ASSESSMENT OF OIL SPILLAGE AND ITS CONTROL IN THE OIL AND GAS INDUSTRY IN NIGERIA

BY

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DECLARATION

I declare that this Masters Research Project entitled "**ASSESSMENT OF OIL SPILLAGE AND ITS CONTROL IN THE OIL AND GAS INDUSTRY IN NIGERIA**" has been performed by me in the Department of Mechanical Engineering under the supervision of Dr. Dauda M. and Dr. Anafi F. O. The information derived from literature research has been duly acknowledged in this project and a list of references provided. No part of this project was previously presented for another degree or diploma at any university or institution.

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Name of Student Signature Date

CERTIFICATION

This Masters Research Project titled "**ASSESSMENT OF OIL SPILLAGE AND ITS CONTROL IN THE OIL AND GAS INDUSTRY IN NIGERIA**" by Adewuyi Olukayode Adelowo meets the regulation governing the award of Masters Degree in Oil and Gas operations management of Ahmadu Bello University and is approved for its contribution to knowledge and literary presentation.

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DEDICATION

This Masters Research Project is dedicated to the Lord Jesus Christ, the Giver of all grace.

ACKNOWLEDGEMENT

I remain eternally grateful unto God for this opportunity to add to knowledge. I am particularly grateful to my lecturers who gave all within their reach to educate us in this field that is not yet popular in many institutions in Nigeria. To my biological family; Mr and Mrs M. A. Adewuyi, Femi, Bola and Adeola, I deeply appreciate your commitment, love and sacrifice to my education. Also to my spiritual family, JAWOM- under the leadership of Bishop David Bakare- I am glad to be a part of this family of God. My appreciation goes to my friends, Yemisi, Samson, Ronke, Rhema, Wale, Femi, Tayo, Bulus, Dinah, Mercy, Seye and also to my colleagues Nunanya, Aderemi, Iorpenda, Julius, Mike, Benard to mention a few.

ABSTRACT

The physical presence of the oil industry in Nigeria is so large and has resulted in a lot of activities in the upstream sector which has deleterious effects on ecosystem stability and local biodiversity – which the peoples' livelihoods depend upon. This research provides an overview of environmental issues in the oil and gas industry in Nigeria with specific focus on oil spillage and also highlights the best approaches to achieving high environmental performance in the oil and gas industry in Nigeria. The materials for this research include the use of existing reports on the oil and gas industry in Nigeria to acquire the required information. Comparative study method was used in which the data obtained Nigerian National Petroleum Company Annual Statistical report for 2013 and Shell Nigeria Monthly/ Annual statistical Reports for 2013 was analysed and logical deductions and sequential presentation of facts were thus made. It was observed in this study that oil spills occur more as a result of vandalisation than rupture during operations. Shell Nigeria has a record of oil spill amounting to about 3.038 billion barrels over a period of ten years (2003 to 2012) from their pipelines alone. The number of incidences of oil spill recorded by Shell Nigeria reduced within the period of 2007 to 2013 from 320 to 200 respectively. Also, it was observed that since 2010 the volume of oil spill has dropped significantly from 102, 000 barrels of 2009 to 20,000 barrels in 2013. Furthermore, the regulatory bodies are not working effectively and some of the country's regulations are out of date. Hence, a need for the government to review the regulatory laws and device an efficient means of enforcing them whenever necessary.

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CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

The oil and gas industry is truly global, with operations conducted in every corner of the globe, from Alaska to Australia, from Peru to China, and in every habitat from Arctic to desert, from tropical rainforest to temperate woodland, from mangrove (as is the case in the Niger Delta region of Nigeria) to offshore. The global community will rely heavily on oil and gas supplies for the foreseeable future. World primary energy consumption in 1994 stood at nearly 8000 million tonnes of oil equivalents; oil and gas represented 63 per cent of world energy supply, with coal providing 27 per cent, nuclear energy 7 percent and hydro-electric 3 per cent (BP *Statistical Review of World Energy*, June 1995).

The exploitation of oil and gas reserves has not always been without some ecological side effects. The challenge is to meet world energy demands, whilst minimizing adverse impact on the environment by conforming to current good practice. Oil spills, damaged land, accidents and fires, and incidents of air and water pollution have all been recorded at various times and places. In recent times the social impact of operations, especially in remote communities, has also attracted attention. The oil and gas industry has worked for a long time to meet the challenge of providing environmental protection. Much has already been achieved but the industry recognizes that even more can be accomplished (Adati, 2012).

The United Nations Conference on Environment and Development (UNCED) held in Rio de Janeiro in June 1992—'The Earth Summit'—focused world attention on the close links that exist between the environment and socioeconomic development. The Summit reviewed global environmental issues and resulted in two conventions (the Framework Convention on Climate

Change and the Convention on Biological Diversity), as well as the Rio Declaration and Agenda 21—plan of action. The central message of Agenda 21 is one of interdependence and cross sector partnership, and the plan of action provided a new approach to the wide-ranging socio-economic and environmental challenges facing the world community.

It is no news that Nigeria is one of the leading oil producers in the World, and that the fragile Niger Delta region is the seat bench (or hub) of oil and gas production of the country. Presently, 90% of Nigeria's gross domestic product (GDP) comes from revenues accruing from crude oil sales (Zabbey, 2012).

The World Bank estimated that the oil sector accounts for 95% of Nigeria export earnings and 85% of the governments revenues as of 2009. Currently in 2010 the International Monetary Fund (IMF) estimates that the oil sector accounts for over 95% of Nigeria export earnings and about 65% of the government's revenue. According to Oil and Gas Journal (OGJ), Nigeria has an estimated 36.2 billion barrels of proven oil reserves as of January 2010. The majority of the reserves located along the Niger Delta River, offshore Bright of Benin, gulf of Guinea and the Bright of Bonny. The current exploration activities focused in deep and ultra-deep offshore and some activities in the Chad Basin located northwest of Nigeria (Ukoli, 2005).

In 2008, Nigeria's crude oil production averaged 1.94 million bbl/d making it the largest oil producer in Africa with current production slightly over 2.2 million bbl/d as of 2009. Also, Energy Information Association (EIA) estimated that Nigeria's production could have reached 2.7 million barrels/day (bbl/d). Recent offshore developments combined with the restart of some shut-in onshore production have boosted crude oil production to an average 2.03 million bbl/d as of 2010 (Adati, 2012).

The country operates a joint venture with the TNCs. The government, through the Nigerian National Petroleum Corporation (NNPC), owns 55% share in the Joint Venture; SPDC 30%, ELF Petroleum Nigeria Limited (a subsidiary of TotalFina) 10% and Agip 5%. (Zabbey, 2005)

In recent times, however, production rates keep fluctuating due to insecurity occasioned by threats of local militias in the delta. As at 2005, Nigeria's daily production of crude oil reached 2.2 million barrels per day (b.p.d.) and was still on the increase (Adati, 2012).

Table 1.1 below shows the physical presence of the oil industry in the Niger Delta.

Table 1.1: The physical presence of the oil industry in Nigeria.

