

# THE LEGAL MEASURES AGAINST ONSHORE NATURAL GAS PIPELINE RIGHT-OF-WAY ENCROACHMENT

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## Introduction

A natural gas pipeline is the most effective means of transporting gas locally or over long distances. The natural gas is required to be transported over long distances from the production site to the places where it is used. Natural gas pipelines are used throughout the natural gas pipeline network system, from the location of production where gas is collected to the point where it is used in houses or businesses. The pipelines have three different forms and each of them serves a different purpose within its network.<sup>1</sup>

The natural gas pipeline system is a vital infrastructure of natural gas business and has been well accepted as one of the most important efficient and safe systems. As the system has been unceasingly developed, the gas pipeline is aimed to deliver a substantial amount of natural gas which is ready to use and generates a saving of transportation. Both road and waterway traffic problems as well as accidents can be lessened. Most of all, the project can help alleviate the air pollution. In the long term, the natural gas pipeline will be the most efficient gas transmission system and more

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<sup>1</sup> Springer International Publishing Switzerland., “Transmission and Distribution Systems and Design,” Natural Gas Engineering and Safety Challenges Downstream Process, Analysis, Utilization and Safety, (2014).

cost-effective than other modes of mass transportation system. In addition, the project causes no environmental effect during gas transmission.<sup>2</sup>

To construct gas pipeline, most of which is on the land that privately owned and the most important element is gas pipeline right-of-way. Gas pipeline right-of-way is strip of land, under which a pipeline is buried in order to operate and deliver clean, affordable natural gas, must cross under land.<sup>3</sup>

Since it is considered as the extended along, across, below and above the gas pipeline where some of property owner's legal rights are granted to pipeline operator to enable natural gas pipeline operator to install, operate, maintain, repair and protect gas pipeline within such area. Besides, granting rights to pipeline operator it also has the effect of partially restricting the rights of land owner to use of that part of the land affected by natural gas pipeline right-of-way.<sup>4</sup>

Generally, property owners are prohibited from constructing any structures or performing activities that could be an obstruction or harm to the natural gas pipeline. An unauthorized structure or activity within gas pipeline right-of-way is known as natural gas pipeline right-of-way encroachment. When property owner installs structures, trees or other facilities on the natural gas pipeline right-of-way without an authorized permission, these encroachments may interfere with natural gas pipeline operations, which lead to major pipeline incidents resulting in loss of life, serious injury and/or major property damage that cost tremendous amount of money.<sup>5</sup>

Thailand has the law that governs gas pipeline operations, it is the Energy Industry Act 2007 (B. E. 2550). Besides it regulates energy industry, by providing

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<sup>2</sup> Pipeline Safety TRUST, Pipeline Basics & Specifics About Natural Gas Pipelines, (Pipeline Briefing Paper#2, September 2015), pp.3-4.

<sup>3</sup> Phillips 66 Pipeline LLC, "Answers to commonly asked questions & guidance for those living or working near a Phillips 66 Pipeline LLC pipeline" Pipelines & Right-of-Ways, pp.1-2.

<sup>4</sup> Federal Energy Regulatory Commission, "Notice to Landowners", Blanket Certificate Program, (June 2007).

<sup>5</sup> Phillips 66 Pipeline LLC, "Answers to commonly asked questions & guidance for those living or working near a Phillips 66 Pipeline LLC pipeline" Pipelines & Right-of-Ways, pp.1.

responsibility for prevention of abuse of power and protection of energy consumers and those adversely affected from the energy industry operation. This law also has provisions which protect natural gas pipeline network system from any encroachment that may cause danger or may be an obstacle to natural gas pipeline network system and its measure against an encroachment. Such measure is founded in Section 112 of the Energy Industry Act 2007 ( B.E.2550), as the only way to prevent natural gas pipeline right-of-way encroachment do have some weak points. Hence, in the present, Thailand is still facing the natural gas pipeline right-of-way encroachment problem. The writer views that the fact that there is only one provision as a measure towards solving the natural gas pipeline right-of-way encroachment problem is insufficient to reduce the natural gas pipeline right-of-way encroachment problem in Thailand effectively.

