UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of Docket No. 52-016

Calvert Cliffs-3 Nuclear Power Plant
Combined Construction and License Application

SUBMISSION OF NEW CONTENTIONS BY JOINT INTERVENORS

Joint intervenors hereby submit two new contentions (for sake of continuity, Contentions 8 and 9). These new contentions are valid under 10 CFR 2.309(f)(2) (i), (ii) & (iii), as Contention 8 is based on information contained in a NRC Safety Evaluation report dated October 28, 2009 and Contention 9 is based on a document released by European nuclear regulators on November 2, 2009.

Contention 8

This contention challenges the validity and accuracy of the October 28, 2009 "SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION REGARDING THE EFFECT OF EXPANDING THE COVE POINT LIQUEFIED NATURAL GAS FACILITY ON SAFETY AT CALVERT CLIFFS NUCLEAR POWER PLANT, UNIT NOS. 1 AND 2, DOCKET NOS. 50-317 AND 50-318." (This document also includes Overpressure effects for Calvert Cliffs 3), for the following reasons:

1. NRC SAFETY EVALUATION is based on a flawed PPRP Study (with admitted errors and identified omissions which have never been corrected) and the Arthur D. Little 1993 study

which is pre 9-11, the NRC SER2009 evaluation bootstrapping its calculations on flawed bases are also consequently flawed and invalid.

2. CCNPP Units 1 and 2 and CC3 share safety and structures and this was addressed in the SER2009 and NRC approved CC3 pipeline overpressure which is incomplete since none of the studies took into account overpressures created by LNG Spill on water (omission of the Sandia 2004 studies and guidance)
3. Omission of expert opinion of threat analysis specifically for CCNPP (such as the Clarke Report 2005 which was done for Naraganssett Bay at the request of the Attorney General of Rhode Island) invalidates the calculations of impact to CCNPP structures and personnel as well as residents of nearby area and the SER2009 did not consider valid distance and burn/pain criteria on the effect of radiant heat on personnel which operate CCNPP (this was covered in the Clarke Report 2005)

Introduction and Overview:

Allegation No. NRR-2009-A-0006 was the communications vehicle between the NRC Senior Allegations Coordinator (collectively referred to as "NRC Staff") and Petitioner representative of Joint Intervenors (Petitioner). Several e-mails and letters regarding this allegation transpired between July 13, 2009 and November 4, 2009. Two files were also forwarded by the Petitioner to the NRC Staff; "Admissibility Arguments of Contentions 4 and 5-final" to the NRC on Docket CLI-09-20 and "Exhibit 3- PPRP Risk Study Gaps and Deficiencies" , which were provided to the Public Service Commission on **PSC Case 9127** Memorandum of Appeal. Petitioner's concerns and submissions were forwarded by NRC Staff to the NRC office which produced the October 28, 2009 Safety Evaluation for Calvert Cliffs Reactors 1 and 2 and the proposed Calvert Cliffs 3.

These supporting communications and file attachments are included in **Appendix A** of this Contention.

The latest communication on Allegation No. NRR-2009-A-0006 was a certified letter from the NRC Senior Allegations Coordinator dated Nov. 4, 2009 (which Petitioner received 11/12/09) which contained the NRC Staff promised copy of the **"SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION REGARDING THE EFFECT OF EXPANDING THE COVE POINT LIQUEFIED NATURAL GAS FACILITY ON SAFETY AT CALVERT CLIFFS NUCLEAR POWER PLANT, UNIT NOS. 1 AND 2, DOCKET NOS. 50-317 AND 50-318."** (This same NRC SAFETY EVALUATION dated October 28, 2009 also included material and relevant facts previously disputed by Petitioner's Contention #4 on Docket CLI-09-20 for Calvert Cliffs 3. NRC stated in the SAFETY EVALUATION, "The NRC staff review considered the PPRP analysis, the UniStar submittal dated November 11, 2008, that addressed overpressure hazards to the Calvert Cliffs facility due to the Cove Point terminal, and independent confirmatory calculations performed by the staff."). Discussions regarding the PPRP Study are also included in **Appendix A** of this Contention.

The NRC's acceptance of UniStar's pipeline overpressure submission underscores the omission from consideration of overpressures which occur when LNG is spilled on water (see **Appendix B**). This is a major omission in the PPRP study, upon which UniStar's COL application and FSAR relies to a great extent. The deliberate omission of relevant information contained in the Sandia National Laboratories **"Guidance on Risk Analysis and Safety Implications of a Large LNG Spill Over Water" (SAND2004-6528, Dec 2004)"** which the PPRP Study identifies as reference

#19 on page B-2, in addition to the admitted errors and deceptive use of imprecise descriptive terminology affecting the import of the volume of LNG spilled (interchangeable use of a single storage tank to also represent entire contents of the LNG ship's cargo), renders the PPRP deficient and incomplete, as well as mathematically and scientifically flawed, and renders calculations and conclusions drawn therefrom to be partially invalid, thereby compromising the safety of the population (within 50 mile radius of CCNPP-Cove Point) and the facilities at CCNPP, and invalidates the CC3 applicant's COL and FSAR.

Information used by the NRC to reach its conclusions in this SAFETY EVALUATION is unacceptably and impermissibly deficient because the conclusions are based upon bootstrapped calculations limited to two risk studies which are limited and deficient in themselves, the PPRP risk study, which has admitted errors and known relevant and material omissions (which have never been corrected nor supplemented), and the Arthur D. Little risk study, which was developed pre-9-11. The proliferation of expert opinions and known facts available in the public domain which could have supplemented and validated the **true** current safety and risk analyses were not considered by the NRC, even when this supplemental information (identified as attachments in **Appendix A**) was identified and provided by the Petitioner to NRC Staff for consideration in their SAFETY EVALUATION.

NRC Staff calculations bootstrapped to unacceptably deficient and disputed studies are relevant and material to the safety of the residents, schools, businesses, communities and facilities at CCNPP and vicinity of the Calvert Cliffs-Cove Point contiguous sites. The seat of the U.S. Government in Washington, DC which is within the 50-mile radius of the nuclear radioactive

fallout underscores the importance of a complete and validated SAFETY ANALYSIS because the 3-mile co-location of Dominion Cove Point LNG to CCNPP as it stands, already compromises the facilities at CCNPP and presents this location as a prime target for intentional threats that could compromise the two existing reactors at CCNPP. The addition of Calvert Cliffs 3 to this siting further emphasizes the CCNPP-Cove Point area as an enhanced target with a bulls-eye for a determined group, given the current situation of threats to the United States from terrorist groups, foreign and home-grown.

LNG tankers docking at the largest LNG marine terminal in the US (DCPLNG at Cove Point) are foreign-flag bearers. And the Maryland State-approved LNG pier expansion to accommodate larger LNG tankers (LNG carrying capacity 260,000 m^3) with the stated frequency of 200 ships transiting per year brings the probability of threat closer to CCNPP and the probability of threat occurrence to 200 times per year, with a greater volume of LNG spill on water. This elevated potential for catastrophic occurrences was not sufficiently or adequately addressed in the NRC SAFETY EVALUATION. Terrorism Expert opinion (Richard A. Clarke, referenced in this document) states, "The probability of a terrorist attack occurring can not be effectively measured, but it is now "a foreseeable risk" in the United States. Instead of calculations involving probability of attack, we suggest an alternative five part methodology for determining security risks and cost calculations."

Based on new, relevant, and material facts, this Contention:

a) appeals the NRC's October 28, 2009 SAFETY EVALUATION to be unacceptably inadequate and deficient not only for Calvert Cliffs 1 and 2, but also exacerbates the potential for harm with the addition of the 3rd double reactor (CC3) in the same CCNPP facility footprint.

b) incorporates information previously submitted in Contention 4 on Docket CLI-09-20. The following arguments and proof of accepted expert opinion updates the information on previously submitted Contention 4 and validates Petitioner submissions of fact, which are material and relevant for consideration by the NRC. Petitioner has been granted standing to intervene in accordance with Docket CLI-09-20.

A. DEFINITIONS: For purposes of reference brevity in this Petitioner Contention, the following are presented for inclusion by reference. Petitioner also intends to rely on these documents as expert testimony in support of this contention.

1. **SER2009** means the October 28, 2009 "SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION REGARDING THE EFFECT OF EXPANDING THE COVE POINT LIQUEFIED NATURAL GAS FACILITY ON SAFETY AT CALVERT CLIFFS NUCLEAR POWER PLANT, UNIT NOS. 1 AND 2, DOCKET NOS. 50-317 AND 50-318." (NRC's SAFETY EVALUATION also includes effects to the proposed Calvert Cliffs 3).
2. **AD Litttle1993** means the Arthur D. Little Study used by the NRC for SER2009 (not available for Petitioner review, but incorporated as reference)
3. **PPRP Study** means "Cove Point LNG Terminal Expansion Project Risk Study, Maryland Power Plant Research Program Report PPRP-CPT-01/DNR 12-7312006-147, Maryland

Department of Natural Resources, June 28, 2006 (ADAMS Accession No. ML080630231), which the NRC used to perform evaluations reflected in SER2009 as described above. (accessed 11/30/09) http://esm.versar.com/pprp/bibliography/PPRP-CPT-01/CovePt_FINAL_Aug2006.pdf

4. **PPRP/ASLB/MD State** means "THE STATE OF MARYLAND'S RESPONSE TO THE BOARD'S ORDERS OF JANUARY 13 AND FEBRUARY 10, 2009, Docket No. 52-016 (COL), Maryland State Responses to Substantive Questions on the PPRP Study submitted by Brent A. Bolea, Asst Atty General. This issue was part of the discussion before the ASLB during Oral Arguments regarding Petitioner's Contention #4 under the same docket.
5. **NRC SER2009_ Appendix A attachments** are documents submitted by Petitioner to the NRC for consideration prior to SER2009 release.
    a. NRC SER2009_ Appendix A-NRC-Cwalina letters.pdf and other related letters as itemized in Appendix F.
    b. NRC SER2009_ Appendix A-Exhibit 3-PPRP Risk Study Gaps and Deficiencies.pdf
    c. NRC SER2009_ Appendix A- Admissibility Argument Contentions 4 and 5-final.pdf
    d. MD Identification of Representatives and Response to Board Questions.pdf (included as supporting documentation for this Contention)
6. **DCPLNG** means Dominion Cove Point LNG for which the PPRP Study was conducted for siting in the vicinity of CCNPP.

7. **Sandia2004** means Sandia National Laboratories "Guidance on Risk Analysis and Safety Implications of a Large LNG Spill Over Water" (SAND2004-6528, Dec 2004)", which the PPRP Study indicates as reference #19 on page B-2.(or see attachment, **sandia_lng_1204.pdf)**
8. **Sandia/DOE2006** means "Sandia National Laboratories Guidance on Safety and Risk Management of Large Liquefied Natural Gas (LNG) Spills Over Water", U.S. Department of Energy LNG Forums 2006 http://fossil.energy.gov/programs/oilgas/storage/lng/houston_p2n2_hanlin.pdf (accessed 11/29/2009)
9. **DOE/Sandia2007** means "DOE/Sandia National Laboratories Coordinated Approach for LNG Safety and Security Research", Briefing to NARUC Staff Subcommittee on Gas; July 15, 2007, accessed 11/29/09 http://www.narucmeetings.org/Presentations/Tom%20Blanchat%20Presentation.ppt#264,1, DOE/Sandia National Laboratories Coordinated Approach for LNG Safety and Security Research
10. **Sandia2008** means SAND2008-3153, Breach and Safety Analysis of Spills Over Water from Large Liquefied Natural Gas Carriers (accessed 11/22/09) http://www.fe.doe.gov/programs/oilgas/storage/lng/sandia_lng_1204.pdf
11. **Clarke Report2005** means **"**LNG Facilities in Urban Areas: A Security Risk Management Analysis for ATTORNEY GENERAL PATRICK LYNCH RHODE ISLAND by Principal Investigator Richard A. Clarke" (former chief counter-terrorism adviser on the U.S. National Security Council) This 2005 analysis focuses on Security Risk Management involving intentional damage by a determined group. http://www.projo.com/extra/2005/lng/clarkereport.pdf (accessed 11/20/09)

12. **Former CIA Official Warns Against LNG Terminal** (Charles Faddis, the retired head of CIA's Weapons of Mass Destruction Terrorism Unit); accessed 11/22/09 http://wjz.com/local/lng.terminal.2.1019979.html May 26, 2009 6:23 pm US/Eastern
13. **ASLB** means Atomic and Safety Licensing Board
14. **NRC PLB I-1** means Nuclear Regulatory Commission Plant Licensing Branch I-1, Division of Operator Reactor Licensing which produced the NRC SAFETY EVALUATION.
15. **Units of Measure**: http://www.lngplants.com/conversiontables.html (accessed 11/23/09)
    a. m^3 = cubic meters (1 cubic meter = 264.172052 US gallons)
    b. 1 oil barrel = 42 US gallons
    c. 1 cubic meter of natural gas ~ 1/2 metric ton.
    d. 1 cubic meter LNG = 600 cubic meter gassified gas
    e. 1 cubic metre (1 kilolitre) = 35.3147 cubic feet
    f. 1 billion cubic metres of natural gas = 730 000 tonnes of LNG
    g. 1 tonne of LNG = 1 460 cubic metres (at 20ºC) (or 1 333 at 0ºC)
    h. 1 pound per square inch (psi) = 68.9475729 millibars
    i. 1 meter = 100 centimeters (1 m^3 = 1000000 cm^3) http://www.metric-conversions.org/volume/cubic-meters-to-cubic-centimeters.htm accessed 11/29/09
    j. Barrels to cubic meters conversion in PPRP are contained in ***PPRP Study, p.A-5:*** ***2.1.1 Liquid Releases from Storage Tanks and Tanker Compartment*** Tank input data are shown in ***Table A 2-4***. Tank configurations are based on capacities of 60,000 m^3 (230,000 barrels), 135,000 m^3 (850,000 barrels), 160,000 m^3 (1,000,000 barrels), and 25,000 m^3 (157,000 barrels) for Tanks A to D, Tank E, Tank F or G, and a single compartment in an LNG tanker respectively.

