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TESTIMONY OF
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U.S. HOUSE OF REPRESENTATIVES
COMMITTEE ON TRANSPORTATION AND INFRASTRUCTURE
Subcommittee on Coast Guard and Maritime Transportation

HEARING ON SAFETY AND SECURITY OF LIQUEFIED NATURAL GAS AND THE IMPACT ON PORT OPERATIONS

BROADWATER PROJECT LONG ISLAND SOUND

May 7, 2007

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Thank you Chairman Cummings and Ranking Member LaTourette, and thank you to the rest of the Committee for inviting me to speak before you today. I would specifically like to thank you for allowing MEBA the opportunity to discuss the unique issues we face in safely and securely transporting Liquefied Natural Gas to the United States.

My name is William Doyle and I am the Deputy General Counsel of the Marine Engineers' Beneficial Association and a U.S. Coast Guard Licensed Officer in the Merchant Marine. The MEBA is the nation's oldest maritime labor union, representing deck and engineering officers licensed by the United States Coast Guard. Our Officers serve in a variety of capacities in the commercial, government owned and operated, and domestic fleets, as well as in shore side employment at various terminals.

The MEBA was proud to take a leading role in the development of the transportation of LNG by tank vessels in the 1970s. Our members crewed U.S. flag LNG vessels until 2001. Today, however, not a single LNG tanker flies the American flag, and none of these vessels are crewed by Americans. We feel that this represents a serious threat to America, and we have been working to restore American mariners aboard this important segment of the maritime community.

Recently, however, MEBA has entered into a landmark agreement with LNG transporter, Excelerate Energy. Pursuant to this agreement, MEBA will be integrating its U.S. Coast Guard deck and engineering officers into its entire LNG tanker fleet and at its terminals. MEBA commends Excelerate and its foreign partners, Exmar, NV and Skaugen Terminals for their cooperation. This is also a result of the tremendous importance that Congress and agencies such as the Maritime Administration have placed on the issue of safe and secure transportation of LNG to the United States.

Broadwater LNG Project

MEBA has testified extensively at local public hearings in Connecticut and New York on the Broadwater LBNG project. MEBA provided expert testimony by several LNG shipboard deck and engineering officers on the safety and security of the transportation of LNG. The U.S. Coast Guard Licensed deck and engineering officers that have provided testimony are members of the MEBA and their testimony is a matter of public record.

The Broadwater project proposes to use a Floating Storage and Regasification Unit (FSRU). The FSRU is a floating receiving station that regasifies and stores the natural gas. For all intents and purposes the FSRU is a floating ship that does not have a propulsion system. The facility would consist of loading arms, piping and shutdown systems just like a land based terminal. Deck gear such as fenders, winches, and quick release hooks for the LNG carrier's mooring lines would also be located on the facility just like a land based port. The FSRU should contain a deck house for berthing consisting of living, dining, and recreation spaces. In addition, the deck house should contain command-and-control facilities, including monitoring and control instrumentation for LNG/natural gas processing activities, a ballasting system, communications, radar equipment, electrical generation, emergency systems, and thruster controls. There should be a command bridge space, located at the top of the deck house that would serve as a back-up location for the command-and-control functions, and be used primarily during docking/undocking of LNG carriers and other marine traffic-related operations.

In addition, the FSRU should be equipped with stern thrusters at the aft of the structure for heading control only. Although an FSRU could use its positioning thrusters to maintain a controlled forward speed of a few knots in light of weather conditions, it would be permanently moored to the seabed and therefore would not be used for navigation or transport.

Briefly, MEBA maintains that LNG can be transported safely. However, as discussed below the LNG tankers and the FSRU must be staffed by U.S. Coast Licensed and Certified Merchant Mariners.

Oversight of LNG Terminals and Ports—Deepwater vs. Land Based

The permitting of LNG import terminals generally fall into two categories, which are Deepwater Port and Land Based. With respect to oversight and permitting, primarily land based terminals are under the authority of the Federal Energy Regulatory Commission (FERC) who works in conjunction with the U.S. Coast Guard. Regarding Deepwater ports, they are under the authority of the Maritime Administration which also works in conjunction with the Coast Guard. The important distinction is that there is basically no oversight from a commercial shipping perspective over the permitting of land based LNG import terminals.

