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1101 NEW YORK AVENUE, N.W.
SUITE 1100
WASHINGTON, DC 20005-4213
(202) 986-8000
FACSIMILE: (202) 986-8102

E-MAIL ADDRESS: BRETT.SNYDER@LLGM.COM
WRITER'S DIRECT DIAL: (202) 986-8008
WRITER'S DIRECT FAX: (202) 956-3217

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September 18, 2007

BY ELECTRONIC FILING

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E.
Washington, DC 20426

Re: *Broadwater Energy LLC*, Docket No. CP06-54-000
Broadwater Pipeline LLC, Docket Nos. CP06-55-000 & CP06-56-000

Dear Ms. Bose:

Enclosed for filing in the referenced proceedings is a copy of the responses of Broadwater Energy LLC and Broadwater Pipeline LLC to certain information requests of the New York State Department of State regarding alternatives (NYSDOS Nos. A-1 – A-9).

Please do not hesitate to contact me with any questions regarding this submission.

Respectfully submitted,

/s/ Brett A. Snyder

Brett A. Snyder

Enclosures

cc: James Martin, FERC

NYSDOS A-1

Preamble:

As part of its consistency review process for Broadwater's proposed LNG project in Long Island Sound (LIS), staff at the NYS Department of State (DOS) met with representatives of Broadwater to exchange information, address outstanding issues and examine potential alternatives to Broadwater's proposed project.

DOS initiated a dialogue with Broadwater about potential alternatives in the Atlantic Ocean, south of Long Island. Broadwater has provided DOS with materials regarding the alternatives. The following are open issues with these materials, as well as additional points for clarification regarding potential sites.

Collision Risk

Request:

Broadwater has stated that some of the proposed Atlantic alternative sites would be at a greater risk of collision from ship traffic than the proposed Long Island Sound site. DOS has not seen compelling evidence that any of the Atlantic alternatives would create a collision risk or that any potential risk could not be sufficiently managed. Please provide documentation from the U.S. Coast Guard or similar authoritative source to support Broadwater's contention that navigational safety would be compromised such that the project could not be sited at Atlantic locations.

Response:

Broadwater assumes the DOS request pertains to the deployment of Shuttle Regasification Vessels (SRVs) in Atlantic locations. Broadwater has indicated in its FERC application and in other data responses, that to be considered a viable alternative, three Submerged Turret Loading (STL) buoys would be required for this alternative to provide the 1 bcf/d throughput proposed by Broadwater. Issues pertaining to the viability of other offshore regasification technologies have been addressed in other responses.[1]

Broadwater further assumes that DOS is aware from the record before the FERC that the Coast Guard has concluded that risks of collision can be properly managed at the proposed Broadwater location in Long Island Sound.

The key issues discussed below with respect to collision risk associated with Atlantic alternatives are the following:

---

[1] Refer to FERC Application Resource Report 10 (Alternatives) and responses NYSDOS A-7 and NYSDOS A-8.

(1) The volume of ship traffic associated with the Port of New York/New Jersey in the Atlantic is much greater than that for Long Island Sound;
(2) Collisions documented on the Atlantic side of Long Island have been between large vessels striking fixed and well lighted navigation object in the precautionary area, which suggests a similar risk potential for a moored SRV;
(3) A review of other Deepwater Port approvals suggests that the impacts to surrounding traffic will be significantly larger than just the safety and security zone around a SRV vessel, which may impact the adjacent Traffic Separation Scheme; and
(4) There has been experience with other Traffic Separation Schemes that suggest these schemes are not always heeded by mariners, due to a combination of weather, inexperience and other factors. This must be taken into account in any analysis of risk for a facility with a proposed operation of 30 or more years.

1.0 Ship Traffic Using the Port of New York/New Jersey

Broadwater has noted that the overall level of ship traffic in the Port of New York/New Jersey is significantly greater than that observed in Long Island Sound. Key facts, as noted in a fact sheet issued by the U.S. Coast Guard, Sector New York, give the following information about the Port of New York/New Jersey:[2]

- Third largest U.S. port and has the largest civilian population contained within a U.S. port area;
- The 2005 total value of cargo through the Port was US$132 billion;
- 12 percent of all the international goods arriving into U.S. come through this Port. This equates to 85 million metric tons of general cargo, which in turn serves 80 million people or 35% of the entire U.S. population.
- NY/NJ is the largest port in the U.S. for the movement of petroleum (aviation fuel, gasoline and home heating oil);
- NY/NJ is also ranked as the largest port in the U.S. as an ocean-borne auto-handling port, moving 722,000 vehicles;
- NY/NJ is the third largest U.S. port in terms of containerized cargo shipments, with 4.8 million Twenty-foot Equivalent Units (TEUs) of containerized cargo (equivalent to 7,300 containers each day).

The Vessel Traffic Service, with its 14 remote radar sites and 20 cameras throughout the Port, monitors 1400 *daily* commercial vessel movements in the Port of NY/NJ.[3]

[2] Available at http://homeport.uscg.mil – refer to Sector New York.
[3] Further validation of these statistics is available from the Port Authority of New York and New Jersey http://www.panynj.gov/ .

These figures can be contrasted with those reported in the Waterway Suitability Assessment for the Broadwater project, where the following traffic details were identified: [4]

> "As outlined in Table 2-1, for the years 2003 through 2005, ports within Long Island Sound experienced an average of 2,300 commercial vessel arrivals per year. For those years, there was an average of approximately 462 foreign-flagged vessels arrivals annually at port facilities within Long Island Sound located in both Connecticut and on the north shore of Long Island. These vessels take one of two routes into Long Island Sound; either north of Block Island, or through Montauk Channel to the west of Block Island and then through The Race. Additionally, for the years 2003-2005, there was an average of 1,840 U.S. flagged vessel arrivals annually at ports in Long Island Sound, consisting primarily tug and barge combinations. These vessels arrive from both the eastern entrances and the western end of the sound."

Table 2-1: 2003-2005 Long Island Sound vessel arrival data

	2003		2004		2005	
Vessel Type	**U.S.**	**Foreign**	**U.S.**	**Foreign**	**U.S.**	**Foreign**
Barge	1131	28	1438	63	1779	112
Bulk Carrier		105		116	1	
Fishing Vessel	3		5		1	1
General Dry Cargo Ship		39	3	70	10	54
Miscellaneous Vessel	1	3	3		8	
Passenger Ship	79	1	97	3	140	
Refrigerated Cargo Ship		62		33		56
Recreational	4		2	4	1	44
RO-RO Cargo Ship	1	1			1	2
Tank Ship	200	228	225	184	225	166
Towing Vessel	16		30	1	71	2
Other	17	3	12		17	6
Total	**1452**	**470**	**1815**	**474**	**2254**	**443**
Year Totals	**1922**		**2289**		**2697**	

Source: Coast Guard MISLE (Marine Information for Safety and Law Enforcement) Analysis and Reporting System (MARS);
Note: Appendix D details the process which was used to derive the arrival information.

[4] U.S. Coast Guard, Waterway Suitability Report for the Proposed Broadwater Liquefied Natural Gas Facility, September, 2006, page 21.

Thus, commercial ship traffic, which tends to be comprised of larger vessel sizes, is more than an order of magnitude greater for the Port of NY/NJ than it is for Long Island Sound where the vessels are also calling at a multitude of ports, some of which do not require the passing of the proposed Broadwater FSRU (for example. New London). While a Traffic Separation Scheme is used in the Port of NY/NJ, increased levels of traffic are generally associated with increased collision risk. Further to this, the volume of traffic to the Port of NY/NJ appears to be increasing with time, which suggests greater traffic volumes than those that have been observed historically.[5]

It should further be noted that there are a wide variety of other marine terminals whose transportation details are not captured by the port authority website itself, including many of the oil berths located around the Kill Van Kull channel.

As part of the Deepwater Port application recently submitted by Safe Harbor Energy, a Marine Vessel Traffic Study[5] was conducted. Excerpts from that report are provided below[6]:

4.1 SHIP TRAFFIC TO NEW YORK

"New York Harbor is a major port on the east coast of United States, handling a diverse range of ship types, which include container carriers, tankers, bulk carriers, cruise, and general cargo vessels. These ships arrive and depart to the majority of the ports of the world, and to assist the safe movement of these ships a Traffic Separation Scheme (TSS) is in operation in the outer approaches to New York. Navigation in the area is governed by the International Regulations for the Prevention of Collisions at Sea (1972). In addition to setting out the action of vessels for collision avoidance in confined and open waters, the regulations also specifically address vessel actions in TSS.

Traffic Separation Schemes are intended to make navigation in congested waters safer for shipping, by designating one way routes for ship transit and thus reducing the probability of head-on collisions. A TSS consists of two one-way traffic routes with a separation zone between to maintain a safe distance between the routes. The areas outside the TSS and the space between adjacent TSS are open waters where shipping can transit in any direction.

TSSs are internationally recognized by the International Maritime Organization (IMO) and inbound and outbound ships should follow the TSS as a matter of navigational prudence. However, vessels are not constrained to use the TSS and may navigate in the adjacent coastal or open waters. Vessels of less than 20

[5] See, for example, a press release entitled "*Port Of New York And New Jersey Sets Cargo Record In 2006*" dated March 20, 2007 from the Port Authority http://www.panynj.gov/AboutthePortAuthority/PressCenter/PressReleases/PressRelease/index.php?id=924

[6] Safe Harbor Deepwater Port License Application, Docket No. 28535, Appendix N (Marine Vessel Traffic Patterns), Section 4.1 to 4.4 and Section 4.6.

meters (which would include the majority of leisure craft) and fishing boats are required not to impede the passage of any vessel following a traffic lane.

Any shipping that is required to join or leave a traffic route is required to do so at as small an angle to the general direction of traffic flow as practicable. This will apply to the LNG carriers when they approach and depart from the Terminal. Vessels crossing the TSS should do so at a right angle or as nearly at a right angle as practicable.

4.2 THE APPROACHES TO NEW YORK

"The TSS in the approaches to New York consists of three individual schemes, each with two routes, which converge at a precautionary area off Ambrose Light. These routes approach/depart from east/west (to and from the U.S. east coast, Canadian east coast, and Europe), southeast/northwest (to and from Africa and South America), and south/north (to and from Southern United States, Caribbean, and Panama Canal for the Pacific and Far Eastern Ports). These six routes are shown in the Figure N-1 and Safe Harbor is located between two of these routes shown as route 2 and route 3 on Figure N-1. Note that the traffic routes narrow as they lead from the open sea to the precautionary area off Ambrose Light. As vessels proceed inbound or outbound in the routes the vessels will bunch together as the routes narrow, and spread apart as the routes widen.

The approximate position of the Safe Harbor site is shown in Figure N-8 between east outbound Ambrose to Nantucket route (route 2) and the inbound Hudson Canyon to Ambrose route (route 3). Safe Harbor is about 0.5 nm south of the southern edge of route 2 and 1.4 nm north of the northern edge of route 3. This position is outside of the traffic routes and in an **area where shipping is permitted to make passage in any direction, provided that it does not interfere with traffic in the TSS**. (emphasis added)

Inbound traffic to New York will follow route 3 to the semi-circular precautionary area and then proceed to the pilot boarding area to the west of Ambrose Light. Vessels departing from New York will disembark the pilot near Ambrose Light and then proceed through the precautionary area to the start of the route 2 and then depart the area …"

4.3 SHIP TRAFFIC ANALYSIS

"The ships arriving and departing from New York will be using one of the six numbered traffic lanes identified in Figure N-1. Data on ship traffic numbers in the area was sought from the U.S. Department of Transportation Maritime Administration, who advise 4,902 port calls, or 9,804 ship movements, of vessels greater than 10,000 tons deadweight; their source is reported as Lloyds Marine Intelligence Unit (LMIU). New York pilots advise that the approximate annual number of ship movements is about 11,000 to 12,000 per year.

The data used for the ship traffic flow analysis was obtained from LMIU for the period November 2005 through October 2006 and covers ships inbound to and outbound from New York. These data were selected because they includes not only the number of vessels but also the previous port and next port and this allows analysis of vessel routes. The data also contain information on the vessels themselves such as vessel type, length, summer deadweight, and summer draft, and these parameters allow analysis of vessel distributions on the routes. The data do not include leisure craft, fishing boats, naval, or USCG vessels.

The LMIU data showed 11,690 in total number New York inbound and outbound movements for this period; these were allocated to the six lanes to give movements on each route as shown in Table N-2. The movement numbers have not been inflated for future trade. The route used by each of the vessels was derived from the previous and next ports for each ship and knowledge of courses used in deep sea and coastal navigation.

Routes 2 and 3 that pass respectively north and south of Safe Harbor are highlighted in Table N-2 and show the traffic numbers on the two routes adjacent to Safe Harbor. Route 2 had 1,754 ship movements outbound and 15 percent of the total movements in the area. Route 3 was much less travelled and had 378 ship movements and 3 percent of the total movements in the area. Of the other, more distant, routes the north/south routes 5 and 6 have the densest traffic with a combined total of 58 percent ..."

4.4 SHIP TRAFFIC ON ROUTES 2 AND 3

"The distribution of vessel transits by ship type on routes 2 and 3 is shown in Figure N-10; both routes have a mix of different ship types, with about half the vessels on route 2 and a fifth of vessels on route 3 being tankers carrying hydrocarbon products or in ballast, and the balance of the vessels carrying dry cargoes. The most common vessel subtype on both routes is a container carrier. Cruise liners anticipated to carry high numbers of passengers transit on both routes ..."

4.6 COLLISION HISTORY

"Data on worldwide collision for the 5-year period 2001 through 2006 show five collisions in the general area of Safe Harbor Energy. The same data also show one allision plus there were two further incidents of striking the Ambrose Light in 1996 and 2001. The locations of relevant collisions are shown in Figure N-18 and details of the collisions are shown in Tables N-13 and N-14. Four of the incidents were in New York Harbor itself and are not considered further here.

The remaining four incidents, two collisions and two allisions, are discussed below:

- Case 4: collision between a bulk carrier and a fishing vessel about 45 nautical miles east of Safe Harbor Energy and in the outbound safety fairway of the Nantucket to Ambrose route.
- Case 5: collision between a tug and a fishing vessel in the open navigation waters of the inshore zone west of the outbound TSS route 6.
- Case 6: allision by an oil tanker striking the Ambrose Light Tower.

- Case 7: allision by a freighter striking the (recently repaired) Ambrose Light Tower.

The records show no collisions between two large ships navigating in the TSS, and indicate the benefits of separating those traffic flows. Both collisions involved fishing vessels. **Both allisions involved a large vessel striking a fixed and well-lighted navigation mark within the precautionary area."**(emphasis added)

Table N-2 Ship Movements by Route (LMIU November 2005 through October 2006)

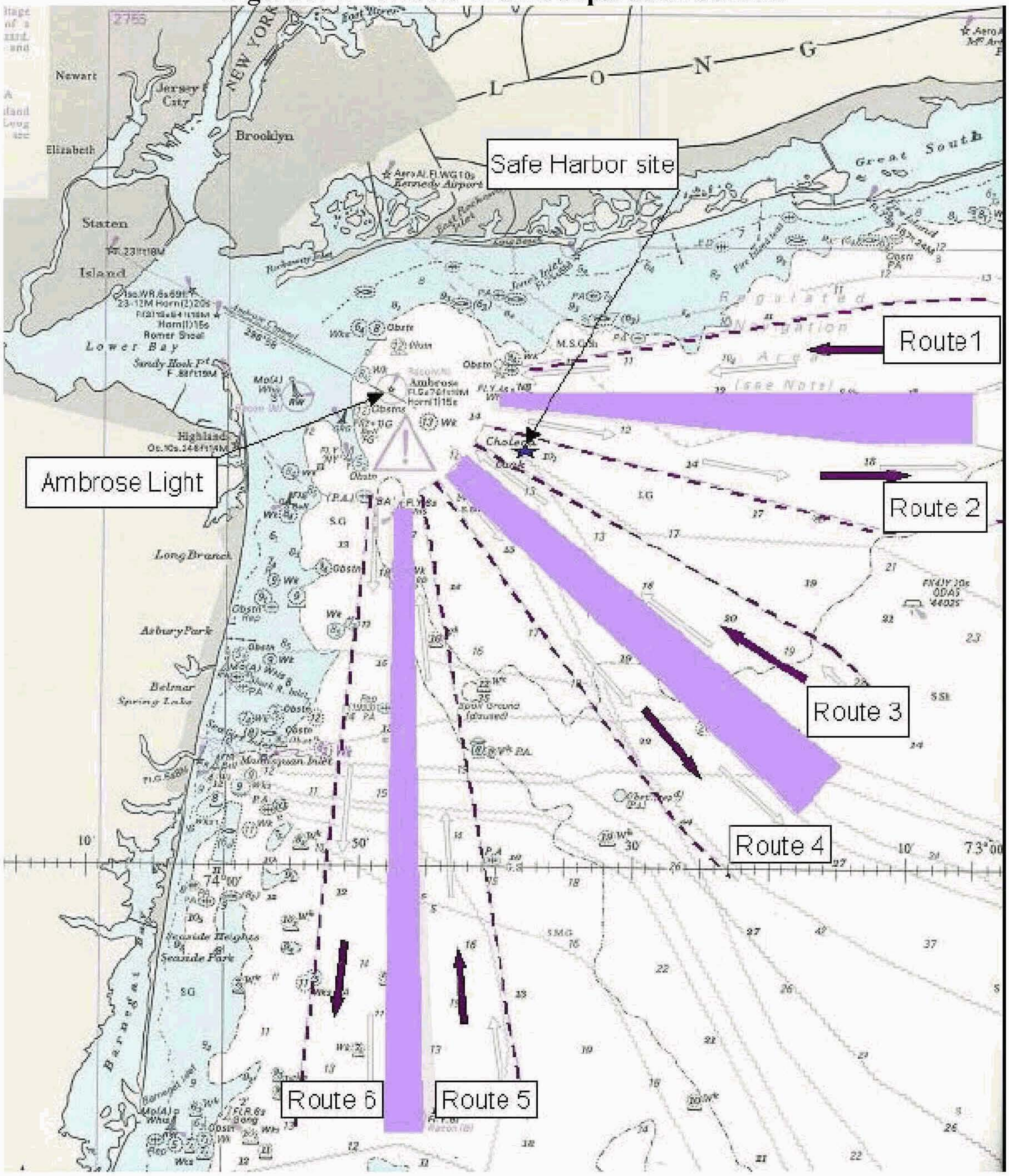
Traffic Direction	*Route*	*Number of Ships*	*Percentage of all Ships*
West bound	*Route 1 (inbound)*	*2548*	*22*
East bound	*Route 2 (outbound)*	*1754*	*15*
Northwest bound	*Route 3 (inbound)*	*378*	*3*
Southeast bound	*Route 4 (outbound)*	*252*	*2*
North bound	*Route 5 (inbound)*	*2919*	*25*
South bound	*Route 6 (outbound)*	*3839*	*33*
Total		*11690*	*100*

In summary, the data from the Safe Harbor marine traffic study confirms Broadwater's assertions:

- Vessel traffic, particularly ships greater than 10,000 tons deadweight, is much greater for the Port of NY/NJ than for Long Island Sound. As stated above, the figures quoted by Safe Harbor do not account for growth in the volume of vessel traffic. However, as noted above by the Port of NY/NJ, vessel traffic and the volume of cargo transported continues to grow.
- Historical collisions have been experienced between large vessels and fixed navigation marks in the precautionary area. Siting two or more SRVs in this area in the sites proposed by NYSDOS would introduce additional fixed vessels in the area.
- As will be discussed below in Section 2.4, Traffic Separation Schemes are not always obeyed by passing vessels. All other things being equal, locating adjacent to an area with frequent ship traffic increases the exposure to those ships who may disregard the TSS and this will result in increased collision risk.

NYSDOS A-1

Figure N-1 – NY/NJ Traffic Separation Scheme



2.0 Affected Areas Around SRV Buoy Locations

The assertion that the only area affected by the installation of a set of STL buoys associated with an SRV operation is the safety and security zone around the SRV when it is discharging natural gas is incorrect. A larger area must be set aside in order to conduct operations and to avoid damage to the STL buoys from other marine traffic. This is evident from a review of the recommendations associated with approved SRV installations.