1) Land area within which the networks of pipelines are located	31,000 km
2) Number of oil wells drilled	5,284
3) Number of flow-stations	257
4) Length of main oil and gas pipelines in the region (flowlines between oil wells and flow-stations not included)	7,000km
5.) Number of export terminals	10
6). Number of communities hosting oil/gas facilities	1500

Source: Steiner (2008)

1.2 Statement of the problem

The Niger Delta is densely populated by about 20 million people. The density in the region continues to expand as oil operators recklessly occupy available lands, and as people, often times, are forced to migrate when hitherto residential areas become uninhabitable due to industrial mess. Oil exploration by seismic companies involves surveying, clearing of seismic lines and massive dynamiting for geological excavation (seismic testing). Virtually every aspect of oil exploration and exploitation has deleterious effects on ecosystem stability and local biodiversity – which the peoples' livelihoods depend upon (Zabbey, 2005). Thus, UNEP (2006) summed the impacts of Oil spill in the Niger Delta as follows:

1. High mortality of aquatic animals.
2. Impairment of human health.
3. Loss of biodiversity in breeding grounds.
4. Vegetation hazards.

5. Loss of portable and industrial water resources.
6. Reduction in fishing and farming activity.
7. Poverty, rural underdevelopment and bitterness.

Generally, the environmental impact of oil and gas can be classified into: human, socio-economic and cultural impacts; or atmospheric, aquatic, terrestrial and biosphere impacts. These highlighted environmental impacts of oil and gas requires that an up-to-date approach to environmental control be put in place to address the issues. Hence the need to analyse these issues and current control measures being administered to ascertain their effectiveness.

1.3 Aim and Objectives

The aim of this research is to assess the oil and gas industry in Nigeria in relation to the causes of oil spillage, its impact on the environment and the control measures being employed to reduce it to the bearest minimum.

The specific objectives of the study are:

- To provide an overview of environmental issues in the oil and gas industry in Nigeria and identify the causes of oil spill in the oil and gas industry in Nigeria.
- To analyse the working environmental control measures applied by oil and gas companies in Nigeria taking a case study of Shell Nigeria with particular focus on oil spill incidences.
- To recommend the best approaches to achieving high environmental performance in the oil and gas industry in Nigeria.

1.4 Justification

The primary measure of the environmental impact of petroleum wastes is their toxicity to exposed organisms. The toxicity of a substance is most commonly reported as its concentration in water that results in the death of half of the exposed organisms within a given length of time and as a

result it renders the environment uninhabitable to man, animals and plants. This research will therefore give/ provide an overview of oil spill issues in the oil and gas industry in Nigeria for key stakeholders in industry and government. It will also attempt to enlighten the host communities, managers in the industry, government and other stakeholders about their responsibilities in environmental management plan leading to the country having the best approach to environmental control in the oil and gas industry.

1.5 Research Scope

The scope of this study will cover the operations in the oil and gas industry as it relates to environmental issues with particular focus on oil spill incidences and the effectiveness of the nation's environmental regulations in controlling the impact of these operations on the environment.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The oil and gas industry comprises two parts, which are the upstream and downstream sectors.

- Upstream:- This is the sector responsible for the following:

- Exploration
  - Land & Aerial surveys, Satellite Images
  - Gravitational, Magnetic & Seismic Surveys
  - Exploration Drilling ("Wildcat")
  - Formation Evaluation
- Development
  - Drilling Appraisal/production wells
  - Production Facilities
  - Gathering Systems
- Production

- Downstream:- This sector deals with:
  - Transportation
  - Refining
  - Marketing

Oil and Gas has been found to occur in places such as: land, offshore, continental shelves, deep sea, deserts, wetlands, forests, mountainous areas, and arctic regions. These different location types often pose both technological and environmental challenges to the upstream petroleum industry in conducting exploration and production activities. The activities of finding and

producing petroleum, however, can impact the environment, and the greatest impact arises from the release of wastes into the environment in concentrations that are not naturally found. These wastes include hydrocarbons, solids contaminated with hydrocarbons, water contaminated with a variety of dissolved and suspended solids, and a wide variety of chemicals. While some of these wastes can have significant adverse effects on the environment, some have little impact, and others are actually beneficial. In virtually all cases, the adverse impact can be minimized or eliminated through the implementation of proper waste management.

The most important steps in minimizing adverse environmental impact by the industry is to take a proactive approach to managing operations and become educated about those activities that can potentially harm the environment. The proactive approach involves adopting an attitude of environmental responsibility—not just to comply with regulations but to actually protect the environment while doing business.

2.2 Overview of environmental issues in Petroleum Industry

Finding and producing oil and gas while minimizing adverse environmental impact requires an understanding of the complex issues facing the upstream petroleum industry. These issues concern operations that generate wastes, their potential influence on the environment, mechanisms and pathways for waste migration, effective ways to manage wastes, treatment methods to reduce their volume and/or toxicity, disposal methods, remediation methods for contaminated sites, and all applicable regulations.

2.2.1 Sources of Wastes

Wastes are generated from a variety of activities associated with petroleum production. These wastes fall into the general categories namely: produced water, drilling wastes, and associated wastes.

i. ***Produced water***, for instance, accounts for about 98% of the total waste stream in the United States, with drilling fluids and cuttings accounting for the remaining 2%. Other associated wastes combined contribute a few tenths of a percent to the total waste volume (American Petroleum Institute, 1987). The total volume of produced water in the United States is roughly 21 billion barrels per year (Perry and Gigliello, 1990). A typical well can generate several barrels of fluid and cuttings per foot of hole drilled. In 1992, 115,903,000 feet of holes were drilled in the United States (American Petroleum Institute, 1993), yielding on the order of 300 million barrels of drilling waste.

Produced water virtually always contains impurities, and if present in sufficient concentrations, these impurities can adversely impact the environment. These impurities include dissolved solids (primarily salt and heavy metals), suspended and dissolved organic materials, formation solids, hydrogen sulfide, and carbon dioxide, and have a deficiency of oxygen (Stephenson,1992).

Produced water may also contain low levels of naturally occurring radioactive materials, or NORM (Gray, 1993). In addition to naturally occurring impurities, chemical additives like coagulants, corrosion inhibitors, emulsion breakers, biocides, dispersants, paraffin control agents, and scale inhibitors are often added to alter the chemistry of produced water. Water produced from water flood projects may also contain acids, oxygen scavengers, surfactants, friction reducers, and scale dissolvers that were initially injected into the formation (Hudgins, 1992).

ii. ***Drilling wastes*** include formation cuttings and drilling fluids. Water based drilling fluids may contain viscosity control agents (e.g clays), density control agents, (e.g., barium sulfate, orbarite), deflocculants, (e.g., chrome-lignosulfonate or lignite), caustic (sodium hydroxide), corrosion inhibitors, biocides, lubricants, lost circulation materials, and formation compatibility agents. Oil based drilling fluids also contain a base hydrocarbon and chemicals to maintain its water-in-oil emulsion. The most commonly used base hydrocarbon is diesel, followed by less toxic mineral and synthetic oils. Drilling fluids typically contain heavy metals like barium,

chromium, cadmium, mercury, and lead. These metals can enter the system from materials added to the fluid or from naturally occurring minerals in the formations being drilled through. These metals, however, are not typically bio- available (Reis,1996).

iii. ***Associated wastes*** are those other than produced water and drilling wastes. Associated wastes include sludge and solids that collect in surface equipment and tank bottoms, pit wastes, water softener wastes, scrubber wastes, stimulation wastes from fracturing and acidizing, wastes from dehydration and sweetening of natural gas transportation wastes, and contaminated soil from accidental spills and releases.

