Preliminary Navigations/Waterways Analysis and LNG Safety Review for LNG Receiving Terminal at Point Pleasant, Maine

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1. SCOPE OF ASSESSMENT AND GENERAL CONTENT REVIEW

1.1. Executive Summary

This Assessment was conducted prior to the publication of USCG NAVIGATION AND VESSEL INSPECTION CIRCULAR (NVIC) 05-05 GUIDANCE ON ASSESSING THE SUITABILITY OF A WATERWAY FOR LIQUEFIED NATURAL GAS (LNG) MARINE TRAFFIC. It is not a complete assessment but in review of the recently published NVIC, can be considered as a preliminary WSA in accordance with paragraph 5.a.(2) of the subject NVIC and shall be the basis document on which a follow-up Waterway Suitability Assessment (WSA) as discussed in paragraph 5.a.(3) is conducted and presented to the USCG COTP/FMSC for review and validation. This assessment looked at the navigational issues for bringing large LNG carriers, from the Saint John Approaches Fairway, past East Quoddy Lighthouse at the NE end of Campobello Island, down Head Harbour Passage (Canadian Waters), into Friar Roads, turning at Eastport and entering U.S. Waters, up Western Passage, to the proposed site of the Facility; which is located south of Pleasant Point (See Section 3.8). Most of the transit is in Canadian Waters. All aspects of the voyage were evaluated including tides/currents, most likely track lines, opposing traffic, recreational traffic, aids to navigation, waterway particulars, critical junctures, restrictions, international issues, and times for vessel transit, support activities, response resources and preliminary security issues. The elements contained in 33 CFR 127.009 were used as the basis for the evaluation addressed in this report.

This report concludes:

1. Within the scope of this analysis, there were no major issues, obstacles or concerns that would preclude this project from moving forward to its logical conclusion. There are no issues with regards to the suitability of the waterway for proposed LNG importation/transportation. The waterway is deep, adequately marked, not congested, and wide enough to handle the vessels size proposed and the frequency estimated. The entire voyage is anticipated to take 2 – 2.5 hours.

2. Those concerns raised by regulatory agencies noted in this report can be addressed and qualified to their satisfaction through further study/analysis, engineering and design, procurement/implementation of specialized/support equipment and technology, and through the execution of appropriate plans, policies and procedures dealing with operations, security and safety concerns. Issues regarding lack of resources to address pollution response, safety and security apprehensions can also be alleviated by working with the local community and regulatory agencies to provide practical solutions.

3. That the criteria contained in NVIC 05-05, with regards to the Sandia Zones of Concern and mitigation strategies, proposed can be adequately and successfully applied. The demographics of this area do not even fall into the Sandia criterion for population density both with regards to the route of the vessel transit or at the proposed facility site. Zone One; the measure with the most severe impact on the local population does not even affect the shoreline anywhere along the vessels route except slightly in the vicinity of the “Old Sow” whirlpool.

4. There are international issues that need to be resolved between the United States Coast Guard and Transport Canada with regards to jurisdiction and application of security measures while the vessel transits Canadian waters and then enters U.S. waters bound for a U.S. Port.

1.2. Professional Competency

The persons utilized in accomplishment of this project by TRC Security, LP were Captain J. J. Kichner, P.E. (USCG ret.) President and Principal of TRC Security, LP and Captain J. J. O'Brien (USCG ret.) Senior Marine Consultant. Their resumes are provided in Appendix A. They have the appropriate skills necessary to meet the requirements of 33 CFR 103.410. They have had extensive assessment experience and are familiar with all aspects of this operation both from a regulatory and commercial perspective.

1.3. Vessel – Facility Interface

The current concept of operations for this facility is to accept LNG from a variety of sources and vessels. This report is being prepared to cover LNG vessels ranging in size from approximately 125,000m^3 to over 250,000m^3. Sources of LNG may be in the Caribbean, North Africa, the Persian Gulf or other yet to be determined areas (i.e. Russia). No particular vessel operator has been named as the sole source provider/operator. It is anticipated that over 100 transfer operations will be conducted annually. The facilities are being designed to have two LNG vessels at the dock simultaneously; one engaged in transfer operations while the other is utilized as a floating storage facility to ensure a continuous and uninterrupted supply of gas into the pipeline at approximately one BCFD. There are no plans for shore-based functional storage tanks where the vessel will discharge the gas as liquid into a liquid storage facility. Current operations anticipate that the vessel will pump liquid into gasifying units located on the pier which will convert the LNG into gas and feed it directly into the pipeline. All LNG processing facilities will be located on the pier/jetty.

KBR has provided a conceptual plant layout which is included in Section 3.8 of this report. Current thinking proposes a plant layout and provides an estimate for a footprint for the re-gasification scheme which does not involve onshore storage tanks. There certainly can be several different layouts to achieve the requirements of the owner for such a facility and modifications will be made as this effort proceeds forward. The arrangement shown by KBR has been prepared with considerations concerning constraints in land parcel availability, safe facility operations and for mitigating any industrial disruption to the tribal lands. KBR's layout scheme demonstrates an offshore footprint, one that locates process equipment associated with re-gasifying the LNG. It retains the onshore portions of land, which will be made available, for buildings and utilities that are better situated in close proximity to the county road. This layout will need to be developed further to account for technical and commercial viability and final considerations after the feasibility aspects of this process.

1.4. International Considerations

The proposed facility is located on land and in water that defines the boundary between the State of Maine and Canada. Although the facility resides in Maine geographically, most of the vessel's transit will be through Canadian waters and affect Canadian land mass. Issues concerning pilotage have been worked out between countries; vessels transiting Canadian waters bound for a U.S. Port will be piloted by U.S. Pilots, while vessels transiting through U.S. waters bound for a Canadian port will be piloted by Canadian Pilots. LNG vessels calling on the proposed facility will enter the approaches to Saint John, New Brunswick Traffic Control and will be subject to Canadian Shipping Act Traffic Services Zones Regulations and requirements. A copy of these regulations is provided in Appendix D. Canada has its own Port State Control Program and currently does not require escort of vessels (LNG or otherwise) in restricted or inland waters for security purposes. Vessels are not boarded at sea and LNG is not scrutinized as closely by the Canadian Government as does the United States Coast Guard. Canadian authorities do require vessels arriving in Canadian waters to provide a 24-hour notice of arrival and does evaluate the safety condition of the vessel through a series of questions. The responsible Canadian Agency for regulating LNG vessel safety, arrivals and vessel traffic is Transport Canada.

1.5. Agencies and People Contacted/Interviewed

Appendix B provides a list and contact information of all of the individuals contacted, interviewed or approached in compiling the information reported. Interviews were held with the United States Coast Guard, Canadian Coast Guard, Transport Canada, local pilot organizations and port authorities as well as others to obtain the most recent information used in compiling this report.

2. PORT CHARACTERIZATION

2.1. Summary of Port Environment

Commerce in the area consists almost entirely of aquaculture, farming, eco-tourism, and commercial fishing. There are many environmentally sensitive areas on both the U.S. and Canadian sides, including bird nesting sites, eelgrass beds, seal pupping ledges, rich clam and oyster beds. Aquaculture is a very large industry in this area with salmon and cod being the primary marine commodity.

There is Northern Right Whale activity in the Bay of Fundy. Other whales (minke, finback, humpback) are also common, as well as porpoises, seals, bald eagles, osprey, ducks and many types of sea birds making their home in the waters of Head Harbour Passage and Friar Roads. The area considered for this project is known as the most diverse aquatic ecosystem on the Eastern Seaboard.

2.2. General Issues and Port Level Impacts of LNG Operations

Local waterway users are very concerned with possible COTP generated "exclusion zones" during LNG vessel transit and discharge.

The present COTP is very concerned about security issues for the proposed facility. These include the fact that it does not have a shore side storage tank and proposes to use a second LNG vessel as a storage platform, as well as perceived delay in vessel turn around

due to re-gasification/offloading operations. Also, due to the remoteness of proposed facility site, the COTP would be interested in studying the feasibility of employing security measures using emergent technologies, such as underwater detection devices, security booming, anti-boat barriers, physical barriers around the vessel(s), and ROV's, etc.

There is much local opposition to this proposed facility, which also causes a great bit of concern to the COTP. In a recent Fishermen's Voice Article, that can be accessed on the internet via: http://www.fishermensvoice.com/archives/perrylng.html, "Opposition has been expressed formally by most of the municipalities on both the American and Canadian shores of Passamaquoddy Bay, environmental groups, the local land trust, and an alliance of U.S., Canadian and Passamaquoddy activists who call themselves "Save Passamaquoddy Bay." The Cobscook Bay Fishermen's Association, representing fishermen who ply the waters that would be affected "is (also) opposed, as are many doctors, scientists, educators and artisans around the Bay." The Save Passamaquoddy Bay alliance can be accessed on the internet via: http://www.savepassamaquoddybay.org, as well as other valuable project information via the Cobscook Bay Resource Center http://www.cobscook.org. Additionally, the Roosevelt Campobello International Park Commission has issued a "Statement in opposition to the proposed LNG Terminal…" released on April 8, 2005.

2.3. Proposed LNG Operations Overview

To Be Determined

2.4 Alignment with Area Contingency Plan/Area Maritime Security Plan

All components of Coast Guard Activity in Maine, New Hampshire, and Vermont (with exception of First Coast Guard District and Atlantic Area controlled Cutters) was combined on July 1, 2005, and now falls under the leadership of COTP Portland as Sector Northern New England.

According to the COTP, Captain Stephen Garrity, USCG, because there is no critical infrastructure located in or around Eastport, Maine, no Port Security Risk Assessment Tool (PSRAT) information is available. Also, due to geographical remoteness, and lack of high value cargo operations, there is little to none Area Maritime Security (AMS) planning/activities for this region. In recognition of these facts, as part of his U. S. Coast Guard Area Maritime Security (AMS) Strategic Plan for Maine and New Hampshire, Captain Garrity has stated his intention to "engage with Canadian partners on LNG, Ferry Security, and CANUSLANT response issues; improve MDA, Identify Down east threats and vulnerabilities, close gaps and bring mega yachts and marinas into MTSA compliance."

Maine & New Hampshire ACP section 8000 (change 6) has a well established Marine Firefighting Plan with extremely limited firefighting equipment listed for Washington County, Maine. The only marine firefighting asset listed is the 41'UTB out of Station Eastport with a 250gpm fire pump. The larger of the two harbor tugs operated in Eastport is reported to have a 2,000gpm fire pump installed.

The ACP lists a pre-designated command post at Washington County Technical College, 16 Deep Cove Drive, Eastport, Maine. Under the Geographic Response Plan Section of the

ACP, this area is listed as Region D (Downeast Region) for oil spill response protection strategies and priority areas. This information can be accessed on line at: http://www.maine.gov/dep/rwm/grp_web/intro.htm

The Maine/New Hampshire Port Safety Forum acts as the Local Harbor Safety Committee for this area. The Eastport/Quoddy Pilots attend meetings when held in the local area.

Maine and New Hampshire ACP scenario 9423.14 lists a 20,000,000 gallon crude oil spill into Passamaquoddy Bay/Eastport area. (*Note: This ACP was written to incorporate the proposed oil tanker traffic through the area which never materialized and may not have been updated; certainly bunkers of vessels using this waterway would not be of that volume*).

Anticipated shortfalls include:

1. Insufficient number of trained response personnel available in a timely manner;
2. Communications resources would be stressed;
3. Insufficient number of designated response work boats possessed by BOA contractor;
4. Insufficient availability of cold weather gear;
5. Insufficient protective clothing;
6. Insufficient number of trained wildlife rehab personnel available; and
7. Insufficient lodging in the immediate area.

Although this is considered a "worst-case scenario", with the probability of a spill this size remote (due to non-tanker traffic in this region), the same shortfalls could be reasonably expected and be a factor with a moderate spill from a breached vessel's (any vessel not necessarily an LNG tanker) fuel oil tank, especially if the spill occurs in the winter months.

To mitigate and manage the effects of an oil or hazmat spill involving both U.S. and Canada, the First Coast Guard District and the Canadian Coast Guard Maritimes Region, since 1974, co-author a joint marine pollution contingency plan (JMPCP) known as CANUSLANT which is titled as a Plan for Response to Harmful Substance Incidents Along the Atlantic Border Between Canada and the United States. This plan is regularly tested and improved by way of biennial exercises.

3. CHARACTERIZATION OF THE LNG FACILITY AND THE LNG TANKER ROUTE

3.1. Transit Route

The proposed site for the new LNG plant is located in the United States, just south of the **Passamaquoddy Point Pleasant Indian Reservation** across the Western Passage from the west side of Deer Island at approximately Mink Point. Deer Island is one of three Fundy Isles; the others being Campobello Island and Grand Manan Island. The closest U.S. city is Eastport and the closest town is Lubec, Maine. Each day 100 billion tons of seawater flows in and out of the Bay of Fundy during one tide cycle. The Bay of Fundy is considered to have the world's highest tide, although this claim has been challenged by evidence of Ungava Bay. *Source: http://bayoffundytourism.com*.

The transit route from sea to pier consists of passage through the Bay of Fundy to Head Harbour Passage, to Friar Roads, to Western Passage to Split Rock arriving at Point Pleasant, Maine. Applicable navigation charts are NOAA 13394 (approach) and NOAA 13396 (inward passage). Supplemental navigational publications include:

- US Coast Pilot 1, Atlantic Coast: Eastport to Cape Cod, 35th Edition, 2005, Chapter 4, Quoddy Narrows to Calais, Maine contains much valuable nautical information for the area and supplements the navigational information shown on NOAA charts 13396 and 13394.
- USCG Light List-Volume I, Atlantic Coast (St. Croix River, Maine to Shrewsbury River, New Jersey), 2005, provides more complete information concerning aids to navigation (lights, buoys, day beacons, radio beacons, and racons) for the coastal and inland waters than charts. Also lists additional information such as reference numbers, official name of aids, where possible its position, height range, structure, and other relevant information.
- Canadian Sailing Directions ATL106E, this publication contains a wealth of general information on history, weather, charts and publications, water levels and datum's, navigation information, regulations, aids to navigation, and other items. Specific marine navigation information describes wharves, lights, dangers to navigation, local conditions, ice, currents, anchorages, marinas, facilities and services, all with reference to the Canadian charts of the areas.

All traffic over twenty meters in length and/or over 500 GT is controlled by the Bay of Fundy VTS Zone, which is manned by Canadian Coast Guard Personnel in Saint John, NB. Twenty-four hour advance notification to Fundy Traffic is required for all vessels transiting this area. Upon entering the Bay of Fundy VTS Zone, which transiting from the south, comprises all Canadian waters contained within the area bounded by a line drawn in a 270 degree True direction from Chebogue Point in position 43-43-54.3N, 66-07-08.0W. Once inside the VTS Fundy Zone, all vessels are required to maintain voice contact with controllers, and check in on designated frequencies, at established points. LNG vessels transiting from and to the South will likely be directed to the traffic lane East of Grand Manan Island. Fundy Traffic has radar coverage of the entire Bay of Fundy, but does not have visual or radar coverage inside Head Harbor Passage. Voice communications (VHF-FM), however, is maintained with vessels transiting to Eastport and/or the Port of Bayside, NB. If necessary, according to the CCG, a radar repeater could easily be installed on Campobello Island, Deer Island, or Eastport, Maine to provide full radar coverage of LNG transits inside of Head Harbour to the proposed terminal.

In U.S. waters, pilotage is compulsory for all vessels (except fishing and sail vessels) with a draft of nine feet or more. In Canadian waters, pilotage is not compulsory, but is used by 90-95% of all vessels transiting the Western Passage to Bayside Marine Terminal in St. Stephen, NB. Interestingly, pilotage is compulsory for the Port of Saint John, NB.

Both U.S. Pilots, Captain Robert J Peacock, II (Quoddy Pilots, USA) and Captain Gerald S. Morrison (Eastport Pilots USA), hold USCG issued Unlimited Master's Licenses with appropriate First Class Pilot of Vessels of any Gross Tons for Eastport (Cobscook Bay, Maine from Sea to the Oil Terminal on Hersey Neck via Head Harbor Passage and Friar Roads (Eastport Harbor)…*additional pilotage endorsement may be required for Western Passage transit to proposed dock at the LNG facility.* Both pilots are extremely well

qualified, having spent considerable time as Masters of large oceangoing VLCC and ULCC tank vessels.

The pilots estimate **total transit time of 2 to 2 1/2 hours** duration from boarding northeast of Quoddy Head to the proposed LNG pier site. Of all vessel transits in the area, US pilots estimate less than 5% will be delayed due to inclement weather. Fog, though persistent at certain times of the year, is not an issue to the pilots. Weather delays are usually due to strong Easterly or Northeasterly winds (in excess of 35 knots) and blizzard conditions from occasional Nor'easter winter storms. Summers are generally cool and winters are extremely cold in this part of the country. Due to the swift currents and extreme range of tides, ice is not an issue in the Head Harbour/Friars Road/Western Passage proposed transit route.

