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**UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION
BEFORE THE ATOMIC SAFETY AND LICENSING BOARD**

OFFICE OF SECRETARY
RULEMAKINGS AND
ADJUDICATIONS STAFF

In the Matter of: : Docket No. 50-423-LA-~~7~~ 3
DOMINION NUCLEAR : ASLBP No. 00-771-01-LA
CONNECTICUT, INC. :
(Millstone Nuclear Power Station, :
Unit No. 3; Facility Operating :
License NPF-49) : November 1, 2001

**CONNECTICUT COALITION AGAINST MILLSTONE AND
LONG ISLAND COALITION AGAINST MILLSTONE
MOTION TO REOPEN THE RECORD
AND REQUEST FOR ADMISSION OF LATE-FILED
ENVIRONMENTAL CONTENTION**

I. INTRODUCTION AND SUMMARY

Pursuant to 10 C.F.R. §§ 2.734 and 2.714(a) and (b), the Connecticut Coalition Against Millstone ("CCAM") and the Long Island Coalition Against Millstone ("CAM") (collectively "CCAM/CAM" or "Intervenors") respectfully request the Atomic Safety and Licensing Board ("ASLB") to reopen the record of this proceeding for the purpose of admitting a late-filed environmental contention. The contention, which is set forth in Section IV below, asserts that in two significant respects, circumstances have changed and new information has become available which warrant reconsideration of the NRC's previous determination that the proposed expansion of fuel storage capacity at the Millstone Unit 3 nuclear power plant poses no significant environmental risk and therefore does not warrant preparation of an Environmental Impact Statement ("EIS").

First, information gathered in the aftermath of the terrorist attacks on the World Trade Center and the Pentagon on September 11, 2001, demonstrates conclusively that

destructive acts of malice or insanity against U.S. nuclear facilities, including the spent fuel pool at Millstone Unit 3, are foreseeable events. Second, recent developments in the NRC Staff's understanding of the phenomenology of spent fuel pool accidents, which were published in January 2001, show that if water is lost from a fuel pool in the event of such an attack, the fuel is significantly more vulnerable to an oxidizing exothermic reaction, *i.e.*, a severe fire leading to offsite radiological release, than the NRC previously thought.

Therefore, before permitting the Applicant, Dominion Nuclear Connecticut, Inc. ("DNC") to roughly double the radioactive inventory of the pool, the NRC Staff should be required to prepare an EIS that addresses the environmental impacts of and reasonable alternatives to expanded spent fuel pool storage. Chief among the alternatives that must be carefully considered in an EIS is dry storage of the fuel. Although dry storage casks are not completely immune to damage in a terrorist attack, the consequences could be reduced by orders of magnitude.

As demonstrated below, this request satisfies the Commission's standards for reopening the record and admitting a late-filed contention. The motion to reopen the record and the contention are supported by the sworn Declaration of Dr. Gordon Thompson, which is attached as Exhibit 1.

II. JURISDICTIONAL STATEMENT

CCAM/CAM has brought this motion before the Atomic Safety and Licensing Board ("ASLB"), under the guidance of *Wisconsin Electric Power Co.* (Point Beach Nuclear Plant, Unit 2), ALAB-86, 5 AEC 376 (1972). In that case, the Commission held that as long as some part of a licensing case remains pending before the ASLB, the ASLB

retains jurisdiction to entertain a motion to reopen the record. *Id.* at 377. Here, because the ASLB has pending before it the reopened proceeding on the adequacy of administrative criticality prevention measures, CCAM/CAM believes this motion is properly brought before the ASLB.

Nevertheless, CCAM/CAM recognizes that Commission precedents are not crystal clear on this subject. *See, e.g., Philadelphia Electric Co. (Limerick Generating Station, Units 1 and 2), ALAB-726, 17 NRC 755, 757 and note 4 (1983)*, which suggests that jurisdiction resides with the Commission once exceptions have been taken to any part of the licensing decision.¹ Notably, in ALAB-726 the Appeal Board conceded the “absence of any clear administrative guidance on the matter,” and advised that the choice of forums should be governed by “common sense and the realities of litigation.” *Id.*, 17 NRC at 758.

CAM/CCAM believes it is commonsensical and realistic that the ASLB, which has the greatest familiarity with the record, should take jurisdiction over this motion to reopen the record. *See CLI-00-15, 52 NRC at 357.*² If the ASLB believes that this motion should have been brought before the Commission, however, CCAM/CAM requests that the ASLB refer it to the NRC Commissioners as expeditiously as possible.

¹ ALAB-726 is cited in CLI-00-25, in which the Commission took jurisdiction over an earlier motion to reopen the record filed by CCAM/CAM regarding criticality prevention issues, but referred the motion to the ASLB for disposition. *See 52 NRC at 357, note 3.*

² *But see Metropolitan Edison Co. (Three Mile Island Nuclear Station, Unit No. 1), ALAB-766, 19 NRC 981, 983 (1984)* (holding that Appeal Board loses jurisdiction over discrete issues once they are decided, even though other issues may be pending before it).

III. FACTUAL AND PROCEDURAL BACKGROUND

Millstone Unit 3 is a 1,150-MW pressurized water reactor located on the coast of Connecticut. On March 1999, the then-licensee, Northeast Nuclear Energy Company ("NNECO") filed a license amendment application seeking to increase the storage capacity of the Millstone Unit 3 spent fuel pool ("SFP") from 756 assemblies to 1860 assemblies.³ The license was subsequently transferred from NNECO to DNC, which continues to pursue the license amendment request.

CCAM/CAM petitioned to intervene in the proceeding, and gained admission of several technical contentions regarding criticality prevention. *See* LBP-00-02, 51 NRC 25, 32-41 (2000). In LBP-00-02, the ASLB also rejected several of CCAM/CAM's contentions as inadmissible, including four environmental contentions which together charged that the proposed license amendment raised the likelihood and consequences of a severe accident in the fuel pool, such that the NRC should be required to prepare an EIS to address the impacts of and alternatives to spent fuel pool storage. *See* 51 NRC at 43-

³ Condition Report #M3-99-1148, attached to the CCAM/CAM "Detailed Summary of Facts, Data and Arguments and Sworn Submission on Which Connecticut Coalition Against Millstone and Long Island Coalition Against Millstone Intend to Rely at Oral Argument to Demonstrate the Existence of a Genuine and Substantial Dispute of Fact with the Licensee Regarding the Proposed Expansion of Spent Fuel Storage Capacity at the Millstone Unit No. 3 Nuclear Power Plant" (July 3, 2000) ("hereinafter CCAM/CAM Summary"), and referenced in footnote 1 therein, suggests that the expansion is sought in part to provide additional storage capacity for Unit 2 spent fuel as well as Unit 3 spent fuel. The application itself and the Federal Register Notice published on September 7, 1999 make no mention of transfer of fuel from the Unit 2 SFP to the Unit 3 SFP, nor is the Millstone facility licensed to move spent fuel from Unit 2 to Unit 3. However, information was submitted by NNECO during recent proceedings before the Connecticut Department of Public Utility Control suggesting that expansion of Unit 3 fuel storage capacity to accommodate Unit 2 waste may have been a factor in decision-making by Dominion Resources, Inc. when it purchased the Millstone Nuclear Power Station. DPUC, Docket No. 99-09-12RE01.

46. The ASLB found that consideration of spent fuel pool accidents is precluded by the NRC's Severe Accident Policy Statement, and that in any event CCAM/CAM had not provided an adequate factual bases for the contentions. *Id.*, citing *Vermont Yankee Nuclear Power Corp.* (Vermont Yankee Nuclear Power Station), ALAB-876, 26 NRC 277, 282 (1987).

Following a Subpart K proceeding, the Licensing Board issued LBP-00-26, which dismissed CCAM/CAM's pending criticality prevention contentions and terminated the proceeding. *See* 52 NRC 181 (2000). On November 13, 2000, the Intervenors petitioned the NRC Commissioners for review of LBP-00-26. On January 17, 2001, in CLI-01-13, the NRC Commissioners granted the Petition for Review of LBP-00-26. *See* 53 NRC 22.

On November 16, 2000, three days after CAM/CCAM filed their petition for review of LBP-00-26, NNECO informed the NRC that it was unable to account for two spent fuel rods at Millstone Unit 1.⁴ CCAM/CAM moved the Licensing Board to reopen the proceedings for further development of the record with respect to the missing spent fuel rods on December 18. After initially denying the motion, the ASLB reconsidered and granted the motion in LBP-01-17, 53 NRC 398 (2001).⁵

⁴ The NRC has publicly acknowledged that NNECO's disclosure that it has lost track of irradiated fuel rods, as reported in License Event Report (LER) 2000-002-00 on docket 50-245 on January 16, 2000, is unprecedented in the U.S. commercial nuclear industry.

⁵ The motion to reopen the record was filed with the ASLB, but was taken up by the Commission in CLI-00-25, 52 NRC 355, 357 (2000). While asserting that the motion should have been brought before the Commission, the Commissioners nevertheless referred it to the ASLB for resolution. In LBP-01-01, the ASLB initially denied the motion. *See* 53 NRC 75 (2001). In LBP-01-17, however, the ASLB reconsidered its decision and ordered that the record be reopened for the purpose of considering the implications of the loss of the spent fuel rods with respect to the adequacy of administrative criticality controls and the licensee's ability or willingness to implement such controls successfully. 53 NRC at 408. Although the reopened proceeding was held

IV. CONTENTION

Contention: In the Environmental Assessment (“EA”) prepared by the NRC Staff in support of the proposed license amendment, the Staff concluded that the proposed expansion of spent fuel storage capacity at the Millstone nuclear power plant will not have a significant adverse effect on the quality of the human environment. Northeast Nuclear Energy Company (NNECO), et al., Millstone Nuclear Power Station, Unit No. 3, Environmental Assessment and Finding of No Significant Impact, 64 Fed. Reg. 48,675 (September 7, 1999). Therefore, the Staff decided not to prepare an Environmental Impact Statement (“EIS”) for the proposed license amendment. *Id.*

In the EA, the Staff did not examine the potential for acts of malice or insanity against the Millstone 3 fuel pool leading to a pool fire. The Staff’s failure to examine this set of environmental impacts apparently was based on the agency’s longstanding position that severe spent fuel pool accidents are not foreseeable, and that acts of malice and sabotage are so unpredictable as to be incapable of analysis in an EIS. *See Philadelphia Electric Co.* (Limerick Generating Station, Units 1 and 2), ALAB-819, 22 NRC 681, 697-701 (19845), *aff’d on this ground and rev’d on other grounds, Limerick Ecology Action v. NRC*, 869 F.2d 719, 743-44 (3rd Cir. 1989).

The terrorist attacks of 11 September 2001 on the World Trade Center and the Pentagon, and related information which has subsequently become public, provide new information which demonstrates conclusively that the NRC's rationale is mistaken and

in abeyance pending completion of an NRC Staff investigation into the causes of the loss of the spent fuel rods, the proceeding has resumed. In a telephone conference of October 31, 2001, the ASLB set a tentative date for a Subpart K oral argument of March 18, 2001.

must be abandoned. They also show that circumstances have changed significantly with respect to the imminence of the terrorist threat. It is now obvious that determined, carefully-planned and highly destructive acts of malice pose an immediate threat to the United States. The particular acts of malice of 11 September 2001 involved the use of weapons -- large, fuel-laden aircraft -- that no nuclear power plant in the United States, including the Millstone Unit 3 plant, is designed to withstand. Available information indicates that acts of malice or insanity, including but not limited to the impact of a large, fuel-laden aircraft, could cause a substantial loss of water from the Millstone Unit 3 spent fuel pool, leading to the onset of exothermic oxidation reactions in that pool. This information was not available when the NRC prepared NUREG-0575, the NRC's Generic Environmental Impact Statement ("GEIS") on spent fuel storage, which concludes that the likelihood of an accident in high-density spent fuel storage pools is not foreseeable.

Other significant new information consists of the Staff's recent concessions that: (a) loss of water from a high-density spent fuel pool can lead to the onset of exothermic oxidation reactions for spent fuel of any age after discharge from a reactor; (b) the onset of exothermic oxidation reactions can be assumed if the water level in a pool declines to the level of the top of the spent fuel racks; and (c) the onset of exothermic oxidation reactions in one pool is likely to lead to the onset of similar reactions in nearby pools. This new information establishes that in the event of an act or malice or insanity which causes uncovering of the fuel in the Millstone pools, a severe pool accident involving a significant offsite release may be assumed as inevitable. The consequences of such an accident in the Millstone pools could be significantly greater under the proposed license

amendment, given the significant expansion of the radioactive inventory of the pools that would be permitted by the license amendment.

