



CONCESSIONARY INSTRUMENTS IN THE OIL AND GAS INDUSTRY, OIL SPILLAGE AND ENVIRONMENTAL REMEDIATION: THE MISSING LINKS

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Abstract

This paper examined the concessionary instruments in the oil and gas industry, oil spillage and environmental remediation with the view of tracing the missing link in-between. Over the years, there is the problem of remediation and clean-up of the part of the environment polluted by incidents of oil spillage. Associated to this problem is also the problem of fair, adequate and timeous compensation of victims of oil spillages. The paper observed that there is a missing link and lacuna in the Petroleum Industry Act as it relates to issues of management of oil spillage, environmental remediation and compensation of victims of oil spillages, hence, the paper suggest for a policy action to ameliorate these issues in the interim and a legislation to regulate these issues at the long run.

Keywords: *Oil Petroleum Prospecting and Exploration Licenses, Mining Lease, oil spillage, Environmental Remediation, Missing Link.*

1.0 Introduction

Nigeria is richly endowed with large deposits of mineral resources including crude oil and other world-renowned natural resources. All over the world, petroleum resources and its ownership have posed uphill and complex issues in terms of its ownership, control and enjoyment of the overwhelming proceeds and other economic benefits emanating from its exploration, sales and usages. However, over time, some theories of ownership of petroleum evolved including Absolute Ownership Theory, Non-Ownership Theory, Qualified Ownership Theory, State Ownership Theory, Islamic Ownership Theory, etc.² Cases have also been made for 'Joint Ownership Theory', which advocates for the hybrid of state and land owners ownership of oil and gas.³ Hitherto, in the Nigerian context which is different from what obtains in some states in the United States of America and other oil-producing nations of the World, ownership of petroleum and other mineral resources is vested on the Government of the Federation of Nigeria.⁴ To that extent, granting of licenses and leases for exploration, prospecting and mining of petroleum and its resources is the prerogative of the Federal Government of Nigeria.

Ancillary to the grant of licenses and leases is the authority vested in the licensees and lessees to proceed in line with the stipulation of their licenses and leases for oil extraction, exploration and exploitation. Unfortunately, one of the expected and naturally associated problems with oil exploration and mining is the incident of Oil spillage which results in enormous environmental degradation, pollution and distortion. Sadly, at the time of concession or contractual engagement between the government of the

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² Yemi Oke, *Nigerian Energy Resources Law and Practice: Oil and Gas Law (Practice, Cases and Theories)* (Princeton and Associate Publishing Co. Limited 2019) 47-53.

³ Kato Gogo Kingston, Nweke Prince Nweke and Sandra Didia-Nweke, 'The Effect of Correlative Rights on Oil and Gas Production in Ogoni Lands', (2019) (6) (1) *Journal of Public Law Rivers State University Journal of Public Law* 1.

⁴ Constitution of the Federal Republic of Nigeria 1999 (as amended) s. 44 (6); Petroleum Industries Act 2021, s. 1 and Nigerian Minerals and Mining Act 2007, s. 1 (1).



Federation of Nigeria,⁵ the licensees/lessees and other players involved in the oil and gas industry, proactive and express terms pertaining to environmental remediation upon incidents of oil spillages are always not included as part of the concessionary plans or agreement, same way, steps and modus operandi for environmental remediation, restoration and clean-up are not properly articulated in the course of grant of the concessionary instruments. By this, issues of environmental restoration are subjected as post-concessionary issues and when they arise, victims are left in dilemma as to who should be held accountable, to what extent and on what grounds. All of these create a missing link between the grant of the required instrument to partake in the oil and gas industry and the restoration and remediation of the environment when polluted in the course of oil and gas explorations.

Therefore, this article would first consider the concession of licenses and leases, then management and remediation of oil spillage with the view of finding the missing links in between.

2.0 Concessions of Licenses/Leases in the Oil and Gas Industry

The fact that petroleum and other mineral resources in and upon any land in Nigeria, Territorial Waters and exclusive economic zones are vested in the government of the Federation of Nigeria presupposes that its exploration, prospecting and/or mining of petroleum in Nigeria would be carried out in line with the prescribed or permissive method in line with the regulating legal framework put in place by the Federal Government of Nigeria. These legal frameworks are Acts of the National Assembly, Subsidiary Legislation or Regulations made by persons or authorities empowered by the extant laws to so do. Harrison Declan referencing Professor Emeka Duruigbo aptly conceptualized this point as follows:

A direct consequence of the government's ownership of all oil and gas resources in Nigeria is that all activities to search for, win and dispose oil and gas must be done pursuant to some form of permission or right granted by the state. This form of permission or right granted by the State to authorize the searching, winning or disposing of oil and gas resources is referred to as a license or a lease. In Private Ownership regimes, the State's permission is also needed to perform some oil and gas activities. This could take the form of conversation laws which prohibits the drilling of oil and gas well without a permit. Such requirements are to ensure efficient recovery of hydrocarbons underground and environmental protection.⁶

The fact that the process of exploration, prospecting and mining of oil and gas requires some form of regulation or authorization by the Government is not just for economic reasons but it is also meant for human and environmental protection. It therefore goes to say and rightly so, that even in jurisdictions such as Texas, Washington D.C and Pennsylvania where absolute ownership of petroleum prevails, private individuals or organizations cannot proceed with the activities of searching, winning and disposing of oil and gas without some form of permits, licenses or adherence to the rules and regulations on environmental sustainability, fiscal policies, taxations, etc.

⁵ Mainly represented by the Minister for Petroleum Resources and Nigerian National Petroleum Corporation Limited (NNPC Ltd).

⁶ Harrison Declan, *Nigerian Oil and Gas Law, Cases, Commentaries and materials* (Westhill Publishers Company) 2018, 37.

In essence, no matter the theory or concept of Petroleum Ownership in place in any nation, some form of concession or license are required for the exploration and exploitation of petroleum. This is so because, the grant of a license or lease, is the permission that authorizes the licensees, lessees or holders of a specified permit to carry on with the activities of searching, winning and disposing of petroleum and its resources. Put differently, license, lease or the required permit are the genuine instruments required for the exploitation of oil and gas in the country where it is issued.⁷

Over the years and even before independence, oil and gas as well as other mineral resources in Nigeria have been and are still being mined by persons, bodies, organizations and municipal/multi-national companies permitted to do so by way of licenses, leases or other forms of concessions required to explore same. Going the history lane, the German Bitumen Company was the first to have been granted concession during precolonial Nigeria. This concession was granted in the year 1908 and it was permitted to prospect for oil in the then British Protectorate at Lagos, concession of which, was abruptly terminated at the advent of World War 1 in 1914.⁸ Also, the consortium of British Petroleum Company (Shell-B.P) and Shell D'Arcy Petroleum Company (Dutch) got the second concession in Nigeria in the year 1937.⁹ Similarly, in 1960, Tenneco (America) was granted concession and the concession was still in vogue as at the time Nigeria became independent on 1st October, 1960.¹⁰ These 'Exploration Rights' or concessionary instruments granted to the earlier precolonial companies were at the material time regulated or were majorly made pursuant to the Mineral Oil Ordinances.¹¹ After independence, the Petroleum Act of 1969 was enacted or promulgated to succeed the erstwhile Mineral Oil Ordinance and in place of the Exploration Rights, Oil Exploration License (OEL), Oil Prospecting License (OPL) and Oil Mining Lease (OML) were put in place.¹²

