

Efficiency of Mitigation and Monitoring in Environmental Impact Assessment

K. Swangjang and S. Cumkhett

Abstract— Petroleum Exploration and production directly affects the impacts to natural resources; thus, proficient environmental management is required. Mitigation and monitoring measurements resulted from environmental impact assessment are one of effective environmental control mechanism, however, the compliance is necessary. This research aims to investigate the effectiveness of mitigation and monitoring compliance of petroleum exploration and production projects. The findings indicate that the implementation of mitigation was mostly in satisfactory level. The performance of monitoring was sufficient complied.

Keywords — EIA follow up, mitigation measurement, monitoring measurement, petroleum exploration and production project.

I. INTRODUCTION

Petroleum exploration and production is one of the activity being determined to require environmental impact Assessment (EIA). Mitigation and monitoring is significant measurements to control environmental impacts. The process is also well-known worldwide. However, the effectiveness of both mitigation and monitoring depends on their implementations.[1]

This research aims to investigate the post-environmental impact assessment, known as EIA follow-up. The effectiveness of mitigation and monitoring measurements was considered. Petroleum exploration and production projects at Buang Katiem A : BKM-A and Nong Pak Chee – A : NPI-A (Figures 1) were used as the case study.

This study emphasizes the results of project's environmental mitigation and monitoring measurement. There are many previous researches concerning EIA follow up; for example, Saunders and Arts [2], Ahammed and Nixon [3], Marian Cameron [4], W.B. Abebe et al. [5], Sarah Njoki Macharia [6]. Those insisted the importance of the effectiveness of mitigation and monitoring as project control mechanism resulting from environmental impact evaluation.

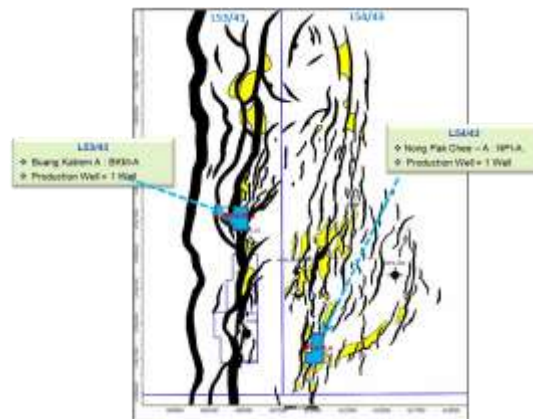


Fig. 1. Study area.

There are also some problem regarding Thai's EIA system, especially during the process of EIA study. The weak points of impact evaluation have been found in many projects required EIA. Consequently, incomplete and unsuitable environmental impact control measurement for both mitigation and monitoring are found. These results affect the outcome of implementation and the effectiveness is unsatisfactory. Consequently, it results to lose the resource, above all it will be lack of sustainable development.

This project investigated how much effectiveness of project implementation. The results could be used as the feedback to improve the effectiveness of control measurement and implementation approach for other projects in the future. Moreover, it could be one of the approaches for project planning through impact monitoring. It can guarantee for long – term sustainable development, and worth resource using.

II. METHOD

As this research, EIA follow-up is aimed. According to the results of the environmental impact statements (EISs) of petroleum exploration and production projects at land exploration area, L53/43 and L54/43, Suphanburi Asset, mitigation and monitoring specified in EISs were used as the implementation information undertaken by project proponent company. The performance of mitigation and monitoring was scored according to project compliance. Average scales were divided into interval class to explain the results of information. The translation of the meaning of effectiveness for each interval class as below.

$$\begin{aligned} \text{Class amount} &= \frac{5-1}{5} \\ &= 0.8 \end{aligned} \quad (1)$$

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The effectiveness of environmental monitoring and translate form the point level was averaged, as following [7]

Average point 4.21 – 5.00 means the excellent implementation.

Average point 3.41 – 4.20 means good implementation.

Average point 2.61 – 3.40 means moderate implementation.

Average point 1.81 – 2.60 means less effective implementation.

Average point 1.00 – 1.80 means the poorest implementation.

The investigation of project compliance was done by documentary analysis. Implementation Report by Solving Measurement and Environmental Impact Reduction (Mitigation) and Implementation Report by Project Environmental Quality Monitoring Measurement are the main reports used. The effectiveness of mitigation and monitoring was analysed.