The mean range of tide at Eastport is 18.4 feet (US Coast Pilot), with a tide range from 11 to 26 feet being common, and 28 feet under extraordinary conditions. Tidal currents of up to 6 knots are also common for these waters, resulting in special care given to vessel moorings. Bottom composition for this area consists of sand, gravel, mud, and rocks in shoal areas. Prevailing winds are from the northwest during September through May, and southwesterly during the summer months (June – August).

Emergency and routine anchorage areas appear sufficient for LNG vessel operations, with two dedicated areas in the Bay of Fundy (controlled by Fundy Traffic) located outside to the North of Head Harbor Passage, and one inside in the vicinity of Friars Bay, southeast of Eastport.

At present time, two harbor tugs (controlled by the Port Authority) are available in the port of Eastport. The primary tug "AHOSKIE" is a 2,400 HP, former US Navy tug, while the secondary tug PILON, is a 1930's vintage ex-Boston Harbor tug, with 1,200 HP.

Within the Head Harbor/Friar Roads/Western Passage, there are two seasonal ferry crossings connecting Deer Island, NB (at Deer Island Point) and Eastport, Maine (at Todd Head) and Campobello Island, NB (at Deer Point). These small passenger/vehicle ferries/scows run from approximately June 15th to September 15th of each year, and operate on an hourly schedule during daylight hours. The routes are well marked on NOAA chart 13396. Also, according to Campobello Island park personnel, there is an additional small seasonal passenger ferry service (June through September) which consists of two vessels operating in the area from St. Andrews, NB, via the St. Croix River to a floating wharf located on Friars Head, Campobello Island. This ferry route is not marked on NOAA chart 13396. Well to the East, in the Bay of Fundy, regularly scheduled passenger/vehicle ferry service between Grand Manan Island, NB and Blacks Harbour, NB operates with several round trips daily, sailing year round. The route for this ferry service is also well marked on NOAA chart 13394, and movements tracked continually by Fundy VTS Traffic Control. Well to the South, from mid-May through mid-October, the fast ferry "The Cat" makes twice daily crossings of the lower Bay of Fundy between Yarmouth, Nova Scotia and Bar Harbor, Maine.

The transit route of LNG vessels on an International voyage would begin by entry into Canadian Waters and into the Saint John, New Brunswick Vessel Traffic Control system and approach areas. Transport Canada is the regulatory agency that would be responsible for oversight for the safety and security of the vessels while they are in Canadian Waters.

Even though the Transport Canada has a Port State Control Program (PSC), as outlined in the Canada Shipping Act 2001, since the vessel would not be docking at a Canadian Port, no PSC boarding at sea would be conducted. Transport Canada conducts all of its Port State Control boarding's in port. On receipt of the 24-hour advance notice of arrival, the master of the vessel would be responsible to provide certain safety information to the Canadian Government as per the regulations contained in the Vessel Traffic Services Zones and be cleared for further transit into port.

From the Saint John Fairway in the vicinity of 44-58.3N/066-53.07W, the vessel would turn on a course of 289 degrees True for a distance 33NM which would provide a suitable track for entry into Harbour Passage in the vicinity of East Quoddy Head and Head Harbour Light. Since the vessel is bound for a U.S. Port, the Eastport Pilots would be responsible for advising the vessel's master in navigating to the LNG terminal and would board the vessel in Canadian Waters seaward of East Quoddy Head and Head Harbour Light.

It is anticipated from discussions with the Eastport Pilots, that the vessel will accomplish its transit in eleven distinct legs (numbered 1 – 11 on the charts). These transit legs are displayed on the following chart segments and summarized in the table following. The table provides names for each leg, the course to be steered, the distance in nautical miles for each leg and their total, navigational obstructions both natural and man made, channel characteristics, crossing traffic and distance of the vessel from shore at critical points along the transit. It also indicates whether the vessel is in Canadian or U.S. waters for each segment or leg.

The vessels transit takes it through Head Harbour Passage where it would pass Campobello Island (CAN) along the island's north shore, to Friar Roads south of Indian Island and Cherry Isle, past Eastport, ME along the city's eastern shore, up Western Passage, passing Quoddy (US) to the West and Deer Island (CAN) to the East. Particular attention must be paid to "Old Sow" whirlpool which requires the vessel to hug the U.S. shore along Eastport in the vicinity of Dog Island (US) and Deer Island Point (CAN). Information about the islands, cities and populated areas can be found in the Section 3.12 of this report.

Nautical Charts Showing Vessel Track from Seaward to Facility

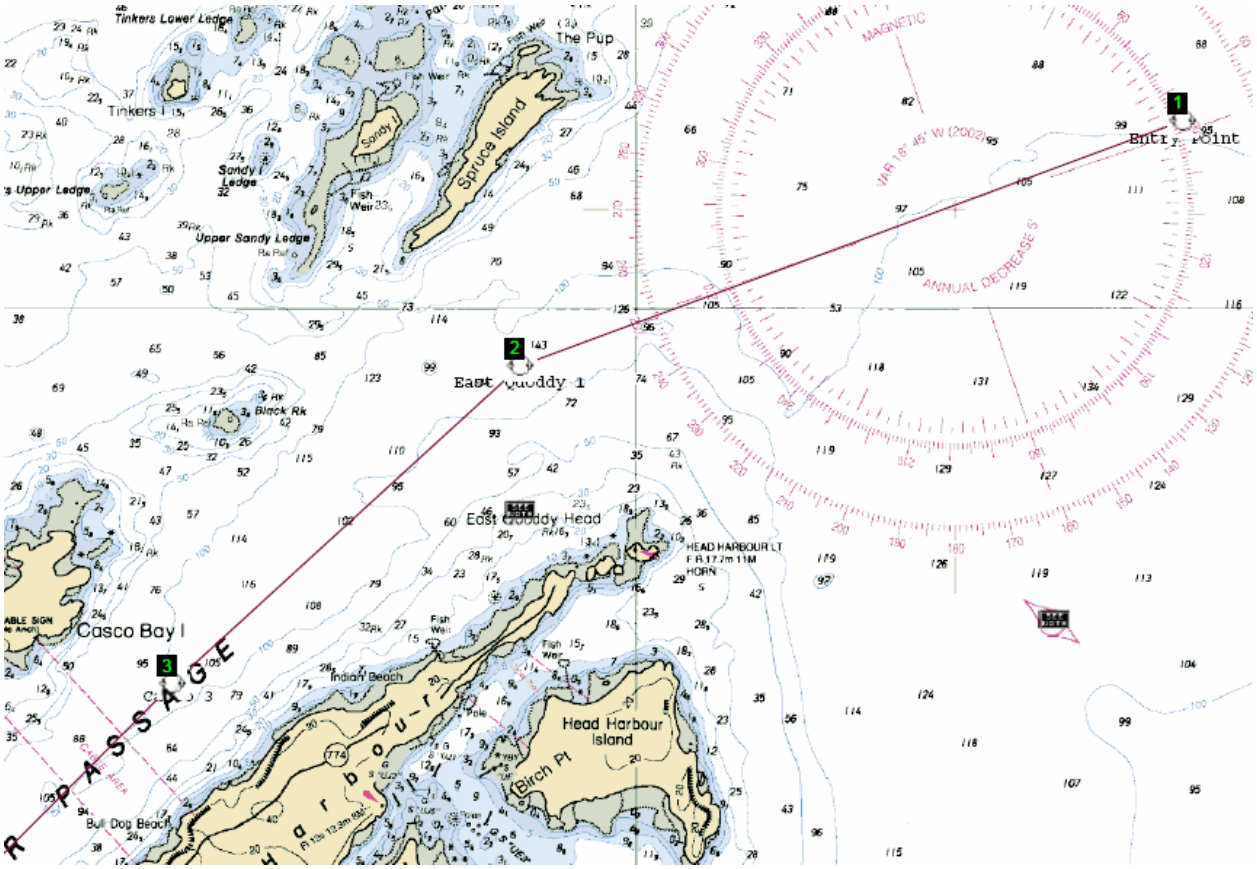

Chart One: LNG Vessel Transit Legs 1, 2 and 3

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NOTE: Red Circles denote shoals and "Old Sow" whirlpool off of Deer Island Point