2.1 North East Gateway Deepwater Port

The North East Gateway (NEG) project intends to use two STL buoys located 1 mile apart. The Final Environmental Impact Statement (FEIS), Section 2.1.1.2 (NEG Port Operations) notes the following:[7]

> "**Safety Zone** – Pursuant to the regulations of the DWPA, the USCG is authorized to establish a permanent mandatory Safety Zone around the deepwater ports whether a vessel is present or not. The NEG Port Safety Zone would extend approximately 800 yards from the centre of each buoy in order to maintain distance from a moored EBRV [Energy Bridge Regasification Vessel] as it weather vaned (rotated) around the buoy. The combined area of both buoy Safety Zones would be 415 acres. All unauthorized vessels would be prohibited from anchoring or transiting the Safety zone at any time. The USCG would have primary jurisdiction for the NEG Port Safety Zone.
>
> **No Anchoring Area (NAA)** – if a License is granted, the USCG would designate a mandatory NAA to further facilitate Port operations, safety and security that would encompass an area within a 1100 yard radius from the centre point of the each buoy. In total, the NAA would restrict 776 acres around each buoy, or a total area of about 1200 acres (considering the overlap of the zones between the two buoys) from access. The NAA is necessary to prevent vessels from anchoring (or bottom trawl line) within the port mooring system and either damaging the mooring system, the vessel itself or its equipment. Restrictions within the NAA include the following:
>
> - No deep draft vessel anchoring or bottom trawl fishing.

[7] Final Environmental Impact Statement, Northeast Gateway Project, Docket #22219, Volume 1, Section 2.0, pages 2-9 to 2-10

- Transiting allowed with pre-approved simultaneous operations management system
- Fishing/lobstering allowed with pre-approved simultaneous operations management systems
- Speed restrictions may apply
- Possible restricted access during LNG carrier movement.
- Possible restricted access during higher terrorist threat levels.

A simultaneous operations management system (or protocol) would ensure coordination between port operations and other vessels in the area and address such areas as:

- Communications
- Identification systems
- Safety and security briefings/procedures
- Emergency notification/evacuation/response plan and procedures

Areas to be Avoided (ATBA) The applicant is recommending an area to be avoided of 1367 yards radius around each buoy or an additional 267 yards beyond the NAA. Restrictions within this area would be as follows.

- Same restrictions as NAA would apply
- Movement or activities would not be restricted but reduced speed in transit may be required.

It may be determined that additional areas in the vicinity of the Port have this designation as well.

These areas would normally be marked on the relevant navigational charts along with their designation and purpose.

2.2 Gulf Gateway Deepwater Port

In the case of the existing Gulf Gateway Deepwater port located in the Gulf of Mexico, the USCG has established the following zones around the port:[8]

> The Gulf Gateway Deepwater Port (DWP) is located approximately 116 miles off the Louisiana coast at West Cameron Area, South Addition Block 603 ``A", 28[deg]05'16" N, 093[deg]03'07" W. The DWP operator plans to offload liquefied natural gas (LNG) vessels by regasifying the LNG on board vessels. The regasified natural gas is then transferred through a submerged loading turret buoy (STL), to a flexible riser leading to a seabed pipeline to a metering platform. From the platform the natural gas feeds into two separate downstream seabed pipelines to connect with the Southeastern United States natural gas network. In order to improve safety and security at the port while regasification and transfer operations are occurring, several routing measures have been implemented. In July 2004, the Coast Guard forwarded a proposal to the International Maritime Organization (IMO) requesting the establishment of an Area To Be Avoided (ATBA) and a mandatory No Anchoring Area for the Excelerate Gulf Gateway (formerly the El Paso Energy Bridge) deepwater port. These two routing measures will promote safety, security, and vessel traffic management in the vicinity of the DWP.
>
> The ATBA has a radius of 2 nautical miles, is recommendatory in nature and does not restrict vessels from transiting the area. However vessel operators are strongly urged to seek alternate routes outside the ATBA and away from the DWP. The No Anchoring Area has a radius of one and one half nautical miles from the STL buoy and compliance is mandatory. It is required to protect the anchoring system securing the port and vessels from potential damage by sub-surface fishing operations (e.g., trawling). These routing measures were adopted by IMO in December 2004 and will be implemented on July 1, 2005. A safety zone is an additional measure, intended to augment the routing measures cited in the previous paragraph. The safety zone is needed to protect the deepwater port, and other vessels and mariners from the potential safety hazards associated with LNG operations while an LNG vessel is moored at the port.
>
> The Coast Guard is establishing an interim safety zone 500 meters around the Gulf Gateway Deepwater Port described above. All unauthorized

[8] 33 CFR Part **§ 150.940** Safety zones for specific deepwater ports and 33 CFR Part 150 [USCG-2005-21111 FR Doc 05-9432].

vessels are prohibited from entering into or moving within this safety zone.

This rule is effective upon publication in the Federal Register.

Regulatory Evaluation

This rule is not a ``significant regulatory action'' under section 3(f) of Executive Order 12866 and does not require an assessment of potential costs and benefits under section 6(a)(3) of that Order. The Office of Management and Budget has not reviewed it under that Order.

This safety zone is encompassed within a circle that extends out only 500 meters from the center point, and is located approximately 116 miles off the coast of Louisiana, so the impacts on routine navigation are expected to be minimal.

As can be seen from the foregoing, the USCG requested a large Area To Be Avoided (2 mile radius), for the Gulf Gateway Deepwater Port, despite the location being 116 miles offshore and in an area which has very few traffic concerns. This would lead to a conclusion that at least an equivalent zone would be enforced for potential sites with such large quantities of passing traffic.

2.3 Potential Interference Associated with Multi-Buoy Submerged Turret Loading Buoy Installation and the Traffic Separation Scheme for the New York/New Jersey Harbor

Broadwater believes that the locations proposed by NYSDOS are in the following locations:

Table 1 - Coordinates for Atlantic Alternatives

Location	Longitude	Latitude
S1A	-73.63074	40.38762
S1B	-73.48079	40.34890
S2	-73.28824	40.30811
S3	-72.68343	40.44326

Refer to Figure 2, which was provided to Broadwater by NYSDOS.

Locations S1A, S1B, S2 and S3 are shown on Figure 3 (attached), relative to the Traffic Separation Scheme (TSS) in the area. Locations S1A, S1B and S2 are located within a sector separating the inbound and outbound lanes of the TSS located off Ambrose Light.

The purpose of a Traffic Separation Zone is defined in the Federal Regulations as:

> "(b) *Traffic separation scheme* (TSS) means a designated routing measure which is aimed at the separation of opposing streams of traffic by appropriate means and by the establishment of traffic lanes."[9]

Broadwater had previously submitted that in order to provide a comparable gas send-out utilizing SRV technology, three STL buoys would be required to ensure reliability of the supply, and that at least two of these buoys would be in constant use.

Accordingly the buoys would need to be positioned 2 miles apart from each other to ensure adequate maneuvering room. This is comparable to other proposed STL proposals, as summarized in Table 2 below.

Table 2 – STL Buoy Deployment

Project	Buoy Separation	Reference
Northeast Gateway	2 buoys - 1 mile	Northeast Gateway Final Environmental Impact Statement, Section 2.0, page 2.4.
Neptune LNG	2 buoys – 2.3 miles	Neptune LNG Deepwater Port License Application, Volume II, page 1-2.
Port Dolphin Energy	2 buoys - 3.1 miles	Port Dolphin Deepwater Port License Application, Volume I, Introduction, page 2.

If the DOS-proposed positions (S1A, S1B, S2 and S3) were utilized and 3 STL buoys were located around these positions to minimize the impact to the surrounding TSS, either the Safety Zone, the No Anchoring Area or the Area to be Avoided would (if using the same criteria as that identified above for the only operational U.S. offshore deepwater port [the Gulf Gateway Deepwater port]), in three of four cases shown in Figure 3, would encroach significantly upon the TSS lane. The only location for which this would not be the case is the S3 location, which encroaches to a lesser extent. However, other issues with the S3 location, relating to the additional environmental impact associated with the connection pipeline, potential shoreline impacts and the unsuitable metocean conditions, are detailed in Broadwater's FERC filing of June 20, 2007.

Encroachment on a TSS is contrary to 33 CFR 148.720 in that it will affect and restrict vessels transiting in and out of New York Harbour.[10] It is a reasonable assumption that

[9] 33 CFR 167.5 (b).
[10] 33 CFR 148.720, which outlines the general siting criteria for a Deepwater Port, indicates that the proposed and alternative sites for a deepwater port will be evaluated based on how well each site "*(e)*

this Safety Zone could be further expanded because of the proposed location(s) and the increased passing traffic that the location is subjected to, to ensure that the safety for both the "terminal" and arriving/departing vessels is not compromised.

2.4 Additional Issues for Atlantic Locations

Location S1A is located 3 nautical miles to the southeast of the TSS Precautionary Area – this is defined as:

> (e) *Precautionary area* means a routing measure comprising an area within defined limits where ships must navigate with particular caution and within which the direction of traffic flow may be recommended.[11]

This is an area where arriving and departing vessels will be on high alert, as vessels will be proceeding in a variety of directions to maintain safe passing distances from other vessels navigating in the area. Accordingly, a simple mistake in this area would lead to serious consequences. Siting an SRV facility at S1A will add to the complexity of the maneuvering required by the vessels. It should be further noted that arriving vessels, many of them foreign flagged, will not have a pilot on board until they transit at least 7 miles past the proposed location.

Historically there have been numerous collision incidents in areas which utilize Traffic Separation Schemes – the main purpose for the TSS is that the port or channel is a busy waterway and the TSS reduces the number of incidents by regulating the traffic flow direction. While the adoption of a TSS has reduced collision and allision events, they do still occur. For example, Appendix 1 provides an excerpt from a report by the Marine Accident Investigation Branch of the United Kingdom's Department for Transport. The report documents issues in the English Channel, another high volume vessel traffic area, where a number of collisions have occurred in the TSS off the Dover straits resulting in fatalities.

Some of the conclusions and recommendations from this report were:

> The problem of traffic bunching in the south-west lane of the Dover TSS is well known. The guidance given on Admiralty chart 5500 "Mariners Routing Guide, English Channel and Southern North Sea" warns that:
>
> •• many vessels keep too close to the north side of the west-bound between South Falls and Dungeness; and,

Minimizes the potential for interference with its safe operation from existing offshore structures and activities."

[11] Refer to 33CFR167.5.

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- vessels should make use of the full width of the traffic lanes and open waters to reduce collision risks.

It is apparent that this advice is not being heeded. The fact that four collisions in overtaking situations have occurred in this area in the past 13 months may be indicative of a worsening situation.

The MAIB believes that a possible explanation lies with the increasing use of Global Positioning Systems (GPS) and electronic chart systems for forming, and then storing, passage plans. Where stored plans are being executed by reference to the GPS navigator, electronic chart system and/or track control system, watchkeepers can be reluctant to stray from the planned track. Further, where circumstances force a deviation, there appears to be a tendency to return to the original track instead of revising the passage plan. This serves to cause and maintain the bunching of traffic, the danger of which is enhanced when the vessels involved have markedly different speeds.

Locations S1B and S2 are again located between two traffic lanes, the outbound Ambrose to Nantucket lane and the inbound Hudson Canyon to Ambrose channel. These lanes are separated by a distance of 2 miles at the NW end (S1A position) and 6 miles apart at position S2. Unlike other parts of the TSS, this "separated quadrant" is not marked by a formal Separation Zone. CFR 33 Part 167 states that

> (d) Separation zone or line means a zone or line separating the traffic lanes in which ships are proceeding in opposite or nearly opposite directions; or separating a traffic lane from the adjacent sea area; or separating traffic lanes designated for particular classes of ships proceeding in the same direction.

Accordingly, this allows the quadrant to be used by all vessels proceeding in any direction. It is likely that smaller, slower craft, including coastal tow units would use these routes due to their own speed and limited maneuverability it keeps them clear of larger, faster ocean-going craft.

These craft are harder to spot both visually and electronically in poor weather. Enforcement of the safety and security zones would be more onerous and the alerts more frequent because of the offshore nature of the proposed site, weather and traffic conditions. Many vessels are going to "close with the facility" before finally giving way and maneuvering clear, and the weather conditions will likely make the task of enforcement of the zones more difficult for the local patrol craft.

In the case of the SRVs there would always need to be, if the weather conditions allow, two SRV vessels connected to the buoy system in order to maintain the base send out requirement. Accordingly, this increased risk, due to the number and type of passing traffic, will exist for the duration of the project.

By siting the facility in the proposed position(s) the safety and associated zones will force vessels to bunch together, reducing the passing and overtaking distances and increasing the risk of collisions between vessels. This will be particularly true in the case of vessels under commercial pressure to make their scheduled arrival time and which may proceed at a speed not considered prudent. With the number of oil tankers serving the NY/NJ market, there is the increased consequential risk of a pollution incident if a collision was to occur.

Location S3 lies between two safety fairways linking the Nantucket lane to New York. The northerly fairway runs Westbound while the Southerly fairway runs Eastbound, location. Location S3 sits equidistant (approximately 2.5 nautical miles) from each of the fairway extremities. The fairways themselves are 2.4 nautical miles wide.

33 CFR 166.105 states:

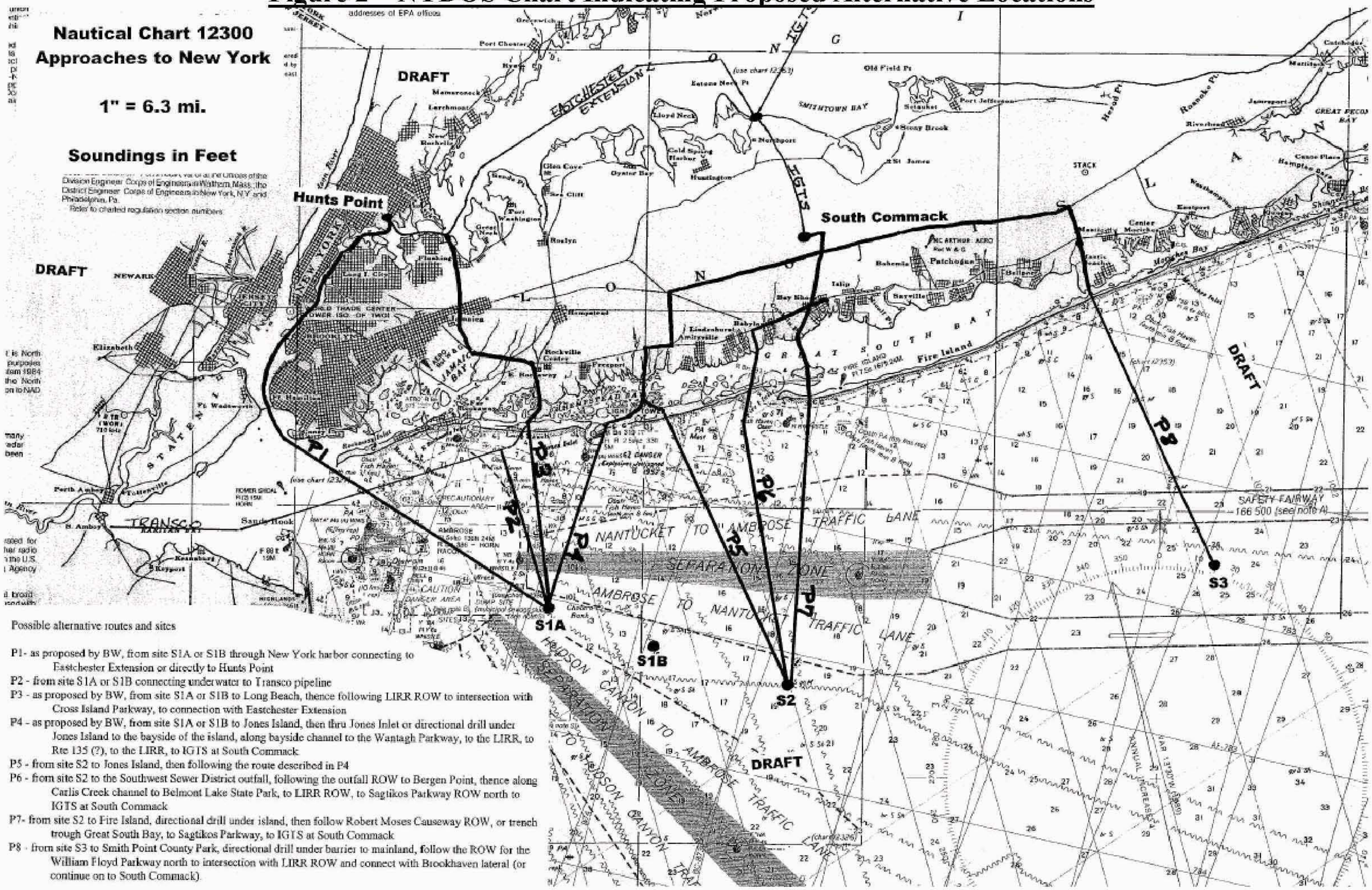
a) Shipping safety Fairway or Fairway means a lane or corridor in which no artificial island or fixed structure, whether temporary or permanent, will be permitted. Temporary underwater obstacles may be permitted under certain conditions described for specific areas in Subpart B. Aids to navigation approved by the US Coast Guard may be established in a fairway.

As above it is likely that smaller coastal craft will use the area between the fairways in order to proceed to and from the New England coast in order to remain clear of the ocean going and transatlantic traffic using the fairways. These would include tug and barge units, which are less maneuverable than conventional vessels, especially in heavy weather conditions.

Enforcement of the safety and security zones would be more onerous and the alerts more frequent due to the offshore nature of the proposed site, its associated weather and traffic conditions. Many vessels are going to "close with the facility" before finally giving way and maneuvering clear, and the weather conditions will likely make the task of enforcement of the zones more difficult for the local patrol craft.

