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DISASTER/HAZARDS OF ENVIRONMENTAL POLLUTION IN PETROLEUM REFINING INDUSTRIES, PETROCHEMICAL COMPLEXES IN THE NIGER DELTA ATLANTIC COAST OF NIGERIA

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ABSTRACT

Along with economic benefits industrialization has also brought with it disasters hazards of environmental pollution. The resulting effect on air water soil and biotic indicate the need for monitoring environmental pollutant and measures for its control. This research deals with the disaster hazards of environmental pollution due to the petroleum refining technology industries and petrochemical complexes in the Niger Delta Atlantic Coast of Nigeria. Obviously this area is facing critical pollution problems as very few studies and survey are conducted in environmental engineering research and environmental; development. Increasingly toxication hazards, disaster and non availability of data prompted the present study.

Key words: Petrochemical complexes, petroleum refineries, data bank.

INTRODUCTION

Assessment of impacts on the total environment of Port Harcourt and Warri refineries as feedbacks for Environmental Management Plan, would require information's on the existing physical, chemical and biological aspects. The existing quality of marine and air environments in these two fields have been suited. Port Harcourt field commissioned in November 1965 is located ten kilometers at Alese-Eleme in the East of the Niger River Delta on the Atlantic coast. This field occupies a total land area of some 300 acres.

Similarly, Warri refinery field is located along the coast of Nigeria. It produces only fuels for internal combustion engines, thermal power generating plants, and heating furnaces. Kaduna refinery which was commissioned and completed in 1980 is the largest and the most complex. It is considered as one of the largest refineries in Africa and it provides Nigeria with a firm foundation for establishment of petrochemical industries.

MATERIALS AND METHODOLOGY

This refinery processes both Nigeria's light crude and the imported heavy crude with high Sulphur content. The Nigerian crude yields fuel products while the imported heavy crude yields in addition to fuel products, lubricating oils, waxes and asphalt. Table 1a and 1b reveal the detailed environmental impacts of petroleum and natural gas in these refineries.

Table 1a.: Environmental impacts of petroleum.

Environment	Exploration	Extraction/Production Processing	Transmission	Use & disposal
Atmosphere	Emission of H2S hydrocarbon due blowout	Refinery emission of H2S, CO2, NOx and hydrocarbon.	----------	Emission of SO2, CO2 & Hydrocarbons.
Hydrosphere	Blowout & spills from exploratory well at sea.	Blowout & spills, brine oil & drilling chemical refinery effluents	Tanker accidents	Groundwater contamination by leaking tanks.
Lithosphere	blowouts & spills by land	Blowout & spills, sludge disposal	Pipeline construction	Used oil disposal
Human impacts	disrupting life style	interference with Fisheries	damage to permafrost interference with fishes or land use,disruption of lifestyle due to construction.	hydrocarbons & polynuclear aromatic hydro-carbons from combustion.

Table 1b.: Environmental impacts of natural gas.

ENVIRONMENT	EXPLORATION	EXTRACTION PRODUCTION PROCESSING	TRANSMISSION	USE & DISPOSAL
ATMOSPHERE	Emission of H2s due to accident.	Gas plant emission of H2s, SO2	----------	Emission of CO2, Nox.
HYDROSPHERE	Blowouts	Blowouts during Drilling, disposal of chemicals.	----------	----------
LITHOSPHERE	----------	----------	construction of pipelines.	----------
HUMAN IMPACTS	----------	LNG blowouts H2S emision	Damages to permafrost, LNG accidents, disruption of lifestyle during constructions.	----------

ENVIRONMENTAL IMPACT IDENTIFICATION IN CRUDE PROCESSING REFINERIES INDUSTRIAL PROJECTS

In the crude processing the first step involved is desalter operation. The desalted crude is distilled first in atmospheric distillation unit and the product is then distilled under vacuum. Desalter unit produces waste containing high dissolved salts, hydrocarbons, phenols, ammonia and sulphide. Both distillation units produce sour water containing sulphur and ammonia from the condensers. The distilled fractions from vacuum distillations are sent either for thermal cracking or fluidized bed catalytic cracking. Cracking unit produces sour water with high concentrations of sulphide and ammonia. LPG, Naphtha and kerosene also go through Merox treatment for mercaptam oxidation. This unit produces rich effluent containing sulfides, phenols and hydrocarbons.

