

**Before the United States House of Representatives  
House Committee on Transportation and Infrastructure  
Subcommittee on Coast Guard and Maritime Transportation  
Elijah E. Cummings, Chair**

**April 23, 2007**

**Safety and Security of Liquefied Natural Gas and the Impact on Port  
Operations**

**Testimony of AES Corporation  
Aaron Teal Samson  
Managing Director  
4300 Wilson Boulevard, Arlington, VA 22203  
Phone number: 703-522-1315**

**Supplying Additional Natural Gas to the Mid-Atlantic Region  
Considerations of Safety and Maritime Operations**

**I. INTRODUCTION**

The AES Corporation is one of the world's largest global power companies operating in 26 countries with home offices in Arlington, Virginia. AES operates 123 power facilities generating 44,000 megawatts including the cleanest coal plant in Maryland located in Cumberland County. AES also developed, owns and operates the Andres LNG terminal and co-located combined cycle power plant in the Dominican Republic.

AES has proposed to build a natural gas import terminal at Sparrows Point, Maryland ("Project") in an effort to introduce a new incremental supply of natural gas into the Mid-Atlantic Region. The Project will provide natural gas customers with access to natural gas production centers throughout the world without the need to construct new long-haul pipelines or expand the existing long-haul interstate pipeline systems that currently serve the Mid-Atlantic Region. The Project will also introduce new natural gas storage facilities into the Mid-Atlantic Region.

Natural gas has increasingly become the fuel of choice in both the United States and the Mid-Atlantic Region due to the clean burning nature of the fuel and the efficiency of its use. In order to combat the threat of global warming, increased natural gas use must be part of the solution. A modern natural gas power plant emits half of the greenhouse gases emitted from a modern coal facility.

This increasing demand, however, is outpacing supply from traditional sources. The need for incremental sources of natural gas supply to meet growing demand is particularly acute in the Mid-Atlantic and surrounding regions of the United States due to distances from

existing production areas and the fact that the existing pipeline capacity from those production areas is already fully utilized.

This testimony provides information on the increasing natural gas demands in the Mid-Atlantic Region, reviews the alternatives for meeting that increasing demand, then walks through the process used by AES to site its proposed liquefied natural gas (“LNG”) import terminal at Sparrows Point (“Terminal Site”). AES’s siting process considered safety and security issues as well as potential impacts on port operations and the environment.

## II. NATURAL GAS NEED IN THE MID-ATLANTIC REGION

Natural gas demand for the Mid-Atlantic Region was approximately 2.4 trillion cubic feet (“Tcf”) in 2005, representing approximately 11 percent of total U.S. natural gas consumption. The Energy Information Administration (“EIA”) is projecting an approximate 1.3 percent compounded annual growth rate in natural gas demand for the Mid-Atlantic Region from 2005 to 2020, which will result in an increase from 2.4 Tcf in 2005 to 2.9 Tcf in 2020. Natural gas demand from the electric power generation and commercial segments has shown the most growth for the period 1995 to 2005. EIA projects that natural gas demand from electric power generation will continue to show the most significant growth for the period 2005 to 2030.

This increasing demand is confirmed in the “Energy Transition Report 2007: Maryland’s Energy Future” that was prepared in February 2007. The Transition Report stated:

Natural gas needs for Maryland have grown. Of the fossil fuels, natural gas is the cleanest burning for energy generation. Maryland imports over 99% of its gas through interstate pipelines, primarily sourced from the Gulf of Mexico region. Supply and cost disruptions are possible as seen in 2005-06 as a result of Hurricane Katrina. Currently, pipeline capacity is also constrained. Interstate pipelines that serve Maryland have been fully subscribed for several years. New capacity projects are in demand by local distribution companies (for non-power uses), large industrial users and power generation companies. Natural gas is the only significant power generation source that has been built in recent years, with over 60% of Maryland’s natural gas electric fleet completed in the last decade (representing approximately 9% of summer capacity).

