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AMERICAN ASSOCIATION OF PETROLUUM GEOLOGISTS
UNIVERSITY MALAYA STUDENT CHAPTER 2019/2020



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Risks and Opportunities of Unconventional Oil and Gas Extraction using the Strategic Environmental Assessment

Summarised by Muhammad Fitri Bin Mohamed Fathil

"There will be 4 phases of approach of the SEA process for UOG development to ensure its saliency, credibility and legitimacy"

Natural gas is expected to account for nearly two-thirds of the total U.S. energy production by 2040 according to EIA: Annual energy outlook 2017, US Energy Information Administration (2017) and this is mainly due to Hydraulic fracturing (fracking) that has made large reserves of previously unavailable unconventional oil and gas (UOG) resources accessible to countries across the globe.

Potential environmental and socio-economic risks are associated with the extraction of unconventional oil and gas despite the advantages of energy security and job creation that is much needed in the current era.

Internationally, the role and importance of strategic environmental assessment (SEA) have been emphasized through the endorsement of two important legal documents, namely, the European SEA Directive (2001/42/EC) and the United Nations Economic Commission for Europe (UNECE) 2003 SEA Protocol.



A SEA is a useful management tool for integrating environmental considerations at the earliest appropriate stage of decision-making, along with social and economic considerations into proposed policies, plans and programmes (PPPs) in an accountable, transparent and efficient manner.

The Ideal Strategic Environmental Assessment Process for Unconventional Oil and Gas Development

The Conceptualization Phase

The main purpose of this phase is to achieve saliency, legitimacy and credibility of this development project by doing a literature review to ensure that all the important issues and concerns are addressed in the UOG SEA. Screening and scoping during the first phase of the SEA sets the ground for subsequent analyses and discussions and prevents idle work and unnecessary delays that might result from the lack or inaccuracy of necessary information. Spatial tools such as Geographic Information Systems (GIS) can augment conventional assessment techniques (e.g. matrix-based assessments) by acting as visual mediators of spatial knowledge and by providing an effective tool for the spatial and temporal analysis of environmental impacts

The Scientific Assessment Phase

A UOG SEA should be conducted as a science-based assessment to improve understanding of the risks and opportunities of UOG development and assist governments in creating a framework and guiding principles that will inform responsible decision-making. The assessment also seeks to translate existing scientific information

into a form usable by policymakers and must be characterized by an extensive, transparent review process by both experts and stakeholders.

The Decision-making Framework Phase

This phase translates the outputs from The Scientific Assessment Phase into operational guidelines and decision-making frameworks. It should be undertaken by the Project Team in close consultation with the various affected regulatory agencies. A SEA policy guidance document should be developed to ensure implementation of policy options and guidelines for site specific assessments, in the case where Environmental Authorization applications for shale gas development are submitted to any relevant authority

The Follow-up Phase

The implementation of the SEA should be followed-up by monitoring to check whether the implementation of recommended SEA impact mitigation measures is effective. Impact mitigation aims to minimize negative impacts, optimize positive ones and insure the sustainability of the proposed action. Follow-up monitoring measures if the adopted strategic action is well implemented and monitors for any unforeseen impacts



Clay Minerals from the Perspective of Oil & Gas Exploration

Summarised by Nadhrah Azmi Shah

The clay minerals such as kaolinite and smectite are present in the targeted rocks of oil and gas exploration. During the early age of worldwide oil exploration in the 1940s, clay minerals were studied to foresee the organic rich source rock's quality as well as the generation mechanism when scientists tried to study the origin of oil and gas. Clay minerals analysis was then used as a tool in environmental determination, stratigraphic correlation and hydrocarbon generation zone identification to discover exploration target interval.

By the 1970s, clay minerals have been studied widely for diagenesis and reservoir quality prediction for the application of petrological analysis and quantitative mineralogical analysis using X-ray diffraction and during the 1980s, it is used for the determination of hydrocarbon emplacement time and petroleum system analysis.

