



# Transporting Oil and Gas by Tanker: Where are the gaps, and where are the opportunities?

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Risk is inherent in oil and gas marine transportation due to the nature of the cargoes carried. But, is industry well prepared to effectively deal with some of the emerging risks and operational challenges, not the least of which is maritime cyber assurance?

Modern vessels serving the global hydrocarbon trade are equipped with myriad networked information technology dependent critical systems, supporting electronic navigation, engine control and remote monitoring, dynamic positioning (if equipped), cargo management, and other vital functions. These systems, as with any other computerized system, are increasingly becoming vulnerable to cyber attack, which may, in turn, constitute a serious threat to a tanker's seaworthiness.

Despite this, there currently are no best practices, regulations or standards governing maritime cyber. And, there is very little, if any, validated reporting of maritime cyber incidents. The latter may lead to a false sense of security under traditional approaches to risk management. Without the threat, then the risk is negligible, right?

What is needed, and what we are working toward at USMRC, is a comprehensive industry-centric strategy, backed by technical research, to enhance maritime cyber assurance in marine operations – aboard tankers and in oil and gas cargo terminals.

Although we are years behind other land-based industry sectors in this effort and the costs of a cyber disruption or loss in the maritime sector could be quite high, actions are just now being taken to address this critical area of maritime safety.

Beyond the maritime cyber problem, another operational challenge for gas tankers, in particular, is the sheer growth in the number of these ships plying the navigable waters around the globe. Low priced U.S. sourced natural gas has resulted in the rapid development of export capacity for high value natural gas liquids (NGLs) that are the feedstock for global manufacturing, thus creating a corresponding increase in Liquefied Natural Gas (LNG) carrier demand. For example, proposed LNG export terminal development in the U.S. Gulf of Mexico alone may result in up to 800 LNG carrier calls per year by 2020.

Is the industry prepared to safely handle the expected traffic volume in confined waterway spaces? And what about the manning aboard these tankers? The manpower requirements for the safe operation of these highly specialized ships to very stringent safety and performance standards, while operating in sensitive waters, will put tremendous strain on available manning and recruiting. More significantly, meeting the training needs and competency standards for the crews that operate these technologically advanced ships and the regulators who ensure safety and environmental protection of the waters they operate in will be an immense challenge for all marine industry stakeholders. Could simulation play a role in addressing these seemingly insurmountable obstacles?

One underutilized method for operators, service providers and stakeholders in the oil and gas sector to facilitate continued improvement of safe marine operations is the use of simulation as a tool to mitigate risk in highly challenging navigation and other aspects of oil and gas tanker operations such as ship to ship transfer, tandem offloading and tethered escorting in restricted waterways.

Great strides in the fidelity and technology of ship simulation have been made in recent years and the most advanced ship maneuvering operations can now be accurately and realistically simulated; more than ever before. This, combined with the right technical expertise on employing high fidelity ship simulation in a manner that yields actionable and practical outcomes for oil and gas marine transportation interests, can provide very valuable benefits in mitigating risks across a wide spectrum of potentially hazardous oil and gas tanker operations. These activities can range from navigation in high traffic density waterways, to operating in adverse environmental conditions, to safely maneuvering in various casualty and emergency situations.

Refinement of marine operations research outcomes also has carried over to and expanded industry use of simulation as a tool for mariner training and assessment with custom-tailored, emergency and specialized operating scenarios. It is likely that more can be done in this area.

As maritime professionals, we are all too familiar with the statistics that point to the human factor as a major contributor in most marine casualties, but as an owner or operator, do you truly know how your bridge team onboard an oil or gas tanker will perform across a range of normal, unusual, and emergency operational scenarios? Have they ever confronted the full spectrum of these types of situations or merely a few?

Further, does the design of your ship and its systems, combined with the skills of your mariners, standard operating procedures, and safety management systems set the right conditions for optimizing the Mariner-Machine Interface (MMI)? Do your deck officers fully understand the limitations of e-Navigation systems and the risks of over-reliance? An effective human capital skills assessment strategy using simulation can identify potential marine workforce risks and address them before it's too late. The costs to achieve this are relatively small in comparison to those of a casualty.

Add to all of this the entry of new regulations around ballast water management and treatment, air emissions, fuel sulfur content, crew comfort and work hours, and navigation equipment, and it can be seen that the challenge to maintain tanker operational safety and integrity standards is more complex than ever. Oh, but wait, are the crews aboard your tanker fleet equipped to effectively deal with the proliferation of unsafe mixed migration by sea, a "Hot Topic" at International Maritime Organization (IMO) and a problem laced with complex geopolitical and social ramifications? Yet, another serious and perplexing issue that tanker owners, operators and mariners face for the foreseeable future.

As in any time of flux, the opportunities are proportional to the challenges. Those operators, service providers and stakeholders that are able to embrace change, leverage existing resources, collaborate with strategic partners, adopt new technology and successfully develop and implement realistic strategies will weather the storm just fine.