Accordingly, the Staff must prepare an EIS that fully considers the environmental impacts of the proposed license amendment, including its effects on the probability and consequences of accidents at the Millstone plant. A credible analysis would differ from current PRA practice in that it would consider events -- including acts of malice and insanity and other events -- for which the estimation of probability has been regarded as difficult or impossible. Causative events that must be considered include all events that could cause a loss of water, including (a) acts of malice or insanity by persons within or outside the plant boundary; (b) aircraft impact, with or without an accompanying fuel-air explosion; (c) earthquake; (d) drop of a fuel transfer cask or shipping cask; (e) a severe accident at a nearby reactor or spent fuel pool which, through the spread of radioactive material and other influences, precludes the ongoing provision of cooling and/or water makeup to the affected pool; and (f) an explosion inside or outside the plant buildings. The EIS should also include consideration of all physically realisable modes of water loss, including leakage, evaporation, siphoning, pumping, displacement by objects falling into the pool, or overturning of the pool. The assessment would not be credible if it arbitrarily considered only a subset of the physically realisable combinations of causative events and modes of water loss.

As required by NEPA and Commission policy, the EIS should also examine the costs and benefits of the proposed action in comparison to various alternatives, including Severe Accident Mitigation Design Alternatives ("SAMDA") and the alternative of dry storage.

Basis:**A. Regulatory Requirements**

NEPA requires federal agencies to prepare an EIS before undertaking any major federal action which may significantly affect the quality of the human environment. 42 U.S.C. § 4332(C). The NRC's implementing regulations at 10 C.F.R. § 51.20(a) also require the NRC to prepare an EIS for any licensing or regulatory action which "is a major Federal action significantly affecting the quality of the human environment."

Where aspects of the proposed action are addressed by a previously prepared EIS, a new EIS must be issued if there remains "major federal action" to occur, and if there is new information showing that the remaining action will affect the quality of the human environment "in a significant manner or to a significant extent not already considered." *Marsh v. Oregon Natural Resources Council*, 490 U.S. 360, 374 (1989). See also 10 C.F.R. § 51.92(a), which requires supplementation where the proposed action has not been completed, if: "(1) there are substantial changes in the proposed action that are relevant to environmental concerns; or (2) There are significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts." Although § 51.92 technically does not apply here, where the action proposed in the original Millstone EIS has already been taken, the criteria provide applicable guidance for these circumstances.

In rejecting CAM/CCAM's first set of environmental contentions in LBP-00-26, the ASLB relied in part on the holding of ALAB-876 that consideration of beyond design basis accidents in spent fuel pools "is neither required by NEPA nor authorized, in the Commission's discretion, under the NEPA Policy Statement. *Id.*, 51 NRC at 43-44,

*citing Vermont Yankee Nuclear Power Corp. (Vermont Yankee Nuclear Power Station), ALAB-876, 26 NRC 277, 282 (1987). CAM/CCAM respectfully request the ASLB to reconsider its ruling in LBP-00-26, because it is inconsistent with the Third Circuit's holding in Limerick Ecology Action v. NRC, 869 F.2d 719, 735 (3rd Cir. 1989) that the Severe Accident Policy Statement may not be accorded the status of a final rule for purposes of excluding accidents from NEPA consideration. Moreover, the ASLB's holding is inconsistent with several cases that followed ALAB-867, in which the NRC entertained contentions calling for evaluation of severe spent fuel pool accidents in EIS's. See, e.g., Vermont Yankee Nuclear Power Corp. (Vermont Yankee Nuclear Power Station), CLI-90-4, 31 NRC 333 (1990) CLI-90-4, 31 NRC 333 (1990) and Vermont Yankee Nuclear Power Corp. (Vermont Yankee Nuclear Power Station), CLI-90-7, 32 NRC 129 (1990) (Vermont Yankee spent fuel pool expansion); Carolina Power & Light Co. (Harris Nuclear Plant), CLI-01-11, 53 NRC 370 (2001) (Harris spent fuel pool expansion).⁶ Thus, ALAB-876 is not consistent with *Limerick Ecology Action v. NRC* or spent fuel expansion cases that followed ALAB-876.*

⁶ See also *Vermont Yankee Nuclear Power Corp. (Vermont Yankee Nuclear Power Station), ALAB-919, 30 NRC 29, 42 (1989), reversed and remanded on other grounds, CLI-90-4, 31 NRC 333 (1990)*, in which the Appeal Board found that the admissibility of NEPA contentions based on severe accident risks should be considered on a "case-by-case basis." As noted in ALAB-919, the Third Circuit's decision in *Limerick Ecology Action v. NRC ("LEA")* "undercut the primary underpinning" of ALAB-876. As the Appeal Board explained, in ALAB-876 and a related decision, ALAB-869:

we clearly relied on the Commission's long-standing distinction between so-called "design-basis" and "beyond design-basis" events and its expert technical judgment that the latter are, by definition, remote and speculative and thus beyond NEPA's mandate. See ALAB-869, 26 NRC at 30-31; ALAB-876, 26 NRC at 283-85. This distinction reflects the very essence of the agency's regulatory

B. Proposed License Amendment Poses Significant Incremental Risk

By adding 1,104 spent fuel assemblies to the Millstone Unit 3 pool, DNC would significantly increase the incremental risk posed by the pool. The proposed license amendment would increase the capacity of the Millstone Unit 3 spent fuel pool from 756 fuel assemblies to 1,860 assemblies. This is the equivalent of adding six reactor cores to the radioactive inventory of the plant.⁷ There would be a corresponding increase in the pool's eventual inventory of long-lived radioactive isotopes, such as cesium-137.

As demonstrated by Dr. Thompson in his Declaration, the Millstone 3 pool is vulnerable to acts of malice or insanity leading to loss of water and a fire in the fuel assemblies. *See* Thompson Declaration, Sections III and IV. The onset of exothermic oxidation reactions in the pool, loaded to its present licensed capacity, would lead to grave offsite consequences. If the pool were loaded to the higher capacity now being sought by DCI, the offsite consequences would be substantially greater. Those consequences would be a regional and national disaster with health, environmental, economic, social and political dimensions. *See* Thompson Declaration, Section VII.

philosophy and scheme and had not been seriously questioned by any court until *LEA*. Indeed, in *San Luis Obispo*, 751 F.2d at 1300-01, the District of Columbia Circuit clearly endorsed it.

ALAB-919, 30 NRC at 51 (footnotes omitted). Relying on the D.C. Circuit's decision in *San Luis Obispo Mothers for Peace v. NRC*, the Appeal Board found that the consideration of severe accidents under NEPA lies within the Commission's discretion. 26 NRC at 31. (NB: ALAB-869, 26 NRC 13 (1987), was another *Vermont Yankee* decision regarding the admissibility of contentions regarding beyond-design-basis accidents in spent fuel pools.)

⁷ The core of the Millstone Unit 3 reactor contains 193 fuel assemblies. The currently licensed capacity of the Unit 3 pool is the equivalent of about four reactor cores. Under the proposed license amendment, it would be increased to about ten reactor cores.

C. New Information Shows Higher Accident Risk Than Previously Evaluated

1. New information regarding threat of acts of malice or insanity.

While the NRC has previously declared that it is unable to make a meaningful assessment of the risks of sabotage, this declaration was made many years ago under very different circumstances. The events of September 11 dramatically and conclusively disproved that conclusion. As of September 11, it is now clear that terrorists are both capable of and intent upon causing major damage to life and property in the United States. Moreover, a variety of statements and actions taken by the federal government demonstrate, beyond dispute, that the government now considers the threat of additional terrorist attacks to be foreseeable, even inevitable. Indeed, planning for additional terrorist attacks has become the major preoccupation of virtually every federal agency that has any role in protecting public safety. This is reflected in NRC and other press releases, and in news reports of statements made by NRC and other government officials.

On September 21, for example, the NRC announced that it was “working around the clock to ensure adequate protection of nuclear power plants and nuclear fuel facilities,” and had directed the Staff to review NRC security regulations and procedures. NRC Press Release, “NRC Reacts to Terrorist Attacks,” attached as Exhibit 2. The press release also reported that the NRC had advised all nuclear power plant licensees to maintain a state of “high alert.” In addition, the press release conceded that nuclear power plants are not designed to withstand to withstand crashes by large aircraft. *Id.*

On October 7, 2001, the Federal Bureau of Investigation (“FBI”) told all law enforcement agencies that they should be at their highest state of alert – “the highest level of vigilance,” ready to respond to any act of terrorism or violence. Robert Pear and Judith Miller, *U.S. on High Alert as Security is Stepped Up*, New York Times, October 8, 2001, attached as Exhibit 3. According to the article, the staff of the National Security Council, anticipating military operations in Afghanistan, “has coordinated a largely secret effort to increase protections at the nation’s transportation hubs, nuclear power plants, drinking water supplies and other potentially vulnerable sites.” In addition, the Coast Guard said it was conducting “the largest port defense operation since World War II”. *Id.* The Federal Aviation Administration notified officials that they should put additional security measures in place, and the Department of Energy suspended all shipments of nuclear waste. *Id.*

Subsequent to the October 7 announcement, the FBI has issued two specific warnings regarding the imminent threat of a terrorist attack. On October 11, 2001, the FBI issued a press release warning that:

Certain information, while not specific as to target, gives the government reason to believe that there may be additional terrorist attacks within the United States and against U.S. interests overseas over the next several days. The FBI has alerted all local law enforcement to be on the highest alert and we call on all people to immediately notify the FBI and local law enforcement of any unusual or suspicious activity.

Press release, U.S. Department of Justice, Federal Bureau of Investigation (October 11, 2001), attached as Exhibit 4. On October 30, 2001, the FBI issued a second global attack alert. A “senior U.S. official quoted by the Washington Post stated that the alert was prompted in part by “big and very credible intelligence reports” from abroad in recent

days that seemed to forecast new attacks. The Post also reported that “senior officials” stated that:

Other intelligence has been gathered indicating that Osama bin Laden and some of his top lieutenants have essentially delegated authority to order and conduct new attacks down the chain of command, perhaps event to individual cells of bin Laden’s al Qaeda terrorist network.

Dan Eggen and Bob Woodward, *FBI issues 2nd Global Attack Alert*, Washington Post, October 30, 2001, at A01, attached as Exhibit 5.

On October 18, 2001, the NRC issued a press release stating that in addition to maintaining “the highest level of security,” the NRC has “advised all of its licensees of additional actions considered prudent and appropriate to strengthen security further” and is “closely monitoring those actions.” NRC Press Release, “Threat to Three Mile Island Nuclear Plant Deemed Non-Credible; NRC Monitoring Continues and Website Restored,” attached as Exhibit 6. In addition, the NRC has sent letters to governors of states with NRC-regulated facilities to advise them to “establish clear liaison between nuclear facilities and state officials” for emergencies. *Id.*

Because of the widespread damage that could be done by a radiological release, nuclear power plants are an obvious target for a terrorist attack. The NRC and other agencies are taking significant measures to respond to the threat of additional terrorist attacks. On October 21, 2001, the Sunday Times reported that the FBI is studying a report that the four terrorists who seized Flight 93, which crashed near Pittsburgh, may have been targeting a nuclear power plant. Nicholas Rufford, David Leppard and Paul Eddy, *Nuclear Mystery: Crashed Plane’s Target May Have Been Reactor*, Sunday Times (London, UK), October 21, 2001, attached as Exhibit 7. Most recently, the Federal

Aviation Administration established a no-fly zone around nuclear power plants. CNN, *FAA Restricts Flights Near World Series, Nuclear Plants*, October 30, 2001, attached as Exhibit 8. CCAM/CAM has been informed by Lieutenant Commander Michael Edgerton that the U.S. Coast Guard has also established a security zone to exclude all marine vessels from within a 500-yard radius around the Millstone intake structures. In addition, the Governor of the State of Connecticut has called out the National Guard to patrol the Millstone plant, and the Groton-New London Airport has been closed to air traffic. See Georgina Gustin, *Ban Shuts Down Groton Airport*, November 1, 2001, attached as Exhibit 9. On October 30, 2001, the Washington Post reported on an interview with a jailed disciple of Osama bin Laden who said there are “more important places, like atomic plants and reactors” that may have been more appropriate targets than the World Trade Center. William Branigan, *In Afghan Jail, a Terrorist Who Won't Surrender*, Washington Post, October 30, 2001, at A13, attached as Exhibit 10.