NYSDOS A-1

Figure 2– NYDOS Chart Indicating Proposed Alternative Locations



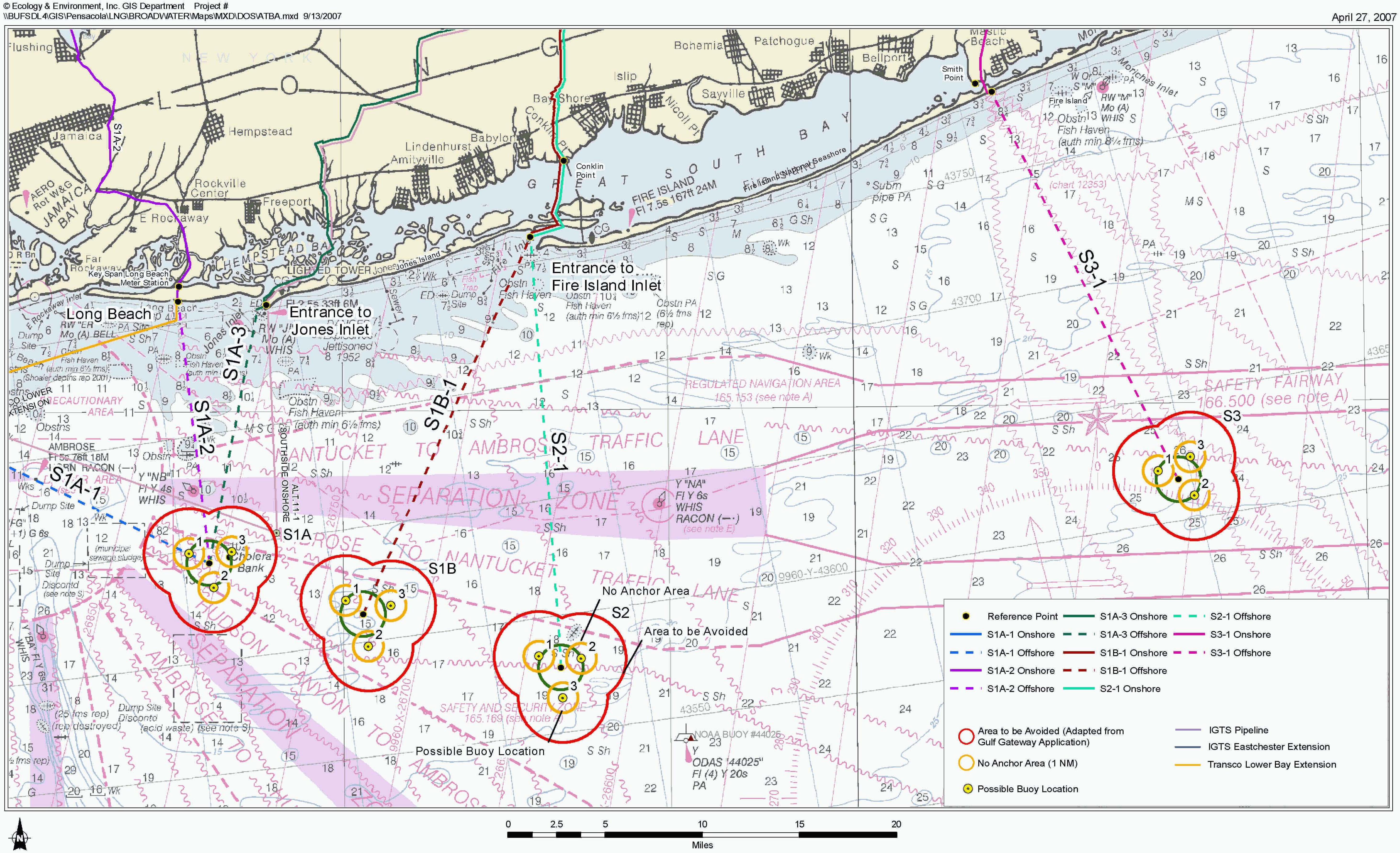


Figure 3 Areas to be Avoided

MAIB SAFETY BULLETIN 2/2001

Collision between

Ash* and *Dutch Aquamarine

south-east of Hastings

in the Dover Traffic Separation Scheme

with the loss of one life

9 October 2001

MAIB SAFETY BULLETIN 2/2001

This document, containing Safety Recommendations, has been produced for marine safety purposes only on the basis of information available to date.

The Merchant Shipping (Accident Reporting and Investigation) Regulations 1999 provide for the Chief Inspector of Marine Accidents to make recommendations at any time during the course of an investigation if, in his opinion, it is necessary or desirable to do so.

The Marine Accident Investigation Branch (MAIB) is carrying out an investigation of the collision on 9 October 2001 between the motor vessels *Ash* and *Dutch Aquamarine,* which resulted in the foundering of *Ash* and the death of her master. The MAIB will publish a full report on completion of the investigation.

This accident is the latest and most serious of four similar collisions which have occurred in the south-west lane of the Dover Traffic Separation Scheme in 13 months. The MAIB believes that modern navigational methods and equipment may be contributing to overcrowding in the traffic lanes, and this Safety Bulletin is issued to alert the Maritime and Coastguard Agency (MCA), owners and masters to the potential hazards involved.

J S Lang
Rear Admiral
Chief Inspector of Marine Accidents

Press Enquiries: 020 7944 4691 / 3387; out of hours: 0207 944 5925
Public Enquiries: 0207 944 3000
INTERNET ADDRESS FOR DTLR PRESS NOTICES:
http://www.dtlr.gov.uk

SAFETY RECOMMENDATIONS

Background

On 9 October 2001 the 1,009 gross tons (gt) motor vessel *Ash* was en route from Odense, Denmark, to the Spanish port of Pasajes with a cargo of steel coils. She had six crew on board and was making a speed of about 6.25 knots in the south-west traffic lane to the south-east of Hastings. The 4,671gt chemical tanker *Dutch Aquamarine* was also on passage in the same traffic lane en route from Antwerp to Swansea and was making about 12.5 knots over the ground. She had a mixed chemical cargo and a crew of 12 on board. There were a number of other vessels in the vicinity, all of which were bunched towards the northern edge of the lane. Close passing was commonplace.

Although the investigation into this accident is still underway, it has been established that *Dutch Aquamarine* had been the overtaking vessel, and her watchkeeper did not notice the developing collision situation until it was too late. *Ash* took no effective last minute avoiding action. The subsequent collision caused *Ash* to founder with the loss of her master.

As part of its investigation the MAIB studied the tracks taken by all vessels on passage in the south-west traffic lane of the Dover traffic separation scheme (TSS) during a six-hour period. This showed that most vessels hug the northern edge of the lane with only two or three choosing to pass to the south of the Varne. Where traffic is bunched in this way, close passing is commonplace. It only requires a brief lapse of concentration to lead to a collision; especially when the speeds of vessels are very different.

This is the latest in a number of collisions that have recently occurred in the Dover TSS. The circumstances in each have been very similar.

In September 2000, *Kinsale* collided with the stern of *Eastfern*. *Kinsale* was the overtaking vessel, with a speed about 6 knots faster than that of *Eastfern.* In January 2001 the overtaking vessel *Unden* collided with the stern of *Star Maria,* causing substantial damage to both ships. In June 2001 the larger and much faster *Atlantic Mermaid* collided with the stern of the smaller cargo ship *Hampoel. Hampoel* was substantially damaged. The MCA has successfully prosecuted those in charge of the overtaking vessels in two of these accidents.

The problem of traffic bunching in the south-west lane of the Dover TSS is well known. The guidance given on Admiralty chart 5500 "Mariners Routing Guide, English Channel and Southern North Sea" warns that:

- *many vessels keep too close to the north side of the west-bound lane between South Falls and Dungeness*; and,

- *vessels should make use of the full width of the traffic lanes and open waters to reduce collision risks.*

It is apparent that this advice is not being heeded. The fact that four collisions in overtaking situations have occurred in this area in the past 13 months may be indicative of a worsening situation.

The MAIB believes that a possible explanation lies with the increasing use of Global Positioning Systems (GPS) and electronic chart systems for forming, and then storing, passage plans. Where stored plans are being executed by reference to the GPS navigator, electronic chart system and/or track control system, watchkeepers can be reluctant to stray from the planned track. Further, where circumstances force a deviation, there appears to be a tendency to return to the original track instead of revising the passage plan. This serves to cause and maintain the bunching of traffic, the danger of which is enhanced when the vessels involved have markedly different speeds.

Safety Recommendations

1. **Ship owners and masters** should:
   i. consider carefully whether their passage planning strategy is adding to congestion in the Dover TSS;
   ii. consider whether the way electronic navigation aids are used on their vessels could be reducing the flexibility of watchkeepers to use the whole traffic lane in areas of congestion;
   iii. remind themselves and watchkeeping officers of the advice contained on Admiralty chart 5500, in particular, to make use of the full width of the traffic lanes to reduce collision risks.

2. **The Maritime and Coastguard Agency** is recommended to:
   i. conduct research into the extent to which modern navigational practices, together with electronic navigation equipment, is contributing to bunching of traffic in the south-west traffic lane of the Dover TSS; and,
   ii. on completion of the research, seek to ensure that effective measures are put in place to mitigate the problem.

NYSDOS A-2

Preamble:

As part of its consistency review process for Broadwater's proposed LNG project in Long Island Sound (LIS), staff at the NYS Department of State (DOS) met with representatives of Broadwater to exchange information, address outstanding issues and examine potential alternatives to Broadwater's proposed project.

DOS initiated a dialogue with Broadwater about potential alternatives in the Atlantic Ocean, south of Long Island. Broadwater has provided DOS with materials regarding the alternatives. The following are open issues with these materials, as well as additional points for clarification regarding potential sites:

Reliability

Request:

Broadwater has stated that its FSRU, proposed to be located in Long Island Sound, could be available 98% of the time, considering all the elements that affect reliability. This, according to Broadwater, would enable the project to serve baseload customers under firm contract. The Atlantic alternatives, according to Broadwater, would be adversely affected by wave conditions which would limit offloading and transferring of fuel. What analysis can Broadwater provide to explain why 98% reliability is adequate for a baseload supply, while 90% is not? If the project were less reliable than contemplated (i.e. below 98%), what options are available to Broadwater for making up the difference? Can Broadwater provide information that demonstrates there is an LNG industry standard regarding facility availability and what is considered a minimum level for baseload supply?

The recently released report, "Broadwater LNG: A Technical Assessment", by Levitan & Associates, Inc., cautions against exposure to volatility in the global spot LNG market. Please demonstrate how upstream price volatility and competition for cargoes from European and Asian buyers willing to pay higher prices could affect or impair Broadwater's ability to offer baseload service.

Response:

(1) Background

Broadwater reviewed issues of marine operability in its original site and technical concept selection prior to filing a regulatory application for the project. As part of that review, historical metocean data was reviewed for NOAA buoys #44025 and #44017, as well as the Hydrobase Ship Observation database.[1] Broadwater's review of the data shows that wave heights exceed 2 meters for a significant proportion of the time in these Atlantic locations, particularly in the winter months. As previously discussed in Broadwater's submission to FERC on June 20, 2007, the assessed operational limits for approach and departure is 2 meters.[2] Moreover, it has been noted that these wave limits are exceeded the greatest proportion of the time during the winter months, where wave heights can exceed the 2 meter threshold as much as 20% of the time.[3]

The figures quoted by Broadwater with respect to marine operability and reliability are annual average figures. Some downtime is contemplated related to ocean conditions, even within Long Island Sound. Downtime can occur at any time throughout the year, but simulations suggest that the predominant amount of downtime will occur in the winter months (November to March). Thus, a figure of 98% reliability implies a lower level of reliability in the winter months combined with reliability in the summer months of close to 100%.

Extrapolating this to lower levels of reliability, a similar result will occur, with the preponderance of downtime occurring in the winter months, on the order of 20 percent or more.[4]

(2) Reliability and Market Price Behavior

Looking at historical natural gas prices in the New York region, in the recent past natural gas prices have shown pronounced spikes during the winter months due to an inability to meet simultaneous demands for natural gas for electrical generation and for hearing demand. The price spikes have been, in some instances, more than double the average natural gas price.[5]

As discussed in the recently released Levitan Report, the project's economic benefit is driven, in part, by the impact of the additional natural gas supply on winter markets in the region:

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[1] The website for this product is www.hydrobase.net .
[2] This summary is also provided in Broadwater's FERC application, Volume V, Resource Report 11, page 11-47.
[3] It should also be noted that an assessment of marine operability must consider combinations of wave height as well as wind speed and ocean currents. Marine operability may be less than that which would be determined by consideration of wave conditions alone.
[4] Federal Energy Regulatory Commission, Broadwater Draft Environmental Impact Statement, November 2006, page 4-29: "A review of the NOAA buoy data indicates that the average hourly wave heights near Montauk Point and in the Atlantic Ocean south of Long Island exceed the 2-meter operational threshold for LNG transfer approximately 18 percent of the time. Between September and April, wave heights in these areas exceed 2 meters more than 22 percent of the time.
[5] See, for example, Levitan and Associates, Inc. *Broadwater LNG: A Technical Assessment*, July 2007, page 27 (Figure 11).

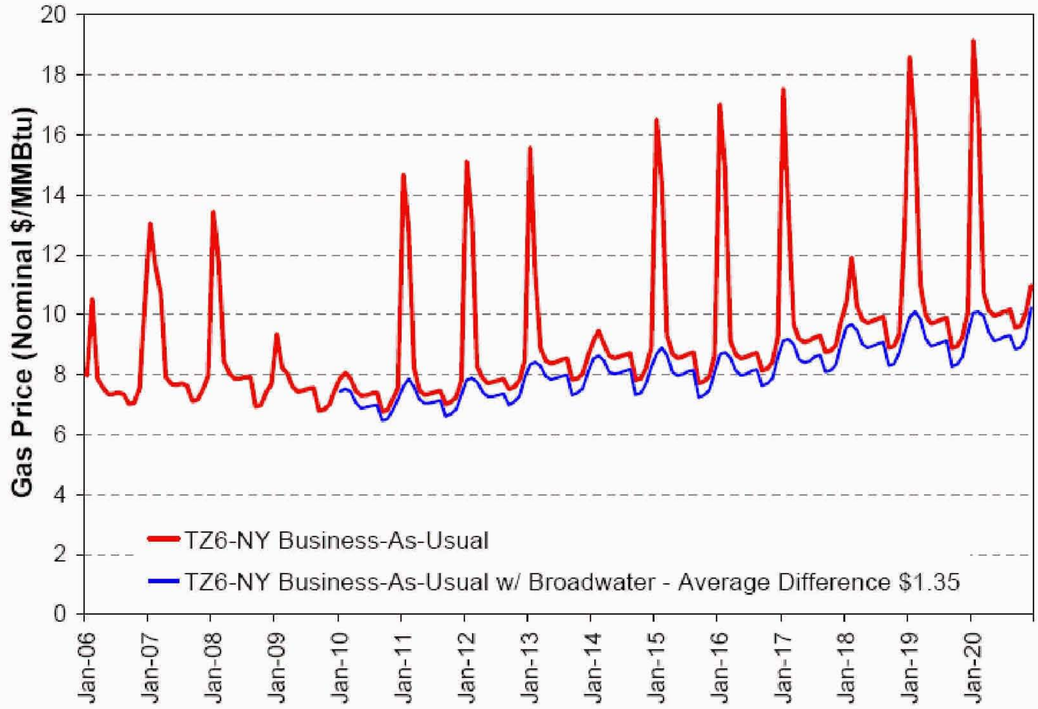
> "Absent Broadwater, natural gas prices on Long Island and in New York City are likely to remain high, generally indexed to crude oil prices, and broadly reflective of tight market fundamentals across North America. Natural gas prices are likely to remain volatile, whipsawing during the heating season when pipelines serving New York are periodically constrained. Even if Broadwater is commercialized, its existence will not in and of itself immunize New York from global competition for premium fossil fuels. Assuming Broadwater regasifies 1 Bcf/d, natural gas prices will certainly be much lower on Long Island, in New York City and Rest of State in relation to what they would otherwise be without a large-scale import terminal at Long Island's doorstep. Relative to LAI's Business-as-Usual Case – that is, a long term energy future without Broadwater – when Broadwater is added to the resource mix we estimate that the average price of natural gas for two leading market-area indices over the ten-year forecast period would decrease by $1.35/MMBtu (Transco Zone 6 New York, or 'TZ6-NY', shown in Figure ES1) and $1.61/MMBtu (Iroquois Zone 2, or 'IGTS-Z2'), a reduction up to 17%. This average decrease in price is explained by the expected reduction in volatility resulting from Broadwater's location in the heart of the market center, as well as the heightened competition among rival production basins to serve New York's gas demand."[6]

Figure ES-1 from the subject report is shown below. It is important to note the character of the forecast market area price under the TZ6-NY Business-as-Usual case. Price spikes and volatility are projected in the winter heating season without Broadwater. According to the Levitan Report, the major economic benefit of the project comes from being able to reliably serve the market area during the winter heating season, thereby eliminating the historically observed volatility. Reliability during the winter heating season is therefore a key consideration to achieving the forecast benefits.

This same period where the highest economic benefit is attainable corresponds to the time of year when metocean conditions for the Atlantic Ocean south of Long Island exceed the operational thresholds for Broadwater. An inability to serve the market during this peak period will reduce the assessed economic benefit to New York energy consumers.

[6] Levitan Report, Executive Summary, pages iv-v.

Figure ES1 – Market Area Price Effect Attributable to Broadwater (TZ6-NY)



(3) Reliability Issues – Electric System

Broadwater will serve both the market for natural gas heating demand and the market for electric power generation. With respect to the electric generation market, there are established criteria for reliability set down by the New York Independent System Operation (NYISO). As part of NYISO's Comprehensive Reliability Planning Process (CRPP), which is intended to establish the grid's reliability needs and solutions to maintain bulk power system reliability, the NYISO conducts a Reliability Needs Assessment (RNA) over a ten year study period.[7]

A key input into the RNA is the establishment of criteria for bulk power system reliability, measured by the frequency, duration and magnitude of potentially adverse effects on customer service. Power system *adequacy* is ability of the bulk power system to supply the aggregate requirements of consumers at all times, accounting for scheduled and unscheduled outages of system components. The adequacy standard for the New York State Power System is expressed by loss of load expectation (LOLE). The planning

[7] New York Independent System Operator, *Comprehensive Reliability Planning Process – 2007 Reliability Needs Assessment*, March 16, 2007, page 1.

requirement is a LOLE that is less than or equal to a involuntary load disconnection that is not more frequent than one day in every 10 years, or 0.1 day per year.[8] This is a high standard, consistent with overall societal reliance on electricity for many critical uses.

In order to fulfill this standard and to ensure that their generating capacity is consistently dispatched in the marketplace, providers of generating capacity to the New York must be able to respond quickly and reliably to changing electric demands.

The issue of interdependent nature between natural gas pipeline supplies and electric generation operations and planning is considered to be of sufficient importance that the North American Electric Reliability Council (NERC) formed a Gas/Electricity Interdependency Task Force to mitigate reliability impacts between the gas pipeline industry and the electric industry.[9] One of the recommendations of the Task Force was that NERC should develop a reliability standard relating fuel infrastructure reliability to resource adequacy. Broadwater is not aware of the establishment of a formal standard, but there is a clear recognition of the need to harmonize natural gas reliability with the electric power industry planning process.

Broadwater has emphasized its intention to serve as a baseload regional supply point. This further underscores the need to provide the highest levels of natural gas infrastructure reliability.

(4) Reliability Issues and SRVs

Shuttle Regasification Vessels (SRVs) would not be capable of providing the same level of reliability as Broadwater's FSRU. The FSRU will add 350,000 m^3 (approximately 8 billion cubic feet of regasified natural gas) of dedicated LNG storage to the region, which will not be dependent on the physical presence of a LNG supply vessel in order to provide natural gas supply.

The mere physical presence of an offshore loading buoy with the ability to connect to a SRV does not, by itself, suggest that natural gas supplies commensurate with system capabilities will be forthcoming. For example, in reviewing the recent FERC decision with respect to Algonquin Gas Transmission's application to construct and operate a 16.4 mile subsea pipeline lateral for the Northeast Gateway Deepwater Port, FERC noted that the Algonquin Pipeline will not be providing firm transportation service on its pipeline for the deepwater port:

[8] NYISO, *CRPP 2007 Reliability Needs Assessment*, page. 3
[9] North American Electric Reliability Council, *Gas/Electricity Interdependencies and Recommendations*, June 15, 2004.

> "20. In response, Algonquin clarifies that it is not planning to construct facilities to increase capacity downstream of the Pipeline Line. Algonquin states that Excelerate will rely on obtaining downstream capacity via capacity release or interruptible service. In any event, Algonquin states a sudden loss of pressure or gas supply on the Pipeline Lateral would not adversely affect service to customers other than those customers whose supplies include regasified LNG from Northeast Gateway's port, since Algonquin would not be required to continue deliveries of natural gas on behalf of such customers to the extent that Northeast Gateway is unable to deliver gas into the Pipeline Lateral."[10]

While the Northeast Gateway Deepwater Port is not yet in operation, Broadwater would suggest that a lack of commitment to firm transportation capacity on the downstream connecting pipeline would not be indicative of a plan to provide baseload supplies to the New England market, as Broadwater would intend for the New York region.

Recently, a number of LNG industry publications have begun to track and publish LNG deliveries to the United States. One of these publications, The U.S. Waterborne LNG Report, provided a summary of deliveries from January 2005 to July, 2007. Table 1 summarizes the results:[11]

Table 1 – North American LNG Port Delivery Summary

Port	Jan/05 to Jul/07 Total Deliveries (billion cubic feet)	Jan/05 to Jul/07 Average Monthly Deliveries (billion cubic feet/month)
Cove Point, Maryland	445.3	14.4
Elba Island, Georgia	384.1	12.4
Gulf Gateway, offshore GOM	23.1	0.7
Everett, Massachusetts	461.1	14.9
Lake Charles, Louisiana	465.2	15.0

The disparity between the four onshore terminals and the Gulf Gateway terminal is evident. While a portion of the disparity can be explained by the tightness in the spot market for LNG, it is clear that the only operating SRV facility has not demonstrated the capability to ship significant volumes of LNG to date.