\* \* \*

It is unlikely that, with the exception of LNG, large increases in gas supply in Maryland will occur. The volatility of gas prices is a continued concern.

Because natural gas prices set the price for electric power almost one-half of the hours of each year in the Mid-Atlantic Region, additional supplies of natural gas will help to reduce both natural gas prices and electric prices. This is especially important during these times of electric price increases.

### **III. THE AES PROJECT IS PREFERABLE TO POTENTIAL ALTERNATIVES**

Given the forecasted decrease in production of natural gas in existing North American supply basins, LNG is projected to supply not only incremental natural gas demand, but it also could replace the projected reduction in other supply components (i.e., natural gas imports from Canada and certain United States production basins). Among alternatives to the AES Project is the construction of major new pipeline systems to provide an equivalent amount of capacity to bring natural gas to the Mid-Atlantic Region from the existing North American production regions. The primary drawback to this alternative is the fact that onshore conventional natural gas production is anticipated to decline from 4.8 Tcf in 2004 to 4.2 Tcf in 2030, while net pipeline imports are also expected to decline from 2004 levels of 2.8 Tcf to about 1.2 Tcf by 2030 due to resource depletion and growing domestic demand in Canada. The decline in overall supply from the west coast of the United States and Canada is coupled with an increase in consumption from 22.4 Tcf of natural gas in 2004 to 26.9 Tcf in 2030.

Building new pipeline systems to transport gas from LNG terminals in the Gulf of Mexico Region, would also require thousands of miles of pipeline construction to provide enough supply to fill the growing market demands in the Mid-Atlantic Region. This would have a significantly greater environmental impact, would be less reliable than importing the LNG directly to the demand center, and would cost more. Regarding reliability, construction of the AES project will provide a new natural gas storage facility to help ensure adequate supply in times of peak demand when the already full existing pipeline system cannot bring enough gas to the areas. Regarding cost, a Wall Street Journal article published last June estimated that the new pipeline alternative would “likely cost \$1 to \$1.75 per million British thermal units more than LNG....consumers will likely feel this inflation.”

For these reasons, our analysis of alternatives outside of the Mid-Atlantic Region, which we have provided to FERC, do not appear to be commercially or environmentally feasible for serving this market. The best solution is direct importation of LNG.

### **IV. AES SITING SELECTION PROCESS**

AES evaluated several factors to determine the extent to which alternative LNG terminal locations would be able to introduce a new incremental supply of natural gas into the Mid-Atlantic Region to meet the growing demand for energy in those markets in a safe, reliable, and economic manner. To meet this purpose, AES determined that, at a minimum, an LNG terminal site would need to satisfy the criteria below. All of the criteria are considered important to the determination of site alternatives.

- Geographic Location. Given the impracticality of siting an LNG terminal and associated pipeline facilities outside of the Mid-Atlantic Region to serve this market, it is necessary to locate the Project within the Mid-Atlantic Region. This allows adequate interconnections with existing natural gas pipeline systems in the

vicinity of the Terminal Site. Because the Project also adds storage capacity in the Region, it provides immediate availability of natural gas supply without the constraints that exist on long haul pipeline capacity constraints in times of peak demands.

