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Brief analysis of key issues in the HSE due diligence of LNG point-supply project

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Abstract: With the increase of national environmental protection and the introduction of favorable policies, LNG point-supply project has achieved rapid development. In order to further optimize the industrial structure and achieve mutual benefit between enterprises, HSE due diligence should be carried out for LNG point-supply project before collecting, merging and purchasing enterprises. On the basis of field investigation, the problems of formalities and site safety existing in LNG point-supply project were mainly analyzed in this paper, and some suggestions were put forward. On the one hand, the project leaders of LNG point-supply should complete the formalities actively to promote the legalization, and strengthen the management and correct problems timely while strengthening communication with owners. On the other hand, investigators should pay attention to the change in national laws and regulations in real time and carry out in accordance with existing laws and regulations.

1. Background and significance

In recent years, air pollution has become increasingly serious. Environmental protection is constantly increasing, resulting in the sustained pressure on China to tackle climate change. The “13th Five-Year” Plan for energy development ^[1] and the “13th Five-Year” Plan for gas development ^[2] were formulated by the national development and reform commission in order to build a clean, low-carbon, safe and efficient modern energy system, dissolve environmental constraints, improve atmospheric quality and achieve green and low-carbon development. Pipeline natural gas has become the main gas source in major cities gradually while domestic natural gas consumption entered a period of explosive growth under many favorable policies. However, the development of pipeline natural gas always lags behind cities, and LNG point-supply is generated ^[3, 4]. Quick construction and convenient gas supply are the biggest characteristics of LNG point-supply. With the continuous improvement of LNG point-supply policies and management specifications, LNG point-supply has developed rapidly as the supplement of pipeline gas ^[5, 6].

In order to establish a cooperation platform for the whole supply chain of domestic LNG, reduce intermediate link and operating costs, and improve distribution efficiency, enterprises would like to strengthen cooperation to achieve mutual benefit. The partner hereby entrusts a third party to conduct HSE due diligence in order to understand the current operation situation of the partner further and find out the potential risks prior to the cooperation. With the rise of the LNG, there will be many more such deals. This paper aims to analyze some key issues in the HSE due diligence of LNG point-supply project deeply, so as to provide references for such projects and promote the development of domestic LNG industry.



2. Conception

2.1. LNG point-supply project

LNG point-supply, known as LNG regional gas supply unit, is suitable for small towns and factories where the gas pipeline is difficult to reach or the construction of pipeline is not economical due to small consumption. The gas supply system of LNG point-supply is mainly composed of LNG tanker, unloading supercharging system, storage tank, gasifier and metering and pressure regulating system. It can be divided into four types of gas supply units: Dewar group, Jie Yishun, box skid station and fixed station according to the user's gas consumption [7].

Compared with pipeline natural gas, LNG point-supply has the following advantages:

- Short construction period. LNG point-supply can be completed within two months from construction to ignition.
- Relatively low cost. The cost of pipeline natural gas construction is high, while the cost of LNG point-supply is relatively low.
- Small regional limitations. Pipeline natural gas only cover the densely populated urban areas, while LNG point-supply can supply gas as long as there are roads.

2.2. HSE due diligence

HSE due diligence is to check the past, present and future information related to HSE of enterprise to fully determine and evaluate the possible obligations and risks [8]. The purpose of HSE due diligence is to minimize HSE risks, protect the interests of enterprises in merger and acquisition activities, and achieve the information equivalence between the two enterprises [8, 9].

In the process of HSE due diligence, investigators shall listen to the enterprise report, understand basic situation of the enterprise, conduct research on enterprise organizational structure, management system, various resources and personnel allocation, operation mode, etc., and review documents to verify information accuracy. At the same time, investigators need to conduct field investigation deeply, check the basic HSE status of equipment and personnel operation, determine the existing risks, sort out the investigation results, and finally form the HSE due diligence report.

LNG is a kind of clean energy, procedures and site safety are focused in the HSE due diligence.

3. Main problems in the HSE due diligence of LNG point-supply project

3.1. Procedure

In the process of HSE Due Diligence, according to the national laws and regulations, procedures required for regular projects include: *state-owned land use certificate* or state-owned construction land transfer contraction, the approval of project establishment, assessment report (table) of environmental impact and approval, acceptance report of environmental protection and record, pre-evaluation report of safety and approval, design of safety facilities, acceptance report of safety facilities and record, evaluation report of safety status, construction project audit opinion of fire design, acceptance opinion of construction project fire, pre-assessment report and approval of occupational hazards, design of occupational-disease-prevention facilities, completion acceptance report of occupational-disease-prevention facilities, control effect evaluation report of occupational hazard, occupational hazard declaration form and return receipt, annual monitoring of occupational-disease-inductive factors, occupational health assessment report, test report of lightning protection device safety, etc. For LNG point-supply project, *hazardous chemicals business license* should be obtained except for the above formalities.

It was found that there were few LNG point-supply projects with complete procedures during the investigation. The specific reasons are as follows:

- In terms of the nature of LNG point-supply, it is different from the traditional project. Traditional project has long operating cycle and numerous formalities, the processing time of formalities is shorter than the project cycle. LNG point-supply is characterized by flexibility and the

ability to provide services quickly to users, service project cycle ranges from months to years, and some projects are intermittent. The time of formalities is longer, it is obvious that the project cycle will be prolonged seriously according to the traditional project processing, which is inconsistent with the characteristics.