Another waste stream associated with the petroleum industry is air emissions. These emissions arise primarily from the operation of internal combustion engines. These engines are used to power drilling rigs, pumps, compressors, and other oilfield equipment. Other emissions arise from the operations of boilers, steam generators, natural gas dehydrators, and separators. Fugitive emissions from leaking valves and fittings can also release unacceptable quantities of volatile pollutants.

iv. ***Oil spillage***: This is a global issue that has been occurring since the discovery of crude oil, which was part of the industrial revolution. The total spillage of petroleum into the oceans, seas and rivers through human activities is estimated to range 0.7-1.7 million tons per year. Oil spills have posed a major threat to the environment of the oil producing areas, which if not effectively checked can lead to the total destruction of ecosystems. The Niger Delta is among the ten most important wetland and marine ecosystems in the world. The oil industry located within this region has contributed immensely to the growth and development of the country which is a fact that cannot be disputed but unsustainable oil exploration activities has rendered the Niger Delta region one of the five most severely petroleum damaged ecosystems in the world. Studies have shown that the quantity of oil spilled over 50 years was at least 9-13 million barrels, which is equivalent to 50 Exxon Valdez spills (FME, et. al. 2006).

One common, but incorrect, perception of the petroleum exploration and production industry is that it is responsible for large-scale hydro- carbon contamination of the sea. The total amount of hydrocarbons that enter the sea is estimated to be 3.2 million metric tons per year. The primary source of hydrocarbon releases into the ocean is from transportation by tankers. Oil production from offshore platforms contributes less than 2% of the total amount of oil entering the sea.

Oil spillage occurrences are classified into three tiers and the spill dimensions associated with the individual tier classes are defined in the Table 2.1 below:

Table 2.1: Categories of Oil spills and the Expected Responses

Tier	**Amount**	**Response**
I	Below 1,000 litres	Individual Company/Ship in house Capacity
II	1,000 to 10,000 litres	First Tier Response plus other Industry and/or government capabilities
III	10,000 litres up	The total national resources, with the addition of foreign resources

(www.epa.com)

2.2.2 Causes of oil spillage

There are different sources of oil spillage, which are:

1. **Operational spills:** These are situations in which oil escape from facilities due to operational causes such as human error or equipment failure. In the case of operational spills the company negotiates compensation with the landowner. It may also help by providing clean water and food during the period of remediation depending on the regulations guiding the situation.

2. **Oil theft and pollution:** Criminal activities including sabotage, oil theft and illegal refining can also be a cause of oil spill. These activities are causing huge environmental damage

in the Niger Delta. From 2008 to 2012, these activities accounted for around 76% of the oil that escaped from oil company facilities (Bamidele, 2013).

2.2.3 Areas affected

Some habitats have a unique sensitivity to oil and gas production activities and require that special operating procedures be followed to minimize sensitivity to oil and gas production. To be considered are rain forest, arctic and offshore regions.

2.2.3.1 Rain forests

Rain forests provide one of the most biologically diverse environments for oil and gas operations. Because of this diversity, operations in rain forests should be conducted with caution. Drilling mud should be land filled in dry, lined pits. Formation water should be re- injected, if possible. Onsite treatment of water not re- injected should include aeration for oxygenation and cooling, skimming of surface oil, flocculation and settling to remove solids and dilution before being discharged into adjacent waterways (Ledec, 1990). Precautions should be taken to prevent oil spills. Proper spacing of valves and shutoff mechanisms can be used to minimize effects of pipeline leaks. Pipelines should be buried to reduce the risk of vehicles damaging pipelines along roads. Buried pipelines also require less clearing of the forest to maintain a right-of-way along the pipe. Oil storage tanks should have permanent, earthen levees of sufficient size to contain all of the fluids. Road construction methods should be used to minimize damage to surrounding trees. New camps in forested areas should use the minimum amount of land required for buildings, recreational purposes, and safety. All cleared areas should be rehabilitated when the use is over. Road construction and the subsequent colonization and conversion of the forest by natives to agricultural uses are a major source of deforestation. These activities can be minimized by reducing the length of roads developed. Rivers and lakes can be used to ship goods to reduce the length of roads needed. Guards along roads can also minimize any illegal travel and limit

colonization and logging. Activities of oilfield personnel should be managed. Sufficient food should be supplied at the site so personnel do not need to supplement their diet locally. Fishing and hunting should be prohibited. Firearms should be prohibited unless security needs demands it and access of workers to host communities should be restricted (Stilwell, 1991).

2.2.3.2 Arctic regions

Because of the harsh climate, the arctic coast tundra and wetlands are very sensitive and are slow to recover from disturbances. Limited sunlight, extreme cold, nutrient- poor soils, and permafrost result in low rates of plant growth and excessively prolonged periods of recovery. Because of these conditions, drilling and production activities must be conducted in such a way as to minimize any adverse impact. One difficulty with operations in the Beaufort Sea is that the shallow waters limit access between the shore and the open sea for transportation of supplies. This problem has been overcome by dredging ports and constructing gravel causeways (Robertson, 1991). Since causeways can alter the natural flow of water in the near shore region, bridges may need to be constructed to allow access for water flow.

2.2.3.3 Off shore

Perhaps the most obvious environmental impact from drilling and producing oil results from offshore releases of oil. Oil slicks can bed over large distances and affect many miles of sensitive shore- lines. Over time, natural processes will disperse and destroy an oil slick, but often not quickly enough to prevent damage to the shoreline. The best response to offshore releases of oil is to minimize the amount that reaches the shoreline. This can be accomplished by mechanically removing the oil from the water by providing a physical barrier between the oil and shoreline and by enhancing the naturally occurring processes that degrade the oil from the water (Ledec, 1990).

2.2.4 Managing Wastes

The most effective way to minimize environmental impact from drilling and production activities is to develop and implement an effective waste management plan. Waste management plans identify the materials and wastes at a particular site and list the best way to manage, treat, and dispose of those wastes (Stilwell, 1991). A waste management plan should also include an environmental audit to determine whether existing activities are in compliance with relevant regulations (Guckian et al., 1993). The effective management of each waste consists of a hierarchy of preferred steps. The first and usually most important step is to minimize the amount and/or toxicity of the waste that must be handled. This is done by maintaining careful control on chemical inventories, changing operations to minimize losses and leaks, modifying or replacing equipment to generate less waste, and changing the processes used to reduce or eliminate the generation of toxic wastes. The next step in effective waste management is to reuse or recycle wastes. If wastes contain valuable components, those components can be segregated or separated from the remainder of the waste stream and recovered for use. Wastes that cannot be reused or recycled must then be treated and disposed of. A written waste management plan that completely describes the acceptable options for handling every waste generated at every site must be developed and effectively communicated to every employee involved with the wastes. Examples of how the waste management hierarchy can be implemented are given by Thurber (1992), Derkies and Souders (1993), and Savage (1993).

In most cases, the cost of eliminating all risks and hazards associated with wastes is economically prohibitive. Prudent management practices focus available resources on the activities that pose the greatest risk to both the economic health of the company and the environment. The risks associated with various waste management practices can be quantified and ranked through risk assessment studies (Sullivan, 1991). When properly managed, the risks and hazards of drilling and production operations can be reduced to lower levels.