- Distance from Residential Concentrations. AES considered only locations for the Terminal Site and associated LNG transit vessel routes that were – at all times – greater than one mile from residential communities and population centers. While not required by any applicable regulations or recent practice, AES has made the corporate decision to follow this one-mile guideline. The guideline adopted by AES is based on recent studies conducted by Sandia National Laboratory (“Sandia”) that sets out a worst-case marine-related thermal event as causing potential harm to persons within approximately one mile of an LNG spill. Studies cited by Sandia corroborate this distance. AES’s decision to incorporate the one-mile guideline is consistent with recent findings published in the Government Accountability Office report titled “Maritime Security: Public Safety Consequences of a Terrorist Attack on a Tanker Carrying Liquefied Natural Gas Need Clarification” (“GAO Report”). The GAO Report noted the nearly universal agreement among experts that the one-mile distance was either “about right” or even “too conservative.”
- Land Use Compatibility. AES examined existing land use and published community development plans in selecting its site. The AES Project complies with the heavy industrial zoning designation of Baltimore County.
- Technical and Economic Feasibility. AES investigated the technical and economic feasibility of constructing and operating an LNG terminal at the proposed site. Factors considered in this investigation include: site access to nearby deepwater port facilities (requiring a nominal 45-foot draft); access to adequate constructible land (requiring a nominal 40 acres); location within the natural gas markets intended to be served by the Project; and the ability of the site to accommodate the equipment and facilities necessary to safely and reliably operate the LNG terminal.
- Safety and Security. The selected site must be able to satisfy all applicable safety and security standards. The Sparrows Point site complies with all applicable federal safety and security regulations. Moreover, all safety and security aspects of the Project will be evaluated as part of the comprehensive Federal Energy Regulatory Commission (“FERC”) review process and the U.S. Coast Guard’s (“USCG”) Waterway Suitability Assessment analysis. We are confident our Project will be found to meet or exceed applicable standards. We will, of course, comply with any recommendations or conditions required by these agencies.
- Landowner and Environmental Impact. AES also seeks to avoid or minimize potential impacts on landowners and to the natural environment, cultural resources and other stakeholders associated with the proposed Project. The information contained in AES’s application to the FERC for approval to build and operate its

proposed LNG facility at Sparrows Point demonstrates that this criterion has been satisfied with the selection of the Terminal Site. The FERC application (AES also filed applications with other federal agencies and State agencies in both Maryland and Pennsylvania) consisted of 13 volumes and several thousand pages of studies, reports, maps, charts, and other information that will form the basis of an Environmental Impact Statement.

## V. SAFETY AND SECURITY

Both Sandia and the GAO Report confirm that safety and security for the public will be maintained by siting the Project more than one-mile from residential areas. Further confirmation of the low risk of an LNG terminal to adjacent populations and facilities is seen in the independent risk assessment issued on June 28, 2006 by the Maryland Power Plant Research Program relative to the recent expansion at the Cove Point LNG terminal in Calvert County, Maryland (“CP Risk Assessment”). The CP Risk Assessment concluded “that the quantified risks to populations and facilities. . . **fall within a range considered acceptable relative to available industry criteria,**” . . . It is important to note that the AES terminal is even further from residential areas.<sup>1</sup> Also important for purposes of appreciating the relevance of the CP Risk Assessment vis-à-vis the AES Project is the fact that the shore side unloading platform associated with the AES Project is also farther from residential areas than the offshore unloading platform at Cove Point, and will be easier to monitor.

Aerial maps of the Cove Point facility and the proposed AES facility are included with this testimony.

In addition, in compliance with FERC, USCG, and other regulatory guidelines, AES will demonstrate that it has “considered and implemented all reductions to risks in the design and construction of the facility that are not disproportionate to the costs of those measures”.

Certain opponents of the AES Project have stated that the Project might present a high-valued target to someone or some group with malicious intentions and that the facility was located in too close proximity to highly concentrated, residential and commercial areas. Those issues were examined by Richard A. Clarke, former White House Advisor to three Presidents on national security and counterterrorism, and he found that the proposed project represents an unlikely terrorist target due to its distance from commercial and residential areas. He categorized the location as being in the lowest risk level zone, and concluded that any risk associated with the project can be effectively managed. A summary of Mr. Clarke’s finding is included with this testimony.

---

<sup>1</sup> The storage tanks at Cove Point are single-containment design and therefore require external diking to contain the LNG in the extremely unlikely event of a failure of the inner tank. AES will use a full-containment design that is essentially a tank within a full integrity tank, thereby not requiring additional external containment. The outer tank is made up of additional insulation and reinforced concrete close to three feet thick. The tanks proposed to be constructed by AES represent the third generation of tank design that is significantly more robust than prior designs.