16. **Ship Storage Tank of LNG** contains 25,000 m^3 LNG (PPRP Study; This value was also used by the PPRP to mean "entire contents of LNG ship's cargo".)
17. **Small LNG ship (tanker) capacity** 148,000 m^3 LNG (DCPLNG)
18. **Newer, larger LNG ship (tanker) capacity** 260,000 m^3 LNG (DCPLNG)
19. **CLI-09-20 means** CLI-09-20 MEMORANDUM AND ORDER granting standing to Joint Petitioners; accessed 11/22/09 http://www.nrc.gov/reading-rm/doc-collections/commission/orders/2009/2009-20cli.pdf
20. **CCNPP Violation** means an example of infractions at CCNPP (accessed 11/30/090) http://www.nrc.gov/NRR/OVERSIGHT/ASSESS/REPORTS/calv_2004002.pdf "CALVERT CLIFFS NUCLEAR POWER PLANT - NRC INTEGRATED INSPECTION REPORT 05000317/2004002 AND 05000318/2004002" was a March 2, 2004 NRC letter and report to UniStar's CEO George Vander Heyden, then CCNPP Vice President, on "inspection examined activities conducted under your license as they relate to plant design activities and compliance with the Commission's rules and regulations." Although the infractions at CCNPP were non-cited violation, the finding was more than minor, and the consequences of failure could in an emergency situation such as a surprise intentional incident, have catastrophic consequences at CCNPP and surrounding community..

B. In fulfillment of requirements on Contention Admissibility:

(i) Provide a specific statement of the issue of law or fact to be raised or controverted . . . ;

Both issue of law and fact are controverted; that the proposed Calvert Cliffs 3 does not meet the acceptance criteria for COL application according to **10 CFR 52.79** and **10 CFR Part 50** and that

instruments (such as risk studies and general assumptions) used to justify the applicant's FSAR and the NRC SAFETY EVALUATION (SER2009) are deficient, mathematically and scientifically flawed and thereby render both the CC3 FSAR and SER2009 partially invalid.

Acceptance criteria for **COL** applications (CC3) are based on meeting the requirements of **10 CFR 52.79** [Go/No-Go Criteria] and more specifically as it relates to **10 CFR 52.79(a)(1) (iii)** The seismic, meteorological, hydrologic, and geologic characteristics of the proposed site with appropriate consideration of the most severe of the natural phenomena that have been historically reported for the site and surrounding area and with sufficient margin for the limited accuracy, quantity, and time in which the historical data have been accumulated, **(iv)** The location and description of any nearby industrial, military, or transportation facilities and routes, and **(vi)** A description and safety assessment of the site on which the facility is to be located..

10 CFR 52.79(a)(2) A description and analysis of the structures, systems, and components of the facility with emphasis upon performance requirements, the bases, with technical justification therefor, upon which these requirements have been established, and the evaluations required to show that safety functions will be accomplished.

52.79(a)(5) An analysis and evaluation of the design and performance of structures, systems, and components with the objective of assessing the risk to public health and safety resulting from operation of the facility and <u>including determination of the margins of safety during normal operations and transient conditions anticipated during the life of the facility, and the adequacy of</u>

structures, systems, and components provided for the prevention of accidents and the mitigation of the consequences of accidents.

52.79(a)(6)A description and analysis of the fire protection design features for the reactor;

52.79(a)(7) A description of protection provided against pressurized thermal shock events

Hereby included by reference, is the regulatory evaluation used in SER2009, since CC3 shares structures, systems, and components with CCNPP Units 1 and 2: General Design Criterion 4, "Environmental and dynamic effects design bases," of Appendix A, "General Design Criteria for Nuclear Power Plants," to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, "Licensing of Production and Utilization Facilities," requires that nuclear power plant structures, systems, and components important to safety be appropriately protected against dynamic effects resulting from equipment failures that may occur within the nuclear power plant as well as events and conditions that may occur outside the nuclear power plant. These latter events include the effects of explosion of hazardous materials that may be associated with nearby industrial activities such as storage facilities or transportation routes such as navigable waterways and pipelines.

According to applicant's FSAR Section 1: Unit 3 is located south of the existing nuclear power plant on the existing CCNPP site. CCNPP Unit 3 is within the CCNPP Units 1 and 2 Exclusion Area Boundary and the CCNPP Units 1 and 2 Independent Spent Fuel Storage Installation Exclusion Area Boundary. The site is approximately 40 mi (64 km) southeast of Washington D.C. and 7.5 mi (12 km) north of Solomons Island, Maryland. CCNPP Unit 3 *shares* the following structures, systems, and components with CCNPP Units 1 and 2:

- Offsite transmission system

- Chesapeake Bay intake channel and embayment
- Meteorological tower
- Emergency Operations Facility (EOF)

This siting places CC3 closer to DCPLNG, the shipping lanes of the LNG tankers and DCPLNG's pier expansion. This close proximity of 3 miles from DCPLNG makes CC3 construction and operation unsuitable, considering that the DCPLNG marine terminal already places Calvert Cliffs 1 and 2 in a precarious situation, should the unthinkable happen, an intentional attack on a docking or at-berth unloading LNG vessel. This scenario was inadequately addressed and underestimated in the PPRP Study, Arthur D. Little study and the NRC SAFETY EVALUATION (SER2009).

The nuclear reactors may be operating normally, however, intentional threat events such as an attack on a docking LNG tanker could create a catastrophic LNG spill over water where cascading failures on land and water create overpressures and LNG fires at 3,000 degrees Fahrenheit, burning until consumed, resulting in radiant heat that could compromise the judgment and survival of CCNPP personnel. These same overpressures and fires could likewise compromise the integrity of the structures at CCNPP, including the storage of spent radioactive material kept on site at CCNPP. None of the studies used in the SER have taken this into consideration, therefore, do not satisfy the requirements of **10 CFR 52.79(a)(2), (a)(5), (a)(6) and (a)(7)** for CC3 as well as CC1 and C2. (The foregoing statements are supported by expert opinions and facts reiterated in Sandia2004, Sandia2007, Sandia2008, Clarke Report2005, and other relevant reports incorporated herein by reference.)

NRC's SER2009 (described in item 1 Section A. Definitions) used the Arthur D. Little (June 1993) and PPRP (June 2006) Risk Studies as the basis to generate their Technical Evaluation and perform conformatory calculations to derive "satisfactory conclusions" that the DCPLNG expansion would not pose a threat to the safety of the structures at CCNPP. The SER2009 also accepted UniStar's pipeline overpressure hazards as the sole determination of overpressure criteria in their Technical Evaluation when there are other factors for LNG spill on water that were omitted. Not one of these risk and safety evaluations addressed catastrophic spill of LNG over water using widely accepted expert opinion and testing done in the USA, such as those of Sandia National Laboratories, which the PPRP omitted, even when Sandia2004 was listed as recference #19 on page B-2. These overpressures that result from detonations of a catastrophic LNG spill on water could significantly be greater than land-based overpressures; in fact, a well planned terrorist attack with multiple targets of pipeline and a docking LNG tanker could create overpressures and fires of such intensity that they should have been considered. The PPRP Study omitted any information contained in the Sandia2004 risk analysis which dealt specifically with factors including overpressures from Rapid Phase Transition (RPT), which does occur when LNG spills over water (such as the 1980 Burro tests at China Lake and subsequent 1981 Coyote tests at China Lake). LNG RPT and Overpressures are discussed in **Appendix B.**

Appendix C contains discussions derived from Sandia2004 and other Sandia National Laboratories Studies, as described in Section A. DEFINITIONS. These U.S. studies, available for presentation to the NRC ALSB and which are relevant and material to the SAFETY EVALUATION and Risk Analysis of CCNPP, due to its 3-mile proximity to DCPLNG, were completely omitted by the PPRP Study and the NRC SAFETY EVALUATION.

According to SER2009, the Arthur D. Little Study used some tornado criteria. Southern Maryland's tri-county area in the vicinity of CCNPP has *had twister sightings on both land and water in 2009 and previous years*, including a deadly tornado devastation in La Plata in 2002. Therefore the probability of a tornado causing overpressures affecting both CCNPP and DCPLNG should also have been considered. This threat aspect was ignored in the NRC SAFETY EVALUATION . **Appendix D** provides discussion and information on tornado occurrences which place Calvert Cliffs as part of the Southern Maryland "Tornado Alley":

Appendix E contains discussions on intentional threats and LNG fires that provide reference for risk analysis that should be considered for CCNPP, given its 3-mile proximity to the Cove Point LNG marine terminal. Richard A. Clarke's risk analysis of the proposed LNG marine terminal at Narragansett Bay mirrors similarities of possible risks that could be experienced in the Calvert Cliffs-Cove Point transportation route and berthing on the Chesapeake Bay. The **"**LNG Facilities in Urban Areas: A Security Risk Management Analysis for ATTORNEY GENERAL PATRICK LYNCH RHODE ISLAND by Principal Investigator Richard A. Clarke" (former chief counter-terrorism adviser on the U.S. National Security Council). This 2005 analysis focuses on Security Risk Management involving intentional damage by a determined group. **Appendix E** also covers LNG fires since the Clarke Report2005 utilizes Sandia2004 information.

Appendix F provides a listing of all 10 attachments included in this contention.

(ii) Provide a brief explanation of the basis for the contention;

The PPRP Risk Study has been and continues to be treated as the "de facto satisfactory risk assessment" for DCPLNG and Calvert Cliffs", in spite of the limitations of its scope, compounded further by admitted errors and omissions, deliberately obscured facts which understate assumptions used, and gross omissions that render this PPRP risk study mathematically, scientifically, legally and morally flawed. Though errors and omissions were identified by the Petitioner and submitted to the NRC for consideration in their ongoing safety evaluation which produced NRC's SER2009, these concerns which were substantiated by expert opinion and widely accepted scientific studies, were ignored by the NRC. The SER2009 included statements regarding the errors in the PPRP which were admitted by DCPLNG to NRC staff. Misleading statements in the PPRP were also admitted by the Maryland State to the ASLB. However, errors and omissions in the PPRP were never corrected in the official record of this proceeding nor documents submitted into the record to reflect the corrections. Calculations by the CC3 applicant in their FSAR and Confirmatory calculations by NRC and any independent parties based on the incorrect assumptions in the PPRP compounds the risk issue, perpetuates the errors and omissions, and also renders the professional conclusions reached by the NRC to be also partially invalid.

The NRC Safety Evaluation report dated October 28, 2009 (**SER2009**) based its corroborative assessment on this mathematically and scientifically flawed PPRP Study and on the Arthur D. Little Study of 1993 which was completed pre 9-11. By bootstrapping its conclusions from flawed, incomplete, and outdated risk studies, the NRC has rendered the NRC SER2009 to be also flawed and partially invalid as a risk assessment for Calvert Cliffs 1 and 2 and for Calvert Cliffs 3.

Petitioner's residence is adjacent to DCPLNG and is located in Emergency Management Zone 3 of CCNPP, roughly 4 miles south of CCNPP. The evacuation route for Cove Point Beach residents is a single lane road 3 miles to MD Route 4 which is shared by several communities and the workers at DCPLNG. Should there be any accident or deliberate incident occur at DCPLNG or CCNPP, Petitioner and residents of these communities are basically captive with no way out of the gridlock on this 3 mile partial section of the evacuation route. The rest of the most direct and only evacuation route to a zone of safety in St. Mary's County, is a total of 11+ road miles, which includes crossing a single lane bridge (Gov. Thomas Johnson Bridge) over the Patuxent River. This bridge already gets gridlocked during morning and evening rush hours and anytime there is an accident near or on the bridge. This already untenable situation will be further exacerbated by gridlock when there is an emergency rush by other Cove Point residents, residents of nearby communities and business employees lucky enough to get to Route 4 during the emergency evacuation.

Because Calvert County and especially this part of Southern Maryland is a narrow peninsula, there is only one way out for everyone by viable access road (Route 4) that leads out south of CCNPP and DCPLNG. A catastrophic LNG spill on water will mean certain death for the Petitioner and many of the residents of Calvert County. Within the 10 mile radius of CCNPP, are one hundred forty four (144) communities, eighteen (18) schools, four (4) community centers, two (2) camps and eleven (11) parks, not counting the burgeoning expansion of business nearby. Also adversely affected by increased pollution and radioactive fallout from CCNPP are the Chesapeake Bay and its tributaries, Patuxent River and various creeks and streams and three (3) impaired watersheds, the Patuxent River, the Chesapeake Bay, and the Severn River which Calvert County traverses.