However, under the Petroleum Industry Act, which repealed the Petroleum Act and many other Legislation regulating the Nigerian Oil and Gas Industry, the OEL, OPL and OML are now styled Petroleum Exploration License (PEL), Petroleum Prospecting License (PPL) and Petroleum Mining Lease (PML). Hence, the PEL, PPL and PML are now the three (3) requisite instruments required by the PIA for the exploration, prospecting and mining of Petroleum in Nigeria.¹³

It has been opined that there are two forms of instruments required for Oil Exploration, oil Prospecting and oil Mining which include 'License' and 'Lease',¹⁴ However, it is understood that the classification of the concessionary instruments into two is perceived in the sense of seeing PEL and PPL¹⁵ as belonging to the family of licenses while PML¹⁶ which represents lease stands on the other side of the

⁷ Abbiba Prebo Lilly-Tariah and Etheldred Ego Woho, 'An Appraisal of the Petroleum Licensing Regimes of Nigeria and United Kingdom' [2019] *Rivers State University Journal of Public Law R/S/UJPL* (vol. 6 No. 1) 28 at 29.

⁸ Yemi Oke, *Nigerian Energy Resources Law and Practice: Oil and Gas law (Practice, cases and Theories)* (Princeton and Associates Publishing Co. Ltd 2019) 26

⁹ *Ibid.*

¹⁰ *Ibid.*

¹¹ 1914.

¹² Petroleum Act 1969 s. 2 (1) (a), (b) and (c).

¹³ PIA 2021 Ss. 70, 71, 72 and 81

¹⁴ Patrick Ndubuisi Oche, *Petroleum Law in Nigeria: Arrangements for Upstream Operations* (Heirs Great Commission 2004) 61.

¹⁵ Formerly OEL and OPL.

¹⁶ Formerly OML



divide, meaning that there exist three instruments that can be broadly be classified into ‘licenses’ and ‘leases’. Accordingly, it is worthy to summarily x-ray each of these required instruments, that is, Petroleum Exploration Licence, Petroleum Prospecting Licence and Petroleum Mining Lease.

a. Petroleum Exploration License (PEL)

PEL is one of the instruments required to be secured by individuals or corporate bodies who desire to carry out exploration activities in the Nigerian Oil and Gas Industry, particularly, the upstream sub-sector. PEL is hitherto established by the PIA and it is granted to qualified applicants to enable such an applicant carry out petroleum exploration operations on a non-exclusive basis.¹⁷

First and most, a license is more or less an agreement, consent, instrument, permission or authority secured in a written form by an Applicant from an owner or one who is in custody or exercises control over a certain thing to deal with such a thing in a designated or prescribed manner and within a stipulated or unstipulated time, depending on the nature or circumstance of the authority sought as well as what it was meant for. Little wonder, it has been said that a license is more or less a consent secured by an equipped specialist, which in itself, presents the privilege to carry out some activities that without approval, would be unlawful or constitute trespass, tort or any other civil or criminal wrong.¹⁸ In the real terms, licenses are given in respect of a particular activity and to a given applicant/corporate body that wants to undertake oil exploration, meaning that, it is not an open-ended authority.

Under the PIA, it is the responsibility of the Commission to grant PELs and the holder of PEL is statutorily accorded a non-exclusive right to carry out Petroleum Exploration Operations within the area covered in the license granted for that purpose.¹⁹ PEL once granted will remain in force for three (3) year and also renewable for an additional term of three (3) years though subject to adherence and fulfillment of the condition stipulated or prescribed in the license. The grant of PEL does not confer on the holder or beneficiary the right to win, extract, work, store, carry away, transport, export or deal with petroleum discovered in the course of carrying out oil exploration in the area permitted to explore for oil.²⁰

Upon the grant of PEL, it can cover areas included in PPL or PML as long as holders of such licenses or leases shall have no obligation to purchase the result of any survey conducted under the PEL. Similarly, PEL granted in respect of a frontier acreage, can also include a provision permitting the licensee to select, in line with the result of his exploration work and accordingly can be granted one or more petroleum prospecting licenses before the time of termination of the license containing the fiscal provisions. Importantly, in carrying out oil exploration activities, the Commission has the right and title over the interpretation of data acquired by the licensee, monitoring of exploration activities and the right to monitor the geological, geophysical or geochemical surveys undertaken thereto.²¹

¹⁷ PIA 2021 s. 70.

¹⁸ Abbiba Prebo Lilly-Tariah and Etheldred Ego Woho, ‘An Appraisal of the Petroleum Licensing Regimes of Nigeria and United Kingdom’ [2019] *Rivers State University Journal of Public Law R/S/UJPL* (vol. 6 No. 1) 28 at 29.

¹⁹ PIA 2021. S. 71 (1) & (2).

²⁰ PIA 2021. S. 71 (3).

²¹ PIA 2021. S. 71 (4) – (10).

In all, a license or lease can be granted to a company duly and validly incorporated in Nigeria,²² but such a grant is required to be granted based on a fair, transparent and binding process which of course should comply with the provisions of the extant laws, regulations and prevailing guidelines.²³ PEL is not granted in perpetuity or granted to last on the whims and caprices of the granting authority or the licensee. It is so because the duration of PEL is statutorily regulated. Once granted, PEL has a lifespan of three (3) years and renewable for another period of three (3) years, though, subject to compliance with the stipulated conditions thereto.²⁴

It is worthy of note that PEL is the first licensing instrument required to commence oil exploration in Nigeria. Its essence is to initiate a preliminary oil finding/inquiry by way of surface, geological and geophysical methods including but not limited to drilling which goes below Ninety-One Point Forty-Four (91.44) meters.²⁵ Technically, next to be granted after PEL is PPL which is fully discussed below.

b. Petroleum Prospecting Licence (PPL)

PPL is also one of the instruments, permits or licenses necessarily required to prospect for oil in the Nigerian oil and gas industry especially the upstream sub-sector of the oil and gas industry in Nigeria. It is in this regard that Harrison Declan,²⁶ conveniently referred to the three (3) instruments required to operate in the Nigerian oil and gas industry as ‘Upstream Permits’.²⁷

Technically, PPL is an agreement, consent, authority, permit or leverage given in a written instrument by an owner or better still one who exercises custodial, supervisory or official control over a certain thing, in this case, petroleum and its resources, permitting another to deal with such a thing in a manner designated, prescribed, stipulated and/or in adherence to the terms and conditions contained in the instruments granted to someone called the ‘licensee’.²⁸ PPL involves an obligation on the licensee or company to meet certain minimum drilling requirements. Accordingly, PPL is an exclusive right vested on the licensee to explore and prospect for petroleum within the area designated in the license granted.²⁹ In a nutshell, prospecting of petroleum is the search for the deposit of commercially valuable accumulation of petroleum.³⁰

As it is, PPL is statutorily established and meant to be granted to qualified applicants who desire to conduct drilling exploration, appraisal of wells and corresponding test production on an exclusive

²² PIA 2021. S. 70 (2).

²³ PIA 2021 Ss. 73 and 74.

