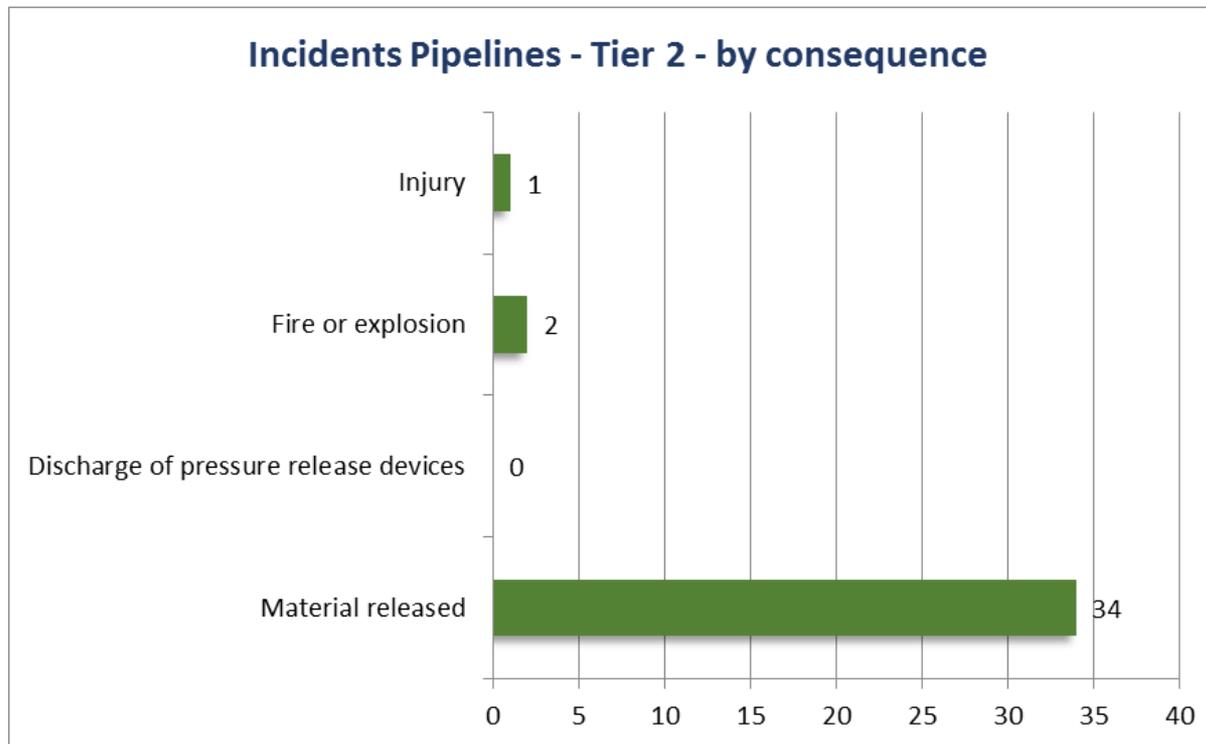
Incidents by consequence: T1 – Distribution