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[10] Federal Energy Regulatory Commission, Algonquin Gas Transmission LLC, Docket No. CP05-383-000, Certificate Order, page 8 and page 10.
[11] Waterborne Energy Inc., *The U.S. Waterborne LNG Report*, Volume 4 Week 32, page 11.

(5) Reliability and LNG Shipping Costs

The inability to berth and unload LNG carriers due to adverse weather conditions has economic consequences, as well as those of overall supply reliability. LNG carriers typically charge a daily charter rate, which is a function of the price of the ship, the cost of financing and ship operating costs. Charter rates vary widely with market conditions, and can be as low as US$27,000 per day to as high as US$150,000 per day.[12] These costs are payable regardless of whether the LNG carrier is in transit to a delivery location, berthed at a LNG regasification terminal, or waiting for inclement weather to pass. Therefore, locating a LNG regasification terminal such as Broadwater in an area with lower marine operability, such as the Atlantic Ocean, will increase the shipping costs to and from the terminal.

(6) Response to Levitan Comments

Broadwater assumes that NYSDOS' question is in response to specific comments made in the Levitan Report, for example:

> "Unless Broadwater is contractually obligated to meet commitments on Long Island and in New York City and, perhaps, other adjacent markets, Broadwater, or its marketing affiliate, may divert cargoes destined to New York, electing to move charter vessels to the most lucrative spot market across the Atlantic Basin. Until worldwide liquefaction capability in exporting countries catches up to the demand for LNG, competing markets across the Atlantic Basin constitute heightened competition for spot cargoes, in particular, the United Kingdom, Spain, and a number of other European Union countries. Certainly, the best way to assure Broadwater's operating regime around 1 Bcf/d is to require performance through contractual safeguards oriented around a "take-if-tendered" commercial structure."[13]

In responding to the question, there first needs to be a clarification concerning the commercial relationships involved with the Broadwater project. Broadwater is a joint venture between TCPL USA LNG, Inc. and Shell Broadwater Holdings LLC, which intends to construct and operate a marine LNG terminal and connecting pipeline for the importation, storage, regasification and transportation of natural gas. Broadwater will in

[12] U.S. Energy Information Administration, The Global LNG Market: Status and Outlook, Report #DOE/EIA-0637, December 2003. Available at http://www.eia.doe.gov/oiaf/analysispaper/global/index.html .
[13] Levitan & Associates, Inc., *Broadwater LNG: A Technical Assessment*, page xi.

turn contract with a Shell affiliate to provide terminal services. By virtue of its size and established position in the LNG business, Shell has access to a broad portfolio of supplies in the Atlantic Basin which can be used to meet supply obligations.

Broadwater notes, also, that a floating LNG regasification terminal entails a substantial capital investment and would anticipate that contract holders would want to reduce their unit costs for storage and regasification by utilizing the facility to the maximum extent. Secondly, as mentioned in the Levitan Report, prospective buyers of natural gas sourced from the Broadwater terminal can manage supply security issues through contractual means.

NYSDOS A-3

Preamble:

As part of its consistency review process for Broadwater's proposed LNG project in Long Island Sound (LIS), staff at the NYS Department of State (DOS) met with representatives of Broadwater to exchange information, address outstanding issues and examine potential alternatives to Broadwater's proposed project.

DOS initiated a dialogue with Broadwater about potential alternatives in the Atlantic Ocean, south of Long Island. Broadwater has provided DOS with materials regarding the alternatives. The following are open issues with these materials, as well as additional points for clarification regarding potential sites:

SRV Depth Restrictions

Broadwater characterizes the depths needed for use of Shuttle Regasification Vessel (SRV) technology to be a minimum of 40 meters. However, Advanced Production and Loading, Inc., the company that engineers and constructs the Submerged Turret Loading (STL) buoy for the SRV technology, has stated that they can design a system to work in 30 meters of water. The Port Dolphin Energy project proposed for Tampa, Florida plans to utilize SRV technology and will be located in approximately 30 meters. In light of the Port Dolphin proposed depth, it appears that a range of locations and depths in the Atlantic, beginning at 30 meters depth, would be suitable alternative locations for the SRV and STL technologies. What data or documentation can Broadwater provide that shows a minimum 30 meter depth would not be feasible for these technologies in the Atlantic Ocean south of Long Island?

Response

As will be explained in the discussion that follows, the primary issues associated with a 30 meter STL installation in the Atlantic Ocean are the following:

(1) There are no installations currently in operation at this water depth. A review of the Port Dolphin Deepwater Port application suggests that proposal of a 30 meter water depth is an economic decision dictated by the length of the connecting pipeline, and not an optimal use of STL buoy technology;
(2) Use of an STL buoy in 30 meter water depths would pose a potential collision risk, considering the height of the buoy and the volume of deep draft vessels that transit the area en route to the Port of New York/New Jersey;
(3) The operability of a STL buoy would be reduced in comparison with greater water depth;
(4) Installation of a STL buoy at this depth would result in a very large footprint for the mooring equipment; and

(5) There are questions about the hydraulic performance of the buoy at these water depths.

The company Advanced Production and Loading, Inc (APL) have been manufacturing the STL buoy concept since 1993, primarily for offshore oil off-take and recently to provide an offshore LNG regasification option. The STL buoy options currently in service are installed in water depths varying from 85 to 350 meters and designed to cater for a significant wave height of up to 16.4 meters.

A summary of these installations is provided Table 1 below (water depth for each installation highlighted). It should also be noted that Shell, one of the project sponsors of Broadwater, is the operator of the Fulmar installation in the North Sea, and is therefore familiar with actual STL buoy technology and its limitations.

The Port Dolphin application is based upon utilizing similar technology to that already in service in deep water and applying it in

> *"water depths at the proposed north buoy location measures 100-feet (30-meters) and 111-feet (33-meters) at the south buoy site. Along the specific pipeline route the water depths range between a maximum of 100-feet (30-meters) at the start of the proposed pipeline route,"*[1]

It is Broadwater's understanding that Advanced Production and Loading, Inc (APL), a company which has been manufacturing the STL buoy concept since 1993, primarily for offshore oil off-take and recently to provide an offshore LNG regasification option has been approached by the Port Dolphin project sponsors to determine if a shallow water application of the STL technology is feasible.

[1] Port Dolphin Deepwater Port Application, Docket No. 28532, Volume I, pages 39-40.

NYSDOS A-3

Table 1 – Summary of STL Buoy Installations

Field	North East Gateway	Banff	Bayu Undan	Heidrun	Volve
Operator	Excelerate Energy	Conoco	ConocoPhillips	Statoil	Statoil
Field Location	Massachusetts Bay, USA	North Sea (UK)	Timor Sea, Australia	Haltenbanken (N)	Central North Sea (NO)
Water depth	90 meters	90 metres	80 metres	350 meters	90 meters
Application	LNG	FSO	FSO	DSL	FSO
Mooring legs/anchor	8 / Suction	8 / piles	12 / piles	8 / drag	9 / suction
Design condition Hs	11 meters	12.8 meters	7.23 meters	15.5 meters	14.3 meters
Tanker characteristics	138.000 Deplacement	T/T Nordic Apollo 130.000 DWT	FSO Liberdade	3 purpose built shuttletankers DP	Navion Saga 149.000 dwt
Field Production (bpd)	69 MMscg/d	90,000	TBA	250,000	60,000
Installed	2007	2001	2002	1994	2006

Field	Njård	Åsgård	Fulmar	Harding	Yme
Operator	Norsk Hydro	Statoil	Shell	BP	Statoil
Field Location	Haltenbanken (N)	Haltenbanken (N)	North Sea (UK)	North Sea (UK)	North Sea (NO)
Water depth	330 meters	290 meters	83 meters	110 meters	95 meters
Application	FSO	FSO	FSO	OLT	FSO
Mooring legs/anchor	8 / suction	8 / suction	8 / piles	8 / suction	8 / suction
Design condition Hs	16.2 meters	15.7 meters	9,8 meters	10 meters	12,5 meters
Tanker characteristics	Purpose built, unmanned, passive	Std. STL shuttle tanker	Conv. Aframax, passive	Std. STL Shuttle tanker, DP	Conv. Suezmax, passive
Field Production (bpd)	70,000	60,000	120,000	77,000	30,000
Installed	1997	1999	1993	1995	1995

Data Source: Advanced Production and Loading website, www.apl.no

The project's focus upon a shallow water STL application may be further explained by Section 2.8.1 of the Port Dolphin application (Preferred Location and Route) which states the following:[2]

> "The Northern Location and Route Alternative is not a feasible or practicable alternative because it would involve the pipeline's crossing major shipping fairways and the Gulfstream pipeline offshore. The Southern Location and Route Alternative involves placement of the offshore terminal buoy array at a further distance from the landfall location than the Proposed/Preferred Alternative. ***As stated above in Section 2.7.3, the determining factor for siting the offshore LNG terminal is the location of the pipeline landfall. The terminal location should be located either directly offshore or some reasonable distance north or south of the shore landing; otherwise, the length of pipeline required from terminal to shore can become uneconomical and/or result in unjustifiable impacts to the marine environment. The Proposed/Preferred Alternative is located the shortest distance offshore and most directly from the landfall location."*** (emphasis added)

It is apparent that the Port Dolphin sponsors have approached APL to see if a "shallow water option" is feasible, as the economics of building the additional span of pipeline will significantly impact the viability of the project.

As evidenced by the current installations shown in Table 1, a shallow water installation is a deviation from previous applications and as such cannot be accepted as "proven technology". Additionally while it is apparent that APL has indeed conducted modeling scenarios to ascertain the equipment required, there are still outstanding questions regarding feasibility of the final design. It is evident that the applicant has chosen to trade off risk with the shallow water installation in order to shorten the length and associated cost of the connecting pipeline. It should be emphasized that this decision was specific to the area chosen for the Port Dolphin project and it does not follow that the same decisions concerning the use of this technology would be applicable in the Atlantic Ocean off Long Island Sound. In fact, as the discussion that follows clearly indicates, there are a number of issues that would directly impact the feasibility of such an installation.

Broadwater also notes that on August 10, 2007 a "Stop Clock" letter was issued to the applicant seeking more information on the project. The key issue pertains to the selection

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[2] Port Dolphin Deepwater Port Application, Docket No. 28532, Volume II, Section 2 (Alternatives Analysis) page 2-35.

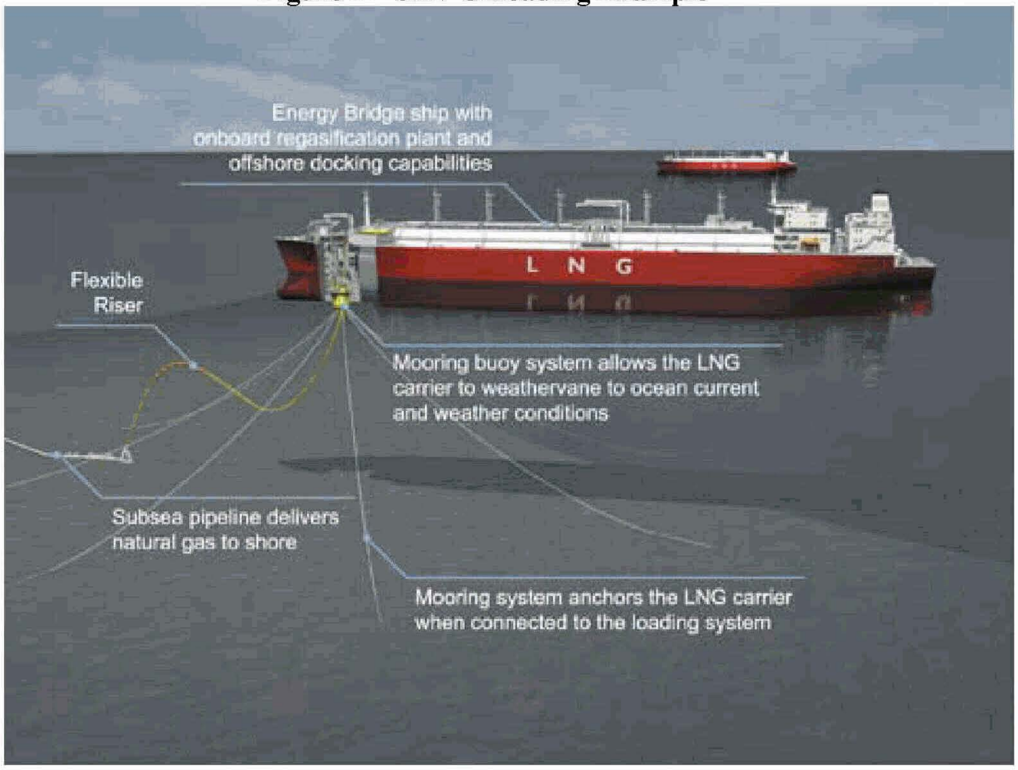
of a pipeline route. Changes to the pipeline route could potentially affect the location of the STL buoy installation.

Four other considerations relevant to use of STL technology in shallower water are discussed below.

1. Buoy Location

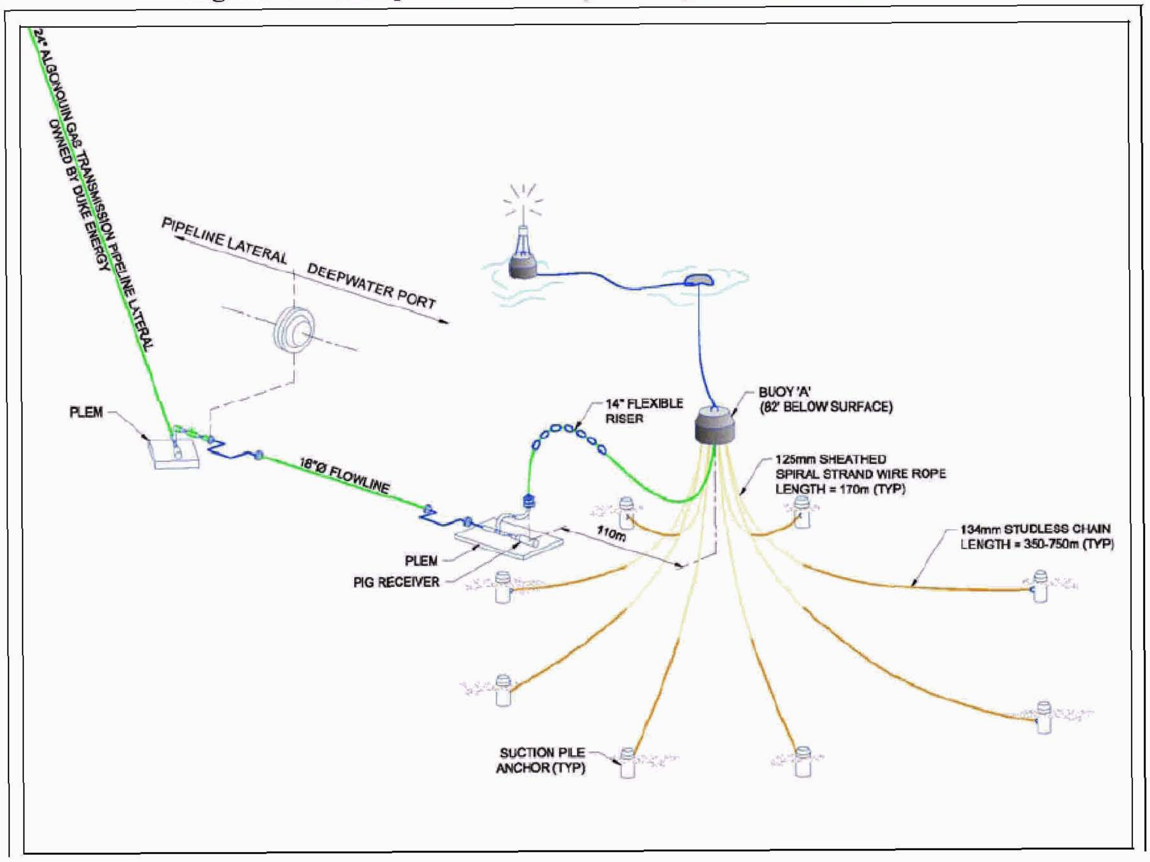
The STL buoy is approximately 35 feet high and consists of a fixed lower segment that is connected to mooring lines and an articulating upper segment that can rotate around a central annulus through the buoy. When deployed in deeper water, once the SRV has completed the vaporization process for its cargo, the STL buoy is released, re-submerging to a depth of approximately 80 to 90 feet – well below the draft of any ship traffic that might inadvertently stray into the area. As such, the buoy remains suspended in the water column and does not impact or rest upon the seabed following disconnection. This is demonstrated in Figure 1 and 2 below taken from Northeast Gateway (NEG) Final Environmental Impact Statement (FEIS).

Figure 1 – SRV Unloading Example



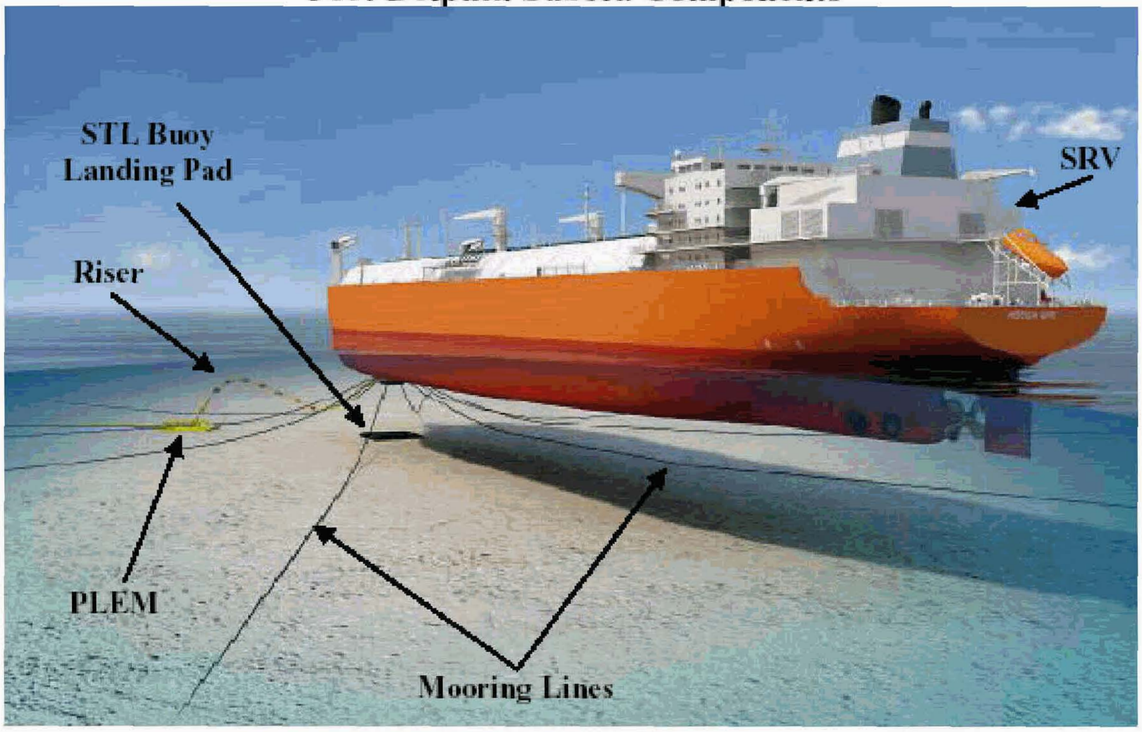
NYSDOS A-3

Figure 2 – Example of STL Buoy in Deeper Water Installation



Port Dolphin have proposed that, due to the shallow depth of water at the location, the STL buoy, when released from the SRV sits upon a STL buoy landing pad. This will result in some environmental impact to the sea bottom, which the applicant must define. See Figure 3.

