# Case study of the exxon valdez oil spill and the resultant changes



Research report of this case study is regarding of the Exxon Valdez oil spill disaster. Exxon Mobil Corporation is found on 30th November 1999 by merging Exxon and Mobil and it's the largest publicly traded companies in the world. It is in the rank of #1 or #2 for the past 5 years. By the time it reached March 1989, a worst tragedy took place where caused by one of the largest super tanker in the world Exxon Valdez. [1]

Different products have developed constantly in respond to changing demand for better in petroleum refinery. There a lot of processes involve in refinery, but the four main processes is refinery, separation, conversion and purification operation processes. At first the use of refinery is to create kerosene as cheaper and better compare to whale oil. Since all vehicles and airplane is combustion engine, it created more needs for petroleum.

The location of Prince William Sound is so deep in where it only can be access by plane and boat. Due to this, the government and particular industries that involve had a tough time cleaning the disaster. By this major disaster, environment, economic and social were the main aspects were affected badly. It has given a negative impact on the lifestyle of the people in Prince William Sound.[2]

A lot of action has been taken in the oil refinery industry after the oil spill, such as Operation Integrated Management System (OIMS), better radar system and Coast Guard in Prince William Sound.

#### Introduction

#### 2. 1 Problem Statement

By such disaster occurring, the exposure and early prevention steps would be taken by the society. Engineers will be efficient as in; safety and the quality would play a big role for them in their career by knowing the consequences of the major disaster.

## 2. 2 Objective

1. The aim and objectives 2. To observe oil and refinery industrial processes and operations and learn the cause of the disaster 3. Risks of the oil spill disaster and pollution that affected all areas that lead to the oil spill disaster and pollution 4. The consequences of all the hazards of the oil spill disaster 5. To improvise and the changes in the management systems to prevent from the disaster to occur

#### 2. 3 Overview

This research report is a case study of the Exxon Valdez oil spill disaster that took place in Prince William Sound, Alaska. Within six hours of the grounding, the Exxon Valdez spilled around 10. 9 million gallons of its 53 million gallon cargo of Prudhoe Bay crude oil. Eight of the eleven tanks on board were damaged. Even before this major disaster occurred, they were high risk of oil spill in Prince William Sound. There is still an unclear doubt why this oil spill took place. [1]

## 3. Aim and objectives of Exxon Mobil Corporation

Exxon Mobil Corporation is merged in two companies which is Exxon and Mobil in the year of 1999. It is the world's largest petroleum and https://assignbuster.com/case-study-of-the-exxon-valdez-oil-spill-and-the-

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petrochemical company and it is also the world's leading traded international oil and gas company. Exxon Mobil markets fuel and lubricants are under three brands which are Esso, Exxon and Mobil. The corporation aims and objective is divided into few sectors:

## 3. 1 Development

Exxon Mobil is focused on serious and discipline investment decision to find the best solutions that can give a large amount of profit and also the same time increase the reliability and reduce the cost. Exxon Mobil is also focused on many major projects which have started with the design and the operating concept and delivery.

# 3. 2 Employees

Exxon Mobil is very choosy in taking in and retaining employers. They need employers who are extremely good and get the best out of them. They make the best of the best by sending them to the best training. They are very committed to maintain their safety during at workplace. A safe work environment enriched by diversity and characterized by open communication, trust and fair treatment.[3]

#### 3.3 Communities

Exxon Mobil is base throughout the world. Where ever the, they are very committed to be a good cooperate citizen. They maintain their high ethical standards, obey all applicable laws, rules and regulation and also respect the culture of the respective country. Among all those objectives above, they are more dedicated to running safe and environmentally responsible process.

Exxon Mobil Corporation is self-motivated to be at the leading edge of competition in all the aspects of our business. They are very discipline and very selective in estimating the range of capital investment opportunities available to them. They create new ways such as develop proprietary technologies that provide a competitive edge. Their goals are achieved by flawlessly executing business plans and adhering to these guiding principles and the foundation policies.