## VI. IMPACT ON PORT OPERATIONS

An important factor considered by AES in siting the Project was to avoid or minimize disruption to commercial and recreational marine traffic while LNG vessels are in transit or at berth. AES is currently working in conjunction with the USCG to develop LNG vessel transit schedules and security zones that would provide the maximum amount of protection for LNG vessels, while at the same time minimizing disruption to commercial and recreational traffic. Different approaches to establishing and enforcing a moving security zone around inbound LNG tankers have been explored in an effort to accommodate as many waterway users as possible, without lessening security to an unacceptable degree.

In a proactive effort to minimize disruption to communities and commercial and recreational vessel traffic, AES sought advice and input from the Baltimore maritime community, the Chesapeake Bay Pilots, Baltimore tug operators, and the Maritime Institute of Technology and Graduate Studies (“MITAGS”). In fact numerous real time ship berthing maneuvers were performed at the MITAGS simulator<sup>2</sup> with the assistance of the Bay Pilots and existing tug operators. These berthing simulations were carried out with the support of the three new tractor tugs AES has proposed to be added to the Baltimore tug fleet to support the AES LNG operations.

Current vessel traffic transiting the Chesapeake Bay to the Port of Baltimore has seen a significant decrease in the amount of vessel traffic over the past few decades. The Baltimore Marine Exchange records show that in 2005 there were 2,119 ship arrivals to the Port of Baltimore compared to 4,033 arrivals in 1975. These numbers include deep draft cargo vessels, passenger vessels, and tug and tows approaching from the south and from the Chesapeake & Delaware Canal. AES’s Project would introduce approximately 100 to 150 vessels per year into the Chesapeake Bay (two to three vessels per week). Increased vessel traffic and new modern tractor tugs supplied as part of the Project will help maintain the economic health of Baltimore maritime industry.

Because LNG vessels would be carrying cargo classified by USCG regulations as certain dangerous cargo or CDC, the USCG is required to establish a security zone around the vessels during their transit when they have the CDC onboard. The objective of establishing security zones is to safeguard vessels and waterfront facilities from destruction, loss, or injury from man-made acts, accidents, or other causes of a similar nature. **These same security zone requirements apply to any vessel carrying CDC such as petroleum, propane, or ethanol. The security zone requirements also apply to cruise ships.**

The introduction of additional LNG traffic in the Chesapeake Bay will have limited or no impact on existing large vessel traffic either in the Bay or for vessels calling at the Inner

---

<sup>2</sup> The simulations were performed using the state-of-the-art marine vessel simulator at MITAGS. MITAGS is a world-class training facility located in Linthicum Heights, Maryland that provides, among many other marine training and education resources, thorough instruction for mariners and enforcement personnel relating to LNG ship operation and inspection.

Harbor. Existing ship management protocols utilized by the Maryland Pilots Association would ensure that orderly inbound and outbound traffic is not delayed or otherwise negatively affected. Once at the Terminal Site, LNG ships would have no impact on large vessel traffic as that traffic would be well outside the established security zone as they enter the Inner Harbor in the existing shipping lanes.

LNG shipping in the Chesapeake Bay may cause minor inconvenience to smaller vessel traffic due to the enforcement of the security zone around the LNG ships. The time-interval during which the security zone applies at any given point along the ship transit route is an important element to consider in assessing the inconvenience. The total time of impact depends on the speed of the ship and the size of the security zone. The table below identifies the various scenarios based on a 1,000 foot ship and an assumed 500 yard security zone fore and aft of the vessel, which can be envisioned as a 4,000 foot long bubble. As can be seen from the table below, the total impact time is in the range of a few minutes. It is important to note that any such restriction would apply only to loaded inbound LNG vessels; there would be no security zone restrictions for the outbound LNG ships as they would no longer be carrying LNG.

<b>Speed (knots)</b>	<b>Security Zone (yards)</b>	<b>Impact Time (minutes)</b>
20	500	1.97
15	500	2.63
10	500	3.95
5	500	7.90

Vessel speeds north of the Bay Bridge average between 10 and 12 knots. Thus, the total impact for boaters within the security zone would be less than four minutes, and limited to two to three times a week.