Other terrorist events during recent years, which were previously discounted by the NRC as unworthy of consideration in its environmental reviews, must now be re-examined in light of the September 11 attack. Taken together, they highlight a number of significant factors: the vulnerability of U.S. facilities and institutions, the sophistication of the attackers, and the persistence of efforts to damage major U.S. government facilities and other institutions. These events include the 1983 bombing of the Marine barracks in Beirut; the 1993 bombing of the World Trade Center; the February 1993 intrusion into the Three Mile Island site, in which the intruder crashed his station wagon through the security gate and rammed it under a partly opened door in the turbine building; the 1995 bombing of the Federal Courthouse in Oklahoma City; the plot to bomb the United

Nations Building, FBI offices in New York City, the Lincoln Tunnel, the Holland Tunnel, and the George Washington Bridge; and the 1998 bombing of the U.S. embassies in Tanzania and Kenya. *See* Thompson Declaration, Section V.

The fact that the risk of sabotage may not be easily quantifiable is not an excuse for failing to address it in an EIS. As provided in the Council on Environmental Quality's regulations implementing NEPA, 40 C.F.R. § 1502.22, the agency must make an attempt to evaluate reasonably foreseeable significant adverse effects, if the costs of obtaining the information are not exorbitant. Even if the costs of obtaining the information are exorbitant, the agency must acknowledge that the information exists but is unavailable, make a statement of the relevance of the information to the evaluation of impacts in the EIS, summarize existing relevant and credible scientific evidence, and provide the agency's evaluation of the impacts based on generally accepted theoretical approaches or research methods. *See also* 10 C.F.R. § 51.71 ("To the extent that there are important qualitative considerations or factors that cannot be quantified, these considerations or factors will be discussed in qualitative terms.").

In considering the environmental impacts of sabotage, it is particularly important to consider severe accident mitigation design alternatives ("SAMDA") which could mitigate the impacts of sabotage. Using an appropriately robust dry storage facility would substantially reduce the vulnerability of the Millstone spent fuel to acts of sabotage or terrorism. Acts of malice or insanity committed against a dry storage installation could release only a fraction of the radioactive material that could be released from the Harris spent fuel pools. It is much easier to drain a spent fuel pool and cause an accident than it

is to penetrate and release the radioactive contents of dry casks holding the same amount of spent fuel. *See* Thompson Declaration, Section VIII.

2. New information regarding potential for pool accident.

The NRC has never performed an EIS that addresses the potential for, and impacts of, the onset of exothermic oxidation reactions in a spent fuel pool. Yet, the NRC Staff has conceded that: (a) loss of water from a high-density spent fuel pool can lead to the onset of exothermic oxidation reactions for spent fuel of any age after discharge from a reactor; (b) the onset of exothermic oxidation reactions can be assumed if the water level in a pool declines to the level of the top of the spent fuel racks; (c) the onset of exothermic oxidation reactions in one pool is likely to lead to the onset of similar reactions in nearby pools; and (d) the onset of exothermic oxidation reactions will cause a release to the atmosphere of a substantial fraction of the radioactive isotopes in the spent fuel. *See* Thompson Declaration, pars. II-10; IV-3 – IV-6; NUREG-1738, Technical Study of Spent Fuel Pool Accident Risk at Decommissioning Nuclear Power Plants (NRC: October 2000).

The NRC Staff discussed the implications of NUREG-1738 with respect to protection against sabotage events in SECY-01-0100, re: Policy Issues Related to Safeguards, Insurance, and Emergency Preparedness Regulations at Decommissioning Nuclear Power Plants Storing Fuel in Spent Fuel Pools (WITS 200000126) (June 4, 2001). Among the conclusions reached in SECY-01-100 were the following:

NUREG-1738 also presented thermal hydraulic analyses of the stored spent fuel when SFP cooling is lost or the spent fuel is uncovered. The staff found that a generic decay heat level (and, therefore, decay time) beyond which a zirconium fire is physically impossible cannot be defined. This is because the geometry of the spent fuel assemblies, the associated air cooling flow paths, and the resultant

heat transfer rates are not predictable following a major dynamic event (such as a very severe earthquake), which could rupture and rapidly drain the SFP. *As a result, the study concluded that the possibility of a zirconium fire cannot be dismissed even many years after final reactor shutdown.*

Id. at 2 (emphasis added). This represents a 180 degree turnaround from the Staff's previous position. The report continues that the Staff's previous position:

was based on demonstrating by thermal-hydraulic analysis that spent fuel stored in the SFP would air cool sufficiently and not reach the zirconium fire ignition temperature. The position did not consider blockage or obstructions to natural circulation air flow through the fuel assemblies since such sequences were considered strictly hypothetical. *In NUREG-1738 the staff observed that it is not feasible, without numerous constraints, to define a generic decay heat level beyond which a zirconium fire is not physically possible.* Stated in this manner, the zirconium fire cannot be considered strictly hypothetical.

Id. at 3 (emphasis added). In an attachment, entitled Decommissioning Policy Issues and Options, the Staff reached the following additional conclusion that effectively concedes the credibility of a sabotage event initiating a spent fuel pool fire:

Until recently, the staff believed that the DBT [design basis threat] of radiological sabotage could not cause a zirconium fire. However, NUREG-1738 does not support the assertion of a lesser hazard to the public health and safety, given the possible consequences of sabotage-included uncovering of the fuel in the SFP when a zirconium-fire potential exists.⁸

Id., attachment at 13. The staff went on to say that it is "conducting detailed analyses of the effects of the DBT of radiological sabotage on SFPs," and that it will "use the results of these analyses to determine, on a plant-specific basis, whether radiological sabotage can result in the conditions which could lead to zirconium fires at a decommissioning plant. *Id.* Thus, by generally conceding the vulnerability of spent fuel pools to sabotage-included fires, and embarking on its own investigation, the Staff has effectively conceded

⁸ It should be noted that a "zirconium-induced fire potential" exists in virtually any high-density spent fuel pool that is filled, or even partially filled, as is the case at Millstone 3.

that acts or malice against a spent fuel are credible and worthy of consideration in the NRC's NEPA decisionmaking process.

B. EIS Should Fully Address Impacts, Weigh Alternatives and Mitigation Options

In an EIS, the NRC Staff would be required to evaluate the environmental impacts of a spent fuel pool accident at Millstone 3. These impacts could be extremely severe, even apocalyptic in nature. *See* Thompson Declaration, Section VII. The comparative risks of storing spent fuel in high-density pools, as compared with alternative options for storing fuel, could be analysed through an extension of techniques that are currently available in the field of PRA. Such an analysis would consider the potential for a release of radioactive material from a storage facility to the environment through exothermic oxidation reactions and other mechanisms. A credible assessment of the release potential would consider all physically realisable combinations of causative events and modes of release. *See* Thompson Declaration, Section X. This assessment, combined with an estimation of offsite consequences, could provide a credible analysis of the comparative risks of storing spent fuel in high-density pools and in other types of facility. *Id*

The offsite consequences arising from the onset of exothermic oxidation reactions in a pool could be estimated through analytic techniques that have been developed in the context of PRA. This estimation of consequences, combined with the assessment of modes of water loss, could provide a credible description of the potential for, and impacts of, the onset of exothermic oxidation reactions in a high-density spent fuel pool. That

description would be an essential component of a credible environmental impact statement (EIS) for a high-density spent fuel pool.

An EIS would also force the NRC Staff to consider reasonable alternatives and/or mitigative measures for avoiding or reducing the risks posed by spent fuel storage in the Millstone 3 pools. Alternatives are available that would greatly reduce, or even eliminate, the risk of a pool fire. But they have been overlooked because of their larger marginal cost. An EIS would require the NRC Staff and DNC to make a more realistic cost analysis, that took into account the very high potential costs of an accident and weighed them against the cost of alternatives that would greatly mitigate or reduce those consequences. For example, the fuel could be stored dry, in robust steel casks that are cooled by natural circulation of air; each cask could be surrounded by an earth-and-gravel berm, with substantial spacing between the casks. This storage arrangement would withstand a wide variety of determined acts of malice. The design basis for this illustrative storage arrangement could include a requirement, among other requirements, that the impact of a large, fuel-laden aircraft on the storage facility would not lead to a release of radioactive material from more than one cask. A fuel storage facility constructed with such a design basis would not only be able to withstand or limit the consequences of a wide variety of acts of malice, but would also exhibit a very low probability of experiencing a substantial release of radioactive material due to events other than acts of malice. *See* Thompson Declaration, Section VIII.

V. MOTION TO REOPEN THE RECORD

The Commission's standard for motions to reopen the record is found in 10

C.F.R. § 2.734:

(a) A motion to reopen a closed record to consider additional evidence will not be granted unless the following criteria are satisfied:

(1) The motion must be timely, except that an exceptionally grave issue may be considered in the discretion of the presiding officer even if untimely presented.

(2) The motion must address a significant safety or environmental issues.

(3) The motion must demonstrate that a materially different result would be or would have been likely had the newly proffered evidence been considered initially.

(b) The motion must be accompanied by one or more affidavits which set forth the factual and/or technical bases for the movant's claim that the criteria of paragraph (a) of this section have been satisfied. Affidavits must be given by competent individuals with knowledge of the facts alleged, or by experts in the disciplines appropriate to the issues raised. Evidence contained in affidavits must meet the admissibility standards set forth in § 2.743(c). Each of the criteria must be separately addressed, with a specific explanation of why it has been met. Where multiple allegations are involved, the movant must identify with particularity each issue it seeks to litigate and specify the factual and/or technical bases which it believes support the claim that this issue meets the criteria in paragraph (a) of this section.

As set forth below, this motion and the accompanying Thompson Declaration satisfy the Commission's standard for reopening the record.

Section 2.734(d) also requires that a motion to reopen which relates to a contention not previously in controversy among the parties must also satisfy the requirements for nontimely contentions in § 2.714(a)(1)(i) through (v). CCAM/CAM's satisfaction of the late-filed contention standard is addressed in Section V below.

A. The Motion is Timely.

This motion is timely, because the information on which it is principally based consists of the September 11 attack on the World Trade Center and a steady stream of subsequent U.S. government pronouncements and initiatives, demonstrating that the government considers additional terrorist attacks to be credible. Relevant pronouncements and decisions were made as recently as October 31. Taken together, statements show that the U.S. is an ongoing target of terrorism; that the terrorists are sophisticated, determined, and effective at inflicting serious damage to life and property; that U.S. facilities are vulnerable and unprepared; and that the NRC and other government agencies consider the terrorist threat to be credible, and that nuclear facilities are potential, even attractive, targets.

CCAM/CAM's motion to reopen also relies on relatively new developments in its understanding of spent fuel pool behavior, *i.e.*, that spent fuel pools are more vulnerable to fire than previously thought. The first official NRC publication reflecting this new understanding, NUREG-1738, Technical Study of Spent Fuel Pool Accident Risk at Decommissioning Nuclear Power Plants, was not released publicly until January of 2001. (Although the document is dated October 2000, public release was delayed for several months.)

B. The Safety and Environmental Issues Raised by the Contention Are Both Significant and Exceptionally Grave.

Even if a motion to reopen the record is not timely, it may be considered if the issues it presents an "exceptionally grave." Here, in addition to being timely, the environmental issues raised by this contention are extremely grave, and could have a

profound effect on public safety. The threat of another terrorist attack on a U.S. facility is neither idle nor speculative, and the entire U.S. nuclear fleet has been advised to maintain a continuous state of high alert. Nuclear power plants are particularly attractive targets for such malevolent acts, because of the potential for radiological accidents to do widespread and severe damage to public health and property.

As discussed above, the spent fuel pool at Millstone 3 is vulnerable to acts or malice or insanity that could lead to the loss of water from the pool. The ensuing fire could contaminate thousands of square kilometers of land, an area many times the size of Connecticut. Although alternative means exist for storing the fuel, which would greatly reduce if not completely eliminate the risk of a significant radiological release from the Millstone plant, these options have never been seriously examined. Accordingly, the proposed contention raises grave safety and environmental issues.