#### 3. 4 Shareholders

Exxon Mobil Corporation is committed to enhance the long term period value of the investment dollars trusted to them by the shareholders. At the end the shareholders would be rewarded with their superior returns. The momentum of this would enhance their management of their Corporation. [1]

#### 3. 5 Customers

To remain successful in an industry, a company has to be firm to please those different perception customers to adapt to their needs. Exxon Mobil commits them self to offer high quality products and services at competitive prices. [1]

# **Refinery Industrial Processes and operations**

Figure 1: Process Flow Diagram [4]

Oil refinery industry is a process where a barrel of raw crude oil that contains a mixture of all sorts of hydrocarbons, is transform it to petrochemical fuel like petrol and diesel. All processes are done by heat, pressure and chemical reaction method. Valves and gadgets is the one regulated when the crude oil

runs through many kilo metres of pipes. Computerizes gadgets used to monitor to control and optimize the processes that are undertaken.

## **Refining Process**

In this industry, refining is the most simplest and common processes is under taken. It starts with the crude oil is been heated up to vaporize the oil in distillation tower. Naturally heavier molecules would not rise as lighter ones in the vapour and with this the vapour can condense with different levels. When the cooling process occurs at various degrees, the liquefied gasses are collected in condensation trays. By this various types of petrochemical material are obtained. [4]

#### 4. 2 Treatment

The purpose of this process is for hydrocarbon streams to get ready for extra processing and to prepare complete products. Sometimes it includes the elimination or separation of aromatics and naphthenic also as impurities. Chemical or physical separation for instance dissolving, absorption, or precipitation using a variation and combination of processes containing desalting, drying, hydro desulfurizing, solvent refining, sweetening, solvent extraction, and solvent dew axing might be included.

# 4. 3 Catalytic Cracking

Catalytic processes are another type of processes. It involves the breaking of heavy molecules into more valuable light molecules. For an example the breaking of low bitumen to diesel or even petrol where this process takes place in a high temperature using an alumina silicate and alumina silicate

acts as a catalyst to the process and helps to break down the molecule. This catalyst is in powder form.

4. 6 Auxiliary operations and facilities Steam and power generation, process and fire water system, flares and relief system, furnaces and heaters, pumps and valves, supply of steam, air, nitrogen and other plant gases, alarms and sensors, noise and pollution controls, sampling, testing, inspecting, laboratory, control room, maintenance and managerial facilities. [5]

# 4. 4 Other Refining Operations

This includes light-ends recovery, sour-water stripping, solid waste and wastewater management, process-water treatment and cooling, storing and management, product movement, hydrogen production, acid and tail-gas treatment and sulphur retrieval. [5]

#### 5. Risks in all areas that lead to disaster

#### 5. 1 Human Error

Human error is the main contributing factors. The first mate or captain of the tanker Captain Hazelwood was under influence of alcohol, at that time of the incident. The captain was unable to concentrate on his responsibility. This could be avoided if the captain of the ship were more discipline during work.

Hazelwood was send to alcohol rehabilitation for 28 days. The management knew about it and they followed his progress in rehab. The mistake the management did was, gave him the responsible to be a captain of vessel again. Instead of reinstating such a major responsible as a captain, they should have given him desk work job.

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Moreover the third mate who was in charge of the vessel when the major accident occurred. This is because he had very little sleep the night before grounding and they were lacking of staff on board tanker. When the Hazelwood went to sleep, the third mate had to take in charge to manoeuvre the tanker without having enough sleep.[6]

#### 5. 2 Failure of Coast Guard

Safe proofing method has been established and agreed between State of Alaska, the Coast Guard and the oil industry. This is to avoid human error to occur. This method works when there is a form of iceberg the coast guard has to warn the captains and the captain has to slow down their tankers. However, most of the tankers did not follow to the rules including Exxon Valdez due to profit and eliminate down time.

# 5. 3 Delayed Response

Location of Prince Williams Sound is deep so deep in by geographical view, where can be only excessed by air or water made the response slow. Apart from the location, the weather also played another big factor. Due to delayed response on reacting to clean the mess, the oil polluted about 2000km of cost line and about 26000 square kilo meters of sea was contaminated. [10]

#### Consequences

Figure 2: State on-scene Coordinator's [8]

A tanker with crude oil from Prudhoe Bay, Alaska collides with a reef in Alaska's Prince William Sound and 11 million gallons of crude oil spilled into one of the biggest coastlines. The horrible outcome out of the incident could

have been reduced but due to the location, it made it hard for the clean-up team and the government to react. Even Exxon Mobile did not react fast due to their unstable system in place to deal with the crisis. There is no any commitment given by Exxon Mobile to ensure that this same incident will occur again. [9]

#### 6. 1 Economical

The total money to just clean the mess is approximately USD 2. 1 billion dollars and fine is USD 5 billion dollars of this was the biggest penalizing fines ever charged out to a company. The total Exxon Mobile had to fork out USD 7. 1 billion dollars.