The consequences of this CC3 COL application and the PPRP Study been permitted to remain error-plagued in the face of the dire probable consequences possible, when the safety of the United States seat of government is at risk and the lives, health and environment of the citizens of Maryland (including Petitioner whose residence is within 4 miles of CCNPP and Washington, D.C. are compromised.

Supporting arguments and expert studies are provided as attachments and are incorporated by reference with this contention. **Appendix A** covers a more detailed discussion and provides expert opinion in support of this Contention on the validity of the PPRP Study.

PPRP:

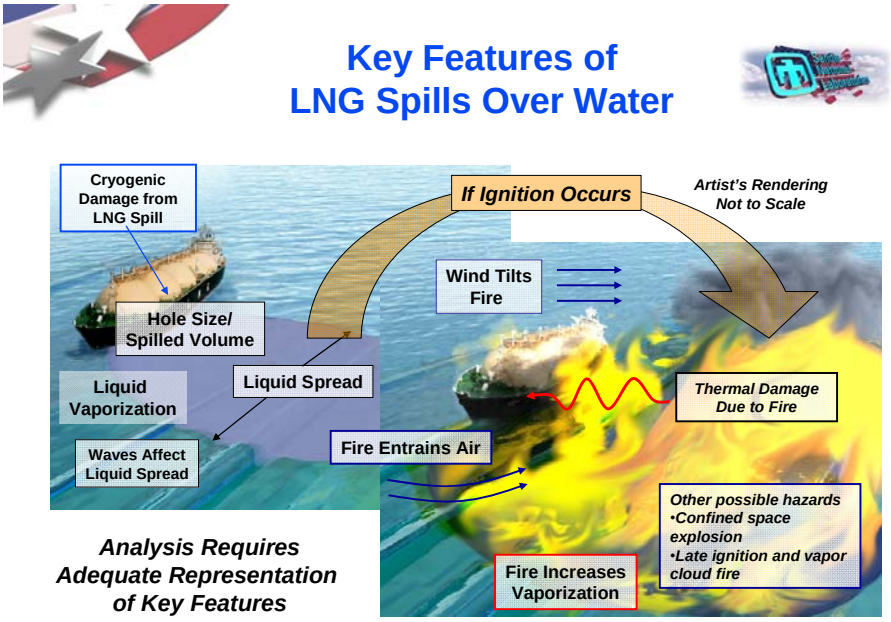
Although the 2006 PPRP Study summary on p.vii states, "After reviewing the draft EIS, PPRP identified the need for an independent and comprehensive evaluation of potential human health risks to nearby communities and risk to the Calvert Cliffs Nuclear Power Plant that would result from the proposed expansion", the PPRP Study is unacceptably deficient, with several flaws:

1. Relied upon LNG land-based foreign studies (UK) to determine risk and consequences for LNG spill on water and failed to use several appropriate studies conducted by experts in the United States, available in the public domain.
2. Omitted the use the **Sandia2004** risk study for LNG spill on water even when it listed Sandia2004 as reference #19 on p. B-2.
3. With the heightened concern of sabotage and terrorist attacks, there was another US study in the public domain that would have been appropriate as a guide and reference, is the

Clarke Report2005 by terrorism expert Richard A. Clarke (former chief counter-terrorism adviser on the U.S. National Security Council) since it was also for marine terminal LNG for Naragansett Bay in Rhode Island.

4. Used imprecise descriptive terminology affecting the import of the volume of LNG spilled (interchangeable use of a single storage tank to also represent entire contents of the LNG ship's cargo) admitted in evidence according to **PPRP/ASLB/MD State.** This affects not only the calculation of LNG spilled in a water-based scenario, but conceptually wraps probability of occurrence of an event (catastrophic LNG spill over water) to be in the same category of evaluation as probability of volume of spill during such an occurence (catastrophic LNG spill over water). This misconceptual wrapping of probabilities is in direct opposition to terrorism expert opinion that was expressed by the **Clarke Report2005** and the **Sandia2004** risk analysis that the probability of occurrence of a terrorist attack on LNG vessel is a viable risk and that a 3-tank breach is highly possible, up to and including total loss of a ship's cargo due to cascading failures that could occur during an intentional breach by a determined group and the nature of LNG spill over water. Below is a representation of catastrophic LNG spill over water from expert sources described in Section A. DEFINITIONS:

Sandia/DOE 2006-slide 5; **DOE/Sandia2007**, Slide 2:



5. The **SER2009** contained discrepancies in the PPRP with regards to volume of LNG stored at DCPLNG: "The (NRC) staff was informed that the four 230,000 barrel storage tanks cited in the PPRP study are incorrect and should be revised as four 375,000 barrels storage tanks each (as previously described in the AD. Little study)." The PPRP shows in ***Table 2.1 Cove Point LNG Operations,*** the incorrect and understated 230,000 which was used in calculations in the PPRP and is understated

PPRP, p.8 states, "A summary of the societal risk criteria suggested by the SSRRC (Santa Barbara County System Safety and Reliability Review Committee) for existing facilities is given in ***Table 3.1***. It is not known if these criteria are still in use in California; however, to our knowledge they are the clearest risk acceptance criteria relevant to an LNG facility that have been developed in the US and are in the public domain. *Table 3.1 Offsite Risk Regulation Criteria for Severe Events (**SSRRC Criteria**)* depicts:

De Manifestis (Risk reduction required at any cost) = > 10^{-5} (1 in 100,000) per year

'Grey Region' (Economic risk reduction methods only) < $1.5 million – Yes;

> $2.0 million – No

= 10^{-5} to 10^{-7} (1 in 100,000 to 1 in 10,000,000 per yr)

De Minimis (No risk reduction required) = < 10^{-7} (1 in 10,000,000) per year.

On page 40 of the PPRP, Section 6.2 Comparison of Risk with Established Risk Criteria, the PPRP states that the **"1980's SSRRC criteria was exceeded",** yet it was ignored in the evaluation conclusions. That statement was followed by, "However, we are not aware of any current and widely accepted criteria directly applicable to this facility."

How can the PPRP ignore what it deemed "clearest risk acceptance criteria relevant to an LNG facility that have been developed in the US and are in the public domain" and just as summarily dismiss it when it purportedly could not find any other "criteria directly applicable to this facility"?

According to **PPRP/ASLB/MD State** submitted to and discussed before the ASLB during Oral Arguments regarding Petitioner's Contention #4, Maryland State Responses to Substantive Questions on the PPRP Study:

2. The PPRP study refers to "total loss of an LNG tanker" (Section 4.4), "Total loss of a ship's tank (Scenarios SH-ER-T, SH-ER-TP,SH-AB-L)" and "Catastrophic loss of a tanker" as SH-ER-T in Table 5.6. What is the difference? Was there a study of the effects of loss of all tanks on a tanker? Is the probability of such an event too low to evaluate?

Answer: The specific scenarios performed as part of the *Cove Pont LNG Terminal Expansion Project Risk Study* are outlined in Table 5.1. Of 12 water-based scenarios evaluated, the worst-case scenarios evaluated with respect to a tanker ship were: (1) total loss to a ship's tank while en route (SH-ER-T); (2) total loss to a

ship's tank while en route, off CCNPP (SH-ER-TP); and (3) total loss of a ship's tank while at berth (SH-AB-T). The "total loss of an LNG tanker" in Section 4.4 refers to any of these potential scenarios. The reference to a "catastrophic loss of a tanker" in Table 5.6 is consistent with a total loss of a ship's tank en route (SH-ER-T). The study did not consider the loss of all tanks on an LNG tanker because of the very low probability of such an event. For the purpose of this Risk Study, any reference to the loss of a "tanker" is equivalent to the total loss of a single tank.

Petitioner Contention: Although the PPRP Study alludes to water-based scenarios evaluated, the study omitted the use of Sandia2004 Risk Analysis water-based scenarios. Instead, the PPRP opted to use a UK Study on spills for land-based Storage Tanks. (See **Appendix A**)

(iii) Demonstrate that the issue raised in the contention is within the scope of the proceeding;

CC3 applicant UniStar uses the flawed PPRP Study extensively in its COL application as justification and basis for its conclusions regarding its proximity to DCPLNG and the overpressure hazards UniStar submitted to NRC are part of the same SER2009 in this contention. The contentions of law and fact have been stated and are within the scope of the NRC's evaluation of CC3. Because CC3 shares many structures and safety requirements with CC1 and CC2, the contentions being brought forth all fall within the scope of the NRC which is currently evaluating the CC3 application and is in the process of developing their draft statement for environmental and safety reports on CC3.

(iv) Demonstrate that the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding;

The estimation of the safety of operation of the new reactor must consider the **real** threats to its physical plant and the challenges presented by conditions that are reflective of the actual operational characteristics of both the reactor, its earlier versions operating on the same point of land, and the neighboring operational characteristics of the adjacent LNG plant, which has approved expansion plans upon which it is constructing facilities to accommodate much larger vessels transporting LNG over bodies of water, not the **scaled-back hypothecations,** designed for minimizing and trivializing the clear and present potential for catastrophic events at the LNG facility as a result of the dangerous state of international affairs for the U.S.

(v) Provide a concise statement of the alleged facts or expert opinions which support the requestor's/petitioner's position on the issue and on which the petitioner intends to rely at hearing, together with references to the specific sources and documents on which the requestor/petitioner intends to rely to support its position on the issue; [and]

The Petitioner has provided a listing in Section A. DEFINITIONS, of widely accepted expert opinions and risk studies supporting this contention. Copies of these relevant expert documents are either provided as attachments (listed in **Appendix F**) and/or access links in the public domain. Expansion of discussions and appropriate excerpts from these expert opinions and studies are in appropriate Appendix Sections in this Contention. However, since the PPRP has included Sandia2004 are reference #19 on page B-2, yet has elected to omit its use (opting instead to use a land-based UK study), a brief overview of this widely accepted scientific and expert opinion and analysis is provided.

SANDIA REPORT

SAND2004-6258

Abstract

While recognized standards exist for the systematic safety analysis of potential spills or releases from LNG (Liquefied Natural Gas) storage terminals and facilities on land, no equivalent set of standards or guidance exists for the evaluation of the safety or consequences from LNG spills over water. Heightened security awareness and energy surety issues have increased industry's and the public's attention to these activities. The report reviews several existing studies of LNG spills with respect to their assumptions, inputs, models, and experimental data. Based on this review and further analysis, the report provides guidance on the appropriateness of models, assumptions, and risk management to address public safety and property relative to a potential LNG spill over water.

2.2 Growing Interest in LNG Safety and Security

The increasing demand for natural gas will significantly increase the number and frequency of LNG tanker deliveries to ports across the U.S. Because of the increasing number of shipments, concerns about the potential for an accidental spill or release of LNG have increased. In addition, since the incidents surrounding September 11, 2001, concerns have increased over the impact that an attack on hazardous or flammable cargoes, such as those carried by LNG ships, could have on public safety and property.

The risks and hazards from an LNG spill will vary depending on the size of the spill, environmental conditions, and the site at which the spill occurs. Hazards can include cryogenic burns to the ship's

crew and people nearby or potential damage to the LNG ship from contact with the cryogenic LNG. Vaporization of the liquid LNG can occur once a spill occurs and subsequent ignition of the vapor cloud could cause fires and overpressures that could injure people or cause damage to the tanker's structure, other LNG tanks, or nearby structures.

Sandia 2004, p.156: Most structures are significantly less resistant to internal blasts than they are to external blasts. If natural gas finds it way into a structure and then ignites, severe structural damage can occur. This is a potential concern to the LNG tanker if the spilled LNG is somehow trapped on the ship or between the hulls, as well as for nearby structures or other ships where the LNG might settle and ignite.

SANDIA REPORT

SAND2008-3153 http://www.fe.doe.gov/programs/oilgas/storage/lng/sandia_lng_1204.pdf (accessed 11/22/09)

p 7: The hazard results developed were based on a range of nominal, or most likely, spill conditions and are not site-specific. Site-specific hazard distances will change depending upon the location of the facility, number, size, and type of LNG carriers or regasification vessels used, as well as environmental conditions. Therefore, the hazard results presented are intended to convey the scale of possible hazard distances for a large spill over water from emerging large capacity LNG carriers. While the major hazards expected from an LNG spill for the intentional events considered are thermal hazards from a fire, vapor dispersion distances for potential spills were also calculated. Dispersion is significantly influenced by environmental conditions and potential

ignition sources, and the information presented should again be used for identifying the scale of hazards, not necessarily be used for defining hazard distances for a specific site.

As noted in the 2004 Sandia LNG report, scenarios could include breaching of more than one LNG cargo tank during intentional events and was considered in these evaluations. Also, cascading damage to an adjacent LNG cargo tank from initial damage to one LNG cargo tank may be possible, based on current experimental data and modeling evaluations, and was considered. As discussed in the 2004 Sandia LNG report, while not considered the most likely LNG spill events, consideration of **up to three tanks spilling at any one time** is expected to provide a conservative analysis of possible cascading damage concerns and associated hazards.

(vi) . . . Provide sufficient information to show that a genuine dispute exists with the applicant/licensee on a material issue of law or fact.