Briefly, the permitting of LNG Deepwater ports utilizes the U.S. Maritime Administration (MarAd) as the licensing agency. MarAd was granted this authority by Congress in 2002 through amending the Deepwater Port Act in the Maritime Transportation Security Act. In 2006, Congress again amended the Deepwater Port Act granting MarAd a larger role in the oversight of the commercial shipboard transportation of LNG. It first requires the Secretary of Transportation to develop and implement a program to promote the transportation of LNG to the United States on US-Flag registered vessels with U.S. citizen crews. That amendment further gives top priority to all applications for deepwater LNG import terminals that intend utilize US-Flag LNG

vessels. Finally, it requires that all applications for deepwater LNG import terminals specify the flag of the vessels and the nationality of the officers and crew that will be used to import the gas into the United States.

Indeed, it is critical to the safe and secure transportation of LNG that American mariners crew these LNG vessels entering U.S. ports. There is a severe worldwide shortage of LNG officers. This shortage is only expected to get worse. In addition, the training standards and qualification process of the foreign officers delivering cargo to the United States has generated enormous concern among shipowners, operators, classification societies and training entities.

The oversight and permitting of land based LNG terminals has not kept pace with the safety and security aspects that have been recognized as important to Congress with respect to Deepwater ports. This should be changed for the reasons discussed below.

Under existing law, the proposed Broadwater LNG Terminal is considered a land based facility under the permitting authority of FERC.

Need for Shipboard Import of LNG to the United States

According to the Federal Energy Regulatory Commission, U.S. natural gas demand is expected to increase by 40% by 2025 to 30.7 trillion cubic feet (TCF).[i] However, domestic supply, which has not equaled demand for many years, will only increase by 14.5 %. Without intervention, our natural gas supply will not keep pace with industry and the public's demand. Mr. Jeff Wright, Chief of the Energy Infrastructure Group, Office of Energy Project, Federal Energy Regulatory Commission cites the following reasons for this situation:

- Decline in the United States' underground domestic gas reserves[ii];
- Canada's problems with flattening gas production in the Western Canadian Sedimentary Basin (WSCB) and its need to fulfill its own demands;[iii] and
- Continuation of Mexico's growing economy with Mexico keeping an increasing share of its natural gas to meet its future demands.[iv]

This means the United States cannot rely solely on natural gas produced in North America. Therefore, LNG will need to be imported to the United States on oceangoing LNG tankships.

Need for U.S. Merchant Marine

The U.S. Merchant Marine should play an integral role in the importation of LNG in order to ensure the utmost in safety and security that all United States citizens deserve. American mariners, in particular members of the Marine Engineers' Beneficial Association, are highly skilled in the operation of steam plants used on the majority of LNG vessels and are experts with respect to operating other marine power systems such as diesel, diesel electric and gas turbine. U.S. Merchant Mariners are also subjected to

rigorous background checks and competency requirements. In addition, the MEBA continues to train its members to the highest industry standards in LNG technologies.

Importantly, it is the policy of Congress that priority should go to using U.S. crews for staffing purposes on LNG tankers that deliver cargo to the United States. After all, major importing nations ensure the safe and secure importation of this vital energy source by utilizing citizen mariners from their respective nations -- the United States should do so as well.

In contrast, reliable crewing in the international LNG transportation market is reportedly in a tail-spin. It has been widely reported that international LNG ship operators are "poaching" qualified shipboard officers from each other through economic enticements. Constant crew changeover, poorly trained crewmembers and questionably qualified mariners undermine the efforts of a historically safety conscious LNG sector and pose an imminent threat to the safety and security of citizens located near or en route to LNG receiving facilities.

