

Opening of Offshore Oil Business in Mexico and Associated Framework to Cope with Potential Maritime Security Threats

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ABSTRACT: After 75 years of State oil monopoly, Mexico performed the first business oil round in 2015 involving the private sector. This auction-round offered 14 oil exploration fields located on the continental shelf to private companies. The development and exploitation of these hydrocarbon fields faces significant challenges regarding security. The economic loss for theft of hydrocarbons through illegal connections to pipelines is estimated to 973 million, 125 thousand U.S. dollar, only for the year of 2014. While productive research has been made, it has mainly focused on transportation systems and basically, pipelines. The development and establishment of policies prioritizing maritime security and protection of critical offshore infrastructure against theft of hydrocarbons, drugs organizations and terror attacks needs to be included in the national agenda to improve maritime security and mitigate potential security threats at sea, including damage to the marine environment. This could increase the trust of investors and stakeholders and would contribute to the faster development of new exploration and production fields. While the International Ship and Port Facility Security Code (ISPS Code) is the cornerstone for the construction of the port's security program and establishes the requirements of the Port Facility Security Plan (PFSP), including oil port facilities, it has not been fully implemented in several important Mexican ports. It is concluded that some important ports lack many of the core security processes, procedures and controls that should be included in any PFSP. This article briefly reviews the situation of the oil industry from a security perspective and discusses key elements of maritime security; addressing the necessity of the inclusion of maritime security and protection of critical oil infrastructure offshore in the national agenda that would provide for future research directions in the maritime security domain and contribute to the establishment of a national maritime security policy.

1 INTRODUCTION

Mexico amended its Constitution and energy law to open the oil industry to the private sector. This was a priority for the actual government because since 2008 the government of the United States of America started to lease blocks close to the border line, where the bi-national oil reservoirs from the "Perdido Folt Belt" are located and in consideration to the USA Rule of Capture; pursuant to, "the owner of an area of land acquires title to the minerals produced from wells

drilled thereon, even if it is proved that part of such minerals migrated from adjoining lands. This is known in the oil industry as the straw effect." (Avila, 2008).

On August 12th 2014 the new Hydrocarbons Law and the new Hydrocarbons Revenues Law became effective. These are part of a set of new laws and legal amendments to implement the Constitutional Energy Reform that became effective on December 21st 2013. After 75 years of monopoly in the oil industry; the

country performed the first oil business round and offered 14 oil exploration fields located on the continental shelf to private companies. Whereas, this first round was not as successful as it was expected by the Mexican Government and only two bids were received by international companies for a total of 14 blocks; in the round one second tender the National Hydrocarbons Commission of Mexico (CNH) awarded three of five shallow-water blocks (Comisión Nacional de Hidrocarburos, 2015).

Diverse factors may affect the interest of international investors in the oil industry in Mexico when participating in the oil fields blocks auctions, like the low international oil prices during the last two years or the fact that the first offer was of exploration fields while the second one was of production fields, which gives more security over the investment.

However, another factor that may affect the interest of international oil companies is the security of the oil installations both onshore and offshore. A total of 4 thousand, 298 illegal connections to pipelines have been discovered by Pemex and authorities during the period of January 1st. to October 27th 2015.

Even though the security challenges in the oil industry are by now more evident ashore, it is necessary to include maritime security in the national agenda as well.

The development and establishment of policies that enhance maritime security and the protection of offshore installations would increase the trust of international investors in the national oil industry.

Maritime security is a topic that has been discussed for several decades at the International Maritime Organization, yet some significant issues remain in discussion and unsolved. The focus of extensive research regarding maritime security has been on piracy at sea, while terrorism at offshore installations, port maritime security and protection of critical infrastructure has not got the same attention.

The International Ship and Port Facility Security Code (ISPS Code) was implemented in Mexico since it entered into force on 1st. of July, 2004, following the requirements and recommendations of the International Maritime Organization. Nonetheless, some of the most important ports of Mexico have not fully implemented the ISPS Code yet. A set of information that according to the requirements of the ISPS Code all the port and port facilities are obligated to keep in logs was missing when such information was requested to the port authorities through the National Institute of Access to Public Information, which reveals a difference between the formal statements of the port regarding the security program purpose and the actual implementation of the ISPS Code. This puts in evidence the urgency of the review of national policies and national legislation in order to enhance maritime security both, at the port and at sea.