It has already been documented that CC3's FSAR relies heavily on the PPRP Study. Supporting documentation and expert opinion are being provided herewith and in the various appendices of this contention. When a COL application and FSAR rely on flawed and incomplete information as its basis, it is consequently flawed and invalid likewise. Mathematically and scientifically, the PPRP risk analysis is severely flawed, has a flawed scientific basis for its assumptions on LNG spill over water, blatantly omits overpressures on a LNG spill over water that, by volume and intensity, can be of far greater magnitude in both the quantity of spill and ensuing fire and radiant heat. Intentional incidents which are accepted as viable by expert opinion, could cause more than just overpressures from pipelines. Expert opinion and studies controvert the

assumptions and conclusions from the base document (PPRP Study), therefore, any study or evaluation that accepts such flaws become likewise invalid and perpetuate the errors and omissions. All the understatements and inappropriate assumptions identified in the discussions in this contention, demonstrate a genuine dispute on the risk analyses in magnitudes of at least 6 to more than 10 by under-estimating LNG volume in its risk assumptions, deliberately or negligently obscures the facts by interchangeably using the term "tank" to mean "storage tank"(25,000 m3) as well as "entire ship's tank" (148,000 m^3 -260,000 m^3), and still further is compounded by the gross understatement of the volume of actual size of LNG storage tanks at DCPLNG. When NRC pointed out the discrepancy (SER 3.1 Cove Point LNG Facility Expanded Storage and Shipment Capacity; PPRP Study; par. 1) , DCPLNG admitted to NRC Staff that ***"four 230,000 barrel storage tanks cited in the PPRP study are incorrect and should be revised to read as four 375,000 barrels storage tanks each"***.

The errors on the PPRP have never been corrected to the Petitioner's knowledge and the SER2009 did not state that there were corrections made or that the computations in the PPRP risk analysis were compromised by the magnitude of this one particular error, which is nearly double the amount of LNG content. Thus every one of these gross understatements negatively impacts the assumptions used in risk analyses and ultimately, the conclusions drawn from them.

Furthermore, it does not address any of the new developments at DCPLNG (such as pier expansion impacts and larger vessel and frequency of deliveries). And the continued use of this PPRP risk analysis as a suitable risk assessment for Calvert Cliffs, rather then undertaking an independent risk assessment as might be expected for a new reactor facility renders any risk analysis based on the PPRP analysis to be just as flawed. The NRC and Calvert Cliffs have never

conducted an independent risk assessment of its proposed facility and the NRC's Safety Evaluation was bootstrapped on the faulty risk analysis results presented by the PPRP, therefore repeats the flaws and errors but also increases the magnitude of the errors by the factors of the omissions.

The Petitioner resides at Cove Point Beach, the community immediately adjacent to DCPLNG and roughly 4 miles from CCNPP. The elderly and long time residents of Cove Point Beach still remember that the last LNG-related death in the United States occurred at the DCPLNG facility, the death deemed caused by operational negligence and resulted in damages of about $3 Million and the plant's shutdown shortly thereafter. As in any industrial operation, events outside of the operation of a plant such as CCNPP, could cause failures at CCNPP. CCNPP's 3-mile proximity to the shipping lane and pier where LNG tankers with carrying capacity of 260,000 m^3 of LNG (equivalent to 156 million cubic meters of natural gas in a pipeline) and the heightened threat of an intentional act targeting both DCPLNG and CCNPP; this threat of catastrophic spill on LNG on water with cascading failures was not adequately addressed in the PPRP Study and the NRC SAFETY EVALUATION. At risk in the vicinity of CCNPP are one hundred forty four (144) communities, eighteen (18) schools, four (4) community centers, two (2) camps and eleven (11) parks, not counting the burgeoning expansion of business nearby. Also adversely affected are the Chesapeake Bay and its tributaries, Patuxent River and various creeks and streams and three (3) impaired watersheds, the Patuxent River, the Chesapeake Bay, and the Severn River which Calvert County traverses and which are also affected by air/water pollution and radiation fallout from CCNPP.

With SAFETY and responsible management at issue, CCNPP has had its own "near misses" and fines. The two existing reactors at Calvert Cliffs have been fined for safety failures. For example, the NRC fined CCNPP $50,000 in 1996 for problem with emergency equipment that had been identified in 1992 but still had not been repaired four years later!

http://www.nrc.gov/NRR/OVERSIGHT/ASSESS/REPORTS/calv_2004002.pdf (accessed 11/30/090) "CALVERT CLIFFS NUCLEAR POWER PLANT - NRC INTEGRATED INSPECTION REPORT 05000317/2004002 AND 05000318/2004002" is a March 2, 2004 NRC letter and report to UniStar's CEO George Vanderheyden, then CCNPP Vice President, on "inspection examined activities conducted under your license as they relate to plant design activities and compliance with the Commission's rules and regulations." The violation, given an emergency situation such as an intentional incident affecting CCNPP, could have serious consequences. According to the report, page ii, Enclosure "……could impact core cooling if the redundant train of HPSI were to fail. The finding was more than minor because it affected the Mitigating Systems cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events (i.e., loss of coolant accidents) to prevent undesirable consequences (core damage)." On page 9: "identified several deficiencies relating to load flow calculations and procedures necessary to ensure availability of the preferred offsite source during a unit trip, **including trips associated with accidents."**

Contention 9. UniStar Nuclear's application does not address a fundamental safety problem identified by European nuclear regulators.

On November 2, 2009, the UK nuclear safety regulator (HSE's ND), the French nuclear regulator (ASN), and the Finnish nuclear regulator (STUK) issued an unprecedented joint letter to Areva, the manufacturer of the EPR reactor design. This **Joint Regulatory Position Statement on the EPR Pressurized Water Reactor is attached and can be found at:**

http://stuk.fi/stuk/tiedotteet/fi_FI/news_571/_files/82389003978932250/default/epr_stuk_asn_ja_hse_englanniksi.pdf

This letter cited serious problems with the EPR's fundamental digital Instrumentation and Control systems (I&C). The letter stated:

"The issue is primarily around ensuring the adequacy of the safety systems (those used to maintain control of the plant if it goes outside normal conditions), and their independence from the control systems (those used to operate the plant under normal conditions).

Independence is important because, if a safety system provides protection against the failure of a control system, then they should not fail together. The EPR design, as originally proposed by the licensees and the manufacturer, AREVA, doesn't comply with the independence principle, as there is a very high degree of complex interconnectivity between the control and safety systems."

This letter identifies a significant, and fundamental, violation of the basic principles of nuclear reactor design, and is a safety issue of the highest significance.

UniStar Nuclear's application for a Combined Construction/Operating License does not address these recently identified deficiencies in the EPR design, nor how they may be corrected. Thus, the license application is incomplete on a fundamental safety issue.

Request of the ASLB

Joint intervenors reiterate that life and property are genuinely at risk and these concerns are supported by facts, which are still in dispute and identified in the CC3 FSAR, PPRP Study, and NRC's SER2009. Joint intervenors' disputes with conclusions in the FSAR, PPRP Study and NRC's SER2009 are also supported by expert opinions and studies, as identified and incorporated in this request. Particular attention is directed to the last page of Appendix E, **Clarke Report2005** p.118**: Table 3.1:** ***Thermal Radiation Burn Injury Criteria*** (from FEMA), which were never considered or discussed in the evaluations of risk and safety.

Joint intervenors request that the ASLB address the issue of the admitted errors and omissions in the base document, the PPRP Study, their incorporation from which the NRC SER2009 draws its calculations and conclusions, and upon which the CC3 COL, FSAR, and CC3 siting have also drawn invalid conclusions, and therefore fail to meet the criteria requirements for **10 CFR 52.79** and **10 CFR Part 50.**

With these issues of law and fact presented, Contentions 8 and 9 are admissible for hearing.

Note: Joint Intervenors attempted to file this document on November 30, 2009, but had problems with our new digital certificate. Technical support at NRC was contacted and the problem cleared up on December 1, 2009.

Respectfully submitted,

This 1st day of December 2009
_____Signed Electronically by_____
Michael Mariotte
Executive Director
Nuclear Information and Resource Service

6930 Carroll Avenue, Suite 340
Takoma Park, MD 20912
301-270-6477
nirsnet@nirs.org

_____ Executed in Accord with 10 CFR 2.304(d)_____

Paul Gunter
Beyond Nuclear
6930 Carroll Avenue, Suite 400
Takoma Park, MD 20912
301-270-2209
paul@beyondnuclear.org

_____ Executed in Accord with 10 CFR 2.304(d)_____

Allison Fisher
Public Citizen
215 Pennsylvania Avenue SE
Washington, DC 20003
202-546-4996
afisher@citizen.org

_____ Executed in Accord with 10 CFR 2.304(d)_____

June Sevilla
SOMDCARES
3086 Calvert Blvd
Lusby MD 20657
410-326-7166
qmakeda@chesapeake.net

CERTIFICATE OF SERVICE

It is our understanding that all on the Calvert Cliffs-3 service list are receiving this motion through the submission I am making on December 1, 2009 via the EIE system.

Joint Intervenors New Contentions (Contention 8 & 9), December 1, 2009

_____Signed Electronically by_____
Michael Mariotte
Executive Director
Nuclear Information and Resource Service
6930 Carroll Avenue, Suite 340
Takoma Park, MD 20912
301-270-6477
nirsnet@nirs.org

_____ Executed in Accord with 10 CFR 2.304(d)_____
Paul Gunter
Beyond Nuclear
6930 Carroll Avenue, Suite 400
Takoma Park, MD 20912
301-270-2209
paul@beyondnuclear.org

_____ Executed in Accord with 10 CFR 2.304(d)_____
Allison Fisher
Public Citizen
215 Pennsylvania Avenue SE
Washington, DC 20003
202-546-4996
afisher@citizen.org

_____ Executed in Accord with 10 CFR 2.304(d)_____
June Sevilla
SOMDCARES
3086 Calvert Blvd
Lusby MD 20657
410-326-7166
qmakeda@chesapeake.net

Appendix A

NRC Allegation No. NRR-2009-A-0006 Supporting Documentation

See Documents/Attachments to this Contention:
NRC SER2009_ Appendix A-NRC-Cwalina letters.pdf
NRC SER2009_ Appendix A-Exhibit 3-PPRP Risk Study Gaps and Deficiencies.pdf
NRC SER2009_ Appendix A- Admissibility Argument Contentions 4 and 5-final.pdf
NRC SER2009 (October 28, 2009 "SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION REGARDING THE EFFECT OF EXPANDING THE COVE POINT LIQUEFIED NATURAL GAS FACILITY ON SAFETY AT CALVERT CLIFFS NUCLEAR POWER PLANT, UNIT NOS. 1 AND 2, DOCKET NOS. 50-317 AND 50-318." (NRC's SAFETY EVALUATION also includes effects to the proposed Calvert Cliffs 3).
PPRP-CovePt_FINAL_June2006 (PPRP Study)
MD Identification of Representatives and Response to Board Questions.pdf

Omissions, understated LNG volumes, incorrect assumptions, and limited modeling calculations in the PPRP Study render all risk and safety evaluations on CCNPP seriously understated, mathematically incorrect, and scientifically flawed. The CC3 FSAR and the NRC's SER2009 which all bootstrapped their assumptions and calculations from this PPRP Study serve to perpetuate all these identified and admitted errors, rendering the affected portions of these evaluations partially invalid. These Petitioner concerns are statement of fact and are supported by content in the NRC SAFETY EVALUATION (**SER2009**), the **PPRP Study** in question, **Sandia2004** and other Sandia and PPRP-related documents incorporated herewith by reference.

***SER2009, p. 3* :** 3.1 Cove Point LNG Facility Expanded Storage and Shipment Capacity
PPRP Study
In the 2006 PPRP study, the Cove Point facility is described as consisting of one 850,000 barrel and four 230,000 barrel storage tanks. In this study, the future expansion of the facility is described in terms of two additional LNG tanks of 1,000,000 barrels each. It is the NRC staff's understanding that the currently existing 850,000 barrel tank was constructed in lieu of the previously proposed two 600,000 barrel tanks. However, it was not clear how the transition was made from the previously existing four 375,000 barrel tanks to the presently existing four 230,000 barrel tanks.
In order to address this apparent inconsistency in the description of the storage capacity, the NRC staff met with the Cove Point facility representatives on September 16, 2008, at the Cove Point site. The staff was informed that the **four 230,000 barrel storage tanks cited in the PPRP study are incorrect** and should be revised as four 375,000 barrels storage tanks each (as previously described in the AD. Little study)

SER2009 as quoted above, states the admission of DCPLNG that the volumes of LNG on the PPRP are incorrect. This volume of LNG (four 230,000 barrels) used by the PPRP Study is understated by 63% when compared to the actual four 375,000 barrels installed at DCPLNG. ***PPRP Table 2.1*** and ***Table A 2-4*** describe the volume, terminology, and the methodology used to perform calculations and their negative impact to the SAFETY EVALUATION. (*emphasis added*)

1) The 63% understatement of LNG volume on shore negatively affects the assumptions and calculations for LNG liquid releases on shore and for computing volumes for cascading failures (on shore as well as combined on shore and off shore liquid releases and vapor clouds formed from these releases).