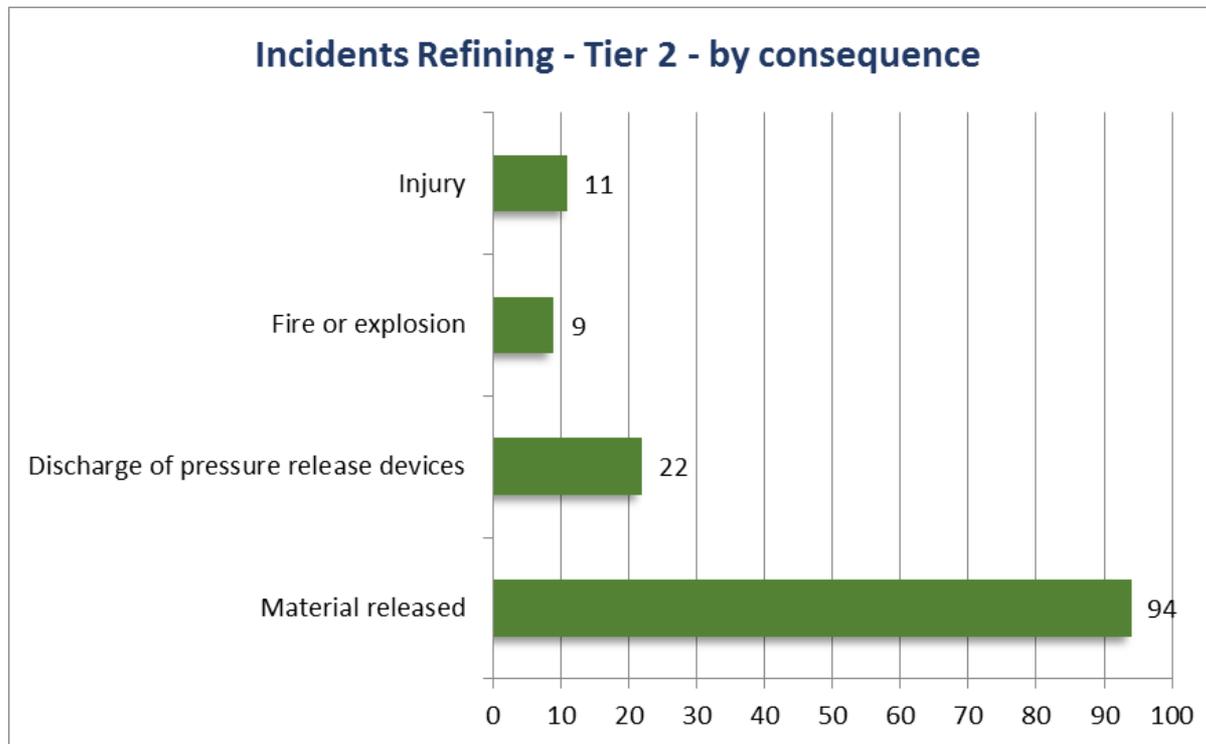
Incidents by consequence: T2 – E&P



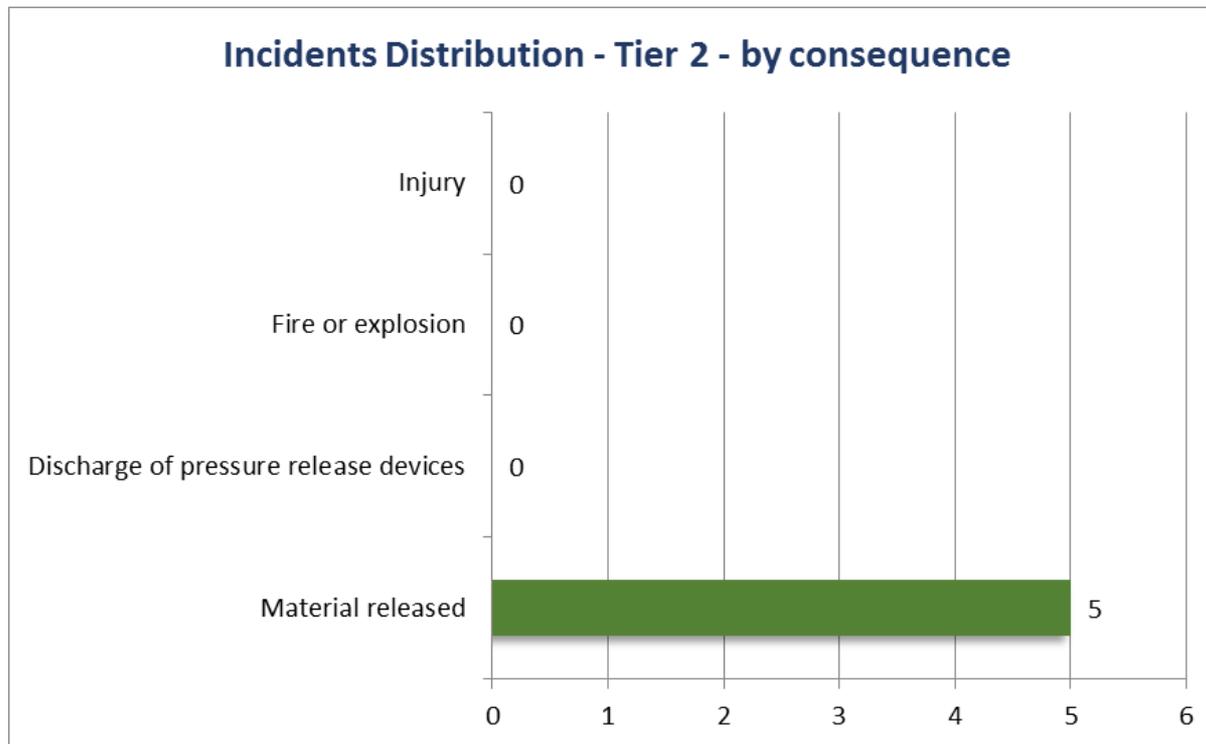
Incidents by consequence: T2 – Pipelines