Figure 3
Port Dolphin Subsea Components



Further, the "protrusion" sitting on the sea-bed will have to have a permanent "Area To Be Avoided" which must be maintained around the location due to the danger it could pose to navigation. The protrusion is indicated in Figure 4 below

Figure 4 – Port Dolphin - STL Buoy Disconnected from SRV

It needs to be recognized that although SRVs have large dimensions, due to the specific gravity of LNG, the actual ship's draft (i.e. the distance between the waterline and the bottom of the vessels keel), is relatively small in relation to other similar sized vessels. Therefore, an SRV may have enough clearance to operate in shallow waters. Crude oil tankers, refined product tankers, bulk carriers and container vessels, all of which routinely transit the Port of New York/New Jersey, have significantly deeper drafts.

The Deep Water Port Application (Docket #28535) by Safe Harbor Energy included as Appendix N - Marine Vessel Traffic Patterns, which highlights that over 900 vessels departing or arriving through the Ambrose to Nantucket and the Hudson Canyon to Ambrose Traffic Separation Schemes (TSS) evidenced drafts of greater than 42 feet. These TSS schemes run on either side of the NYSDOS proposed Atlantic alternatives S1A, S1B and S2.

Further, the prevailing weather conditions at the Atlantic locations offshore Long Island, with a 3-6 foot swell being considered normal (data obtained from NOAA Buoy 44025), this additional reduction in underwater clearance between passing vessels and the STL buoy landed on the seabed, it can be easily seen what a danger to passing traffic a shallow water STL buoy could pose.

2. Operability

The Port Dolphin Deepwater Port Application details the following weather-related design criteria for connecting the SRV to the STL buoy:[3]

> **18.2 § 148.105(q)(2) Design Criteria**
> Overall design requirements for the floating offshore components:
> - The passive SRV is weathervaning
> - Built for 40-year design life
> - Survive the 100-year non-hurricane condition for the connected STL Buoy scenario
> - Survive the 100-year hurricane condition for the disconnected STL Buoy scenario
> - Connect Conditions
>   - Significant wave height (H_s) 11.5 feet (3.5 m)
>   - Wind speed (U_w; 1 hour mean) 30 knots (15 m/s)
>   - Current speed (U_c) 3 knots (1.5 m/s)

Excelerate Energy's operational Gulf Gateway terminal is located in significantly deeper water, 300 feet (91.4m) but in the same general location (the Gulf of Mexico) and, this, is subjected to similar weather patterns. Examination of the Gulf Gateway Deepwater Port FEIS[4] reflects the following:

> The STL buoy and mooring system can operate effectively in water depths of approximately 40 m (131 ft) to greater than 150 m (492 ft). At North Sea locations, connections have taken place at a buoy during 5.5 m (18.0 ft) sea states, and loading can be accomplished with sea states at 13 m (42.7ft). For the EPEBVs, El Paso Energy Bridge GOM has established a 5.0 m (16.4 ft) sea state maximum connection and 12.0 m (39.4 ft) sea state maximum discharge (unloading) design criteria.
>
> Based on GOM weather data, an EPEBV would be able to connect to the buoy more than 98 percent of the year.

It should be noted that despite proposing the same system for Port Dolphin as Gulf Gateway, there is a reduction of permissible operating conditions allowed for connecting the SRV to the STL buoys at the Port Dolphin site.

[3] Port Dolphin Deepwater Port Application, Docket No. 28532, Volume I, pages 63.
[4] Final Environmental Impact Statement of the El Paso Energy Bridge Gulf of Mexico LLC Deep Water Port Application page 2-26.

The obvious differentiator between the two terminals is the prevailing depth of water at the locations. This factor obviously was taken into account when Port Dolphin submitted its Deep Water Port Application, trading off a reduced operability window against the additional pipeline cost incurred if they sited the terminal further offshore in deeper water more suitable for the STL buoy.

The prevailing weather expected at the proposed Atlantic Alternative sites is, not surprisingly, worse than that expected for the Port Dolphin location of Tampa, Florida. This is evidenced by comparing the met-ocean buoys operated by the National Buoy Data Centre.[5] (refer to data from Station 44025 (33 nautical miles south of Islip, New York) against NDBC Station 42036 (106 nautical miles west-northwest of Tampa, Florida)).

In summary, assuming technical feasibility as discussed above, a shallow water SRV option placed in any of the Atlantic Alternative locations will have lower permissible environmental conditions for all operational phases in a location suffering from poorer year round weather. This will affect the reliability of gas deliveries from any proposed terminal using a shallow water STL installation.

3. Footprint of a Shallow Water STL Buoy Installation

In a typical application, there are eight (8) to ten (10) mooring lines attached to the STL buoy which are anchored to the sea floor using wire rope and chain segments. The design of the mooring system is site- and application-specific to ensure optimum performance and availability for the weather and other environmental conditions in a specific project area. These mooring lines keep the buoy stationary and the vessel on station.

The Port Dolphin Deepwater Port intends to separate the two STL buoys by some 3.1 miles as indicated in Figure 5 below. As can be seen in the pictorial representation the mooring system, due to the depth of water, is stretched out at an acute angle to the perpendicular, resulting in a substantial footprint required for this particular location. Recall that to deliver the same volume of gas as Broadwater proposes, three or more STL buoys would be required, rather than two. Thus, the footprint of an Atlantic location STL installation would be even greater.

Port Dolphin has indicated the following information concerning safety zones and precautionary areas around the proposed terminal[6]:

[4] Final Environmental Impact Statement of the El Paso Energy Bridge Gulf of Mexico LLC Deep Water Port Application page 2-26
[5] Buoy data can be retrieved at **www.ndbc.noaa.gov** .
[6] Port Dolphin Deepwater Port Application, Docket No. 28532, Volume I, pages 34-35.

Safety Zone

The Safety Zone is proposed to extend 1641-feet (500-meters) in addition to the length of the SRVs around each STL Buoy. Based on this formula, the Safety Zone radius will be approximately 2790-feet (850-meters) from the center location of each STL Buoy. (Slightly varying with the length of each SRV)

No Anchoring Area (Precautionary Area)

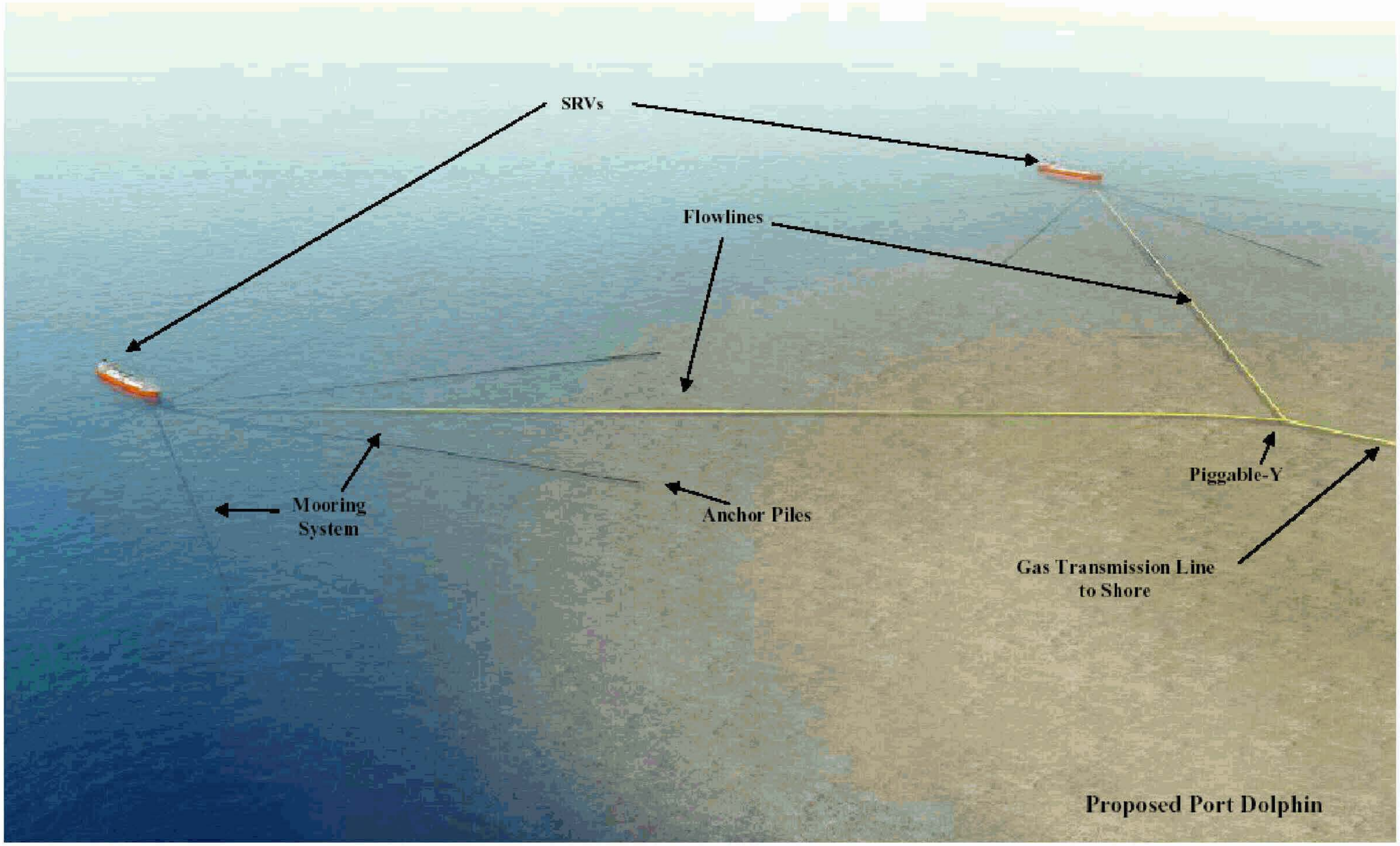
The No Anchoring Area is defined by avoidance of entanglement of any vessel's anchors with the STL Buoy mooring system. Accordingly, for Port Dolphin, the No Anchoring Area is proposed to be an area defined by the outer bounds of each STL Buoy anchor pile (plus 821-feet (250-meters)) and having a radius of 4925-feet (1500-meters). Additionally, an area between the STL Buoys defined by a 4925-feet (1500-meters) boundary extending on both sides of a straight line between the buoys shall be part of the No Anchoring Area. Separately, the No Anchoring Area for the pipeline route is proposed to be defined by a line parallel on both sides of the pipeline centerline with a distance of 656-feet (200-meters).

Area To Be Avoided

The proposed Area To Be Avoided is identical to the No Anchoring Area described for the mooring site. The proposed Area To Be Avoided does not include the gas transmission pipeline route. Aside from the areas described above, the proposed Port Dolphin does not require areas to be designated that would potentially impact other vessels' routing. Nor does the proposed port require special routing measures for SRVs arriving at the port.

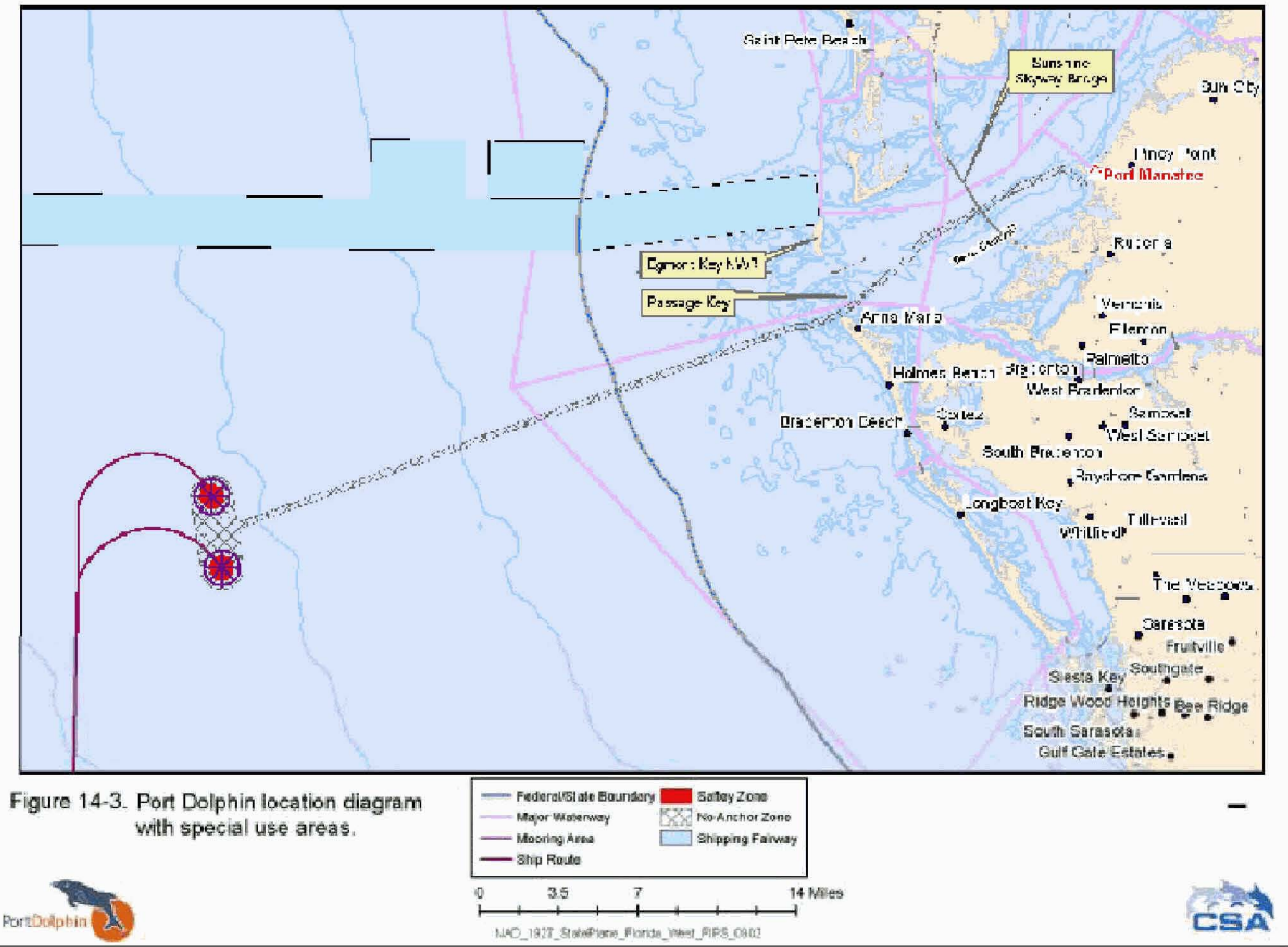
NYSDOS A-3

Figure 5 – Port Dolphin STL Buoy Deployment
Aerial View (to scale)



NYSDOS A-3

Figure 6
Port Dolphin Location Diagram with Special Use Areas



Because of its location offshore Tampa, it is uncertain as to what effect this would have on arriving and departing traffic in the region.

In identifying a potential site for deepwater LNG ports, each applicant is required to utilize the USCG siting criteria identified in 33 CFR § 148.720, which necessitates the consideration of how well the proposed site and each alternative site:

> "(a) Optimizes location to prevent or minimize detrimental environmental effects;
> (b) Minimizes the space needed for safe and efficient operation;

(c) Locates offshore components in areas with stable sea-bottom characteristics;
(d) Locates onshore components where stable foundations can be developed;
(e) Minimizes the potential for interference with its safe operation from existing offshore structures and activities;
(f) Minimizes the danger posed to safe navigation by surrounding water depths and currents;
(g) Avoids extensive dredging or removal of natural obstacles such as reefs;
(h) Minimizes the danger to the port, its components, and tankers calling at the port from storms, earthquakes, or other natural hazards;
(i) Maximizes the permitted use of existing work areas, facilities, and access routes; (emphasis added)
(j) Minimizes the environmental impact of temporary work areas, facilities, and access routes;
(k) Maximizes the distance between the port and its components and critical habitats including commercial and sport fisheries, threatened or endangered species habitats, wetlands, floodplains, coastal resources, marine management areas, and essential fish habitats;
(l) Minimizes the displacement of existing or potential mining, oil or gas production or transportation uses; (emphasis added)
(m) Takes advantage of areas already allocated for similar use, without overusing such areas;
(n) Avoids permanent interference with natural processes or features that are important to natural currents and wave patterns; and
(o) Avoids dredging in areas where sediments contain high levels of heavy metals, biocides, oil or other pollutants or hazardous materials and in areas designated as wetlands or other protected coastal resources."

If an SRV/STL concept was used in the shallow water as proposed in the Atlantic Alternative sites, and the same footprint was required as that being proposed by Port Dolphin, the various zones around the terminal, combined with the large spacing between the STL buoy locations, would encroach upon the passing Traffic Separation Schemes on either side of the location. This would appear to be contrary to the USCG's siting considerations identified in (i) and (l) above. The potential size of the Area To Be Avoided would cause passing traffic to deviate from their planned route in order to avoid the area around the terminal. This is a significant issue in view of impacts to the Traffic Separation Scheme and the volume to ship traffic entering and exiting the Port of New York/New Jersey, as discussed in NYSDOS A-1.

4. Hydraulic Performance of Shallow Water STL Buoy

It is unknown whether the riser from the STL buoy to the pipeline interconnect will restrict the gas throughput when compared to the natural catenary of the riser hoses in STL applications based in deeper, more conventional locations. APL reportedly is considering fitting some sort of tank unit between the vertical and horizontal portions of the riser unit. This is likely to add some restriction and reduction to the planned send-out. Broadwater is unaware of the extent to which this could impact the hydraulic performance of the buoy, but this issue must be clarified.

NYSDOS A-4

Preamble:

As part of its consistency review process for Broadwater's proposed LNG project in Long Island Sound (LIS), staff at the NYS Department of State (DOS) met with representatives of Broadwater to exchange information, address outstanding issues and examine potential alternatives to Broadwater's proposed project.

DOS initiated a dialogue with Broadwater about potential alternatives in the Atlantic Ocean, south of Long Island. Broadwater has provided DOS with materials regarding the alternatives. The following are open issues with these materials, as well as additional points for clarification regarding potential sites:

Nearshore Effects of Pipeline Construction

Request:

Broadwater has characterized the pipeline alternatives for the south shore as having a potentially higher environmental impact than the pipeline proposed for Long Island Sound. A matrix of engineering and environmental discriminators was developed by Broadwater which provides an analysis of potential concerns along the proposed DOS alternative pipeline routes. Appropriate route selection and utilization of advanced horizontal directional drilling and boring technologies would appear to avoid or minimize many of the impacts characterized by Broadwater. What detailed documentation can Broadwater provide that specifies why the use of advanced technologies would not avoid or minimize adverse impacts to natural and cultural resources and specifies the consequences of those remaining impacts?

Response:

The pipeline proposed for the Broadwater project would include a 30-inch-diameter natural gas pipeline that will deliver vaporized natural gas to the existing IGTS pipeline. It will be installed beneath the seafloor from the stationary mooring tower structure of the FSRU to an interconnection location at the existing 24-inch-diameter subsea section of the IGTS pipeline, approximately 22 miles (35 km) west of the proposed FSRU site. To stabilize and protect the operating components, sections of the pipeline will be covered with engineered back-fill material or spoil removed during the lowering operation. The construction of the preferred alternative is comprised of installation in one type of media and primarily uses one type of installation technique, the sub-sea plow on the seafloor of Long Island Sound. The preferred alternative does not involve the crossing of any land based features including beaches, wetlands, highways, neighborhoods or parks.

In contrast, the construction of an Atlantic Alternative would involve the crossing of all the features listed above both in water and on land and would involve multiple types of installation techniques for these different areas including horizontal directional drilling (HDD).

The sediment resuspension and redeposition modeling analysis performed as part of the FERC application indicated the suspended sediments associated with Broadwater's preferred installation technique will have a localized, short-term and minor impact on water quality during installation activities. In addition, modeling results demonstrate that neither increased sediment in the water column nor increased sediment deposition will result in a significant adverse impact on the water column or on existing ecosystems in Long Island Sound (see Broadwater Resource Report 2 – Water Quality and Resource Report 3 – Fish, Vegetation, and Wildlife). Beyond these minor and temporary impacts, no significant impacts are associated with pipeline construction.