But in the case of eventual occurrence of oil spillage, for instance, some waste cleanup processes that can be employed are as follows:

i. **Containment and Removal:** When an oil spill occurs on water, it is critical to contain the spill as quickly as possible in order to minimize danger and potential damage to persons, property, and natural resources. Containment equipment is used to restrict the spread of oil and to allow for its recovery, removal, or dispersal. The most common type of equipment used to control the spread of oil is floating barriers, called booms. Once an oil spill has been contained, efforts to remove the oil from the water can begin. Three different types of equipment—booms, skimmers, and sorbents—are commonly used to recover oil from the surface (EPA, 1999).

ii. **Application of Dispersants:** Dispersants have been found to be effective in accelerating the dissipation of oil slicks and reducing the long- term impact of released oil (Reis, 1996). Natural removal processes are accelerated if an oil slick is broken into a large number of smaller droplets. Wind and wave action naturally break up a slick into droplets, but the resulting droplets can easily coalesce back into larger patches of oil. This coalescence can be inhibited by adding chemical dispersants. Most dispersants are surfactants that lower the interfacial tension between the oil and water. Using dispersants has some important advantages for environmental protection. Oil dispersed into the water column is swept away by the currents and is not easily blown to shore by winds. Dispersants also inhibit the formation of mousse, making the removal of non dispersed oil easier. Dispersants also reduce the tendency of oil to stick to solid surfaces (including suspended particulates, fish eggs, and shoreline rocks), making any subsequent shoreline cleanup easier. Dispersant have also been shown to significantly lower the uptake of oil by suspended sediments (American Petroleum Institute, 1985).

iii. **Remediation:** This is a longer term process aimed at returning the site to its previous state. There are several ways to achieve international standards of restoration depending on whether the spill is on Land or Swamp terrain. Three methods of Remediation are in use on Land - Remediation by Enhanced Natural Attenuation (RENA), Remediation by Stabilization / Solidification and Low Temperature Thermal Desorption. The RENA technique is the predominant method in use and may be applied in-situ (treating the soil on site) or ex-situ (removing the soil to be cleaned elsewhere and returned site). Remediation in swampy terrain depends on the nature of swamp, whether seasonal or perennial. A seasonal swamp is dry during the dry season and holds water during rainy season. Remediation of the impacted soil can be undertaken using RENA method in the dry season. In perennial swamps, free phase oil on water and vegetation is cleaned by flushing and skimming whilst oily sludge is remediated by systematic agitation using swamp buggies coupled with application of suitable nutrient amendment to promote biodegradation and other natural attenuation processes (www.shell.com.ng).

iv. **Bioremediation:** This is a process in which microbes are introduced into the affected area in which enzymes are released by the microbe to break the contaminant down into digestible pieces. The contaminant is consumed as food by the cell and harmless biological wastes are all that remain of the contaminant. Fig. 2.1 below shows the operation of microbes in a contaminated soil.

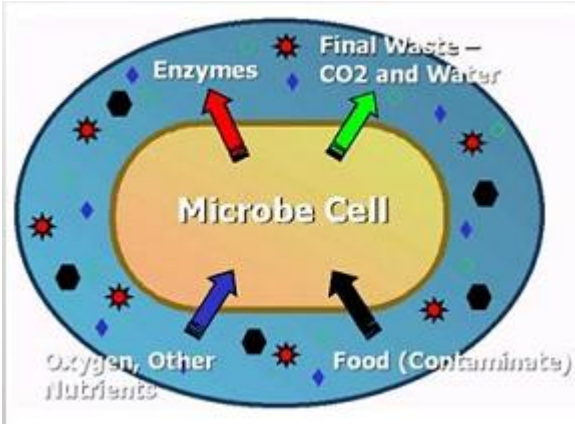


Figure 2.1: Diagram showing the operations of microbes in oil polluted soil

(www.integraenvironmental.com)

2.2.5 Environmental Regulatory Agencies in Nigeria

One of the most significant changes that occurred in the operations of the upstream petroleum industry during the 1980s was the need to minimize environmental impact. This change has been driven by an increase in the number of regulations governing drilling and production activities. Most of these regulations impose economic fines and possibly criminal penalties for violations. These regulations have significantly increased the cost of industry operations (Reis, 1996). Environmental regulatory bodies obtainable in Nigeria are:

1. National Oil Spill Detection and Response Agency (NOSDRA)

The Federal Government established the National Oil Spill Detection and Response Agency (NOSDRA) as an institutional framework to implement the National Oil Spill Contingency Plan. The exploration and production, as well as storage and transportation of oil in the Niger Delta area of Nigeria which is presently the hub of oil exploration and production in the country, have negative impacts on the fragile ecosystem of the area, notwithstanding its revenue generation.

Hence, the Obasanjo Administration, in a bid to check this adverse impact of oil and other human and natural activities on the environment, upgraded the defunct Federal Environmental Protection Agency (FEPA) to Federal Ministry of Environment in 1999. The Ministry swung into action immediately by inaugurating a National Action Coordinating Committee of the Forum for Cleaning the Niger Delta. Membership of the Committee comprised all relevant Government Ministries, Agencies, Oil companies, the Academia, and Non-Governmental Organisations (NGOs).The Committee had four (4) sub-committees namely: State of the Environment, Community and Public Affairs, Oil and Gas Waste Management and Oil Spill Response.

The sub-committee on Oil Spill Response considered and finally reviewed in year 2000 the National Oil Spill Contingency Plan (NOSCP) which was drafted in 1981 and first reviewed in 1997. The National Oil Spill Contingency Plan itself is mandatory for all parties to the International Convention on Oil Pollution Preparedness and Response Co-operation (OPRC 90) to which Nigeria is a signatory. The National Oil Spill Contingency Plan is a blueprint/manual for checking oil spill through, containment, recovery, and remediation/restoration. It is a proactive strategy for preventing loss of lives, assets and natural resources (nosdra.gov.ng, 2012).

Mission of the agency

"To create, nurture and sustain a zero tolerance for oil spill incident in the Nigerian Environment"

Vision of the agency

"To restore and preserve our environment by ensuring best Oil field, storage and transmission practices in exploration, production and use of oil in the quest to achieve sustainable development in Nigeria" (nosdra.gov.ng, 2012).

2. Department of Petroleum Resources (DPR)

DPR was created to perform the statutory supervision and control duties in the oil industry in Nigeria, its activities include:

i. Supervising all petroleum industry operations being carried out under licences and leases in the country, in order to ensure compliance with the applicable laws and regulations in line with good oil producing practices.

ii. Enforcing safety and environmental regulations and ensuring that those operations conform to national and international industry practices and standards.

iii. Keeping and updating records on petroleum industry operations, particularly on matters relating to petroleum reserves, production and exports of crude oil, gas and condensate, licenses and leases as well as rendering regular reports on them to Government.

iv. Advising Government and relevant agencies on technical matters and policies which may have impact on the administration and control of petroleum.

v. Processing all applications for licenses so as to ensure compliance with laid-down guidelines before making recommendations to the Honourable Minister of Petroleum Resources.

vi. Ensuring timely and adequate payments of all rents and royalties as at when due. Monitoring Government Indigenisation policy to ensure that local content philosophy is achievable (Department of Petroleum Resources, 1999).

2.2.6 Environmental Regulations

Nigeria has a substantial body of environmental law. Its basis lies in section 20 of the 1999 Constitution of the Federal Republic. This contains provisions for the protection of the water supply, air, forest and wildlife at a fundamental level. This is supported by the Federal Environmental Protection Agency Act of 1988 (FEPA), which provides environmental protection in relation to effluent, pollution abatement, and the management of solid and hazardous wastes. This in turn is backed up by the Environmental Impact Assessment Act of 1992, which requires

that an environmental impact assessment for all major industries, requiring approval of the environment ministry.