Incidents by consequence: T2 – Refining

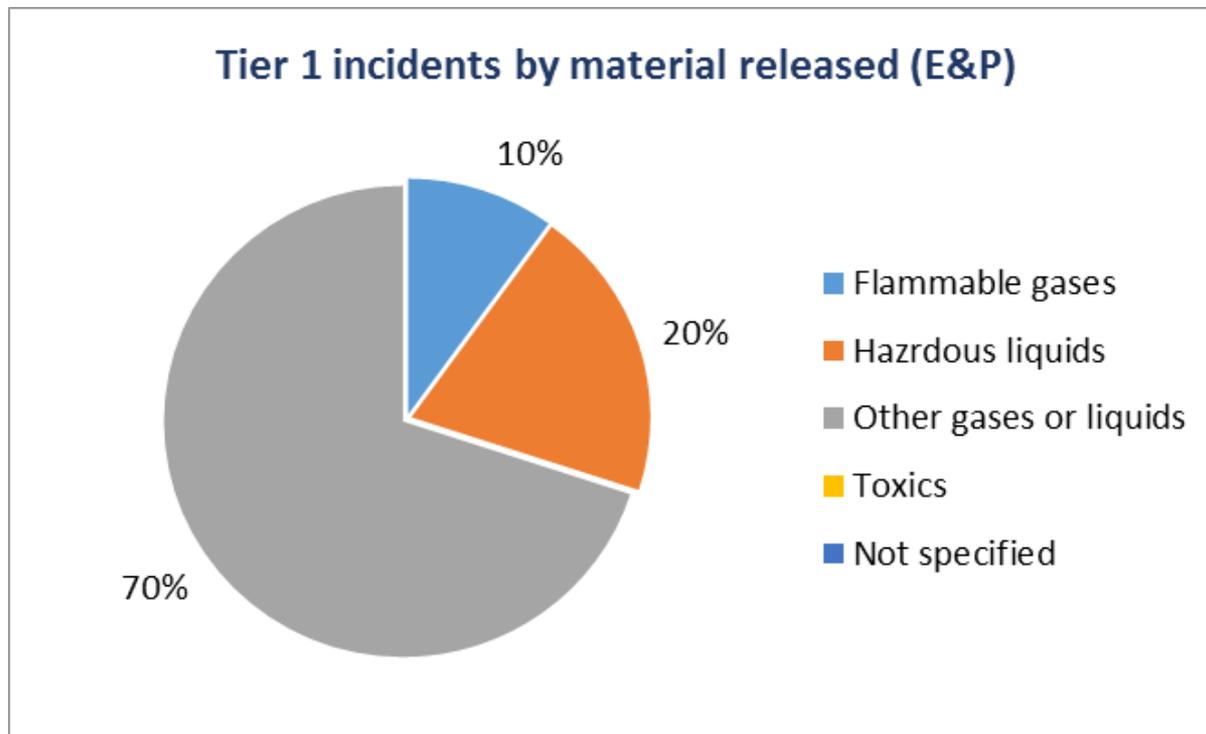


Incidents by consequence: T2 – Distribution



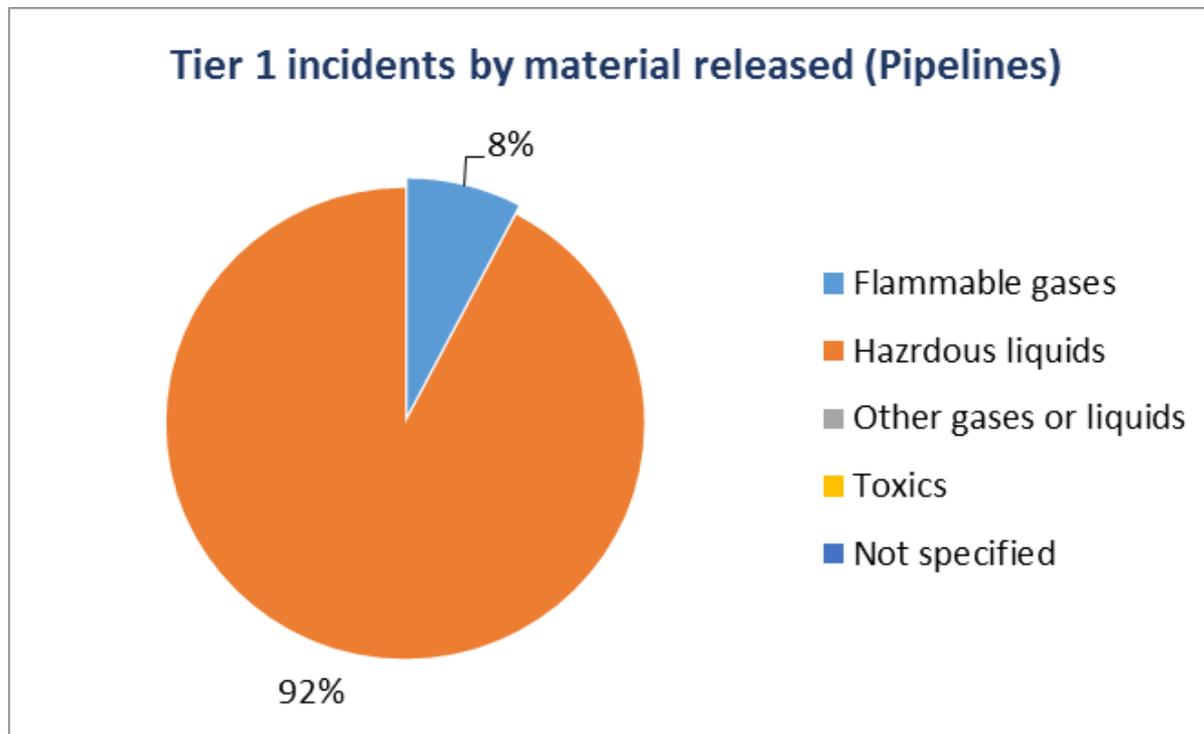
Incidents by material released

T1 – E&P



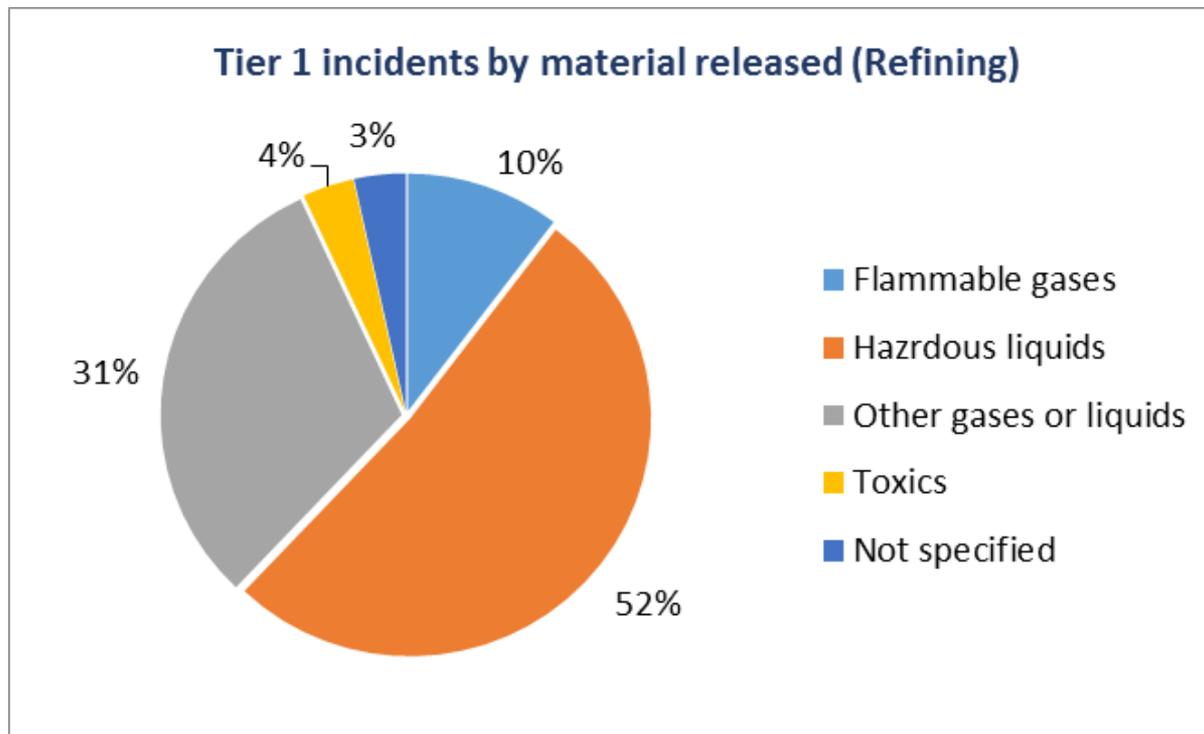
Incidents by material released

T1 – Pipelines



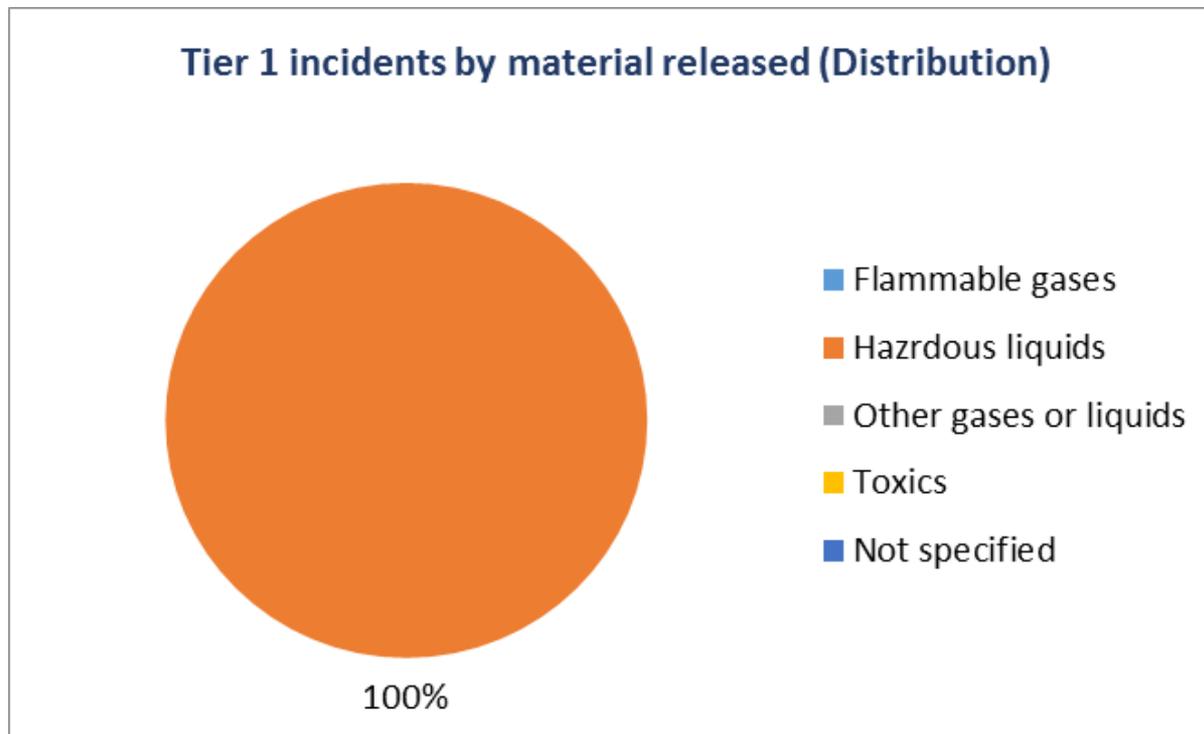
Incidents by material released

T1 – Refining



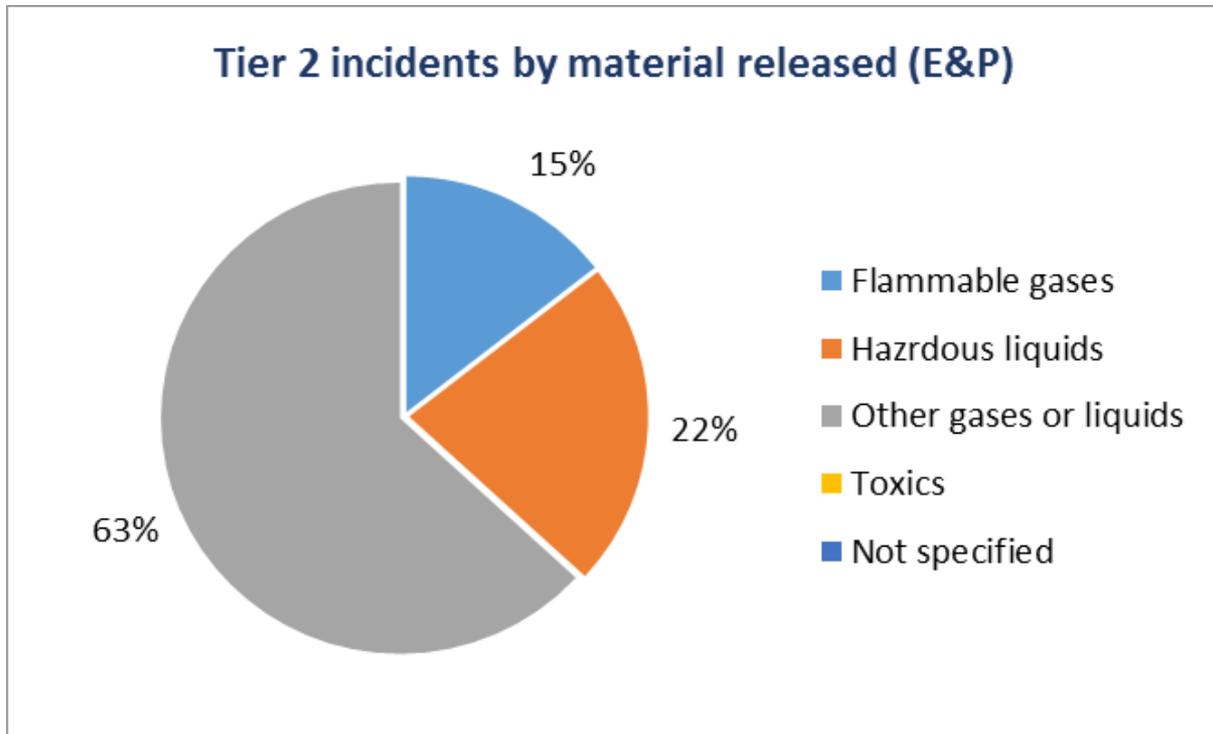