2 METHODOLOGY

For the purposes of this study the authors have used the method of document review to analyse the actual situation of the oil industry in Mexico from the security perspective. The data was gathered from different sources that included official information from Petroleos Mexicanos (Pemex), the Mexican oil agency and different authorities published on their webpages. In addition some relevant information was requested to Pemex and other different institutions through the National Institute of Transparency, Access to the Information and Protection of Personal Data (Instituto Nacional de Transparencia, Acceso a la Información y Protección de Datos Personales in Spanish, and represented with the acronym INAI). Once the documents relevant for this topic were gathered, they were further selected and classified according to their relevance to analyse what the security challenges of the oil industry in Mexico are from a strict security perspective.

3 OBJECTIVES

The objective of this paper is to review the situation of the oil industry in Mexico from a security perspective and discuss key elements of port and maritime security; addressing the necessity of the inclusion of port and maritime security and the protection of critical oil infrastructure located in the Continental Shelf in the national agenda, which would provide for future research directions in the maritime security domain and contribute to the establishment of a national maritime security policy.

4 RESULTS & GENERAL DISCUSSION

The security of the oil industry in Mexico has been seriously affected during the last years, which has left significant not only loss of civilian life, but also huge economic losses to Pemex, the Mexican government and the Mexican society as a hole.

The results of this document analysis show that there is an inconsistency between the requirements of the ISPS Code and its actual implementation at some of the most important ports with oil facilities. These factors need to be improved to enhance maritime security and to avoid serious security deficiencies that could result in loss of life, oil spill and environmental damage. Other important security challenges for the oil industry, like the increasing tendency of theft of hydrocarbons were also found.

On September 19th 2014, the general director of Petróleos Mexicanos (Pemex), Emilio Lozoya Austin, presented the problematic and challenges of Pemex, before the Commission of Energy of the LXII Legislature-group of the National Congress (Parliament). In this presentation, the mentioned director of Pemex said that "In the year 2014, up to August, it is estimated that the volume of crude oil subtracted through illegal connections to pipelines amounted to 7.5 million barrels, which equivalent cost is 15 thousand, 300 million pesos. That is what is

stolen to the Mexican Government, at least up to this presentation”.

The textual wording in Spanish of the director of Pemex is as follows: “En el año 2014, al cierre del mes de agosto se estima que el volumen de combustible sustraído ilícitamente a través de las tomas clandestinas ascendió a 7.5 millones de barriles, con un costo equivalente a 15 mil 300 millones de pesos. Eso es lo que le roban al Estado mexicano o, por lo menos, a la presentación del informe”.

According to the figures published by the National Institute for Statistics, Geography and Informatics the annual average of oil prices for 2014 is 86.5 USA Dollars per barrel, whereas the average for 2015 and up to September that year, the oil price average is 46.6, as figures illustrated in table I.

Table 1. Oil Price Indices per Barrel (Mexico), 2014-2015. Source: Elaborated with data from the National Institute for Statistics, Geography and Informatics (INEGI); price indices series.

Period	Price Oil Barrel	Annual Average
2014/01	90.65	86.5
2014/02	93.09	
2014/03	93.48	
2014/04	95.68	
2014/05	96.79	
2014/06	98.79	
2014/07	94.65	
2014/08	90.8	
2014/09	85.82	
2014/10	75.23	
2014/11	71.39	
2014/12	52.36	
2015/01	41.7	46.6
2015/02	47.26	
2015/03	47.36	
2015/04	50.69	
2015/05	54.06	
2015/06	53.87	
2015/07	46.56	
2015/08	39.87	
2015/09	38.82	

Therefore the estimated number of stolen barrels from January to August, 2014 amounts to 7.5 million barrels; the economic loss amounts to 648 million, 750 thousand US dollars.