Transportation of LNG worldwide is a rapidly expanding marine service. This growth has never happened so quickly before, or in a segment of the maritime industry that is technically so different from other segments. The shipboard transportation of LNG has a great safety record. This is due in large part because it took approximately 40 years to for the international LNG fleet to reach 200 vessels. It may only take 5 more years for the LNG fleet to increase by 100 or more LNG tankers. Thus proper vetting and training are critical factors for consideration.

Thorough Vetting of U.S. Merchant Mariners Provides Unmatched Shipboard and Port Security

All LNG entering the U.S. is carried on foreign flag ships operated by either non-U.S. citizen mariners, or aliens who are not lawfully admitted to the United States for permanent residence. Unlike foreign seamen:

- U.S. Merchant Mariners receive their credentials to work from the U.S. Coast Guard;
- U.S. Merchant Mariners undergo extensive background checks performed by the Federal Bureau of Investigation;
- U.S. Merchant Mariners are background checked through a National Driver (vehicle) Record database;
- U.S. Merchant Mariners will also be subject to jurisdiction of the Transportation Safety Administration (TSA) where they will be vetted through a terrorist watch database in order to receive a Transportation Worker Identification Card (TWIC).
- U.S. Merchant Mariners are citizens of the United States or aliens lawfully admitted for permanent residence.

American mariners undergo a stringent and thorough vetting and credentialing process. Our Coast Guard-issued license is considered accurate (with regard to identity of the holder) and valid with respect to the qualifications and ability of the individual mariner.

Moreover, the document is relatively tamper-proof. Each mariner goes through an extensive background check by several federal agencies including the Coast Guard, Federal Bureau of Investigation and now with the TWIC coming into effect, the Transportation Security Administration.

While foreign mariners may be required to comply with their government's regulations as well as international standards, the validity of some of the credentials is suspect. A few years ago, International Transport Workers Federation President, David Cockroft, purchased an authentic Panamanian first officers certificate and sea book despite no practical maritime experience. The Seafarers' International Research Centre at the University of Wales investigated the issue of fraudulent qualifications. Its preliminary findings revealed 12, 653 cases of forgery in 2001

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Federal and state government, local municipalities and the communities surrounding LNG import terminals can be assured, that with American mariners, the LNG vessels are manned by professional seafarers who have the integrity and the training necessary for the safe transport of LNG.

Problems in Growth of Demand for LNG and with Incoming Generation of LNG Officers

On June 20, 2006, Reuters reported that a growing global demand for liquefied natural gas and tight supply of specialized tankers and crew create a risk of dangerous lapses in standards of security. See, Darwin (Reuters), *LNG Demand Growth Risks Fall in Shipping Standards, June 20, 2006.*

Setting aside the security issue of foreign mariners, the United States must take into consideration the risks involved with poorly trained, insufficiently qualified and questionably vetted mariners who may deliver LNG to its shores. For instance, Yea Byeon-Deok, professor and LNG initiative coordinator of the International Association of Maritime Universities, recently stated at a conference in Australia: "Nobody knows what would happen if a significant accident occurred on a large LNG carrier. All we can say is that a 100,000 ton tanker has four times the energy potential of the atomic bomb used to hit Hiroshima. . . Many sub-standard vessels have begun to appear as demand for LNG increases, while there is a chronic shortage of experienced crew."

New orders for construction of LNG vessels imply a need for 3,575 officers over the next three years, Professor Yea said, of which 60% would need to be at senior or experienced level. Yea warned that "recruitment and training were falling ***dangerously short of requirements to staff complicated vessels which could make dramatic targets for potential terror attacks***." Reuters, *June 20, 2006.* Mr. Yea pointed out that the growth in "flag of convenience" ships which fly alternative flags to the country of ownership, allow the owners to avoid taxes, quality control and labor regulations which evidences deteriorating standards.

The younger generation of sea-going deck and engineering officers is withdrawing from the industry prematurely. These junior officers are showing less and less interest in continuing to go to sea and they are typically leaving for shore-side positions prior to taking on senior level seagoing positions. This has made it difficult for ship owners and operators to ensure a sustained supply of senior officers. There is as of yet no effective means to counter this tendency. This data is based on a report in the U.S. Coast Guard *Journal of Safety at Sea, Proceedings* regarding the international (non-U.S. Merchant Mariner) pool of shipboard officers.

