OIL DISCHARGED, SPILLED POLLUTION IN SEA WATER ENGINEERING DESIGN OF TREATMENT OF PROCESS WASTE WATER

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ABSTRACT

The fate of petroleum spill in a marine estuarine sea environment as related to biodegradation processes will in compass degradation via microbial metabolism ingestion zoo plankton uptake and possible retention by marine invertebrates and vertebrate. In other to study the impact of oil pollution in sea the specific group of organisms such as hydrocarbon degrading and sulphate reducing microbes can be monitored since oil is composed of hydrocarbon and sulphate. The study identified certain engineering designed of treatment of process waste water on oil discharged spilled over and pollution in sea water.

Key words: Oil Pollution, zooplankton organisms.

INTRODUCTION

In the marine environment uncontrolled flow of oil from well production plate form may possibly result in the pollution of the sea. Offshore production wells are invariably fitted with surface control sub surface safety valves and under water pipe lines are provided with automatic Shut off valves hence reducing leakage of oil into the sea. The effluent from production plate forms are discharge into the marine environment after adequate prior treatment in accordance with the prescribe standard are mate. The contingency of likely hood spill has to be access and adequate equipment and facilities installed.

MATERIAL AND METHODOLOGY

The predictions are made in terms of the location of likely zone of impact on the coast, the length of the affected zone about the point of impact and the likely time interval after which the spill may reach the coastline. As the wind profile exhibit two dominant components of

in terms of direction in a month, the simulations are made for each of these components. Two extreme current speeds are considered in all simulations.

If the model predictions indicate the spill reaching the coast within 22 hours of simulations for which a steady wind is assumed, the coastal extent designated by the two extremes points of simulation results is identified as the likely region of impact. It is evident that the spill shall reach the coast within this identified zone for any combination of fluctuating winds and the dominant components for a particular month of the year. For the case where the oil spill drifts away from the coast, its probable location is designated by identifying the diagonally opposite points of a rectangle within which the spill is likely to be located after 2 to 10 hours of simulation. The spreading of oil spill on sea surface with time is simulated by the semi-empirical Blokker model described On the basis of experimental observations on Bomu crude oil it is assumed that 30% of the spilled oil (the lighter fraction of the crude) gets evaporated within first hour of the spill. A value of 0,65 is found to be appropriate for the blocker constant Kb for Bomu crude which has a relative density of approximately 0,88. It is assumed that after evaporation of the light hydrocarbons the relative density of the crude approaches a value of 0,88. The relative density of sea water is assumed to be 1,05 in all simulations presented herein. NNPC 1982.

Table 1.: Monthwise wind and current speeds, direction Bomu offshore.

Month	predominant wind speed m/sec	predominant wind direction	predominant current speed m/sec	predominant current direction
January	2,86	NE (SE)	1,82 (3,25)	NE.
February	2,44	NE (SE)	1,82 (3,25)	SE.
March	2,31	SW (SE)	1,82 (3,25)	SE.
April	2,53	SW (SE)	1,82 (3,25)	SE.
June	3,36	SW	1,82 (3,25)	SW.
July	3,42	SW	1,82 (3,25)	NW.
August	3,06	SW	1,82 (3,25)	SW.
September	2,39	SW	1,82 (3,25)	NE.
October	2,64	NE,SE	1,82 (3,25)	NE.
November	3,33	NE	1,82 (3,25)	NE.
December	3,14	NE	1,82 (3,25)	NE.

MODEL APPLICATION FOR OIL SPILL WEATHERING

An oil spill undergoes a complex physical chemical and biological process which give to change of the properties of the oil spill. The essential mass transport or weathering processes are spreading, dispassions evaporation emulsification dissolution up welling of dispersed oil photo oxidation biodegradation sedimentation and consumption by planktons. The last for term for slow processes and can be neglected while predicting the weathering of an oil within a week after the spill. Spreading and evaporation are considered in this study besides the complex nature of other weathering processes. As the remaining

processes contribute to dilution and removal of the oil from the slick simple procedure is adopted for prediction of worst case impact on the coast line in the event of an oil spill. The process of spreading of the oil can be considered by means of use of the semi-empirical Blockker model. The model provides an adjustable parameter the blocker constant Kb which is an oil specific parameter and is determine by actual observation on the rate of spreading of the particular type of oil on water surface.

The model gives the oil slick radius as a function of time,

$R = (3\pi r) Kb (Pw-Pe) (Po/Pw) . V.t) ½$ 1

And the oil film thickness (h);

H= (V/r) raised to power 1/3 + (Pw/3Pe (Pw-Po) Kb) 2/3 t 23

It is assumed that the oil slick spread as in the form of a circle. The notations used are as followed;
r = oil slick radius (m)
h = oil film thickness (m)
V = amount of oil spilled (m)
t = spreading time (s) cube
Pw= density of water (kg m^{-3})
Po= density of oil (kg m^{-3})
Kb= the Blocker constant (m^3, kg^{-1}-g^{-1}).

The evaporation looses from the oil spill constitute a fast weathering process. The lighter fraction of the hydrocarbon from the spill is lost through the process of evaporation during the first hour after the spill. The extent of this looses is determined by estimation of extent of this fraction of the oil which constitutes the skill.

ENGINEERING DESIGN OF TREATMENT PROCESS 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.

CONCLUSION

The physico-chemical processes employed in the petroleum industrial waste treatment for the removal of dissolved materials are screening, coagulation, flocculation, activated carbon treatment, reverse osmosis, electro dialysis, ion-exchange, chemical oxidation, trickling filtration and activated sludge digestion.

REFERENCES

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