²⁴ PIA 2021 s. 71 (3).

²⁵ Patrick Ndubuisi Oche, *Petroleum Law in Nigeria: Arrangements for Upstream Operations* (Heirs Great Commission 2004) 63.

²⁶ Petroleum Exploration License, Petroleum Prospecting License and Petroleum Mining Lease formerly Oil Exploration License, Oil Prospecting License and Oil Mining Lease.

²⁷ Harrison Declan, *Nigerian Oil and Gas Law, Cases, Commentaries and materials* (Westhill Publishers Company) 2018, 38.

²⁸ Olong Mathew Adefi; Dominic Asada and Eric A. Okogie ‘Rewriting Concessions Agreement: Nigerian View Point’ [2015] *Global Journal of Politics and Law Research* Vol. 3 No. 2 pg. 79. Available at <http://www.eajournals.org/wp-content/uploads/Rewriting-concessions-Agreement-Nigerian-Viewpoint.pdf> Accessed 30th September, 2020.

²⁹ Yemi Oke, *Nigerian Energy Resources Law and Practice: Oil and Gas law (Practice, cases and Theories)* (Princeton and Associates Publishing Co. Ltd 2019) 24.

³⁰ Patrick Ndubuisi Oche, *Petroleum Law in Nigeria: Arrangements for Upstream Operations* (Heirs Great Commission 2004) 65.

basis.³¹ Holders of PPL have the rights, exclusive one at that, to drill, explore and appraise wells. They also have a non-exclusive right to undertake the operation of petroleum exploration within the area covered in their licenses. Similarly, holders of PPL are vested with the right to take away and convey petroleum, natural gas and its by-products acquired in the course of drilling, exploration, appraisal of well, etc. though these rights are subject to the fulfillment of the obligations imposed at the time of the grant of the license.³²

Upon the recommendation of the Commission, the Minister for Petroleum Resources may grant PPL to qualified applicants and where for any reason the Minister did not grant PPL to an Applicant recommended for that purpose by the Commission, the Minister is duty bound to communicate the Commission reasons for refusal in writing.³³ Also, the bidding and award process of PPL is statutorily required to be based on a fair, transparent and competitive process, such that, the grant will be seen to have been made to the best bidder. Among others, parameters to determine the best bidder include the work program commitment exhibited during the initial oil exploration period, royalty interest, profit oil spilled, etc.³⁴

The duration or lifespan of PPL depends on the part of the environment with respect to which the PPL is granted. For instance, when granted in respect of onshore and shallow water acreages, the duration is within six (6) years which shall comprise the initial exploration period of three (3) years and optional exploration period of three (3) years. Similarly, when granted in respect of deep offshore and frontier acreages, its duration shall be within ten (10) years accordingly comprising of the initial exploration period of five (5) years and an optional extension period of five (5) years.³⁵

It is equally worthy of note that the area to be covered in a particular PPL depends on the part of the environment the oil prospecting activities are to be conducted upon. For instance, whereas PPL granted in respect of onshore and shallow acreages shall not exceed Three Hundred and Fifty (350sqkm) square meters; the one granted in respect of deep offshore acreages shall not exceed one thousand square kilometers (1000 sqkm) while those relating to frontier acreages shall not exceed one thousand five hundred square kilometers (1500sqkm). Therefore, the area to be covered by a PPL is largely determined by the nature of the environment the prospecting activities are to be carried out, bearing in mind that some parts of the environment are more volatile and turbulent while other parts are more friendly and easily accessible. In essence, it presupposes that accessibility, difficulties and risks associated with certain areas of the environment, equipment and expertise required to sustain and prospect in the turbulent area of the environment, cost implication, etc. are factors worthy of consideration in granting PPL.

Importantly, after petroleum prospecting activities are concluded and oil perhaps discovered in commercially viable quantity, the instrument to be granted next is the 'Petroleum Mining Lease' which is the instrument required by an applicant to win, work, carry away as well as dispose of crude oil, candescent and natural gas discovered or found in high volume after prospecting activities. The track

³¹ PIA 2021, s. 70 (1).

³² PIA 2021, s.72 (1).

³³ PIA 2021, s. 72 (5).

³⁴ PIA 2021, s. 73 and 74.

³⁵ PIA 2021, s. 77 (1) & (2).

of success of the holder of PPL is meant to be reckoned with at the time of its grants, hence, work commitment, commercial discovery and field development plan are required to be provided, incorporated and accordingly to be considered at the time of the grant of the PPL to a qualified applicant.³⁶

3.0 Petroleum Mining Lease (PML)

PML is one of the instruments usually granted to qualified applicants to win, work, carry away and dispose of crude oil, candescent as well as other natural gas on an exclusive basis. The PML takes the form of a lease and the lease is between the issuing authority and the applicant. According to G. Etikerentse, ‘... a lease is an agreement which gives rise to relationship of landlord and tenant or a lessor and lessee in respect of real or personal property.’³⁷ He further opined that when compared with a license, a lease is more formal and the rights conferred on a lessee are greater and more enduring to those conferred on a licensee.³⁸

Truly, the rights vested in the holder of PML are overwhelming compared to those vested in the holders of PEL and PPL. First and foremost, oil exploration and oil prospecting are upstream activities that are first conducted before the grant of PML. Similarly, PML is granted to holders of PPL or applicants who want to continue after petroleum prospecting activities in the upstream sector have been concluded and commercially viable deposit of oil discovered. Further, the superiority of PML over the other instruments is more visible when viewed against the background that, holders of PML are statutorily empowered to mine, win, work, carry away as well as dispose of crude oil, candescent and natural gas on an exclusive basis, which is not true of the other instruments.³⁹ It is on this premise, it has been said that PML permits its holder to legally explore and dispose oil discovered within the designated area covered by the PML upon payment of royalty.⁴⁰ Also, under the PIA, PML can only be granted in respect of an area where there is prove of a commercial discovery of crude oil, natural gas or both. It is granted to a holder of PPL who has complied or certified the conditions imposed by the relevant instruments, regulations, guidelines or the Act.⁴¹

To mention but a few, factors to be considered in granting PML include compliance with the conditions contained in the instruments earlier granted,⁴² submission of approval of field development plan, work program requirement, etc.⁴³ Holders of PML are empowered to exclusively carry out the development and production of petroleum concerning the areas defined in their leases. They are also endowed with the right to carry out exploration and appraisal wells, conduct any kind of upstream petroleum operation etc.⁴⁴ In mining oil within the designated area, the holders of PMLs are duty bound to provide a yearly summary of royalties, fees, taxes, profits, oil shares and other payments to the government within six

³⁶ PIA 2021, Ss. 78 & 79.

³⁷ G. Etikerentse, *Nigerian Petroleum Law* (London Macmillan 1985) 66.

³⁸ *Ibid.*

³⁹ PIA 2021, s.70 (1) (c).

⁴⁰ Yemi Oke, *Nigerian Energy Resources Law and Practice: Oil and Gas law (Practice, cases and Theories)* (Princeton and Associates Publishing Co. Ltd 2019) 24

⁴¹ PIA 2021, s. 81.

⁴² Such as PEL and PPL.

⁴³ See PIA 2021, s. 81 (1) – (12).