## **Problem of the Study**

There are problems divided into three aspects that cause natural gas pipeline right-of-way encroachment in Thailand which are:

### **1. Legal Problem**

The rationale behind section 112 of the Energy Industry Act 2007 (B.E.2550) takes into account for two important principles which are 1) prevention measure 2) refraining measure as follow;

First, preventive measure in which any person wanting to do any activity that may harm or may be an obstruction to natural gas pipeline right-of-way shall be granted permission to commit any act in the gas pipeline right-of-way area by the Office of ERC in advance so that the competent official could consider the effect of such act on the natural gas network system. The study shows that the provision has a flaw as to be discussed, which is it can be seen that the officer performs his duty in reactive way, he unable to perform his duty unless there is a reception of application for permission from excavator first. This is the problem of the case where excavator do not know the existence of natural gas pipeline or the exact location of the pipe in that area, or his duty to ask for a permission that required by the law, hence excavators

do not apply for permission required by section 112 paragraph 1 of the Energy Industry Act 2007 (B.E.2550) before doing activity within natural gas pipeline right-of-way. Although, in practice, operator performs regular patrol along the pipelines and warn excavator who conducts activity within natural gas pipeline right-of-way without permission. But in Thailand, there is no law at present that stipulate operator to provides program in the way that raise awareness and knowledge of people about the information of natural gas pipeline transportation and its safety.

Second, the administrative measure under section 112 of the Energy Industry Act 2007 (B.E.2550), as a refraining measure, is the only measure to counter natural gas pipeline right-of-way encroachment in Thailand. The study shows that the provision has a flaw as to be discussed as follows: 1. Such measure has not prescribed a clear and certain enforcement process yet as it just briefly prescribes that the administrative measure in pursuant to the administrative procedural law shall be enforced in case of any act committed in the natural gas pipeline right-of-way area without permission, or with permission but violating permission, or condition of permission resulting in the problems of an officer as to whether he could use his power to immediately withdraw the object encroaching the natural gas pipeline right-of-way or he should wait for an administrative order first<sup>6</sup>; 2. The enforcement of administrative order such as withdrawal, cutting off, access to private-owned land, are acts that have a direct impact on people in the area, causing the work to be risky to cause damage to life and property of the officer undertaking such work. It is also risky to lead to a confrontation with the community along the gas pipeline line; 3. Although the advantage of imposing the administrative measure, which called self-help mechanism, it is the time-efficiency of work for the prompt prevention of any danger to the gas pipeline, such measure solves the problem at its surface. In other words, the administrative measure be imposed upon an existence of violation of law.

As the negative result as described above. Therefore, the administrative procedure shall be the last option in order to avoid the violence impact between operator and excavator. Instead, the program which ease the way of operator to provide consult to excavator relating to the existence of natural gas pipeline and its safety with such activity should be encouraged.

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<sup>6</sup> Article 5 of *Administrative Procedure Act*, B.E. 1996 (B.E.2539)

## 2. Excavator

An excavator means any person who wishes to commit any activity within the area of natural gas pipeline right-of-way such as a land owner, possessor, as well as those who make use of lands belonging to others without any right, in which such activity would possibly cause a danger or an obstacle to the natural gas pipeline. Any act committed without permission or without compliance to the permission, or with violation to permission condition in the area of natural gas pipeline right-of-way, might either directly or indirectly cause damage to the natural gas transportation system is called “natural gas pipeline right-of-way encroachment”. The study shows that one of the factors of such problems can be considered as follows: 1. The excavator unaware of the existence of natural gas pipeline transportation, the safety of gas pipeline transportation, and the guideline for residents or people making use of the land under natural gas pipeline right-of-way area; 2. People lack of sufficient information about the natural gas pipeline in the area of their residence or use such as natural gas pipeline location, the depth of natural gas pipeline, the width of natural gas pipeline right-of-way due to the absence of location specification, or information of natural gas pipeline in a land title deed at all; 3. People has no awareness enough of his legal duty not to cause any obstacle to the natural gas pipeline right-of-way; 4. People usually see that the public safety is out-of-reach and they do not cooperate with officers or operators as the case should be.

