MONTARA (AUSTRALIA) OFFSHORE STATION DRILLING CATASTROPHY ANALYSIS AND PROBLEMS SOLVING MERITS

Akhmetov R.R.[1], Krainov S.A.[2] Email: Akhmetov17116@scientifictext.ru

[1]Akhmetov Radmir Rustemovich – Student;
[2]Krainov Sergei Alexeevich – Student,
PETROLEUM ENGINEERIND DEPARTMENT,
SAINT PETERSBURG MINING UNIVERSITY,
SAINT PETERSBURG

Abstract: *this paper investigates incident causes, scope, environmental consequences and offers ways of future incidents solutions taking Montara as an example. It was calculated that 376200 birds, 26355 turtles and 6726 mamals died because of Montara incident and 2508, 251 and 54 daily died respectively, whereas more than 5 billion fish died by paper's estimation. Nevertheless the amount of total oil spilled was much bigger in the Gulf of Mexico, it took almost the same number of days to clean water from pollution, so it is annother proof for Australian spill being important to investigate and being misjudged in terms of damage. As the area of spill was more 25000 square metres the environmental harm was enormous. It was investigated that the reason for disaster was defective products and operator's mistake. As possible sollutions it was offered developed oil spill trajectory models, satellite systems, fatigue management, more detailed control after working process and materials.*

Keywords: *oil spill; water pollution, animals deaths, offshore drilling*.

АНАЛИЗ РАЗЛИВА НЕФТИ ПРИ БУРЕНИИ НА ШЕЛЬФЕ МОНТАРА (АВСТРАЛИЯ) И МЕТОДОВ ПРЕДОТВРАЩЕНИЙ

Ахметов Р.Р.[1], Крайнов С.А.[2]

[1]Ахметов Радмир Рустемович – студент;
[2]Крайнов Сергей Алексеевич – студент,
кафедра транспорта и хранения нефти и газа,
Санкт-Петербургский горный университет,
г. Санкт-Петербург

Аннотация: *в статье исследуются причины, масштабы и экологические последствия, связанные с морской буровой установкой в Монтаре, а также предлагаются пути решения будущих инцидентов. Было подсчитано, что 376200 птиц, 26355 черепах и 6726 млекопитающих умерли из-за инцидента в Монтаре и 2508, 251 и 54 ежедневно умерли соответственно, также умерло более 5 миллиардов рыб по приблизительной оценке. Поскольку площадь разлива была более 25000 квадратных метров, экологический ущерб был огромен. Было выяснено, что причиной катастрофы были некачественные материалы и ошибка оператора. В качестве возможных решений были предложены разработанные модели траектории разлива нефти, спутниковые системы, управление рабочими сменами, более строгий контроль над персоналом и материалами.*

Ключевые слова: *разлив нефти, загрязнение воды, смерти животных, бурение на шельфе*.

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In Australia before Montara catastrophy there were 2 oil spills incidents. Australian offshore drilling and offshore exploration sectors demand (Figure 1).

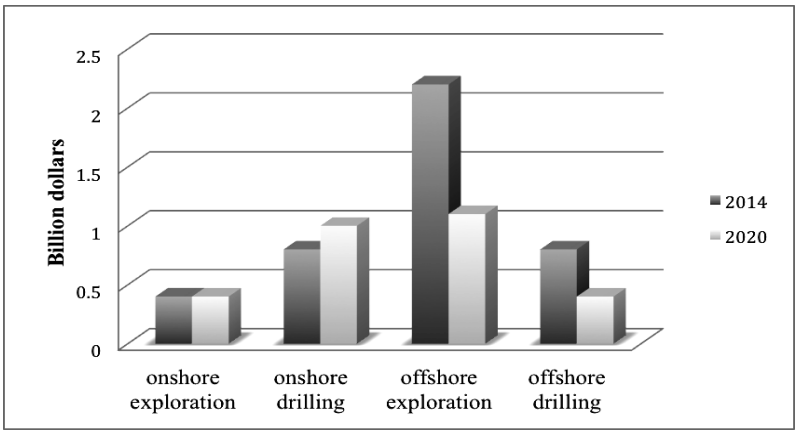

Fig. 1. Australian oil field services sector demand in 2014 and 2020

The cause of blowout and spill (Figure 2). Relevantly, the 9⅝" cemented casing shoe had not been pressure tested in accordance with the company's Well Construction Standards, despite major problems having been experienced with the cementing job. In particular, the cement in the casing shoe was likely to have been compromised as it had been substantially over-displaced by fluid, resulting in what is known as a 'wet shoe'. None of this was understood by senior PTTEPAA personnel at the time, even though the company's contemporaneous records, such as the Daily Drilling Report (DDR), clearly indicated what had happened. The multiple problems in undertaking the cement job – such as the failure of the top and bottom plugs to create a seal after 'bumping', the failure of the float valves and an unexpected rush of fluid – should have raised alarm bells. Those problems necessitated a careful evaluation of what happened, the instigation of pressure testing and, most likely, remedial action. No such careful evaluation was undertaken. The problems were not complicated or unsolvable, and the potential remedies were well known and not costly. Pressure containment cap was not on one of the four oil wells it was drilling at the time. The cap was reported as being in place when in fact it had not been installed on the Montara H1 Well, causing it to burst [7].