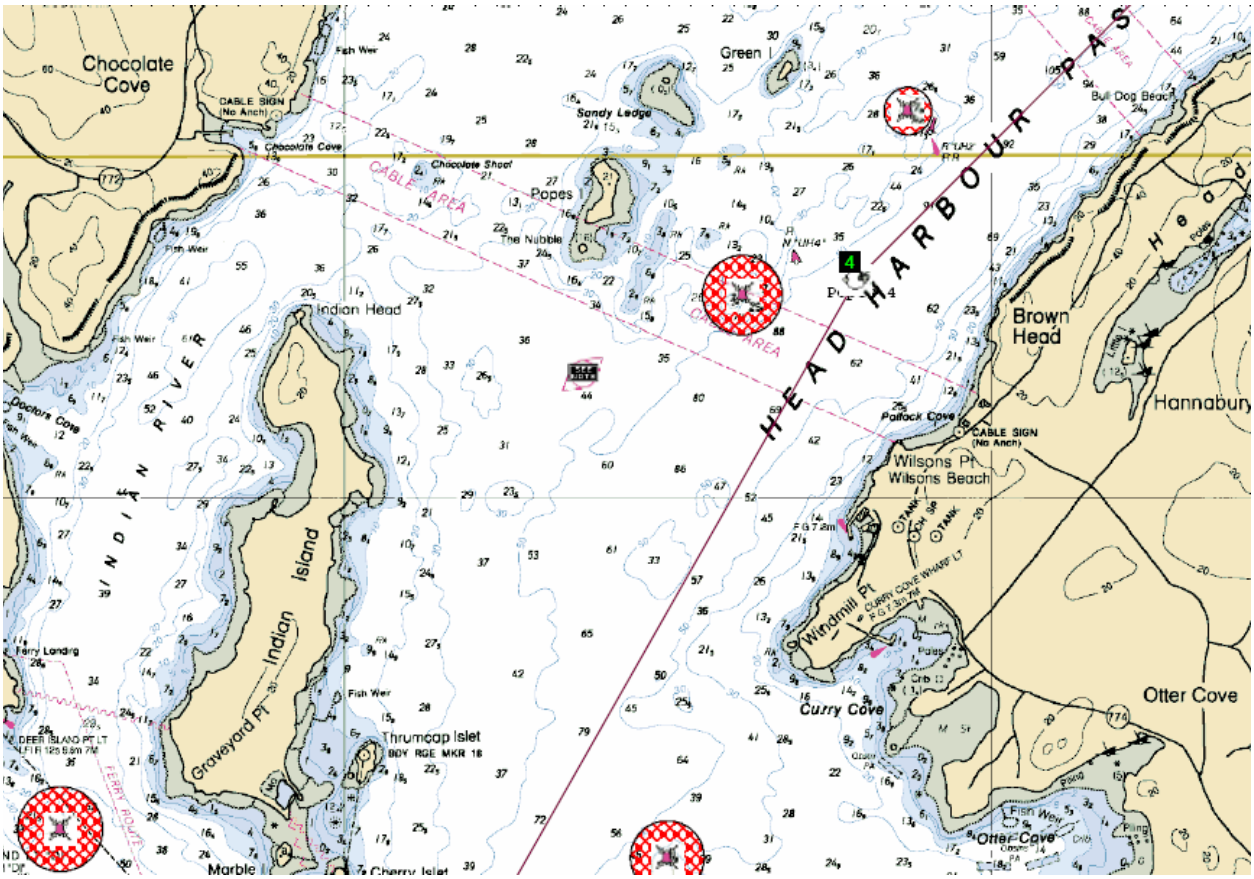


Chart Two: LNG Vessel Transit Legs 4 showing Shoal Areas

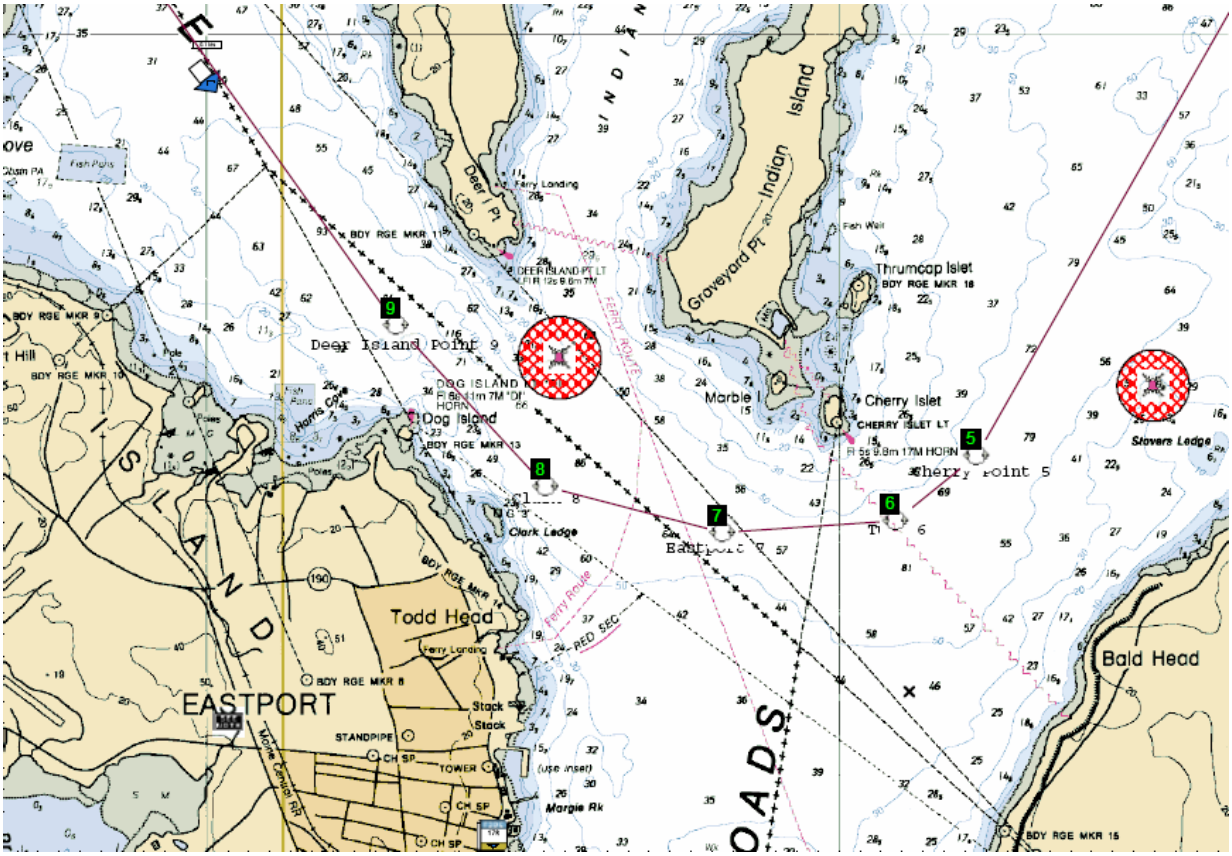


Chart Three: LNG Vessel Transit Legs 5,6,7,8 & 9 around Eastport Maine

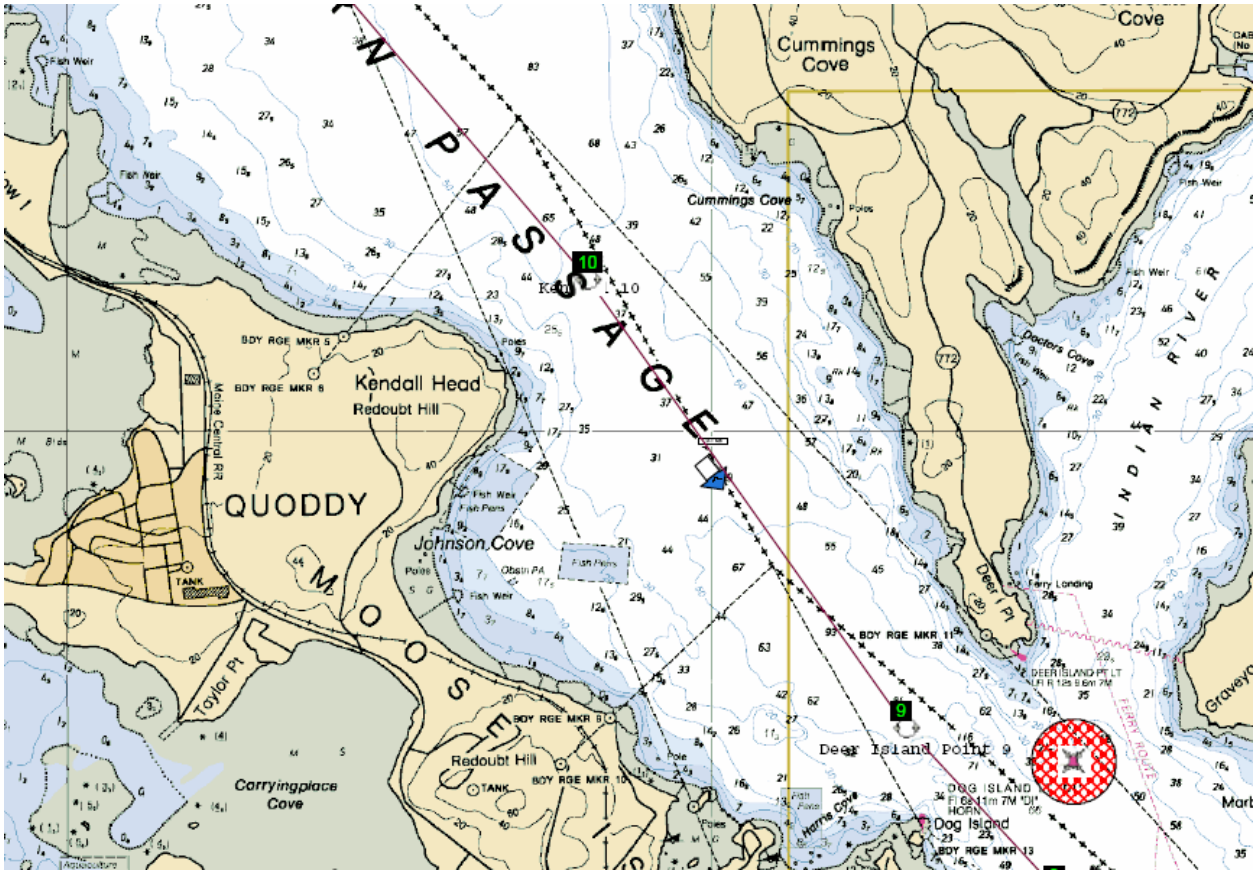


Chart Four: LNG Vessel Route 9, 10 around Quoddy

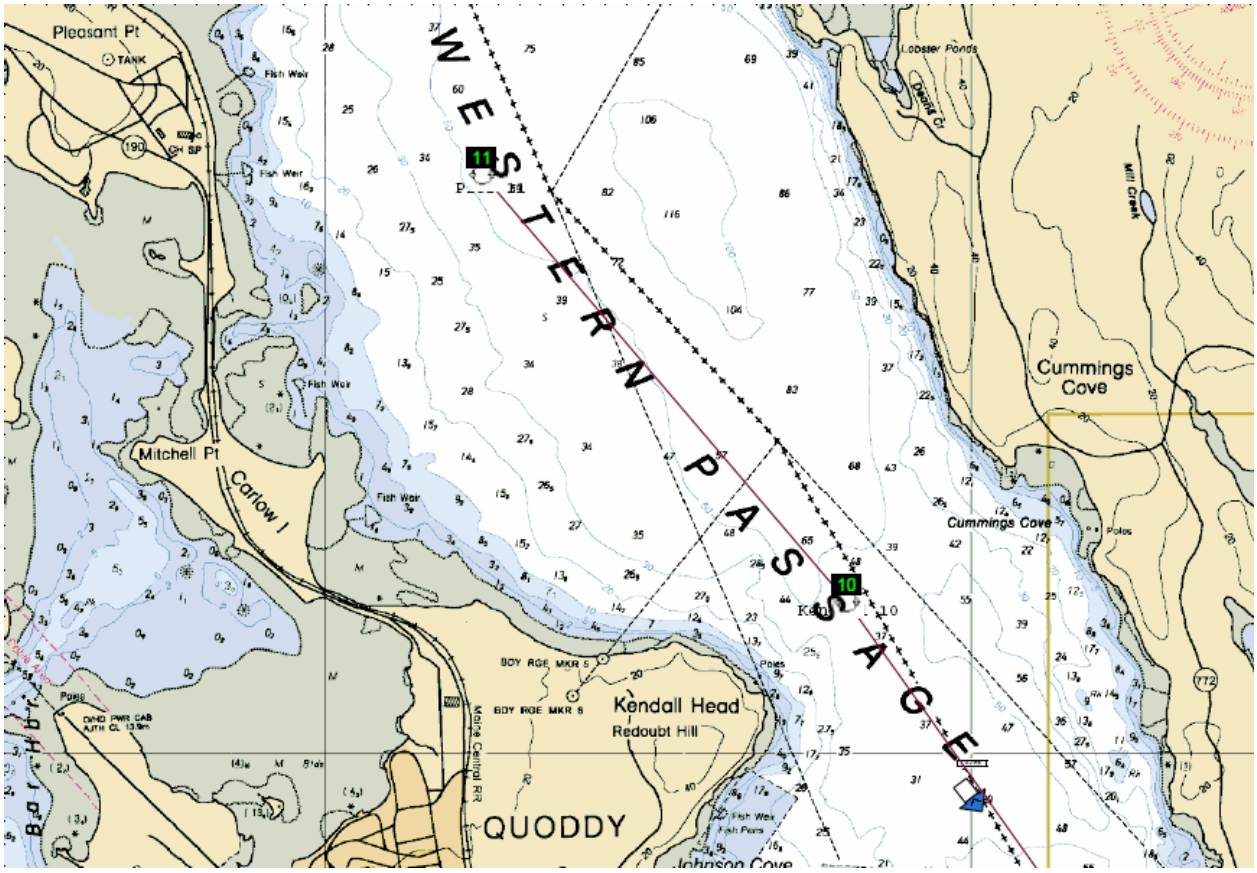


Chart Five: LNG Vessel Transit Legs 10 & 11 terminating in vicinity of proposed LNG Site

Table One: Navigation Summary Table for LNG Vessel Transit to and from LNG Facility

Leg	Name of Leg	Latitude	Longitude	End of Leg WayPoint	In Bound Course	Outbound Course	Distance	Landmark	Navigation Obstruction		Channel Characteristics		Ferry Crossing	Distance to Shore from Ship Track	Canadian or U.S. Waters
		N	*W*		*Degrees True*	*Degrees True*	*Nautical Miles*		*Cable*	*Shoals*	*Width (NM)**	*Depth (M)*		*Nautical Miles*	
1	Initial Entry Point	44-58.4	066-52.3	1					No	No	2.25	90 - 120	No	1.5	CAN
2	East Quoddy	44-57.9	066-54.4	2	250	70	1.54	Head Harbour Light	No	No	0.9	53 - 143	No	0.46	CAN
3	Casco	44-57.2	066-55.4	3	228	48	1.01	Casco Bay Island	No	No	0.47	60 - 90	No	0.25	CAN
4	Popes	44-56.5	066-56.4	4	224	44	1	Brown Head	Yes	Yes	0.43**	60 - 80	No	0.1	CAN
5	Cherry Point	44-55.1	066-57.6	5	210	30	1.65	Windmill Point	Yes	Yes	0.8	36 - 80	No	0.35	CAN
6	Turn	44-54.9	066-57.8	6	231	51	0.23	Cherry Island	Yes	Yes	0.8	50 - 80	No	0.25	CAN
7	Eastport	44-54.9	066-58.4	7	266	86	0.41	N/A	No	No	0.7	35 - 60	Yes	0.4	CAN/US
8	Clark	44-54.9	066-58.9	8	284	104	0.4	N/A	No	No	0.56	50 - 86	Yes	0.15	US
9	Deer Island Point	44-55.4	066-59.4	9	318	138	0.47	Deer Island Pt	No	Other - Old Sow	0.44	32 - 116	No	0.15	US
10	Kendall	44-56.3	067-00.4	10	325	145	1.24	Kendall Head	No	No	0.7	37 - 65	No	0.3	CAN/US
11	Pier	44-57.3	067-01.5	11	320	140	1.22	LNG Pier	No	No	1.3	34 - 106	No	0.5	US
							9.17	TOTAL DISTANCE							

* Distance taken from Point of Land to Point of Land
** Distance Taken from Obstruction

3.2. Navigation Safety Issues

3.2.1. Areas of Heavy Marine Traffic

U.S. Coast Guard NVIC 05-05 defines these areas *to include areas of the waterway that are congested with commercial, military and/or recreational vessels (marine events and seasonal activities such as regattas, fisheries, etc.)*. As discussed in Section 3.6 and Section 3.7 of this report there are no known areas of Heavy Marine Traffic along the intended route of this project.

3.2.2. Aids to Navigation

Local Aids to Navigation on the U.S. side are serviced by CG ANT Southwest Harbor, Maine, with assistance from USCGC WILLOW, USCGC ABBIE BURGESS, and USCGC BRIDLE. Local Aids to Navigation on the Canadian side are serviced by the Canadian Coast Guard from their Operations Center in Halifax, NS as a result of discrepancy reports filed via Fundy Traffic. All Buoys/Lights/Navigation Aids are installed and maintained by the U.S. and Canada in their respective areas.

Periodically, the U.S. Coast Guard conducts a Waterways Analysis and Management System (WAMS) study to validate the adequacy of the existing aids to navigation system. This study focuses on the waterways present ATON system, marine casualty information, port/harbor resources, changes in marine vessel usage (both recreational and commercial) and future development projects. Two WAMS studies have been completed for this area. The first, dated July 23, 1987, and the latest dated March 8, 2000, was completed by Group Southwest Harbor, Maine, First Coast Guard District. Copies of these studies were obtained under the Freedom of Information Act and reviewed for this report. These studies found the aid system in this waterway were adequate to meet current and expected needs of users, and classify the waterways from West Quoddy Head to Calais, Maine (including Friar Roads and the Western Passage) as "non-critical", which, according to the Aids to Navigation Manual means "a waterway serving commercial and recreational interests, where the disruption or degradation of an aid system, beyond the normal level of discrepancies, will not increase the risk of a marine accident to an unacceptable level". LTJG Brian R. Jeffrey of D1 (oan) adds that, "Critical would be the other broad designation, and each waterway would be designated as Navigationally, Militarily, or Environmentally Critical. If LNG was to be transported into the area, that would be a significant enough change to warrant a review of the waterway and its designation. Scheduling a review for a non-critical waterway is at the discretion of the District Commander. As long as we can support the non-critical designation and barring a significant change in the waterway, a review will not be conducted for a number of years. As previously mentioned, transporting LNG into the area is a significant enough event that would lead to a review of the waterway. If additional Aids to Navigation become necessary, the US and Canadian CG will appropriately mark the waterway." It should be noted that these studies did not include the Head Harbour Passage, East Quoddy Head areas (which are entirely in Canadian waters). The latest study, however, recommends that "all future WAMS studies for this area be coordinated with the Canadian Coast Guard".

US Pilots feel there are sufficient Aids to Navigation in the area to sustain present operating tempo, i.e. medium size commercial vessels carrying paper/steel products, once missing Head Harbour Passage channel buoy N "UH4" is located and returned to

station. For larger, high value cargo vessels (LNG) transits, the following improvements are recommended to be added/made to existing aids:

1. Intensify power of Dog Island (US) Light
2. Intensify power of Deer Island (CA) Light
3. Establish new light on Kendall Head (US)
4. Establish buoy w/light in vicinity of Stovers Ledge (CA) to mark shoal
5. Install light on Clam Cover Head (CA)
6. Install light on N "UH4" (CA)
7. Once the LNG pier is established, install range lights w/ electronic range on approach (CA & US)

According to Canadian Coast Guard Officials, the area is currently in midst of being "privatized" by the Canadian Coast Guard. Any additional aids required will most likely need to be privately funded. Also, Canadian Aids to Navigation system is currently undergoing a 30% reduction program.

As part of the annual 4th of July Celebration, a major U. S. Navy vessel (frigate, cruiser, destroyer) is invited to act as the centerpiece for the event. Over the past six years, the USS KAUFFMAN (FFG 59), USS TICONDEROGA (CG 47), USS GONZALEZ (DDG 66), USS MITSCHER (DDG 57), and USS HAWES (FFG 53) have moored at the Eastport "Breakwater" pier for the festivities. A review of each vessel's unclassified "After Action Reports", provided by Eastport Pilot Captain Robert Peacock, reveals some interesting, unbiased observations of transit from East Quoddy Head Light entrance to a pier located adjacent to downtown Eastport via Head Harbour Passage and Friar Roads, as well as unanimous praise for the professionalism and expertise exhibited by Captain Peacock.

Excerpts of these reports include:

USS KAUFFMAN (KAU) 2004:

- All shoal water was clearly marked on both the approach and harbor charts.
- KAU entered and departed port during 2-3 knot flood… pilot provided adequate warning of upcoming sheer condition…during sheer condition, helmsman was required to use full rudder to maintain course.
- Fog was present during each night and morning, and during both inbound and outbound transits.
- There are numerous excellent land features to set parallel index lines for both the inbound and outbound transits during low visibility.
- Fog during both the inbound and outbound transits made navigation aids difficult to sight. Many smaller lights and range markers could only be seen when directly abeam.
- Entrance well marked with navigation aids, specifically Head Harbour Light.
- Range of tide during KAU visit was 22.5 feet.
- The pilot, Capt Robert Peacock USNR (Ret) provided expert services… (he) was familiar and helpful with the tidal and sheer currents in the area.

USS TICONDEROGA (TIG) 2003

- Radar navigation was extremely accurate due to natural features…shoal water was clearly marked by buoys and other navigation aids, with the exception of a small area at Stover's Ledge approx 500 yards north of Bald Head.
- Range of tide during TIC visit was 18.4 feet.
- Fog and rain showers were common.
- The Pilot, Capt Robert Peacock USNR (Ret) provided expert service. He has a Merchant Mariners Masters License and was familiar with a CG's (sic) maneuvering characteristics.

USS GONZALEZ (GON) 2002

- Fog was present during nights and mornings and on both inbound and outbound transits.
- Lights, approaches, etc. navigation aids used were difficult to pick out due to forestation and topography…not all charted navigation aids were present.
- Range of tide during GON's visit was 17.8 feet.
- Captain Peacock was knowledgeable of the transit, ship handling characteristics, and very helpful with services once pier side.

USS MITSCHER (MIT) 2000

- Channel is 700 yards wide at its narrowest. Head Harbour Passage and Friars Roads are very deep channels. Shoal water is located almost contiguous with shoreline.
- Most of our inbound transit though the Bay of Fundy was in 500 yards visibility…visibility was unrestricted during outbound transit.
- Captain Peacock was superbly prepared and was exceptionally helpful. He is expert at ship handling in the complex tides of the region as well as low visibility. He was conservative and safe at all times.

USS HAWES (HAWES) 1999

- While on charts 13263 and 13394, HAWES had no visibility due to heavy fog.
- The tidal range was 20 feet during visit… HAWES planned her entrance and departure time specifically around slack water times.
- Captain Peacock was the most prepared pilot I have ever encountered…his skill at transiting through the channel equaled his thorough preparation.

3.3. Waterway Obstructions and Channel Crossings

There are no known waterway obstructions. There are, however, several areas along the transit route in Head Harbour Passage and Friar Roads which contain submarine pipeline and cable crossings. These areas are well marked on NOAA chart 13396 and include:

a) Head Harbour Passage:

- Cable Area between Deer Island, NB (Leonardville) and Campobello Island, NB(Head Harbour) via Casco Bay Island.

- Cable Area between Deer Island, NB (Chocolate Cove) and Campobello Island, NB(Pollock Cove) via Casco Bay Island.

b) Friar Roads: Submarine pipeline area between Indian Island, NB (Graveyard Pt) and Campobello Island, NB(Bald Head).

Other than crossing Ferries, there are no areas of crossing deep draft traffic. Only meeting situations would be encountered. Both of these situations could be controlled by a moving safety zone imposed by the local COTP for inbound and outbound transits of the LNG vessels. Presently, the amount of commercial traffic is not of such a volume that the proposed LNG transit evolutions would severely or negatively impact other deep draft commerce using the waterway.