In comparison, any construction associated with an Atlantic Alternative would likely employ the sub-sea plow for the portion of the pipeline construction needed offshore, but would include the addition of many different construction technologies that would have significantly greater adverse impacts on natural and cultural resources than the preferred alternative. Of particular concern are the construction methodologies for the south shore beaches. Construction in these nearshore areas would disrupt and likely destroy habitat and result in increased sediment loading in these shallow waters resulting in high turbidity and potential water quality impacts. The preferred alternative does not cross any sensitive habitat areas and will not cause these associated impacts

HDD and boring technologies are not a simple technology that can be applied to any type of crossing environment. HDD and boring technologies often have a high failure rate and their use is dependent on many factors including length of the required HDD installation, type of subsurface material and its cohesive and shear-strength properties, and the availability of work space in the project area for staging of equipment for operations.

.Studies have shown that shear failure around boreholes in HDD installations is common in sands which are present on the south shore beaches (Kennedy et al. 2006). Even though horizontal directional drilling has become commonplace, there are problems associated with high drilling mud pressures causing hydraulic fracture leakage of mud vertically out into the environment. This failure is due to tensile fracture and the filtercake that forms around the borehole during drilling operations. The failure is related to the soil response as mud pressures increase and include shear failure in the sand material and the cohesive filtercake layer. Studies have found significant discrepancies relative to limits currently used in the industry for application of HDD and that adjustments made in installation practices such as drilling mud pressures and borehole stress have been overly conservative and do not guarantee a successful installation with no adverse effects.

As shown in Figures 1 and 2 below, for workspace and installation techniques there are numerous features of an HDD that must be considered that can lead to significant adverse effects in the nearshore environment. These include:

- Greater short-term environmental damage to onshore set-up areas along with shore crossing zones created by required directional drills. Also, the potential impact to other near shore wetlands areas;
- Soils disposal issues are exacerbated with HDD and onshore burial operations can result in additional impacts;
- Any FERC required contingency plan will include a secondary HDD option for moving off the route centerline and a retry of the HDD, and continual retry until successful and a contingency plan for crossing the area in the event the HDD is unsuccessful using methods such as open cut. This further expands the corridor of disturbance and potential impacts along the shoreline if numerous HDD attempts are needed or an open cut becomes the crossing method (see FERC *Wetland and Waterbody Construction and Mitigation Procedures*, Section V. (B) (6) (d) 1/17/2003 Revision);
- HDD operations require a 24 hour installation activity which is likely to create a nearshore noise, lighting and visual impact to local communities and associated beach users;
- Dependent on offshore bottom topography, dredging in significant coastal habitat areas and areas containing submerged aquatic vegetation may be needed to ensure that sufficient soils are removed to allow near shore access of HDD marine support equipment and the workspace they need for the pipeline installation and pulling operations associated with the HDD;
- Nearshore jetting or dredging and bury operations will create increased localized sedimentation and on-bottom sediment build-up affecting existing benthic and marine resources since these areas are very shallow;
- Sufficient onshore acreage for workspace and support areas will be needed for each HDD operation and will likely be located in the sensitive beach areas; and
- A greater risk will exist for successfully performing HDD operations due to the more severe metocean conditions that exist in the Atlantic and the ability of support vessels to carry out their required tasks.

Aside from the impacts associated with HDD during installation, additional impacts from this approach may be realized in the beach areas due to the geotechnical and subsurface soil investigations that would need to be undertaken via a drill rig operation to assess the soil characteristics in the beach areas and the physical properties of the soils/sands present to determine if they can withstand the HDD operation and provide stability for the pipeline. Figure 3 is provided below to show this type of operation and to indicate the level of disturbance that will likely take place along the entire pipeline route that lies within the nearshore beach area, and at areas to the left and right of the centerline, that would need to be investigated as alternate routes in the event of an HDD failure.

Any HDD installation requires a contingency plan that must be approved as an alternative method in the event that the HDD fails. The contingency plan for any construction on the south shore Atlantic beaches would include an open cut trench in the event of HDD failure. An open cut trench presents a significant increase in adverse effects to significant coastal habitat areas, ranging from 0.19 to 5.37 miles, which contain nursery habitat for marine organisms and provide important food and shelter for marine life. Finding additional working space for an open cut trench would likely be very difficult, in view of the environmental sensitivity of the locations chosen and the population density.

In summary, the Broadwater project in Long Island Sound has significantly less adverse impacts to natural and cultural resources than a pipeline making landfall on the south shore of the Atlantic that would utilize HDD for nearshore crossings. HDD is not a technique with guaranteed success and its use could lead to significant impacts to beaches and coastal habitat during installation that are avoided with a pipeline constructed in Long Island Sound.

References:

1. LNG Working Group Project Presentations, February 2007.
2. Matthew J. Kennedy, Ian D. Moore, M.ASCE, and Graeme D. Skinner "Development of Tensile Hoop Stress during Horizontal Directional Drilling through Sand", *International Journal of Geomechanics.*, Volume 6, Issue 5, pp. 367-373 (September/October 2006)
3. Federal Energy Regulatory Commission, *Wetland and Waterbody Construction and Mitigation Procedures* Section V. (B) (6) (d) 1/17/2003 Revision accessed at http://ferc.gov/industries/gas/enviro/guidelines.asp
4. Williamson, A. I. and J. R. Jameson, "Design and Coating Selection Considerations for Successful Completion of a Horizontal Directionally Drilled (HDD) Crossing", Shaw Pipe Protection Limited and Entec Consulting Ltd. 1999.
5. "Guidelines for a Successful Directional Crossing Bid Package" Directional Crossing Contractors Association.
6. Shapiro and Associates, "Draft Supplemental EIS – Georgia Strait Crossing Project", September 24, 2003.

NYSDOS A-4

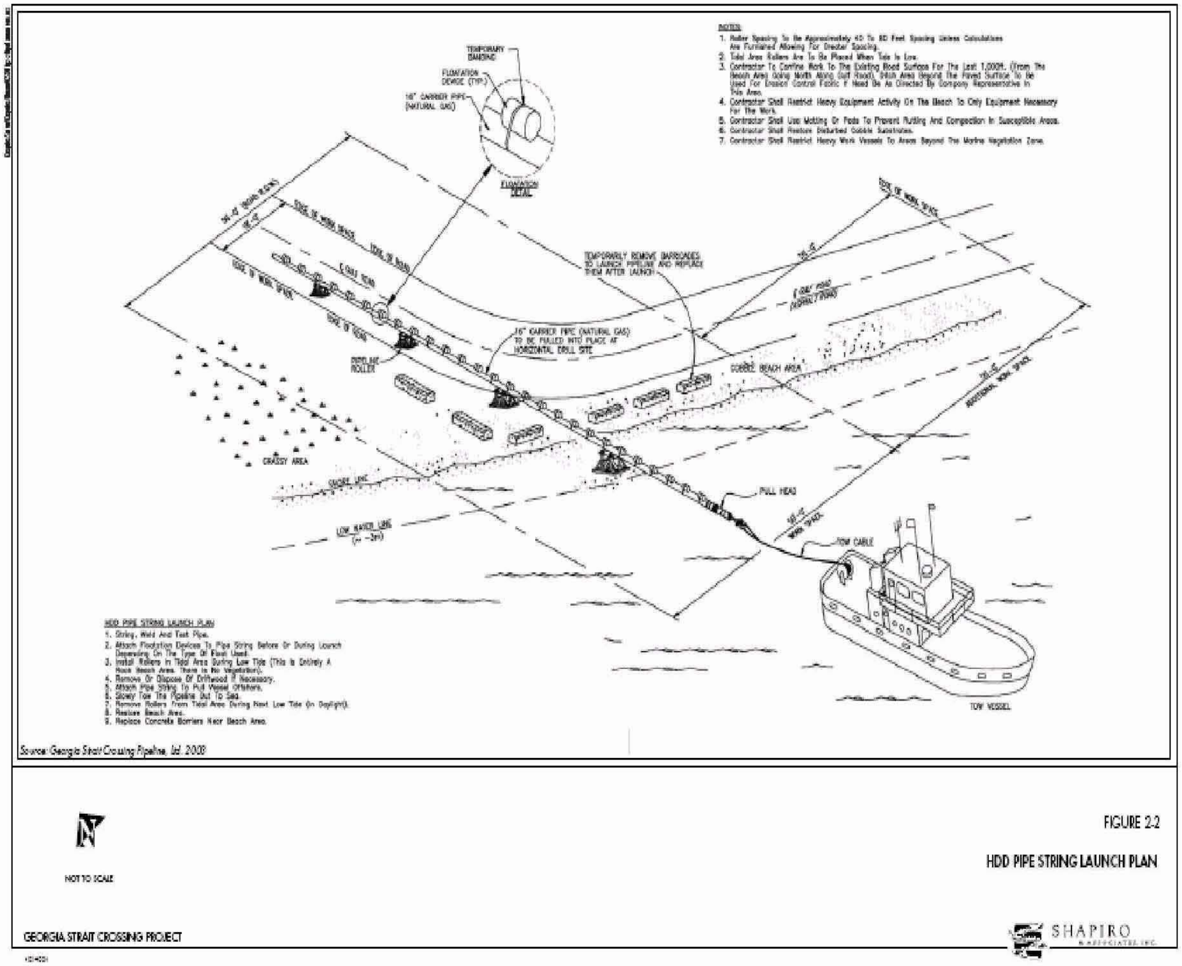


Figure 1: Example of HDD Pipe String Launch Plan

NYSDOS A-4

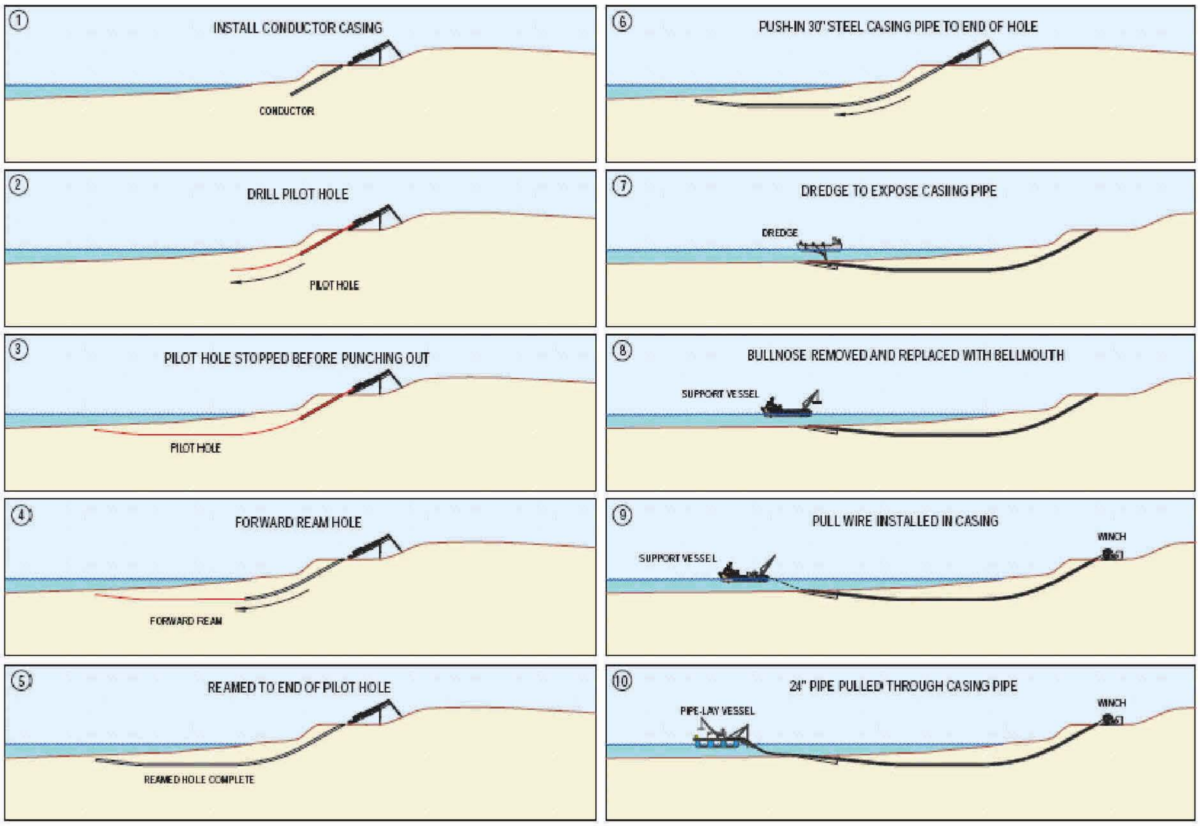


Figure 2: Example of HDD Installation Methodology

NYSDOS A-4

Figure 3: Example of geotechnical investigation in Southern California

NYSDOS A-5

Preamble:

As part of its consistency review process for Broadwater's proposed LNG project in Long Island Sound (LIS), staff at the NYS Department of State (DOS) met with representatives of Broadwater to exchange information, address outstanding issues and examine potential alternatives to Broadwater's proposed project.

DOS initiated a dialogue with Broadwater about potential alternatives in the Atlantic Ocean, south of Long Island. Broadwater has provided DOS with materials regarding the alternatives. The following are open issues with these materials, as well as additional points for clarification regarding potential sites:

Sloshing Concerns

Request:

Broadwater has stated that locating a facility, either SRV or FSRU in the Atlantic Ocean would expose the project to a more energetic ocean environment which could create a storage containment issue known as "sloshing" which could cause structural damage to the storage membrane. Given the SRV projects that are now in various stages of development, the industry appears confident with the ability to minimize sloshing effects onboard SRVs. What data or documentation can Broadwater provide that demonstrates that operational procedures and/or engineering solutions could not address this issue with FSRU's and SRV's?

Response:

(1) FSRUs and sloshing loads

The evaluation of loads associated with sloshing is a complex process requiring model testing and analysis. Figure 1, taken from the American Bureau of Shipping's (ABS's) *Guidance Notes of Strength Assessment of Membrane-Type LNG Containment Systems*, April 2006 (page 7) provides an illustration of the evaluation process.[1] There are a number of instances where sloshing loads have damaged LNG membrane containment systems.

Sloshing loads are dependent on metocean conditions, among a number of factors. In order to assess the loads, the typical procedure is to complete a rigorous statistical analysis of metocean conditions in the region (the combination of wind, wave and ocean currents, in combination). Subsequently, an analysis of the motion of the facility (in this

[1] This document can be obtained from the ABS website at www.eagle.org .

case the FSRU) is completed – first, the facility taken alone in response to these metocean conditions and second, the facility with an LNG carrier alongside (unloading scenario). These analyses will define the extreme motions, and response, of the floating facility and the LNG storage tanks within it.

For an LNG carrier, using ABS guidelines as an example, loads would be evaluated at the following levels – 10%, 70%, 80%, and 90% of LNG storage tank height.[2] If there is no restriction on tank level (as would be the case for the FSRU), then the ABS guidelines also suggest evaluation at 25%, 30%, 40%, 50%, and 60% of the tank height.

Broadwater has evaluated Long Island Sound sea states and ship motions and completed a high-level assessment of sloshing issues in Long Island Sound. This is discussed in Resource Report 13 of Broadwater's FERC. The relatively benign conditions in Long Island Sound suggest that sloshing issues can be addressed satisfactorily in detailed design.

With respect to locating a FSRU in the Atlantic Ocean, Broadwater has not completed a detailed statistical characterization of metocean conditions or the resultant motions of the facility, and therefore cannot comment in detail on the extent to which sloshing loads will impact facility design. All other things being equal, however, given the significantly greater wave conditions observed in the Atlantic locations, it is reasonable to assume that sloshing loads would in turn be greater than in Long Island Sound. Broadwater does not believe that analyses of the type described above, which would require significant expenditures of time and cost, are justified given the environmental issues associated with establishing a viable pipeline connection for the identified Atlantic sites, as discussed in Broadwater's FERC submission of June 20, 2007.

Perhaps more significantly, in the case of deploying a FSRU in the Atlantic Ocean, the LNG carriers that will call at the facility must be designed for sloshing loads as well, as they will be exposed to ocean conditions during unloading operations. In this respect, the vast majority of the LNG carriers in service have not been explicitly design for sloshing, since they serve onshore LNG terminals and typically berth in protected areas sheltered from open ocean conditions. These carriers typically transit either fully loaded with LNG or essentially empty.

As a result, the number of LNG carriers that would be available to make deliveries to an Atlantic FSRU would be significantly constrained. The LNG carriers that would be capable of offloading to an Atlantic FSRU would be the SRV-type vessels, which have been explicitly designed for sloshing loads. As presented at the May 2, 2007 meeting between Broadwater and NYSDOS, Broadwater believes that the number of SRV-type

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[2] American Bureau of Shipping, *Guidance Notes of Strength Assessment of Membrane-Type LNG Containment Systems*, April 2006, page 7.

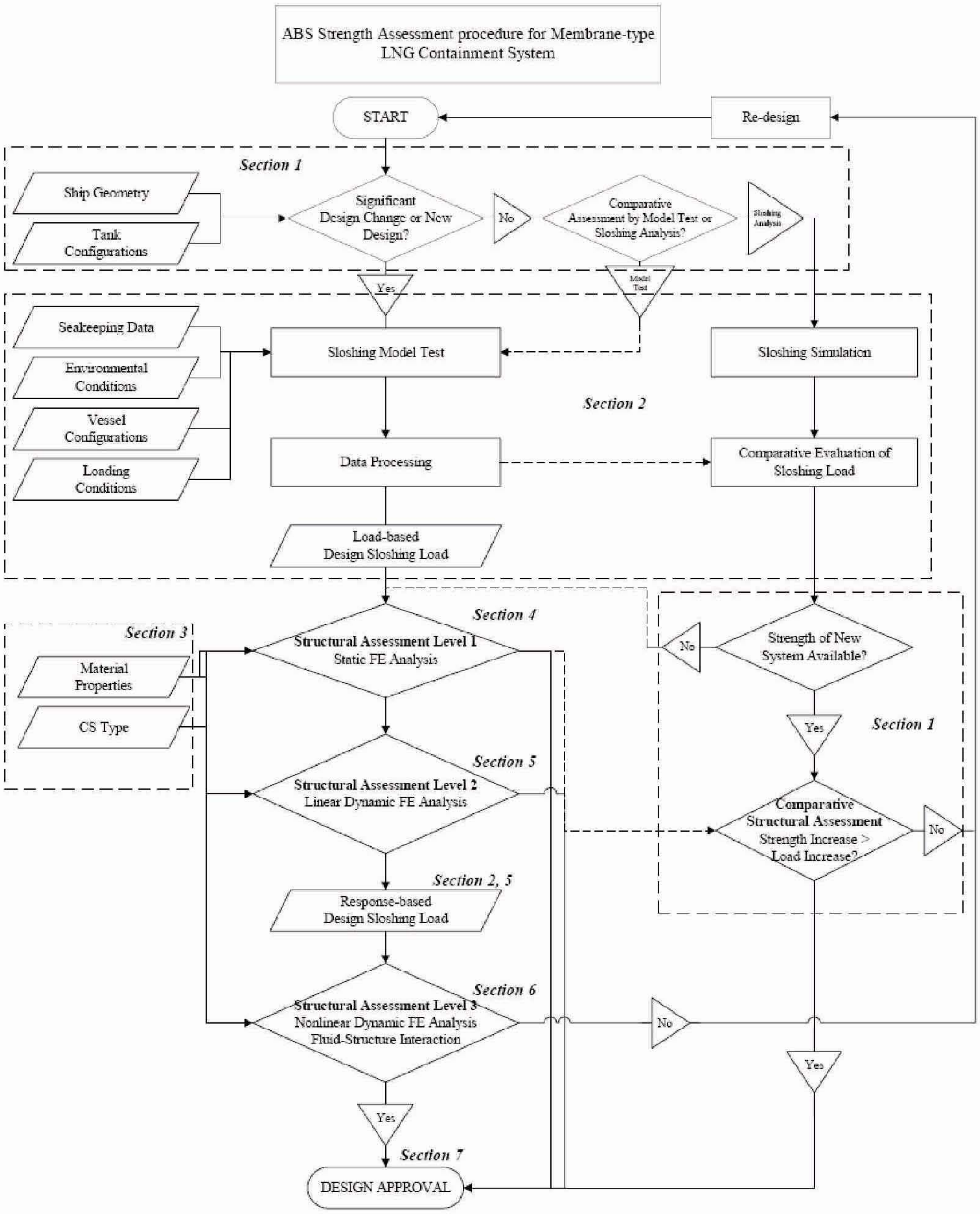
vessels either in operation, or on order for delivery by 2010, is a total of nine vessels. These vessels are either currently dedicated to other commercial uses, or will likely be in the future. Broadwater concludes that constraints associated with suitable LNG carrier availability for offshore loading operations in the Atlantic Ocean could significantly compromise Broadwater's ability to reliably deliver baseload natural gas supplies to the market.