Due to these research progresses of clay minerals, it has resulted in the exploration demands of conventional reservoirs (sandstone and carbonate rocks) at different times.

Clay minerals in source rocks are pivotal for quality assessment of hydrocarbon generation, expulsion and migration. Clay minerals help concentrate organic matter by adsorption and eventually act as catalyst to generate petroleum.

Meanwhile clay minerals in reservoir rocks gives an important impact upon reservoir properties for instance porosity and permeability which are used to evaluate reservoir quality. Geologists use clay minerals information to decipher the burial diagenetic process and reveal the pore type and evolution. Modern innovative approach such as QEMSCAN® and FIB/SEM/EDS play enormous roles in the identification and quantitative characterization of clay minerals, in which will aid to define the best brittle reservoir interval and prevent exploration failure by choosing the compatible drilling and hydraulic fluids.

To deduce, the clay minerals are vital compositions in source rocks and reservoir rocks that can generate and store oil and gas respectively. The presence of clay minerals significantly influences the physical and chemical properties of conventional sandstone, carbonate and unconventional shale.

Regionally, the clay minerals can be used to interpret and comprehend the basin evolution on tectonics, sedimentation, burial and thermal history, to infer the sedimentary environment and to correlate strata, etc.

CLAY MINERALS AS A TOOL IN ENVIRONMENTAL DETERMINATION, STRATIGRAPHIC CORRELATION AND HYDROCARBON GENERATION IDENTIFICATION ZONE...



Deepwater Horizon: The Damage Assessment of the World's Largest Oil Spill

Summarised By Camelia Batrisyia binti Mizamer

A major and widescale marine oil spill from the Deepwater Horizon (DWH) operated by BP is the largest marine oil spill industrial disaster that set about 20th April 2010 until July 2010 into the Gulf of Mexico. An estimated volume of 8% to 31% more immense discharge subdued the past largest oil spill of Ixtoc I at about 780000m³ diffused into the sea. This unforeseeable disaster after containing the flow and sealing the well still led a portion of oil into the shorelines.

In a research article, Nixon, Z. et al., (2016) had conclusively written of damage assessment of shoreline segments, habitat, oiling category and its timeline of Deepwater Horizon surface and subsurface shoreline oiling. Research was done through a series of documented surveys spanning 9545km of shoreline by mapping a quarter quadrangle (quad) boundaries across possible oil strands in Louisiana, Alabama, Mississippi, Florida and Texas. Data were supplemented by federal regulatory bodies and collected by teams deployed into the field by foot or by vessel. Primarily, Shoreline Cleanup Assessment Technique (SCAT) program as a fragment of DWH response operations (NOAA, 2013) observed oiling data of the shoreline surface by detailing oiling conditions of shorelines.

In addition, another method of describing oiling conditions are compiled from NOAA National Environmental Satellite, Data, and Information Service (NESDIS) regarding the surveillance of experimental marine pollution.

Accordingly, numbers of ground surveys or remote sensing after oil being stranded on the shoreline were conducted to strain data for date estimation and to digitize a resolution of shoreline segments in terms of days. Other than that, the depositional setting of shoreline morphology, habitat and lithological setting were considered by allocating each segment with a habitat with a previous one as an indicator. A most ecologically sensitive shoreline was designated if given a numerous primary habitat existing in the same span of time. Furthermore, a compilation of surface oiling of oiled and unoiled subsurface was recorded in frequencies. Lastly, every shoreline segment is assigned an oil exposure category in intensity and change rate of geological setting.

Resultantly, 2113 km worth of documentation was recorded of oiled shoreline. Majorly, these investigations dominates the area of Louisiana where it should be plausible to conclude that it is a surface of significant oiling. However, it contradicted the evidence which remarkably documented shoreline oiling at the beaches of Mississippi, Alabama, Florida and Texas (Table 1).