The aforementioned factors are the causes of an act committed without permission from a regulatory authority in the area of natural gas pipeline right-of-way, and with no comment and risk analysis of engineering safety of such act to the natural gas pipeline, the specification of natural gas pipeline location, as well as the cooperation by means of regulation to ensure that the operation is of the highest safety level, possibly causing damage to the natural gas pipeline or obstacles to the natural gas pipeline right-of-way.<sup>7</sup>

By considering that in Thailand there is only the law that requests person who wanting to do any activity that may harm or may be an obstruction to natural gas pipeline right-of-way applying for permission to commit any act in the natural gas

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<sup>7</sup> PTT Public Company Limited, “Safety of Natural Gas Pipeline System,” Natural Gas Knowledge, Unit 3: p.5.

pipeline right-of-way from the Office of ERC in advance so that the competent official could consider the effect of such act on the natural gas network system. But there is the problem which is in case of transferring of ownership or possession of the land to a third person, the transferee rarely knows the existence of the gas pipeline or the exact location of the gas pipe in their land because of besides the sign warning post, he cannot access to the information about natural gas pipeline buried beneath the land transferred to him. Leading the unawareness of the existence and exact information of natural gas pipeline in their lands. Consequently, to the problem of natural gas pipeline right-of-way encroachment. This problem can be address if the person knows the existence and information of natural gas pipeline in such area by the information provided by operator through encouragement program that raise awareness of people either in particular or wide area about the existence and information of natural gas pipeline, its safety, the guideline of best practice near natural gas pipeline etc.

### **3. Operator**

Natural gas pipeline operator has a duty to effectively and safely transport natural gas via pipeline, he plays an important role in the advertisement of information and news to people residing in or using the land in area where natural gas pipeline crosses. In the part of the operator, the main problem of natural gas pipeline right-of-way encroachment can be explained as follows: The study found that there is no law that prescribe the duty to record the information or direction of natural gas pipeline installation in a land title deed in Thailand at all, and after the completion of natural gas pipeline construction, some of the operator's detailed document identifying information about the natural gas pipeline such as the location and direction of natural gas pipeline, the depth of natural gas pipeline, the width of natural gas pipeline right-of-way for the land owner or others with rights vested in the land are rather complicated, causing these people difficulty to clearly understand about the information of the natural gas pipeline. Moreover, this is the problem of the case where there is transfer of ownership or possession to a third person in the future, because the transferee rarely accesses to the information about natural gas pipeline buried beneath the land transferred to him.

By considering that section 112 of the Energy Industry Act 2007 (B.E.2550), the role of operator is a commentator concerning the safety of natural gas pipeline for the Office of ERC's consideration on the permission granting. It can be

seen that the operator performs his duty in such reactive way, he unable to perform his duty unless there is a reception of application for permission from excavator first. Although, in practice, operator performs regular patrol along the pipelines route and warn excavator who conducts activity within natural gas pipeline right-of-way without permission. But there is no law at present that stipulate operator to provides program in the way that raise awareness and knowledge of people about natural gas pipeline transportation and its safety. Therefore, it shall be the law that stipulate operator to provide program that raise awareness and knowledge for stakeholders such as landowner, officer, community or people who live vicinity of natural gas pipeline about natural gas pipeline, its safety, and the best practices guideline for who live vicinity to gas pipeline area. Such program should be a minimum standard for operators to comply with, leading to the effective cooperation of operator and stakeholders. Consequently, the reduction of natural gas pipeline right-of-way encroachment and enlargement of the legal compliance.

## **The Legal Measures Against Gas Pipeline Right-of-Way**

### **Encroachment in the United States**

There are many reasons that the writer selects the preventive measure of the natural gas pipeline right-of-way encroachment in the United States as a model for making comparison to that of Thailand as follows:

1. The United States has a good management system of natural gas pipeline transportation rendering them to manage all natural gas pipelines spreading over the country that are way longer than the ones in Thailand effectively. Because the United States establishes standard protocol to prevent natural gas pipeline right-of-way encroachment;<sup>8</sup>

2. The United States has a long and continuous history and development of the prevention of natural gas pipeline right-of-way encroachment problem by prescribing measures as laws for compliance;<sup>9</sup>

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<sup>8</sup> Pipeline Safety TRUST, Pipeline Basics & Specifics About Natural Gas Pipelines, (Pipeline Briefing Paper#2, September 2015): pp.1-2.