Potential impacts to small watercraft in the area of the Terminal Site would involve different considerations due to the slow speeds during the maneuvering process and the proximity of the transit route to the mouth of Bear Creek. Real-time vessel simulations performed at MITAGS for the maneuvering of LNG vessels from the Brewerton Channel, through the Shipyard Channel, and into the LNG berths at the LNG terminal site show that the total time for this maneuvering is about 45 minutes. Boaters transiting between the Terminal Site and Ft. Carroll would be restricted in their movements (for approximately 20 minutes) at certain points near the end of the maneuvering process as the LNG ship berthed. It is important to note that access into Bear Creek would never be completely cut off even during this maneuvering, as boaters could navigate around the west side of Ft. Carroll.

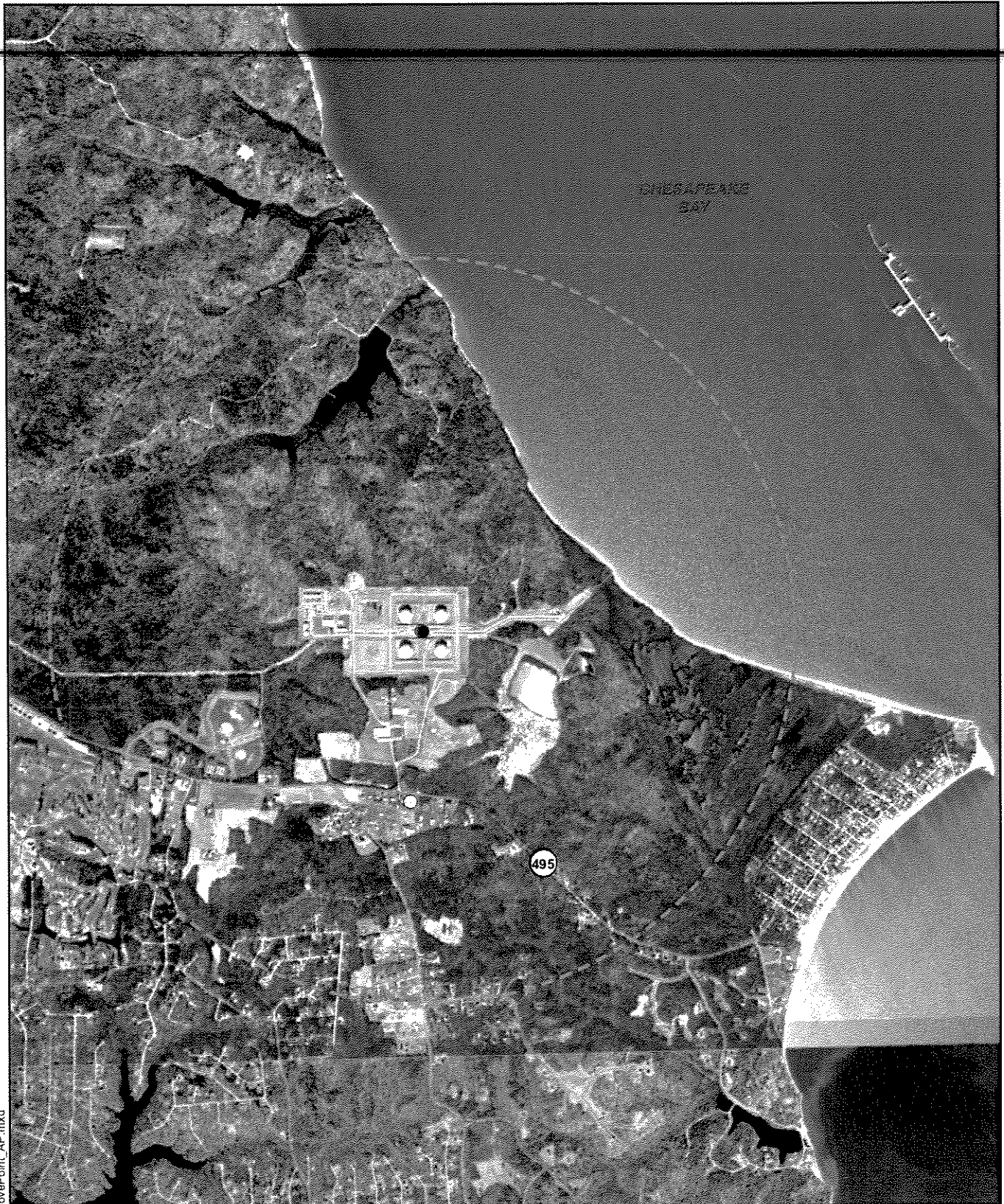
Commercial and recreational boaters could also be restricted in areas immediately around the Terminal Site while LNG vessels are at the berth. A fixed security zone of 500 yards is currently applied to the vessel berths at the Cove Point LNG terminal. The Project may be suitable for additional security measures, such as floating barriers, which could safely reduce the zone surrounding the vessel berth to less than 500 yards. The stationary security