⁴⁴ PIA 2021, s. 82.



(6) months after each calendar year.⁴⁵ All things being equal, PML once granted shall be in force for a maximum of 20 years inclusive of the development period for a PML and subject to be renewed for another 20 years.⁴⁶

Besides the PEL, PPL and PML, there are other contractual or concessionary arrangements in the oil and gas industry including but not limited to Joint Ventures, Production Sharing Contracts, Service Contract Arrangements and Risk Service Contracts which are deliberately left out in the article for want of time to allow for robust discussion on management of oil spillage and environmental remediation.

4.0 Management and Remediation of Oil Spillages

It is true that no matter how careful or preventive an oil exploration company or an oil-producing nation is, wherever oil exploration activity takes place, spillages are imminently inevitable. What is usually of interest is how issues of spillages are treated or handled to avert colossal damage or impact on the environment and its inhabitants. It is on this note that cases of oil spillage are expected to be treated by the multi-national oil companies and the government of the oil-producing nations as an issue of national emergency. In essence, nations of the world, including the United States of America treat cases of oil spillages as issues of national urgency.⁴⁷ In that regard, the government needs to and accordingly are expected to provide effective capacity building at all levels by acquiring the essential Oil Spill Response Assets, Equipment, Training of Personnel, Oil Spill Management Team, among others.⁴⁸

Ideally, management of oil spillage should be the responsibility of all tiers of government because it constitutes an imminent and dreaded concern. This means that, an oil-producing nation should have layers, hierarchical structures or stages of contingency plans for the management of oil spillage. This is true with countries such as Turkey, France, the United Kingdom, Dutch, etc. where there are effective:

- a. National Oil Spill Disaster Contingency Plan,
- b. Regional Oil Spill Disaster Contingency Plan,
- c. District Oil Spill Disaster Contingency Plan,
- d. State Oil Spill Disaster Contingency Plan, and
- e. Facility Plan.⁴⁹

However, in Nigeria, there is no well-developed spill prevention and management contingency plan that cuts across the three (3) tiers of government, that is, the Federal, State and Local Government. Rather, there is in place the National Oil Spill Detection and Response Agency (NOSDRA),⁵⁰ which is also primarily charged with the responsibility of Oil Spill Detection and Response. Another agency that is primarily concerned with environmental issues is the National Environmental Standards and

⁴⁵ *Ibid* s. 83.

⁴⁶ *Ibid* ss. 86-89.

⁴⁷ A. Sylvester and A Eguru, 'Oil Spill Control and Management' (2012) (1) *Petroleum Technology Development Journal: An International Journal* (2) 1.

⁴⁸ *Ibid*.

⁴⁹ Saurabh Tewari and Abhinav Sirvaiya 'Oil Spill Remediation and its Regulation' [2015] *International Journal of Research in Science and Engineering IJRISE* (1) (6) 2. Available at https://www.researchgate.net/publication/283644184_OIL_SPILL_REMEDIATION_AND_ITS_REGULATION/link/564238870ae997866c480dd/download. Accessed 30/9/2020.

⁵⁰ Established under NOSDRA Act 2006, Ss. 1, 2, 5, 6 and 7.



Regulations Enforcement Agency (NESREA).⁵¹ These two (2) agencies are superintended by the Federal Ministry of Environment and Federal Ministry of Petroleum Resources, meaning that, the state and local governments in Nigeria have little or no stake in cases of prevention, remediation and management of oil spillages in Nigeria.

Unfortunately, incidents of oil spillages are endemic in Nigeria and at the moment, Nigeria's oil industry is majorly dependent on foreign experts, imported equipment as well as other foreign organizations for effective spill management and remediation.⁵² This external dependence explains why oil spillages are frequent in Nigeria and also the reason some spillages continues unabated for months before it can be halted. The most recent of these incidents is the Non-Producing OML 29 Santa Barbara Oil Spill in Nembe Local Government Area of Bayelsa State which occurred on 1/11/2021 and lasted for over a month unabated before precautionary measures were taken to arrest the situation or stop the spillage.⁵³

Though factors such as bureaucratic bottleneck in the oil companies and government parastatals as well as community agitations and youth restiveness most at times affects speedy response and efficient clean-up exercise in oil spill sites,⁵⁴ it cannot be said to be the cause for not having a pragmatic National Oil Spill Contingency Plan in Nigeria. This is so because, a well-developed spill management encompasses a proactive expanded knowledge of spill prevention, remediation and clean-up operations which in itself is lacking in Nigeria. A well-developed spill management plan also involves a clear National Spill Contingency Plan, massive and responsive investment in Oil Spill Remediation and Clean-up equipment, asserts, technology, a clear-cut national spill contingency strategy as well as effective public and private sector partnership arrangements, which are all lacking in Nigeria.

In use are levels of bodies put in place for spill management. This multi-dimensional and multi-layered contingency plan for spill management in the United States of America is commendable and can be a good recipe for the Nigerian situation. In the USA, there is in place a National Institute of Environmental Health Sciences (NIEHS) superintended by the Department of Health and Human Services charged with the responsibility of handling incidents of oil spillage and problems emanating thereto and it is the first layer in the oil spill contingency plan of USA.⁵⁵ The US NIEHS undertakes a regular educational course and training programs for her workers, encompassing issues of occupational safety and health administration.⁵⁶ There is also a National Contingency Plan for responding to hazardous substances and oil spillage, that is, the Areal Contingency Plan developed for smaller areas which describe or stipulates the responsibilities of operators, companies and the government agencies charged with the responsibility of prevention of hazardous discharges which includes oil spillage. The third layer is the

⁵¹ Established under the NESREA Act 2007, Ss. 1, 2, 3, 7 and 8.

⁵² A. Sylvester and A Eguru, 'Oil Spill Control and Management' (2012) (1) *Petroleum Technology Development Journal: An International Journal* (2) 1

⁵³ Sunday Independent Newspaper 'Nembe Oil Spill: We Can no Longer Breath-Affected Communities' [5/12/2021] Vol. 20, No.542 pg. 1 & 2.

⁵⁴ Eni D.D. and Okpiliya F.E., 'Evaluation of Onshore Oil Spill Remediation Operations in Port Harcourt, Nigeria' Available at [www.ajol.info>index.php>ijdmr>article](http://www.ajol.info/index.php>ijdmr>article). Accessed 30/9/2020.

⁵⁵ The National Institute of Environmental Health Sciences can be likened to the NOSDRA as it exists in Nigeria.

⁵⁶ Saurabh Tewari and Abhinav Sirvaiya 'Oil Spill Remediation and its Regulation' [2015] *International Journal of Research in Science and Engineering IJRISE* (1) (6) 2. Available at https://www.researchgate.net/publication/283644184_OIL_SPILL_REMEDIATION_AND_ITS_REGULATION/link/564238870ae997866c480dd/download Accessed 30/9/2020

Facility Contingency Plan which is put in place for speedy response and remediation exercise by the respective oil companies in facilities such as Petroleum Storage Tanks, Refineries, etc.⁵⁷ With these three (3) layers of effective and well-coordinated Oil Spill Contingency Plan in the United States of America (USA) and added to their technological advancement, it is well understood why the USA is the leading Oil producing state when it comes to proactive spill prevention, remediation, management and clean-up operation.