Lastly, the oil industry in Nigeria has Environmental Guidelines and Standards for the Petroleum Industry in Nigeria (EGASPIN) which was produced by the Department of Petroleum Resources (DPR). It was revised in 2002 from the original 1991 version and designed to minimise oil pollution. It also sets out the approach to be adopted regarding contamination of the soil and groundwater, with the person responsible for the contamination required to restore the soil and groundwater to appropriate safety levels under threat of fines, potential imprisonment and loss of a license (Cragg et al, 2013).

They set out the powers of the DPR, which include seizure of premises, impose fines and shutdown of installations. They also require monthly inspection of pipelines and clean-up of all spills within 24 hours with the complete containment and removal of spilt oil. They require companies to continue to monitor spill sites after clean-up. For all waters the demand is that there is to be no visible sheen after the first 30 days and in swamp areas no sign of oil after 60 days. EGASPIN also intriguingly suggests that there is a fund to compensate operators for any clean-up costs incurred, if the spill is not their responsibility. Standards relating to spillage and clean-up are very precise and established and are probably as good as any guidelines anyway. The problem is that they are not enforced (Cragg et al, 2013).

The UNEP Report on Environmental Assessment of Ogoniland, showed many areas contaminated way beyond the 50 mg/kg of total petroleum hydrocarbon EGASPIN target range and sometimes well above the 5,000 mg/kg EGASPIN intervention level. A third of all areas studied were seriously impaired. The oil companies themselves admit that either they cannot start clean-up operations within 24 hours and regard themselves as lucky to get clean-up started within several days. Furthermore, it is not clear whether EGASPIN is legal enforceable, in spite of the powers it apparently gives the DPR. It is not clear whether EGASPIN falls under the Petroleum Act of 1969

in which case it would be enforceable. If not, then it would appear that they are merely guidelines (Cragg et al, 2013).

CHAPTER THREE

MATERIALS AND METHODS

3.1 Materials

The study relied on secondary data obtained from the Nigerian National Petroleum Company Annual Statistical report for 2013, Amnesty International 2012 Report on Bodo Oil spill, Shell Nigeria Monthly/ Annual statistical Reports for 2013, United Nations Environmental Protection Programme Report in Paris (1995), Published materials, Books, and the internet. Secondary data review and analysis involves collecting information, statistics, and other relevant data at various levels of aggregation in order to conduct a situational analysis of an area of study.

3.2 Method of Data Collection

The statistical information used was extracted from:

- Official Statistics: Official statistics are statistics collected by governments and their various agencies, bureaus, and departments. These official statistics were obtained from: Nigerian National Petroleum Company Annual Statistical report for 2013 and Shell Nigeria Monthly/ Annual statistical Reports for 2013, UNEP report for 1995 (Nigeria).

- Non- Governmental Organization like Amnesty International Report on Bodo Oil spill.

- Review Articles from Published materials- Society of Petroleum Engineers Journals and the internet- oil company (Shell, Addax, Chevron) websites, online newspapers- The Guardian Newspaper (July, 1995) and Premium Times (June, 2012)- articles on oil and gas issues.

Most of the data items collected were added up to obtain national aggregates such as total number of oil spills and aggregate quantity of oil spilled. This research adopted comparative study method in analysing the materials obtained through reviewing, interpreting, and cross-analysis of these pieces of information to allow for better understanding of the specific situation in regards to the cause of oil spillage, its impact and control measures being administered. Cross-analysing the data obtained also helped to understand the cause oil spills in Nigeria and why it has been a challenge to the oil and gas industry in Nigeria.

The data collected are as follows:

- Current practices of the oil company in addressing oil spillage and other environmental issues.
- Environmental issues encountered during operations which reflects the waste management plan, waste treatment/ disposal methods and cleanup methods of the oil companies in Nigeria.
- Statistical Reports from NNPC 2013 Annual Report on Oil Spill Data, Amnesty International Report on Bodo Oil spill in Ogoniland, Shell Nigeria 2013 Monthly/ Annual Oil spill Data.

Logical deductions and sequential presentation of facts which were thus made gave a clear picture of the approach of oil companies to oil spill and its control and the response and action of the regulatory bodies in Nigeria.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Current Practices of Shell Nigeria on Environmental Issues

The approach of shell to addressing environmental issues in Nigeria is as follows: Shell has a desire to meet the world's growing energy needs and believes the best way to secure a more sustainable energy future is to take action today by focusing their efforts on:

• producing more natural gas;

• developing lotheyr-carbon bio fuels;

• helping to advance carbon capture and storage (CCS) technologies;

• working to improve energy efficiency in our operations.

They are also sharpening their focus on ways to limit the environmental impact of their operations by responding effectively to climate change. Shell believes that the need to tackle climate change remains urgent and that the best way to secure a more sustainable energy future is to take action today through the following means of managing environmental impacts:

i. Biodiversity protection

Protecting biodiversity is an important factor when they consider any new major project or large expansion to existing operations. They work in partnership with leading conservation groups, including Wetlands International and the International Union for Conservation of Nature (IUCN). If an area is rich in biodiversity they engage with local communities and experts and develop biodiversity action plans. They also consider the possible impact on benefits that ecosystems provide such as purifying water and air and

sustaining food supplies to communities. The research they support includes, for example, helping to identify endangered species (IUCN/CEESP, 2006).

ii. Preventing spills

Spills of oil and oil products can harm the environment and put their employees and neighbouring communities at risk. Over the years they have reduced the amount spilled at their operations for reasons they can control, like corrosion or operational failures.

To help prevent spills from oil tankers, our ship quality assurance standard sets out requirements for the ships they use. For example, they require larger ocean vessels to have double hulls.

iii. Ensuring Cleaner air

They have made efforts to reduce the emissions of local pollutants from their operations. This has involved a wide range of investments to upgrade facilities, install cleaner-burning equipment and sulphur dioxide capture technology.

iv. Reducing water use

They are finding innovative ways to make the most of the water needed in their operations. They design and operate their facilities – using advanced technology and new approaches – to help manage their water use.

They are also active in global initiatives guiding sustainable water management in the private sector. For example, Shell is leading a project with the World Business Council for Sustainable Development to develop insights into the linkages between water and energy systems to help prepare for future challenges (www.shell.com.ng).

4.2 Oil Spill issues encountered during operations

The Shell Petroleum Development Company (SPDC) since 1989 has recorded an average of 221 spills per year in its operational area involving 7,350 barrels annually (SPDC Nigeria Brief, May 1995:3). From 1976-1996 a total of 4647 oil spill incidences spilling approximately 2,369,470

barrels of oil into the environment of which 1,820,410.5 (77%) were not recovered. Most of these oil spill incidences in the Niger Delta occur on land, swamp and the offshore environment (Nwilo and Badejo, 2005). The UNDP 2006:181 also reported that between the period of 1976-2001, 3 million barrels of oil were lost in 6,817 oil spill incidences of which over 70% of the spilt oil was not recovered. In 2001 the western operations of the Shell Petroleum Development Company (SPDC) recorded a total of 115 incidences of oil spills in which 5,187.14 barrels of oil were spilled and 734,053 barrels of the spilt oil representing 14.2% were recovered (SPDC, 1995). In January 1998, 40,000 barrels of crude oil was spilled by Mobil in Eket (details of this can be found in Appendix 1) but the largest spill in Nigeria was the offshore well blowout in January 1980 with a spill of approximately 200,000 barrels of oil into the Atlantic Ocean from an oil facility which damaged 340 hectares of mangrove forest (Nwilo and Badejo, 2005)

4.3 Shell Report showing monthly oil spill incidences in Nigeria

Statistics of oil spill incidents as provided by Shell Nigeria are as follows:

Table 4.1 below shows the volume of oil spills in barrels per month in the year 2013.