With this information the total economic loss caused by theft of hydrocarbons for 2014 may be estimated; considering that 7.5 million barrels from January to August gives a monthly average of 937 thousand 500 barrels; multiplying this figure for 12 months, it gives a total of 11 million, 250 thousand barrels, which can be multiplied by the average price of crude oil barrel for the year 2014; which is 86.5 US Dollars. Therefore the total economic loss for theft of hydrocarbons for the year 2014, for Mexico, can be estimated to 973 million, 125 thousand U.S. dollars.

The total number of illegal connections to pipelines discovered by Pemex and relevant authorities for 2014 was 3 thousand 635, while this figure increased to 4 thousand 298 for 2015 and only up to October 26th. This figure means that the number of illegal connections to pipelines increased

with 18.24 per cent from 2014 to 2015, which can be observed in table 2.

Table 2. Nr. of Illegal Connections Discovered by Pemex or Authorities, 2000-2015. Source: SISI12857200255215, from INAI

Year	Nr. of Illegal connections discovered
2000	155
2001	132
2002	159
2003	152
2004	102
2005	132
2006	213
2007	324
2008	392
2009	462
2010	691
2011	1361
2012	1635
2013	2613
2014	3635
2015	4298

If this figure is applied to the loss of barrels for 2014; in this case 11 million, 250 thousand barrels, the increase would amount to 2 million 52 thousand oil barrels, giving a total of 13 million 302 thousand oil barrels for the year 2015. If the estimated amount of loss of barrels for 2015, in this case 13 million, 302 thousand barrels is multiplied by the average price of crude oil barrel for the year 2015 (In this case the average was calculated with figures from the period January-September, as presented in table 1); which is 46.5 US Dollars, the estimated economic loss for 2015 amounts to 618 million 543 thousand U.S Dollar; under the condition that the production remain unchanged and the average loss of barrels per incident remains the same from 2014 to 2015.

The fact that the estimated economic loss caused by theft of hydrocarbons from 2015 is less than the estimated loss for the year 2014, even considering that the number of incidents of illegal connections to pipelines was larger in 2015 than in the previous year; is because the dramatic fall of the oil prices in 2015.

It was requested to Pemex to provide information about how many clandestine connections were found to pipelines, warehouse tankers, oil terminals, refineries and other oil installations, but this classification had not been registered in the files. However, the discovery of such illegal connections to Pemex installations to steal hydrocarbons have resulted in 14 thousand 547 legal claims, only for the period 2006 to 2015, (Pemex unidad de enlace a travez del INAI 2015, SISI 12857200255215) from which a total of 324 persons have become sentenced with a guilty verdict, as observed in table 3.

According to the same document from the INAI, clandestine connections to pipelines and other oil installations have led to explosions, which have caused the dead of two civilian and serious injuries to other four persons in 2014, while in 2015 an individual lost his life by the same cause.

The consequences of illegal connections to hydrocarbon's pipelines have also caused severe damages to the environment polluting diverse rivers

and valleys because of oil spill. During the period of 2006 to 2015 a total of 571 legal claims for oil spill pollution have been presented as illustrated in table 4.

Table 3. Nr. of Persons Convicted for Theft of Hydrocarbons, 2006-2015. Source: SISI12857200255215

Year	Nr. of Persons Convicted	
	Guilty Verdict	Acquittal Verdict (No Guilty)
2006	19	13
2007	36	16
2008	55	35
2009	30	19
2010	34	31
2011	35	52
2012	68	69
2013	35	46
2014	12	12
2015	0	5
Total	324	298

Table 4. Legal Claims for Oil Spill Pollution, 2006-2015. Source: SISI12857200255215

Year	Nr. of Legal Claims for Oil Spill Pollution
2006	130
2007	101
2008	65
2009	52
2010	24
2011	46
2012	46
2013	35
2014	54
2015	18
Total	571

To connect illegal pipelines to Pemex's installations network requires a high degree of expertise. Several employees and ex-employees from the Mexican oil agency have been investigated for participating in these crimes against the nation. Information from another document also from the INAI, with register number SISI1857200171515 (2015), establishes that a total of 136 employees from Pemex had been investigated in relation to theft of hydrocarbons, as illustrated in table 5.