Nigeria can surpass her present sluggishness and uncoordinated spill prevention, remediation, management and clean-up exercise if the institutional and legal framework is strengthened and properly positioned in such a way that it would eschew red-tapism, corruption and nonchalance on the one hand and embrace international best practices as it relates to oil spill prevention, remediation, management and clean-up exercise on the other hand, which of course, encompasses the use of up-to-date technology in spill prevention, remediation and clean-up operations. Nigeria's predicament concerning effective prevention, management and remediation of oil spillage would also be alleviated if there is in place State Oil Spill Detection and Response Agency (SOSDRA) and Local Government Oil Spill Detection and Response Agency (LOSDRA) to complement the activities of NOSDRA. However, the point must be made that the concept of State ownership of petroleum in Nigeria cannot allow for the accommodation of SOSDRA and LOSDRA since the ownership of petroleum and its management is the prerogative of the Government of the Federation of Nigeria.⁵⁸ Therefore, SOSDRA and LOSDRA can only be established upon amendment of the legal framework providing for the ownership of petroleum as well as regulating the exploration and management of oil and gas cum other mineral resources in Nigeria.

The germane consideration to be made whenever issues of environmental remediation and clean-up are concerned, is to consider the characteristics of the oil spilled, the quantity or quantum of oil spilled, the part of the environment affected, the season of the year the spillage occurred, etc. While the other factors listed above are self-explanatory, it is pertinent to briefly explain the characteristics of oil which is a bit technical in terms of connotation.

5.0 Characteristics of Oil Spills

According to A. Dave and A.E. Ghaly,⁵⁹ spilled oil constitutes two characteristics namely physical and chemical characteristics.

a. Physical Properties of Oil

The physical properties of oil encompass viscosity, specific gravity, colour, surface tension, etc. These physical properties of oil vary depending on the type of oil spilled into the environment, particularly,

⁵⁷ Saurabh Tewari and Abhinav Sirvaiya 'Oil Spill Remediation and its Regulation' [2015] *International Journal of Research in Science and Engineering IJRISE* (1) (6) 2. Available at https://www.researchgate.net/publication/283644184_OIL_SPILL_REMEDIATION_AND_ITS_REGULATION/link/564238870ae997866c480dd/download Accessed 30/9/2020

⁵⁸ CFRN 1999 (as amended) s. 44 (3); PIA 2021 s.1 and Nigerian Mineral and Mining Act 2007 s. 1 (1).

⁵⁹ D. Dave and A.E. Ghaly, 'Remediation Technologies for Marine Oil Spills: A Critical Review and Comparative Analysis' (2011) (7) (5) *American Journal of Environmental Sciences* 423. Available at <http://thesciencepub.com/pdf/ajssp.2011.423.440pdf>. Accessed 30/9/2020



the marine environment. Physically, upon spillage, the naturally black or dark brown coloured oil has the propensity to change its colour into yellow, red or green depending on the part of the environment affected, the temperature of the day, the season of the year and other chemical or organic substances it might have come in contact with. Also, the ability of spilled oil to spread widely and quickly depends largely on the viscosity, surface tension and specific gravity. Meaning that, oil possessing low surface tension is capable of spreading quickly even in the absence of wind or current. Similarly, because surface tension is related to temperature, oil spreading tendencies increase in warm water than in cold water. Importantly, as it relates to density, most oil tends to float on the surface of the marine environment and horizontally spread. It is so because the density of most oil is lower than the ocean water.⁶⁰ However, the evaporation of lighter substances in oil increases the specific gravity of oil and has the effect of allowing heavier oils to sink and form tar-balls which may commune with sediments or rocks on the bottom of the water.⁶¹

In essence, each of the physical characteristics of oil contributes to the reaction of oil upon spillage and it also contributes to the speed of spread. It is equally a factor to be considered when talking about the effect of oil spillage on the environment, on humans and other inhabitants dependent on the environment. For instance, as it relates to viscosity, it is said that a higher viscosity of a spill leads to or constitutes the formation of chocolate moss which is very difficult to degrade or treat.⁶²

b. Chemical Characteristics of Oil

The chemical characteristics or properties of oil which of course are worthy to be considered in cases of spill management, remediation and clean-up operation encompass the oil explosivity limits, inflammable limits, solubility, molecular weight, etc. and these chemical characteristics vary based on the type of oil.⁶³

Accordingly, anyone, body or organization charged with the responsibility of clean-up, spill management or remediation is rationally expected to also consider the chemical characteristics of the spilled oil as such consideration in addition to the consideration of the physical properties or characteristics of the spilled oil, enhances the viability of effective spill management, clean-up and remediation operation.

Oil spill prevention, remediation and management techniques, particularly spill remediation techniques for the onshore and offshore are different. Also, factors to be considered in arriving at the appropriate remediation techniques to be adopted for onshore and offshore remediation operations equally differ, though, it may be related in a way. Therefore, it is pertinent to consider clean-up or remediation of soil or underground water as well as the technique or guideline for the clean-up of the marine environment.

⁶⁰ *Ibid*, 424.

⁶¹ *Ibid*.

⁶² *Ibid*.

⁶³ *Ibid*.

6.0 Onshore and Groundwater Remediation

The technique for remediation of soil and groundwater upon oil spillage differs from what obtains in remediation of the marine environment. This is so because, in the marine environment, the spilled oil floats on the ocean and continues to flow or spread on the water body, which is not the same in the case of an onshore spill, where most of the spilled oil gradually permeates into the soil and others disperse by way of evaporation particularly when the spill happens at the time of the year when the temperature is high.

Be that as it may, cleaning and remediation of the soil and groundwater is not an easy process and it takes time to be done as was confirmed by the United Nations Environmental Program Report on Clean-up of Ogoni.⁶⁴ Among others, to be considered when remediation of the soil and groundwater is to be undertaken includes where the contamination took place and the type of contamination present on the soil. The major techniques for remediation of soil and groundwater includes:

- a. Soil Vapour Extraction,
- b. Pump and Treat System,
- c. Degradation, and
- d. Bio-Remediation.⁶⁵

- a. Soil Vapour Extraction: this is one of the prevalent techniques of soil and groundwater remediation. By this technique, contaminants or properties of spilled oil present in the soil are forced to vaporize at the soil temperature by applying a vacuum in the soil. This technique is employed to create pore spaces and increase the flow of air in the soil, hence, the process is also called 'Vacuum Extraction' or 'Enhanced In Situ Volatilization'. Upon the creation of pore spaces and increase in airflow in the soil, contaminants are sucked by the vacuum blower in a gaseous form via a vapour extraction well.⁶⁶ Proper and technical use of the Soil Vapour Extraction Technique frees the soil from absorbed contaminants, though, the contaminants cannot be one hundred percent (100%) extracted or vapourised but it goes a long way helping the soil to recover its fertility.
- b. Pump and Treat System: This is another technique that is used for soil and groundwater remediation, though, mainly for groundwater remediation. By this technique, a pumping well is drilled aimed at bringing out the contaminated water to the surface to treat the contaminated water in surface water facilities. After treatment of the groundwater, the treated water can be reused or supplied to be reused. Importantly, the treatment of water in this manner, largely depends on the contaminants present in the groundwater and this technique can also be used with the Evaporation Extraction Technique.⁶⁷

⁶⁴ See UNEP Ogoni Oil Assessment Reveals Extent of Environmental Contamination and Threats to Human Health. Available at <https://www.unenvironment.org/new-and-stories/story/unep-ogoni-assessment-reveals-extent-environment-contamination-and-threats-to-human-health>. Accessed 9/10/2018.