The U.S. Merchant Marine was not considered in the aforementioned report. Indeed, had the U.S. Merchant Marine been considered, the resulting report would have shown that there is a vibrant and growing U.S. Merchant Mariner pool resulting in part by investments made in the passenger, freighter and tanker vessel maritime sectors. Moreover, it makes sense to staff LNG vessels delivering cargo to the United States with U.S. merchant mariners. U.S. merchant mariners are true patriots and care about their country-- they would not be "for hire" foreign personnel with little or no connection to America other than a job that provides a paycheck. U.S. Coast Guard licensed officers and crew provide answers and solutions to many of the safety and security concerns surrounding the importation of LNG.

Wide Scale Officer Shortage is Resulting in Foreign Ship Operators "Poaching" LNG Officers; Poor Training; Steep Decline in Safety and Security; and Violations of International Law

As reported in numerous articles and studies conducted by leading international maritime trade publications including Tradewinds and Fairplay, LNG owners and operators are lashing out at each other with allegations of "poaching", conducting insufficient training in violation of ISM Code as well as failing to properly check past employment references.

The sudden and sustained surge in global demand for liquefied natural gas and the worldwide shortage of mariners with LNG and steam experience is leading to predictable results. Ship managers seem willing to do whatever they can to get their ships fully crewed in the face of a growing wide-scale officer shortage. "The industry had previously grown slowly, so companies were able to train manpower and expand operations at a comfortable rate of two to three ships every two years," Keith Bainbridge, director of LNG Shipping Solutions, told Fairplay magazine in 2005 "But where an industry experiences 40-50% growth within a couple of years, it will split at the seems," he predicts.[v]

This manpower crisis is made even worse by new ship managers entering the LNG trade. A Fairplay article titled, *Poaching War for Crew Erupts*, cited the "voracious appetite for scarce manning resources, both at sea and onshore. This has created severe competition among LNG owners."[vi]

The Society of International Gas Tanker and Terminal Operators LTD (SIGTTO) has recognized the acute shortage and the reaction by some. "A short-term answer for an LNG vessel operator is to "poach" crew from another such operator but, clearly, the long-term answer is training, training, and further training. SIGTTO members, as much as anyone, wish for the quite unique safety record of LNG shipping to be preserved. The influx of new personnel into the industry is of concern, especially if there is a temptation by a minority of operators to "cut corners" and put officers into positions of responsibility on a LNG carrier before they have been properly trained." [vii]

In an article titled *Officer Crunch Sparks Safety Alarm*, Anglo Eastern Ship Management's training director Pradeep Chawla states that "intense pressure to promote more maritime officers is resulting in inexperienced officers making more mistakes and more dangerous situations on board. The training director noted that, "shortages have made it harder to retain officers because manning agents use higher wages to lure away experienced seafarers, especially in LNG/LPG and other specialized trades."[viii] Moreover, not all companies train officers, with many resorting to poaching.

The crewing crunch is giving rise to new and dangerous theories of crewing to meet the sustained demand. "Some operators are contemplating an airline-style approach, training their crew units to ever-higher standards and frequently rotating them among vessels. That would fly in the face of an industry that had, until last year, been characterized by its conservatism on crewing and had viewed rapid crew rotation as a threat to safety." The article mentions that with the shortage, there is an "increasing incidence of crews of strangers being cobbled together with precious little time to develop mutual trust and overcome their natural fear of blame."