2) The assumption stated in ***PPRP Study, p.A-5:*** 2.1.1 Liquid Releases from Storage Tanks and Tanker Compartment, "The tanker compartment height was estimated on the assumption that the compartment was spherical, with the diameter (of a cylindrically vertical tank; the only tank type allowed in the liquid release rate model) estimated from the assumed capacity" appears to be both inadequate from the "liquid release rate model" used and understated from the "assumed capacity". The PPRP assumed capacities are understated in two identified incorrect volumes of LNG:

   a) the 63% understatement in on shore storage tanks (4 X 230,000 barrels) or 240,000 m^3 of LNG that a single tank (assumed to be 25,000 m^3) on a LNG ship accounts for an entire ship's cargo (148,000 m^3 for a small LNG ship to 260,000 m^3 for the larger tankers).
   b) The "cylindrically vertical tank; the only tank type allowed in the liquid release rate model" is the shape of the on-shore storage tanks (see picture of DCPLNG, following). The LNG tanker storage tanks however, are spherical (see picture of LNG ship docked at DCPLNG, following), both obtained from 2006 **Project Description** slide, **Cove Point LNG Expansion Project Update"** by Richard McLean, DNR Power Plant Research Program (accessed 11/30/09) http://esm.versar.com/pprp/PPRAC/presentations/8_July06_McLean_CovePoint%20LNG_files/frame.htm
   c) The PPRP Study utilized a UK land -based study (see discussions in Appendix A attachment, NRC SER2009_ Appendix A-Exhibit 3-PPRP Risk Study Gaps and Deficiencies.pdf which Petitioner submitted to NRC under NRC Allegation No. NRR-2009-A-0006)
   d) PPRP Study omitted the use and guidance of the more appropriate SANDIA2004 US Study and expert opinion for Large LNG Spill on Water, which the study listed as reference #19 in page B-2.

3) The PPRP assumption of a catastrophic LNG spill on water as a single tank (25,000 m^3) failure is contradicted by the post 9-11 **Sandia2004** 3-tank breach guide (more understatement of LNG volume, adding another 67% understatement to risk and safety calculations).
   a) The **Sandia2004** guide is reconfirmed by subsequent Sandia studies, presentations, and reports such as **Sandia/DOE2006, DOE/Sandia2007, SANDIA2008** and by the **Clarke Report2005**, all expert opinions and studies incorporated by reference in this Contention.
   b) These same studies (**SANDIA2008** is quoted) to also state that even a single tank breach could set the LNG tanker on fire and could cause the total loss of the LNG ship's cargo (between 148,000 m^3 to 260,000 m^3), further impacting the total amount of LNG spilled which exponentially alters assumptions of temperatures and overpressures resulting from RPT's of the LNG, size of LNG pool fire, size of flammable vapor cloud, radiant heat that cause burns and death to CCNPP and DCPLNG personnel, residents in the area, and emergency responders. Damage to structures at CCNPP and DCPLNG from overpressures and resulting fire have also been grossly understated in the PPRP Study as it stands, and the additional understating of volumes of LNG further exacerbates the errors exponentially, rendering evaluations and conclusions drawn from flawed bases, to be also flawed and

invalid, such as the **CC3 FSAR** and the NRC SAFETY EVALUATION (**SER2009**). (*emphasis added*)

c) The use of improper terminology in the PPRP provide misleading assumptions on volume of LNG spilled in the PPRP Study. These were admitted by MD State Assistant Attorney General during the ASLB oral arguments by Petitioner's Contention #4 (see attachment MD Identification of Representatives and Response to Board Questions.pdf). An excerpt, below, directly affects computations in the PPRP's ***Table A 2-4 Liquid Releases from Storage Tanks and Tanker Compartment***

>>>>>>>>>

"2. The PPRP study refers to "total loss of an LNG tanker" (Section 4.4), "Total loss of a ship's tank (Scenarios SH-ER-T, SH-ER-TP,SH-AB-L)" and "Catastrophic loss of a tanker" as SH-ER-T in Table 5.6. What is the difference? Was there a study of the effects of loss of all tanks on a tanker? Is the probability of such an event too low to evaluate?

4) Answer: The specific scenarios performed as part of the *Cove Pont LNG Terminal Expansion Project Risk Study* are outlined in Table 5.1. Of 12 water-based scenarios evaluated, the worst-case scenarios evaluated with respect to a tanker ship were: (1) total loss to a ship's tank while en route (SH-ER-T); (2) total loss to a ship's tank while en route, off CCNPP (SH-ER-T_P); and (3) total loss of a ship's tank while at berth (SH-AB-T). The "total loss of an LNG tanker" in Section 4.4 refers to any of these potential scenarios. The reference to a "catastrophic loss of a tanker" in Table 5.6 is consistent with a total loss of a ship's tank en route (SH-ER-T). The study did not consider the loss of all tanks on an LNG tanker because of the very low probability of such an event. For the purpose of this Risk Study, any reference to the loss of a "tanker" is equivalent to the total loss of a single tank."

>>>>>>>>>>>

PPRP Study, p.4: PPRP Table 2.1 Cove Point LNG Operations shows 230,000 barrels used in calculations for LNG released as stated in Section 2.1.1 and in Table A 2-4 below. These calculations are affected by the 63% understatement of the actual volume of LNG stored on shore and the calculations for cascading failures.

PPRP Study, p.A-5:

2.1.1 Liquid Releases from Storage Tanks and Tanker Compartment

Tank input data are shown in ***Table A 2-4***. Tank configurations are based on capacities of 60,000 m^3 (230,000 barrels), 135,000 m^3 (850,000 barrels), 160,000 m^3 (1,000,000 barrels), and 25,000 m^3 (157,000 barrels) for Tanks A to D, Tank E, Tank F or G, and a single compartment in an LNG tanker respectively. Storage tank diameters were measured from site plans, with heights then calculated from the tank capacity. The tanker compartment height was estimated on the assumption that the compartment was spherical, with the diameter (of a cylindrically vertical tank; the only tank type allowed in the liquid release rate model) estimated from the assumed capacity.

Table A 2-4 Liquid Releases from Storage Tanks and Tanker Compartment

Applies to scenarios:
SH-AB-S, SH-AB-M, SH-AB-L, SH-AB-T
SH-ER-S, SH-ER-M, SH-ER-L, SH-ER-T
SH-ER-S_P, SH-ER-M_P, SH-ER-L_P, SH-ER-T_P
ST-S, ST-M, ST-L, ST-T
Storage Temperature, $_oC$ -166.5 5$_oC$ below boiling point
Storage Pressure Atmospheric
Orifice location, m from tank base 0 Maximum liquid head
Discharge Coefficient 0.6 Typical for sharp edged orifice

Figure 1. **Cove Point LNG Expansion Project Update, Project Description,** following, was obtained from the 2006 **Project Description** slide, **Cove Point LNG Expansion Project Update"** by Richard McLean, DNR Power Plant Research Program http://esm.versar.com/pprp/PPRAC/presentations/8_July06_McLean_CovePoint%20LNG_files/frame.htm (acccessed 11/30/09)

Figure 1 illustrates that on-shore LNG storage tanks are cylindrical in shape, while LNG tanker storage tanks are spherical in shape and volumes for these tanks are mathematically computed using different formulas. This controverts the calculation stated in the foregoing PPRP ***2.1.1 Liquid Releases from Storage Tanks and Tanker Compartment***, described in the preceding page, "diameter (of a cylindrically vertical tank; the only tank type allowed in the liquid release rate model)", compounded by the admitted understatements of volumes in the PPRP of 580,000 barrels of LNG in cylindrically vertical storage tanks [4x(375,000 – 230,000)], plus the understatement of at least 50,000 m^3 of LNG in spherical LNG tanker storage tanks (75,000 – 25,000), since the PPRP only used a ship's single tank breach instead of the expert opinion of Sandia2004 and Sandia2008 that a ship's 3-tank breach of LNG spill on water is most likely for an intentional incident.

Figure 1. **Cove Point LNG Expansion Project Update, Project Description:**

- In April 2005, Dominion Resources submitted an application to FERC to expand its current LNG Terminal and on-shore storage facility at Cove Point in Calvert County, Maryland
- The project is estimated to provide an increase of 1.0 billion cubic feet of natural gas per day
- The on-shore facility will add two 160,000 m^3 LNG storage tanks
- The expansion project will require an additional 22 acres of developed land to a total of 130 acres

Appendix B

As previously stated in Petitioner's Contention #4 and incorporated herein by reference, is the fact that CC3 applicant's FSAR contains statements which prove that their analysis, assumptions, and conclusions are severely flawed, are mathematically and scientifically inaccurate by their bootstrapping on a flawed PPRP Study, and any additional calculations and evaluations provided by the applicant in their FSAR do not conform to a catastrophic LNG spill on water as demonstrated by widely accepted expert opinions and studies. This Appendix B provides expert opinion and studies quoted directly from the various **Sandia National Laboratory Studies on LNG Spill On Water** and from the terrorist expert analysis, the **Clarke Report2005** as previously defined in Section A, DEFINITIONS.

Applicant's FSAR and Overpressure Analysis submitted to NRC, the NRC's SER2009, and the PPRP Study to which the SAFETY EVALUATION affecting CCNPP Unit 1, Unit 2 and Unit 3 (CC3) are being controverted by the following expert opinions and studies available in the public domain and which were not utilized by all 3 parties in their Risk Analysis and SAFETY EVALUATION.

Statement of FACTS BEING CONTROVERTED:

A. CCNPP Unit 3 FSAR Page 2.2-14, Rev 0:
(as referenced in Petitioners' previous Contention #4)

2.2.3.1.2 Flammable Vapor Clouds (Delayed Ignition)
Par 3: …….. ALOHA was used to model the worst case accidental vapor cloud explosion, including the **safe distances and overpressure effects** at the nearest safety-related {CCNPP Unit **3)** structure. To model the worst case in ALOHA, ignition by detonation was chosen for the ignition source. The safe distance was measured as the distance from the spill site to the location where the pressure wave is at **1** psi (6.9 kPa) overpressure.

Conservative assumptions were used in both ALOHA analyses with regard to meteorological inputs and identified scenarios. The following meteorological assumptions were used as inputs to the computer model, ALOHA: Pasquill stability class F (stable), with a wind speed of 1 m/sec; ambient temperature of 25 ^{0}C; relative humidity 50%; cloud cover 50%; and an atmospheric pressure of 1 atmosphere. Pasquill Stability class F represents the worst 5% of meteorological conditions observed at a majority of nuclear plant sites. **For each of the identified chemicals, it was conservatively assumed that the entire contents of the vessel leaked forming a 1 cm thick puddle. This provides a significant surface area to maximize evaporation and the formation of a vapor cloud**.

CCNPP Unit 3 FSAR Page 2.2-15 Rev. 0:

The analyzed effects of flammable vapor clouds and vapor cloud explosions from internal and external sources are summarized in Table 2.2-9 and are described in the following sections relative to the release source.)

Waterway Traffic
{CCNPP Unit 3 is located about 1,000 ft (305 m) from the west bank of the Chesapeake Bay.
The plausible chemicals identified for further analysis due to their capability of forming a vapor cloud with delayed ignition and possibly exploding are: gasoline; benzene; toluene; ammonia;

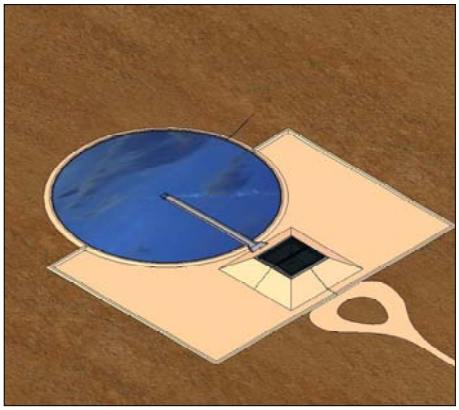
and **liquefied natural gas**. As detailed in Section 2.2.2.4.2, the DCPLNG facility operates a liquefied natural gas facility with an offshore terminal located approximately 3.2 mi (5.2 km) south of the CCNPP site.
It is estimated that approximately 90 LNG tankers per year currently transit the Chesapeake Bay to the DCPLNG terminal. With the planned expansion of the DCPLNG facility, nearly 200 LNG tankers will transit the Bay to this facility. Section 2.2.3 addresses the overall risks associated with the DCPLNG facility for both the current and planned expansion, including its terminal, to the CCNPP site (MDNR, 2006).
The specific hazards associated with LNG tankers in the vicinity of the CCNPP site are presented in Table 2.2-9. The greatest consequence range presented, 13,943 ft (4,250 m), or 2.64 mi (4.25 km), was for the scenario where a total loss of LNG tanker inventory occurred.
This maximum range is less than the distance from the postulated accident site to the CCNPP site.

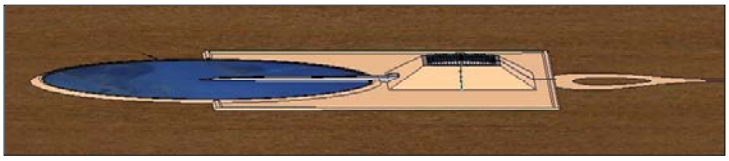
DISCUSSION IN SUPPORT OF CONTENTION, utilizing widely accepted expert scientific opinion and studies omitted by the three SAFETY EVALUATIONS: CC3 FSAR, PPRP Study, and NRC's SER2009:

1) The ALOHA calculations in the FSAR, generalized Liquid Natural Gas (LNG) to behave in the same category as other hazardous chemicals, including the assumption that "**For each of the identified chemicals, it was conservatively assumed that the entire contents of the vessel leaked forming a 1 cm thick puddle. This provides a significant surface area to maximize evaporation and the formation of a vapor cloud**.
   a) LNG is cryogenic and behaves very differently from the other chemicals being analyzed, especially when spilled on water such as the Chesapeake Bay. This is documented by the following Sandia expert opinions and studies.
   b) LNG spills are categorized as a "pool" in cubic meters of spill, which is much larger by order of magnitude than "leak forming 1 cm thick puddle" (1m = 100 cm; 1 m^3 = 1,000,000 cm^3). See below, **DOE/Sandia2007, Slide 18:**

Large LNG Experiment Description

- LNG gravity released onto a 120-m diameter water pool (1-m deep).
- Concrete-lined soil-bermed reservoir supplies pipes that extend from the reservoir bottom to a covered collector box.
- LNG flows on an open concrete channel to the center of the pool.
- Capped reservoir vents LNG vapors during the filling process.
- Large diked impoundment area in event of reservoir leakage





c) LNG spill on water creates overpressures from Rapid Phase Transitions (RPT) which were never addressed in any of the 3 evaluation documents being disputed. CC3 FSAR, PPRP Study, NRC SER2009. The Sandia2004 study omitted by the PPRP Study, CC3 FSAR and NRC SER2009, demonstrate that RPT's can create overpressures that could be greater than 1 psi, depending on the assumptions made for the scenario of cascading failures which can take place from a deliberate incident by a determined group.