C. If Intervenors' Evidence Had Been Considered Initially, a Materially Different Result Would Have Occurred.

The ASLB has not previously considered a contention that sought the preparation of an EIS based on the risk of acts of malice or insanity. However, in Contentions 6, 7 and 8, CCAM/CAM asked the ASLB to admit contentions generally calling for an EIS to consider the impacts of severe spent fuel pool accidents. *See* LBP-00-26, 51 at 42-43. CCAM/CAM submit that if the evidence presented by CCAM/CAM and Dr. Thompson had been considered earlier, the ASLB would have ordered a hearing on whether an EIS should be prepared for the spent fuel pool expansion at Millstone 3. This is because CAM/CCAM has satisfied its burden of going forward to demonstrate that an act of

terrorism or sabotage against the Millstone 3 pool is a credible event, and also that if such an attack results in loss of water from the pool, a fire is almost certain to result.

C. The Motion is Supported by the Declaration of Dr. Thompson, a Qualified Expert and by NRC Documents and Reliable Documentary Sources.

1. Qualifications of Dr. Thompson

As required by 10 C.F.R. § 2.743(b), this motion and the accompanying contention are supported by the expert declaration of Dr. Gordon Thompson. A copy of Dr. Thompson's curriculum vitae is attached to his Declaration. Dr. Thompson is highly qualified, by reason of training and experience, to testify regarding the potential for a sabotage event at the Millstone nuclear plant, and the consequences of such an attack.

Dr. Thompson's professional qualifications are detailed in his Declaration at Section II. To summarize, Dr. Thompson is the executive director of the Institute for Resource and Security Studies ("IRSS"), a nonprofit, tax-exempt corporation based in Massachusetts. He received an undergraduate education in science and mechanical engineering at the University of New South Wales, in Australia. In 1973, from Oxford University, he received a Doctorate of Philosophy in mathematics, for analyses of plasmas undergoing thermonuclear fusion. During his graduate studies he was associated with the fusion research program of the UK Atomic Energy Authority. Dr. Thompson's undergraduate and graduate work provided him with a rigorous education in the methodologies and disciplines of science, mathematics, and engineering.

Since 1977, a significant part of Dr. Thompson's work has consisted of technical analyses of safety and environmental issues related to nuclear facilities. These analyses have been sponsored by a variety of nongovernmental organizations and local, state and

national governments, predominantly in North America and Western Europe. Drawing upon these analyses, he has provided expert testimony in legal and regulatory proceedings, and has served on committees advising US government agencies.

Dr. Thompson's work includes the conduct of, direction of, or participation in, a number of studies that evaluated aspects of the design and operation of nuclear facilities with respect to severe accident probabilities and consequences. For instance, he was co-investigator in a study by the Union of Concerned Scientists on the "source term" issue -- the potential for release of radioactive material to the environment. He also was one of a team of four scientists who prepared, for Greenpeace International, a comprehensive critique of the state of the art of probabilistic risk assessment (PRA). In addition, Dr. Thompson conducted analysis on the relevance of PRA to emergency response planning, as part of a study on emergency planning for nuclear power plant accidents. All of these studies required him to be highly familiar with the design and operation of nuclear power plants, as well as the characteristics of probabilistic risk assessment.

Dr. Thompson has also done considerable work on the risks posed by individual nuclear facilities, including a study of the risks posed by the Seabrook plant (USA), the La Hague site (France), the Darlington station (Canada), the Sizewell B station (UK), the Dukovany plant (Czech Republic) and the Pickering station (Canada). All of these studies required Dr. Thompson to become familiar with the relevant details of the design and operation of the facilities involved.

To a significant degree, Dr. Thompson's work has been accepted or adopted by relevant governmental agencies. During the period 1978-1979, for example, he served on an international review group commissioned by the government of Lower Saxony (a state

in Germany) to evaluate a proposal for a nuclear fuel cycle center at Gorleben. He led the subgroup that examined accident risks and alternative options with lower risk. One of the risk issues that he identified and analyzed was the potential for an exothermic oxidation reaction of fuel cladding in a high-density spent fuel pool if water is lost from the pool (*i.e.*, a “pool fire.”) In examining the potential for a pool fire, he identified partial loss of water as a more severe condition than total loss of water. He also identified and described alternative fuel storage options with lower risk. The Lower Saxony government accepted Dr. Thompson’s findings and ruled that high-density pool storage was not an acceptable option at Gorleben. As a direct result, policy throughout Germany has been to use dry storage, rather than high-density pool storage, for away-from-reactor storage of spent fuel.

Dr. Thompson’s work has also influenced decisionmaking by safety officials in the U.S. Department of Energy (DOE). During the period 1986-1991, he was commissioned by environmental groups to assess the safety of the military production reactors at the Savannah River Site, and to identify and assess alternative options for the production of tritium for the US nuclear arsenal. Although much of the relevant information was classified or otherwise inaccessible to the public, Dr. Thompson was able to address safety issues through analyses that were recognized as accurate by nuclear safety officials at DOE.

In 1977, and again during the period 1996-2000, Dr. Thompson examined the safety of nuclear fuel reprocessing and liquid high-level waste management facilities at the Sellafield site in the UK. His investigation in the latter period was supported by consortia of local governments in Ireland and the UK, and his findings have been

presented at briefings in the UK and Irish parliaments. Dr. Thompson identified safety issues that were not addressed in any publicly available literature about the Sellafield site. As a direct result of his investigation, the UK Nuclear Installations Inspectorate (NII) required the operator of the Sellafield site to conduct extensive safety analyses, and established a binding schedule for reduction of the inventory of liquid high-level radioactive waste at Sellafield.

Dr. Thompson also served as an expert witness for Orange County, North Carolina in the spent fuel pool expansion proceeding for the Harris nuclear plant. Although the applicant and the NRC Staff disparaged Dr. Thompson's expertise and views, the Staff later adopted his position on significant aspects of spent fuel pool behavior. In particular, the Staff now agrees with Dr. Thompson that (a) loss of water from a high-density spent fuel pool can lead to the onset of exothermic reactions of spent fuel of any age after discharge from a reactor; (b) the onset of exothermic oxidation reactions can be assumed if the water level in a pool declines to the level of the top of the spent fuel racks; and (c) the onset of exothermic oxidation reactions in one pool is likely to lead to the onset of similar reactions in nearby pools. *See* Thompson Declaration, pars. II-10, IV-3 – IV-6; NUREG-1738.

In his Declaration, Dr. Thompson has presented in detail CCAM/CAM's evidentiary basis for asserting that (a) a terrorist attack on a U.S. nuclear power plant is foreseeable, (b) such an attack could foreseeably lead to an accident in the fuel storage pool, and (c) an accident could foreseeably result in a fire and offsite radiological release. In addition, Dr. Thompson addresses the safety significance of this issue. His Declaration provides ample support for the motion to reopen the record and the contention.

2. NRC Documents and Other Documentary Sources.

In addition to Dr. Thompson's expert Declaration, the motion to reopen is supported by documents issued by the NRC Staff and the Commission, as well as announcements by the NRC and other agencies that have been reported in U.S. newspapers. Official NRC documents have been recognized as sufficient to support for a motion to reopen the record. *Louisiana Power & Light Co.* (Waterford Steam Electric Station, Unit 3), ALAB-812, 22 NRC 5, 17 and note 7 (1985), citing *Pacific Gas & Electric Co.* (Diablo Canyon Nuclear Power Plant, Units 1 and 2), CLI-81-5, 13 NRC 361, 363 (1981).

Circumstances have also required CCAM/CAM to rely on newspaper reports of statements made and actions taken by the NRC and other government agencies. Reliance on news reports is necessary because they constitute the best available information regarding the nature of the terrorist threat and the U.S. government's response to it. In this context, it should be noted that the NRC has issued very little information formally regarding its response to the September 11 attack, or the response by other agencies that is relevant to the protection of nuclear power facilities. The index of press releases on the NRC's website identifies only three press releases since September 11 that are directly related to the NRC's actions in the wake of the September 11 attack.

C. The Evidence Provided in Support of the Motion Meets NRC Standards for Admissibility.

As required by 10 C.F.R. § 2.734(b), the evidence provided by CAM/CCAM in support of its motion meets the NRC's admissibility standard in 10 C.F.R. § 2.743(c), because it is relevant, material, and reliable. Dr. Thompson's declaration provides

extensive detail in support of both the motion and the contention. CCAM/CAM also relies on NRC documents, and press releases and news articles regarding numerous actions and statements by government agencies in response to the ongoing threat of a terrorist attack. As discussed above, in many instances press articles constitute the best, and indeed the only, evidence of the U.S. government's response to the crisis.

CCAM/CAM also wishes to alert the ASLB to an issue concerning the sensitivity of information that may be raised in this proceeding. During the preparation of its contention, CCAM/CAM took care not to include in its pleading or Dr. Thompson's declaration any detailed information that would assist a perpetrator of an act of malice or insanity in harming the Millstone plant. *See* Thompson Declaration, Section IX. We believe that if our contention is admitted, it would be appropriate for the ASLB to establish a process for identifying and protecting such information through the use of a nondisclosure agreement and closed proceedings. However, as discussed in Section IX of Dr. Thompson's Declaration, we believe that not all of the information related to the contention would fall into a protected category, and indeed that public disclosure and debate on some of this information is very important. Therefore, we would request that any process for identifying sensitive information be established with input from all of the parties and due regard for the public's interest in maximizing disclosure to the extent consistent with protection of public health and safety and the environment, and national security.

V. SATISFACTION OF LATE-FILED CONTENTION STANDARD

As discussed below, CCAM/CAM satisfies the standard for late-filed contentions, which is set forth in 10 C.F.R. § 2.714(a)(1).

Good Cause: CCAM/CAM has good cause for filing its contention at the present time. The contention is based on the events of September 11 and subsequent developments, and could not have been filed before then. *See* discussion in Section IV.C, *supra*.

Availability of Other Means to Protect CCAM/CAM's Interest: There are no other means for CCAM/CAM to protect their interest in seeking the preparation of an EIS by the NRC. This hearing is the only forum in which CCAM/CAM can seek an EIS and have any recourse to the Commission or the Courts if its request is denied.

Extent to Which CCAM/CAM's Participation May Reasonably Be Expected to Assist in the Development of a Sound Record: CCAM/CAM's participation in this proceeding may be expected to fully assist in the development of a sound record in this case. CCAM/CAM's contentions are supported by the expert opinion of Dr. Gordon Thompson. Dr. Thompson is a qualified expert in nuclear facility safety and severe accident analysis, who has had significant experience in the field of spent fuel pool behavior. His high level of expertise and credibility are reflected by the fact that his recommendations and analyses have been adopted by various government agencies in the U.S. and abroad, including the NRC. *See* Thompson Declaration, Section II. Dr. Thompson's Declaration and CV, which describe his experience in detail, are attached as Exhibit 1.

In support of the contention, Dr. Thompson has prepared a detailed declaration, which evaluates the risks and consequences of a malevolent attack against the Millstone 3 spent fuel pool. If a hearing is granted, Dr. Thompson will provide testimony consistent with the contention and his Declaration.

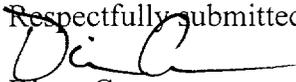
Extent to Which CCAM/CAM's Interests Will be Represented By Another Party: There are no other intervenors in this case, and therefore there are no other parties who can or will represent CCAM/CAM's interests if its contentions are not admitted.

Extent to Which CCAM/CAM's Participation Will Broaden the Issues or Delay the Proceeding: It is clear that the admission of its contention will broaden the issues, because the only contention currently pending before the ASLB concerns the adequacy of administrative measures for criticality prevention. CCAM/CAM believes that the extent to which the admission of the contention will delay the proceeding is marginal, because litigation of the environmental contention would significantly overlap litigation of the criticality prevention issue. In the criticality prevention case, the parties are to commence a 90-day discovery period on November 7, 2001. The Board has also tentatively set a date of March 18, 2001, for the Subpart K oral argument. CCAM/CAM anticipates that the environmental proceeding will take somewhat longer to complete, but that the additional delay would be a matter of only several months. Given the enormous long-term safety and environmental implications of the issues raised in the contention, the impacts of this additional delay pale in significance.

VI. CONCLUSION

For the foregoing reasons, the ASLB should grant CCAM/CAM's Motion to Reopen the Record and admit its late-filed environmental contention.