In an article titled *Near Calamities in Cargo Operations*, Fairplay details two case studies, on international vessel crewing practices, to illustrate the dangers of new crew members who are unfamiliar with the vessel or on-board procedures. "In both incidents, one of the factors that contributed to the near calamities was the fact that one or more of the crewmembers involved were new to the ship and unfamiliar with all aspects of the vessel." "The importance of learning the idiosyncrasies of a particular vessel cannot be overstressed, and even when crew are transferred to sister ships they should not assume that every feature of the ships will be the same." As noted above, short cuts in manning and "inventive" solutions to crew shortages can prove to be a recipe for disaster.[ix]

The consequences of crewing instability and poaching can also lead to serious deterioration of the relationship between mariner and management. "There has to be a management team in which officers can pick up the phone and discuss problems openly, rather than hiding them until it is too late" says Simon Pressly, GM of Dorchester Marine, an LNG vessel operator in a Fairplay article. The author continues with the observation that, "Unfortunately, with poaching so rampant, the dangerous lack of crew continuity is likely to continue until operators start making the requisite investments in manpower training."[x]

Tradewinds states that the LNG-crewing shortage is giving rise to some serious shortcomings that are a direct threat to the industry's safety record and are in violation of the International Safety Management (ISM) Code. Some operators and ship managers are employing senior-level ship's officers that were terminated from employment by competing companies due to poor performance and substance abuse[xi].

On another front, big international shipping companies and ship management firms are feeling the LNG crewing pinch. Some operators are enticing LNG shipboard officers to switch companies by offering wages at 30%-40% higher than what has been paid in the past—and officers are switching companies and leaving their former employer in crisis. Some companies are offering over $18,000 a month (in wages only, not including benefits) to attract qualified LNG officers[xii].

All decision makers and stakeholders involved with the importation of LNG to the United States must take notice of what is going on in the international market. With growing natural gas demands and some 50-plus applications on the books for LNG import terminals, the American people need to be assured that the most highly trained and experienced personnel are transporting security sensitive LNG to the United States. There is no room for error when it comes to liquefied natural gas. Like no other time in history, the economics are in place whereby the U.S. Merchant Marine can economically and safely deliver LNG cargo; provide a stable pool of mariners for the long term; provide the highest amount of training; and comply with all U.S. and international laws.

International Consequence: Insurance Underwriters Deeply Concerned with Inexperienced Crews Aboard LNG Vessels

A recent article titled *LNG Ships Facing Premium Boost* details the nervousness of the insurance industry as the LNG fleet suffers through poorly managed growing pains. "Underwriters appear to be changing their view of LNG vessels, which have traditionally been regarded as particularly well managed, despite being costly and potentially hazardous." Now, higher insurance premiums are the prospect for LNG vessel owners as a result of "a big deterioration in the claims record of the world gas fleet." Marsh, the largest insurance brokering group issued a report concerning claims of more than $400 million run up by the LNG fleet.[xiii]

Higher insurance premiums are in prospect for owners of LNG carriers after a spate of claims including operational incidents have left insurance underwriters facing big losses according to Marsh.[xiv] Marsh reports that risk profile is increasing due to a shortage of crew with LNG experience.[xv]

With 200 LNG vessels in service and over 100 on order, Marsh identifies a number of factors associated with the rapid growth as adding to the risk profile of the gas-ship fleet including shortage of crews with LNG-carrier experience and new owners entering the market with the intention of trading vessels on the spot market rather than traditional long term charters.[xvi]

The shortage of mariners in the international fleet is dire. It is abundantly clear, therefore, that the U.S. Merchant Marine must enter the market.

International Reaction: Responsible Shipping Ministries React to Manning Shortcuts and Abuse; Use of National Flag Vessels Promoted By Major Importers

The worldwide shortage of mariners and the severe competition among ship-owners is leading to drastic cuts in manning with sometimes fatal results. An article titled, *Modern Seafaring Can Kill You*, notes the rising rates of suicide, murder and poor health among Indian seafarers and details India's response on behalf of its mariners. India's director general of shipping, GS Sahni believes that severe competition has compelled international ship-owners to cut down on manning. "Crews that numbered 50-55 few years ago have now come down to just 20 or less. Stress and fatigue has become a part of seafarer's tough life. With total strength of 15, there's no time for the floating staff to interact with each other since they are kept busy all the time and there is no peer sense." Captain MM Saggi, a nautical advisor to the government of India, says that stress and fatigue have led to several incidents of suicide, murder or seafarers going missing. "Ship-owners employ fewer seafarers, otherwise they feel they run the risk of going out of business. A situation develops where some employ fewer persons, yet keep whipping the crew and using them as slaves."