Table 5. Nr. of Employees and Ex-employees investigated for theft of hydrocarbons, 2006-2015. Source: SISI1857200171515

Year	Nr. of Employees and Ex-employees involved and investigated in theft of hydrocarbons 2006-2015	
	Nr. of Employees investigated for theft of hydrocarbons	Nr. of Ex-employees investigated for theft of hydrocarbons
2006	10	0
2007	7	3
2008	19	0
2009	10	0
2010	14	2
2011	5	2
2012	11	2
2013	15	1
2014	33	1
2015	12	1
TOTAL	136	12

There are other important aspects of security that reflect the urgency of implementing measures to improve security within the oil agency. From 2006 to 2015 several employees were arrested and put under investigation for other type of law-breaking including possession of cocaine, cannabis, falsification of company's card, terror attempts and murder, as illustrated in table 6.

Table 6. Pemex's employees investigated for other crimes, 2006-2015. Source: SISI1857200171515

Pemex's employees investigated for other crimes (2006-2015)	
Crime	Nr. of employees
Possession of Cocaine	9
Possession of Cannabis	25
Falsification of company's card	1
Possession/bearing of fire weapons	7
Violence with weapons	8
Explosion Threat	1
Theft of production material, ferric material, working tools, machinery, cable, pipes, car parts, cooper and cranes among other Pemex's property items.	115
Murder	1
Kidnapping	2
Fraud for selling working positions	4
Improper (unmoral) Behaviour at work	2
Psychotropic medicine drugs	1
Stealing other employees properties	4
Falsification of fuel tickets	1
Car accident	1
Fraud	1
Attack/assault & Violence	2
Being member of the "Z" narcotic organization	1
Alcohol at work	3
TOTAL	189

Pemex also function as the operator of several oil terminals. The crimes made by some employees of Pemex like falsification of the company card put unacceptable risk to the company and measures to stop these actions are essential regarding security, since this type of actions could be required for terror attacks in a terror scenario. On the other hand, crimes like possession of weapons and drugs can lead to serious accidents putting in risk the safety of the personnel; the installations and the marine environment because of oil spill pollution. It is important to mention that even though maritime security and maritime safety are two different concepts, they are directly connected.

Pièrre-Cambacédès & Bouissou, (2013) analyses the similarities and differences between the two domains, safety and security. The authors wrote that while security is connected to risks originated or exacerbated by a malicious action, independently from the nature of the related consequence; the concept of safety is linked to accidental actions i.e. without a malicious intention, but with potential impact to the related environment (p.111). They further clarify that in the security discipline it is common to use the term "threat", while in the safety discipline the tendency is to use the term "hazard", even though they are used to describe identical concepts in several standards. An example given by the cited authors is the use of the term incident, as an event with minor consequences in safety, while it

means an infringement or breach with regards to security (p.112).

Klein, Rothwell, & Mossop, (2009 p. 242), states that one of the main characteristics of maritime security is that there are two different dimensions in terms of response to external threats faced by a coastal state. The author establishes that the first dimension is the fact that exists a core set of threats, values and responses, which any state will bring to bear in seeking to secure its maritime security; which is reflected in the national and international outlook of a state, its geographical location and maritime domain, as well as its bilateral and regional relationships. These are factors that even if they may slightly vary over time, they will remain fairly stable. The authors explained that the second dimension is the *“evolving and emerging threats to maritime security”*. They further clarified that some of those threats could be periodic or temporary, while others may suddenly arise with little or no warning at all. Therefore, planning and organizing maritime security requires not only ongoing attention to the core values of a state, but also the capacity to respond to sudden and totally unexpected threats with diverse scenarios from oil spills to terror or nuclear attacks, as well as transnational crime against the port or offshore installations (Klein, Rothwell, & Mossop, 2009 p. 242-243).

By citing to Ng and Gujar (2008), Vaggelas & Ng, (2012 p.674) established that port security includes all security and counter-terrorism activities within the port's domain, including the protection of port facilities and the security of the activities during the interaction of the ship with the port.