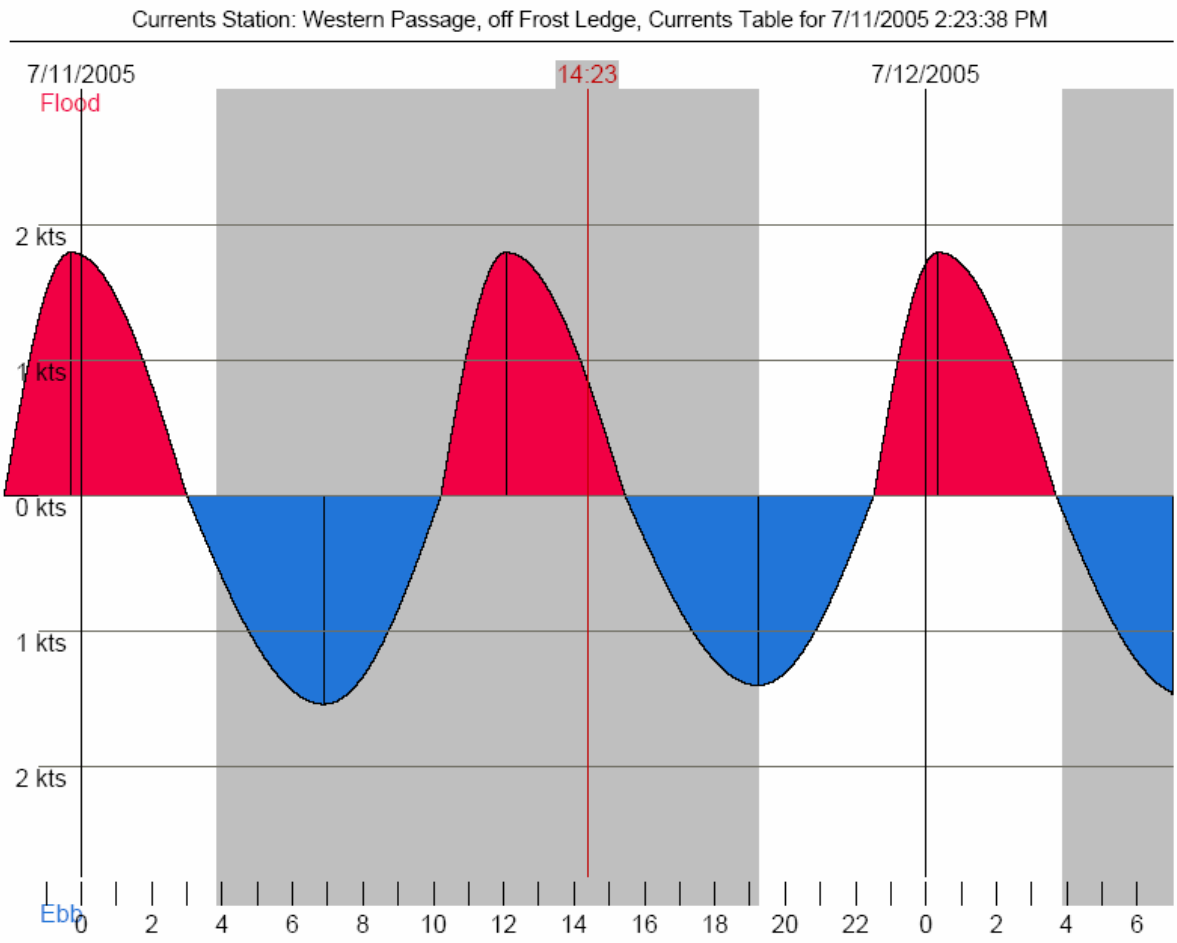
3.4. Natural Features and Hazards of the Waterway

The Port of Eastport is known as "Maine's All Natural Deep Water Port". Accordingly, water depths for the transit from East Quoddy Head to Point Pleasant, Maine are more than adequate for this operation, with more than 100' of depth found right up to the approach of the proposed pier at Split Rock, Pleasant Point, Maine.

There are no known physical hazards to navigation (wrecks, reefs, etc.) in this area, although the "Old Sow" whirlpool, located in the channel between Dog Island, Maine and Deer Island Point, New Brunswick, presents a natural hazard requiring special care for transit. The "Old Sow" is the second largest whirlpool in the world, and the largest in the Western Hemisphere. The whirlpool forms as a result of the ebb and flow of tides, mixing with strong currents from the St. Croix River, between Eastport and Deer Island. To counter the effects of this natural phenomenon, the Eastport pilots time all transits in this vicinity to coincide with "slack water" periods, and will require "adequate" tug escorts for LNG vessels at all times.

Displayed below is the typical current table for the area in the vicinity of the proposed LNG terminal at the date this report was being written. It graphically demonstrates the large currents experienced in the Western Passage and the slopes on the curves indicate rapidly changing conditions (current velocity per unit time)

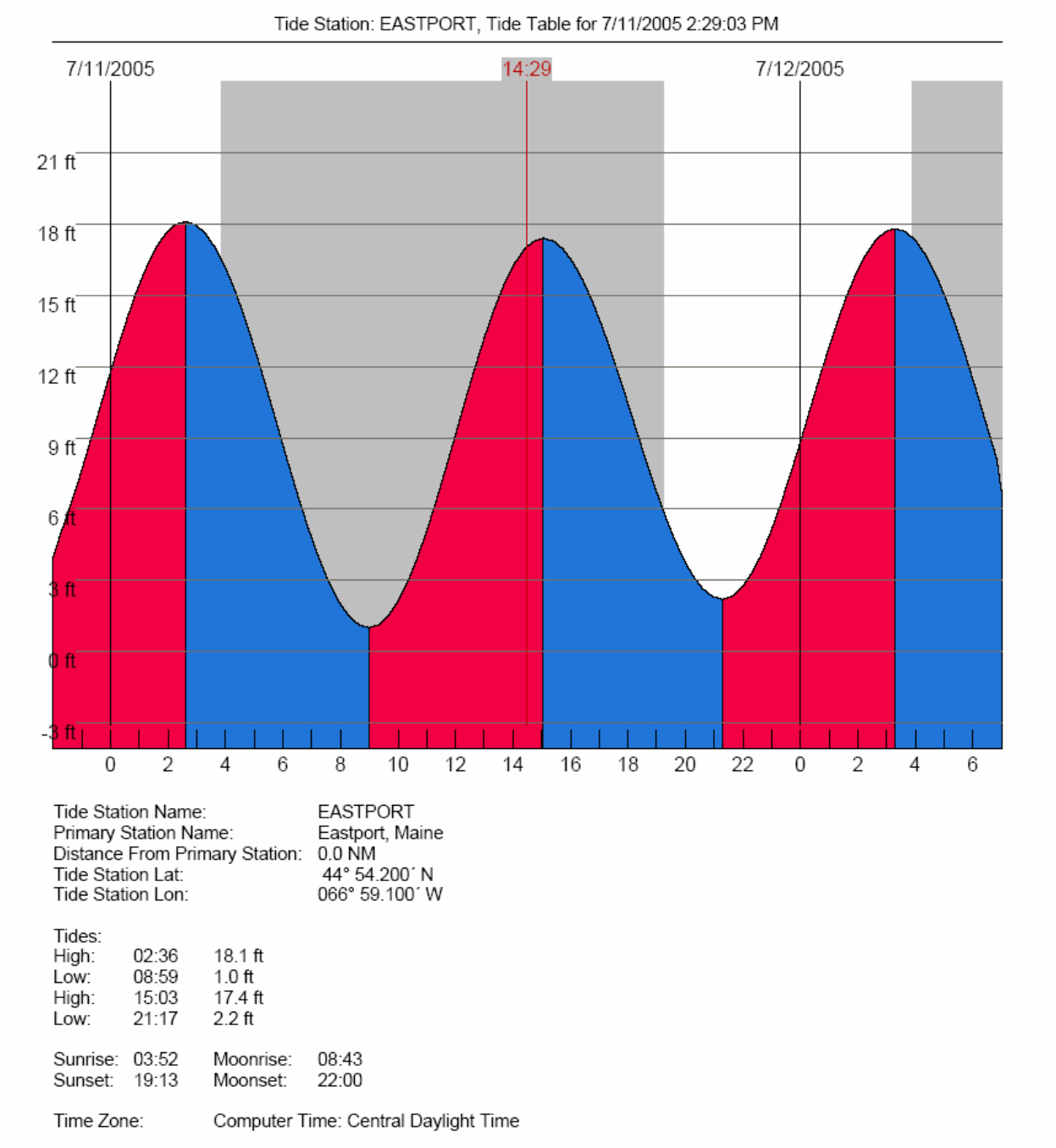
Representative Tidal Current Chart



Currents Station Name:		Western Passage, off Frost Ledge
Primary Station Name:		Estes Head, Eastport, Maine
Distance From Primary Station:		4.9 NM
Currents Station Lat:		44° 57.900´ N
Currents Station Lon:		067° 01.900´ W
Present Flood:	348° Mag	0.86 kts

The graph below displays the significant tidal range in the Eastport, Maine vicinity. Movement of LNG vessels will have to be planned to take advantage of slack water at the proposed LNG Facility. Most inbound transits will be undertaken in an ebb situation, while outbound transits will most likely be undertaken in a flood situation. The tides and currents can be utilized to favorably aid in the safety of mooring and unmooring of the vessels.

Representative Tidal Range Chart for Area



Tide Station Name:	EASTPORT
Primary Station Name:	Eastport, Maine
Distance From Primary Station:	0.0 NM
Tide Station Lat:	44° 54.200´ N
Tide Station Lon:	066° 59.100´ W

Tides:		
High:	02:36	18.1 ft
Low:	08:59	1.0 ft
High:	15:03	17.4 ft
Low:	21:17	2.2 ft

Sunrise:	03:52	Moonrise:	08:43
Sunset:	19:13	Moonset:	22:00

Time Zone: Computer Time: Central Daylight Time

3.5. Points of Security Concerns

The only choke point for this passage is the relatively narrow (1/2 nautical mile) passage between Dog Island, Maine and Deer Island Point, New Brunswick, which also is the location of the "Old Sow" Whirlpool. A detailed analysis of security concerns are beyond the scope of this report and need to be covered in a more comprehensive WSA in the future.

3.6. Marine Traffic

3.6.1. Recreational

Recreational craft activity in the Head Harbour Passage/Friar Roads/Western Passage area is extremely light, with only a handful of vessels operating on any given day. According to the pilots and CG Station OIC, a "busy" mid-summer day would see a maximum of twenty recreational vessels underway in these areas. Similarly, due to the heavy currents in this area, commercial fishing operations are virtually non-existent. On any given day, there are approximately twenty small commercial draggers/lobster vessels working in the inlets and coves, well away from the shipping channel.

3.6.2. Commercial

Large commercial vessel activity in area consists of vessels transiting to:

- Port of Bayside, NB, 300-750' bulkers/reefers carrying gypsum, potatoes & paper rolls – approximately 75 vessel transits/year via the Western Passage.
- Port of Eastport, Estes Head Pier on Southwest side of Eastport, 300-800' bulkers/general cargo vessels carrying forest/steel products – approximately 50 vessel transits/year via Head Harbour Passage/Friar Roads.
- Possible large cruise vessel (seasonal) traffic transiting the Western Passage enroute to St. Andrews, NB. REGAL EMPRESS was the last vessel to service this port, but has not visited in last two years.
- Possible medium sized cruise vessel (seasonal) traffic transiting the Head Harbour Passage/Friar Roads to Eastport Port Authorities "Breakwater" pier on Southeast side of Eastport. The Eastport Port Authority is currently attempting to attract a suitable carrier in this market.

There are very few vessel incidents in this area. CG Station Eastport OIC could recall only two commercial fishing vessel groundings in the past two years, with no pleasure or commercial vessel collisions or allisions. According to US Pilots, approximately 2400 ship transits with pilots (both US and Canadian) onboard since 1982 have been without incident.

3.7. Seasonal and Marine Events

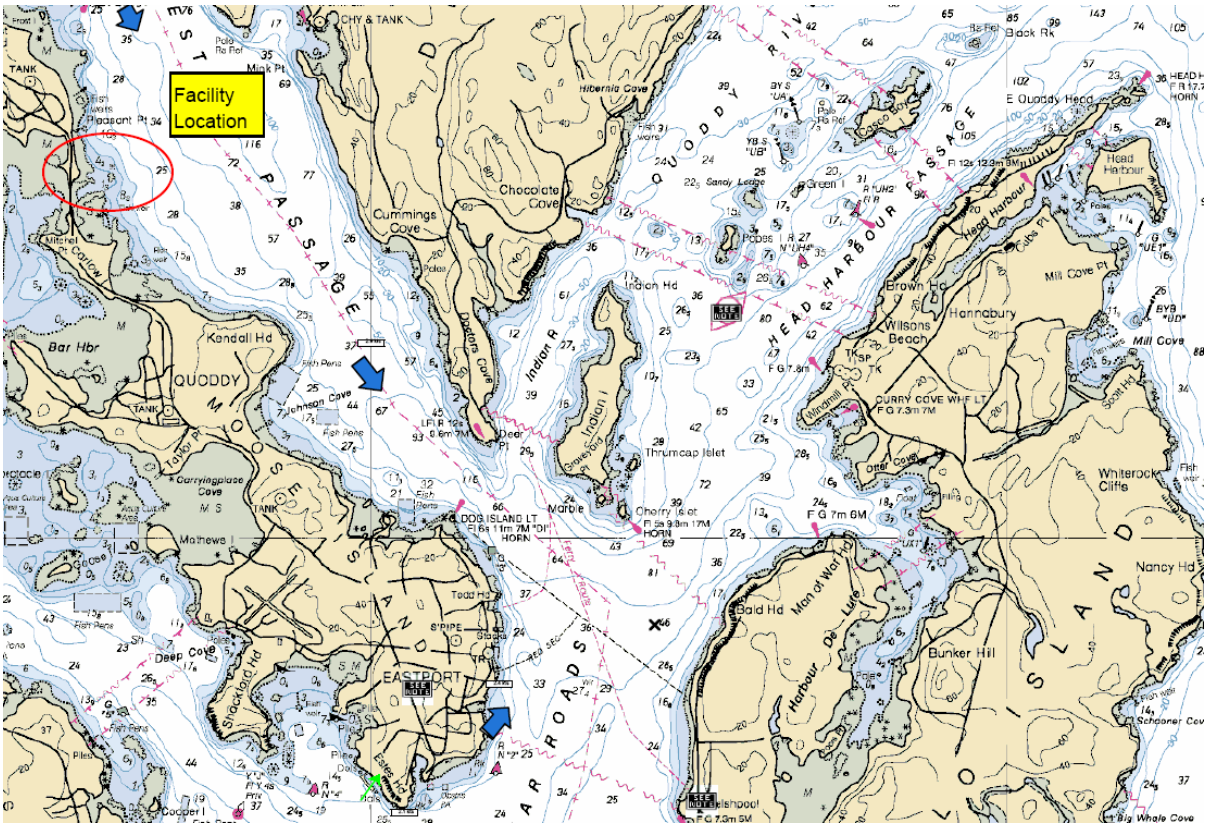
There are three annual festivals held in Eastport, none of which add any significant traffic to the waterways, but do attract hundreds of visitors to the area. These festivals are:

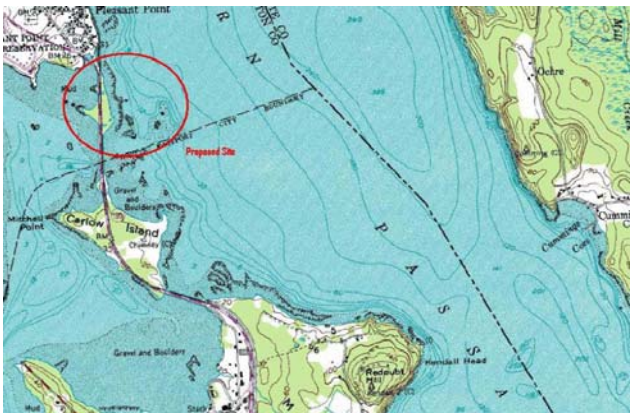
- Memorial Day weekend Downeast Spring Bird Watching Festival.

- Eastport 4th of July/Old Home Week, which has a large Naval Vessel taking part in the festivities, and is moored at "The Breakwater" pier in the downtown vicinity.
- The Maine Salmon Festival in Eastport, the first weekend after Labor Day.

3.8. Physical Location of Proposed Facility

The proposed facility is to be located on the site of Split Rock at Pleasant Point, Maine which is on the Passamaquoddy Indian Tribal Reservation in the approximate position 44-57.2N and 67-01.9W. Due to limited onshore plot and proximity to the county road, most of the process equipment is located on an offshore pier platform whereas the buildings and utilities are located on land at the shore line. The send-out gas rate is assumed to be 1 bcfd. Very limited site data is available at this time and none of the process selection studies have been undertaken. The layout is not currently complete and will most certainly be altered to optimize for the safe operation of the facility.