Incidents by material released

T1 – Distribution



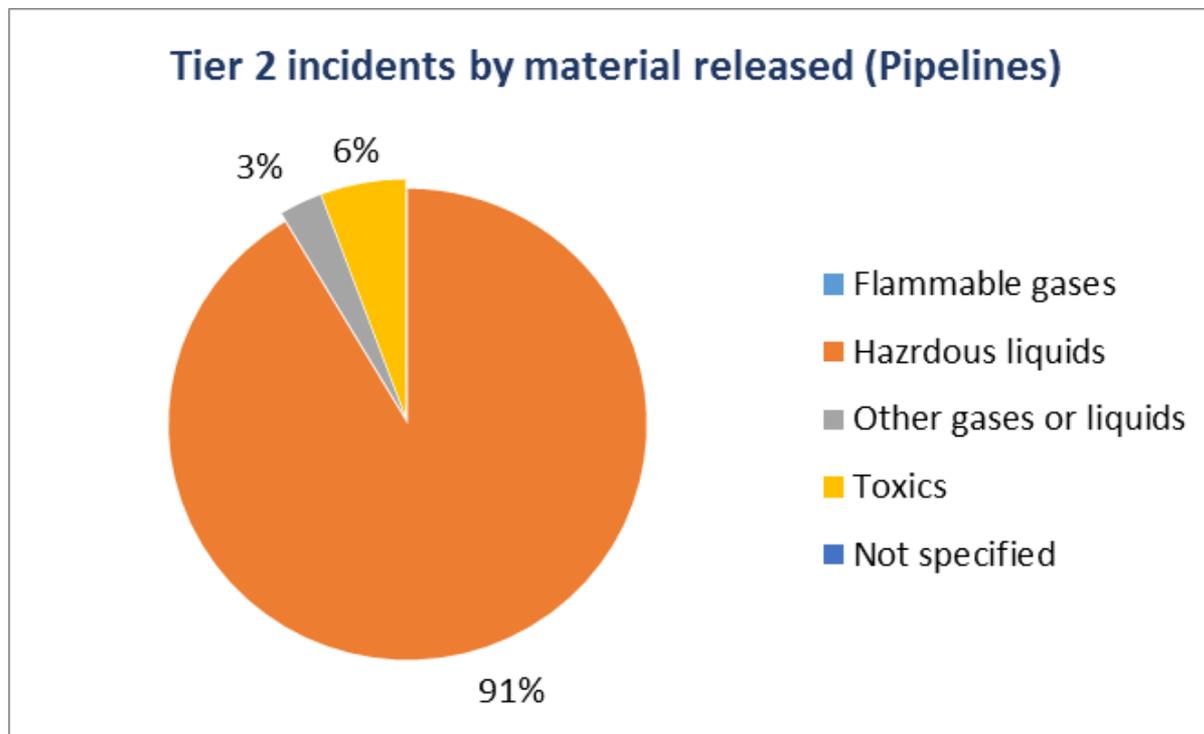
Incidents by material released

T2 – E&P



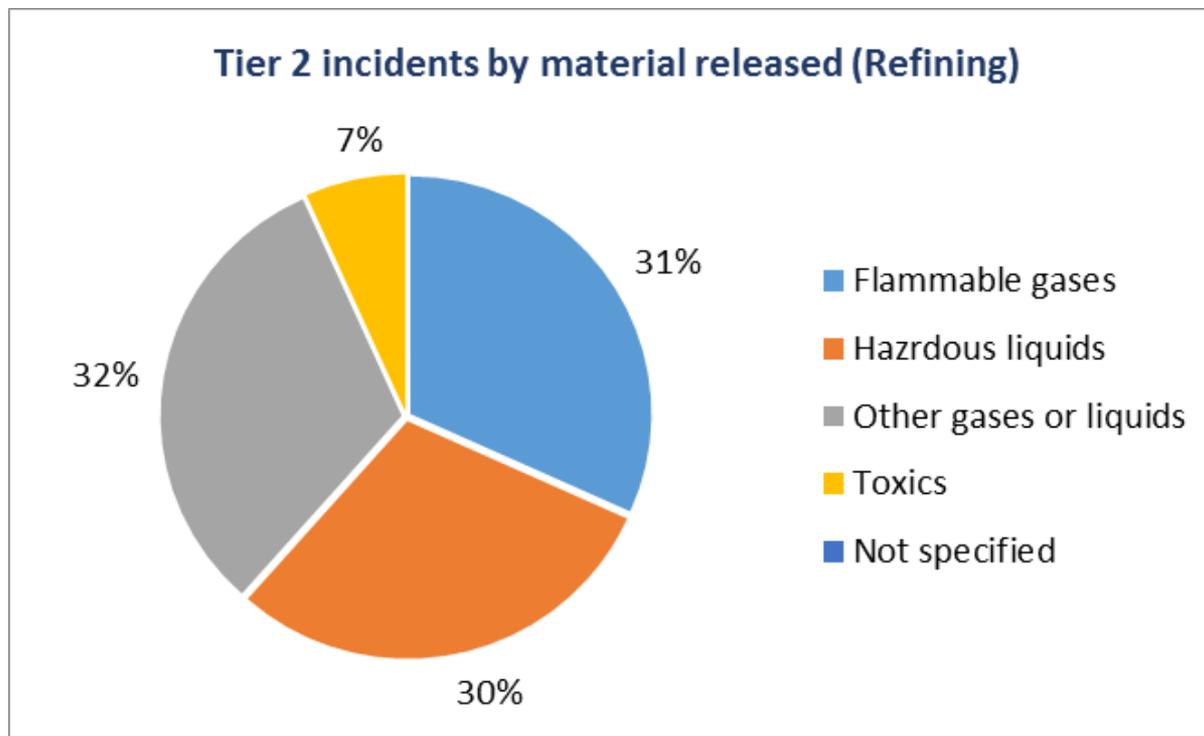
Incidents by material released

T2 – Pipelines



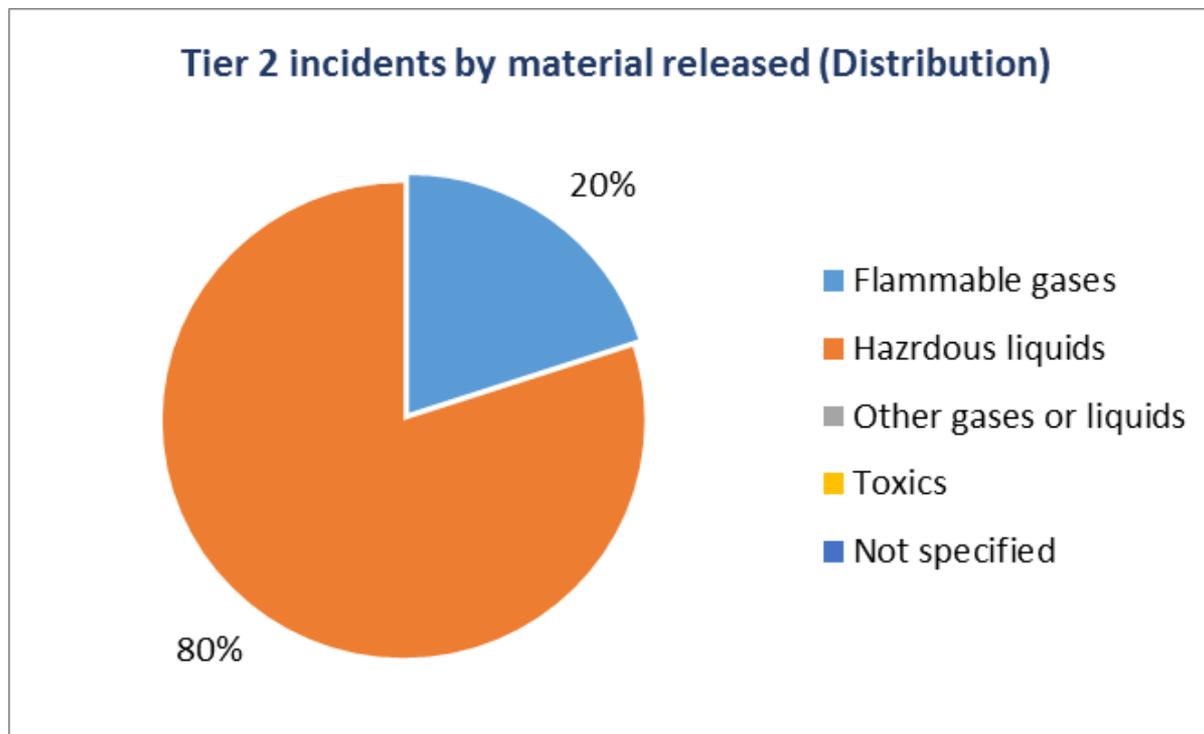
Incidents by material released

T2 – Refining



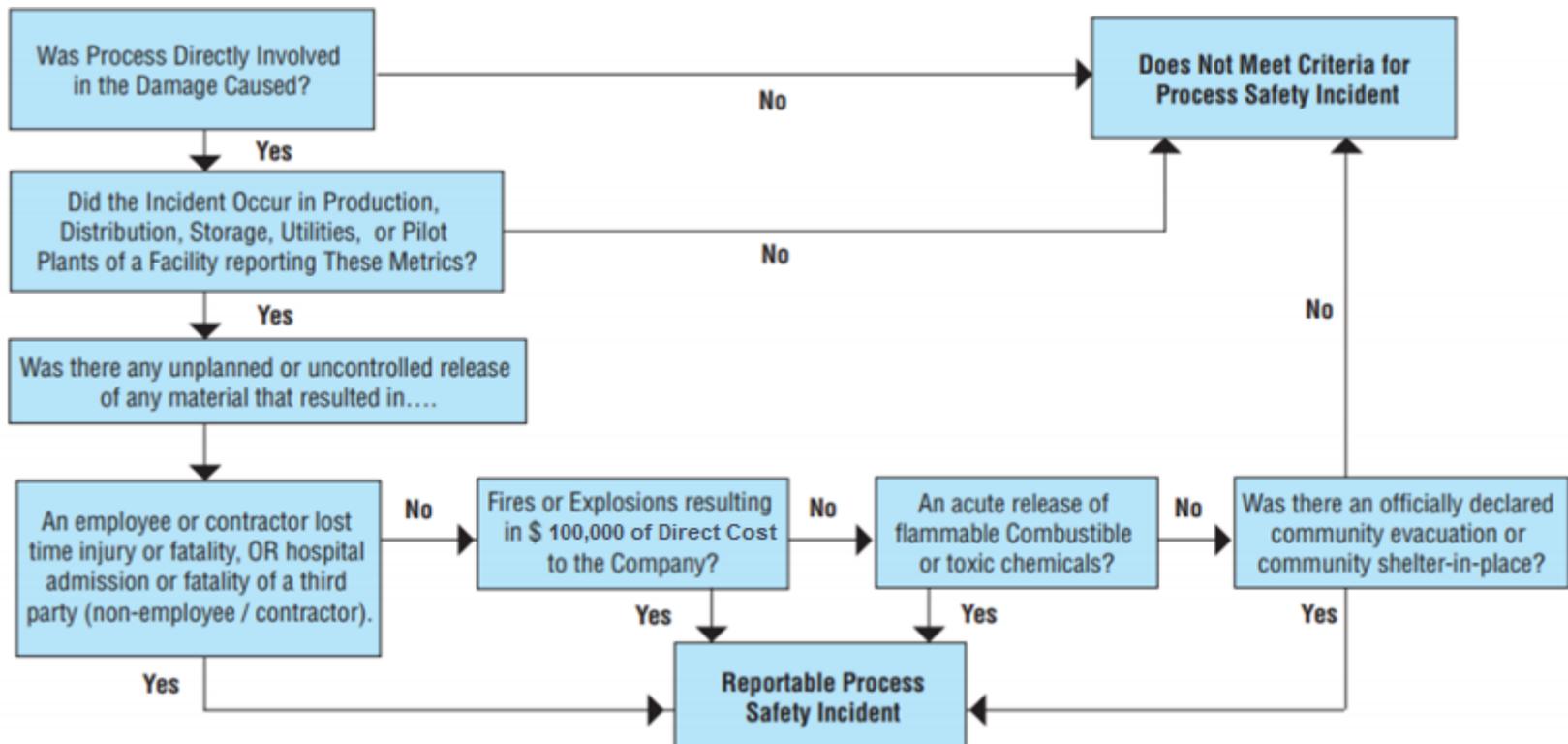
Incidents by material released