2) The PPRP Study understated amount of LNG spilled, and by use stating that "**total loss of LNG tanker inventory occurred**" when in fact, only one-fifth of the entire contents of the LNG ship's cargo was used (25,000 m^3 LNG); cleverly concealed by the use of imprecise language and admitted by the Maryland Assistant Attorney General in the document **PPRP/ASLB/MD State** contrary to the Sandia guidance of a possible 3-tank breach.
3) As described in item 1 Section A. Definitions, ***SER2009, on p.3*** states: 3.1 Cove Point LNG Facility Expanded Storage and Shipment Capacity, PPRP Study, par. 2: "In order to address this apparent inconsistency in the description of the storage capacity, the NRC staff met with the Cove Point facility representatives on September 16, 2008, at the Cove Point site. The staff was informed that the **four 230,000 barrel storage tanks cited in the PPRP study are incorrect and should be revised as four 375,000 barrels storage tanks each** (as previously described in the AD. Little study).
4) The distances to safety from fires resulting from cascading failures of both on shore attack and a catastrophic spill of LNG over water is understated in the PPRP Study by the 63% understatement of LNG capacity in storage tanks and the understatement of at least 67% of LNG spilled using a 3-tank breach. These gross understatements negatively impact the conclusions of safety in the PPRP and consequently in the CC3 FSAR and the NRC SER2009.(*emphasis added*)
5) **Fires and consequences** are covered in more detail in **Appendix E** and information obtained from the **Clarke Report2005** expert opinion and the **Sandia Studies** in support of same.

OVERPRESURES: These overpressures affect the SAFETY EVALUATION and conclusions drawn from CCNPP Units 1 and 2 and CC3. They also challenge the acceptance of NRC on the Pipeline Overpressure submitted by CC3 as reiterated in SER2009. An **intentional incident could cause both pipeline overpressures and LNG spill on water overpressures, the latter having never been addressed by all parties**.

Supporting documentation on **Rapid Phase Transition (RPT)** of LNG spill over water which cause **OVERPRESSURE** are reiterated in this **Appendix B,** using relevant information excerpts from various Sandia National Laboratories Risk Analyses of LNG spill on Water.

Excerpts from SANDIA2004, "Guidance on Risk Analysis and Safety Implications of a Large LNG Spill Over Water" (SAND2004-6528, Dec 2004)" which the PPRP Study indicates as reference #19 on page B-2. The PPRP Study however, deliberately omitted these facts about LNG spills.

Sandia2004, p.11: SYMBOLS AND ACRONYMS (RPT) Rapid Phase Transitions: the rapid evaporation of a liquid resulting from contact with another liquid that is at a temperature significantly above the boiling temperature of the evaporating liquid.
Sandia2004, p.39: Rapid Phase Transitions (RPT)
Rapid Phase Transitions occur when the temperature difference between a hot liquid and a

cold liquid is sufficient to drive the cold liquid rapidly to its superheat limit, resulting in spontaneous and explosive boiling of the cold liquid. When a cryogenic liquid such as LNG is suddenly heated by contacting a warm liquid such as water, explosive boiling of the LNG can occur, resulting in localized overpressure releases. Energy releases equivalent to several kilograms of high explosive have been observed.

Sandia2004, p.108 2.3 Rapid Phase Transition (RPT) Explosions

2.3.1 Experiments

Coyote Tests – 1981 [Goldwire et al. 1983] [McRae et al. 1984] [Morgan et al. 1984] [Rodean et al. 1984] [Ermak et al. 1983] [Ermak et al. 1982]

The Coyote series is a continuation of the Burro test series to further study combustion hazards and rapid phase transition (RPT) explosions. They were performed by Lawrence Livermore National Laboratory (LLNL) and the Naval Weapons Center at China Lake, California, and sponsored by the U.S. DOE and the Gas Research Institute. To study RPTs, 13 spills of 3 – 14 m^3 with flow rates of 6 – 19 m^3/min were performed with fuel of varying ratios of methane, propane, and ethane. Five spills of 8 – 28 m^3 with flow rates of 14 – 17 m^3/min were also performed, obtaining dispersion and combustion data under a variety of meteorological conditions.

Six of the 18 Coyote spills produced RPT explosions. Most were early RPTs that occurred immediately with the spill, and in some cases continued for the duration (over a minute) of the spill. They were generally located near the spill point and appeared to be primarily underwater. Delayed RPTs, occurring at the end of the spill and located away from the spill point out on the LNG pool surface, were also observed. Delayed RPTs occurred on three tests.

The results indicate that, for the spill sizes tested, the pre-spill composition is not a good indication of the likelihood of an RPT. Enger and Hartman from Shell performed a series of small-scale experiments (~0.1 m^3) and found that **there is a composition envelope within which RPTs can occur [Enger and Hartman 1972]. The Coyote tests found RPTs occurring outside this envelope, indicating that other mechanisms become dominant for larger spills.**

Water temperature appeared be correlated with the occurrence of RPTs…… Spill rate was found to correlate with maximum RPT yield. **An abrupt increase in the RPT explosive yield was found at around 15 m^3/min, from which the strength increased by five orders of magnitude, to 18 m^3/min.** The maximum equivalent free-air, point source TNT explosion that occurred was 6.3 kg for about an 18 m^3/min spill rate.

Appendix C

(Covers attachments and links to various LNG Studies)

(Note: **Appendix C** on LNG FIRES are covered under **Appendix E**)

- **Sandia2004** means Sandia National Laboratories "Guidance on Risk Analysis and Safety Implications of a Large LNG Spill Over Water" (SAND2004-6528, Dec 2004)", which the PPRP Study indicates as reference #19 on page B-2.(or see attachment, **sandia_lng_1204.pdf)**

- **Sandia/DOE2006** means "Sandia National Laboratories Guidance on Safety and Risk Management of Large Liquefied Natural Gas (LNG) Spills Over Water", U.S. Department of Energy LNG Forums 2006 http://fossil.energy.gov/programs/oilgas/storage/lng/houston_p2n2_hanlin.pdf (accessed 11/29/2009)

- **DOE/Sandia2007** means "DOE/Sandia National Laboratories Coordinated Approach for LNG Safety and Security Research", Briefing to NARUC Staff Subcommittee on Gas; July 15, 2007, accessed 11/29/09 http://www.narucmeetings.org/Presentations/Tom%20Blanchat%20Presentation.ppt#264,1,DOE/Sandia National Laboratories Coordinated Approach for LNG Safety and Security Research

- **Sandia2008** means SAND2008-3153, Breach and Safety Analysis of Spills Over Water from Large Liquefied Natural Gas Carriers (accessed 11/22/09) http://www.fe.doe.gov/programs/oilgas/storage/lng/sandia_lng_1204.pdf

Appendix D

The CC3 FSAR, PPRP Study, and NRC SER2009 did not address tornados and their effect on CCNPP.

Tornado just missed nuclear plant -Storm passed two miles northeast of Calvert Cliffs, officials estimate (accessed 11/25/09)

http://www.baltimoresun.com/news/yahoo/bal-te.md.reactor01may01,0,3953009.story

TORNADOS in Southern Maryland and vicinity of CCNPP on the Chesapeake Bay.
http://somd.com/news/headlines/2002/04/tornado/ accessed 11/25/09

F5 Class Tornado Strikes Southern Maryland on April 28, 2002

A tornado, ranging from strengths of F3 to F5, tore a path through Charles, Calvert, and Dorchester counties in Maryland on Sunday April 28 2002. The area suffered millions of dollars of property damage and there was a loss of three souls…….

(Source: National Weather Service)
FUJITA WIND DAMAGE SCALE

Classification	Wind Speed	Damage
FO	72 MPH	LIGHT
F1	73-112 MPH	MODERATE
F2	113-157 MPH	CONSIDERABLE
F3	158-206 MPH	SEVERE
F4	207-260 MPH	DEVASTATING
F5	260-319 MPH	INCREDIBLE

The F5 Tornado as seen from the Baltimore Gas & Electric (BGE) Calvert Cliffs Nuclear Power Plant in Lusby, MD as it begins it's trek across the Chesapeake Bay. This photo was shot looking east, close to the plant's water intake systems. The photos were taken by an on-duty employee of the power plant. Photo Credit: Calvert Cliffs Nuclear Power Plant

APPENDIX E
Deliberate Incident Concerns and Security Analysis for CCNPP

Investigator Richard A. Clarke" (former chief counter-terrorism adviser on the U.S. National Security Council) has stated in his **Clarke Report2005** that "Traditional risk management calculation methodologies are insufficient to deal effectively with the security risk now posed by terrorist groups. Traditional risk management methodologies would have determined that the probability of terrorists employing hijacked commercial passenger aircraft to destroy the World Trade Center was zero."

The proximity of CCNPP to DCPLNG in Southern Maryland and the sensitivity of this location to the US Seat of Government in Washington, DC, makes the threat of a deliberate act of terrorism a probability that cannot be calculated by conventional means; however, the NRC's SER2009 continues to ignore expert opinion and warnings from terrorism experts, even when these concerns and substantiated expert opinions and studies were submitted by the Petitioner to the NRC prior to the NRC release of SER2009.

Petitioners concerns on LNG-related terrorism threats are shared by legislators and terrorism experts alike. Richard A. Clarke sites other terrorism expert opinions and studies in his Clarke Report2005, excerpts of these are included in this Appendix E. Another terrorism expert fresh from the CIA, Charles Faddis as recently as last May 2009, also warns:

Former CIA Official Warns Against LNG Terminal (Charles Faddis, the retired head of CIA's Weapons of Mass Destruction Terrorism Unit), accessed 11/22/09
http://wjz.com/local/lng.terminal.2.1019979.html May 26, 2009 6:23 pm US/Eastern

http://mikulski.senate.gov/record.cfm?id=274078 (accessed 11/22/09) BALTIMORE, Md. – **Senator Barbara A. Mikulski (D-Md.)** testified today at a field hearing of the House of Representatives Transportation and Infrastructure Committee's Coast Guard and Maritime Transportation Subcommittee chaired by delegation colleague **Congressman Elijah E. Cummings (D-Md.).** Senator Mikulski has been an outspoken critic of the proposed Liquefied Natural Gas (LNG) facility at Sparrows Point in Baltimore. **She has also continued to challenge federal agencies on the safety and security impact of the current facility at Cove Point in Calvert County**.

"I oppose this because of my fears and my frustrations. We're talking about burns, vapor clouds and asphyxiation. We're talking about injury and possible death. I worry about a terrorist attack. I worry about an accident with ghoulish consequences," testified Senator Mikulski. "I want to make sure every single agency with authority over LNG plants and shipping has looked at the risk of a terrorist attack. It is my responsibility as a U.S. Senator to ensure the right people are asking the right questions to protect the American people from terrorism."

Senator Mikulski's prepared testimony also stated: "I'm on the Intelligence Committee. I know that the threats to our country are real. I know terrorists are plotting to kill us every day. I'm on the Homeland Security Appropriations Subcommittee. I know that our ports and vital infrastructure are high-risk targets. These are targets of choice; we do not want them to be targets of opportunity. That's why I worry about an LNG facility in a densely populated area near one of the busiest ports in the nation. **With LNG laden tankers passing by a nuclear power plant and under the Bay Bridge?**

“We’re talking about burns, vapor clouds and asphyxiation. We’re talking about injury and possible death. The GAO said that we simply don’t know what the impact could be of a serious LNG accident on public safety. How can anyone make a decision on LNG without knowing the impact on public safety?

“Mr. Chairman, I am really hot about this and I am not new to this issue. I have been working on the safety of LNG facilities since 2001, when I first learned of plans to reopen the LNG terminal at Cove Point. It was just one month after 9/11 – October 11, 2002.

“Let me tell you where Cove Point is – it is on the Bay in Calvert County, 3.5 miles from the Calvert Cliffs nuclear plant. Let me read from my letter to Patrick Wood, Chairman of FERC: ‘Dear Mr. Wood, What were you thinking when you granted preliminary approval to reopen the natural gas unloading plant at Cove Point, Maryland? I cannot believe you would give this approval on the one month anniversary of the terrorist attacks on America, while President Bush was announcing that our country was at war.’

“Today, I am here to tell you about the safety and security lessons learned from Cove Point and why these issues need to be examined more closely before new LNG terminals are approved in populated areas like the Port of Baltimore. We still don’t have the answers we need on Cove Point. Maybe today we can get some real answers.