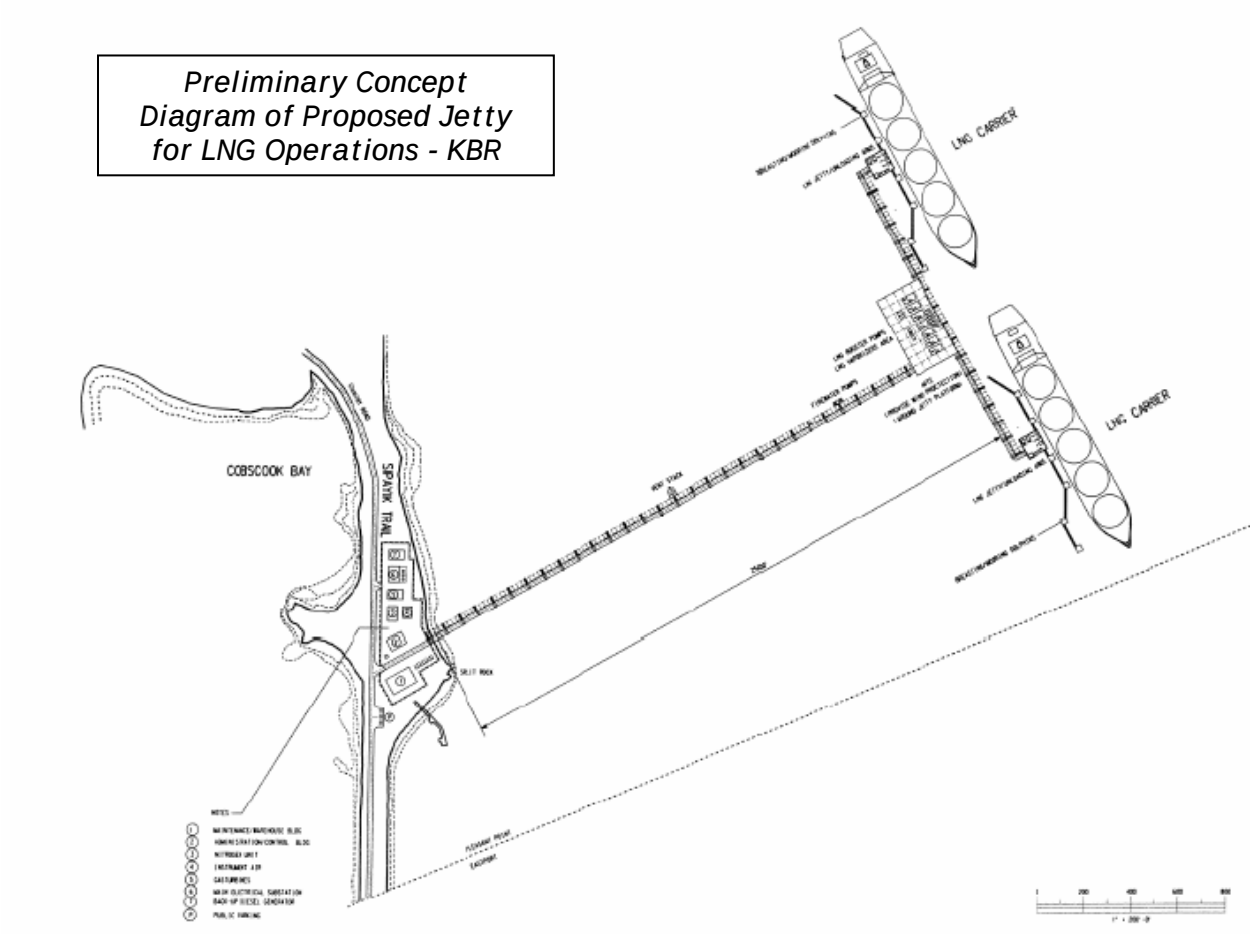
The facility is to be built with a half mile long jetty, where most LNG operations will take place. The jetty is to be placed so as to minimize current and tide range related issues to the vessels both while maneuvering alongside and while the vessel is moored. The facility is also placed so as to minimize the affects of the zones of concern as listed in Enclosure (11) of the USCG NVIC 05-05. It

will be built to withstand tidal ranges in excess of twenty feet and current influences of over 5 kts.

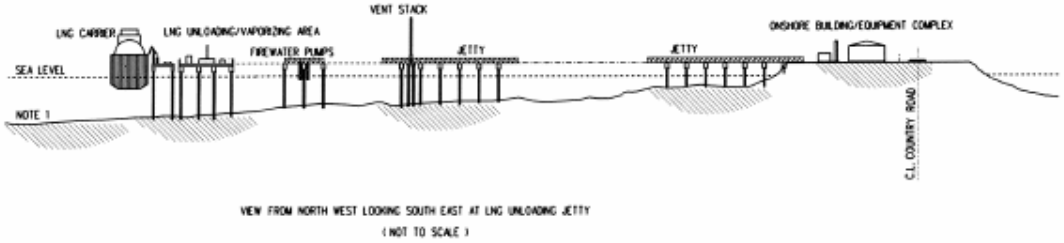
Diagrams outlining the preliminary plans for the jetty and gasification system are provide below. The jetties will be built to handle two large LNG carriers at the facility simultaneously.

The facility will be located approximately 3.5 NM (straight line) northwest of the Eastport Pier in Eastport, ME, 5.7 NM (straight line) from the town of Lubec, ME and 8.5 NM from the East Quoddy Lighthouse (navigation distance) which stands at the entrance to Head Harbour Passage. The facility will also be located less than .5NM from the international border with Canada; almost directly across from at Clam Clove Head on Deer Island.

Preliminary Concept Diagram of Proposed Jetty for LNG Operations - KBR

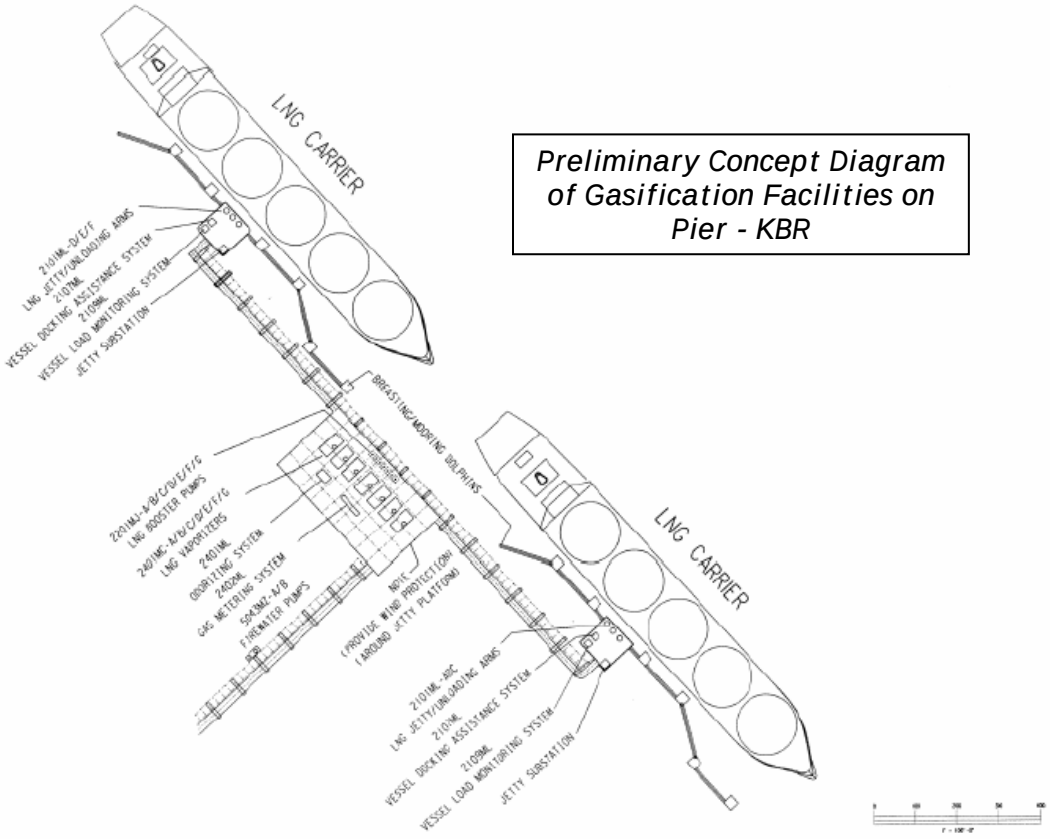


Preliminary Concept Elevation of LNG Transfer Facility - KBR



VIEW FROM NORTH WEST LOOKING SOUTH EAST AT LNG UNLOADING JETTY
(NOT TO SCALE)

Preliminary Concept Diagram of Gasification Facilities on Pier - KBR

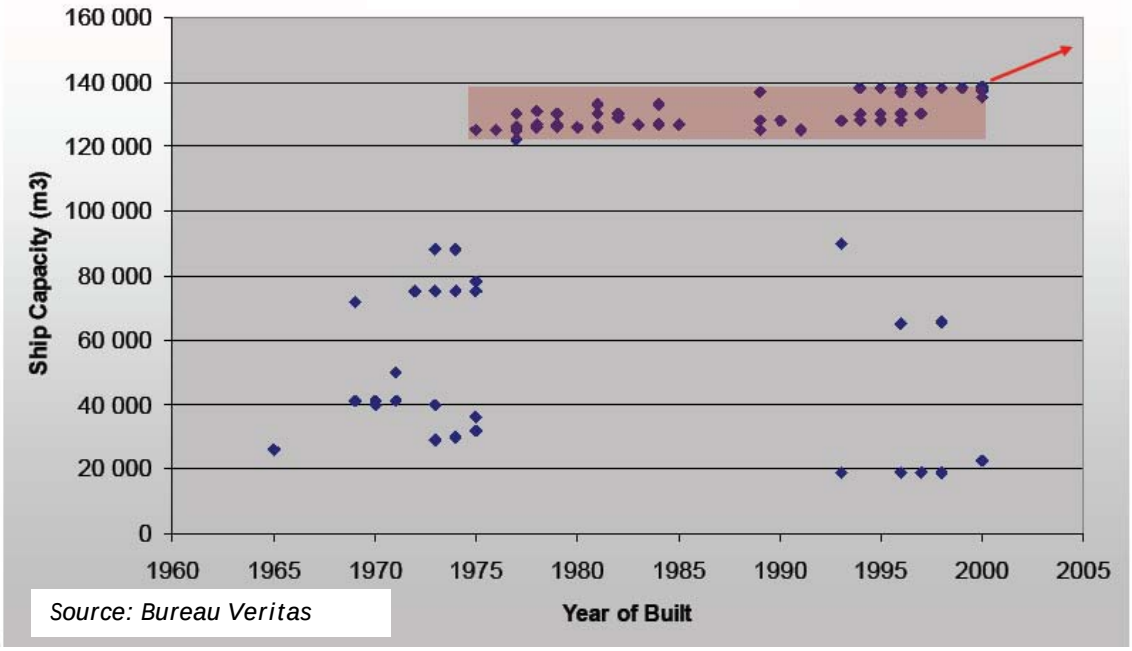


3.9. LNG Vessel Characteristics and Frequency of Visits

It is anticipated that there will be over 100 port calls at the facility by LNG vessels of all types, sizes and ports of origin. This assessment was evaluated using those criteria. According to many sources, the size of LNG carriers is gradually increasing since they were first built in the 1960's from 25,000 m^3 to around 153,000 m^3 in the present day. This size increase was driven because of economic considerations which included such factors as economies of scale, boil-off reduction, longer transit distances as well as technological advances that allowed reduction of cargo tanks, and alternative propulsion as well as re-liquefaction facilities on board the vessel itself. A broad range of optimum sizes for these tankers are considered based on the route. In general, tankers with capacities ranging from 125,000m^3 up to 250,000m^3 could service the proposed Quoddy Bay facility without any navigational constraints.

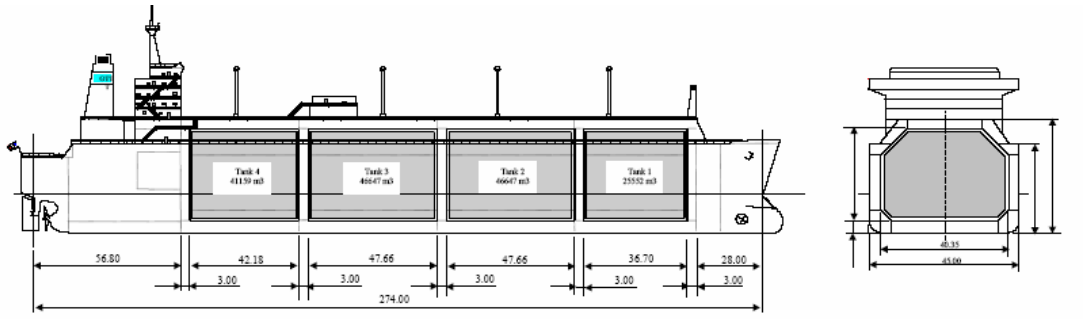
LNG Vessel Characteristics

LNG Vessel Construction



Source: Bureau Veritas

A typical 160,000m^3 LNG Tanker would have the characteristics as presented below:



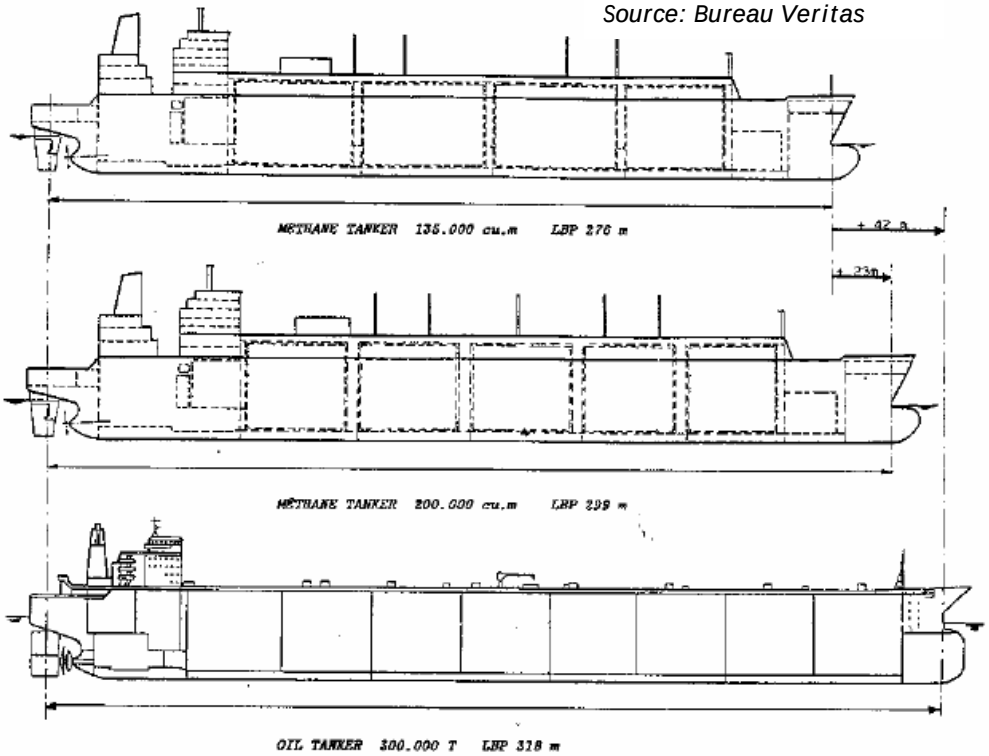
Source: GTT

MAIN CHARACTERISTICS

Hull		**Power**	
Length overall	285.00 m	Estimated speed at 90% MCR, design draught and 21% sea margin	19.5 Knots
Length between perpendiculars	274.00 m	Estimated maximum continuous rating	33555 Kw
Moulded breadth	45.00 m		
Depth to upper deck	27.45 m	**Departure Full Loaded**	
Depth to trunk deck	33.75 m	Displacement	111818 t
Block coefficient (at design draught)	0.753	Estimated steelwork	25200 t
		Light Ship	33711 t
		Range (using only FO)	6000 NM
		Design draught	11.72 m
Tanks			
Number of cargo tanks	4	**Arrival Full Loaded**	
Number of oblic prismatic tanks	1	Displacement	109781 t
Total insulation thickness (including 0.01m for mastic)	0.54 m	Covered distance (using BOG+FO)	4000 NM
Insulation area (at secondary barrier)	27744 m^2	Range (using only FO)	4000 NM
Estimated boil-off (with 12% margin)	0.15 %	Draught (limited)	11.50 m

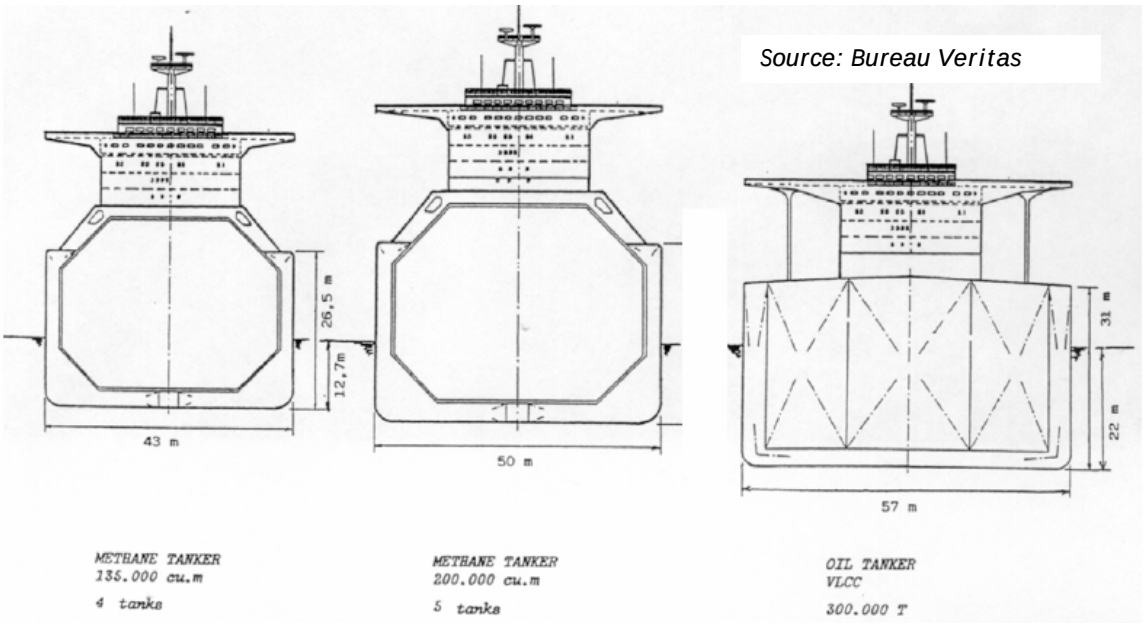
In comparison to a typical VLCC (Very Large Crude Carrier) an LNG carrier would have the following profile

Source: Bureau Veritas



Profiles: 135,000m3 and 200,000m3 LNG carriers, 300,000dwt VLCC

And the following cross sections (for a membrane tank vessel)



Source: Bureau Veritas

There are many other commercial vessels that are significantly larger than the proposed LNG carriers, most notably the VLCC oil tankers. The selection of the type of cargo containment system and the number of cargo tanks include many factors, but the general trend is to have vessels of 160,000m^3 capacities with four cargo tanks, 200,000m^3 with four or five cargo tanks and 250,000m^3 with four or five tanks depending on the containment technology used. Propulsion systems for these vessels involve Steam turbine, Diesel, Electric propulsion, and gas turbines. Propulsion systems long since discounted due to bunker consumption are back in consideration if they can physically take up less space on the vessel allowing for other systems like re-liquefaction facilities and cargo capacity to be added. Most LNG vessels use a combination of bunkers and LNG boil off to power the propulsion systems. Up to 3% of the cargo is "boiled off" on a typical trans-Atlantic crossing and is used in supplementing ship propulsions systems. Normal bunkers for ship propulsion systems use some form of Heavy Fuel Oil (HFO), many new LNG tankers are built to burn more of their cargo boil-off.