Water environment

Information on water resources (ground/river/coastal) was collected under physical, chemical-inorganic, chemical-organic, nutrient and heavy metal groups. For bacteriological analysis of ground/surface water resources, samples collected in pre-sterilized bottles were subjected to multitude dilution technique for the estimation of bacteria. Information on water requirements and sources of wastewaters was collected. Characteristics of wastewaters from various process plants are known. In addition, the probable characteristics of the combined effluent to be treated and discharged have also been anticipated as shown in Table 2 Paul 2004.

Waste water

A refinery is a polluting industry. All the pollutants emitted from it can be effectively controlled and treated to very safe levels for discharge into the environment. An elaborate system of underground sewer carries oil leaks and rain water falling on process areas to two 15.000 cubic meter reservoir where oil, if any, is separated out gravimetrically. The remaining oil in the water is removed in two biological treating units.

Wastewater contains different substances of natural and artificial origin, which can be harmful to the humans, animals and biota. The composition of wastewater depends on its origin and treatment before discharging.

Table 3.: Water pollution disease vectors cause health hazards.

MODE OF OCCURRENCE	NATURE	EXAMPLE.
(a) Physical	I) floating matter	foam, slum, wood and leaves.
	II) suspended matter	silt, sand, gravel, rubber, wood chips, paper pulp, solid sewage materials and animal carcasses.
	III) thermal	waste heat.
(b) Chemical	I) organic	oils, dyes, synthetics, detergents, chlorinates, hydro-carbons, phenols, carboxylic acids, sugars and carbohydrates.
	II) inorganic	acids, alkalis, chlorine, metallic Salts, nitrates, phosphates, hydrogen sulphide and radio active isotopes.
(c) Biological	I) pathogenic forms	bacteria, protozoa, fungi, parasite worms that produce diseases and viruses.
	II) algae	excess growth causes eutrophication, the decay causing depletion in oxygen content of water.

Environmental petroleum pollution problems

Pollution from crude petroleum arises from oil spills that can be caused by any of the following factors blow out equipment failure operator maintenance engineering error sabotage erosion and accident. Environmental effects of fossil fuel are emitted primary from different transformation processes of energy. These emissions are given for single pollutants wherever possible. As the exert damage for the different pollutant and their impact on the various part of the environment are unknown the damages cost are access with the help of information given in relevant literature on this problems. Based on a number of working hypothesis this general damages have been access to the different pollutants and polluting energy transformation processes.

Petrochemical industries hazards on environment

Citing increased concern petrochemical plant operation, the environmental Protection Agency and the Occupational Safety and Health Administration initiated inspection of the petrochemical industries the management systems governing the health and safety procedures for maintenance activities contractor activities general operation including compliance with regulation to control risks and prevent disaster were studied.

CONCLUSION

Areas of special reviews included plastic materials synthetic resins and non volcanizable elastomers industrial organic chemical not else where classified and petroleum refining. Inventory of the chemical used insignificantly quantities at each facilities and data on accidental relaxes were taking into account. a major programme of the inspection was to identify and correct industry practices that are potential contributing cases of accident explosions. Serious accidents not only represent and imminent threat to the health and safety of the plants employees but also have a potential to release large quantities of toxic materials into the environment. Proper control emissions of organic compounds from the synthetic organic chemical manufacturing need be checked. the study addresses the rules equipment leaks combining traditional standard with innovative strategies including resources for superior performance and quality improvement programme that will be triggered instead of penalties when emissions exceeds specified levels for the clean air art.

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