Table 4.1: Volume of oil spills (bbls)/ Month (SPDC, 2013)

Month	Sabotage	Operations	Others	Total
Jan	350	50	0	400
Feb	200	0	0	200
Mar	1,700	50	0	1,750
Apr	970	30	0	1,000
May	450	0	0	450
Jun	4,950	0	0	4,950
Jul	1,800	0	0	1,800
Aug	500	200	400	1,100
Sep	2,370	30	0	2,400
Oct	500	2,200	0	2,700
Nov	1,700	200	0	1,900
Dec	750	50	0	800

Figure 4.1 below shows the volume of oil spills per month in barrels for the year 2013.

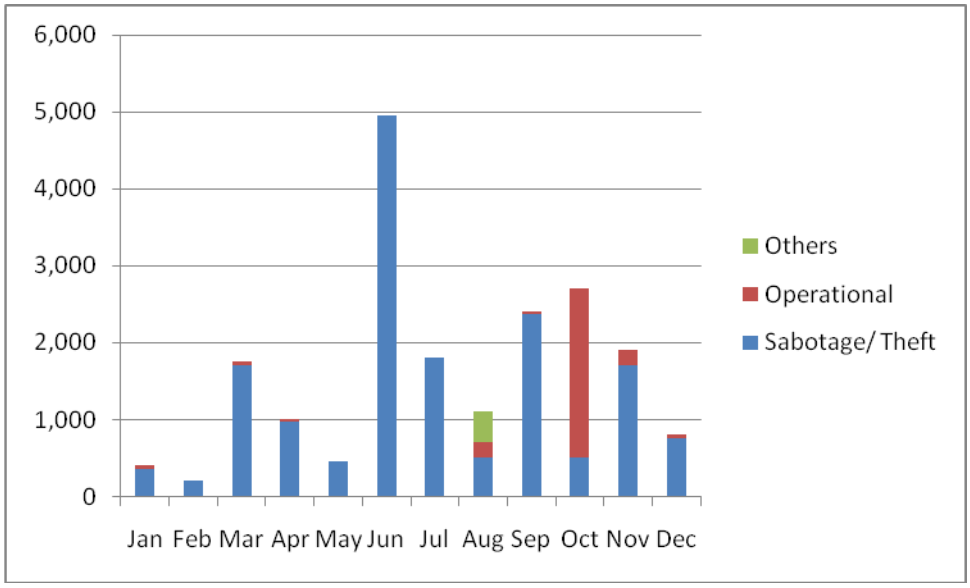


Fig. 4.1: Chart showing the Volume of Oil Spills (bbls)/ Month (SPDC, 2013)

This shows that the company recorded the lowest volume of oil spilled in February, 2013 and the highest in June. As seen in the figure above, it can be deciphered that oil spills occur more as a result of sabotage/ theft than it is during operations. Though in October, 2200 barrels were spilled due to operational activities while only 500 barrels was as a result of sabotage/ theft.

Table 4.2 below shows the volume of oil spills per year between 2007 and 2013.

Table 4.2: Number of incidences/ Year (SPDC 2013)

Year	Operational	Sabotage	Others	Total
2007	230	90	0	320
2008	155	60	0	215
2009	140	50	0	190
2010	135	30	0	165
2011	130	95	0	225
2012	150	40	0	190
2013	165	35	0	200

Figure 4.2 below shows the number oil spills per year between 2007 and 2013.

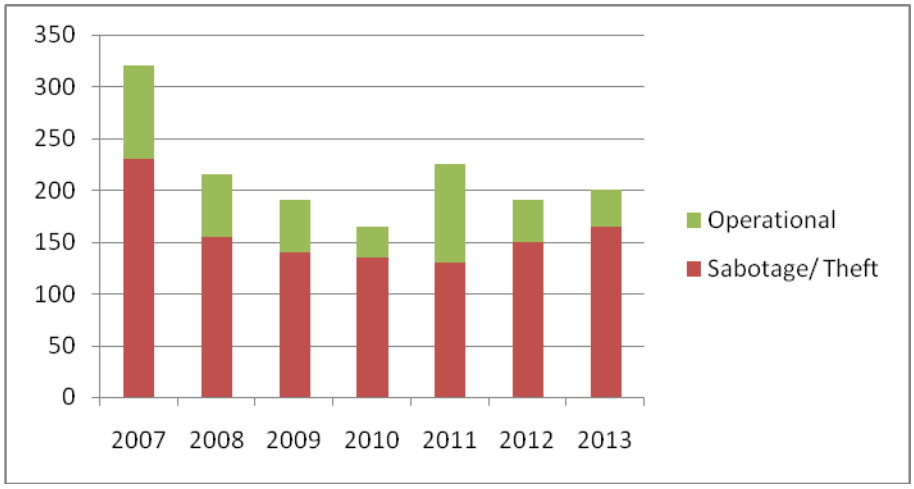


Fig. 4.2: Chart showing the Number of incidents of Oil spills per Year (SPDC, 2013)

Figure 4.2 shows the number of oil spills per year between 2007 and 2013. Number of incidences of oil spill reduced within this period from 320 in 2007 to 200 in 2013.

Table 4.3 below shows the volume of oil spills in barrels between 2007 and 2013

Table 4.3: Volume of oil spills (bbls)/ Year (SPDC, 2013)

Year	Sabotage	Operations	Others	Total
2007	20,000	12,000	0	32,000
2008	48,000	52,000	0	100,000
2009	102,000	2,000	0	104,000
2010	22,000	5,000	0	27,000
2011	12,000	4,000	0	16,000
2012	24,000	2,000	0	26,000
2013	16,000	4,000	0	20,000

Figure 4.3 below shows the volume of oil spills in barrels per year between 2007 and 2013

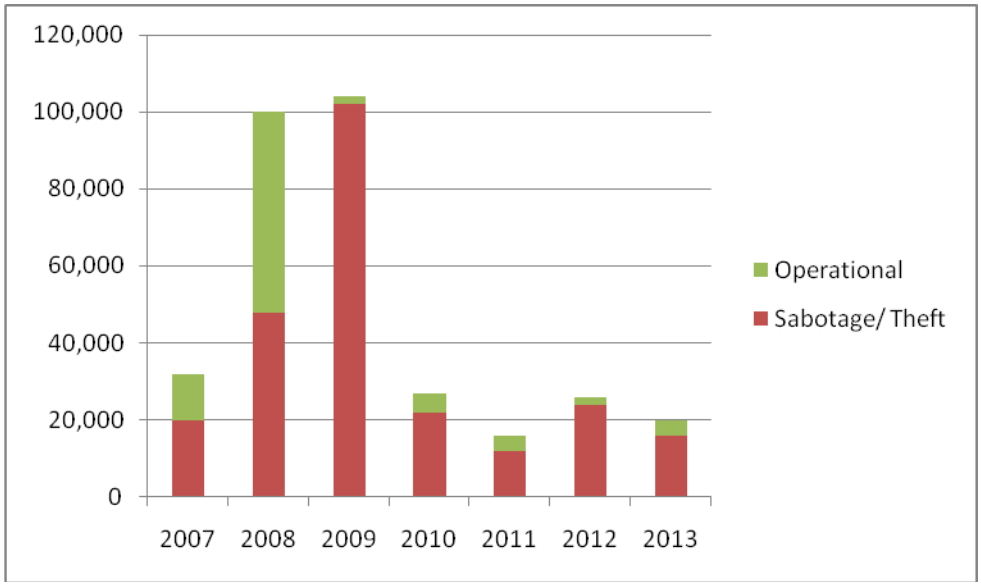


Figure 4.3: Chart showing Volume of oil spills (bbls)/ Year (SPDC, 2013)

Figure 4.3 shows the volume of oil spill per year between 2007 and 2013. This shows that in the period under consideration, the quantity of oil spilled was highest in 2009 and lowest in 2011. However, it was observed that since 2010 the volume of oil spill has dropped significantly from 102, 000 barrels of 2009 to 20,000 barrels in 2013.

