

LEGISLATION ON OIL POLLUTION PREVENTION AND CONTROL DURING PETROLEUM PRODUCTION

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Abstract

Malaysia has long been a victim of oil pollution well before the start of her own offshore exploitation of oil. With the effort to exploit offshore oil and gas, Malaysia has now become a contributor to pollution. Legislation has already existed for oil pollution prevention and control, along each and every stage of offshore petroleum operations which include exploration, development, production, transportation, treatment and storage. But procedures to explain the existing legislation are lacking and hence it is important to expound the existing legislation for controlling and preventing oil pollution from offshore operation in line with current practices around the world.

Introduction

Malaysia is both a victim and contributor to oil pollution. As a victim of pollution, Malaysia has long been exposed to the oil tanker traffic and the risk of oil tanker accidents. When the exploration and exploitation of hydrocarbons in the offshore areas started, Malaysia has since become producer of oil pollution, hence exposing the coastal and marine environment to this contamination.

Currently, oil exploitation activities are confined to the South China Sea off the east coast of Peninsular Malaysia, Sarawak and West Sabah⁽¹⁾ as shown in Fig. 1. Beside the oil producing platforms, there are two floating marine terminals and storage/export functions. Together with the production activities, maintenance and servicing operations, the combined picture for offshore petroleum operation is indeed busy. So the risk of operation mishaps resulting in oil pollution is great.

This paper attempts to examine the environment impact in term of oil pollution potential of various phases of petroleum exploitation, the legislation that prevent and control oil pollution from petroleum exploitation and finally the monitoring activities carried out to ensure that the legislations are abided.

Potential impact of oil pollution during petroleum exploitation⁽²⁾

The exploitation of petroleum will inevitably effect the environment and and this will be discussed in detail.

Potential impact of oil pollution during drilling stage

Many of the environmental concerns associated with drilling are common to both exploratory and development phases. Before a drilling rig is selected to drill in a particular marine environment, its strength and water depth capability must be matched to that of the environment to ensure safe operations.