---

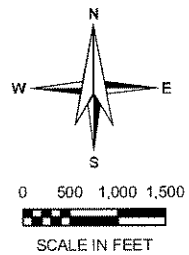
zone would impact commercial and recreational boaters in this small area adjacent to shipyard Pier 1 two to three times a week while LNG vessels discharge their cargos.



32907.GIS\Maps\Comparative\Facilities\CovePoint\_AP.mxd



- EXISTING DOMINION COVE POINT LNG TERMINAL FACILITY, COVE POINT, MD
- APPARENT NEAREST RESIDENCE OR PLACE OF GATHERING
- ONE MILE RADIUS



AES SPARROWS POINT LNG, LLC  
SPARROWS POINT, MD

EXISTING DOMINION COVE POINT LNG TERMINAL FACILITY, COVE POINT, MD, WITH APPARENT NEAREST RESIDENCE OR PLACE OF GATHERING

PREPARED BY:  
HALEY & ALDRICH

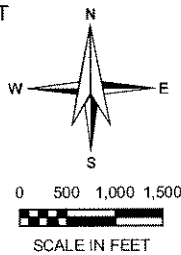
SCALE: AS SHOWN  
DECEMBER 2006

FIGURE XX



32907\GIS\Maps\ComparativeFacilities\SparrowsPoint\_AP.mxd

- PROPOSED SPARROWS POINT LNG TERMINAL FACILITY
- NEAREST RESIDENCE OR PLACE OF GATHERING
- ONE MILE RADIUS



AES SPARROWS POINT LNG, LLC  
SPARROWS POINT, MD

**PROPOSED SPARROWS POINT LNG TERMINAL FACILITY WITH NEAREST RESIDENCE OR PLACE OF GATHERING**

PREPARED BY:  
HALEY & ALDRICH

SCALE: AS SHOWN  
DECEMBER 2006

**FIGURE XX**

# GOOD HARBOR

CONSULTING, LLC

## AES SPARROWS POINT: A RISK ASSESSMENT

Richard A. Clarke, Principal Investigator

January 31, 2007

The AES Corporation retained Good Harbor Consulting, LLC, to conduct a risk assessment of the proposed Sparrows Point liquefied natural gas (LNG) terminal using the same methodology employed in our reviews of other LNG projects. The conclusions articulated in this memorandum are taken from the full assessment, which will be released in the coming weeks.

### *Methodology*

Good Harbor's risk management assessment methodology focuses on the potential security risk by examining **THREAT**, **VULNERABILITY** and **CONSEQUENCE**.

**THREAT** is defined as a function of intent and capability. "Intent" is defined as the extent to which terrorist groups have expressed interest in attacking a particular type of target or whether their strategic objectives would be served by such attacks, and "capability" is defined as the extent to which terrorist groups have or could easily obtain the means necessary to conduct a significant attack against a class of facilities.