(2) SRVs and Sloshing Loads

Broadwater has not indicated that sloshing loads cannot be accommodated in the design for a SRV. Detailed analysis of sloshing issues and appropriate reinforcement of the membrane storage system for partial loading scenarios is incorporated into the design of these vessels. Broadwater's past comments have always pertained to sloshing issues for the deployment of a FSRU in the Atlantic Ocean.

NYSDOS A-5

FIGURE 1
Flowchart of Sloshing Analysis and Strength Assessment of LNG Containment System



Source: American Bureau of Shipping, *Guidance Notes on Strength Assessment of Membrane-Type LNG Containment Systems*, page 3.

NYSDOS A-6

Preamble:

As part of its consistency review process for Broadwater's proposed LNG project in Long Island Sound (LIS), staff at the NYS Department of State (DOS) met with representatives of Broadwater to exchange information, address outstanding issues and examine potential alternatives to Broadwater's proposed project.

DOS initiated a dialogue with Broadwater about potential alternatives in the Atlantic Ocean, south of Long Island. Broadwater has provided DOS with materials regarding the alternatives. The following are open issues with these materials, as well as additional points for clarification regarding potential sites:

Connection with Transco Pipeline

Request:

Broadwater has stated that its target market is New York City, Long Island and Connecticut, and that a direct connection to Transco's Lower Bay Extension could effectively only serve markets in New Jersey and points further south. DOS is aware of at least one project proposed for offshore of New York Harbor that would put 1.15 bcfd into the Transco pipeline. Given that some upgrades would likely be needed on the Transco pipeline in New Jersey and the Keyspan Long Island distribution system, what additional analysis (e.g. analyses and statements from Transco, Keyspan LI, and Con Edison) can Broadwater provide to demonstrate that adequate gas to meet demand could not reach Long Island and New York City markets through use of the Transco system?

Response:

On August 15, 2007 Broadwater filed on the FERC docket (*Broadwater Energy LLC*, Docket No. CP06-54-000, and *Broadwater Pipeline LLC*, Docket Nos. CP06-55-000 & CP06-56-000) a letter in which Broadwater provided information to clarify additional questions raised by NYSDOS in its July 3, 2007 letter filed with the FERC. In the August 15, 2007 letter Broadwater included a discussion of its position on the concept of connecting a send-out pipeline from an Atlantic LNG terminal location with Transco's Long Beach Pipeline (i.e. Lower New York Bay Extension).

As Broadwater has advised in the past, Broadwater's 1 Bcf/d nominal send-out would not be able to reach Broadwater's intended New York City, Long Island and Connecticut markets from an Atlantic LNG terminal connected to Transco at a subsea tie-in off Long Beach. These are markets that are served by the Iroquois Gas Transmission System through ConEd Hunt's Point, NYC and KeySpan Northport and South Commack, Long Island meter stations. The Transco pipeline does not connect to those points. Broadwater's position has not changed.

NYSDOS A-6

Broadwater notes that the project proposed for offshore of New York Harbor that would put 1.15 bcfd into the Transco pipeline alluded to by the NYSDOS is in fact the Atlantic Sea Island Group LLC, Safe Harbor Energy project for which a Deep Water Port Act filing is currently before the United States Coast Guard.

Broadwater has reviewed Volume Three, Part One, Topic Report One, Attachment 1-1 "Market Area Access for Supply Sendout" of Safe Harbour's project application. The Safe Harbor Energy Attachment 1-1 comprises a letter report dated March 31, 2007 from Energy Market Decisions, Inc. and is attached to this response.The observations and conclusions in Attachment 1-1 are consistent with information Broadwater has presented to the NYSDOS regarding the realities of market access from an Atlantic LNG terminal connected to Transco at a subsea tie-in off Long Beach.

Energy Market Decisions state that its has completed a detailed analysis of the Transco system in New York and New Jersey including flow analyses evaluating multiple cases. It concludes that the existing Transco pipeline should be able to receive up to 1.15 bcfd from Safe Harbor Energy; however, flow reversal on Transco's Lower New York Bay Extension line would be needed to take away a large portion of Safe Harbor Energy's sendout and it is assumed that Transco's new compressor at Middlesex Co. New Jersey (part of the Leidy to Long Island expansion) would be re-piped for reverse flow. Access to markets connected by Transco in New York City (ConEd's Manhattan and Central Manhattan meter stations; and KeySpan's The Narrows (Brooklyn) meter stations), as well as Long Island (KeySpan's Long Beach meter station, Nassau County) would be constrained by customer's downstream systems and take away capability. The balance of Safe Harbor Energy's send out would need to be consumed in New Jersey and Pennsylvania, and points further south (upstream of Milltown, New Jersey) along Transco's long haul pipeline from the Gulf of Mexico. There would be reliance on backhaul arrangements on Transco for this to work in order to market significant displaced volumes on the Transco system.

Attachment 1-1

Market Area Access for Supply Sendout

EMDEC ENERGY MARKET DECISIONS, INC.
32 Alexander Road • P. O. Box 225 • Hopkinton, MA 01748-2425
Tel: 508-435-0400 • Fax: 508-435-5998 cjmeeske@earthlink.net

March 31, 2007

Mr. William VanHerwarde
Atlantic Sea Island Group, LLC
405 Lexington Avenue, Floor 26
New York, NY 10174

Dear Bill:

Subject: Safe Harbor Energy Project – Transco Market Area Access for Supply Sendout

As part of the Safe Harbor Energy Project, Atlantic Sea Island Group LLC proposes to construct a 12.8 mile pipeline system consisting of two 36-inch pipe segments to connect the Safe Harbor terminal to Transcontinental Gas Pipe Line Company's existing 26-inch Lower New York Bay Pipeline extending from Morgan, New Jersey to Long Beach, New York (the Transco Pipeline).

For gas flowing eastward from the connection point into the Transco Pipeline, Safe Harbor Energy can deliver all of the supply to satisfy market requirements up to the maximum takeaway capacity from the Long Beach Meter Station (located onshore in the Town of Long Beach), which is determined to be approximately 530 million cubic feet per day (MMcfd) based on the Transcontinental Gas Pipe Line Corporation FERC Gas Tariff and the system upgrades recently approved by FERC. To the extent that additional take away capacity can be developed downstream of the Long Beach Meter Station, the Transco Pipeline has design capability to deliver additional volumes eastward from Safe Harbor Energy to the Long Beach Meter Station.

For gas transported westward on the Transco Pipeline flowing from the connection point to the Milltown Regulator Station, the maximum capacity is estimated at 619 MMcfd. This estimate is based on detailed analysis of the Transco Pipeline system in the New York and New Jersey region where flow analyses evaluating multiple cases were performed. This flow is calculated assuming the existing 10,000 horsepower of compression at the Morgan Compressor Station is reconfigured for bi-directional flow. This reconfiguration can be performed by Transco under its FERC blanket certificate.

Table A shows the direction of gas flows from Milltown.

- All forward hauls to delivery points are limited to the shippers' existing firm capacity to downstream points. Any increases in deliverability to those downstream delivery points will require an increase in facilities.

- Backhauls or Deliveries by displacement to locations upstream of Milltown are limited only by lateral capacity and/or meter station capacity.

- Deliveries to and from Leidy flowing from Milltown through Compressor Station 505 will either be forward hauls or backhauls depending upon seasonal operations.

Conclusion

The Transco Pipeline should be capable of receiving up to approximately 1.15 billion cubic feet per day of natural gas at the proposed interconnection point and transporting those volumes through the existing pipeline infrastructure without requiring additional downstream facilities.

If you have any questions regarding the information above, please advise.

Sincerely yours,

C. John Meeske
President

EMDEC

Table A

TRANSCO MARKET AREA SYSTEM

Potential Available Market Access for Incremental Gas Supply at Milltown, NJ

NE in A & E lines to Linden Regulator Station	F
South in Narrows Lateral to Brooklyn	F
NE in A line into Northern NJ and Manhattan	F
Displacement back to Princeton Junction	D
North to Compressor Station 505 (Centerville):	D/F
East through Northern NJ & into Manhattan	F
West through PA to Leidy hub & Storage	D/F
SW to Trenton-Woodbury Lateral junction:	D
South into Philadelphia & Camden area	F
West to CS200 and any point upstream	D

F = Forward haul within customers' firm capacity

D = delivery by displacement

D/F = varies depending on storage activity

NYSDOS A-7

Preamble:

As part of its consistency review process for Broadwater's proposed LNG project in Long Island Sound (LIS), staff at the NYS Department of State (DOS) met with representatives of Broadwater to exchange information, address outstanding issues and examine potential alternatives to Broadwater's proposed project.

DOS initiated a dialogue with Broadwater about potential alternatives in the Atlantic Ocean, south of Long Island. Broadwater has provided DOS with materials regarding the alternatives. The following are open issues with these materials, as well as additional points for clarification regarding potential sites:

Technical Feasibility of an Atlantic Mooring Tower

Request:

In a June 20th, 2007 filing with FERC, Broadwater stated that it "cannot conclude that a yoke mooring system, which would need to consider a much more stringent design criteria than for Long Island Sound and which would certainly require a structure designed to withstand wave events greater than 10 meters in height, could be designed to withstand such conditions or would otherwise be technically feasible." What analysis can Broadwater provide to demonstrate that such a mooring system could not be engineered to withstand Atlantic Ocean wave and wind conditions? What data and analysis can Broadwater provide to show that alternative mooring systems, such as a turret mooring system, for an FSRU would not be feasible in the Atlantic?

Response:

Yoke Mooring System

Broadwater discussed some of the issues associated with the technical feasibility of an Atlantic mooring tower at a meeting on May 2, 2007. A copy of the presentation is provided in Broadwater's FERC filing dated August 15, 2007. At that time, it was noted that the design of the Yoke Mooring System within Long Island Sound was designed to withstand extreme wave events within Long Island Sound (wave heights up to 7.0 meters) as well as a Category 5 hurricane. Taken together, the overall design of the Yoke Mooring System is designed to withstand a storm event with a likelihood of less than 1 in 1000 years. By comparison, typical design values in the Gulf of Mexico for storm events consider a likelihood of 1 in 100 years. In the case of Long Island Sound, Broadwater's assessment of a 1:100 year significant wave height is 4.3 meters. More general aspects of the Yoke Mooring System design, from a safety perspective, are discussed in Resource Report 11, pages 11-22 to 11-26.

In its June 20, 2007 submission to FERC, Broadwater discussed the prevailing metocean conditions associated with alternate locations in the Atlantic. It was noted that within the last 15 years a wave event of 9.3 meters was recorded at the nearest NOAA metocean buoy (#44025). While Broadwater has not completed a detailed metocean study for the Atlantic locations suggested by NYSDOS, there is a very high likelihood that a statistical review of the data would indicate that significant wave heights in excess of 10 meters or more would be associated with a 1:100 year storm event. If a more conservative design criteria were chosen, such as that adopted for the design of the Yoke Mooring System in Long Island Sound, the extreme wave event for design purposes would be correspondingly greater.

Broadwater has not completed a detailed statistical characterization of the metocean conditions for specific sites in the Atlantic, owing to the threshold significant environmental issues related to the construction of the connecting pipeline from an Atlantic site. Broadwater will address the issue of a subsea connection to the Transco system in a separate response. Some of the issues associated with the Transco system are discussed in Broadwater's August 15, 2007 submission to FERC.

Broadwater has, however, reviewed the potential implications for the design of the Yoke Mooring System in response to significantly greater wave heights. These issues have not been evaluated in detail to determine their technical viability. Some of the more significant implications are:

- Designing for increased wave height would require a larger air gap for the lower deck of the mooring tower, which would require the overall tower height to increase.
- The YMS design requires that the ballast tank, which provides the force that holds the FSRU at a constant distance from the mooring tower, must always be unsupported by the sea. To accomplish this, a larger and taller Mooring Support Structure would need to be designed and mounted on the bow of the FSRU.
- In addition, because of the greater forces associated with significantly greater wave heights, the ballast tank itself must be enlarged to provide a larger restoring force, which would increase the amount of steel required in the Mooring Support Structure mounted on the bow of the FSRU.
- The increased requirements for the Mooring Support Structure would, in turn, require additional reinforcement of the bow of the FSRU.
- The YMS design must be capable of resisting overturning forces that would occur if a significant wave were to strike the facility broadside. The mooring system and particularly the mooring tower would require additional strengthening to resist these forces. This would imply a large footprint for the tower, as well as larger, deeper and more numerous piles to affix the tower to the sea bed. Broadwater is unaware of any

geotechnical investigation to determine whether seabed conditions could be capable of sustaining these requirements, or the related environmental impacts.

In summary, the significantly harsher metocean conditions in the Atlantic Ocean would have major adverse technical and economic consequences for the design of the Yoke Mooring System.

Turret Moored FSRU

Broadwater assessed the feasibility of a turret-moored FSRU in its consideration of offshore alternatives. This is discussed in Resource Report 10, Section 10.5.2 (Offshore LNG Terminal Concept Alternatives). Table 10-8 provides a summary comparison of offshore terminal concepts, and explicitly considers the use of a turret-moored FSRU in the Atlantic Ocean. The key differences were:

A yoke-moored FSRU has a modest seabed footprint, compared to the anchor and mooring spread required for a turret moored FSRU, and therefore less environmental impact. For example, the anchor spread diameter for Northeast Gateway is 1460 meters (0.91 mile) and has eight mooring lines and anchors.[1]

A further key consideration would be the difference between the size and operation of the FSRU using a turret loading system, compared to the current applications of this technology. The FSRU's storage capacity is 350,000 m^3 of LNG, compared to the smaller SRV applications currently in use. The current generation of SRV has a onboard storage capacity of 138,000 m^3 of LNG; the next generation of SRV will have a capacity of 150,900 m^3.[2] Thus, the Broadwater FSRU is more than twice the capacity of any SRV currently in operation or contemplated in the near future.

In addition, LNG carriers will berth at the Broadwater FSRU during unloading operations. The maximum contemplated size of LNG carrier planned during the life of the project is 250,000 m^3. While berthed, the mooring system must be capable of supporting both the loads associated with the FSRU and the LNG carrier. Broadwater has not conducted a detailed review of the design implications for a turret mooring system for the FSRU and associated operations, or the related environmental implications of such a design.

As discussed above, a detailed analysis would also require characterization of the metocean conditions upon which an assessment of the loads on the mooring system would be made. Broadwater has not completed a detailed statistical characterization of

[1] Northeast Gateway Final Environmental Impact Statement, October, 2006, page 2-4.
[2] Northeast Gateway Final Environmental Impact Statement, page 2-1.

the metocean conditions for specific sites in the Atlantic, owing to the threshold significant environmental issues related to the construction of the connecting pipeline from an Atlantic site.

Finally, Broadwater submits that a turret moored FSRU would have the same challenges and issues with respect to reliability of operation and sloshing loads that a yoke moored FSRU would have. These issues are discussed in other responses to NYSDOS' identification of issues.

NYSDOS A-8

Preamble:

As part of its consistency review process for Broadwater's proposed LNG project in Long Island Sound (LIS), staff at the NYS Department of State (DOS) met with representatives of Broadwater to exchange information, address outstanding issues and examine potential alternatives to Broadwater's proposed project.

DOS initiated a dialogue with Broadwater about potential alternatives in the Atlantic Ocean, south of Long Island. Broadwater has provided DOS with materials regarding the alternatives. The following are open issues with these materials, as well as additional points for clarification regarding potential sites:

Gravity Based Systems

Request:

Broadwater has provided general information about reasons for rejecting the use of Gravity Based Systems (GBS), due to issues associated with construction and transportation of the tanks and due to impacts to the benthic environment. Please provide more detailed documentation of specific environmental impacts from a GBS. What data and analysis can Broadwater provide demonstrating that an Atlantic site cannot be identified where these environmental impacts would be minimized?

Response:

A discussion of some of the considerations associated with siting a GBS can be found in a briefing paper prepared by the Center for Energy Economics (CEE) at the University of Texas at Austin entitled *Offshore LNG Receiving Terminals* dated November 7, 2006.[1]

A general discussion on the use of fixed structures for LNG receiving terminals can be found on page 25 of this document:

> "Three types of fixed structures are presented here – gravity based structures (GBS), offshore platforms and artificial offshore islands. To date none has been used for LNG service in the US though most of the components have been used successfully in other applications. Fixed facilities are typically considered for shallow water locations, with water depths limited to at most 100 ft due to limitations at their construction sites. The fixed structures must also be located in areas where the seafloor

[1] Center for Energy Economics – document available at
http://www.beg.utexas.edu/energyecon/documents/CEE_offshore_LNG.pdf

> is relatively level or gently sloping, lacking in geologic hazards, and with satisfactory sediments to support the foundation and weight of the structure."

While the briefing paper cites a maximum depth of 100 feet (30 meters), the economic cost of construction of a GBS is directly dependent on water depth. In Resource Report 10, Table 10-8 (Comparison of Offshore LNG Terminal Concepts)[2], it is indicated that the preferred water depth is approximately 15 meters (49 feet), which is the minimum water depth requirement for LNG carrier operations. For example, Shell's Gulf Landing LNG terminal proposal, situated in the Gulf of Mexico, is in a water depth of 55 feet (about 17 meters).

Due to the drop-off in the bathymetry on the Atlantic coast of Long Island, previous evaluations suggested that, assuming a feasible seabed location could be found, a GBS would have to be located much closer to shore (potentially as close as 1 nautical mile) to provide the preferred water depth.[3] In order to minimize visual and nearshore impacts, GBS alternatives in the Atlantic were not considered further. In order to ascertain a suitable location, a detailed geotechnical investigation would be required to determine whether the seabed is capable of withstanding the on-bottom weight transfer of the facility and also the transfer of loads associated with extreme wave events impacting the facility.

Resource Report 10, Table 10-8 also describes the footprint associated with a comparable GBS facility, which is estimated to be 40,000 m^2 plus an additional 28,400 m^2 around the perimeter for scour protection, for a facility located in Long Island Sound. The footprint could be larger if offshore Atlantic metocean conditions were explicitly taken into account. Therefore, use of a GBS would remove 68,400 m^2 (approximately 17 acres) of seabed from the surrounding environment. This seabed impact would be equal or greater regardless of the site chosen. This seabed footprint compares to 1,225 m^2 associated with the Yoke Mooring System for the Broadwater proposal.

In addition, the operability for a GBS in Atlantic conditions would be worse than either of the FSRU or SRV alternatives. A FSRU has freedom to weathervane and always face into the prevailing weather. A GBS would be placed in a fixed position on the seabed and would be unable to adjust to the prevailing weather conditions, therefore berthing conditions would be more restrictive.

[2] Broadwater Energy LLC FERC Application, Volume V, page 10-27.
[3] This issue is documented in Resource Report 10, Table 10-8, page 10-28, and Section 10.6.1 (Regional Screening Criteria), page 10-33.

In addition to the footprint of the GBS, there would be the related environmental impacts associated with the construction facility. As described in the CEE briefing paper:[4]

> "GBS fabrication and installation of the majority of the LNG tanks and regasification equipment would be performed at a shore-based facility. The GBS needs to be constructed inside an unflooded dry-dock and the operating equipment installed and tested. The dock would then be flooded in order to float the GBS to the installation site. The GBS would then be towed to the terminal site and fixed to the seabed. The installation procedures generally involve gradually lowering each GBS to the seafloor using ballast tanks around the perimeter of the GBS. The skirts on the bottom of the GBS would require jetting way the softer sediments so that the GBS skirts can be drawn into the seafloor to firmly anchor the GBS at the site. Once the GBS is in place, the remaining equipment would be installed and connections made between the GBS quarters platform and offloading platforms."