Respectfully submitted,



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November 1, 2001

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	:	Docket No. 50-423-LA-2
	:	
DOMINION NUCLEAR	:	ASLBP No. 00-771-01-LA
CONNECTICUT, INC.	:	
	:	
(Millstone Nuclear Power Station,	:	
Unit No. 3; Facility Operating	:	
License NPF-49)	:	

DECLARATION OF 31 OCTOBER 2001
BY DR. GORDON THOMPSON IN SUPPORT OF
A MOTION BY CCAM/CAM

I, Gordon Thompson, declare as follows:

I. INTRODUCTION

(I-1) I am the executive director of the Institute for Resource and Security Studies (IRSS), a nonprofit, tax-exempt corporation based in Massachusetts. Our office is located at 27 Ellsworth Avenue, Cambridge, MA 02139. IRSS was founded in 1984 to conduct technical and policy analysis and public education, with the objective of promoting peace and international security, efficient use of natural resources, and protection of the environment. A statement of my professional qualifications is provided in Section II, below.

(I-2) I have been retained by the Connecticut Coalition Against Millstone (CCAM) and the Long Island Coalition Against Millstone (CAM) as an expert witness in a proceeding before the US Nuclear Regulatory Commission (NRC), regarding an application by Dominion Nuclear Connecticut Inc (DNC) for a license amendment that would allow a major expansion of storage capacity in the spent fuel pool at the Millstone Unit 3 nuclear power plant.¹

(I-3) The purpose of this declaration is to support a motion by CCAM/CAM to reopen the record in the abovementioned proceeding, and to provide an evidentiary basis for CCAM/CAM's late-filed "environmental" contention. The contention states that the NRC must prepare an environmental impact statement (EIS) for the proposed expansion of spent fuel storage capacity in

¹ Northeast Nuclear Energy Company (the licensee preceding DNC), license amendment application, 19 March 1999.

the Millstone Unit 3 pool. Moreover, the contention demands that the EIS addresses the potential for a range of events -- including, but not limited to, acts of malice or insanity -- to cause a significant release of radioactive material from the pool to the environment. The contention also demands that the EIS examines alternative options for storage of spent fuel.

(I-4) This declaration has eleven sections. After this introduction (Section I), the declaration addresses my professional qualifications (Section II). Then, the declaration provides some information (Section III) about the Millstone Unit 3 pool in its present and proposed configurations. Section IV provides a generic discussion of the potential for occurrence of self-sustaining, exothermic oxidation reactions in a spent fuel pool; such an event is referred to here, for simplicity, as a "pool fire". This is followed by a generic discussion (Section V) of the history of, and potential for, acts of malice or insanity at nuclear facilities. The vulnerability of the Millstone Unit 3 pool to a range of events -- including acts of malice or insanity -- is discussed in Section VI. A brief discussion of the offsite consequences of a pool fire at Millstone Unit 3 is provided in Section VII. Alternative options for storing spent fuel on the Millstone site are discussed in Section VIII. Then follows a discussion (Section IX) about the identification and management of sensitive information relating to the vulnerability of nuclear facilities. Section X sets forth some requirements for a credible EIS for the proposed expansion of capacity in the Millstone Unit 3 pool. Conclusions are presented in Section XI.

II. MY PROFESSIONAL QUALIFICATIONS

(II-1) I am an expert in the technical analysis of safety and environmental issues related to nuclear facilities. My Curriculum Vitae is provided here as Attachment A.

(II-2) I received an undergraduate education in science and mechanical engineering at the University of New South Wales, in Australia. Subsequently, I pursued graduate studies at Oxford University and received from that institution a Doctorate of Philosophy in mathematics in 1973, for analyses of plasmas undergoing thermonuclear fusion. During my graduate studies I was associated with the fusion research program of the UK Atomic Energy Authority. My undergraduate and graduate work provided me with a rigorous education in the methodologies and disciplines of science, mathematics, and engineering.

(II-3) Since 1977, a significant part of my work has consisted of technical analyses of safety and environmental issues related to nuclear facilities.

These analyses have been sponsored by a variety of nongovernmental organizations and local, state and national governments, predominantly in North America and Western Europe. Drawing upon these analyses, I have provided expert testimony in legal and regulatory proceedings, and have served on committees advising US government agencies. To illustrate my expertise, I provide in the following paragraphs some details of my experience.

(II-4) I have conducted, directed, and/or participated in a number of studies that evaluated aspects of the design and operation of nuclear facilities with respect to severe accident probabilities and consequences. These include generic studies and studies of individual facilities. For instance, with respect to generic studies on the potential for severe accidents at nuclear power plants, I was co-investigator in a study by the Union of Concerned Scientists on the "source term" issue -- the potential for release of radioactive material to the environment.² Also, I was one of a team of four scientists who prepared, for Greenpeace International, a comprehensive critique of the state of the art of probabilistic risk assessment (PRA) for nuclear power plants.³ Our report noted that acts of malice, such as sabotage and acts of war, are not considered in PRAs, despite a history of malicious acts at many nuclear facilities. In addition, I conducted analysis on the relevance of PRA to emergency response planning, as part of a study on emergency planning for nuclear power plant accidents.⁴ All of these studies required me to be highly familiar with the design and operation of nuclear power plants, as well as the characteristics of probabilistic risk assessment.

(II-5) I have also done considerable work on the risks posed by individual nuclear facilities. In addition to performing the studies described elsewhere in this declaration, I have studied the risks posed by the Seabrook and Three Mile Island plants (USA), the Darlington and Pickering stations (Canada), the Sizewell B station (UK) and the Dukovany plant (Czech Republic). All of these studies required me to become familiar with the relevant details of the design and operation of the facilities involved.

(II-6) To a significant degree, my work has been accepted or adopted by relevant governmental agencies. During the period 1978-1979, for example, I served on an international review group commissioned by the government

² Steven Sholly and Gordon Thompson, The Source Term Debate (Cambridge, Massachusetts: Union of Concerned Scientists, January 1986).

³ H Hirsch et al, IAEA Safety Targets and Probabilistic Risk Assessment (Hannover, Germany: Gesellschaft fur Okologische Forschung und Beratung mbH, August 1989).

⁴ D Golding et al, Preparing for Nuclear Power Plant Accidents (Boulder, Colorado: Westview Press, 1995).

of Lower Saxony (a state in Germany) to evaluate a proposal for a nuclear fuel cycle center at Gorleben. I led the subgroup that examined accident risks and identified alternative options with lower risk.⁵ One of the risk issues that I identified and analysed was the potential for self-sustaining, exothermic oxidation reactions of fuel cladding in a high-density spent fuel pool if water is lost from the pool. Hereafter, for simplicity, this event is referred to as a "pool fire".⁶ In examining the potential for a pool fire, I identified partial loss of water as a more severe condition than total loss of water. I identified a variety of events that could cause a loss of water from a pool, including aircraft crash, sabotage, terrorism and acts of war. Also, I identified and described alternative fuel storage options with lower risk; these lower-risk options included design features such as spatial separation, natural cooling and underground vaults. The Lower Saxony government accepted my findings about the risk of a pool fire, and ruled in May 1979 that high-density pool storage of spent fuel was not an acceptable option at Gorleben. As a direct result, policy throughout Germany has been to use dry storage in casks, rather than high-density pool storage, for away-from-reactor storage of spent fuel.

(II-7) My work has also influenced decisionmaking by safety officials in the U.S. Department of Energy (DOE). During the period 1986-1991, I was commissioned by environmental groups to assess the safety of the military production reactors at the Savannah River Site, and to identify and assess alternative options for the production of tritium for the US nuclear arsenal. Initially, much of the relevant information was classified or otherwise inaccessible to the public. Nevertheless, I addressed safety issues through analyses that were recognized as accurate by nuclear safety officials at DOE. I eventually concluded that the Savannah River reactors could not meet the safety objectives set for them by DOE.⁷ DOE subsequently reached the same conclusion, and scrapped the reactors. The current national policy for tritium production is to employ commercial reactors, an option that I had concluded was technically attractive but problematic from the perspective of nuclear weapons proliferation.

⁵ Jan Beyea, Yves Lenoir, Gene Rochlin and Gordon Thompson (subgroup chair), Report of the Corleben International Review, Chapter 3: Potential Accidents and their Effects, submitted (in German) to the Government of Lower Saxony, March 1979.

⁶ At water-cooled reactors, such as the Millstone Unit 3 reactor, the fuel cladding is made from a zirconium alloy that can enter into a vigorous exothermic oxidation reaction with either air or steam. For simplicity, this reaction can be referred to as a "fire".

⁷ Gordon Thompson and Steven C Sholly, No Restart for K Reactor (Cambridge, Massachusetts: Institute for Resource and Security Studies, October 1991).

(II-8) In 1977, and again during the period 1996-2000, I examined the safety of nuclear fuel reprocessing and liquid high-level radioactive waste management facilities at the Sellafield site in the UK. My investigation in the latter period was supported by consortia of local governments in Ireland and the UK, and I presented my interim findings at briefings in the UK and Irish parliaments in 1998. I identified safety issues that were not addressed in any publicly available literature about the Sellafield site.⁸ As a direct result of my investigation, the UK Nuclear Installations Inspectorate (NII) required the operator of the Sellafield site -- British Nuclear Fuels (BNFL) -- to conduct extensive safety analyses. These analyses confirmed the significance of the safety issues that I had identified, and in January 2001 the NII established a legally binding schedule for reduction of the inventory of liquid high-level radioactive waste at Sellafield.⁹ The NII took this action in recognition of the grave offsite consequences of a release to the environment from the tanks in which liquid high-level waste is stored. I had identified a variety of events that could cause such a release, including acts of malice or insanity.

(II-9) In May 2000 I completed a study for Greenpeace International on the hazard potential of the La Hague site in France.¹⁰ Nuclear fuel reprocessing and related activities are conducted at this site. The operator of the site -- COGEMA -- is authorised to store 14,000 tonnes of spent fuel in high-density pools at La Hague, and proposes to increase the capacity of these pools to 17,600 tonnes. My study described the potential for a pool fire at La Hague, and identified events -- including acts of malice or insanity -- that could lead to a pool fire. One of the findings of my study was that neither COGEMA nor the French government had a thorough understanding of La Hague's hazard potential, including the potential for a pool fire. Subsequent to the terrorist events of 11 September 2001 in New York and Washington, media exposure brought La Hague's hazard potential to the attention of the French government. During October 2001 the French government deployed anti-aircraft missiles at La Hague.

⁸ Gordon Thompson, High Level Radioactive Liquid Waste at Sellafield: Risks, Alternative Options and Lessons for Policy (Cambridge, Massachusetts: Institute for Resource and Security Studies, June 1998).

⁹ Nuclear Installations Inspectorate, "Specification Issued under Licence Condition 32(4) for the Limitation of the Accumulation or Storage of Liquid High Level Radioactive Waste in B215. Licence Instrument 343. January 2001."

¹⁰ Gordon Thompson, Hazard Potential of the La Hague Site: An Initial Review (Cambridge, Massachusetts: Institute for Resource and Security Studies, May 2000).

(II-10) As stated in paragraph II-6, I determined in the period 1978-1979 that partial loss of water from a high-density spent fuel pool is a more severe condition than total loss of water. This is because convective heat transfer is suppressed by the presence of residual water at the base of the fuel assemblies. During any scenario for loss of water from a spent fuel pool, there will be a period of time during which residual water is present. As a result, comparatively old fuel -- potentially including fuel aged 10 or more years after discharge from a reactor -- can ignite if water is lost from a high-density spent fuel pool. The NRC Staff failed, for more than two decades, to understand this point. An illustration of the Staff's lack of understanding was provided by its statements during a license amendment proceeding in regard to the expansion of spent fuel pool capacity at the Harris nuclear power plant. I served as an expert witness for Orange County, North Carolina, the intervenor in this proceeding. In filings during March and April 2000, the Staff repeatedly disparaged my statements that comparatively old fuel can ignite. A few months later, however, the Staff adopted my position. In a report dated October 2000, but not published until January 2001, the Staff recognized that the flow of air to exposed fuel assemblies could be blocked by the presence of collapsed structures -- which might be attributable, for example, to a cask drop or an earthquake -- or by the presence of residual water.¹¹ The Staff analyzed the heat transfer implications of flow blockage and concluded:¹²

"While the February 2000 [draft] study indicated that for the cases analyzed a required decay time of 5 years would preclude a zirconium fire, the revised analyses show that it is not feasible, without numerous constraints, to define a generic decay heat level (and therefore decay time) beyond which a zirconium fire is not physically possible."