<sup>9</sup> Pipeline Safety TRUST, Pipeline safety statutes, regulations, consensus standards, recommended practices, (Pipeline Briefing Paper#4, September 2015): p. 3.

3. The management system of natural gas pipeline transportation including safety measures of natural gas pipeline in Thailand mostly follows the model of the United States;<sup>10</sup>

4. The United States sees the importance of the knowledge in relation to the safety of natural gas pipeline to people as encouraging and supporting measures are prescribed by laws in order to raise awareness of people, which called “public awareness program” that an operator creates a program enhancing the awareness of people in relation to the safety of natural gas pipeline transportation, by providing knowledge and information to people involved. This, in turn, leads to an understanding and cooperation of all parties involved on the purpose of safe and effective natural gas pipeline transportation. In addition, the program also builds good relationship between the operator and people in the area of natural gas pipeline. While this triggers people to think of the gas pipeline operator first when they want to conduct any activity in the natural gas pipeline area, the operator could access to information in relation to such conduct in the gas pipeline area necessary to the consideration of engineering safety standard of such activity – reducing the natural gas pipeline line encroachment problem as well as the harmony between the natural gas pipeline transportation system and people residing in the area.<sup>11</sup>

The study found that the United States’ regulations, which states about the measure that raising an awareness of people about a natural gas pipeline transportation and its safety, with its objective to provide knowledge and understanding about the natural gas pipeline transportation and to ease the natural gas pipeline right-of-way

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<sup>10</sup> ASME's B31.8 refers to Gas Transmission and Distribution covers the design, fabrication, installation, inspection, testing, and other safety aspects of operation and maintenance of gas transmission and distribution systems, including gas pipelines, gas compressor stations, gas metering and regulation stations, gas mains, and service lines up to the outlet of the customer’s meter set assembly. The scope of this Code includes gas transmission and gathering pipelines, including appurtenances, that are installed offshore for the purpose of transporting gas from production facilities to onshore locations; gas storage equipment of the closed pipe type that is fabricated or forged from pipe or fabricated from pipe and fittings, and gas storage lines.

<sup>11</sup> American Petroleum Institute, “Public Awareness Programs for Pipeline Operators,” API Recommended Practice 1162, (First Edition, September 2003).



encroachment problem through the program called “Public Awareness Programs”, provided in Part 192.614 to Part 192.616 of Title 49 Code of Federal Regulation (49 CFR). The crucial principle serving as the beginning of the cooperation of each party are providing knowledge and understanding about the natural gas pipeline transportation, the objective of transportation, the safety of natural gas pipeline transportation, right and duty of each party according to law that will facilitate the safety and effectiveness of the natural gas pipeline transportation, as well as the awareness of social responsibility for the public interest. Which consist of three components as follows:

**Damage Prevention Program (49 CFR Part 192.614)<sup>12</sup>**

This provision is one of the minimum standards of the United States law that prescribes the operator duty to provide a preventive program of natural gas pipeline from any act conducted in the natural gas pipeline area that might cause damage or an obstacle to the natural gas pipeline transportation management. This includes but not limited to the use of blasting, excavation, the improvement of land surface by machinery or explosion, etc. The general duties of the operator are as follows:

1. To gather information in relation to people who usually commit an act that may be dangerous or obstructive to the natural gas pipeline area;
2. To warn people residing in the natural gas pipeline area including excavators about the objective of the program and the initial examination of natural gas pipeline location in order to raise the awareness among these people of the damage prevention program of natural gas pipeline from any act in the natural gas pipeline right-of-way area;
3. To provide a channel for gathering and recording information about any activity in the natural gas pipeline right-of-way area;
4. In case where the natural gas pipeline is in the area where an act that could possibly cause damage or an obstacle to the natural gas pipeline right-of-way is usually committed, there should be the specification of natural gas pipeline location and the initial examination of the natural gas pipeline location;

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<sup>12</sup> Part § 192.614, Title 49 of the Code of Federal Regulations

5. To provide the specification of the temporary location of natural gas pipeline or a warning sign before such activity in the natural gas pipeline right-of-way area is conducted.