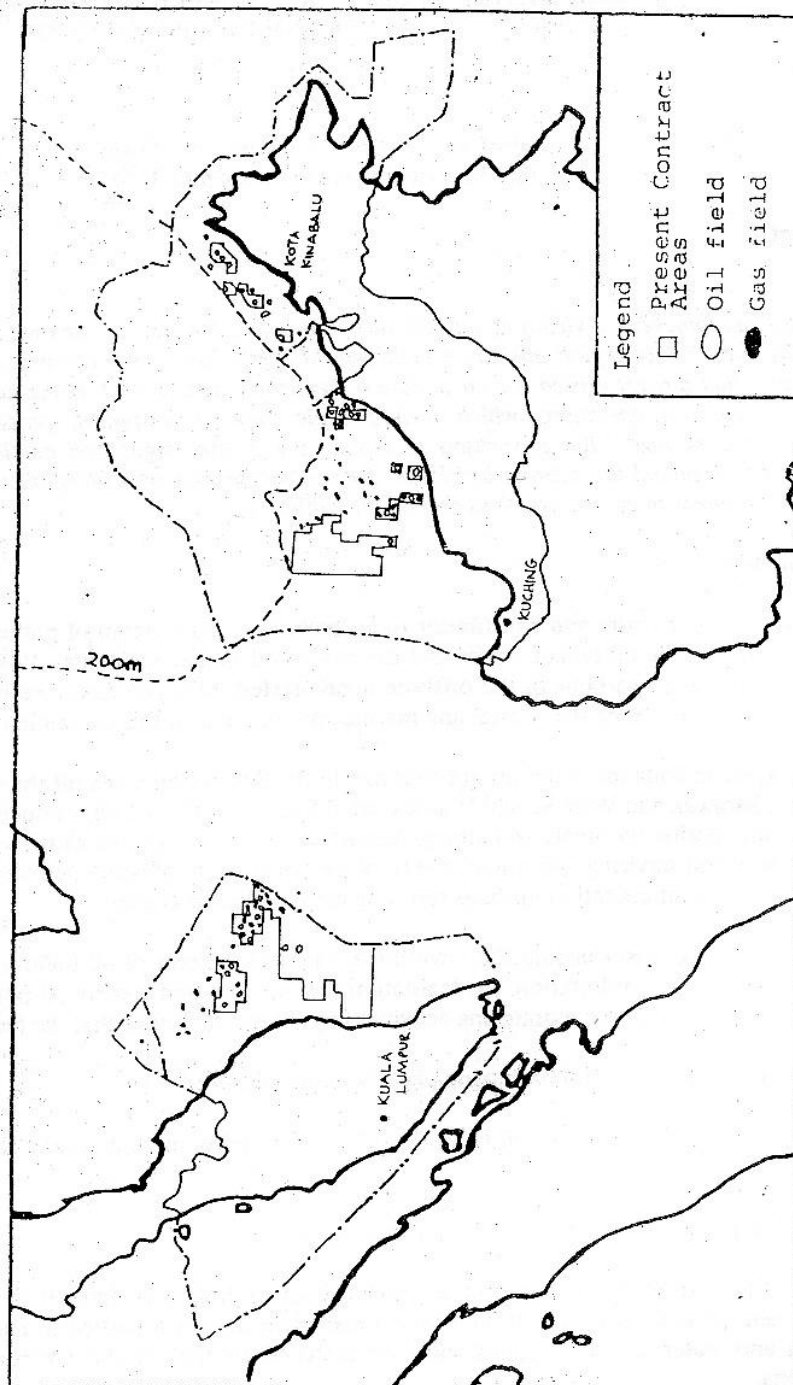


Fig. 1 : Offshore production areas in Malaysia

Once the drill bit penetrates the ocean floor, the most important aspect of drilling operations is well control to prevent a blowout which could result in oil spill. Various types of waste are produced while drilling. Drilling wastes like drilling mud residues, (with/without free oil toxic chemicals) and drilling cuttings (with/without oil and chemicals), need proper disposal to minimize impact on the environment. Deck drainages should ensure that direct discharge of oil and chemicals into the sea is avoided.

After the discovery of a field, platforms are installed and the impact of discharges from a platform during development drilling is similar to those during exploratory drilling. The only difference is that wells are drilled from a permanent platform and several wells will be drilled from the same location. Although this multiplies the discharges of drilling mud residues and cuttings, the effect are restricted to the vicinity of the platform only.

Potential impact of oil pollution during production operations

After development wells are drilled, the drilling rig is removed from the platform and replaced with oil and gas production and processing equipment. Water is normally produced in conjunction with the oil and gas, the amount increasing as the reservoir become depleted of oil and gas. The produced water is either separated in processing vessels on the platform or sent with the oil to onshore separating facilities. On the marine terminal, the bulk of the water is separated in the separation system and then further treated in the corrugated plate interceptor⁽³⁾. Primary effects of the water discharged into the sea after treatment on the marine terminal are related to its oil content (normally about 100 to 1000 ppm) and the total produced volume.

Other normal discharges from a production platform are deck drainage (with/without oil) and solid waste (with/without oil and chemicals). Water treating fluids (with/without oil and chemicals) are being used throughout production life of a field.

Damage to platform and facilities is rare but could result in a major oil spill.

Potential impact of oil pollution during offshore storage/transportation

Most offshore oil is transported by pipeline from the production platform to shore for storage, but when transfer is by ship, offshore storage facilities are needed. Environmental impact from storage facilities occurs mainly from damage to the storage unit and through spills during transshipment of oil from well to storage or storage to tanker. Damage to storage facilities and pipelines is rare but could result in a major oil spill. Transshipment leakage is more common, but generally the quantities are small and the impact is localized.

Prevention of chronic discharge from storage facilities requires the same precautions as those used for platform operation.

Potential pollution incidents related to oil transportation by tankers or barges fall essentially into two categories. Operational (deliberate discharge) or accidental operation discharges, mostly occur when oil is not separated from the ballast water before it is released into the ocean.

Potential impact of oil pollution during onshore storage/terminal

Pipeline landfalls and crude oil storage tanks are generally located in populated lowland areas. These are environmentally sensitive areas. Storage tanks need to have dikes constructed around them to confine oil-spill and visual inspection made regularly.

At the land terminal, the bulk of the water is separated and then extensively treated to meet the stringent environmental discharge requirement. The resulting effluent water contains oil with small immediate impact on the environment but the cumulative long term effect on the river life is of great concern⁽⁴⁾.

During export operation when oil is transferred from shore terminal to tankers via pipelines and Single Bouy Mooring System, the potential oil spill is through leakage.