4.4 NNPC Reports on Oil Spills in Nigeria

According to NNPC reports, we have the statistics somewhat in line with that of SPDC, which further proves that oil spill, is more as a result of vandalisation rather than pipeline/ operational failure. The report further shows that the amount of money lost to such occurrences is overwhelming as shown in the tables below.

Table 4.1 below shows the number of occurrences of oil spillage, the cause of occurrences and the area of occurrence between 2003 and 2012 as reported by NNPC.

Table 4.4: Number of occurences, Causes and Area of occurence

Year	2003		2004		2005		2006		2007		2008		2009		2010		2011		2012	
Area	Vandalisation	Rupture	Vandalisation	Rupture	Vandalisation	Rupture	Vandalisation	Ruptre	Vandalisation	Ruptre	Vandalisation	Ruptre	Vandalisation	Ruptre	Vandalisation	Ruptre	Vandalisation	Ruptre	Vandalisation	Ruptre
P/HARCOURT(Sys. 2E,2EX)	608	16	396	33	1017	0	2,091	0	1,631	0	567	0	382	0	142	0	336	0	393	0
WARRI (Sys. 2A,2C,2CX)	90	14	241	25	769	0	662	0	306	0	745	0	280	0	161	0	548	0	495	0
MOSIMI (Sys. 2B)	70	8	147	5	194	15.00	480	6	459	20	516	14	605	4	184	7	463	5	479	2.0
KADUNA (Sys. 2D)	11	9	110	12	237	6	176	0	126	0	110	19	100	23	240	15	571	14	622	24
GOMBE (Sys. 2D)	0	1	1	1	20	0	265	3	702	0	357	0	86	0	109	2	850	0	241	0
TOTAL	779	48	895	76	2,237	21	3,674	9	3,224	20	2,285	33	1,453	27	836	24	2,768	19	2,230	26

Table 4.1 shows the comparative statistics of vandalisation versus rupture cases leading to oil spill and it will be seen that between 2003 and 2012 a total of 20,684 cases were recorded. The highest number being 2011 with 2,787 cases recorded and the lowest being 2000 with 827 cases.

Table 4.2 below shows the area of occurrence of oil spills and compares the amount of product loss versus the value loss as reported by NNPC.

Table 4.5: Area of occurrence, Product Loss and Value Loss

Year	2003		2004		2005		2006		2007		2008		2009		2010		2011		2012	
Area	Prod. Loss ('000ml)	Value Loss (Nm)	Prod. Loss ('000ml)	Value Loss (Nm)	Prod. Loss ('000ml)	Value Loss (Nm)	Prod. Loss ('000ml)	Value Loss (Nm)	Prod. Loss ('000ml)	Value Loss (Nm)	Prod. Loss ('000ml)	Value Loss (Nm)	Prod. Loss ('000ml)	Value Loss (Nm)	Prod. Loss ('000ml)	Value Loss (Nm)	Prod. Loss ('000ml)	Value Loss (Nm)	Prod. Loss ('000ml)	Value Loss (Nm)
PORTHARCOURT	225.8	8,121	150	7,765.0	337	20,591	336	21,885	95.6	6,333.0	151	12,289	0	0.00	0	0.00	0	0.00	539	684.00
WARRI	27.98	1002	73.1	3,148.0	145	9,854.0	18	1,052.0	0	0.00	22.3	1,589.	0	0.00	45.9	2,671.	14.3	1,434	Nil	nil
MOSIMI	109.0	3660	156	8,011.0	148	9,251.0	183	13,709	141	10,634	12.9	681	110	8,195	144	3,796	127.	9,903.0	163	18,958.
KADUNA	0.2	7	3.16	183	18.5	990	0	Nil	5.1	273	5.13	35	0	0	3.99	380	16.0	1,189.0	13.0	1,842.0
GOMBE	0.14	0.003	13.2	573	16.7	929	0	Nil	0	0	Nil	0	0	0	0	0	0	0	0	0
TOTAL	363.1	12,99	396	19,880	681	41,815	535	36,646.	242	17,240.	191	14,594	110	8,195	194	6,848	157	12,526	182	21,484

Table 4.2 gives details on the amount of product loss and value loss between 2003 and 2013, which reveals that a sum of ₦191billion was lost and a total of 3.038 billion litres of crude oil was lost to oil spill occurrences between 2003 and 2012.

4.5 Amnesty International Report on Oil Spills in Nigeria

Amnesty International is a global movement of more than 3 million supporters, members and activists in over 150 countries and territories who campaign to end grave abuses of human rights. Their vision is for every person to enjoy all the rights enshrined in the Universal Declaration of Human Rights and other international human rights standards. They are independent of any government, political ideology, economic interest or religion, and are funded mainly by members and public donations.

According to Shell, the 2008 spill from a faulty weld on a pipeline resulted in 1,640 barrels of oil being spilled into the creeks near the town of Bodo in Ogoniland. The figure was based on an assessment agreed at the time by the company, the government oil spill agency, the Nigerian oil regulator and a representative of the community.

"All oil spill incidents are investigated jointly by communities, regulators, operators and security agencies," said a Shell spokeswoman in London. "The team visits the site of the incident, determines the cause and volume of spilled oil and impact on the environment, and signs off the findings in a report. This is an independent process – communities and regulators are all involved. This is the process that was employed with the two spills in question, and we stand by the findings [of 1,640 barrels]." Shell has argued the community prevented the company being allowed near the pipeline to repair it.

The amount of oil spilled by Shell at Bodo was key to a high court case heard in London in 2012. Shell was sued by nearly 11,000 Bodo inhabitants, who said their lives were devastated by the spill which destroyed their fishing grounds, caused long-lasting ill health and polluted fresh water sources. The community, represented by the London law firm Leigh Day, is thought to be seeking more than $150m (£93m) to clean up the creeks, which, even four years after the spill, remain coated in oil.

Oil spill compensation in Nigeria is based largely on the amount of oil spilt. But negotiations over the Bodo spill broke down earlier in 2012 in London when the gap between what Shell was offering and what the community wanted could not be bridged. Neither party can agree on when the 40-year-old pipeline started to leak.

Amnesty International member, Gaughran once said, "More than three years after the Bodo oil spill, Shell has yet to conduct a proper cleanup or to pay any official compensation to the affected communities. After years of trying to seek justice in Nigeria, the people of Bodo have now taken their claim to the UK courts."

"The evidence of Shell's bad practice in the Niger delta is mounting," said Patrick Naagbanton, co-ordinator of the local oil watch group Centre for Environment, Human Rights and Development (CEHRD). "Shell seems more interested in conducting a post remediation operation than a cleanup operation. The problem is not going away; and sadly neither is the misery for the people of Bodo." Amnesty and CEHRD have repeatedly called for an independent process to investigate oil spills in Nigeria, and an end to the system that allows oil companies to have such influence over the process (Amnesty International, 2012).