T2 – Distribution



Annex: Methodology

- The information presented in this report is compiled by a confidential survey answered by ARPEL member companies. The recommended practice API 754 is the main reference to categorize incidents and reporting thresholds.
- In the following flowchart are shown the characteristics an incident should have to be considered a process safety incident according to API 754.



Annex: Methodology

- The Process Safety Pyramid is shown below. The main difference between a Tier 1 and Tier 2 incident are the consequences.
- A Tier 1 incident implies at least one of the following consequences (fatality –own or third parties-, lost workdays, hospital admission, community evacuation, fire or explosion with losses higher to 100kUSD or a material release exceeding the reporting thresholds)
- A Tier 2 incident implies a non-fatal injury, fires or explosion with losses between 2.5 and 100 kUSD or a material release exceeding a reporting threshold lower than thresholds defined for Tier 1 incidents.



Annex: References

- API “Guide to reporting process safety events. Version 3.0”
- ARPEL (2017) “User’s Manual – ARPEL Database – Safety benchmarking in the oil and gas industry in Latin America and the Caribbean” 7th edition [?](#)
- CCPS “Process Safety Leading and Lagging Indicators”
- IOGP (2017) “Safety Performance Indicators. Process Safety Events, 2016 data”



Regional Headquarters:

Av. Luis A. de Herrera 1248. WTC. Tower 2. 7th Floor. Of. 717.

CP 11300. Montevideo, Uruguay

Ph: (+598) 2623-6993 | info@arpel.org.uy



BENCHMARKING

Process Safety Benchmarking in the Oil and Gas Industry in Latin America and the Caribbean (2018 data)