(II-11) On numerous occasions, I have drawn attention in my writings and oral presentations to the vulnerability of nuclear facilities to acts of malice or insanity. I have pointed out that PRAs do not address acts of malice or insanity, with the result that a PRA can, at best, provide a lower bound to the probability of a release of radioactive material.¹³ In 1996 I wrote a generic report on war and terrorism as risk factors for nuclear power plants.¹⁴ Among other findings, this report noted that an act of war or terrorism at a

¹¹ Timothy Collins et al (authors are all from the NRC Staff), Technical Study of Spent Fuel Pool Accident Risk at Decommissioning Nuclear Power Plants, October 2000.

¹² Collins et al, October 2000 (op cit), page 2-1.

¹³ The strengths and weaknesses of PRA methodology are discussed in Hirsch et al, August 1989 (op cit).

¹⁴ Gordon Thompson, War, Terrorism and Nuclear Power Plants (Canberra: Peace Research Centre, Australian National University, October 1996).

nuclear power plant might have as its primary target the spent fuel stored at the plant, rather than the reactor. The report concluded with a statement that supports CCAM/CAM's contention that an EIS must be prepared for the proposed expansion of capacity in the Millstone Unit 3 pool, and that the EIS must consider acts of malice and insanity. My statement was:

"Public debate about the future operation of existing nuclear power plants, and the construction of new plants, should be broadened to encompass the possible involvement of nuclear plants in war or terrorism."

III. THE MILLSTONE UNIT 3 SPENT FUEL POOL

(III-1) Millstone Unit 3 is equipped with one spent fuel pool, which is the sole pathway for removing fuel from the Millstone Unit 3 reactor.¹⁵ The pool is L-shaped, and has a floor area of about 1,600 square feet. At present, the pool contains 21 high-density spent fuel racks, with a total capacity of 756 fuel assemblies. These racks now contain 585 fuel assemblies. All of these assemblies have been discharged from the Millstone Unit 3 reactor, whose core contains 193 fuel assemblies. No fuel has been removed from the pool. DNC expects that the present racks will contain 754 fuel assemblies -- leaving 2 remaining empty spaces -- after a refueling outage of the reactor in June 2004.

(III-2) To provide additional storage capacity, DNC seeks a license amendment that allows the addition of 15 high-density racks to the pool, thereby expanding the pool's capacity to a total of 1,860 assemblies. DNC expects that a total of 1,877 fuel assemblies will have been discharged from the Millstone Unit 3 reactor when its 40-year operating license expires in 2026. Thus, DNC seeks a pool capacity that would accommodate all but 17 of the fuel assemblies that are expected to be discharged from the Unit 3 reactor during its 40-year license period. However, DNC is considering moving spent fuel from Millstone Unit 2 to the Unit 3 pool. A company document states:¹⁶ "Moving Unit 2 fuel to the Unit 3 pool is necessary to assure Unit 2 can operate to the end of its license." If this option were exercised, then the Unit 3 pool -- if equipped with the proposed additional racks -- would be filled before 2026. At present, DNC is not licensed to transfer spent fuel into or out of the Unit 3 pool.

¹⁵ Information provided in Section 3 of this declaration is taken, unless another source is identified, from Northeast Nuclear Energy Company, March 1999 (op cit).

¹⁶ CR No: M3-99-1148, 14 June 2000.

(III-3) The 21 racks now in place in the Unit 3 pool are high-density racks, with a center-center distance of 10.4 inches. The proposed 15 additional racks would also be high-density racks. Ten of the additional racks would have a center-center distance of 9.0 inches, while five of the additional racks would have a 10.0 inch (North-south) and 10.5 inch (East-West) center-center distance. The additional racks would cover most of the now-unused floor space in the pool.

(III-4) A useful indicator of the potential consequences of a pool fire is the inventory of cesium-137 in the pool. Cesium-137 is a radioactive isotope with a half-life of 30 years. This isotope accounts for most of the offsite radiation exposure that is attributable to the 1986 Chernobyl reactor accident, and for about half of the radiation exposure that is attributable to fallout from nuclear weapons tests in the atmosphere.¹⁷ Cesium is a volatile element that would be liberally released during a pool fire. An NRC study has concluded that a generic estimate of the release fraction of cesium isotopes during a pool fire -- that is, the fraction of the pool's inventory of cesium isotopes that would reach the atmosphere -- is 100 percent.¹⁸ It is reasonable to assume such a high release fraction because cesium is volatile, because a fire in a high-density pool, once initiated, would eventually involve all of the fuel in the pool, and because pool buildings are not designed as containment structures.

(III-5) The present and potential future inventory of cesium-137 in the Millstone Unit 3 pool can be readily estimated. Three parameters govern this estimate -- the number of spent fuel assemblies, their respective burnups, and their respective ages after discharge. I have conducted such an estimate, assuming a representative, uniform burnup of 46 GW-days per tonne. The results are provided in the following paragraph.

(III-6) The 585 fuel assemblies that are now in the Millstone Unit 3 pool contain about 31 million Curies (350 kilograms) of cesium-137. DNCI expects that the pool will contain 754 assemblies after a refueling outage in June 2004. Assuming this outcome, the pool will contain about 38 million Curies (430 kilograms) of cesium-137 in the latter part of 2004. If new racks are added to the pool, the inventory of fuel in the pool rises to 1,860 assemblies in 2026, and all of these assemblies are from the Unit 3 reactor, then the pool will contain about 74 million Curies (820 kilograms) of cesium-137 in 2026.

¹⁷ US Department of Energy, Health and Environmental Consequences of the Chernobyl Nuclear Power Plant Accident, DOE/ER-0332 (Washington, DC: DOE, June 1987).

¹⁸ V L Sailor et al, Severe Accidents in Spent Fuel Pools in Support of Generic Safety Issue 82, NUREG/CR-4982 (Washington, DC: NRC, July 1987).

(III-7) For comparison with the inventory estimates in paragraph III-6, note that the Chernobyl reactor accident of 1986 released about 2.4 million Curies (27 kilograms) of cesium-137 to the atmosphere. That release represented 40 percent of the Chernobyl reactor core's inventory of 6 million Curies (67 kg) of cesium-137.¹⁹ The core of the Millstone Unit 3 reactor, like the core of the Chernobyl reactor at the time of the 1986 accident, contains about 6 million Curies (67 kilograms) of cesium-137. Also, atmospheric testing of nuclear weapons led to the deposition of about 20 million Curies (220 kilograms) of cesium-137 across the land and water surfaces of the Northern Hemisphere.²⁰

IV. POOL FIRES: A GENERIC DISCUSSION

(IV-1) In the 1970s, the spent fuel pools of US nuclear power plants were typically equipped with low- or medium-density, open-frame racks. If water were partially or totally lost from such a pool, air or steam could circulate freely throughout the racks, providing cooling to the spent fuel. By contrast, high-density racks -- such as those now located in the Millstone Unit 3 pool -- have a closed structure. To suppress criticality, each fuel assembly is surrounded by solid, neutron-absorbing panels, and there is little or no gap between the panels of adjacent cells. This configuration allows only one mode of circulation of air and steam around a fuel assembly -- vertically upward within the confines of the neutron-absorbing panels.

(IV-2) If water is totally lost from a high-density pool, air will pass downward through available gaps such as the gap between the pool wall and the outer faces of the racks, will travel horizontally across the base of the pool, will enter each rack cell through a hole in its base, and will rise upward within the cell, providing cooling to the spent fuel assembly in that cell. If the fuel has been discharged from the reactor comparatively recently, the flow of air may be insufficient to remove all of the fuel's decay heat. In that case, the temperature of the fuel cladding may rise to the point where a self-sustaining, exothermic oxidation reaction with air will begin. In simple terms, the fuel cladding -- which is made of zirconium alloy -- will begin to burn. The zirconium alloy cladding can also enter into a self-sustaining, exothermic oxidation reaction with steam. Other exothermic oxidation reactions can also occur in a pool if water is lost. For simplicity, the occurrence of one or more of the possible reactions is referred to here as a "pool fire".

¹⁹ Allan S Krass, Consequences of the Chernobyl Accident (Cambridge, Massachusetts: Institute for Resource and Security Studies, December 1991).

²⁰ US Department of Energy, June 1987 (op cit).

(IV-3) In many scenarios for loss of water from a pool, the flow of air that is described in paragraph IV-2 will be blocked. For example, an earthquake or the drop of a shipping cask may distort rack structures, thereby blocking air flow. Alternatively, an earthquake, aircraft impact or explosion may cause objects -- for example, the roof of the fuel handling building -- to fall into the pool, leading to a blockage of air flow. The presence of residual water in the bottom of the pool would also block air flow. In most scenarios for loss of water, residual water will be present for significant periods of time. Blockage of air flow, for whatever reason, will lead to ignition of fuel that has been discharged from a reactor for long periods -- potentially 10 years or longer.²¹ The NRC Staff failed to understand this point for more than two decades (see paragraph II-10).

(IV-4) The NRC Staff has prepared or sponsored a number of generic, technical studies related to the potential for a pool fire. The first of these studies was conducted for the Staff by Sandia Laboratories in 1979.²² The most recent was a Staff study, dated October 2000 but published in January 2001, that addressed the risk of a pool fire at a plant undergoing decommissioning.²³ In a February 1999 report for Orange County, North Carolina, I reviewed some of the Staff analyses conducted prior to February 1999.²⁴ I reviewed the Staff's October 2000 study in comments submitted to the NRC Commissioners in February 2001.²⁵

(IV-5) Technical documents related to the potential for a pool fire were generated in the course of a license amendment proceeding (see paragraph II-10) in regard to the expansion of spent fuel pool capacity at the Harris nuclear power plant. I prepared a report for Orange County, the intervenor in this proceeding.²⁶ The NRC Staff's principal technical document was an affidavit

²¹ The role of residual water in promoting ignition of old fuel is discussed in: Gordon Thompson, Risks and Alternative Options Associated with Spent Fuel Storage at the Shearon Harris Nuclear Power Plant (Cambridge, Massachusetts: Institute for Resource and Security Studies, February 1999), Appendix D.

²² Allan S Benjamin et al, Spent Fuel Heatup Following Loss of Water During Storage. NUREG/CR-0649 (Washington, DC: NRC, March 1979).

²³ Collins et al, October 2000 (op cit).

²⁴ Thompson, February 1999 (op cit), Appendix D.

²⁵ Gordon Thompson, Comments on the NRC Staff's Technical Study of Spent Fuel Pool Accident Risk at Decommissioning Nuclear Power Plants (Cambridge, Massachusetts: Institute for Resource and Security Studies, 19 February 2001).

²⁶ Gordon Thompson, The Potential for a Large, Atmospheric Release of Radioactive Material from Spent Fuel Pools at the Harris Nuclear Power Plant: The Case of a Pool Release Initiated

by members of the Staff.²⁷ The principal technical document proffered by the licensee -- Carolina Power and Light (CP&L) -- was a document prepared by ERIN Engineering.²⁸ Each of these documents was limited in scope, in the sense that the Atomic Safety and Licensing Board (ASLB) had ordered the three parties to confine their analyses to a single scenario for a pool fire.²⁹ In the postulated scenario, a severe accident at the Harris reactor would contaminate the Harris site with radioactive material to an extent that would preclude actions needed to supply cooling and makeup to the Harris pools. The Harris plant has one reactor and four pools. Two pools were in use at high density prior to the proceeding, and the proceeding addressed the activation of the two remaining pools, also at high density.

(IV-6) In its October 2000 report (see paragraph II-10), the NRC Staff conceded that comparatively long-discharged fuel can ignite in the event of water loss from a high-density pool. In the Harris proceeding, the Staff made the same concession. Staff members stated that loss of water from pools containing fuel aged less than 5 years "would almost certainly result in an exothermic reaction", and also stated: "Precisely how old the fuel has to be to prevent a fire is still not resolved."³⁰ The Staff assumed -- conservatively, in its view -- that a fire would be inevitable if the water level fell to the top of the racks.³¹ Thus, the Staff has conceded that the potential for a pool fire is equivalent to the potential for a loss of water down to the top of the racks.

