

**Offshore Oil Spill Incidents: Creating a Database in Brazil**

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**ABSTRACT 300124:**

Brazil has performed an important role in the oil and gas industry mainly because its offshore E&P activities. The volume of oil produced in offshore fields had increased 88% in the last decade and correspond to more than 90% of national production.

The maritime Exploration and Production (E&P) operations in Brazil started in the middle of the 1970's. In 1981 a law was promulgated to establish a compulsory environmental permit to many activities, including oil and gas exploration and production activities. Although this regulation has existed for over 25 years, only in 1999 was it effectively brought into force to the E&P sector, with the creation of the oil and gas specialized office integrated to the Instituto Brasileiro de Meio Ambiente e Recursos Naturais Renováveis – IBAMA (Brazilian Federal Environmental Agency).

On January 2000 Brazil faced one its worst oil spills, in Guanabara Bay. A broken pipeline owned and operated by Petrobras spilt 1300 tone of bunker fuel into Guanabara Bay, Rio de Janeiro. At that time, Brazil had no clear environmental scenario regarding the oil industry in Brazil: uncoordinated environmental regulations, debilitated environmental agencies and a relapse industry took part in the scenario.

As a result of the repercussion of the disaster, in the same year was enacted the Federal Law 9966/2000, the so called “Oil Law”, on the prevention, control and inspection of pollution caused by the releasing of oil and other harmful substances in waters under national jurisdiction. The provisions of the Law 9966 included, among other things, the requirement for the notification to the competent environmental authority, the maritime authority and the oil regulating agency, of any incident which might cause water pollution.

Although IBAMA receives the oil spill communications since 2001, only in 2010 the Agency began to include this information in a database.

This paper discusses the offshore oil spill data received between 2010 and 2012.

## **INTRODUCTION:**

The maritime Exploration and Production (E&P) operations in Brazil started in the middle of the 1970's when environmental protection was not an issue. In 1981 a law was promulgated to establish a compulsory environmental permit to many activities, including oil and gas exploration and production activities. Although this regulation has existed for over 25 years, only in 1999 was it effectively brought into force to the E&P sector, with the creation of the oil and gas specialized office integrated to the Brazilian Federal Environmental Agency - IBAMA.

On January 2000 Brazil faced one its worst oil spills, in Guanabara Bay. A broken pipeline owned and operated by Petrobras spilt 1300 tone of bunker fuel into Guanabara Bay, Rio de Janeiro. Although it is a largely urbanized area, the Guanabara Bay houses important ecosystems like mangroves and were home for small cetaceans [1]. At that time, Brazil had no clear environmental scenario regarding the oil industry in Brazil: uncoordinated environmental regulations, debilitated environmental agencies and a relapse industry took part in the scenario.

As a result of the repercussion of the disaster, in the same year was enacted the Federal Law 9966/2000, the so called "Oil Law", on the prevention, control and inspection of pollution caused by the releasing of oil and other harmful substances in waters under national jurisdiction. The provisions of the Law 9966 included, among other things, the requirement for the notification to the competent environmental authority, the maritime authority and the oil regulating agency, of any incident which might cause water pollution. This paper was based on the data compiled from a report of the Oil and Gas Coordination from the Brazilian Federal Environmental Agency – IBAMA [2]

## **INCIDENT NOTIFICATION:**

As enforced by the law 9966/2000, the incident notifications shall inform the installation that originated the incident, date, hour, geographical position, volume and type of the released substance, presumable cause besides other data. In this paper, we use the term incidents to refer to incidents itself and also to refer to accidents, as it is defined by the Law 9966/2000.

The Offshore Incident Notifications received by the Instituto Brasileiro de Meio Ambiente e Recursos Naturais Renováveis – IBAMA (Brazilian Environmental Agency) are continually inputted in a specific database since 2010.

In 2010 there were 80 notifications of incidents related to offshore E&P activities. In 2011, this number significantly increased 51%, 121 notifications, despite the fact that the oil production increased less than 1% in the same period [3]. The Environmental Agency points out two possible reasons: sub-notification in 2010 (its possible that in 2010, the companies had not notified all the incidents). Or the number of incidents had, indeed, increased. As the increase of activities was insignificant, the Agency presumes that investments in environmental safety could have been neglected. In 2012 there were a increase in activities, due to the pre-salt reservoirs, and the number of notifications had followed this increment, summing up 172 notifications.

Crude oil, maritime diesel, drilling fluids and oily water were responsible for more than 80% of the incidents as seen in Table 1.