'...Deep-Water Horizon oil spill is the largest marine oil spill...!'



Oiled shoreline segments is divided into 46% beaches, 52% wetlands with a remainder of 2% of other shoreline depositional environment type. The overall shoreline exposure outlined 340 km additional and newly documented shoreline oiling from previously presented research. 210 km (62%) is from un-surveyed area by SCAT, 129 km (38%) from undocumented or undetected oiling and a balance of less than 2 km due to additional survey after 2012. These length proves that DWH oil spill is by far the largest marine oil spill.

Oiling exposures categories from DWH were divided into two and those are (1) oiling intensity spill-specific pattern, (2) and rate of oil persistence. These two are specifically descriptive of a habitat and a contrast for the measure of potential consequence of oil exposure spanning vast range of shoreline reserves. After further investigation, chemically there are correlation of petroleum hydrocarbon and aromatic hydrocarbon in sediments. However, the results are inconclusive since they are only partial of the oil mass. These are due to oil being suspended as emulsions in sea water and oil build ups in sediment.

Data concluded from the research article is comprehensively compared with data that are substantial to the DWH incident for overall accuracy. No records of oil or surveys concludes either (1) No surveys in a given oiled shoreline, (2) Location survey was prior or after oil transcend on to shoreline, or (3) Oil was present but was undetected. The causative of shoreline oiling is independent of aforementioned points since the length of shoreline exposed are an underestimate of the actual measure.

The methodology aims to improve the construction of shoreline oil exposure from DWH crossing the Gulf of New Mexico into segments and summation of patterns. It is also inclusive of rate of oil persistence. Understanding the reference and extent may assist in generating map sections and statistics. The incorporation of data from previous surveys are crucial for future predictions of oil spills with a possibility of an increased estimation of oiled shoreline provided there are sufficient data. Odds on, a more relevant characterization of oil exposures will be yield.

Kilometers of shoreline oiling by oil exposure categories and state for beaches, and coastal wetland habitats. Note that kilometers have been rounded to nearest whole digit and may not total exactly.

Exposure category	No oil observed	Lighter oiling	Lighter persistent oiling	Heavier oiling	Heavier/lighter persistent oiling	Heavier persistent oiling	Total oiled
Florida	Beaches	380	101	123	0	60	284
	Wetlands	235	0	NA	0	NA	0
	Other	26	2	NA	0	NA	2
Alabama	Beaches	29	6	60	1	69	136
	Wetlands	100	7	NA	0	NA	7
	Other	76	9	NA	1	NA	10
Mississippi	Beaches	33	22	116	1	39	195
	Wetlands	163	41	NA	3	NA	44
	Other	27	15	NA	0	NA	15
Louisiana	Beaches	118	63	39	15	90	293
	Wetlands	6178	707	NA	276	NA	1055
	Other	68	10	NA	4	NA	16
Texas	Beaches	0	57	0	0	0	57
	Wetlands	0	0	NA	0	NA	0
	Other	0	0	NA	0	NA	0
Totals	Beaches	560	248	337	16	258	965
	Wetlands	6675	754	NA	278	NA	1105
	Other	197	36	NA	5	NA	43

Table 1:
Kilometers of shoreline oiling (Marine Pollution Bulletin, 2016)

UK declares moratorium on fracking due to tremors in Lancashire

Source: The Guardian

The UK government has put a halt to fracking due large tremors which maybe caused by the UK's only active fracking site. A 2.9 magnitude quake was recorded near Cuadrilla's site near Blackpool last August which could be the biggest tremor felt due to fracking.

Fracking operations at Preston New Road started since May 2014 by oil and gas exploration company Cuadrilla for a shale gas exploration. A report released by the Oil and Gas Authority (OGA) shows recent seismic activity at the Preston New Road site which cannot rule out the possibilities of it being linked to fracking. This made Andrea Leadsom, the business and energy secretary to announce a moratorium on fracking operations in England.