Those fishermen's were affected badly, till their livelihoods were affected.

They were relying on that for surviving. They lost around yearly gross valued at USD 174 million dollars. Due to this tourism industry were affected as well.

[8]

#### 6. 2 Environmental

Ecological system and wildlife were destroyed fully. Shoreline for 1400 miles was affected till they can't find those areas. A total of 1, 015 dead Sea otters, 36, 466 dead Sea birds 144 dead bald eagles, 302 harbour and more than 100, 000 of oiled birds. The number for dead birds was the highest compare to Heneman oil spill happen in 1989. Some species sinked when they die, due to that the whole sea was polluted. Most of the marine mammals fall sick due to ingesting oil while trying to clean oil of their furs or feathers or eating intoxicated prey. [9]

# Improvement and Changes in the Management System

# 7. 1 Operation Integrity Management System

After the oil spill Exxon Mobil Corporation devised a complete 11 point plan which covers from management to employees and everything including facilities and training. Exxon Mobil implemented an approach where safety is a major factor. The multilevel (OIMS) covers an extensive level of element in management system. This elements could classified as leadership management in safety and accountability, design, constructing and maintaining facilities, readiness in facing emergency, adaptation to change, continuous assessment of performance and inquiries in accident and incidents. When this policy been implemented Exxon had to go through a lot of changes and this changes lead to more improve and safe environment. This creates, Exxon Mobil to be the leader for safety in the industry. [4]

## 7. 2 Management Leadership

Implementation of safety starts at the management and work itself down to the labour force. This is because at the management level, the planning of the health and safety procedure is done. Thus enforcing safety measures also the responsibility of the management. This is done by identifying the risk involves followed by setting clear performances criteria. This can be done by creating a clear risk management procedure. Once that is done the leadership in the organization should have a strict enforcement policy where everybody involve should be given proper training and additional exposure to the risk and safety measure are involve. [4]

#### 7. 3 Construction and Facilities

When designing a facilities and construction of the facilities there is different type degree of safeties. For an example when u designing a machinery or tool, in this case best related to a building of a oil tanker. After the catastrophic disaster of Exxon Valdez, the safety emphasis on the design was changed. For an example, tankers now are re-enforced by having double hull and other safety measures are more efficient. The operation safety is emphasis by training where is given to all ship crew. For an example, navigation officers are given training in extreme condition ship manoeuvring.

## **Improvement and Policies**

After the incident Exxon Mobil had strict recruitment policies where all employees which are new has to go through an alcohol and drug screening. This was also implemented on existing staff and this was done after the incident. If in case there was a employee who was under the influence of any substance on board a vessel would be stopped from sailing again until they can prove that they would not repeat and gone through proper rehabilitation.

## **Conclusion**

The conclusion is Exxon Valdez was one of the major oil spill disaster. It effect of this incident was wide spread and very devastating. Resulting from a human error and negligence, many innocent people and environment was affected. From this case study it can be said that a good safety plan is required. Management also should always be responsible with their action

and measures to prevent such disaster. Given the situation and late response to the disaster made the incident even worse. They were many guidelines that did not followed by the management and employees, for an example the captain who was under the influence of alcohol and the lack of crew members on board. Incident happens because of human error.

The crew on board was very badly trained or not trained at all for any kind of situation. Therefore more training needed in future for all the employees, there should be always a body which monitors the training and sets on-going training for all the staffs. The management should also enforce health and safety guidelines in a regular basis. To ensure in the future there will be any similar incidents occurring. There also should be a team that ensures the maintainers of the tanker and equipment on board.

The Exxon Valdez spill was a lesson well learned by everyone especially Exxon Mobil Corporation and other oil and gas companies.