⁶⁵ Saurabh Tewari and Abhinav Sirvaiya 'Oil Spill Remediation and its Regulation' [2015] *International Journal of Research in Science and Engineering IJRISSE* (1) (6) 2. Available at https://www.researchgate.net/publication/283644184_OIL_SPILL_REMEDIATION_AND_ITS_REGULATION/link/564238870ae997866c480dd/download. Accessed 30/9/2020.

⁶⁶ *Ibid.*

⁶⁷ *Ibid.*

- c. Degradation Remediation: This is a technique by which chemical or biological substances are infused or injected into the soil or groundwater to degrade, neutralize or make less harmful, the contaminants present in the soil and groundwater. There are two types of Degradation Remediation Techniques namely 'Chemical Degradation Technique' and 'Biological Degradation Techniques'.⁶⁸ While Chemical Degradation Technique is the application of some chemicals to neutralize and transform contaminants into a less harmful state or oxidize the metal and reduce the oxidation state of contaminants, Biological Degradation Technique is the introduction of organic reagents into the soil with groundwater for bio-remediation, which thereafter, converts the hydrocarbons in the soil into carbon dioxide, water or other harmless elements in the soil.⁶⁹
- d. Bio-Remediation: This is a technique where some specific microorganisms are used to remove toxic and harmful substances from the soil or groundwater. Many classes of bacteria, algae, archaea, fungi, etc. has the propensity to degrade pollutants in spilled oil by metabolizing them into non-toxic molecules or simpler elements. Most times, in the case of soil remediation, fertilizers that are phosphorous-based, nitrogen-based and other reagents are added to provide adequate nutrients to the microbes, so that, they can multiply and grow rapidly.⁷⁰
- Bio-remediation is the healthier environmental technique in which microorganisms are added to the soil to accelerate the natural remediation process. However, the first thing to be considered is soil composition, texture and the microorganisms that can be added for effective bio-remediation. Second to be considered is how to ascertain the proper technique for injecting the required microorganism and also the nutrients it needs to thrive or survive because nutrients infused in the soil alongside the microorganisms accelerate the reproduction of the microorganisms and permit them to tremendously grow.
- Comparatively, the advantage of the Bio-Remediation technique over the other techniques is that it does not introduce any chemical substance or element to the soil or groundwater. Secondly, after the remediation is done, the microorganisms injected into the soil for that purpose, decay and metamorphose into organic nutrients for the soil, hence, making the technique more environmentally friendly.

7.0 Offshore or Marine Spill Remediation

Offshore or Marine Spill Remediation as sometimes called is simply the clean-up of spilled oil on the marine environment. There are four (4) basic types of marine spill control and clean-up namely:

- a) Physical Remediation,
- b) Chemical Remediation,
- c) Thermal Remediation, and

⁶⁸ *Ibid.*

⁶⁹ *Ibid.*

⁷⁰ *Ibid.*

d) Biological Remediation.⁷¹

- a. **Physical Remediation Method:** Just as the name implies, the physical method of offshore remediation or clean-up is the method through which spills are controlled or the spilled oil in the marine environment is either extracted or prevented from spreading. There are varieties of methods of physical remediation of the marine environment which among others include the Boom, Skimmers and Absorbents Materials Techniques.⁷²

- i. Boom: this is a physical technique whereby a floating barrier is placed across the river or a certain part of the river to prevent the spreading or to curtail oil spills in the marine environment. The use of a boom is a very simple and popular method of controlling oil spills. In this method, equipment known as a containment boom act like a fence to prevent the oil from further spreading or floating away.

By its nature, a boom floats on the river and has three (3) parts. The first is the 'freeboard' which is the part that is positioned higher than the water surface or level to curtail or prevent the oil from spreading or splashing across the board. The second is the 'skirt' which is the part of the boom placed below the surface of the river and it keeps the oil from being squeezed under the boom and escaping. The third part of a boom is a kind of cable or chain which accordingly connects the other parts of the boom and is principally meant to strengthen and stabilize the boom. The connected parts of the boom are made to be placed around the area of the oil spilled and it would be so placed until it surrounds and curtails the spill. Boom, as a physical remediation method, is only effective when the oil is accessible or when the oil is confined within a reasonable spot. Meaning that it may not be effective when the spilled oil has gone too viral to manage.

As a method of physical remediation, Boom is categorized into fenced boom, curtailed boom and fire resistance boom.⁷³ Fenced boom is more like a floating fence or structures made of rigid or semi-rigid materials, built on the river to prevent the floating or spreading of oil. It is built vertically against floating oil. About 60% of the boom is usually under the water while 40% is above the water surface.⁷⁴

The fence boom is not without disadvantages. Some of its disadvantages include low resistance and stability in strong winds and current, poor flexibility for towing and low efficiency in a situation of high waves.⁷⁵ Similarly, curtail booms are booms made with materials which do not allow liquid or gas to pass through it. It is made with impervious,

⁷¹ Hattie Larson, 'Responding to Oil Spill Disasters: The Regulations that Governs their Response'. Available at https://www.wise-intern.org/journal/2010/HattieLarson_presentation.pdf. Accessed 28/2/2010.

⁷² D. Dave and A.E. Ghaly, 'Remediation Technologies for Marine Oil Spills: A Critical Review and Comparative Analysis' (2011) (7) (5) *American Journal of Environmental Sciences* 423. Available at <http://thesciencepub.com/pdf/ajssp.2011.423.440pdf>. Accessed 30/9/2020.

⁷³ S. Potter and J. Morrison, *World Catalogue of Oil Spill Response Product* (9th ed. S.L. Rose Environmental Research Ltd 2008) 1-42.

⁷⁴ D. Dave and A.E. Ghaly, 'Remediation Technologies for Marine Oil Spills: A Critical Review and Comparative Analysis' (2011) (7) (5) *American Journal of Environmental Sciences* 423. Available at <http://thesciencepub.com/pdf/ajssp.2011.423.440pdf>. Accessed 30/9/2020.