“First, I want to remind you about the LNG facility at Cove Point. In the aftermath of 9/11, as America fought the war on terrorism, we could not do business as usual. Yet, FERC was preparing to rubberstamp its approval for a LNG facility – highly flammable liquefied natural gas transported on foreign ships – 3.5 miles from a nuclear power plant.

“I did five things to ensure that the safety and security of this plan was fully examined:

1. I demanded FERC review its decision in the interest of national security.

2. I got DHS [Department of Homeland Security] and FBI involved in the review process, asking them to fully consider potential terrorism risks.

3. I asked the Nuclear Regulatory Commission to look at the potential threat to Calvert Cliffs and the people of Maryland.

4. I urged the Coast Guard to rigorously review the proposal.

5. I pushed the Coast Guard to review how they will keep Cove Point secure. Believe it or not, it was the very first of its kind for a LNG terminal. In their report, the Coast Guard assured me they had sufficient resources to control and secure LNG tanker shipping. The Coast Guard promised to provide waterside security during gas transfer, scrutinize crew lists, board and inspect tankers, escort the tankers up the Bay, and enforce exclusion zones.

“The Coast Guard stood up and took the lead, and they have done their job effectively. But guess what? They are overstretched. Now the Coast Guard is turning over some of its security responsibilities to Dominion Power. The Coast Guard has bailed out. Now security for Cove Point is shared between the Coast Guard, Dominion Power and local law enforcement. So the safety and security of the people of Calvert County and all who live or work on the Bay is provided by an uncertain mix of private security guards, local law enforcement and the overstretched Coast Guard. What will this mean? I’ve tried to find out – all I get is platitudes and abstractions – and a lot of paper. If there is a problem, do you call the Sheriff of Calvert County? Do you call the rent-a-cops from a private security firm? We must have these answers!”

To add to the risk factors not considered by any study or safety evaluation for CCNPP, is the fact that security for DCPLNG-related activities has been reduced from the Coast Guard and delegated to local Calvert County authorities as part of their police work and to DCPLNG's security personnel. This is the only location with this type arrangement. According to DCPLNG, "When a transport ship is docked at the offshore platform, the safety and security zone is enforced by the Calvert County sheriff's department, using specially designed boats provided by Dominion." http://www.dom.com/business/gas-transmission/cove-point/safety-and-security.jsp (accessed 11/27/09).

Petitioner has observed from her residence at Cove Point Beach, 2 persons speeding away from the LNG pier in a small rubber boat during these operations, but unsure whether this "local enforcement" of the security zone around the LNG pier is sufficient to thwart a determined group since Calvert Cliffs Nuclear Power Plant has never sought its own security risk analysis, but has relied solely upon the deficient and flawed PPRP Study prepared primarily for the DCPLNG expansion. As it stands, this PPRP Risk Study is being disputed with supporting documentation on its deficiencies and omissions. In addition to the PPRP's omission of information from the Sandia2004 study which the PPRP lists as reference in page B-2, the PPRP also failed to consult with widely accepted terrorist expert opinions and analysis available in the public domain, such as the **Clarke Report2005**.

The **Clarke Report2005, "**LNG Facilities in Urban Areas: A Security Risk Management Analysis for ATTORNEY GENERAL PATRICK LYNCH RHODE ISLAND by Principal Investigator Richard A. Clarke" (former chief counter-terrorism adviser on the U.S. National Security Council) This 2005 analysis focuses on Security Risk Management involving intentional damage by a determined group, is included in this Contention by reference.
http://www.projo.com/extra/2005/lng/clarkereport.pdf (accessed 11/20/09)

The following excepts from the **Clarke report2005,** provide information and insights that should be considered for CCNPP since the threat for CCNPP is even more acute, considering its 3-mile proximity to DCPLNG, the largest LNG marine terminal, storage, and regasification plant in the United States and that the US seat of government is within the 40-mile of the 50-mile radioactive pathway should an incident of unprecedented proportions occur. **Clarke report2005** also includes excerpts from the same Sandia2004 study omitted by the PPRP Study in its analysis, along with other expert opinions and studies relevant to LNG facilities and catastrophic LNG spill over water which are totally lacking in the PPRP Study, The Arthur D. Little Study, and the NRC SAFETY EVALUATION for CCNPP Units 1, 2, and 3.

Clarke report2005, p.3 : 1. METHODOLOGY: Traditional risk management calculation methodologies are insufficient to deal effectively with the security risk now posed by terrorist groups. Traditional risk management methodologies would have determined that the probability of terrorists employing hijacked commercial passenger aircraft to destroy the World Trade Center was zero. <u>The probability of a terrorist attack occurring can not be effectively measured, but it is now "a foreseeable risk" in the United States</u>. <u>Instead of calculations involving probability of attack, we suggest an alternative five part methodology for determining security risks and cost calculations.</u>

The above expert opinion of the realities of the true risk to CCNPP, contradicts the methodology used in the risk studies affecting CCNPP as it relates to the DCPLNG expansion and operations. The Arthur D. Little Study of 1993 was conducted pre 9-11, and the PPRP Study ignored the realities and threats post 9-11.

Clarke Report2005, p.14: In our examination, we have come to a number of conclusions that should affect decision-making about the placement of such a facility (LNG):

- The United States will continue to face the risk of domestic terrorist attack over the foreseeable future.
- Critical infrastructure, including gas and oil facilities, are primary targets for terrorist attack.
- Although the LNG industry has enjoyed a history of relatively few safety incidents, there is no reason to believe that the LNG industry would be a less attractive target to terrorist organizations than other infrastructure.
- Although intentionally creating the "perfect storm" of events necessary to cause a significant LNG incident would be challenging, it is not impossible.
- The placement of such an LNG facility could either increase or decrease the level of risk and the resulting consequence management demands.

p.21-22: However, in any terrorist threat assessment it is important to examine the potential threat posed by domestic terrorists, specifically individual actors. Increasingly, lone individuals with no connection or formal ties to established or identifiable terrorist organizations are rising up to engage in violence. These individuals are often inspired or motivated by some larger political movement of which they are not actually a part, but nonetheless from which they draw spiritual and emotional sustenance and support.[18] U.S. Marshals Service chief inspector Geoff Shank said, "Not a lot of attention is being paid to this, because everybody is concerned about the guy in a turban. But there are still plenty of angry, Midwestern white guys out there."[19]
With the noted exception of 9/11, all of the major terrorist attacks that have occurred in United States were the work of a sole domestic actor or a group of two or three co-conspirators.

p.25: As LNG imports become a more important sector of our economy, terrorist organizations like al Qaeda will become more interested in attacking them. In addition, LNG tankers, which often travel in close proximity to metropolitan seaports, are undoubtedly attractive high casualty targets for al Qaeda planners[32].

---

[18] Hoffman, Bruce. *Al Qaeda, Trends in Terrorism, and Future Potentialities: An Assessment.* Published by The Rand Corporation: Washington, D.C. 2003

[19] Copeland, Larry. "Domestic Terrorism, New Terrorism at Home" *USA Today:* Atlanta, GA: 11/14/2004.

[32] Image details adapted from Mark Clayton, "LNG: A Prized Energy Source or a Potent Terrorist Target. *The Christian Science Monitor*: Apr 6, 2004. accessed at http://www.csmonitor.com/2004/0406/p01s01-uspo.html 5apr04.

Clarke Report2005, p.26: In a recently released document known simply as the National Planning Scenarios, DHS indicated that a potential terrorist attack on chemical or gas tanker is the number six ranked doomsday scenario for the United States government. As a result, DHS is expected to spend at least an additional one billion dollars to secure against this form of terrorist attack. However even those within DHS believe that the United States is a long way away from true preparedness.[33]

Currently, over 80% of the United States natural gas imports are shipped in tankers from Trinidad and Tobago, which are attractive targets to terrorist organizations. [34]

Clarke Report2005 p.27: Additionally, al Qaeda was reported to have smuggled an operative into Boston on an LNG tanker from Algeria before September 11, 2001[37]

---

[33] Lipton, Eric. U.S. Report Lists Possibilities for Terrorist Attacks and Likely Toll, *New York Times* March 16, 2005

[34] Candyce M Kelshall. *LNG Tanker Terrorism: A Case Study*. London 2004

[37] Candyce M. Kelshall MSc BSc (Hons), *LNG Tanker Terrorism: A Case Study*, London 2004, p. 3.

The preceding summary of conclusions drawn from the Clarke Report2005 is further exacerbated because CCNPP is co-located with DCPLNG the largest LNG marine terminal and gasification plant in the United States. "As many as a tanker a day could be unloading," said Dan Donovan, spokesman for DCPLNG." The probability of an attack is possible any time a LNG tanker comes in to unload at DCPLNG.

p.26, p.47: Description of LNG tanker

- A typical LNG tanker holds more than 33 million gallons of LNG
- As tall as a 12-story building -- traveling at 20 knots
- LNG tankers require 5 miles to halt
- LNG tanker hull and containers Block forward view for 3/4 of a mile
- LNG tanker is more than 900 feet long; length of almost 3 football fields

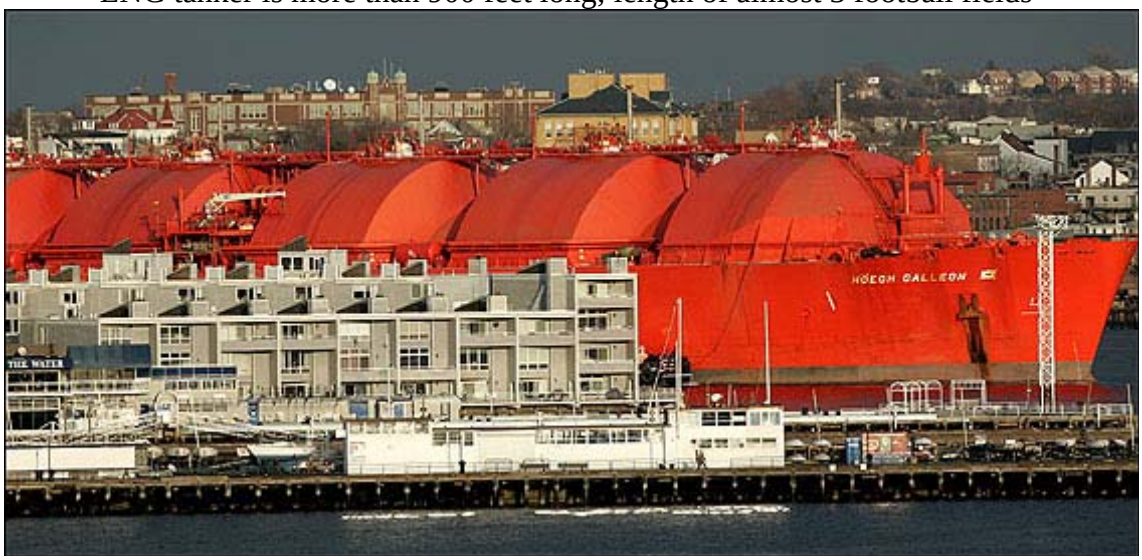


Figure 1.7: LNG Tanker in Boston Harbor. Source: AP.

Clarke Report2005, p.49: The **pool fire scenario is the most likely event to cause major devastation from a LNG release on water.** The LNG would seep out of the breached tank and form a pool on the surface of the water. As the pool forms, some of the liquid will evaporate as the warmer water condenses the colder LNG. If an ignition source is present, as it likely would be in the case of a large-scale LNG release, the flammable vapor will ignite and the flame will travel back to the spill, resulting in the ignition of the LNG that had pooled on the surface of the water. **Most scientists believe that if one of a tanker's five tanks were to fully release onto the water's surface, a pool fire could result that could potentially envelop the entire tanker.** LNG fires cannot be extinguished by conventional fire-fighting techniques and will burn much more rapidly and at much greater intensities and levels of heat than crude oil or even gasoline fires.[86,87]

---

[86] *Consequence Assessment Methods for Incidents Involving Releases from Liquefied Natural Gas Carriers* (accessed March 19, 2005); available from http://www.ferc.gov/industries/gas/indus-act/lng-model.pdf.

[87] Jerry Havens, "Terrorism: Ready to Blow?" *Bulletin of the Atomic Scientists* 59, no. 4 (2003): 16-8.