- In terms of current national laws and regulations, there is no specific legal provision for the LNG point-supply to handle the project procedures. Take the evaluation report of safety and approval for example, according to *the Law of the People's Republic of China on work safety*, "construction project used for the production, storage, loading and unloading of dangerous goods shall be subject to safety evaluation in accordance with the relevant provisions of the state", and all LNG point-supply projects need to complete safety evaluation. Normally, the LNG point-supply projects for enterprises in a certain area exist on a large scale, and if the safety evaluation of each LNG point-supply projects is carried out according to the normal procedures, the cycle is relatively long. There is an urgent need for clear legal provisions to minimize the processing period of LNG point-supply project.

- In terms of local policies, the policies of different provinces are different, and the policies of different regions in the same province are also different.

As for the province, Shandong province has made clear support. The Shandong province development and reform commission has issued *Medium and long term development plan of petroleum and natural gas in Shandong (2016-2030)* ^[10], which states: "in areas close to the natural gas pipeline network, small branch pipeline network should be built to supply gas, and LNG satellite stations should be encouraged to supply gas in areas inaccessible to pipelines". Hebei province, on the other hand, strictly controls LNG point-supply project. *Measures for the administration of fuel gas in Hebei* ^[11] states: "no independent pipeline gas supply facilities shall be built within the coverage of the gas pipe network".

Different policies in different regions result in different degree of difficulty in handling procedures. According to the investigation, Shijiazhuang city of Hebei province cannot handle the procedure for the *hazardous chemicals business license* of LNG point-supply, but Gaoyi county of Shijiazhuang city can handle the procedure. The difference in policies of different regions in Shijiazhuang leads to the illegal phenomena.

- In terms of the procedures for LNG point-supply, most projects rely on the owners. When the owners have demands, the suppliers will build LNG tank areas directly on the owners' sites. Driven by interests, many LNG point-supply did not carry out project approval and planning separately at the early stage of construction, while project approval is the prerequisite for environmental assessment, safety assessment and fire control procedures. The development mode of *getting on the train first and buying tickets later* not only brings great responsibility risk to the local formalities department, but also brings many unnecessary troubles for the later procedures of LNG point-supply.

- In terms of LNG point-supply project owners, most of them only care about LNG supply and pay little attention to the compliance. At the same time, most LNG point-supply projects are located in the owners' factory and the owners' factory has already carried out the project planning audit. The LNG point-supply inevitably involves the owners' interests in the handling procedures.

3.2. Field safety survey

The investigators mainly conducted the investigation according to *the urban gas design code (GB 50028-2006)* and *the technical regulations for small liquefied natural gas gasification stations (T/BSTAUM 001-2017)* for site safety. According to the investigation, there are many safety problems in LNG point-supply, which are highlighted in the following aspects:

- The safe distance between the tank area and the surrounding buildings is insufficient.
- Many LNG point-supply have no cofferdams or irregular cofferdams.
- Some key valves are missing. Most tank areas just have basic level gauge, pressure gauge, safety valve, check valve equipment.
- Most LNG point-supply are unmonitored and remote. Some LNG point-supply reserved remote transmission device, but does not work.

- The grounding of storage tanks is not in accordance with regulations, and some of them are not even grounded.

There are many problems on site, and the specific reasons are as follows:

- From the perspective of industry development trend, LNG point-supply has experienced a blowout growth in recent years. Suppliers are oriented by economic interests and pay insufficient attention to safety issues. As long as there is a place, the equipment will be installed without safety demonstration.

- From the perspective of project location, LNG point-supply relies on the owners and most of them are built in the owners' factory, which makes the tank area and the surrounding building safety distance insufficient. Some of them are even built against the wall (as shown in figure 1), which undoubtedly increases the safety risk level.



Figure 1. Case diagram of insufficient safe distance.

- From the perspective of field management, most LNG point-supply adopt the inspection method for safety inspection. In the absence of remote transmission, the detection method is far from meeting the security requirements. In addition, the safety management personnel are young and have little knowledge of the cofferdam setting, electrical instrument setting and remote transmission equipment in LNG industry regulations. They cannot really solve the on-site details, such as grounding problems.

- From the perspective of capital investment, both the increase of security equipment and security management personnel need a large amount of capital investment. LNG point-supply has a short period. In order to maximize benefits, suppliers cut corners on equipment they consider as non-essential, and try to reduce the number of safety management personnel.

- From the perspective of owners, the owners' safety awareness is weak. The safety distance of some plants was obviously insufficient after the LNG point-supply was added, but the owners turned a blind eye and continued the production. Even when the safety management personnel pointed out the problems, they still delayed the safety rectification time on the grounds that the production could not be stopped.

4. Conclusions and suggestions

In order to promote the rapid development of domestic LNG industry, cooperation among enterprises has become the general trend. The cooperation can maximize savings and improve work efficiency. In view of the two key problems of LNG point-supply in the process of HSE due diligence, the following suggestions are hereby made:

- For the problems of formalities, HSE due diligence shall be conducted in strict accordance with existing laws and regulations before the country makes special provision. It is suggested that the person in charge of projects should consult actively with the local department and complete the procedures for the operational projects. The planned projects shall go through the formalities according to the regulations to promote the legalization.

- For the problems of management, it should be strengthened. Safety management personnel should check regularly, find problems and rectify timely, strengthen communication with the owners at

the same time.

● For the problems of on-site safety problems, the current reference standards applicable to LNG point-supply mainly include *the urban gas design code (GB 50028-2006)* and *the technical regulations for small liquefied natural gas gasification stations (T/BSTAUM 001-2017)*, which are in small quantities and need to be improved. With the advancement of legalization, there will be increasingly laws and regulations for LNG point-supply, and it should be pay more attention to the change in real time.

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