Due to the size of the facility, a new dedicated graving yard would be required. While the yard sizing will vary depending on the chosen construction method, Broadwater estimates that at a minimum, the excavation of approximately 70,000 m^2 to the required depth to float the completed structure. The requirement for a graving yard and associated environmental impact would occur regardless of the ultimate location of the GBS around Long Island. Potential construction sites could include the U.S. East Coast or the Gulf of Mexico. By comparison, the Broadwater FSRU can be constructed in a conventional shipyard using established LNG carrier construction techniques, thereby avoiding any incremental environmental impact.

In summary, Broadwater evaluated a GBS as a potential alternative to its proposed FSRU and concluded that a FSRU would provide better operability with reduced environmental impact. The environmental impact associated with the seabed footprint of the facility and with the associated construction of a graving yard would be greater than that for the Broadwater proposal regardless of location in Long Island Sound or in the Atlantic Ocean.

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[4] Center for Energy Economics, *Offshore LNG Receiving Terminals*, page 28.

NYSDOS A-9

Preamble:

As part of its consistency review process for Broadwater's proposed LNG project in Long Island Sound (LIS), staff at the NYS Department of State (DOS) met with representatives of Broadwater to exchange information, address outstanding issues and examine potential alternatives to Broadwater's proposed project.

DOS initiated a dialogue with Broadwater about potential alternatives in the Atlantic Ocean, south of Long Island. Broadwater has provided DOS with materials regarding the alternatives. The following are open issues with these materials, as well as additional points for clarification regarding potential sites:

Viability of Brookhaven Lateral

Request:

Broadwater representatives have verbally expressed to DOS that the proposed S3 alternative would be infeasible because it relies on the proposed Brookhaven Lateral Pipeline to connect it with the South Commack terminus of the Iroquois Pipeline. According to Broadwater, the Brookhaven project is "dead", due to siting difficulties. What documentation can Broadwater provide that demonstrates that the Brookhaven Lateral will not be pursued further (i.e. a letter from Iroquois Pipeline)?

Response:

The Brookhaven Lateral Project commenced the NEPA pre-file process on September 5, 2005. Attached are recent monthly progress reports filed by Iroquois Pipeline covering the period January to June 2007. In recent months there has been little or no progress in advancing the project, as indicated in the progress reports.

On July 23, 2007, Iroquois wrote to FERC and asked that activities associated with the NEPA pre-file process be placed in abeyance due to an inability to progress the project.

> "In light of these events, it has been difficult for LIPA and Iroquois to make progress on this matter over the last several months. As such, and in order to preserve the Commission's regulatory resources, Iroquois hereby moves to hold proceedings in the NEPA pre-filing process in abeyance (including the filing of additional monthly status reports), without prejudice to Iroquois' right to resume activities relating to the Brookhaven Project in the future should conditions warrant."

NYSDOS A-9

Also attached is a Newsday article dated October 19, 2006, quoting LIPA executives who desire to explore alternative routes.

Pipeline heading for detour

BY MARK HARRINGTON
Newsday Staff Writer

October 19, 2006

The Long Island Power Authority has backed off a plan to thread a massive natural-gas pipeline through residential neighborhoods, near schools and in environmentally sensitive areas from Commack to Yaphank, officials pledged at the utility's trustees meeting yesterday.

"We are going to change the route and accommodate your concerns," LIPA Chairman Richard Kessel told attendees at the meeting at its Uniondale headquarters.

Since learning of the plan this summer, residents, school officials and legislators have been up in arms about the intended placement of the 20-mile, $65-million Iroquois pipeline, which is to feed the planned Caithness power plant in Yaphank.

In addition to fears about gas explosions, some have complained of spotty notification of public meetings and plans. The Federal Energy Regulatory Commission is to meet with residents at Hauppauge High School on Wednesday.

With the residential pipeline off the table, LIPA Chief of Staff Ed Grilli said talks are under way with the state Department of Transportation to revisit a previous plan to place the 24-inch natural gas pipeline along a service road on the Long Island Expressway. That plan had been scrapped because of state concerns about losing federal tax credits, because of restrictions by the Federal Highway Authority, which limits utility use to communications lines. Kessel said the expressway route is just one alternative to the residential plan.

Suffolk Legis. John Kennedy (R-Nesconset), who attended the meeting and addressed the trustees, said he was pleased that LIPA offered to address his constituents' concerns, but emphasized that the battle isn't over. He and residents are to meet with LIPA next week to discuss alternative routes.

Kennedy, who voiced support for Caithness, said he still plans to insist that LIPA not sign a power purchase agreement with the pipeline's owner, Iroquois Pipeline Operating Co., until the route issue is fully resolved. And he said he plans to insist that LIPA reconsider other pipeline plans to fuel Caithness rather than just Iroquois.

Grilli acknowledged that a KeySpan-owned pipeline already in place ends just 5,000 feet from the proposed Caithness site in Yaphank. But he said current demands on the pipeline from KeySpan customers prevent KeySpan from guaranteeing the amount of gas Caithness would need to operate the plant at full capacity.

Jamie Mare, a Lake Ronkomkoma resident whose home is within 50 feet of the proposed pipeline, called LIPA's about-face "a very shocking turn of events," which she welcomed.

"I look forward to seeing proof of that," said Mare, noting that the pipeline originally was planned for the expressway. "They could turn around and change it again and say, 'Sorry.'"

Paul Borowski, a Hauppauge resident who has led opposition to the pipeline's placement, said he was "optimistic" about Kessel's pledge. "But as we know, this process is very involved, and until we have a definite alternative on paper, we're still handing out fliers."

Iroquois
GAS TRANSMISSION SYSTEM
IROQUOIS PIPELINE OPERATING COMPANY OPERATOR

ONE CORPORATE DRIVE, SUITE 600
SHELTON, CT 06484-6211
TEL: (203) 925-7200
FAX: (203) 929-9501

February 16, 2007

The Honorable Magalie R. Salas
Secretary
Federal Energy Regulatory Commission
888 First Street, N.E.
Washington, D.C. 20426

RE: *Iroquois Gas Transmission System, L.P.*
Docket No. PF05-16

Dear Secretary Salas:

By letter dated September 5, 2005, issued in the captioned proceeding, the Director, Office of Energy Projects of the Federal Energy Regulatory Commission ("Commission"), approved the request of Iroquois Gas Transmission System, L.P. ("Iroquois") to participate in the NEPA pre-filing process for its Brookhaven Lateral Project ("Brookhaven Project"). In accordance with Section 157.21(f) (6) of the Commission's regulations, Iroquois hereby provides the attached monthly status report detailing its activities for the Brookhaven Project through January 2007.

Since its prior status report, Iroquois has continued discussions with the Long Island Power Company ("LIPA") on a binding precedent agreement for service on the Brookhaven Project. Iroquois will continue to update the Commission on the status of those negotiations. Any questions or comments about this matter should be directed to the undersigned at (203) 925-7228.

Sincerely,

/s/ Paul W. Diehl

Paul W. Diehl
Senior Attorney
IROQUOIS GAS TRANSMISSION SYSTEM, L.P.

Enclosure

cc: Paul Friedman, FERC Staff (w/enclosure)
Kellie Doherty, ERM (w/enclosure)

IROQUOIS GAS TRANSMISSION SYSTEM, LP
BROOKHAVEN LATERAL
DOCKET NO. PF05-16-000
FERC Pre-Filing Process Monthly Progress Report

Period Ending: January 31, 2007 Report #1

Background

Iroquois Gas Transmission System LP is proposing to construct the Brookhaven Lateral Project in the towns of Smithtown, Islip and Brookhaven located in Suffolk County, Long Island, New York. The Brookhaven Project involves the construction of approximately 21 miles of lateral pipeline and associated facilities to supply natural gas to a proposed new 350 megawatt power plant in Brookhaven, New York. This non-jurisdictional facility is being developed by Caithness Long Island, LLC.

This monthly progress report will serve to update and inform the Federal Energy Regulatory Commission (FERC) of project activities, progress and any changes that may occur.

Summary of Progress (Through January 2007)

1. Negotiations continue with LIPA to refine PA.

2. ElectroScience continues to refine interference and cohabitation of high voltage electric lines and proposed natural gas line.

Anticipated Progress/Work to be Done-February 2007

1. Continue to work with ElectroScience towards a determination of mitigation solutions for cohabitation.
2. Review preliminary Design Basis Manual with Iroquois Engineering staff.
3. Refine Alignment sheets.
4. Continue environmental review and archeological review.

Overall Project Progress and Target

To date, Iroquois continues to refine FERC Resource Reports and preliminary engineering design.

Submission Contents

Iroquois
GAS TRANSMISSION SYSTEM
IROQUOIS PIPELINE OPERATING COMPANY
OPERATOR

ONE CORPORATE DRIVE, SUITE 600
SHELTON, CT 06484-6211
TEL: (203) 925-7200
FAX: (203) 929-9501

March 9, 2007

The Honorable Magalie R. Salas
Secretary
Federal Energy Regulatory Commission
888 First Street, N.E.
Washington, D.C. 20426

RE: *Iroquois Gas Transmission System, L.P.*
Docket No. PF05-16

Dear Secretary Salas:

By letter dated September 5, 2005, issued in the captioned proceeding, the Director, Office of Energy Projects of the Federal Energy Regulatory Commission ("Commission"), approved the request of Iroquois Gas Transmission System, L.P. ("Iroquois") to participate in the NEPA pre-filing process for its Brookhaven Lateral Project ("Brookhaven Project"). In accordance with Section 157.21(f) (6) of the Commission's regulations, Iroquois hereby provides the attached monthly status report detailing its activities for the Brookhaven Project through February 2007.

Any questions or comments about this matter should be directed to the undersigned at (203) 925-7228.

Sincerely,

/s/ Paul W. Diehl

Paul W. Diehl
Senior Attorney
IROQUOIS GAS TRANSMISSION SYSTEM, L.P.

Enclosure

cc: Paul Friedman, FERC Staff (w/enclosure)
Kellie Doherty, ERM (w/enclosure)

IROQUOIS GAS TRANSMISSION SYSTEM, LP
BROOKHAVEN LATERAL
DOCKET NO. PF05-16-000
FERC Pre-Filing Process Monthly Progress Report

Period Ending: February 28, 2007 Report #1

Background

Iroquois Gas Transmission System LP is proposing to construct the Brookhaven Lateral Project in the towns of Smithtown, Islip and Brookhaven located in Suffolk County, Long Island, New York. The Brookhaven Project involves the construction of approximately 21 miles of lateral pipeline and associated facilities to supply natural gas to a proposed new 350 megawatt power plant in Brookhaven, New York. This non-jurisdictional facility is being developed by Caithness Long Island, LLC.

This monthly progress report will serve to update and inform the Federal Energy Regulatory Commission (FERC) of project activities, progress and any changes that may occur.

Summary of Progress (Through February 2007)

1. Negotiations continue with LIPA to refine PA.
2. ElectroScience continues to refine interference and cohabitation of high voltage electric lines and proposed natural gas line.

Anticipated Progress/Work to be Done-March 2007

1. Continue to work with ElectroScience towards a determination of mitigation solutions for cohabitation.
2. Review preliminary Design Basis Manual with Iroquois Engineering staff.
3. Refine Alignment sheets.
4. Continue environmental review and archeological review.
5. Attend meeting on Long Island on March 22, 2007.

Overall Project Progress and Target

To date, Iroquois continues to refine FERC Resource Reports and preliminary engineering design.

Submission Contents

Iroquois
GAS TRANSMISSION SYSTEM
IROQUOIS PIPELINE OPERATING COMPANY
OPERATOR

ONE CORPORATE DRIVE, SUITE 600
SHELTON, CT 06484-6211
TEL: (203) 925-7200
FAX: (203) 929-9501

April 13, 2007

The Honorable Kimberly D. Bose
Secretary
Federal Energy Regulatory Commission
888 First Street, N.E.
Washington, D.C. 20426

RE: *Iroquois Gas Transmission System, L.P.*
Docket No. PF05-16

Dear Secretary Bose:

By letter dated September 5, 2005, issued in the captioned proceeding, the Director, Office of Energy Projects of the Federal Energy Regulatory Commission ("Commission"), approved the request of Iroquois Gas Transmission System, L.P. ("Iroquois") to participate in the NEPA pre-filing process for its Brookhaven Lateral Project ("Brookhaven Project"). In accordance with Section 157.21(f) (6) of the Commission's regulations, Iroquois hereby provides the attached monthly status report detailing its activities for the Brookhaven Project through March 2007.

Any questions or comments about this matter should be directed to the undersigned at (203) 925-7228.

Sincerely,

/s/ Paul W. Diehl

Paul W. Diehl
Senior Attorney
IROQUOIS GAS TRANSMISSION SYSTEM, L.P.

Enclosure

cc: Paul Friedman, FERC Staff (w/enclosure)
Kellie Doherty, ERM (w/enclosure)

IROQUOIS GAS TRANSMISSION SYSTEM, LP
BROOKHAVEN LATERAL
DOCKET NO. PF05-16-000
FERC Pre-Filing Process Monthly Progress Report

Period Ending: March 31, 2007 Report #1

Background

Iroquois Gas Transmission System LP is proposing to construct the Brookhaven Lateral Project in the towns of Smithtown, Islip and Brookhaven located in Suffolk County, Long Island, New York. The Brookhaven Project involves the construction of approximately 21 miles of lateral pipeline and associated facilities to supply natural gas to a proposed new 350 megawatt power plant in Brookhaven, New York. This non-jurisdictional facility is being developed by Caithness Long Island, LLC.

This monthly progress report will serve to update and inform the Federal Energy Regulatory Commission (FERC) of project activities, progress and any changes that may occur.

Summary of Progress (Through March 2007)

1. ElectroScience continues to refine interference and cohabitation of high voltage electric lines and proposed natural gas line.
2. Attended March 22, 2007 meeting on Long Island to discuss status of Project with various stakeholders.

Anticipated Progress/Work to be Done-April 2007

1. Prepare to continue to work with ElectroScience towards a determination of mitigation solutions for cohabitation.
2. Review preliminary Design Basis Manual with Iroquois Engineering staff.
3. Refine Alignment sheets.
4. Prepare to continue environmental review and archeological review.
5. Continue discussions with LIPA on potential contractual arrangements.

Overall Project Progress and Target

To date, Iroquois continues to refine FERC Resource Reports and preliminary engineering design.

[illegible] Docket# PF05-16-000

Submission Contents

Iroquois
GAS TRANSMISSION SYSTEM
IROQUOIS PIPELINE OPERATING COMPANY
OPERATOR

ONE CORPORATE DRIVE, SUITE 600
SHELTON, CT 06484-6211
TEL: (203) 925-7200
FAX: (203) 929-9501

May 11, 2007

The Honorable Kimberly D. Bose
Secretary
Federal Energy Regulatory Commission
888 First Street, N.E.
Washington, D.C. 20426

RE: *Iroquois Gas Transmission System, L.P.*
Docket No. PF05-16

Dear Secretary Bose:

By letter dated September 5, 2005, issued in the captioned proceeding, the Director, Office of Energy Projects of the Federal Energy Regulatory Commission ("Commission"), approved the request of Iroquois Gas Transmission System, L.P. ("Iroquois") to participate in the NEPA pre-filing process for its Brookhaven Lateral Project ("Brookhaven Project"). In accordance with Section 157.21(f) (6) of the Commission's regulations, Iroquois hereby advises the Commission that there are no changes to the status report submitted on April 13, 2007.

Any questions or comments about this matter should be directed to the undersigned at (203) 925-7228.

Sincerely,

/s/ Paul W. Diehl

Paul W. Diehl
Senior Attorney
IROQUOIS GAS TRANSMISSION SYSTEM, L.P.

cc: Paul Friedman, FERC Staff
Kellie Doherty, ERM

Submission Contents

Iroquois submits there are no changes to the Brookhaven status report submitted on April 13, 2007.

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OPERATOR

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June 15, 2007

The Honorable Kimberly D. Bose
Secretary
Federal Energy Regulatory Commission
888 First Street, N.E.
Washington, D.C. 20426

RE: *Iroquois Gas Transmission System, L.P.*
Docket No. PF05-16

Dear Secretary Bose:

By letter dated September 5, 2005, issued in the captioned proceeding, the Director, Office of Energy Projects of the Federal Energy Regulatory Commission ("Commission"), approved the request of Iroquois Gas Transmission System, L.P. ("Iroquois") to participate in the NEPA pre-filing process for its Brookhaven Lateral Project ("Brookhaven Project"). In accordance with Section 157.21(f) (6) of the Commission's regulations, Iroquois hereby advises the Commission that there are no changes to the status report submitted on May 11, 2007.

Any questions or comments about this matter should be directed to the undersigned at (203) 925-7228.

Sincerely,

/s/ Paul W. Diehl

Paul W. Diehl
Senior Attorney
IROQUOIS GAS TRANSMISSION SYSTEM, L.P.

cc: Paul Friedman, FERC Staff
Kellie Doherty, ERM

Submission Contents

Iroquois advises that there are no changes to the PF05-16 status report submitted on May 11, 2007.

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Iroquois Pipeline Operating Company
Operator

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FAX: (203) 929-9501

July 23, 2007

The Honorable Kimberly D. Bose
Secretary
Federal Energy Regulatory Commission
888 First Street, N.E.
Washington, D.C. 20426

RE: *Iroquois Gas Transmission System, L.P.*
Docket No. PF05-16
STATUS REPORT

Dear Secretary Bose:

By letter dated September 5, 2005, issued in the captioned proceeding, the Director, Office of Energy Projects of the Federal Energy Regulatory Commission ("Commission"), approved the request of Iroquois Gas Transmission System, L.P. ("Iroquois") to participate in the NEPA pre-filing process for its Brookhaven Lateral Project ("Brookhaven Project"). Since that time, Iroquois has been attempting to resolve all issues to enable to file a certificate application with the Commission, and has been filing monthly status reports pursuant to Section 157.21(f)(6) of the Commission's regulations.

As reflected more fully in those status reports, among the outstanding issues has been the development of an appropriate route for the proposed pipeline, as well as completion of negotiations with the Long Island Power Authority ("LIPA") on the terms and conditions of a precedent agreement for service on the Brookhaven Project. For example, Iroquois and LIPA have not been able to agree on whether the pipeline should be routed along the LIPA right of way, or along the service road of the Long Island Expressway.

Since January 2007, LIPA has been undergoing significant personnel and structural changes, including the appointment of a new Chairman and the retirement of key Officers who were intimately involved in discussions regarding the Brookhaven Project.

In light of these events, it has been difficult for LIPA and Iroquois to make progress on this matter over the last several months. As such, and in order to preserve the Commission's regulatory resources, Iroquois hereby moves to, hold proceedings in the NEPA pre-filing process in abeyance (including the filing of additional monthly status reports), without prejudice to Iroquois' right to resume activities relating to the Brookhaven Project in the future should conditions warrant. Iroquois appreciates the efforts that the Commission Staff and its third party contractor have undertaken throughout the pre-filing review process, and holding the instant proceedings in abeyance as proposed herein would maximize the ability of the parties to take advantage of those efforts in the future. Iroquois will provide a further update on the status of the Project on or about September 15, 2007.

Any questions or comments about this matter should be directed to the undersigned at (203) 925-7228.

Sincerely,

/s/ Paul W. Diehl

Paul W. Diehl
Senior Attorney
IROQUOIS GAS TRANSMISSION SYSTEM, L.P.

cc: Paul Friedman, FERC Staff
Kellie Doherty, ERM

Submission Contents

CERTIFICATE OF SERVICE

I hereby certify that I have this day served the foregoing document upon each person designated on the official service list compiled by the Secretary in this proceeding in accordance with the requirements of Rule 2010 of the Commission's Rules of Practice and Procedure.

Dated at Washington, D.C. this 18th day of September 2007.

/s/ Brett A. Snyder
Brett A. Snyder

Submission Contents