**VULNERABILITY** is defined as the extent to which a class of infrastructure has inherent weaknesses to certain vectors of attack, with and without mitigation efforts, which can be exploited to generate consequences.

**CONSEQUENCE** is defined as the range of damage from an attack on a certain class of infrastructure and to what extent surrounding communities have the capability to respond adequately to such circumstances; what the costs would be of creating missing capabilities, and on whom the financial burden would be placed.

Good Harbor's analysis utilized the safety guidelines for LNG tankers articulated in the Sandia National Laboratories' 2004 report, "Guidance on Risk Analysis and Safety Implications of a Large Liquefied Natural Gas (LNG) Spill Over Water."

### *Key Judgments*

Employing this methodology, Good Harbor concludes that Sparrows Point represents an unlikely terrorist target. A successful attack on an LNG vessel in transit to or berthed at the facility would be difficult and would yield few fatalities, minimal damage to other key facilities, and limited socio-economic disruption. The proposed facility would be located in an industrial zone, away from commercial or residential areas. The location provides an inherently safer alternative than proposals in major population centers. There are more attractive targets which would be much easier to attack and which would, unlike Sparrows Point, produce mass casualties and significant disruption.

In the definitive government study on the risks of LNG spills over water, the Sandia National Laboratory team divided the areas through which LNG tankers transit into three numbered zones. For intentional spills, Zone 1 facilities are in areas within 500 meters of major infrastructure,

# GOOD HARBOR

CONSULTING, LLC

population, and commercial centers. Zone 2 facilities are in areas with major infrastructure, population, and commercial centers between 500 meters and 1600 meters. Zone 3 facilities are in areas greater than 1600 meters from major infrastructure, population, and commercial centers. The proposed Sparrows Point terminal would be a Zone 3 facility, the lowest risk level. In comparison to the existing terminal in Everett, Massachusetts, which Good Harbor has previously advocated be closed, the Sparrows Point proposal is inherently safer. Its location in an industrial area is far different than the mixed-use commercial and residential area within the hazard zones of the Everett facility. This also holds true in comparison to the 2004 proposal for an LNG facility in Providence, Rhode Island, that was denied FERC permitting largely on the basis of an analysis conducted by Good Harbor.

## ***Net Assessment***

In short, security concerns should not be a bar to approval of the project. Because the vulnerabilities of an LNG tanker bound for or berthed at the proposed Sparrows Point terminal are difficult to exploit and possible to protect, and because the consequences of an attack on a vessel are relatively low, we judge it unlikely that terrorists would find the terminal to be an attractive target. The planning required, the training necessary, and the weapons capability needed suggest that an LNG tanker is only an attractive target if the consequences in terms of human loss and property damage are high. Though terrorist groups possess the necessary capabilities to attack an LNG carrier, the proposed location of the Sparrows Point facility in an industrial area prevents a successful attack from fulfilling their intent to kill large numbers of Americans and destroy iconic structures. They would therefore likely not attempt such an attack and apply their capabilities to more spectacular and lethal targets.

## ***Recommended Security Measures***

There are serious risks attendant with any flammable product, and these extend to the AES' proposal to bring LNG to Sparrows Point. These risks can be effectively managed for the proposed project. Facilities such as LNG terminals should be constructed with security as an embedded feature, not imposed post-construction as an afterthought. AES should consider security of the facility as their responsibility, not just that of the U.S. Coast Guard, the Department of Homeland Security or local law enforcement. While the decision to pursue the project in a remote location represents a significant investment in security, additional measures that should be taken include, but are not limited to: construction of a security barrier around the berth; posting armed security personnel at all times; installing LNG release detection systems; equipping Turner Station with a loudspeaker system and preparing emergency procedures; installing swimmer detection systems; and deploying smart CCTV cameras around the berth.

## ***About Good Harbor***

Good Harbor Consulting, LLC provides security consulting services for a broad range of clients—including Fortune 500 companies, industry associations, systems integrators, and innovative technology start-ups—in the fast-developing areas of homeland security, cyber security, critical infrastructure protection and counterterrorism.