⁷⁵ S. Potter and J. Morrison, *World Catalogue of Oil Spill Response Product* (9th ed. S.L. Rose Environmental Research Ltd 2008) 1-42.

non-absorbent and floating materials. Curtail boom has big-circular or foam-filled chambers that remains above the water level as well as a very flexible skirt that remains under the water to curtail oil from spreading. Accordingly, materials such as polystyrene, bubble wraps, cocks, polyurethane and its like are the materials for which the curtailed boom is made up of. Some of the advantages of the curtailed boom include its reliability in offshore spill remediation particularly, in calm water and high flexibility in towing. Also, it has the disadvantages of difficulties in clearing, storing or assembling the curtailed oil.⁷⁶ Further, the fire-resistant boom is a kind of boom made with fireproof metal that can assemble or concentrate enough oil or a sufficient amount of oil to efficiently burn the oil at 1093°C. This method is equally reliable in calm water but very cost-intensive and difficult to tow due to its weight and size.⁷⁷

- ii. Skimmers: These are machines or technological crafts designed to scoop oil from the water body or surface of the river particularly when the oil is already confined by booms. Skimmers are usually deployed into boats to absorb or remove contaminants from the surface of the water or to physically separate oil from water so that the spilled oil can be recollected and possibly processed for reuse. It goes to say that, skimmer devices are used in conjunction with booms to recover oil from the water surface without changing the oil surfaces. Skimmers are composed of the following parts: belts, brushes, drums and disks.⁷⁸ Skimmers can be moved or operated from vessels or self-propelled. There are three (3) types of skimmers namely: Weir, Oleophilic and Suction Skimmers.⁷⁹ Weather conditions, degree of debris on the water, thickness or weight of the oil as well as location of the spilled site have major determinants of the effectiveness of skimmers, though, it is effective in calm waters than turbulent waters but risks clogging by debris on calm waters.

Whereas Weir skimmers are crafted technologies like a dam which sucks the floating oil on the water surface through gravity action and transfers the sucked oil from the weir central sink to storage tanks with the help of pump or gravity action, Oleophilic skimmers are drums, ropes, brushes, belts and disk type skimmers made up of oleophilic properties or materials designed to squeeze tanks while Suction skimmers are vacuum pumps or air venture system that absorbs, sucks or scopes oil on the surface of the water through wide floating heads and accordingly transfers the sucked oil into storage tanks.

- iii. Adsorbent: Sorbents are materials that soak up liquids by way of absorption or adsorption. Hydrophobic sorbents are of great interest when it comes to the control of

⁷⁶ D. Dave and A.E. Ghaly, 'Remediation Technologies for Marine Oil Spills: A Critical Review and Comparative Analysis' (2011) (7) (5) *American Journal of Environmental Sciences* 423. Available at <http://thesciencepub.com/pdf/ajssp.2011.423.440pdf>. Accessed 30/9/2020

⁷⁷ D. Dave and A.E. Ghaly, 'Remediation Technologies for Marine Oil Spills: A Critical Review and Comparative Analysis' (2011) (7) (5) *American Journal of Environmental Sciences* 423. Available at <http://thesciencepub.com/pdf/ajssp.2011.423.440pdf>. Accessed 30/9/2020.

⁷⁸ A. H. Hammoud, 'Enhance Oil Spill Recovery Rete Using the Weir Skimmer'. Available at <https://www.Apa.Gov/OEM/Docs/Oil/FSS/FSS06/hammoud.pdf>.

⁷⁹ D. Dave and A.E. Ghaly, 'Remediation Technologies for Marine Oil Spills: A Critical Review and Comparative Analysis' (2011) (7) (5) *American Journal of Environmental Sciences* 423. Available at <http://thesciencepub.com/pdf/ajssp.2011.423.440pdf>. Accessed 30/9/2020.

oil spills as they serve as a final clean-up approach after skimming operation.⁸⁰ The adsorbent materials for clean-up include synthetic natural organics and natural inorganic materials.⁸¹ The synthetic material comprises of polypropylene, polyester foam and polystyrene. Similarly, organic adsorbents include Kapok, saw dusts, vegetable fibers, milkweed, straw, etc. while natural inorganic adsorbent materials are clay, glass, wool, vermiculate or volcanic ash, sand, etc.⁸²

- b. **Chemical Remediation Method:** The Chemical Remediation Method of the curtailment of the spread of oil spillage is employed hand-in-hand in most cases with the physical method of spill remediation with the intendment or aim of preventing spills from contaminating or spreading into the adjacent areas. Varieties of Chemicals are used to treat and curtail oil spills and these chemicals have the propensity to change the physical and chemical composition or properties of hydrocarbons into a solid or semi-solid matter.⁸³ Dispersants and solidifiers are employed when using a chemical remediation approach for spill spread prevention.⁸⁴ Also, compounds like 'Elastol' which is basically isobutylene and in a white powdered form is equally used to confined spills as the compound gelatinizes or solidifies the oil on the water surface, thereby, making it incapable of spreading or escaping like an object in liquid or gaseous form thereby making it easier to clean-up.

The basic advantage of the Chemical Method or Remediation is that it is very easy, quick and rapid in application and action and also adaptable in both turbulent and calm water, however, some compounds contained in the chemical of choice can in themselves be hazardous to the marine environment and its inhabitants as most of these chemicals are not organic in its composition.

- c. **Thermal Remediation Method:** Thermal Remediation Method is also called In-Situ Burning. It is an oil spill clean-up or oil spill spreading prevention method whereby spilled oil is removed or cleaned up by burning it off on the surface of the marine environment. In-situ burning methodology or remediation approach is carried out mainly after some physical clean-up and oil spreading preventive remediation approaches have been employed or used to circumscribe the spilled oil. The Thermal Remediation method is quite simple and rapid in oil spill remediation and it is also carried out with some minimally specialized equipment such as 'Fire Resistant Boom', igniters, etc. and has a high level of oil clean-up removal efficiency.⁸⁵ The effectiveness, removal and clean-up efficiency of the Thermal Remediation Method is up to

⁸⁰ D. Dave and A.E. Ghaly, 'Remediation Technologies for Marine Oil Spills: A Critical Review and Comparative Analysis' (2011) (7) (5) *American Journal of Environmental Sciences* 423. Available at <http://thesciencepub.com/pdf/ajssp.2011.423.440pdf>. Accessed 30/9/2020.

⁸¹ *Ibid.*

⁸² *Ibid.*

⁸³ *Ibid.*

⁸⁴ Dispersants chemicals consists of surfactants i.e. surface active agents that has the capacity of dissolving in one or more solvents and stabilizers. Dispersants have the capacity or capability of breaking down the slick of oil into smaller droplets, transfer it into water column and accordingly make it to undergo dissolution and degradation. Solidifiers are chemicals that are used to metamorphose the oil from its liquid composition into a solid or semi-solid matter for easy clean-up.

⁸⁵ D. Dave and A.E. Ghaly, 'Remediation Technologies for Marine Oil Spills: A Critical Review and Comparative Analysis' (2011) (7) (5) *American Journal of Environmental Sciences* 423. Available at <http://thesciencepub.com/pdf/ajssp.2011.423.440pdf>. Accessed 30/9/2020.

98%, hence, more efficient than most other methods.⁸⁶ The successful and effectiveness of a Thermal Method largely depends on the thickness of the oil and there is two (2) prominent agent that can be employed or used for the sustenance of the combustion of the oil which equally provides enough oxygen for the fire. Some of the burning agents are light crude oils, gasoline, etc. However, irrespective of the effectiveness of the thermal method of clean-up of oil spill remediation, it introduces toxic fumes and other pollutants into the marine environment, hence, causing loss of aquatic life and further toxification of the water body. Be that as it may, the thermal method is still highly effective and more accommodating in calm water than a turbulent one.