Cargo Containment Systems

There are two primary containment systems utilized in modern LNG carriers; membrane or independent type B (sphere & prismatic).

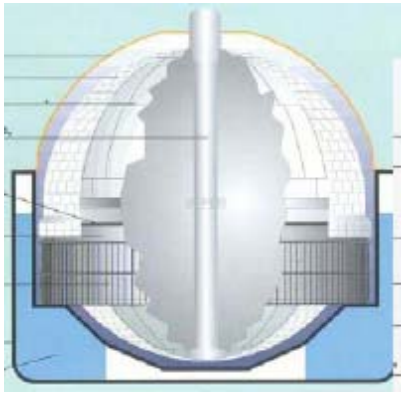
The membrane systems come with construction and material variations. Membrane systems are found in industry under the following names: GT96, Mk III, CS 1.

Membrane Tank

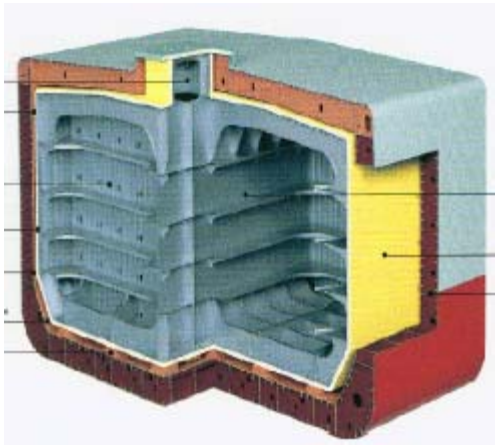
LNG Vessel with Membrane Tanks

The Independent Type B LNG tank comes in two commercial varieties namely MOSS (spherical) and IHI (hull shape). The largest sphere to date is 43m in diameter. Spheres are constructed of aluminum with aluminum to stainless structural transition and are fused to an equatorial ring which is connected to the vessels hull. While membrane tanks could be considered "integral tanks" meaning that they utilize the ship's structure as the strength member to contain the cargo, a spherical tank could be considered an independent tank and be capable of self support of the cargo's weight. A membrane tank allows more cargo to be carried on the vessel in a given amount of volume available and is probably the preferred method of transport under certain economic conditions. There would be five tanks for a typical 200,000m^3 Moss Sphere LNG tanker.

Sphere Containment LNG Vessel



Sphere LNG Containment System



IHI SPB Type LNG Containment System

The IHI SPB Type LNG tank is also of the independent tank definition. It is usually constructed of aluminum alloy, nickel alloy or stainless steel. For tankers in the 160,000m^3 to 250,00m^3 capacities, four tanks are prescribed. The tank is built with internal stiffners that serve to provide strength to the tank and its ability cargo LNG cargo.

Due to the value of the cargo and the technical complexity associated with cargo containment and transfer, LNG vessels are manned with highly trained and experienced mariners and are outfitted with state of the art ship navigational, cargo control and communication systems.

3.10. Physical Factors around Facility

Beyond the scope of this project. Currently the facility is in the preliminary design stage. Known information about the proposed layout is provided in Section 3.8 of this report. Additional work will be necessary to complete this section

3.11. Zones of Concern

A chart with overlay of the Zones of Concern from the Sandia Report and included as Enclosure 11 to USCG NVIC 05 -05 is provided with this report for the entire voyage of the vessel when inside the islands from East Quoddy Point.

3.12. Critical Infrastructure and Key Assets along transit route

NVIC 05-05 identifies Critical Infrastructure "*as Facilities, structures, systems, assets, or services so vital to the port and its economy that their disruption, incapacity, or destruction would have a debilitating impact on defense, security, the environment, long-term economic prosperity, public health, or safety of the port."* The Area Maritime Security Plan has no such listing for infrastructure in the subject area. Several assets along the transit route are discussed below.

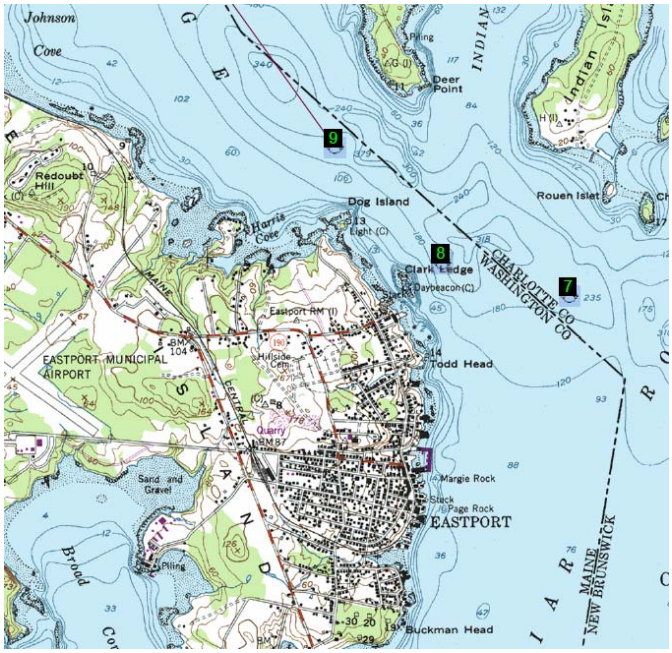
Roosevelt Home on Campobello Island

Campobello Island is the second island of the Fundy Isles. The island is 70 sq. km with a population of approximately 1195. FDR once referred to the island as his "Beloved Island", visiting it since he was one-year old until he was stricken with Polio in 1921. Since 1962, the opening of the FDR Memorial Bridge has permitted approximately 150,000 visitors to the island each year most visiting the Roosevelt Campobello International Park *Source: Brochure: Campobello Island, An Ideal Summer Resort)*. The park was created to commemorate FDR and it's a symbol of friendship between the U.S. and Canada. Currently, there are about 53 full-time and part-time employees. Along with Herring cove Provincial Park, both parks occupy about one-third of the island; the northern two-thirds of the island is privately owned with most residents living on the Northern and Western shorelines. *Source: Roosevelt Campobello International Park Statement Regarding the proposed LNG Terminal near Eastport and Perry, Maine on the lands of the Passamoquoddy Nation.* It is the only Island with a mainland connection into Lubec, Maine.

Deer Island is the smallest and northernmost island of the Fundy Isles. It is mostly rural in nature with the population being approximately 1000 and the largest island community being Fairhaven, located on the west side of the island. Fairhaven overlooks the Western Passage and is protected by Clam Cove, which shelters the small community from rough seas. Deer Island boasts the best onshore view of the world's second largest whirlpool, "Old Sow", at the Deer Island Point Campground on the Southside of the island.

Eastport, Maine is the easternmost city in the United States and is located on Moose Island in Washington County. It has a population of approx. 1640 but increases to 1920+ in the summer months. *Source: Eastport Camber of Commerce: Eastport, Maine: The Island*

City. Its' biggest industry is fishing and tourism. Eastport is considered one of the smallest cities in the U.S., covering a land area of 4.5 square miles with a population density of 448 residents per square mile. It is also home of the U.S. Coast Guard's most easterly division and Border Patrol. The city struggles with little industry and high unemployment rates.



Note the LNG vessel Transit Way Points 7, 8 & 9. The Largest Population density of Eastport is located south of the choke point at Dog Island and will not be affected by Zone 1 as described in NVIC 05-05. Eastport has a population density of approximately 400 per sq. mile and a household density of 290 per sq. mile.

Port of Eastport is the easternmost facility in the United States. It's located at the mouth of the Bay of Fundy on the American-Canadian Border. It has the deepest water of any port in the contiguous United States that attributes to keeping port maintenance costs low, since no dredging is necessary *Source: Brochure: The Port of Eastport: Maine's Deep Water Cargo Port*. It is also one of the fastest growing Ports in the U.S.

The **Port of Eastport** has two main piers; the first is Estes Head Terminal and the second is the downtown pier. Built in 1998, the Estes Head Pier is 634 feet long and 100 feet wide. Serving Eastport since 1981, the downtown pier is 420 feet long and can accommodate ships up to 750 feet in length. The Port offers three warehouses, a 40,000 sq. foot bulk storage pad and administration and maintenance facilities. *Source: Brochure: The Port of Eastport: Maine's Deep Water Cargo Port*.

The Eastport Breakwater Terminal has berthing for a vessel up to 700 ft. An equipment maintenance shop, the Eastport Port Authority office, US Customs, and Coast Guard Station Eastport are located just off the pier. The downtown Fish Pier berths the Port's two tugboats, Ahoskie and Pleon, on the North side, and has slips for transient boats on the South side. Approach depths to the Breakwater are over 100 feet and the

mean low water depth is 42 feet. Located at the downtown area of Eastport, the Breakwater offers cruise ships a direct docking within close proximity to all of Eastport's offerings. The Estes Head Cargo Terminal can accommodate a ship of 900 feet in Berth A and one up to 550 feet in Berth B. EHCT's 43 acre site has several open storage areas, three 20,000 square foot, drive-thru warehouses, and one 43,000 square foot warehouse. The operations are easily supervised from the Federal Marine Terminals' office located just above the Estes Head pier. Approach depths to this pier are also well in excess of 100 feet and the mean low water depth is 64 feet. *Source: Brochure: The Port of Eastport: Maine's Deep Water Cargo Port)*.

The **Passamaquoddy Point Pleasant Reservation** is located off Route 1, just south of the town of Perry, covering a land area of 225 acres. The reservation sits on a peninsula, known by its residents as "Sipayik". At the end of the peninsula begins a tidal dam that was built for the never-completed Passamaquoddy Bay Tidal Power Project of the 1930's. *Source: http://www.quoddyloop.com/pe.shtml*. The dam now serves as a causeway supporting Route 190 on its way to Eastport, Maine. The population, according to the Point Pleasant tribal census rolls, is 1,998. *Source: http://www.wabanaki.com*. There are two separate Passamaquoddy Reservations with the other being 50 miles inland and called the Indian Township Reservation. *The LNG terminal is to be built on Indian Reservation property.*

Lubec, Maine is the easternmost town located in Washington County, ME, with a population of 2000(US Census 2000). It is located 44 miles south of Eastport, Maine. Lubec was once considered the World's Sardine Capitol with the last of the sardine packing plant closing in 2001. *Source: Brochure – Lubec Maine, A unique Downeast Experience*. Lubec is also a Customs port of entry for the United States. Lubec contains the easternmost point of land in the United States: West Quoddy Head, on which the famous lighthouse of the same name is located. *Source: http://www.maine.gov/local/washington/lubec. Lubec Maine is not a factor in this study with regards to Zones of Concern and is only included in this report for information purposes*.

The largest of the Fundy Isles is **Grand Manan Island** covering a land area of 142 sq. km with a population of approximately 3000. Most of its residents live almost exclusively along the Eastern side of the island. With the exception of Dark Harbour, the western side of the island is an inaccessible wall; uninhabitable (http://eee.gnb.ca/cnb/grand/index-e.asp). The largest community on the island is North Head, approx. 700 residents, with the second largest being Grand Harbour and Ingalls Head, approx. 600 residents; which is the commercial and educational centre of the island. *Source: http:www.grandmanannb.com/profiles*. *Grand Manan Island is not a factor in this study with regards to Zones of Concern and is only included in this report for information purposes.*

Saint John, New Brunswick is located on the northern shore of the Bay of Fundy at the mouth of the Saint John River. It is the largest city in the province with a population of approximately 69,661 (*http://en.wikipedia.org/wiki/Saint_John,_New_Brunswick*). Saint John is also home to New Brunswick's main and largest port, the Port Saint John. *Saint John is not a factor in this study with regards to Zones of Concern and is only included in this report for information purposes as well as controlling ship movements offshore*

under its Vessel Traffic System. Saint John does have or is in the process of activating an LNG facility.

3.13. Populated Areas/Shore Use/Community Structures Along Route

Hospitals
No hospitals are located within any zones of concern for LNG vessel transits.

The following are Hospital/Medical Facilities in the general vicinity of Eastport, Maine:

- **CALAIS REGIONAL HOSPITAL** (about 24 miles away; CALAIS, ME) Calais Regional Hospital is a non-profit healthcare facility serving the communities of northern Washington County, Maine, including Calais, Baring, Baileyville (Woodland), Charlotte, Princeton, Indian Township, Alexander, Crawford, Wesley, Robbinston, Perry, Eastport, Pleasant Point, Pembroke and other outlying towns, townships and plantations. The 16-physician active medical staff at CRH encompasses emergency medicine; general surgery, endoscopy, orthopedic and laparoscopic surgery; obstetrics and gynecology; family practice; radiology; pediatrics and internal medicine which is complimented by a multi-specialty courtesy staff of 30 physicians and a variety of allied medical specialists. Calais Regional Hospital offers acute care, intensive care and obstetrical inpatient services. CRH currently has 15 acute care beds and ten swing beds all accommodated together on Hall Wing, in addition to a 24-hour physician staffed emergency department. It continues to serve Northeastern Washington County with an approximate population of 14,000. *Source: www.calaishospital.com*.

- **DOWN EAST COMMUNITY HOSPITA**L (about 39 miles away; MACHIAS, ME)

- **MOUNT DESERT ISLAND HOSPITAL** (about 94 miles; BAR HARBOR, ME) 21 physical active medical staff, 24 beds *Source: www.mdihospital.org*.

In addition, two small Health Centre's operate in the vicinity, and by far, the largest hospital in the region is located in Saint John, NB, these facilities include:

- **Campobello Health Centre**- Campobello Health Centre has serviced the 1,200 residents of Campobello for the past 20 years. In addition to primary care services, the Centre provides community health education initiatives. Extra-Mural services are located with the Clinic, encouraging close collaboration with the clinic staff. The Health Centre operates Monday to Friday during regular business hours, with a physician on site three days per week.

- **Deer Island Health Centre**- The Deer Island Health Centre operates Monday through Friday during regular business hours with a physician on-site for one day per week. In addition to primary care services, clinics and information services are provided by the visiting specialists and other healthcare partners. The Deer Island Health Centre underwent a $100,000 renovation and now offers clients more privacy and a more efficient use of space.