A. The effectiveness of environmental mitigation

Mitigation implementation of Buang Katiem A : BKM-A and Nong Pak Chee – A : NPI-A was investigated. The levels of compliance were as below [8]

Level 5 for Full Compliance: FC means project completely implements according to the regulation.

Level 4 for Partial Compliance: PC means project partially implements according to the regulation

Level 3 for Comparable Compliance: CC means project comparable implements according to the regulation

Level 2 for Not Applicable: NA means project's status does not concern with project's regulation.

Level 1 for Non-Compliance: NC means project do not implement to the regulation, including to having not the other management.

B. Study the information of environmental monitoring

Percentage of monitoring implementation was considered. The specification of environmental parameters included in EISs, as following; ambient air quality, effluent air quality, noise level, surface water, aquatic ecology, underground water, insect and occupational health and safety, were investigated their monitoring compliance.

III. RESULTS

A. The effectiveness of environmental mitigation

Mitigation implementation of Buang Katiem A : BKM-A was considered its effectiveness. It was found that the measurement was in satisfactory level since 2011 – 2015, with the scores of 4.48, 4.48, 4.54, 4.54 and 4.54, respectively (Table 1).

TABLE I: BUANG KATIEM A : BKM-A

Rating Criteria	Year of operation									
	2011		2012		2013		2014		2015	
	item	Score	item	score	item	Score	item	score	item	score
5	51	255	51	255	53	265	53	265	53	265
4	2	8	2	8	0	0	0	0	0	0
3	0	0	0	0	1	3	1	3	1	3
2	9	18	9	18	9	18	9	18	9	18
1	1	1	1	1	0	0	0	0	0	0
Summary	63	282	63	282	63	286	63	286	63	286
Full score	315		315		315		315		315	
average score	4.48		4.48		4.54		4.54		4.54	
Means	Compliance measures are the most effective.									

Level 5 which is the full compliance was found with the highest percentage (82.86%). However, the non-applicable, level 2, was found with the percentage of 14.29. For the others, around 1% more or less were detected, as illustrated in the figures 2.

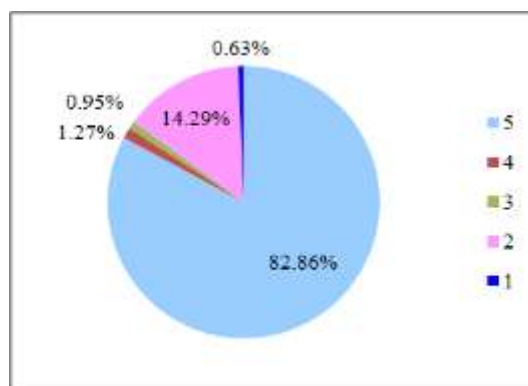


Fig. 2. Mitigation implementation levels of Buang Katiem A : BKM-A

The results of mitigation implementation of Nong Pak Chee – A : NPI-A are showed in Table 2. The compliance levels during 2012-2016 have been in satisfactory levels, with the scores of 4.48, 4.63, 4.63 and 4.54, respectively.

TABLE II: NONG PAK CHEE – A : NPI-A

Rating Criteria	Year of operation									
	2011		2012		2013		2014		2015	
	item	score	item	Score	item	Score	item	score	item	score
5	0	0	51	255	55	275	55	275	53	265
4	0	0	2	8	0	0	0	0	0	0
3	0	0	0	0	1	3	1	3	1	3
2	0	0	9	18	7	14	7	14	9	18
1	0	0	1	1	0	0	0	0	0	0
Summary	0	0	63	282	63	292	63	292	63	286
Full score	0		315		315		315		315	
average score	0.00		4.48		4.63		4.63		4.54	
Means	Compliance measures are the most effective.									

As to Nong Pak Chee – A : NPI-A , the highest mitigation compliance was found for level 5, with the percentage of 84.92. The following was level 2, with 12.70%. For the others, the compliance is insignificant levels (Figures 3).