Upon the consideration, it is of the view that such provision is the prevention of danger or an obstacle that could happen to the natural gas pipeline arising from an activity that could cause damage or an obstacle to the natural gas pipeline right-of-way. It puts the operator in an active working status. The operator has to create a program that provide people to aware of the existence of natural gas pipeline in their areas. In this way, an activity to be committed in such area will be required extra care comparing to a normal case, and this also creates a channel for the information exchange between the operator and any person wishing to conduct any act in the natural gas pipeline area, such as information of excavator, type, procedure, characteristic, activity plan to be executed, information of natural gas pipeline location, the depth of natural gas pipeline, the size of natural gas pipeline, as well as other facilities in relation to the natural gas pipeline transportation, which are important information for the consideration and safety assessment of work to the natural gas pipeline. It also states that the operator will have to communicate with many people residing in the natural gas pipeline area, which would increase an opportunity of the communication between the operator and people. This creates the understanding and awareness of the existence and safety of natural gas pipeline in the area among people receiving these information, which if there is any activity conducted in the natural gas pipeline right-of-way area, the safety of natural gas pipeline is the first priority that the excavator will have to take into account and notify such activity request to the operator so that he could investigate. This would be more beneficial than waiting for people one-sided to be the only ones who contact to the operator in order to notify or give information. With the cooperation of all parties involved such as operator, excavator in natural gas pipeline area, government agency, etc., for the development and foundation of such program to be effective in terms of communication from the beginning of natural gas pipeline activity to its completion, the risk of natural gas accident from such activity could potentially be reduced.

By considering that such provision can improve operator's abilities to manage natural gas pipeline right-of-way, prevent encroachment problems and prevent gas pipeline damage from excavation activity in Thailand in many aspects as follow;

1. Operator do have ability to perform his duty in more active way that reach people and excavator in the area of natural gas pipeline in order to achieve and record information of excavator, activities plan, or to notify people of gas pipeline in their area, or warn excavator of how their activity affect gas pipeline, and mark the exact gas pipe location beforehand.

2. Gain the opportunity for operator to communicate with people residing vicinity to natural gas pipeline and excavator who want to do any activity within the natural gas pipeline right-of-way, and to exchange their information and contact that could be an advantage for managing gas pipeline right-of-way properly.

3. Raise awareness, knowledge, cooperation, better relationship of people residing vicinity to natural gas pipeline area and excavator who want to do activity within natural gas pipeline right-of-way

4. Eliminate the gap between excavator and operator to make them aware of natural gas pipeline, its safety, gain ability to initial examination of the natural gas pipeline location in their area, and notify to officer or operator prior to conducting their activity.

#### **Emergency Planning (49 CFR Part 192.615) <sup>13</sup>**

Such provision prescribes the operator duty to provide a plan in dealing with emergency event that might happen to the natural gas pipeline transportation system. This can be considered in three important components as follows:

1. The operator shall provide a management plan for emergency cases, as well as the readiness of staff, equipment, procedures of gas pipeline transportation shutdown, notification to firefighter, police officer, or related government agencies, and remedy, etc.;

2. Such plan shall be submitted to all people involved such as executive officer and officer. Everyone shall be trained and assessed as to whether or not they could actually execute such work according to the program;

3. The operator shall provide a coordinator to liaise with such government agencies involved as firefighter, police officer, and other government agencies in relation to the work execution and preparation to deal with emergency events.

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<sup>13</sup> Part § 192.615, Title 49 of the Code of Federal Regulations

Providing that this provision is complied with, governments agencies involved will obtain information necessary for the effective consideration of the management plan and assessment of emergency events. The routine of joint training among officers involved leads to senses of activeness and familiarity to promptly deal with emergency events once there is an emergency event in the natural gas pipeline area under their responsibility. This further build good relationship and professional training between the operator officers and the officers of those government agencies, for the preparation to effectively deal with an accident.

By considering such provision that can improve operator's abilities to manage natural gas pipeline right-of-way, prevent encroachment problems and prevent gas pipeline damage from excavation activity in Thailand in many aspects as follow;

1) these officer is close to people and reliable. The operator provides knowledge and emergency training on the natural gas pipeline, and necessary information about natural gas pipeline in those areas, safety practice of natural gas pipeline transportation. The officer could further pass on this knowledge to the community and public.