Fracking is the process of drilling down into the earth before a high-pressure water mixture is directed at the rock to release the gas inside. It is a technique designed to recover oil and gas from shale rock which many environmental activists opposed as it poses several environmental concerns.

EU should drop oil, gas and coal funding, say ministers

Source: BBC News

The European Union should halt funding of oil, gas and coal projects EU finance ministers said, potentially cutting €2bn (£1.7bn) of yearly investments.

The finance ministers called upon the European Investment Bank (EIB), the EU's financing department, to cut its funding. Previously, they had only called for coal projects to be dropped. Since 2013, the EIB has funded €13.4bn of fossil fuel projects. Last year it funded about €2bn worth of projects.

Some gas projects may be excused after Hungary suggested that Croatia and Ukraine might otherwise rely on Russia, Reuters reports, citing confidential documents. Gas projects are relatively common among EU member states as they are seen as a cleaner alternative to coal and oil, and more reliable than renewable sources during winter.

The joint statement from ministers requested that the EIB and other international financing organisations like the World Bank should "phase out financing of fossil fuel projects, in particular those using solid fossil fuels, taking into account the sustainable development, and energy needs, including energy security, of partner countries". Protests against fossil fuels have intensified in recent years, and activists who are members of the Extinction Rebellion (an organization that aims to "peacefully occupy the centres of power and shut them down") group are demanding governments declare a climate emergency and want the UK to commit to reducing carbon emissions to net zero by 2025.

Internationally, Extinction Rebellion estimates an additional 400 of its activists have been arrested since 31 October 2018, including about 70 in New York City. The finance ministers' request will need to be agreed by the EIB board, which meets on 14 November.

Current Issues

Word Search

Word Search is based on bulletins above

CARBONATE
DEEPWATER
EMULSION
HYDROCARBON

S A N S Y R L D F I R Q A T T I Y B
M N K D D S L Q D C M E X I C O P K
E L O A E E A U U J A N A R Z Y X I
C D V T O F E N A A B R D N Y T R I
T P K N W L D P D P D A B W I Q Q K
I F S V J B I V W S D R W O B Q N Z
T R Y Q O X K N D A T U A E N E S T
E K N K J C C Q I J T O X N V A N W
K W K P I E M G V T A E N G G B T J
C C E M U L S I O N E S R E B L W E
S S E D I M E N T A T I O N K N E H
A I H Y D R O C A R B O N U V A W F

KAOLINITE
SANDSTONE

SEDIMENTATION
SMECTITE

MEXICO
QUADRANGLE

Job Vacancies

1

Helms Geomarine Sdn Bhd
Offshore Laboratory Technician
Location: Kuala Lumpur, MY
Source: <https://bit.ly/2qLM1l1>

4

Exact Analytical Sdn Bhd
Sales Engineer
Location: Puchong, Selangor, MY
Source: <https://bit.ly/2O7oyDr>

2

ExxonMobil
Internship
Location: Kuala Lumpur, MY
Source: <https://bit.ly/2KjZFWX>

5

Miclyn Express Offshore Pte Ltd
Crewing Executive
Location: Miri, Sarawak, MY
Source: <https://bit.ly/2phdJcz>

3

Qatar Petroleum
Senior Strategy Analyst (Oil and Gas)
Location: Qatar
Source: <https://bit.ly/2QbUfBb>

6

Subsea 7 Malaysia Sdn Bhd
CAD Designer
Location: Kuala Lumpur, MY
Source: <https://bit.ly/34Vc8Z5>

Posters of Geology Activities in Nov 2019

November Activities

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3 RD PRIZE : RM750
3 CONSOLATION PRIZE :
RM 300

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Geopark Lembah Kinta Fun Run
Pertandingan Tarik Tali
Geopark Talk
Pekan Kartun
Persembahan Kebudayaan
Pameran & Jualan
Aktiviti berkaitan Geopark

Geopark Lembah Kinta geoparklembahkinta

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