Total impact of oil pollution during petroleum exploration

At present it is not feasible to specify the relative significance of each of these impacts, or their summed effect upon the receiving environment. Although the sources of impact can be identified, evaluating their real impact is largely speculative. One point that clearly emerges from the above somewhat general appraisal of impact of offshore petroleum exploitation is that the threat of oil pollution on the environment is great. So great care should be taken to prevent control oil pollution and this could only be possible through stringent legislation and monitoring activities. The potential environmental effects from petroleum exploitation is shown in Table 1.

Environmental Policy and Legislation⁽⁵⁾

Malaysia's overall environmental policy is to ensure that as far as possible, man's activities are in balance with his environment. Legislation and regulations have been promulgated to attain this objective. The legislation and regulation are:

- i) Merchant Shipping Ordinance, 1963, allows for control and prevention of pollution from offshore installation.
- ii) Continental Shelf Act, 1966 (revised 1972)
Part 6F provides for control of pollution of the territorial waters of Malaysia.
- iii) Petroleum Mining Act, 1966 (revised 1972)
Part 12 (1) E provides for control of effluent in the vicinity of the exploration area.
- iv) Water Enactment. Section 7A provides for control of pollution rivers.
- v) Environmental Quality Act, 1974 is the most comprehensive legislation for the control of pollution of inland waters and air. Control can be by way of licence with attached conditions or by way of limits for discharges or emission. Two sets of regulations apply; Environmental Quality (Clean Air) Regulations 1978 and Environmental Quality (Sewage and Industrial) Regulations, 1979. Section 27 also relates to control of discharge of oily mixture while Section 29 deals with discharge of wastes into the Malaysian territorial water. No set of regulation is available.
- vi) Exclusive Economic Zone Act, 1984. Section 10 provides for control of pollution of the water 200 miles off the territorial waters of Malaysia. The effluents limit is 100 ppm for offshore waters.

- vii) Petroleum Development Act, 1974 is the legislative instrument vesting in PETRONAS the entire ownership, exclusive rights, powers, liberties and privileges of exploring, exploiting and obtaining petroleum in the country. Through the Production Sharing Contract, the contractors should take necessary precautions for the prevention of pollution in accordance with existing standards or guidelines designated by PETRONAS.
- viii) Intergovernmental Maritime Consultative Organisation Treaty, implements international standards and regulations for safety of shipping and environmental protection.
- ix) Local Government Act, 1976. Provision in Part VIII for control of pollution of streams within local authority areas.

Application of Legislation to prevent and Control Oil Pollution During Oil Exploitation⁽⁶⁾

Legislation for land based facilities i.e. crude oil terminal is governed by numerous regulations especially the Environmental Quality Acts on Clean Air Regulations and the Sewage and Industrial Regulations as shown in Table 2. The stipulated level of hydrocarbon (oil) content in the effluent is 10 ppm. But the final target should be Standard A inline with advancement of treating facilities and practices of other nations of the world. The continuous dumping of effluent containing oil into the environment in the long term would effect the surrounding environment in term of water life and plant growth. For offshore based facilities, there is no rules or regulations made subsequent to the main legislation. A number of Rules and Regulations is on the drawing board to control discharges of oily mixture and solid waste into Malaysian water. The various Acts are interrelated and implementation of Rules and Regulations when they existed should be coordinated to ensure uniformity. Although there is no legal requirement of stipulated oil content level in the effluent disposed offshore, standard industrial practice in other part of the world has been adopted and imposed by PETRONAS. The oil content in the effluent disposed offshore has been set at 100 ppm. Generally the legal requirement on effluent quality is more lax at location offshore than onshore is due to restricted platform space and dilution factor on the open sea. The final objective is to reduce this criteria to reflect the advancement in treating technology. Some of our platforms are near the shoreline, hence this should be taken into consideration in future Rules and Regulations. As a guideline, the effluent limit should be in line with the Paris Convention requirement of 40 ppm (monthly).⁽²⁾

Rules and Regulations implemented should reflect those existing in neighbouring countries. There is no physical boundary existing that could stop pollution from one country entering into neighbouring countries. There should be closer regional cooperation to set up uniform Rules and Regulations. PETRONAS as the custodian of our petroleum resources should take active participation in ensuring Rules and Regulations pertaining to prevention of pollution from oily mixture and solid waste from offshore activities. But the dual role of PETRONAS as a custodian as well as a contractor could be conflicting. Hence the role of the National Petroleum Advisory Council should be important i.e. pooling of expert in the scope of petroleum pollution to work with the Department of Environment in formulating Rules and Regulation faster to ensure that our environment is not contaminated the longer the Rules and Regulation is delay, the more the environment get battered - probably to a point of no return.