2) To make officer and operator staff to familiar with the training program in order to counter with the further emergency event with high capability.

#### **Public Education (49 CFR Part 192.616)**<sup>14</sup>

Such provision prescribes the duty of an operator to create a program providing knowledge to people involved such as people in the local area who are prone to be affected, local government agency, disaster service agency, and excavator in the natural gas pipeline area, by taking into account the content of appropriate message, communication method, and communication frequency. In this regard, the operator should focus on knowledge in the following aspects:

1. The program of the operator shall be in compliance with the standard of American Petroleum Institute Recommended Practice 1162 (API RP 1162), by taking into account the specific characteristics of those natural gas pipelines. The operator shall comply with the program standard of APP RP 1162 as well as the main and additional measures. The program shall provide the communication that focus on

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<sup>14</sup> Part § 192.615, Title 49 of the Code of Federal Regulations

the provision of knowledge to people in general, government agency, and excavator in the natural gas pipeline area. The content of which should be related to: 1. The use of one-call system prior to the activity in the natural gas pipeline line, 2. Danger that might arise from the transmission of gas by accident, 3. Warning sign of such gas release, 4. Procedures to maintain the public safety in case of gas release, and 5. Measure to notify such event;

2. To create a recommended activity and to provide knowledge to community, school, business, and resident in the natural gas pipeline area;

3. The program communicating the knowledge in relation to the awareness of the safety of public natural gas pipeline shall be able to communicate to the areas covering all places where gas pipelines cross.

**The American Petroleum Institute Recommended Practice 1162 (API RP 1162)**<sup>15</sup> is used as a practice guideline for the natural gas pipeline transportation operator for the development and management of public awareness program, which could be used as a guideline to develop a program in relation to the natural gas pipeline transportation in an international level. The rationale behind this is to encourage people to aware of the importance and safety of natural gas pipeline transportation. This can be considered into 4 components as follows:

API RP 1162 provides operator a guideline in the implementation and development of their public awareness program and also the considerations to determine when and how to enhance the program to provide the appropriate level of public awareness outreach. The effectiveness of communications shall consider all 3 main relevant aspects as follows; 1) Stakeholder Audiences such as affected people, emergency official, local public official, excavator; 2) Communication Content, that conveyed to the intended audience provide enough information that will allow the operator to meet the program objectives 3) Communication Method and Tools, available for operator to foster effective communications. By the guidance of API RP 162, operator is reminded that the effectiveness of communication, not all message content or methods are effective in all situation. The content of the communication

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<sup>15</sup> American Petroleum Institute, "Public Awareness Programs for Pipeline Operators," API Recommended Practice 1162, (First Edition, September 2003).

efforts should rely on: needs of the audience, type of pipeline and/or facilities, intent of the communication, and appropriate method for the content.

The study shows that public education program will provide stakeholder audiences as follows; 1. People who are prone to be affected such as residents in the natural gas pipeline area; 2. Disaster officer such as police officer and firefighter in their area of responsibility; 3. Officer in charge in the area; 4. Excavator in the natural gas pipeline area, with knowledge and understanding in connection to the natural gas pipeline and the safety of natural gas pipeline transportation. This will raise public awareness on gas pipeline transportation and build good relationship between the operator and the public as well, leading to the cooperation of all parties involved in terms of the compliance with law and officer recommendation – on the purpose of preventing the natural gas pipeline right-of-way from any encroachments. As a result, the problem of natural gas pipeline right-of-way encroachment and the risk of damage or an obstacle to the natural gas pipeline are reduced.

By considering such provision that can improve operator's abilities to manage natural gas pipeline right-of-way, prevent encroachment problems and prevent gas pipeline damage from excavation activity in Thailand in many aspects as follow:

- 1) Raise awareness and knowledge in Thailand relating to many aspects such as; the existence of natural gas pipelines in their area, natural gas pipeline transportation safety, information of natural gas pipeline for examples: pipe location, pipe diameter, depth of gas pipe, wides of the right-of-way to stakeholders such as people who may be affected by natural gas pipeline area, police officer, firefighter, government agency being responsible in the area, and excavators with appropriate procedure by follow the guideline of API RP 1162 which is an international standard of establishing program relating to public awareness.