In an article written by J. Urbansky, W. Morgas and M. Miesikowsky (2009) presented in the book edited by A. Weintrit (2009 p.3), the authors wrote the following about maritime security: *“is the security from the terrorism, piracy and similar threats, as well as effective interdiction of all the illicit activities on sea, such as pollution of the marine environment; illegal exploitation of sea resources; illegal immigration; smuggling the drugs, persons, weapons and other matters that can be used for terrorist activities”*.

Maritime security regulative framework encompasses several international conventions like SOLAS 1974 and respective protocols up to date, MARPOL 73/78 with respective protocols, and the SUA convention from 1998 and 2005 with respective protocols, among others. The International Ship and Port Facility Security Code (ISPS Code) came into force on July 1st of 2004 and it is a part of the amendments to the 1974 Convention for the Safety of Life at Sea (SOLAS). The amendments to the SOLAS Convention included a new chapter XI-2, about special measures to enhance maritime security. Kenneth (2009) defines the ISPS Code as the comprehensive set of measures implemented in 2004 to enhance the security of ships and port facilities, developed and agreed to by member countries of the International Maritime Organization in response to the perceived threats to ships and port facilities after the September 11, 2001, terrorist attacks in the United States.

Vaggelas & Ng (2012 p.677-678) simplify that the Code has mainly two major components, whereas the

first part illustrates the minimum mandatory requirements that ships and ports represented by the contracting government must follow, the second part, which is not compulsory, provides guidelines and recommendations for the implementation of security assessments and plans with more detail. The authors clarify that even if certainly the ISPS Code includes a standardized guidance on maritime security for both, ships and ports, it focuses mainly on how terrorist attacks can be deterred and mitigated, while detailed procedures on how to deal with the consequences of such security events, like crisis management or recovery are not addressed. Resilience plans or plans for crisis management are instruments that should be considered as a part of any security program. By citing Sarathy (2006) Zhang, Payam, & Ekwall (2011) expressed that a system of this type should be *“a robust, resilient, and flexible that will require extensive coordination both at national and international levels”*. Robustness and resilience are different features. By citing to Husdal (2008), Zhang, Payam, & Ekwall (2011) wrote that whereas resilience is the ability to survive, robustness is the ability to rapidly recuperate the stability.

A security plan must rapidly respond to events that threaten security from a proactive perspective rather than a reactive. However, it should include a resilience plan to reduce consequences of a terror event in a properly reactive way.

Espin-Digon, Burns-Herbert, & Bateman (2008 p.4), says that passenger ships, including high-speed passenger craft, cargo ships of 500 gross tonnage and above, Mobile Offshore Drilling Units (MODUs) and all port facilities serving ships engaged in international voyages are required to comply with the ISPS Code, according to the established in the SOLAS Chapter XI-2.

The Port Facility Security Plan (PFSP) is a legal instrument embodied in the ISPS Code to ensure the application of security measures to protect the port facility and its serving vessels, their cargoes, and persons on board at the respective security levels. Kenneth (2009 p.99), said that a port facility is required to plan and effect security at the levels identified in the risk assessment process and as established by the governmental entities with statutory responsibilities for port security oversight. The author adds that the development of a PFSP shall include measures aimed to neutralize vulnerabilities for criminal activities within the port; identify and respond to safety matters; minimize the threat of terrorism; reduce opportunities of internal criminal conspiracies; disrupt the connection between corruption, terrorism and organized crime; share intelligent and investigative information, with the respective and correct law enforcement agencies; and promote opportunities for the interchange of best practices in port security (p.100) .

Vaggelas & Ng (2012), clarified that based on the requirements of the PFSA (Port Facility Security Assessment), a PFSP must be developed for each port facility which has authorization for changes according to the different security levels for every security operation and highlight that a PFSP may be extended to more than one facility only provided that the

operator, location, operation, equipment and design of those facilities are very similar to each other.

Requirements of the port facility security plan establish a number of security records that must be kept updated as a part of the specific security plan.