4.6 Data Analysis

Comparatively, all the reports agree that oil spill is caused majorly by vandalisation (sabotage/theft) yet the frequency of oil spills during operations is equally not negligible. The volume of oil spills per year reveals that the amount of wastes being transmitted to our environment is devastating and it is no wonder the Niger Delta region has been so adversely affected. It will also not be a puzzle that is hard to solve to understand why more of the oil spills has been as a result of vandalisation seeing that the people of the Niger Delta region have been deprived the use of their lands that has now been contaminated.

Oil spillage has caused loss of lives, and adversely affected human health and the environment. Amnesty International report which proves that remediation has not yet been properly done in most of these areas further confirms the adverse effect of oil spill on the economy of Niger Deltans and Nigeria at large. These adverse effects have led to the clamor for strict environmental regulation of oil and gas operations, in order to control, reduce or prevent pollutions arising from exploration and exploitation activities which will lead to close monitoring and evaluation of the activities of the oil companies involved particularly, in the upstream sector.

Also looking at the amount of money lost, Nigeria being an oil dependent nation will not be able to significantly improve her economy except something drastic is done because the regulations governing the oil and gas industry in Nigeria have not been effective due to the negligence of government in addressing these issues appropriately.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATION

5.1 Conclusion

Oil spill is caused by vandalisation and operational activities. Obviously, the production of oil and gas generate waste gases and necessitates that there should be control in a manner that protects the environment. But a major problem with oil and gas exploration activities in Nigeria is the inability of governments (federal and state) and their regulatory agencies to control and prevent environmental pollution and other associated problems. This inability is caused by the overlap of responsibilities of regulatory bodies and the nonchalant attitude of government to environmental matters. The insufficiency of our regulatory laws and the high level of corruption in the system are also responsible for the current state of our environment in relation to the oil and gas industry.

Also, the sum of approximately ₦192 billion was lost through oil spills and Okonjo-Iweala (2014) said in her presentation of the 2014 budget, that the budget envisages net federally collectible revenue of N7.50 trillion. This therefore means that if the value loss from oil spill can be minimized, our country will be able to fund the nation's budget with other income revenues without hitch. Our debts will be serviced effectively and there will be no pressing need to borrow from International Monetary Fund (IMF) anymore.

This research has also shown that the working environmental control measures applied by oil and gas companies in Nigeria are not adequate enough to protect our environment and minimize the impact of oil pollution. Shell Nigeria has a record of oil spill amounting to about 3.038 billion barrels over a period of ten years (2003 to 2012) from their pipelines alone either as a result of vandalisation or operational activities. Obviously that is disheartening and much more than this is

the fact that remediation has not been effectively carried out to the fullest in the Niger Delta region which has rendered many homeless and jobless leading to increase in criminality in the society. Shell's waste management plan is good on paper as it is with other oil companies in Nigeria (as can be seen in Appendix II), but not effectively carried out in reality.

5.2 Recommendation

- The Petroleum Industry Bill should be passed into law as soon as possible because it creates an opportunity to break up the existing ineffective structure and greatly increase environmental protection, particularly in relation to oil spills. It also offers the prospect of a new regulator and independent inspectorate.
- The main regulatory framework regarding environmental pollution in the Nigerian system, EGASPIN (Environmental Guidelines and Standards For Petroleum Industry in Nigeria), lies within the jurisdiction of the Department of the Petroleum Resources (DPR). These standards are good but need revision to meet up with world standards. This department must be empowered with the capacity to enforce the laws, either with NOSDRA, or independently.
- The Nigerian Security and Civil Defense Corps (NSCDC) or another security outfit should be strongly mandated to position officers round the clock at different locations where we have major pipelines to monitor activities in such areas. This will minimize the occurrence of vandalization of the pipelines which has accounted for more of the oil spill incidences in the country.
- A system should be developed to combat corruption in the oil and gas industry by setting up for instance, a court of arbitration to handle cases of violation of the country's environmental regulations which will create an independent process of investigating oil spills in Nigeria.

- The government should also mandate the regulatory agencies to run educative programmes for the citizens in the oil regions about oil spills and environmental issues in general, the need to avoid vandalisation for the ultimate progress of our economy and other skill acquisition/ entrepreneurship programmes to empower the people with ideas for financial freedom. This will open an avenue to cater for the economic and psychological need of the people.

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APPENDIX I

Report of Oil Spill by Mobil in Eket

The situation in Eket is a sad example of unbridled corporate impunity that must be overturned in the Nigerian oil and gas sector. It further makes a strong case for the need to urgently reform the Nigerian oil regime, tightening and strengthening laws that protect the environment and expand community access to justice. Without any prior assessment of the extent of damage, and without holding any meaningful consultation with affected persons and communities, Mobil unilaterally announced an offer of N26.5 Billion Naira. How Mobil arrived at that compensation sum is still a mystery to industry watchers and communities alike. Tossing figures like carrots at polluted communities is consistent with the entrenched culture of impunity which has seen oil companies view paying compensation for oil spills as acts of charity or benevolence to communities they have wronged. In the same way, it is this often unchallenged impunity that makes them treat community demands for justice and accountability with distasteful condescension, and consider them as “disturbance” to oil flow and production.

APPENDIX II

ADDAX PETROLEUM ENVIRONMENTAL PROTECTION PRACTICES

Addax Petroleum prioritize on creating a safe and healthy work place for employees, contractors and the public and practising responsible stewardship of the environment in its activities. They continuously work to improve their HSSE performance through:

1. **Leadership and Commitment:**

   Our management conducts regular safety tours of facilities, and sponsors and promotes health and safety programmes. Addax Petroleum also sponsors periodic third party audits of its HSSE performance and implements recommendations arising from the audits.

2. **Training and Safe Operations**

   Employees and contractor staff are trained on Addax Petroleum's HSSE policy, standards and procedures. Compliance with our HSSE policy, work procedures, relevant regulations and industry standards is a condition of employment. Risk Assessments of activities are conducted regularly and control measures instituted to eliminate or mitigate HSSE impact.

3. **Incident Reporting and Investigation**

   To encourage employees to report unsafe conditions and practices, Addax Petroleum has adopted a "No Blame" approach to responding to accidents and near misses. Incidents are documented and investigated. Recommendations are made to help prevent a reoccurrence and lessons learned shared throughout the Company. The "No Blame" approach has ensured that there is a two-way communication between employees and management on health and safety issues.

4. **Environment**

   Environmental protection and conservation are a fundamental part of Addax Petroleum's

operations. They ensure that all new projects comply with the relevant standards and regulations. They also upgrade our existing facilities in compliance with the standards.

Addax Petroleum's waste management policy promotes minimisation and recycling.

Addax Petroleum collaborates with local groups to promote environmental awareness and continuously re-evaluate its performance to ensure compliance

CHEVRON ENVIRONMENTAL PROTECTION PRACTICES

Chevron believes that one of the best ways to protect the environment is to conserve energy and use it efficiently. Wise energy use reduces greenhouse gas emissions, eliminates waste, and stretches available crude oil and natural gas supplies. Improving energy efficiency is part of Chevron's long-term business strategy. Their new office complex in Covington, Louisiana, is a good example. Completed in 2008, it is certified as "gold" by the Leadership in Energy and Environmental Design, a program of the U.S. Green Building Council. Our subsidiary Chevron Energy Solutions also is helping external and internal clients use energy efficiency and renewable energy technologies to optimize the performance of their facilities.