(IV-7) Partial or total loss of water from a spent fuel pool could occur through leakage, evaporation, siphoning, pumping, displacement by objects falling into the pool, or overturning of the pool. These modes of loss of water could arise from events, alone or in combination, that include: (a) acts of malice or insanity by persons within or outside the plant boundary; (b) an aircraft impact, with or without an accompanying fuel-air explosion or fire; (c) an earthquake; (d) dropping of a fuel transfer cask or shipping cask; (e) a severe

by a Severe Reactor Accident (Cambridge, Massachusetts: Institute for Resource and Security Studies, 20 November 2000).

²⁷ ASLBP No. 99-762-02-LA, "Affidavit of Gareth W Parry, Stephen F LaVie, Robert L Palla and Christopher Gratton in Support of NRC Staff Brief and Summary of Relevant Facts, Data and Arguments upon which the Staff Proposes to Rely at Oral Argument on Environmental Contention EC-6", 20 November 2000.

²⁸ ERIN Engineering and Research Inc, "Technical Input for Use in the Matter of Shearon Harris Spent Fuel Pool Before the Atomic Safety and Licensing Board (Docket No. 50-400-LA)", November 2000.

²⁹ ASLBP No. 99-762-02-LA, "Memorandum and Order (Ruling on Late-Filed Environmental Contention)", 7 August 2000.

³⁰ Parry et al, November 2000 (op cit), paragraph 29.

³¹ Ibid, paragraphs 29 and 124.

accident at a nearby reactor or spent fuel pool which, through the spread of radioactive material and other influences, precludes the ongoing provision of cooling and/or water makeup to the affected pool; and (f) an explosion inside or outside the plant buildings.

(IV-8) Neither the NRC nor any other entity has performed a study (of the potential for a pool fire) that addresses all of the modes of water loss and causative events that are mentioned in paragraph IV-7. Such a study could be performed by extending the analytic techniques that are currently available in the field of PRA. A credible study would consider all of the modes of loss of water from a pool that are mentioned in paragraph IV-7, all of the events that could cause a loss of water that are mentioned in paragraph IV-7, and all physically realisable combinations of causative events and modes of water loss. The study would not be credible if it arbitrarily considered only a subset of the physically realisable combinations of causative events and modes of water loss.³² Moreover, a credible study would differ from current PRA practice in that it would consider causative events -- including acts of malice and insanity -- for which the estimation of probability has been regarded as difficult or impossible. If a credible, numerical estimate of the probability of a causative event cannot be made, the foreseeability of that event should be addressed through qualitative analysis.

(IV-9) Various studies prepared by or sponsored by the NRC Staff have addressed selected scenarios for a loss of water from a spent fuel pool. For example, a Staff study -- NUREG-1353 -- has drawn upon other literature to provide a generic estimate that the probability of a loss of water from the dropping of a shipping cask is 3.1 per 100 million reactor-years.³³ This estimate assumes that the conditional probability of a loss of water, given the dropping of a cask, is 0.1, with an uncertainty range of 0.01 to 1.0. Acts of malice or insanity are not considered. An alternative formulation of this estimate would be that the probability (per reactor-year) of water loss from a cask drop = [3.1 per 1,000 million to 3.1 per 10 million] + [(0.01 to 1.0) x (the probability that a cask will drop due to an act of malice or insanity)]. In simpler terms, arranging for the drop of a cask could be an option that appeals to a malicious or insane person.

³² The ASLB in the Harris proceeding ordered the parties to analyse only one scenario for water loss from the Harris pools (see paragraph IV-5). Such an arbitrary limitation of the scope of a study guarantees that its findings will provide, at best, a lower bound to the potential for a pool fire.

³³ E DThrom, Regulatory Analysis for the Resolution of Generic Issue 82, "Beyond Design Basis Accidents in Spent Fuel Pools", NUREG-1353 (Washington, DC: NRC, April 1989), page 4-14.

(IV-10) NUREG-1353 also provides an estimate that the probability of a loss of water from a pool due to aircraft impact is 6.0 per 1,000 million reactor-years as a best estimate, with an upper bound of 2.0 per 100 million reactor-years.³⁴ The same numbers are provided elsewhere in NUREG-1353 as the "hit frequency" of aircraft impact.³⁵ Thus, NUREG-1353 assumes that the conditional probability of a loss of water from a spent fuel pool, given an aircraft impact, is 1.0 (100 percent). This assumption may have been made thoughtlessly, because NRC analyses typically give little attention to threats that are judged to have very low probability.

(IV-11) The NRC Staff's October 2000 report includes a crude, generic analysis of the conditional probability that aircraft impact will cause a loss of water from a spent fuel pool.³⁶ The pool is assumed to have a 5-ft-thick reinforced concrete wall. Impacting aircraft are divided into the categories "large" (weight more than 5.4 tonnes) and "small" (weight less than 5.4 tonnes). The Staff estimates that the conditional probability of penetration of the pool wall by a large aircraft is 0.45, and that 50 percent of penetration incidents involve a loss of water which exposes fuel to air. Thus, the Staff estimates that, for impact of a large aircraft, the conditional probability of a loss of water sufficient to initiate a pool fire is 0.23 (23 percent).

(IV-12) The abovementioned Harris proceeding considered a pool fire scenario (see paragraph IV-5) in which the release of radioactive material during a reactor accident precludes actions that are needed to provide cooling and makeup to spent fuel pools. My analysis found that the minimum value for the best estimate of a pool fire, for this scenario, is 1.6 per 100 thousand reactor-years. This estimate did not account for acts of malice, degraded standards of plant operation, or gross errors in design, construction or operation.³⁷ The NRC Staff estimated, for the same scenario, that the probability of a pool fire is on the order of 2 per 10 million reactor-years.³⁸ The ASLB accepted the Staff's estimate, thereby concluding that the postulated scenario is "remote and speculative", and terminated the proceeding.³⁹ In another declaration, I have described numerous deficiencies in the ASLB's ruling.⁴⁰

³⁴ Ibid, Table 4.7.1 (at page 4-36).

³⁵ Ibid, page 4-14.

³⁶ Collins et al, October 2000 (op cit), page 3-23 and Appendix 2D.

³⁷ Thompson, November 2000 (op cit), page 43.

³⁸ Parry et al, November 2000 (op cit), paragraph 251.

³⁹ ASLBP No. 99-762-02-LA, "Memorandum and Order (Denying Request for Evidentiary Hearing and Terminating Proceeding)", 1 March 2001.

⁴⁰ US Court of Appeals for the District of Columbia Circuit, No. 01-1246, "Declaration of 31 May 2001 by Dr Gordon Thompson in Support of Orange County's Stay Motion".

(IV-13) The Harris fuel handling building contains four pools. In the Harris proceeding, the NRC Staff stated its view that the onset of a pool fire in two of the pools would preclude the provision of cooling and makeup to the other two pools.⁴¹ This view was not supported by any analysis or rationale. ERIN Engineering, on behalf of CP&L, expressed the opinion: "The consequences of loss of water inventory in pools A and B could in turn adversely impact both access and further prevention actions related to pools C and D."⁴² Again, this opinion was not supported by any analysis or rationale. It seems clear, however, that the Staff and ERIN Engineering are in agreement with one of my findings, which was based on analysis. My finding was that the onset of a fire in one or more pools would, through the creation of radioactive contamination of the site and other influences, preclude the provision of cooling and makeup to nearby pools, thereby leading to the onset of fires in the nearby pools.⁴³

V. ACTS OF MALICE OR INSANITY AT NUCLEAR FACILITIES: A GENERIC DISCUSSION

(V-1) For two decades or more it has been clear to many people that nuclear power plants and other nuclear facilities are potential targets of acts of malice or insanity, including highly destructive acts. The NRC has repeatedly rebuffed suggestions by members of the public that this threat be given the depth of analysis that would be expected, for example, in an EIS. This history is illustrated by a September 1982 ruling by the ASLB in the operating license proceeding for the Harris plant. The intervenor, Wells Eddleman, had proffered a contention alleging, in part, that the plant's safety analysis was deficient because it did not consider the "consequences of terrorists commandeering a very large airplane.....and diving it into the containment." In rejecting this contention the ASLB stated:⁴⁴

"This part of the contention is barred by 10 CFR 50.13. This rule must be read *in pari materia* with 10 CFR 73.1(a)(1), which describes the "design basis threat" against which commercial power reactors *are* required to be protected. Under that provision, a plant's security plan must be designed to cope with a violent external assault by "several persons," equipped with light, portable weapons, such as hand-held automatic weapons, explosives, incapacitating agents, and the like.

⁴¹ Parry et al, November 2000 (op cit), paragraph 29.

⁴² ERIN Engineering, November 2000 (op cit), page 2-36.

⁴³ Thompson, November 2000 (op cit), page 40.

⁴⁴ Carolina Power and Light Co. (Shearon Harris Nuclear Power Plant, Units 1 and 2), LBP-82-119A, 16 NRC 2069, 2098 (1982), (emphasis in original).

Read in the light of section 73.1, the principal thrust of section 50.13 is that military style attacks with heavier weapons are not a part of the design basis threat for commercial reactors. Reactors could not be effectively protected against such attacks without turning them into virtually impregnable fortresses at much higher cost. Thus Applicants are not required to design against such things as artillery bombardments, missiles with nuclear warheads, or kamikaze dives by large airplanes, despite the fact that such attacks would damage and may well destroy a commercial reactor."

(V-2) In the statement quoted in paragraph V-1, the ASLB correctly described the design basis for US nuclear plants. However, other design bases are possible. In the early 1980s the reactor vendor ASEA-Atom developed a preliminary design for an "intrinsically safe" commercial reactor known as the PIUS reactor. The design basis for the PIUS reactor included events such as equipment failures, operator errors and earthquakes, but also included: (a) takeover of the plant for one operating shift by knowledgeable saboteurs equipped with large amounts of explosives; (b) aerial bombardment with 1,000-pound bombs; and (c) abandonment of the plant by the operators for one week.⁴⁵ It seems likely that this design basis would also provide protection against the impact of a large, fuel-laden aircraft. Clearly, ASEA-Atom foresaw a world in which acts of malice could pose a significant threat to nuclear plants.

(V-3) There is a rich history of events which shows that acts of malice pose a significant threat to nuclear power plants around the world. Many of these events, up to 1996, are summarised in a report that I prepared.⁴⁶ Consider some examples. Nuclear plants under construction in Iran were repeatedly bombed from the air by Iraq in the period 1984-1987. Yugoslav Air Force fighters made a threatening overpass of the Krsko nuclear plant in Slovenia -- which was operating at the time -- a few days after Slovenia declared independence in 1991. So-called research reactors in Iraq were destroyed by aerial bombing by Israel in 1981 and by the United States in 1991. In 1987, Iranian radio threatened an attack by unspecified means on US nuclear plants if the United States attacked launch sites for Iran's Silkworm antiship missiles. Bombs damaged reactors under construction in Spain in 1977 and in South Africa in 1982. Antitank missiles struck and penetrated the containment of a nuclear plant under construction in France in 1982. North Korean commandos were killed while attempting to come ashore near a South Korean plant in 1985. These and other events illustrate the "external"

⁴⁵ K Hannerz, Towards Intrinsically Safe Light Water Reactors (Oak Ridge, Tennessee: Institute for Energy Analysis, February 1983).

⁴⁶ Thompson, October 1996 (op cit).

threat to nuclear plants. Numerous crimes and acts of sabotage by plant personnel illustrate the "internal" threat.

(V-4) The threat posed to nuclear plants by truck bombs became clearly apparent from an October 1983 attack on a US Marine barracks in Beirut. In a suicide mission, a truck was driven at high speed past a guard post and into the barracks. A gas-boosted bomb on the truck was detonated with a yield equivalent to about 5 tonnes of TNT, destroying the building and killing 241 Marines. In April 1984 a study by Sandia National Laboratories titled "Analysis of Truck Bomb Threats at Nuclear Facilities" was presented to the NRC. According to an NRC summary:⁴⁷ "The results show that unacceptable damage to vital reactor systems could occur from a relatively small charge at close distances and also from larger but still reasonable size charges at large setback distances (greater than the protected area for most plants)." Eventually, in 1994, the NRC introduced regulations that require licensees to install defenses (gates, barriers, etc.) against vehicle bombs. The NRC was spurred into taking this action by two incidents in February 1993. In one incident, a vehicle bomb was detonated in a parking garage under the World Trade Center in New York. In the other incident, a man recently released from a mental hospital crashed his station wagon through the security gate of the Three Mile Island nuclear plant and rammed the vehicle under a partly-opened door in the turbine building.