Substance	2010		2011		2012	
	No	%	No	%	No	%
Crude Oil	26	32,9%	25	22,1%	46	26,7%
Maritime Diesel	8	10,1%	19	16,8%	2	1,2%
Drilling Fluids	16	20,3%	32	28,3%	45	26,2%
Oily Water	14	17,7%	15	13,3%	13	7,5%
Others	15	19,0%	22	19,5%	66	38,4%
Total	79	100%	113	100%	172	100%

Table 1 – Number of occurrences per type of substance

Despite the greater repercussion of crude oil spills, other substances spills demands specific attention, like the drilling fluids spills that are seen by the industry as of minor relevance.

Although the great number of occurrences, the volumes associated to them rarely are above 1000 liters. In 2010 there were only one occurrence of this magnitude, and in 2011 there were three. Plus than 70% of occurrences had volumes below 100 liters in both years.

The sum of each spill in 2010 adds up to 2.259 liters and in 2011 this sum increased to 480.000 liters, and then returns to a similar level in 2012. This dramatic difference is due to the accident in Frade's Field operated by Chevron that spilled 477.000 liters. If the Frade's spill is not considered, we got similar volumes for the three years considered.

Volume [liters]	Maritime Diesel						Crude Oil						Oily Water					
	2010		2011		2012		2010		2011		2012		2010		2011		2012	
	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
<b>0 ≤ v ≤ 100</b>	8	100	15	78,9	25	89,3	18	69,2	16	64	33	78,6	11	78,6	12	8	12	92,3
<b>101 ≤ v &lt; 1000</b>	0	0	1	5,3	3	10,7	3	11,5	5	20	4	9,5	2	14,3	2	13,3	1	7,7
<b>v ≥ 1000</b>	0	0	1	5,3	0	0	1	3,8	1	4	3	7,1	0	0	1	6,7	0	0
<b>Unknown</b>	0	0	2	10,5	0	0	4	15,4	3	12	2	4,8	1	7,1	0	0	0	0
<b>Total</b>	8	100	19	100	28	100	26	100	25	100	42	100	14	100	15	100	13	100

Table 2 – Number of occurrences and percentage of incidents by type of product and volume

The spillage of drilling fluids is one of the major problems registered in the notifications, not only for the number of occurrences but for the volumes associated to them.

Although the number of drilled wells decreased from one year to the other [4], the number of notifications of spilled drilling fluids increased more than 100%, the volume spilled increased in 20% and for all volumes the number of notifications increased. The average of drilling fluids spilled to the ocean is 250.000 liters per year, indicating that additional risk reduction measures should be taken by the industry.

Volume [liters]	Drilling Fluids					
	2010		2011		2012	
	No	%	No	%	No	%
$0 \leq v \leq 100$	5	31,3%	12	37,5%	21	48,8%
$101 \leq v < 1000$	5	31,3%	11	34,4%	15	34,8%
$v \geq 1000$	6	37,5%	7	21,9%	7	16,2%
<b>Total</b>	16	100%	30	100%	43	100%

Table 3 – Number of occurrences and percentage of incidents with drilling fluids by volume

## CONCLUSIONS:

Most of the spills notified were small, below 100 liters, but the cumulative effect of this spills should not be neglected. The environmental impact from repeated small spills is complex and dependent on local conditions. The Brazilian results are comparable to the worldwide industry results indicated by OGP report, that shows that 59% of spills are below 1 barrel. [6]

These incidents should be investigated by the government, and their causes and prevention measures should be followed-up and recorded. The National Petroleum Agency conducts some investigation, but only of the major accidents. In their website there is a section of Accidents Investigations, but there exist only two reports from the accidents of the platforms P-36 occurred in 2001 and P-34 occurred in 2003. [6]

From the notifications sent by the operators it is not possible to identify the causes of the spills, the information provided is too general, like operational causes or equipment failure. In order to improve the quality of the notifications data, the Brazilian Environmental Agency should ask for more detailed information regarding the incident causes, as well as causes investigation reports.

Most of the countries with relevant offshore E&P activities, like Australia, Canada, UK and USA, publicly reports oil spill data through websites. Unfortunately, no country provides publicly reports about the disclosure of oil spills, so there is no available information about the impacts of the oil spills. [7]

Although yet incipient, only two years survey, the initiative of the Brazilian Environmental Agency to report oil spill statistics is of great value, and can indicate some mitigation measures. But the inclusion of the data in a publicly available website should be a must as it is the government's responsibility to inform the public on the extent of environmental impact from a regulated industry. The release of spill statistics is important information for public awareness of the environmental impacts of offshore oil and gas activities.

In 2013, the National Petroleum Agency started to develop an online incident notification system, that could be used by IBAMA also. This system, that is still under tests, intend to facilitate the oil spill communication procedures, and also will enable faster reports.

As suggested by Fraser et al the best practice in oil spill report is full disclosure which includes annual summary statistics on what was spilled, the volume of spill, substance, the

identity of the operator, the exact location, outcome of spill and the action taken by the regulator for every spill.

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