Petitioner's inset below was derived from the Sandia Studies, illustrating the behavior of LNG Pool Fires from 2 selected experiments:

Behavior of Pool Fires

- Burn rate controls pool area and flame height
- Flame height to pool diameter ratio decreases as pool diameter increases, with transition at very large diameters
- Heavier hydrocarbons produce more smoke than methane for equal diameters, smoke production unknown for LNG pool fires >35 m diameter
- Smoke shielding on average reduces the radiative heat flux level at a distance

Guidance on Safety and Risk Management
of Large Liquefied Natural Gas (LNG) Spills Over Water
U.S. Department of Energy LNG Forums 2006
(Reproduced from Slide 7)

Anay Luketa-Hanlin and Mike Hightower
Sandia National Laboratories
Albuquerque, New Mexico

Clarke Report2005, p.52: To date, the definitive study on intentional and unintentional LNG breaches is the Sandia Laboratories report released in December, 2004. The report was designed to be the definitive study that drew from the best existing research. It examines the report presents its own research and compares it with 3 additional spill modeling studies Sandia deems to be of sufficient scientific merit: The Lehr Study (2003), the Fay Study (2003), the Quest Study (2003), and the Vallejo Study (2003).

p. 53 *a. Risk of Attack*

FERC determined that the likelihood of a terrorist attack on the Providence LNG facility is "unpredictable given the disparate motives and abilities of terrorist groups," and said that the continuing need to expand the natural gas industry "is not diminished by the threat of any such unpredictable acts." Of course terrorist attacks are by their nature unpredictable, but as was shown in the previous section, terrorist groups have a stated intent and demonstrated capability to inflict damage upon the oil and gas industry. The potential disaster that would result from an attack on a LNG tanker or facility could be of the "spectacular" nature that groups like al Qaeda are keen to

produce. **Discounting the threat of terrorist attack on the Providence LNG facility as unpredictable and manageable ignores evidence that shows that certain attacks are more likely than others.**

The above description of FERC's determination in Providence, Rhode Island is similar to the decision that was made for the DCPLNG facility at Cove Point, even when the facility is a double jeopardy because of its close proximity to CCNPP. The PPRP Study, in spite of its claims as intervenor to the FERC decision, failed to perform the risk analysis adequately as previously stated and likewise made the same conclusion which is contradicted by the findings in the Clarke Report2005 "**Discounting the threat of terrorist attack on DCPLNG (and the catastrophic LNG spill on water) and its impact on CCNPP as extremely low and manageable ignores evidence that shows that certain attacks are more likely than others."** Furthermore, the PPRP Study and the NRC SAFETY EVALUATION used traditional statistical methods of risk computations which are not true representations of the real threat scenarios; ignoring expert terrorist opinion post 9-11, such as the Clarke Report2005, available in the public domain.

Although the **Clarke Report2005** was performed at the request of the Rhode Island Attorney General for the Naraganssett Bay project, it underscores the fact that CCNPP has never commissioned an independent study such as this to truly assess the risks associated with the CCNPP-DCPLNG co-location. Fire from a catastrophic LNG spill on water using a 3-tank breach was omitted from the PPRP Study because it the written testimony of the MD Attorney General "

Clarke Report2005, p. 111: SECTION THREE: Consequence Management

I. Summary, ***P.111, Par 2:*** An LNG fire cannot be extinguished by conventional fire-fighting techniques and will burn more intensely than crude oil or gasoline fires.[115,116] LNG fires can burn at temperatures of 3,000 degrees Fahrenheit,[117] or 1,922 degrees Kelvin. Its emissive power can reach 265 kW/m^2 or 84,000 $Btu/hr/ft^2$.[118] A 3-tank breach would extend thermal heat zones up to 37.5 kW/m^2 or 12,000 Btu to a radius of 630 m (2,066 ft) (the **"Red Ring"**) and up to 5 kW/m^2 or 1,600 Btu to a radius of 2,118 m (6,947 ft) (the **"Orange Ring"**).[119]

Firefighters cannot operate at radiant heat levels above 1,600 Btu for extended periods. As a result, first responders would be limited in their ability to operate within the Orange Ring until temperatures subsided – after significant damage had been done. Approximately 36,386 residents live within the Orange Ring. Nearly 6,000 students attend schools dispersed throughout the Orange Ring

Within the Red Ring, death from this scenario is nearly certain, with damage to critical infrastructure such as bridges, industrial centers, harbors, etc.[120] Between the Red Ring and Orange Ring, thermal hazards decrease exponentially. Within the Orange Ring, radiant heat of 5 kW/m^2 or 1,600 Btu will cause unbearable pain to people exposed for 13 seconds and second-degree burns after exposure for 40 seconds. At levels of 10 kW/m^2, exposure for 40 seconds is the maximum threshold a person can withstand before death.[121] Other lesser danger and damage will likely occur due to a domino effect on combustible structures once sympathetic fires spread outward from the Red Ring.

In this section we assess the consequences of a 3-tank breach for an attack on **Sector 8**, the site of the existing KeySpan facility proposed to house the new LNG facility near Providence Harbor.

In **Sector 8**, the attack scenario could produce the following consequences:

- Approximately 3,000 deaths and 10,000 injuries from severe burns in the first few minutes of the pool fire with numbers escalating due to sympathetic fires and untreated burns. Deaths will be concentrated among residents of Providence.

- Approximately 3,000 homes destroyed among the 10,085 contained in the Orange Ring, with hundreds of others

---

[115] *Consequence Assessment Methods for Incidents Involving Releases from Liquefied Natural Gas Carriers*. ABS Consulting. http://www.ferc.gov/industries/gas/indus-act/lng-model.pdf

[116] Havens, Jerry, "Terrorism: Ready to Blow?", *Bulletin of Atomic Scientists* 59, no. 4 (2003):16-8.

[117] Sandia report, p. 150.

[118] *Consequence Assessment Methods for Incidents Involving Releases from Liquefied Natural Gas Carriers*. ABS Consulting. P. 22. http://www.ferc.gov/industries/gas/indus-act/lng-model.pdf

[120] Sandia Report, p. 21

[121] James A. Fay, "Public Safety Issues at the Proposed Fall River LNG Terminal," Massachusetts Institue of Technology." January 2004, p. 2.

Clarke Report2005, p. 115, par 2: Given that cascading failure of a third, but not a fourth, tank can be expected, the consequences discussed are based on a 3-tank breach using the parameters described on p. 51 of the Sandia report.[123] As per the added consequence of additional LNG spilling from a third tank, conversations with LNG expert Dr. James Fay have concluded that such a scenario is not expected to drastically increase the overall diameter of the pool fire but would add several minutes to its duration.[124]

LNG fires can burn at temperatures of 3000 degrees Fahrenheit,[125] or 1922 degrees Kelvin. Its emissive power can reach 265 kW/m^2 or 84,000 Btu/hr/ft^2.[126] An LNG fire cannot be extinguished by conventional fire-fighting techniques and will burn more rapidly and intensely than crude oil or gasoline fires.[127][128] Sandia developed nominal fire modeling parameters to calculate expected thermal hazards from a LNG fire for intentional breaches involving both 1 and 3 tanks with hole sizes ranging from 2 to 12 meters. The scenarios take into consideration that cascading damage resulting from fire or cryogenic-induced failure is a distinct possibility that exponentially increases as more tanks are involved.

It is important to consider that the results contained in the Sandia report were designed to provide guidance only, and that actual distances will vary due to the site-specific factors and environmental conditions of Narragansett Bay. Wherever possible, we have incorporated our knowledge of the topography, river currents, wind conditions, physical structures, hazardous material and other relevant factors specific to Providence to make informed calculations about potential consequences to people and property in the surrounding area.

The following is an **assessment of the consequences of a 3-tank breach** for Sector 8, which was designated as "extremely high risk" in Section 2. Sector 8 is the unloading area adjacent to the existing KeySpan facility proposed to house the new LNG facility near Providence Harbor.

[122] Sandia Report, p. 53.

[123] Sandia Report, p. 51

[124] Phone conversation with Dr. James Fay, Massachusetts Institute of Technology (April 9, 2005)

[125] Sandia report, p. 150.

[126] *Consequence Assessment Methods for Incidents Involving Releases from Liquefied Natural Gas Carriers*. ABS Consulting. P. 22. http://www.ferc.gov/industries/gas/indus-act/lng-model.pdf

[127] *Consequence Assessment Methods for Incidents Involving Releases from Liquefied Natural Gas Carriers*. ABS Consulting. http://www.ferc.gov/industries/gas/indus-act/lng-model.pdf

[128] Havens, Jerry, "Terrorism: Ready to Blow?", *Bulletin of Atomic Scientists* 59, no. 4 (2003): 16-8. *LNG Threat Analysis*

Clarke Report2005 p11 7: **A. Effects of Thermal Radiation**

Thermal radiation is the transfer of heat by electromagnetic waves. The example most commonly referred to is the transfer of heat from a fireplace to a person across a room in the line of sight. According to the ABS study, the extent to which people are injured by thermal radiation depends on both the incident heat flux and the exposure time. Experiments have been performed on both humans (at low level radiation) and animals to calculate various risks. ABS provided a list of other important factors to consider when gauging the affect of thermal radiation on people. These include:[129]

- Protection afforded by shelter
- Protection afforded by clothing
- Contribution of solar radiation to total exposure (250-330 Btu/hr-ft^2)
- Susceptibility of individual exposed
- Response of individual (e.g., ability to take shelter)

Burning LNG can emit levels of thermal radiation so intense that people as far as 1.5 miles from the pool fire would be exposed to a thermal flux of 5 kilowatts per square meter (kW/m^2) or 1,600 Btu. Using the thermal radiation burn criteria provided by FEMA in Table 3.1, that amount of radiant heat would be sufficient to cause unbearable pain to people exposed for 13 seconds and second-degree burns to people exposed for 40 seconds. At levels of 10 kW/m^2, or 3,200 Btu, 40 seconds is the maximum threshold a person can withstand before death.[130] Heat levels higher than 3,800 Btu were not analyzed by FEMA but according to conversations with fire officials, exposure to 10,000 Btu will result in near instantaneous death regardless of protective clothing or quality of shelter.

[129] ABS p. 31.

[130] Fay p. 2.

Clarke Report2005 p.118**:**
Table 3.1: ***Thermal Radiation Burn Injury Criteria***
Source: ABS Consulting Report, p. 30

Thermal Radiation Intensity		Time for Severe Pain (sec)	Time for Second-degree Burns (sec)
BTU/hr/ft^2	kW/m^2		
300	1	115	663
600	2	45	187
1000	3	27	92
1300	4	18	57
1600	5	13	40
1900	6	11	30
2500	8	7	20
3200	10	5	14
3800	12	4	11

The above statistics on thermal burns were not included in the PPRP Study and assumes that only the 5 kW/m^2 is sufficient criteria for all persons. The safety of CCNPP and the surrounding structures and population is dependent on personnel at CCNPP and DCPLNG performing their functions effectively. This is a major flaw in all the studies for the CCNPP-DCPLNG scenarios.

As in the 1979 nuclear incident of core meltdown at Three Mile Island Nuclear Power Plant, it is more often small failures, personnel panic reactions, and more than minor violations of laws and regulations that cause subsequent catastrophic failures. Given that, a surprise intentional incident that could happen at Calvert Cliffs-Cove Point is exacerbated by the above mentioned probable thermal burns, added to panic reactions which are characteristic of human behavior in the face of danger.

CCNPP has had their share of more than minor violations and one in particular (accessed 11/30/090) http://www.nrc.gov/NRR/OVERSIGHT/ASSESS/REPORTS/calv_2004002.pdf "CALVERT CLIFFS NUCLEAR POWER PLANT - NRC INTEGRATED INSPECTION REPORT 05000317/2004002 AND 05000318/2004002" was a March 2, 2004 NRC letter and report to UniStar's CEO George Vander Heyden, then CCNPP Vice President, on "inspection examined activities conducted under your license as they relate to plant design activities and compliance with the Commission's rules and regulations." Although the infractions at CCNPP were non-cited violation, the finding was more than minor, and the consequences of failure could have catastrophic consequences in an emergency situation such as a surprise intentional incident affecting CCNPP. The report states:

"The team identified a non-cited violation (NCV) of 10 CFR Part 50, Appendix B, Criterion III, Design Control, for Constellation Energy Group's (CEG) failure to correctly translate the emergency core cooling system (ECCS) design basis into the HPSI system operating instructions and procedures. Specifically, for short durations during surveillance test activities, the HPSI loop isolation valve was placed in a condition that could impact core cooling if the redundant train of HPSI were to fail.

The finding was more than minor because it affected the Mitigating Systems cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events (i.e., loss of coolant accidents) to prevent undesirable consequences (core damage). The finding was associated with the attribute of configuration control (operating equipment lineup)."

On page 9:
Description. The team identified several deficiencies relating to load flow calculations and procedures necessary to ensure availability of the preferred offsite source during a unit trip, **including trips associated with accidents**. The deficiencies included:
• Inadequate documentation of design inputs, methodology and results
• Failure to consider immediate effects of a unit trip on grid voltage
• An apparent non-conservative software error
• Failure to perform adequate analysis for removing voltage regulators from automatic operation

The above described situation at CCNPP could become the cause of a more catastrophic failure as "relatively minor violations" become exacerbated by the operator's mindset, health, safety, and environment during hazardous situations where even minor equipment malfunctions coupled with panic and pain combined, impair judgments. Similar experience occurred at Three Mile Island.

APPENDIX F

ATTACHMENTS TO CONTENTION

1. CC1-2SafetyEvaluation.pdf (**SER2009**)
2. PPRP-CovePt_FINAL_June2006 (**PPRP Study**)
3. MD Identification of Representatives and Response to Board Questions.pdf (**PPRP/ASLB/MD State)**
4. sandia_lng_1204 (**Sandia2004**)
5. Clarkereport.pdf (**Clarke Report2005**)
6. NRC SER2009_ Appendix A-NRC-Cwalina letters.pdf
7. RAC Response_NRR-09-06 _2_ _3_NRC-Cwalina
8. SER2009-Cwalina letter.jpg (sent by USPS certified mail and received 11/12/09)
9. NRC SER2009_ Appendix A-Exhibit 3-PPRP Risk Study Gaps and Deficiencies.pdf (provided to NRC Staff for consideration in SER2009)
10. NRC SER2009_ Appendix A- Admissibility Argument Contentions 4 and 5-final.pdf (provided to NRC Staff for consideration in SER2009)