- **Saint John Regional Hospital-** With a total of 449 beds, the Saint John Regional Hospital is the region's primary centre for acute care, and is one of only two

accredited tertiary trauma centers in Atlantic Canada. SJRH houses a nucleus of expertise in Cardiac Surgery, Cardiology services, Neurosciences, Pediatric and Adult Oncology, and many other specialties. Twenty-four hour care in 23 areas of specialty medicine and surgery is supported by a vast array of research, teaching, health promotion activities and partnerships. *Source: www.ahsc.health.nb.ca*

Schools

Three schools are located with Zone 2 and Zone 3 of the "Zones of Concern" criteria. They are not affected by Zone 1. They are identified in Eastport, Maine as follows:

- **Shead High School – 89 High Street** Shead High School is a public school operated by the Eastport School Department. The school provides for the education of pupils in grades 9 through 12. On October 1, 2004, the school served 158 students. *Source: http://portalx.bisoex.state.me.us*

- **Eastport Elementary School – 8 High Street** Eastport Elementary School is a public school operated by the Eastport School Department. The school provides for the education of pupils in grades K through 8. On October 1, 2004, the school served 155 students. *Source: http://portalx.bisoex.state.me.us.*

- **Washington County Community College (WCCC) – Eastport Campus** – The entire WCCC system has a student body of approximately 300 students. The Eastport campus offers courses in boatbuilding technology, Marine composites, Marine Mechanics, Aquaculture Technologies and Marine Drafting. The campus is located on the eastern coast.

Waterfront Parks or Recreational Areas
There are no waterfront Parks or Recreational Areas in the vicinity of Eastport, ME.

Iconic Structures
There are no Iconic structures along the waterfront.

Federal and State Government Buildings and/or Facilities
United States Coast Guard Station Eastport and ICE/CBP are located in the vicinity Eastport Breakwater Pier.

3.14. High Density Population Areas

NVIC 05 – 05 defines a *High Population Area* as those *residential areas with a population of density of 9,000 people/square mile* [HPA > 9K people/sq mi]. A *Medium Population Area* is a residential area with a population density greater than 1,000 people/square mile but less than 9,000 people/square mile [MPA >1K people/sq mi < 9K people/sq mi].

There are no high population areas or medium population areas as defined in NVIC 05-05 on either the U.S. or Canadian sides surrounding the waterway that would be affected by releases as noted in the Sandia Study and referenced in NVIC 05-05.

Population Centers that are in the "Zones of Concern" include:

Campobello Island – 1200 permanent residents; Occupation – fishing/aquaculture or tourism.

Eastport, Maine - 1640 permanent residents; 750 households and 444 families; Occupation – fishing/aquaculture or tourism. High unemployment rate.

Deer Island – 851 permanent residents; rural, major community is Fairhaven.

4. RISK ASSESSMENTS (SAFETY AND SECURITY)

Not conducted as part of this project**.** An in-depth risk analysis needs to be done as part of the full waterways assessment.

- **4.1. Analysis Methodology**
- **4.2. Safety Analysis**
- **4.3. Security Analysis**
- **4.4. Scenarios for LNG Release**
- **4.5. Consequences of Accidental LNG Release**
- **4.6. Attack Scenarios**
- **4.7. Vulnerabilities**
  - **4.7.1. Facility**
  - **4.7.2. Community**
  - **4.7.3. Points of Concern along Route (Security)**
- **4.8. Key Assumptions and Risk Management Strategies**
- **4.9. Sensitivity and Risk**

5. RISK MANAGEMENT STRATEGIES

Not comprehensively conducted as part of this project; a preliminary Risk Mitigation matrix from NVIC 05 – 05 is provided in Appendix C and further explained in the Conclusions and Recommendations Section.

- **5.1. Quick Reference Tool**
- **5.2. Additional Risk Management Strategies**

6. RESOURCE NEEDS FOR SAFETY, SECURITY AND RESPONSE

This section was only briefly looked at for this project and is not complete enough to meet the requirements of NVIC 05 - 05.

LE agencies available for Eastport area include: RCMP, USCG, NCIS, US Border Patrol, Maine Marine Patrol, Fisheries and Oceans Canada, Maine State Police (with dive team), Eastport Police Department, and the Washington County Sheriffs Department.

Federal Bureau of Investigation

Closest FBI office is in Portland, Maine with an agent located in Bangor, Maine.

United States Coast Guard

The USCG Station Eastport is located at the head of the Eastport Breakwater and has an area of responsibility which runs from the Canadian international boundary on the St. Croix River and the Grand Manan Channel west to Long Point (15 miles) and then seaward along an extension of the U.S./Canadian Boundary. This station is manned year round with a complement of 24, including the (E-7) Officer in Charge, and is equipped with a 41' UTB and 22' UTL. According to the OIC, a 25' RBS is scheduled to be delivered this summer, to augment present assets.

Operational Statistics for this Station for FY01-04 are:

Year	*2001*	*2002*	*2003*	*2004*
Search and Rescue Cases:	*5*	*14*	*25*	*30*
Law Enforcement Boardings:	*No Data*	*63*	*66*	*60*

Source: 2001-2003 CGD1 website
2004 OIC Station Eastport

USCG Station Jonesport, three hours south by boat is a similarly sized station with a 47' MLB and 21'UTL as assets. They are also scheduled to receive an additional 27'UTM later this summer.

All Marine Safety activities (Marine Inspection, Port State Control Boardings, ISPS/MTSA Boardings/Pollution Prevention/Response) are handled by the Marine Safety Detachment (which is under the COTP, Portland, Maine) in Belfast, Maine, which is three hours south, by car.

This seven person detachment is billeted as follows:

Billet	*Assignment*	*Billet*	*Assignment*
LT (0-3) 1	*Detachment Supervisor*	*LTJG (0-2*	*Assistant*
CWO (W4)	*Marine Inspector*	*Civilian GS-12/13*	*Commercial Fishing Vessel Examiner*
PO1 (E-6)	*General duty*	*PO3 (E-4)*	*General duty*
PO3 (E-4)	*General duty*		

US Customs and Border Patrol (CBP)

US Customs and Border Patrol has a base of operations in Eastport, with two vessels at their disposal; 25' RBS, and a 22' Sea Ark.

Royal Canadian Mounted Police

The Royal Canadian Mounted Police (RCMP) also maintains two 24' patrol boats in the Fundy area.

State of Maine and Local

Maine Department of Marine Resource (DMR) has two vessels in the vicinity. A 25' Boston Whaler based in Lubec, Maine, and the 35' Patrol Vessel SENTINEL, based in Jonesport, Maine.

According to Mr. Paul Thompson, director of Washington County Maine Emergency Management Agency (which encompasses the entire Eastport area):

- No Fire Boat or Marine Firefighting capabilities in Eastport area.
- Tug AHOSKIE pump provides 2,000 gal/minute, Tug PILON considerably less.
- Land based firefighting assets include:
    - One station in Eastport equipped with two pumpers and one tanker; and
    - Station in Calais (one hour away) has an 85' ladder truck. All firefighters are volunteer, with approximately 450 countywide (which encompasses 2,500 square miles, with a year round population of 35,000, with 10,000 additional summer visitors), 250 of which have been FF1 trained. None of the firefighters in Washington County trained in Marine Firefighting, which is accomplished via a training course titled "Marine Fire Fighting for Land Based Firefighters" that is based on "NFPA Standard for Firefighting number 1405, titled "Land Based Fire Fighters who respond to Marine Vessel Fires, 2001 edition".

According to Robert S. Gardner, Technological Hazards Coordinator Maine Emergency Management Agency the following resources are available in Eastern Washington County:

City of Eastport

- Police – Four full-time and fifteen reserve officers have had ICS training level. Also have vehicles.

- Fire – Twenty member volunteer department – No response to inquiry regarding training or equipment

- Ambulance - Ambulance service is provided by DownEast EMS. Two ambulances are stationed at the Eastport Fire Station. During the day, two EMS intermediates are on duty. At night there are two on call for response within five minutes. Paramedic coverage is provided from Calais about 28 miles away. Also there is a mutual aid agreement in place with Dennysville, a volunteer EMS provider, which is located about 17 miles away.

Town of Perry (Immediately North of Eastport)

- Police – No municipal law enforcement. Area coverage provided by Maine State Police or Washington County Sheriff's Department dependant on area coverage/call sharing.

- Fire – Volunteer department. No response to inquiry on numbers or equipment
- Ambulance – Coverage is provided by the DownEast EMS branch located in Eastport.

Pleasant Point

- Police- Fourteen fulltime officers, ten vehicles, and four fulltime dispatchers and 6 part-time.
- Fire- Sixteen fulltime fire fighters and three trucks.
- Ambulance- Nine employees: four paramedics, one supervisor, one director, one intermediate.

Canada Local Resources

According to Darren McCabe of Canadian Emergency Measures Organization, Department of Public Safety, the following additional resources are available in nearby Deer Island, NB, St. Stephen, NB, and Calais, ME (as outlined in the 1999 Deer Island and St. Croix Estuary Community Contingency Plans):

Deer Island Volunteer Fire Dept.

- Staff Level - unavailable
- Equipment Available: 1250 gallon tank truck,1500 gallon tank truck, both with 450 gallon pumps, one boot truck to transport equipment, four air packs, with spare bottles, 1400ft. of 1 ½" hose, 1400ft. of 2 ½" hose, complete set of foam gear, 25 tubs of foam concentrate, 26 sets of full gear for men, generating outfit, smoke ejection fan, complete stokes basket assembly, call system, marine radio, 1500 gallon port-a-tank, complete assortment of nozzles, ladders, and ten backpacks.

St. Stephen, NB Fire Department Assets

- Staff Level – Four full time, 90 volunteers
- Equipment Available - 3-Pumper trucks, 1-1500 Tanker, 1-1200 Tanker, 2-800 GPM Tanker,1-700 GPM Tanker

Calais (Maine) Fire Dept

- Staff Level - Twenty Fulltime, twenty-six Volunteers
- Equipment Available - Rescue Truck, 1250 gpm 77 foot Pumper/Ladder, 1000 gpm Pumper, two Passport Gas Detectors, 135 gallons of 3% and 6% Foam concentrate.

1. CONCLUSIONS AND RECOMMENDATIONS

1. There are no major issues with regards to the suitability of the waterway for proposed LNG importation. The waterway is deep, adequately marked, and wide enough to handle the size vessels proposed and the frequency estimated.

2. The proposed route, Bay of Fundy to the terminal via Head Harbour Passage, Friar Roads, and Western Passage, is suitable in all aspects for the transportation of LNG on large vessels. Minor modifications to present navigational aids as noted in the report would greatly enhance the waterway to support the proposed LNG operations.

3. Carefully planned transits with tug escort of sufficient horsepower to adequately handle the large LNG vessels are anticipated to service the proposed facility. Of particular concern, due to the enormity of tides and currents and deep channels, a steering or engine casualty must be carefully planned for with contingencies identified on how these types of casualties are overcome.

4. Although the "dangers" of LNG are getting the focused attention from various groups, no one is focusing on the more probable issue of a vessel grounding or puncture of its bunker tanks releasing HFO into the environment. A catastrophic HFO leak into the environment from any vessel transiting the area has the potential of impacting the environment much more than any plausible LNG release.

5. There are no high density population areas along the route of the vessel. As demonstrated in the report Section 3.11, a Zone 1 "Zones of Concern" minimally impacts the shoreline along the northern part of Eastport on the vessel's intended route at Dog Point. It does not impact any of the shoreline in Canadian Waters. There are schools located within the Zone 2 and Zone 3 "Zones of Concern".

6. Zone 2 and Zone 3 impact the shoreline of Campobello Island, Deer Island and Eastport as well as Quoddy at Kendall Head.

7. Any increase in personnel resources allowances to support LNG activity will require U.S. Coast Guard First District and Headquarters approval, which would/could include upgrade in personnel at Station Eastport, and would certainly include additional marine inspector/marine safety personnel resources at MSFO Bucksport, Maine. Additionally, the present complement of one 41' UTB and one 22' UTL at Station Eastport, with one 87' WPB out of Jonesport, Maine (11/2 to 2 hours away) may also need upgrading if the project is approved. The need for these assets could be offset by use of commercial and private resources. Further study is necessary to identify type and quantity (note conclusion 9). A proactive approach in this area would greatly enhance success of approval from the regulatory agencies and law enforcement across the spectrum of those with responsibility in this venue.

8. Presently, there appears to be inadequate fire/emergency medical facilities and/or incident support mechanisms in place in Eastport, Maine area to support

the proposed operation. A detailed study of available resources (in both the United States and Canada) is recommended.

9. A full resource study needs to be conducted as it was not part of this project. Resource issues need to be addressed for:

    a. Security requirements by State, Local and USCG regulatory agencies (based on vulnerability assessment).
    b. Firefighting – both vessel and facility.
    c. Escort and Security Vessels – Private/Commercial/Government.
    d. Security/LE Personnel – Private/Commercial/Government (Fed/State/Local) for both transit evolution and on-site.
    e. MARSEC requirements both Canadian and USCG.
    f. Issues concerning armed escort through Canadian and U.S. Waters; melding of philosophy and operations.

10. A full vulnerability assessment needs to be conducted to fully ascertain the vulnerabilities and threats to the vessel (during transit and while alongside) and the facility. From a very cursory overview, it is felt that the study will show that the vulnerabilities will be low; the most likely vectors for attack would be stand off weapons (deployed during vessel transit from remote areas) or a boat bomb attack (USS Cole of T/V Limburg). Due to the currents and tidal ranges it is highly improbable that a swimmer attack would be successfully employed.

11. It has been proposed that a second tanker always be alongside at the facility to provide capacity to ensure uninterrupted service into the pipeline. The USCG COTP is concerned about this issue; however, we feel that situation may not be as negative as it seems on the surface. The following positive factors need to be stressed:

    a. During periods of higher MARSEC Levels, the tanker could be sent to sea therefore removing the threat versus an onshore tank.
    b. A tanker with a full complement of crew (or some level yet to be determined) would provide a much better chance of detection and deterrence than a much more minimally manned shore side facility crew.
    c. Fully securing this tanker would present challenges due to the tides and currents, but it could be done and those naturally occurring situations could be favorably employed to enhance the security of this vessel. The major concern would be other large commercial traffic either proceeding up the passage or down the passage and either intentionally or unintentionally colliding with the vessel at the dock. Dock design could be chartered to deal with such a situation/event minimizing exposure and impact potential to the tanker at the facility.

12. The present complement of tugs in the area is insufficient to sustain proposed LNG transit operations. Eastport Pilots recommend a minimum of four (4) 7,000 horsepower tractor tugs with sufficient firefighting capability to ensure safe passage of LNG vessels from the Pilot Station to the proposed facility. It is recommended that these tugs meet the vessel at Head Harbour Passage and escort

the vessel to and from the berth. They could also serve as law enforcement platforms engaged in escort duty if necessary.

13. The recent attempt by Quoddy Bay LLC to seek volunteers for a Citizens Advisory Panel is a very positive step in the right direction. Educating local citizens and attempts to form a partnership of consensus and cooperation are critical steps in assuring success of this endeavor. It is recommended that continuous outreach be provided to local citizens to keep them abreast in developments, and employment opportunities within the greater Eastport Community.