Monitoring the application of legislation to prevent and control oil pollution during oil exploitation

Rules and Regulations are not enough to ensure control but monitoring, that is, abiding to the Rules and Regulations is important. Again vesting the role of a watch dog to PETRONAS could be conflicting to its dual role. So the Department of Environment (DOE) along with the other authorities i.e. the Marine Dept., the Marine Police, the Navy should be requested in monitoring. Monitoring does not stop at checking whether the laws are being abided to but it also encompassed the study of the long term effect of pollution to the environment whether the existing laws is enough to safeguard minimal changes to the environment. As a comparison, "baseline" study should be carried out as a reference to future conditions.

Laboratory studies are needed to determine the toxicity level acceptable to the environment. Toxicity level studies should not only be restricted to the contribution from oily water effluent but should encompassed the whole range of requirement in terms of the parameters stipulated in the EQA Act, 1974.

Oil spill contingency plans

No matter how stringent the preventive measures and safety precautions are, accidents will occur. It is to this anticipation and preparation when preventive measure fail and emergency situation develops that Contingency Plans are formulated and organized. These plans have come in different levels of preparedness in accordance with the expected scale and magnitude of the oil spills. The plans are company, national and regional based.

If the company-based contingency plan has failed to cope with the scale and magnitude of any spill, National Contingency Plan would have to be invoked. At present only the Straits of Malacca is covered but study is undertaken to extend it to the South China Sea where the bulk of the offshore activities is taking place. The National Contingency Plan of Malaysia is intended primarily to take care of pollutions originated from seaborne vessels. Realising the gaps of oil spills rising out of offshore hydrocarbon exploitation hitherto left unattended, the regional countries of ASCOPE have gotten together to formulate an ASCOPE Contingency Plan to deal with specifically with spills from offshore petroleum operation.

Conclusion

The exploration/exploitation for hydrocarbon is still actively moving on and a certain degree of oil pollution is inevitable. There always exist a potential risk of oil spillage in every phase of petroleum exploration/exploitation.

Malaysian policy on the environment is clear - to maintain a healthy environment. Legislation implemented show our seriousness especially Regulations pertaining to land based operations. Onshore based operation is covered by detailed Regulation but for offshore based operations detailed Regulations is non existence. Regulations should be uniformed with neighbouring countries.

Monitoring in terms of compliance is necessary to ensure the quality of the environment is maintained at an acceptable level.

Malaysia has a good degree of confidence when face with an eventual situation of major spill.

Acknowledgement

I would like to thank PETRONAS and the Department of Environment for information on existing situation with respect to legislation on hydrocarbon exploitation/exploration.

References

1. PETRONAS and the petroleum industry of Malaysia, PETRONAS Publications, 1984.
2. Gilbert, J.T.E. "Environmental Planning Guideline for offshore oil and gas development East West Environment and Policy Institute, Honolulu, 1982.
3. Yassin, Abu Azam Md. "Wastewater Treatment and disposal in an offshore petroleum exploration and production activities" 1987 International Symposium on small systems for water supply and wastewater disposal, Singapore July 2 - 4, 1987.
4. Environmental Impact Assessment by Universiti Pertanian Malaysia, Universiti Kebangsaan Malaysia and Universiti Sains Malaysia.
5. Environmental Quality Act, 1974

Environmental Quality (Sewage and Industrial Effluents) Regulations, 1979

Economic Exclusive Zone Act, 1984

Continental Shelf Act, 1966

Petroleum Mining Act, 1966

Merchant Shipping Ordinance, 1963

Intergovernmental Marine Consultative Organization on Shipping and Marine Pollution

Production Sharing Contract (extract on pollution prevention)
6. Yassin, Abu Azam Md. "Environmental legislation for the Malaysian Oil and Gas Industry" "Environmental Legislation Conference, its significance to planning and development in Malaysia, Kuala Lumpur, 24-25 April, 1987.