An official from the Indian shipping directorate notes that, "Indian ships do not face such problems because seafarers have their unions and as a result of the large manpower available, there is 20-25% more persons on board." A similar approach is taken in the U.S. by the Coast Guard in tightly regulating the minimum required number of mariners to safely operate a vessel under U.S. flag. The certificate of inspection (COI) ensures that proper manning of vessels for both the safety and security of the vessel and its cargo. However, *i*n the international shipping business, the flag flown over the stern (registry) determines the wages paid and the minimum standards followed. As the Indian example shows, some registries promote a lowest common denominator where strict employment and environmental standards no longer apply. This underscores the importance of the choosing the right people, both shoreside and at sea, for the sensitive job of carrying LNG to our coasts.[xvii]

India's Shipping Ministry also took the lead in requiring Indian manning and Indian registry for LNG vessels importing to the Indian coastline. For the time being, the Indian Ministries of Commerce and Petroleum & Natural Gas has prevailed in the internal battle, handing India a set back in its efforts to build a domestic flagged LNG fleet. However, Some of the world's largest importers of LNG, Japan and Korea, are an increasingly powerful consumer of LNG, have made registry of LNG ships a matter of national maritime policy. "Japan transported about 43% of its total LNG import of 59.1 million tons in 2003 on Japanese owned and controlled ships. Similarly, Korea transported about 61% of its LNG imports of 19.3 million tons in the same year on Korean controlled ships. In the combined import of Japan and Korea, third-party owned ships constituted only 8.3 percent," says a shipping industry representative.[xviii]It is notable that Japanese and

Korean controlled vessels are in respectable registries and do not cut corners on crewing in order to compete on the world market.

India's Shipping Ministry has attempted to rejuvenate its merchant marine by requiring Indian manning and Indian registry for LNG vessels importing to the Indian coastline. However, another branch of the Indian government, the Indian Ministries of Commerce and Petroleum & Natural Gas, has prevailed in the internal battle, handing India a set back in its efforts to build a domestic flagged LNG fleet.

Superior Domestic Maritime Resources: Calhoon MEBA Engineering School

The Marine Engineers' Beneficial Association operates a world renowned training facility, the Calhoon MEBA Engineering School (CMES), in Easton, Maryland. The school is fully accredited and certified by the U.S. Coast Guard and Det Norske Veritas (DNV). The MEBA School provides LNG training to organizations such as the U.S. National Transportation Safety Board and Transportation Safety Board of Canada & Transport Canada.

The MEBA training facility trains both deck and engineering officers and has recently installed a cutting-edge Bridge Simulation System designed and built by TRANSAS USA. The simulator is one of the newest and most sophisticated systems in the world. The interactive program allows students to simultaneously control simulated ships utilizing any of 56 different types of vessels in over 20 different ports. In addition to the ten ships that can be controlled within one scenario, instructors can further intensify the simulation by implanting multiple computer-controlled ships into the scenario. Unlike many existing bridge simulators, each station, operating a different type of vessel (including LNG vessels), can interact with every other station simultaneously. The LNG cargo simulation program allows students to dock, load and discharge LNG vessels. Moreover, the computerized system even encompasses the terminal-side operations of an LNG facility. It accommodates upgrades to adapt to ever-evolving Coast Guard and International Maritime Organization training and testing requirements.

The Calhoon MEBA Engineering School (CMES) prides itself in developing and offering courses before the need becomes apparent in the US marine transportation industry. Relevant courses meeting today's LNG training needs include Tankship Liquefied Gases (LNG). This course has been part of the MEBA training core since 1975. It provides U.S. Coast Guard Licensed Deck and Engine Officers with the knowledge to safely and efficiently transport LNG. This LNG course is a USCG prerequisite for employment aboard LNG carriers. The class includes comprehensive lecture, lab work, and computer training as well as LNG science, engineering systems, cargo systems, stability, and safety. This course complies with the IMO Code for the LNG Vessels.