14. Recommendations from Risk Mitigation Matrices (Appendix C) from NVIC 05 -05:

    a. **Pre-Arrival Security Inspection:** This evolution is highly recommended and mandatory for heightened MARSEC levels. Issues of jurisdiction, armed presence in sovereign waters (Canada/US) will need to be addressed. A pre-arrival security inspection will mitigate/validate sabotage/hijacking or integrity of the vessel's crew. A system will be necessary to ensure that the hijacking does not occur under the pretense of a security boarding.
    b. **Pre-Arrival Safety Inspection:** This procedure is highly recommended. The USCG has an aggressive Port State Control Program that is tied in with its Security Program. Although LNG vessels do not historically fit the profiles of vessels that would be detained or denied entry because of non-compliance in safety issues or for that matter security concerns, it is something that needs to be actively monitored and managed. The USCG is much attuned to the vessel's last port of call and origination of cargo, crew composition, flag and registry, classification society as well as safety record. TRC can support management of the Port State Control issues both in the safety and security components.
    c. **Safety/Security or RNA's:** A moving safety zone would certainly be appropriate, although with the small amount of vessel traffic in the area (currently) it would only be effective for the time the vessel is in U.S. waters and would serve to provide jurisdictional authority for controlling small craft like the local fishing boats as well as recreational craft. Any traffic issues involving deep draft vessels could be expertly and quickly handled by the pilots charged with guiding those vessels. A Regulated Navigation Area (RNA) and/or established/standing Security Zone might certainly be in order. Depending on the final design of the facility and its proximity to the Canadian border this RNA might not provide the necessary stand-off distances to be an effective deterrent. These international issues will have to be discussed between the United States Coast Guard and Transport Canada.
    d. **Small Boat Escort:** TRC would recommend having a small boat available at the facility; not necessarily the same as for ship escort. The planned tugs could be used to escort the vessel from the entrance of Head Harbour Passage to the facility. A small boat readily available at the facility could serve a dual purpose; alleviate CG resources for escort/patrol as well as provide a deterrence/response for waters around the facility.
    e. **Positive Control Boarding:** Not recommended by TRC unless they required by increased MARSEC levels. The issue of armed Law Enforcement Officers

in a foreign country's sovereign waters needs to be addressed and policy established before this mitigation strategy can become a viable element.

f. **Commercial Tug Escort:** Highly recommended for both security and navigation safety issues as well as for firefighting resources; they would be multi-functional platforms and make for a more efficient use of resources (multi tasked).
g. **Day Transit Only:** Transit times and conditions need to be established by the pilots; if a decision to conduct night time transits is made and concurred with by regulatory agencies, TRC sees no reason in this analysis that would indicate doing otherwise. Daylight transits may become the requisite for increased MARSEC levels.
h. **Video Surveillance of Waterways:** Appropriate technology, correctly chosen and deployed can provide high levels of deterrence at much lower costs than the use of other resources (human). An analysis of technology capabilities necessary and costs associated with employment of that technology is highly recommended. TRC can certainly provide those services. Without question technology can effectively monitor the facility and its operations, but it also can be used to monitor the waterways and areas along the waterways that might be used to stage a stand-off attack (RPG, missile or high powered projectile type weapon) at costs less than the elements discussed in paragraphs j & k below.
i. **Restrictions on Commercial and Public Activities:** TRC at this time does not see a need for restriction of commercial and public activities to facilitate LNG vessel transits.
j. **Law Enforcement Presence on Piers and Structures along waterways:** TRC at this time does not see a need for LE presence along the route although it could be a mitigation strategy for increased MARSEC levels.
k. **Police Presence by Air:** TRC does not at this time see a need for routine police presence by air unless increased levels of MARSEC and specific intelligence indicates otherwise.
l. **Warning Signals for Community:** The issue needs to be studied from a "human element" perspective, but it could certainly be a low cost "good will" gesture.
m. **Areas of Refuge for Community:** This is most likely already addressed in Local Emergency Planning documents for certain "existing" conditions, like natural disasters, weather etc.; that planning will need to be modified to incorporate the LNG operations proposed.
n. **Educational Programs for Community:** Highly recommended, anything that can be done to bring the community on board in support of this project is well worth the effort and money expended.
o. **Diver Sweep of Pier:** Due to the currents and tidal range encountered in the area, swimmer attacks are highly unlikely if not impossible; sophisticated support equipment would have to be used and extensive planning would need to take place to ensure success of such an attack. Underwater detection equipment/technology needs to be evaluated and may be required by regulatory agencies in increased MARSEC levels.
p. **Anti- Boat Barriers:** Due to the currents and tidal range encountered in the area, traditional boat barriers would not function properly. Effort should be made to design the pier and offshore facility itself to provide protection to LNG vessels alongside. Further research needs to be done to evaluate

different types of boat barriers available and their capability of being effective under these extreme conditions of tide and current. The major threat against which the boat barrier could be effective is the small to medium fishing/lobster vessels and recreational boats that ply the waters of Eastport and Pleasant Point. They would not be effective against the deep draft vessels transiting Western Passage.

q. **Physical Barrier around moored vessel:** As discussed in paragraph p. above, an appropriate study needs to be taken to ensure proper design of the LNG facility including security measures that would provide the necessary mitigation strategy in a cost effective manner. Return on investment is best realized if all aspects are considered in the design "ground-up" rather than after through add-ons.

r. **Cargo Transfer Monitoring:** Technical aspects of cargo monitoring are beyond the scope of this product; cargo transfer monitoring will take place.

Appendix A
Resumes

CAPTAIN JERZY J. KICHNER, P.E., (RET.)

PRESIDENT, TRC SECURITY LP

EDUCATION

B.S. Chemistry, United States Coast Guard Academy (1974)
M.S. Chemical Engineering, University of Maryland (1982)

PROFESSIONAL REGISTRATIONS / AFFILIATIONS

Registered Professional Engineer, Chemical Engineer, District of Columbia

Clearance - Secret

TECHNICAL SPECIALTIES

- Maritime port operations; commercial and security
- Vessel Operations/Construction
- Regulatory Compliance; USCG Marine Safety
- Military Experience
- Emergency Response/Crisis Management
- Risk Analysis & Modeling; Vulnerability Assessments
- Emergency Planning

REPRESENTATIVE EXPERIENCE

Capt. Kichner is Senior Vice President of TRC Companies, Inc. and is President of TRC Security, LP. His responsibilities include development and management of TRC's security business sector both nationally and internationally with specialization in the Maritime Sector, Airports, Transportation, Municipalities, Energy and Infrastructure and capabilities ranging from conducting assessments and risk analysis to design/engineer/build as well as operational and crisis/business continuity management and planning.

- Responsible for the development of the Port of Houston Authority Security Master Plan and currently managing a $12M+ project with the Port of Houston Authority for the design, engineering and installation of security technology enhancements throughout the Port.
- Principal in charge for the development, execution and management both nationally and internationally of the Port Vulnerability Assessment and Risk Management business. Under his responsibility, ISPS Assessments were conducted for Ports in Northern Europe, entire countries in the Middle East, numerous Port Facilities in the Caribbean, South & Central America, Africa and the Far East
- LNG Facility Permitting; Managed Threat and Hazard Assessments as well as feasibility studies for LNG terminals and operations being considered for construction in the United States.
- Directed and managed the development of a comprehensive multi-facility Master Security Plan for the Port of Montreal to meet Canadian ISPS requirements.

Marine Safety/ Maritime Port Operations Experience. Captain Kichner brings over 28 years of Coast Guard experience in port & commercial vessel safety, environmental response and security having served in Marine Safety Offices along the East and Gulf Coasts, as Commanding Officer of the Gulf Strike Team responding to national and international environmental emergencies, as Executive Officer of the National Strike Force Coordination Center directing the operation and national policy of the Coast Guard's elite Strike Force and as Captain of the Port and Officer in Charge Marine Inspection for the Mobile Office.

- As Captain of the Port, Officer in Charge Marine Inspection and the Pre-Designated Federal on Scene Coordinator for the Marine Safety Office Mobile Zone**,** his responsibilities encompassed all maritime operations, ship and OCS platform construction and repair in the nation's most prolific concentration of major shipyards**.** He was also responsible for all pollution and emergency response activities in an area composed of five deepwater ports across states of MS, AL, GA and FL; which combined make-up the 5th largest commerce Port of the U.S and one of the largest geographic areas of responsibility in CG which provided in excess of $2B to regional commerce.
- Designed and integrated with DOD, Navy and Marine anti-terrorist assets, and executed a large-scale port security operation to fully secure 11 miles of waterfront around Pensacola Naval Air Station for Joint Chiefs of Staff Conference.
- Designed and perfected the foundation of small boat combat tactics in conjunction with Reserve Training Center staff still used by the Coast Guard's Port Security Units and was a member of the Coast Guard's original cadre selected for training these units in shore side security and boat combat tactics at Camp Perry Ohio for their initial deployment to the Persian Gulf Operation Desert Shield/Storm.

Emergency Response. Captain Kichner is a nationally recognized expert in pollution response and crisis management with expertise and success in management of high tempo, high consequence, political, scrutinized, media intensive and technically complex response and crisis operations. His international experience includes leading multi-national and multi-agency teams representing U.S. interests in Middle East, Mexico and the Caribbean to defuse and solve technical and highly politically charged situations.

- Led deployment of U.S. assets to work with International Team to the Arabian Gulf during Desert Storm to evaluate and provide for the protection and security of national assets from pollution being released by Iraq and to evaluate and direct continuing clean-up efforts reporting directly to the Saudi Arabian Ministers of the Environment and Defense and the Administrator USEPA.
- Led an interagency team under direction of USDOS to the UAE, working for the Minister of Health, to direct an investigation into a massive fish kill initially thought to be illegal dumping, by a suspect vessel, of precursor chemicals for nerve gas agents. He evaluated and advised the UAE government on infrastructure vulnerabilities and environmental security issues associated with commercial traffic in the Straits of Hormuz.
- Notable responses during his tenure as Commanding Officer of the Gulf Strike Team included the Santa Clara I magnesium phosphide and arsenic trioxide incident in Charleston, SC, the Tampa Bay Spill of 1993 and the Morris J. Berman Spill in Puerto Rico as well as participation in the Exxon Valdez Spill.
- At the National Strike Force Coordination Center he initiated a "first look" at the CG's response capabilities for the then developing national WMD program. He was selected as the Coast Guard's technical representative to a high level summit/conference in the Middle East with regards to the vulnerabilities of countries to terrorist activities involving Weapons of Mass Destruction and security measures to contain and mitigate the threat.

Vulnerability Plans and Assessments. Extensive Port Vulnerability Assessment and Risk Management expertise both from military and civilian perspective.

- Planned and directed the Port vulnerability assessments Mobile COTP Zone. Methodology employed was recognized and integrated into the Coast Guard's national policy being developed for implementation
- Formulated and evaluated different risk management models and processes in support of the CG R&D Center's work in providing the Marine Safety Field with Risk Management Tools.
- Executive level planning of NORAD's exercises for terrorist threats to Gulf Coast Ports and their infrastructure.
- Project Manager for Department of Homeland Security $31M contract to Northrop Grumman Corporation, Captain Kichner led the development of processes, methodologies and risk assessment models used in conducting these assessments and in directing field operations of the assessment teams that conducted 11 strategic, multi-faceted vulnerability assessments for the United States Coast Guard at major Gulf, Pacific, and Atlantic coast ports as well as along the Great Lakes.
- Principal in charge of the Port of Houston Authority's effort to develop a Security Master Plan and implement facility hardening in the Houston Galveston Bay system. This Master Plan is based on the vulnerability assessments designed and conducted by TRC as a result of the requirements of the IMO ISPS Code and MTSA; a multi year document that provides a comprehensive dynamic roadmap on how to best achieve the security goals and objectives of the Port in a progressive, logical and cost efficient manner. The second aspect of the contract entails building the largest wireless wide area network of electronic technology in any U.S. Port to secure over 27 miles of property and integrate this technology to operate seamlessly with other federal, state and local agency equipment, policies and procedures as well as provide critical security related information into the Port's Coordination Center.
- Managed development of feasibility, threat, hazard and vulnerability assessments, reports and plans to meet both FERC and USCG LNG permitting and operational requirements.

CAPTAIN JOHN J. O'BRIEN

EDUCATION

MBA, Business Administration, New Hampshire College, 2000
B.S., Business Studies, State University New York-Empire State College, 1993

PROFESSIONAL REGISTRATIONS

REC Licensed Examiner

TECHNICAL SPECIALTIES

Captain O'Brien has over 32 years of service in the USCG, with over 23 years experience encompassing:

- Project Management
- Marine Safety Program Management
- Regulatory Compliance
- Operations/Response Management
- Process Training
- Marine Inspections

REPRESENTATIVE EXPERIENCE

Captain (0-6) Retired, U.S. Coast Guard has experience working in the Marine Safety Program. Captain O'Brien has extensive management and crisis management experience. He has an intimate knowledge of domestic & International vessel safety regulations, including SOLAS and MARPOL. He has vast

experience to include vessel inspection, casualty investigation, port state control, maritime security, port safety, waterways management, licensing and certification of merchant marine officers and seamen, pollution prevention, and response to marine incidents.

Project Management

Captain O'Brien performs the role of senior consultant and project management professional in a variety of projects, covering all aspects of marine industry.

Port Security Assessment, Northrop Grumman, Tampa, FL
As Assistant Team Leader/Maritime Operations Specialist, Captain O'Brien led assessment teams through the field assessment process as part of the United States strategic and most vital ports initiative.

ISPS Port Security Master Plan, Montreal Port Authority
Captain O'Brien, as Project Manager, was responsible for directing all aspects of the project and budgetary controls. He provided oversight of the quality control and coordinated with engineering staff to ensure designs met security requirements.

Vessel Security Plans, Offshore Marine Services Association (OMSA) affiliated vessels

Acted as Project Manager and/or Team Leader for over 450 vessels. He provided technical expertise, quality control and plan development skills to ensure the on-time completion and compliance of each project.

Crisis Manager/USCG Liaison, Velez Blanco, Philadelphia, PA
Captain O'Brien served as the on-scene representative and project coordinator for the vessel owner. He effectively liaised with the United States Coast Guard and vessel owner. He performed oversight of the removal of over 1 million gallons of cargo from the ballast tanks and directed operations for temporary repair, during a winter port of call.

United States Coast Guard Liaison, American Bureau of Shipping

He was responsible for facilitating the cooperation and interactions of both organizations to promote the safety of life, property and environment. He interacted on a continual basis with ABS executives and senior staff to ensure proper implementation of regulations, programs and standards to foster/nurture all partnership efforts.

Marine Safety Program Management

Chief, Port Safety Division, Group/COTP New York

He directed a 163-person staff carrying out duties and responsibilities in the New York/New Jersey area, including over 160 regulated waterfront facilities. The annual workload consisted of over 700 investigations and response to oil/HAZMAT spill reports in the coastal zone, screening/boarding of over 5500 foreign vessel arrivals under the Port State Control Program, and over 2000 HAZMAT placarded container inspections under the Container Inspection Program.

Regulatory Compliance

Chief of Compliance, First CG District, Boston, MA

Captain O'Brien managed and supported activities of four (4) Marine Safety Offices, one (1) overseas Marine Inspection Office and one (1) large Activity. Acted as Program Manager for all First District

Marine Safety Inspection, Investigation, Waterways Management, Licensing, and Commercial Fishing Vessel initiatives.

Operations/Response Management

Executive Officer, Marine Safety Office, Boston, MA
He was responsible for all aspects of administration and operation of a 104-person unit. He acted as Alternate Captain of the Port (COTP), Alternate Pre-designated Federal On-Scene Coordinator (FOSC) and Acting Officer in Charge of Marine Inspection (OCMI).

Process Training

Chief, Inspection Department/Training Officer, Marine Inspection Office, New York
Directly responsible for 50 marine inspectors, providing oversight to the day-to-day operation of the staff conducting commercial vessel inspections. His span of control included vessels and mobile offshore drilling units in the New York/New Jersey area of operations, Europe, Africa, and the Middle East. He also supervised a clerical staff of five (5) civilian employees.

Marine Inspections

Marine Inspector/Investigator/REC License Examiner
He has conducted inspections, examinations, and surveys of over 2,000 commercial vessels. His experience includes conducting over 200 marine casualty and personal misconduct investigations during tours of duty at the following ports:

- Marine Safety Office, Mobile, Alabama
- Detached Duty, Panama City, Florida
- Marine Safety Office, Baltimore, Maryland
- Marine Inspection Office, New York, New York

SPECIALIZED TRAINING

- ISPS/RSO, 2003
- ISO 9000/ISM Marine Auditor/Lead Auditor, 2000
- On-Scene Coordinator/Crisis Management, 1996
- Incident Command System I-100-I-400, 1995
- Merchant Marine Industry Training, 1990
- Leadership & Management, 1989
- Officer Candidate School, 1977
- Various Coast Guard Inspection/Port Operations resident training Courses, 1979-2000 (Complete listing available)

PROFESSIONAL AFFILIATIONS

Offshore Marine Services Association

Appendix B
Contact Information

Persons and agencies contacted for purposes of obtaining Information for this report

U.S. Contacts

Commandant, U. S. Coast Guard
*CDR John Cushing (G-MSO-2)
(202) 267-0214

First Coast Guard District Office
*Theodore Harrington (D1 CFV Coordinator)
(617) 223-8440
*BMC (Ret.) Kevin Blount (oan)
(617) 223-8365

CG Sector Northern New England
Captain Steve Garrity, Commanding Officer/COTP
Captain Allen Moore, USCG (Ret)-Security Specialist
(207) 741-5497

CG Marine Safety Detachment Belfast
*Lt. Dan Mclain –Supervisor
Mr. Gerry Moores -CFVS Coordinator
(207) 338-8395

CG Station Eastport
OIC – BMC Mark Corbishly
(207) 853-2845

Eastport/Quoddy Pilots
Capt. Bob Peacock
Capt. Gerald Morrison
(207) 263-6403

Eastport Port Authority
John Sullivan – Port Director
Capt. Charles Leppin –Tugs/Ops Manager
(207) 853-4614

Washington County (Eastport) Emergency Management
Paul Thompson - Director
(207) 255-3931

Maine Emergency Management Agency
Robert S. Gardner – Technical Hazards Coordinator
(207) 624-4400

Sandy Hook (NY/NJ) Pilots Association
CDR Jack Olthuis, USCG (Ret.)
Captain Howard Hill (Ret.)
Captain Andrew McGovern
(718) 448-3990

Canadian Contacts

Transport Canada, Dartmouth, Nova Scotia
*Mihai (Mike) Balaban
(902) 426-3477

Roosevelt Campobello International Park, NB Commission
Harold Bailey, Park Naturalist
(506) 752-2922

Canadian Coast Guard, Saint John NB
Ryan Green – Marine Emergency Officer
(506) 636-4714
Renaud Landry – VTS (Fundy Traffic) Watchstander
(506) 636-4269

Department of Public Safety, Fredericton, NB
Ernest MacGillivray - Director, Emergency Measures Organization
(506) 453-5507
Darren McCabe – St. Stephen Office

Saint John, NB Port Authority
Andrew Sommerville, Supervisor, Operations & Outside Services
(506) 636-4883

*telephone/e-mail interview