- d. **Bio Remediation Method-** Bio remediation method which can also be called the Organic Method of Oil Spill remediation or clean-up refers to the use or relates to the injection, infusion or planting of some form of micro-organisms to remove toxic and harmful substances or degrade the properties of spilled oil into less harmful components. In essence, it is a process whereby some micro-organisms are used to degrade and metabolize chemical substances inherent in the environment and proceed to restore the environment to its designed quality.⁸⁷ There are some organic or various classes of algae, fungi, archaea, bacteria, etc. that when mechanized and applied in a spilled marine environment or any other environmental surface including into the soil, deplete or degrades petroleum products by breaking and metabolizing them into a simpler and non-toxic element or molecules such as fatty acids and carbon dioxide.⁸⁸ In terms of advantage, the bioremediation method is environmentally friendly and cost-effective. Conversely, unlike chemicals and burning in-situ remediation approach, bio-remediation takes quite some number of time, in most cases to metabolize or degrade pollutants present in a given environment.

Finally, it has also been said that the natural remediation method is also a means of oil clean-up and remediation.⁸⁹ The natural recovery or oil spill clean-up operation encompasses the reliance or use of the vagaries of nature such as wind, weather conditions, tides, sun or other naturally occurring microbes which by themselves gradually disperse spilled oil either by way of evaporation, depletion into smaller particles, heating up, etc. however, this approach is highly unreliable and unpredictably time-consuming.

8.0 The Missing Link

The grant of PEL, PPL and PML are statutorily regulated under the PIA as robustly discussed above. Incidental to the grant of these concessionary instruments is the fact that contract is created between the licensing authority and the persons/body in whom licenses, leases or permits to operate in the Nigerian oil and gas industry are granted to. In this case, the licensing authorities are 'The Commission' and 'The Authority' who does so on behalf of the Government of the Federation of Nigeria in adherence to the

⁸⁶ MI News Network, '9 Methods for Oil Spill Clean-up at Sea'. Available at <https://www.marineinsight.com/environment/10-methods-for-oil-spill-cleanup-at-sea/>. Accessed 30/9/2020.

⁸⁷ D. Dave and A.E. Ghaly, 'Remediation Technologies for Marine Oil Spills: A Critical Review and Comparative Analysis' (2011) (7) (5) *American Journal of Environmental Sciences* 423. Available at <http://thesciencepub.com/pdf/ajssp.2011.423.440pdf>. Accessed 30/9/2020.

⁸⁸ MI News Network, '9 Methods for Oil Spill Clean-up at Sea'. Available at <https://www.marineinsight.com/environment/10-methods-for-oil-spill-cleanup-at-sea/>. Accessed 30/9/2020

⁸⁹ *Ibid.*

stipulation of the PIA which is the hitherto principal legislation regulating the Nigerian oil and gas industry.⁹⁰

On the other hand, the licensees, lessees, holders of permit or concessionary instruments are authorized, upon the grant of PEL, PPL and/or PML to them, to proceed, carry out or undertake oil and gas exploration, prospecting, mining or extraction activities on the areas covered by their enabling instruments, licenses, leases or permits. Ancillary to oil exploration activities is the notorious incident of oil spillage and its dreaded environmental and health related consequences which among others are principally caused by corrosion of pipeline, sabotage, oil production operations, vandalism, ship seepage, tanker and oil terminal leakages, equipment failures, malfunctions of oil facilities and so on. For instance, the January 1969 Santa Barbara Well Blow out which caused the spill of 112,900 tonnes of oil into the environment and the 17th January, 1980 Funiwa-5 Off Shore Station Blow Out are few examples of catastrophic spills caused by operational production and malfunction of equipment that impacted so much on the environment and human health.⁹¹ In fact, no matter what constitutes the cause of oil spillage, be it minor spill, medium spill, major spill or catastrophic spill,⁹² it must have an anthropogenic origin.⁹³

Though the catastrophic effects of oil spillage are too numerous to mention, but it ranges from effect on the environment to wit: soil, marine environment, crop production, ecosystem; human health; economy and so on. However, despite the impact of oil spillage, compensation of victims of oil spillage, environmental remediation and clean-up exercises constitutes post spillage issues. Incidentally, these post spillage issues including but not limited to clear and articulated provisions as to whose responsibility it is to ensure environmental remediation and clean-up operations upon spillage, time within which to commence and conclude remediation of the impacted environment, relocations of the inhabitants of the polluted part of the environment, resuscitation of the fauna and flora and so on, were not specifically made issues of consideration at the time of granting of the concessionary instruments to the lessees and licensees and where considered, it is infinitesimal, in passing and not in the core of the contracts created between the lessees and lessors or the instrument granting authority and those it is granted to.

Secondly, issues pertaining to timeous, fair and adequate compensation of victims of oil spillage, quantum of compensation, assessment of compensation, sources of compensational fund, speedy access to justice or redress and so on, are also not placed on the front burner at the time of grant of the concessionary instrument, rather, relegated to the background with little or no legal framework put in place to properly address these issues. More worrisome is the fact that NOSDRA Act⁹⁴ which hitherto specifically deals with prevention and management of oil spillage in Nigeria is silent on most of these

⁹⁰ See PIA 2021, Ss. 4-28; 29-52; and 70-110.

⁹¹ I.A. Augustine, *The Impact of Oil on Developing Country* (Ibadan Evans Brother Ltd 1990) 133.

⁹² E.R. Egbe, 'Environmental Challenges of Oil for Families in Oil Producing Communities of the Niger Delta Region' (2011) (3) JHER 25. Available at www.heran.org/html/jher13/zegbe.pdf. Accessed 2/3/2017.

⁹³ Ifeoma Christy Mba and others, 'Causes and Terrain of Oil Spillage in the Niger Delta Region of Nigeria: The Analysis of Variance Approach' (2019) (9) (2) *International Journal of Energy Economics and Policy* 283. Available at www.econjournals.com. Accessed on 20/9/2020

⁹⁴ 2006.

issues, hence, the reason the PIA, which is latter in time, ought to have covered the field. These and more are the missing links between the time of grant of concessionary instruments through the stage of oil and gas exploration, prospecting, mining, decommissioning or post mining eras as abandoned or disused well/oil facilities also causes spillages in certain instances.

9.0 Conclusion

The PIA put in place the procedure for the grant of the permits, licenses or leases required for oil and gas exploration, prospecting and mining but neglected the aspects pertaining to management and prevention of oil spillages, environmental remediation and compensation of victims of oil spillages as no comprehensive legal blueprint was made in respect of these all important issues by the PIA and where considered at all, it is such that is incapable of dealing with the said issues, hence the missing links.

10.0 Recommendation

Considering the importance of environmental sustainability and the trauma/health hazard associated with incidents of oil spillage, cum the need for compensation of victims of oil spillage, it is recommended:

- a. That in the interim, the institutions and regulatory bodies in the Nigerian Oil and Gas Industry to wit: Ministry of Petroleum Resources, Federal Ministry of Environment, The Nigerian Upstream Regulatory Commission, the Nigerian Midstream and Downstream Regulatory Authority, NNPC Limited and all other relevant institutions or players in the oil and gas industry, should, in line with the enabling and available legal framework, put in place an action plan to ameliorate and address the issues of management and prevention of oil spillages, environmental remediation, clean-up exercise and compensation of victims of oil spillages.
- b. At the long run, a clear cut legislation should be enacted to comprehensively deal with issues of management and prevention of oil spillages, environmental remediation, clean-up exercise and compensation of victims of oil spillages.