XII. Conclusion

With 97% of all cargo imported to United States being carried on vessels that are not registered under the American-Flag and not crewed by U.S. citizens, one would think that

the safe and secure transportation of security sensitive cargo would be a serious concern. More to the point, at this time 100% of all Liquefied Natural Gas that enters the United States is carried on ships staffed by non-U.S. citizen mariners. The MEBA strongly believes that the use of American mariners is a critical component to the safe and secure importation of LNG to the United States.

With this in mind, some responsible corporate citizens in the LNG sector have recently agreed to expand their crewing practices to include U.S. citizen crews on LNG tankers. These companies, Suez LNG/Neptune, Excelerate/Northeast Gateway and Freeport-McMoRan, must be commended. We must also praise Maritime Administrator Sean Connaughton and the Maritime Administration for their efforts to promote American mariners on LNG tankers. Without their help, the progress made with these companies would have been much more difficult.

We look forward to working with Congress and the Administration moving forward to further protect our communities and maritime infrastructure.

Respectfully,
/S/
William P. Doyle

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[i] Annual Energy Outlook 2005, Energy Information Administration, U.S. Department of Energy, February 2005, Table 13.

[ii] Mr. Wright cites the Annual Energy Outlook 2005, Energy Information Administration, U.S. Department of Energy, Table 13, which reaches the conclusion that production from conventional underground gas deposits is projected to decline between now and 2025. This decline is somewhat offset by increased gas production from non-conventional domestic gas sources (most notably coal-bed methane), increased production from deep water sources (greater than 200 meters) in the Gulf of Mexico, and commencement of deliveries of Alaska gas to the lower 48 states. The Alaskan volumes are problematic according to Mr. Wright, because there has been no application to construct necessary infrastructure to transport the gas, and the timeline from application to first delivery is approximately 10 years.

[iii] The National Energy Board of Canada states, the Western Canadian Sedimentary Basin (WSCB) accounts for more than 90% of the gas production in Canada and for about 23% of North American natural gas production annually. In the last few years, gas production from the WSCB appears to have flattened after many years of growth, leading to increased uncertainty about the ability of industry to increase or even maintain current production levels from the basin over the longer term. See, Canada's Conventional Natural Gas Resources: A Status Report, National Energy Board, April 2004, pp. 9-10.

[iv] Exports of gas to Mexico have increased greatly in the last few years. These exports do not constitute a large out-flow of gas at present. However, the Mexican economy is growing and if it continues to grow, its demand for natural gas will increase and require the United States to import an increasing amount of gas to meet, not only domestic needs, but also the needs of Mexico. In other words, what Mexico imports and shares today by way of natural gas, Mexico may not be able share later. Jeff Wright, Chief, Energy Infrastructure Policy Group, Office of Energy Project, Federal Energy Regulatory Commission, Fall 2005.

[v] *Poaching War for Crews Erupts*, Fairplay International Shipping Weekly, February 24, 2005.

[vi] Id.

[vii] SIGTTO News, September 2005, p.5.

[viii] *Poaching War for Crews Erupts*, Fairplay International Shipping Weekly, February 24, 2005.

[ix] *Near Calamities in Cargo Operations*, Fairplay International Shipping Weekly, December 1, 2005.

[x] *Poaching War for Crews Erupts*, Fairplay International Shipping Weekly, February 24, 2005.

[xi] *LNG Crewing Shock,* Tradewinds, February 25, 2005
[xii] *Philippines Dangles $18,000 Carrot*, Tradewinds, January 9, 2006; See also, *LNG Wage Anger*, Tradewinds, November 4, 2005; *Officer on $320,000 a year, claims Sigtto*, Tradewinds, November 4, 2005.
[xiii] Tradewinds, Insurers Get LNG Jitters, LNG Ships Facing Premiums Boost, March 17, 2006
[xiv] Id.
[xv] Id.
[xvi] Id.
[xvii] *Modern Seafaring Can Kill You*, Fairplay International Shipping Weekly, April 20, 2006
[xviii] *Foreign Flag Vessels May Bring Down LNG Import Costs*, The Hindu Business Line, December 13, 2005.