- 2) Creating a standard of public awareness program in Thailand that follows API RP 1162 model and set it as minimum standard for all operators to comply with under the same standard.

- 3) Strengthen the enforcement of section 112 of the Energy Industry Act 2007 (B.E.2550) which is a preventive measure in Thailand by connecting between people and operator through public awareness program in order to increase the cooperation of excavator to apply for permission prior to their activity.

4) Creating activities between operator and stakeholders in Thailand concerning with natural gas pipeline transportation and its safety in order to raise awareness and knowledge, build better relationship, and exchange necessary information and problem.

## **Conclusion**

After the consideration, the study indicates that the problem of natural gas pipeline right-of-way encroachment in Thailand which divided into three aspects which are; legal problem, excavator, and operator, causing the unawareness of excavators. To elaborate, people commit an act in the area of natural gas pipeline right-of-way without permission from a government agency involved or notify to operator. Therefore, the operator is not given an opportunity to consider the safety of such conduct to the natural gas pipeline right-of-way, causing damage to the natural gas pipeline or an obstacle to the natural gas pipeline right-of-way.

The cause of which is the people lack of awareness and knowledge about the existence of natural gas pipeline and the safety of the natural gas pipeline transportation. They unaware of the existence or clear location of the natural gas pipeline, or unaware of the safety and practice guideline of the community which the natural gas pipeline crosses as it should be. Also, they do not cooperate with an officer or follow an instruction or suggestion given by the officer as the case should be. Therefore, to address the natural gas pipeline right-of-way encroachment problem should begin with the awareness and legal mind of people residing in the vicinity of natural gas pipeline area. This could be achieved by cultivating the public mind and awareness of the natural gas pipeline transportation safety as a subject matter, through the cooperation among all parties involved in the natural gas transportation such as operator, landowner, excavator, regulator, affected public, and public officer.

Although, the legal system in the United States and Thailand are different in some aspects, such as the acquisition of natural gas pipeline right-of-way. However, once areas of the land become under a natural gas pipeline right-of-way, it share the same general objective of the natural gas pipeline right-of-way, which to protect the management of natural gas pipeline transportation, especially in terms of safety of the

natural gas pipeline right-of-way, to protect natural gas pipeline right-of-way from activity that may cause damage or obstacle to natural gas pipeline. Many countries have already prescribed such measures as laws for their enforcement. Moreover, the United States sees the importance of the knowledge in relation to the safety of natural gas pipeline to people as encouraging and supporting measures are prescribed by laws in order to raise awareness of people about natural gas pipeline transportation and its safety by establishes standard program to prevent natural gas pipeline right-of-way encroachment.

The study found that the United States' regulations, states about the measure that raising an awareness of people in relation to the natural gas pipeline transportation and its safety, by establish program that provide knowledge and understanding about the natural gas pipeline transportation and to ease the natural gas pipeline right-of-way encroachment problem through the program called "Public Awareness Programs". Which contains three components as follows:

- 1) Damage Prevention Program (49 CFR Part 192.614), that provide a preventive program of natural gas pipeline from any activity that might cause damage or obstacle to natural gas pipeline transportation and communicate such program to people and excavators in the area that natural gas pipeline cross.

- 2) Emergency Planning (49 CFR Part 192.615), which for operator to provide a plan and training program with relevant officials in order to counter an emergency event that might happen to the natural gas pipeline transportation system

- 3) Public Education (49 CFR Part 192.616), which for operator to create a program providing knowledge to stakeholders such as people in the local area who are prone to be affected, local government, disaster service agency, and excavator in the natural gas pipeline area, by taking into account the communication content of appropriate message and communication method that follows API RP 1162.

Therefore, the public awareness program which is the minimum protocol in the United States for natural gas pipeline operator to develop and implement, can be applied as a model for Thailand in order to raise the awareness of the people about natural gas pipeline transportation and its safety through the program that conducted by the operator, by providing knowledge and awareness of the safety of natural gas pipeline transportation to people involved. Consequently, the increasing of awareness



and knowledge of people about gas pipeline transportation and its safety and the reducing of natural gas pipeline right-of-way encroachment problem in Thailand.