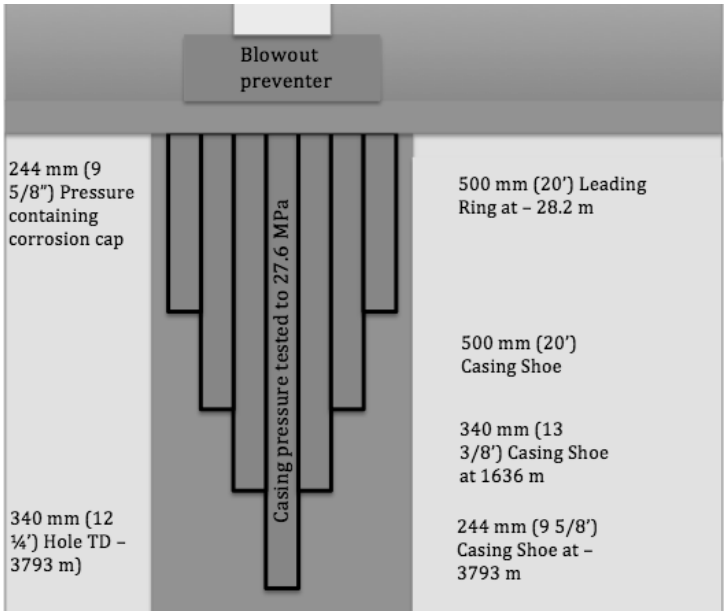

Fig. 2. Suspension model diagram

It is crucial to compare Montara spill with the same incident in the Gulf of Mexico to be aware of how malicious was this disaster.

Table 1. Comparison of incidents in Mexico in Australia

	Gulf of Mexico	
Total oil spilled, bar	35000000	36815
Time to clean, days	180	105
People died	11	0
Sea depth, m	1500	90

Area, square km	177000	26000

DEWHA reported one confirmed report of an oil affected sea snake and 29 oil affected birds found in the region affected by the oil spill. Of these, 21 birds died as a consequence of being oiled. This paper seriously doubts the truth of this information, because the calculations do not match with provided numbers. It can be explained by the fact that people do not really care about animals' deaths statistics, because no one really cares about their health and lifes. We want to try to show the real numbers about the damage to poor birds, turtles, mammals and fish [4].

Species daily and totally died because of Montara oil spill:

$$S_d = \frac{m_1 \cdot n \cdot S_1 \cdot h_1}{m_2 \cdot S_2 \cdot h_2} \qquad (1)$$

$$S = \frac{m_1 \cdot n \cdot S_1 \cdot h_1}{S_2 \cdot h_2}, \text{ where} \qquad (2)$$

S_1- the area of Montara oil spill, S_2 – the area of the Gulf of Mexico spill, h_1 – the depth of sea (Montara), h_2 – the depth of sea (the Gulf of Mexico), n – number of species daily died in the Gulf of Mexico from oil pollution [7], m_1 - number of days needed to clean the spill in Montara, m_2 – number of days needed to clean the spill in Mexico, example of the calculation for birds:

$$S_d = \frac{6147 \cdot 170000 \cdot 90}{25000 \cdot 1500} = 2508 \text{ birds died every day}$$

$$S = \frac{6147 \cdot 105 \cdot 170000 \cdot 90}{25000 \cdot 1500} = 376200 \text{ birds died}$$

Table 2. Daily dead wildlife because of Montara oil spill

	Species daily died	**Species totally died**
Birds	2508	376200
Turtles	251	26355
Mammals	64	6726

The statistic for fish was hard to calculate, because no one calculated exact number of died species, but approximately it comprises around 5 billions of fish by our personal estimates. These are the pictures of different animals died as a result of oil pollution after Montara disaster (Figure 3).

Fig. 3. Poor animals abandoned by people in Montara after oil spill. Source: (CBS 8), (News Limited), (http://spanish.china.org.cn/photos/txt/2010-06/23/content_20325213.htm)

Dispersant spraying operations commenced on 23 August 2009 and continued until 1 November 2009. Two vessels worked together joined by a 300 metre containment boom, with a skimmer operating in the boom "pocket" to recover the oil. For much of the response, two pairs of vessels undertook these operations. A total of 844,000 litres of product was recovered. It is estimated that some 493,000 litres of this oil-water mixture was oil [2, 4]. The first problem that is the most crucial nowadays is saving animals. The Australian Maritime Safety Authority should review and update its existing internal procedures for oil and chemical spill response for major incidents in which the Authority is combat agency. Regular trials of the procedures should be undertaken (given live implementation is likely to be infrequent) and adjustments made as necessary. These are the recommendations and ways of solution of some problems: a fatigue management plan, extend exhausts on skimmer power pack to better disperse emissions, the use of satellite sensing technology to support oil spill response, Create a system that involves the chemical matching of the oil slick to samples taken from the suspect vessel to positively identify the polluter [5, 6].

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