Some of the information required to be kept in logs was requested for some important ports of Mexico through the INAI. This included the number of oil spills by vessels under operations at the port; number of accidents at the port/port facilities, number of fatalities that resulted in loss of life at the port installations; number of dead and seriously injured persons in accidents at work at the port; number of employees arrested by committing crimes related to their working duties or against the interest of the port and the type of crime. However, the answer was that the port agency does not have such information and it was suggested to further require it to the terminal operator. Since the terminal is directly connected to the operation of the port, the port shall also keep this type of information. This reflects deficiencies in the implementation of the Port Facility Security Plan at the specific ports.

The ISPS establishes that the port and port facilities should keep security records including security threats and incidents; oil spills, changes in the security levels and internal audits and reviews, among others. When the appointed authorities, in this case the Ministry of Communications and Transport, discover deficiencies in the implementation of the PFSP their approach should be at a first stage to advise the port or port facility in correcting the deficiency; the second stage is the persuasion of the port or port facility on the need to correct the deficiency; the third stage is the formal notification of the requirement to correct the deficiency; the next step is the commencement of proceedings to impose sanctions for the failure to correct the deficiency; while the last step is the imposition of sanctions for failing to correct the deficiency, according to the provisions established in the ISPS code (International Maritime Organization, IMO 2012). In case of serious security deficiencies that put in risk the ability of the port or port facility to continue to operate at security levels 1 to 3 the authority is able to suspend or restrict specified activities at a port or port facility and cumulative security failings at a port or port facility could lead to the suspension or withdrawal of the approved Port Facility Security Plan and the respective statement of compliance (IMO, 2012).

Furthermore, once the statement of compliance and approval of the PFSP have been withdrawn, the national authorities can demand completion of a full Port Facility Security Assessment (PFSA) and a revised PFSP before reinstating the approval and statement of compliance (IMO 2012). Kenneth (2009 p. 116) criticises that very often the PFSP exists only in paper but rarely is tested for its effectiveness. The author emphasizes that the key to achieve a successful port security management in terms of the PFSP is to understand it as a living document. He adds that the PFSP should not be written as a one-time effort, but should really be a working document addressing the security threats twenty-four hours a day, seven days at the week, the whole year.

To avoid that port and port facilities stop the compliance of the PFSP, the government through the Designated Authority shall perform PFSP inspections. The frequency of inspections may be programmed and announced in advance could be totally without warning. Inspections may be performed in connection with the initial, intermediate and renewal verification of the port facility's Statement of Compliance, investigating a security incident or concerning the assessments of the port facility with the Maritime Security Measures (IMO, 2012). The Government through the Designated Authority has the responsibility to ensure the compliance of the provisions of the ISPS Code, as well as other requirements established in International Conventions from which Mexico is signatory to enhance maritime security.

5 DIRECTIONS FOR FUTURE RESEARCH

Maritime security is an area directly connected to several issues that vary from immigration at sea, to smuggling of drugs, weapons; theft of hydrocarbons; terrorism and piracy. All of these are areas that have research potential within the context of the case of Mexico. However, the compliance of international conventions and national legislation should be reviewed to ensure that the international obligations of Mexico are properly reflected in national law.

Another area is the examination of the implementation of the ISPS Code in the Mexican ports and port facilities, including case studies from ro-ro terminals, container terminals, chemical terminals and oil terminals. It is also suggested to study the case of Pemex concerning security and safety systems to improve security within the organization and to reduce the theft of hydrocarbons. Research about the penalties for theft of hydrocarbons from a holistic perspective, including the social and environmental aspect is also suggested.

6 CONCLUSIONS & RECOMMENDATIONS

According to the results of this document review, the conclusion is that the oil industry in Mexico faces substantial security challenges. The losses are not limited to economic factors, but also to loss of civilian life and the marine environment.

Even though the oil companies as private entities are responsible for implementing effective security systems within their own property and responsibility areas; national authorities must cooperate to ensure the operation of these business activities and to improve the security of vulnerable infrastructure like pipeline networks, offshore installations and port facilities.

Maritime and port security is an issue that should be included in the national agenda for the development of analytical instruments that should provide the fundamentals for an effective and proactive maritime security program and the establishment of a national maritime security policy.

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