## **Recommendations**

From the study about the natural gas pipeline right-of-way encroachment problem, including its preventive measure in Thailand and the United States, the writer analysed about such problem and measure and found that the problem of natural gas pipeline right-of-way encroachment is one caused by the lack of knowledge, understanding, and awareness of people relating to the safety of natural gas pipeline transportation. This could lead to any act causing damage or an obstacle to the natural gas pipeline transportation, resulting in damage many areas to life, body, property, resource, environment, and national energy stability as stated above. Therefore, in order to solve such problem, the writer has recommendations as follows:

To add a provision about the public awareness program following the model of the United States in Part 5, The Use of Real Estate, in the Energy Industry Act 2007 (B.E.2550). In this way, the natural gas pipeline operator shall create a program encouraging and supporting the awareness of natural gas pipeline and the safety of its transportation among people. The encouraging program to be created should be categorized as follows:

### **1. Damage Preventive Program**

This provision is one of the minimum standards of the United States law that prescribes the operator duty to provide a preventive program of natural gas pipeline from any act conducted in the natural gas pipeline area that might cause damage or an obstacle to the natural gas pipeline transportation management. This includes the use of blasting, excavation, the improvement of land surface by machinery or explosion, etc. The general duties of the operator are as follows:

- 1) To gather information in relation to people who usually commit an act that may be dangerous or obstructive to the natural gas pipeline area;
- 2) To warn people residing in the natural gas pipeline area including excavators about the objective of the program and the initial examination of natural

gas pipeline location in order to raise the awareness among these people of the damage prevention program of natural gas pipeline from any act in the natural gas pipeline right-of-way area;

3) To provide a channel for gathering and recording information about any activity in the natural gas pipeline right-of-way area;

4) In case where the natural gas pipeline is in the area where an act that could possibly cause damage or an obstacle to the natural gas pipeline right-of-way is usually committed, there should be the specification of natural gas pipeline location and the initial examination of the natural gas pipeline location;

5) To provide the specification of the temporary location of natural gas pipeline or a warning sign before such activity in the natural gas pipeline right-of-way area is conducted.

## **2. Emergency Planning**

Such provision prescribes the operator duty to provide a plan in dealing with emergency event that might happen to the natural gas pipeline transportation system. This can be considered in three important components as follows:

1) The operator shall provide a management plan for emergency cases, as well as the readiness of staff, equipment, procedures of gas pipeline transportation shutdown, notification to firefighter, police officer, or related government agencies, and remedy, etc.;

2) Such plan shall be submitted to all people involved such as executive officer and officer. Everyone shall be trained and assessed as to whether or not they could actually execute such work according to the program;

3) The operator shall provide a coordinator to liaise with such government agencies involved as firefighter, police officer, and other government agencies in relation to the work execution and preparation to deal with emergency events.

## **3. Public Education**

It is prescribed that the operator shall have the duty to create a program providing knowledge to people involved such as local people who might be affected, local government agencies, disaster service government agencies, and excavators in the natural gas pipeline area, by taking into account the content of appropriate

message, communication method, and communication frequency, focusing on the operator providing knowledge on several matters as follows:

1) The program should provide communication focusing on the provision of knowledge to people, government agencies, and excavators in the natural gas pipeline area. The content of which should be in relation to: 1. Contacting to operator's service centre before any act will be conducted in the natural gas pipeline area; 2. The danger that might arise from the transmission of gas by accident; 3. The warning sign of possible gas transmission; 4. Procedures for public safety practice in case of gas transmission; 5. Measure to notify such event;

2) To create an activity introducing and providing knowledge to community, school, business, and resident in the natural gas pipeline area;

3) The program communicating on the knowledge in relation to the awareness of the public safety of natural gas pipeline shall be able to communicate to the whole area that the gas pipeline crosses.

In such program, the operator could adhere to the standard of API RP 1162 as a model and a minimum standard for practice, because the API RP 1162 of the United States is designed to be nationally and internationally guideline, by taking the type and specific characteristic of natural gas pipeline, people involved (stakeholder audiences), matter communicated, and communication method in accordance with the practice principle prescribed by the API RP 1162 into account, etc.