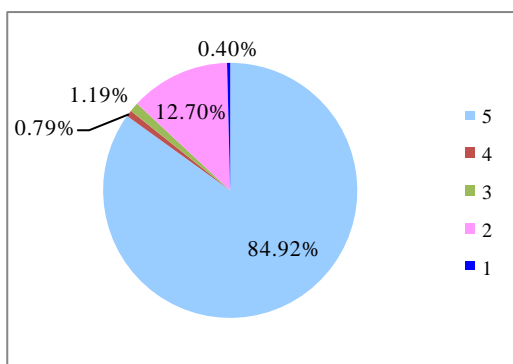


Fig. 3. Mitigation implementation levels of Nong Pak Chee – A : NPI-A

The results can explain that both project areas present the most effectiveness for environmental mitigation at level 5 score, and the least is level 1. For the disappearance, it was occurred from the project's implementation status, not concern with the measurement

B. The effectiveness of environmental monitoring

The study according to environmental monitoring implementation of Buang Katiem A : BKM-A and Nong Pak Chee – A : NPI-A consider the follow-up of environmental monitoring specified in EISs, including environmental parameters, frequency and stations. It was found that Buang Katiem A : BKM-A complied monitoring specification in high level, with the percentage of 85.63%. For the others, the ignorance was found by not implemented (8.38%), not analyzed the index (6.00), as illustrated in figures 4

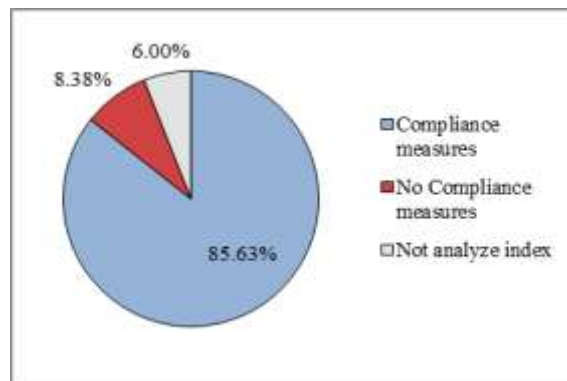


Fig. 4. Monitoring implementation of Buang Katiem A : BKM-A

For Nong Pak Chee – A : NPI-A, the implementation was satisfactory with the percentage of 86.50%, not implement by measurement 6.75%, not analyze the index 6.75 % (Fig.5).

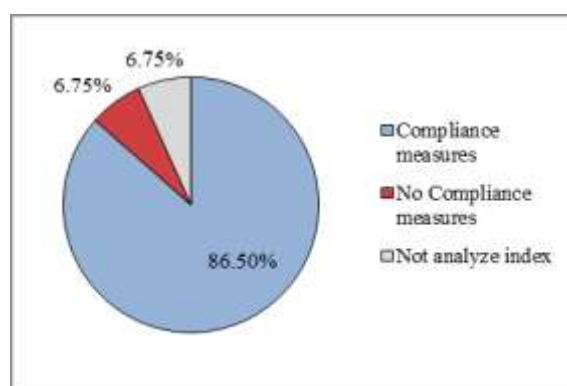


Fig. 5. Monitoring implementation of Nong Pak Chee – A : NPI-A

IV. CONCLUSION

From the research, it can be concluded the effectiveness of environment mitigation and monitoring as following

For mitigation, it was found that Buang Katiem A : BKM-A and Nong Pak Chee – A : NPI-A effectiveness of environment mitigation implementation is in satisfactory level. Although, there were some lacking, these were not directly concerned with project implementation. These are for examples, in the production phase, natural gas is not found resulting to the missing of gas burning; thus, it was not necessary to control the gas burning for installation, equipment checking, toxin quantity recording, suggestion receiving and compensation for gas burning. It was still found that at the earlier phase of project, there is not responsible officer for public relation to the community, only the letter detailed preliminary project development distributed. Moreover, it was also found that some measurement was not used; for example, gas detector in the production station.

As to the pre-project development, the information was not available because the responsibility is not directly with the officers.

For monitoring, the study was found that monitoring implementation of both Buang Katiem A : BKM-A and Nong Pak Chee – A : NPI-A is in satisfactory level, with 80% of compliance. The incompliance was happen in the first year of production phase. These are the ignorance of ambient air

monitoring and lacking of insect survey. not check the air quality in the atmosphere, not keeping the insect example in the first year of production. Unlikely with Nong Pak Chee – A : NPI-A case, the ignorance of ambient air quality monitoring was come from technical error with the problem of location of station.

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