(V-5) The threat of suicidal aircraft attack on symbolic or high-value targets became clearly apparent from three incidents in 1994.⁴⁸ In April 1994 a Federal Express flight engineer who was facing a disciplinary hearing was travelling as a passenger on a company DC-10. He stormed the cockpit, severely wounded all three members of the crew with a hammer, and tried to gain control of the aircraft. The crew regained control with great difficulty. Federal Express employees said that the flight engineer was planning to crash into a company building. In September 1994 a lone pilot crashed a stolen single-engine Cessna into the grounds of the White House, just short of the President's living quarters. In December 1994 four Algerians hijacked an Air France Airbus 300, carrying 20 sticks of dynamite. The aircraft landed in Marseille, where the hijackers demanded that it be given a large fuel load -- three times more than necessary for the journey -- before flying to Paris. Troops killed the hijackers before this plan could be implemented. French authorities determined that the hijackers planned to explode the aircraft over Paris or crash it into the Eiffel Tower.

⁴⁷ T A Rehm, memo to the NRC Commissioners, "Weekly Information Report -- Week Ending April 20, 1984".

⁴⁸ Matthew L Wald, "US Failed to Learn From Earlier Hijackings", International Herald Tribune, 4 October 2001, page 6.

(V-6) The incident described in paragraph V-5 involving the Federal Express flight engineer illustrates the vulnerability of industrial systems, including nuclear plants, to "internal" threats. That vulnerability is further illustrated by a number of incidents. In December 2000, Michael McDermott killed seven coworkers in a shooting rampage at an office building in Massachusetts. He had worked at the Maine Yankee nuclear plant from 1982 to 1988 as an auxiliary operator and operator before being terminated for exhibiting unstable behavior.⁴⁹ In 1997, Carl Drega of New Hampshire stockpiled weapons and killed four people -- including two state troopers and a judge -- on a suicide mission. He had passed security clearances at three nuclear plants in the 1990s.⁵⁰ In October 2000 a former US Army sergeant pleaded guilty to assisting Osama bin Laden in planning the bombing of the US embassy in Nairobi, which occurred in 1998.⁵¹ In June 1999, a security guard at the Bradwell nuclear plant in Britain hacked into the plant's computer system and wiped out records. It emerged that he had never been vetted and had two undisclosed criminal convictions.⁵² These and other incidents demonstrate clearly that it is foolish to ignore or downplay the "internal" threat of acts of malice or insanity at nuclear plants.

(V-7) The events mentioned in the preceding paragraphs occurred against a background of numerous acts of terrorism around the world. Many of these acts have been highly destructive. US facilities have been targets on many occasions, as illustrated by the bombing of the US embassy in Beirut in 1983, the embassies in Nairobi and Dar es Salaam in 1998, and the USS Cole in 2000. There have been repeated warnings that the threat of terrorism is growing and could involve the US homeland. For example, three authors with high-level government experience have written:⁵³

Long part of the Hollywood and Tom Clancy repertory of nightmarish scenarios, catastrophic terrorism has moved from far-fetched horror to a contingency that could happen next month. Although the United States still takes conventional terrorism seriously, as demonstrated by the response to the attacks on its embassies in Kenya and Tanzania in

⁴⁹ Anne Barnard and Ross Kerber, "Web posting tells of suspect's firing from Maine plant", The Boston Globe, 5 January 2001, page A12.

⁵⁰ Ibid.

⁵¹ John J Goldman, "Former sergeant admits role in bombings of US embassies", The Boston Globe, 21 October 2000, page A2.

⁵² Kevin Maguire, "Security checks tightened after high-level alert", The Guardian, 9 January 2001.

⁵³ A Carter, J Deutch and P Zelikow, "Catastrophic Terrorism", Foreign Affairs, November/December 1998, page 80.

August, it is not yet prepared for the new threat of catastrophic terrorism.

(V-8) A few years ago the US Department of Defense established an advisory commission on national security in the 21st century. This commission -- often known as the Hart-Rudman commission because it was co-chaired by former Senators Gary Hart and Warren Rudman -- issued reports in September 1999, April 2000 and March 2001. The findings in the September 1999 report included the following:⁵⁴

"America will become increasingly vulnerable to hostile attack on our homeland, and our military superiority will not entirely protect us.....States, terrorists and other disaffected groups will acquire weapons of mass destruction and mass disruption, and some will use them. Americans will likely die on American soil, possibly in large numbers."

(V-9) From the preceding paragraphs in Section V it is clear that the potential for acts of malice or insanity at nuclear plants -- including highly destructive acts -- has been foreseeable for many years, and has been foreseen. However, the terrorist attacks on the World Trade Center and the Pentagon on 11 September 2001 provided significant new information. These attacks conclusively demonstrated that the threat of highly-destructive acts of malice or insanity is a clear and present danger, and that no reasonable person can regard this threat as remote or speculative. According to recent press reports, US authorities possess information suggesting that the hijackers of United Airlines flight 93, which crashed in Pennsylvania on 11 September 2001, were planning to hit a nuclear plant.⁵⁵ This may be true or false, or the truth may never be known. Whatever the truth is, it would be foolish to regard nuclear plants as immune from attack.

(V-10) The NRC Staff has conceded that it cannot provide a quantitative assessment of the probability of an act of malice at a nuclear plant. In a SECY paper for the NRC Commissioners, the Staff has stated:⁵⁶

⁵⁴ US Commission on National Security / 21st Century, New World Coming: American Security in the 21st Century, Phase I report, 15 September 1999, page 4.

⁵⁵ Nicholas Rufford, David Leppard and Paul Eddy, "Nuclear Mystery: Crashed plane's target may have been reactor", The Sunday Times, London, 20 October 2001.

⁵⁶ William D Travers, memo to the NRC Commissioners, "Policy Issues Related to Safeguards, Insurance, and Emergency Preparedness Regulations at Decommissioning Nuclear Power Plants Storing Fuel in Spent Fuel Pools (WITS 200000126), SECY-01-0100", 4 June 2001, pp 5-6.

"The staff, as a result of its ongoing work with the Federal national security agencies, has determined that the ability to quantify the likelihood of sabotage events at nuclear power plants is not currently supported by the state-of-the-art in PRA methods and data. The staff also believes that both the NRC and the other government stakeholders would need to conduct additional research and expend significant time and resources before it could even attempt to quantify the likelihood of sabotage events. In addition, the national security agencies, Intelligence Community, and Law Enforcement Agencies do not currently quantitatively assess the likelihood of terrorist, criminal, or other malevolent acts."

(V-11) Although the probability of a terrorist attack cannot be assessed quantitatively, it can be assessed qualitatively. From a qualitative perspective, the probability of a terrorist attack within the US homeland appears to be significantly greater in the current period than it was, for example, in the 1980s. There is now a focussed, well-organized and well-financed threat. The United States is taking military action that may provoke further attacks. This new threat environment may persist for many years.

VI. VULNERABILITY OF THE MILLSTONE UNIT 3 POOL

(VI-1) This Section of my declaration addresses the vulnerability of the Millstone Unit 3 pool to a loss of water. As explained in paragraph IV-6, the NRC Staff has conceded that the potential for a pool fire is equivalent to the potential for a loss of water down to the top of the racks.

(VI-2) Modes of water loss from a pool, and events that could cause water loss, are set forth in paragraph IV-7, above. Paragraph IV-8 provides specifications for a credible study of the potential for water loss from a pool, pointing out that a credible study would: (a) consider all physically realisable combinations of causative events and modes of water loss; and (b) include acts of malice or insanity in its consideration of causative events. Any order by a licensing tribunal to limit the scope of a study of the potential for water loss, so that only some modes of water loss and some causative events are considered, would render the findings non-credible. Moreover, the ordering of such a limit would suggest that the tribunal is seeking to evade or distort the truth.

(VI-3) A thorough, credible study of the potential for water loss from the Millstone Unit 3 pool would require substantial effort by a number of investigators. This declaration does not purport to be such a study. Here, I provide an illustrative discussion of some modes of water loss and some

causative events. The discussion focusses on acts of malice or insanity, especially aircraft impact. This focus does not imply that other causative events are unimportant.

(VI-4) Paragraph IV-9 points out that an act of malice or insanity could lead to the drop of a shipping cask, causing a loss of water from a pool. This event would become possible at Millstone Unit 3 when cask movement begins at that unit. In a report about the Harris plant, I have sketched a scenario for the deliberate siphoning of water from a pool.⁵⁷ Siphoning could be accomplished by one person equipped with some thick-walled hoses.⁵⁸ After the fuel is exposed to air, a fire will begin within a few hours, as explained in paragraph VI-13. A time period sufficient for this scenario could be available if the event were successfully concealed from plant operators and security staff, or if the pool building were successfully defended by an armed group. Either approach could be accompanied by diversionary activity elsewhere on the plant site. Numerous other scenarios could be identified, whereby deliberate actions could lead to a loss of water from the Millstone Unit 3 pool. Detailed information about these scenarios does not necessarily belong in the public domain, as discussed in Section IX of this declaration.

(VI-5) Aircraft impact at the Millstone site could, through a variety of mechanisms, cause a loss of water from the Unit 3 pool. A scenario involving the hijacking of a commercial aircraft may be less likely now than it was before 11 September 2001, because the airline industry is now aware of this threat. However, according to the physicist Richard Garwin, a scenario involving a rented or stolen cargo aircraft may be no less likely than before 11 September 2001. Garwin, who has served on numerous panels advising the US government, warns that a cargo aircraft may be used against a nuclear plant.⁵⁹ Also, one must consider a scenario in which a licensed crew member of a passenger or cargo aircraft engages in a suicide attack. Finally, one must consider the aerial equivalent of a truck bomb, which need not require a large aircraft.

(VI-6) As indicators of the forces that could accompany an aircraft impact, consider the weights and fuel capacities of some typical commercial aircraft.⁶⁰ The Boeing 737-300 has a maximum takeoff weight of 56-63 tonnes and a fuel

⁵⁷ Thompson. February 1999 (op cit), Appendix C.

⁵⁸ After the water level recedes below the effective siphoning depth, water will be lost due to evaporation. This scenario assumes an absence of pool makeup.

⁵⁹ Richard Garwin, "The Many Threats of Terror", The New York Review, 1 November 2001, pp 16-18.

⁶⁰ Data here are from Paul Jackson (editor), Jane's All the World's Aircraft, 1996-97 (Alexandria, Virginia: Jane's Information Group, 1996).

capacity of 20-24 thousand liters. The Boeing 747-400 has a maximum takeoff weight of 363-395 tonnes and a fuel capacity of 204-217 thousand liters. The Boeing 757 has a maximum takeoff weight of 104-116 tonnes and a fuel capacity of 43 thousand liters. The Boeing 767 has a maximum takeoff weight of 136-181 tonnes and a fuel capacity of 63-91 thousand liters.

(VI-7) Commercial jet fuel typically has a heat of combustion of about 38 MJ per liter. For comparison, 1 kilogram of TNT will yield 4.2 MJ of energy. Thus, complete combustion of 1 liter of jet fuel will yield energy equivalent to that from 9 kilograms of TNT. Complete combustion of 100 thousand liters of jet fuel -- about half the fuel capacity of a Boeing 747-400 -- will yield energy equivalent to that from 900 tonnes of TNT. Thus, the impact of a fuel-laden aircraft can lead to a violent fuel-air explosion. Fuel-air munitions have been developed that yield more than 5 times the energy of their equivalent weight in TNT, and create a blast overpressure exceeding 1,000 pounds per square inch.⁶¹ A fuel-air explosion arising from an aircraft impact will be less efficient than a munition in converting combustion energy into blast, but could nevertheless generate a highly-destructive blast, especially if fuel vapor accumulates in a confined space before igniting.

(VI-8) The NRC Staff report NUREG-1353 assumes (see paragraph IV-10) that the impact of an aircraft on a spent fuel pool will cause a loss of water from the pool with a conditional probability of 100 percent. This assumption is not supported by analysis. The NRC Staff's October 2000 report includes a crude, generic analysis of aircraft impact (see paragraph IV-11), yielding an estimate that, for impact of a large aircraft (weight more than 5.4 tonnes), the conditional probability of a loss of water sufficient to initiate a pool fire is 0.23 (23 percent). This estimate ignores the potential for fuel-air explosions and fires. All of the typical, commercial aircraft mentioned in paragraph VI-6 weigh considerably more than 5.4 tonnes.

(VI-9) Another, rough indication of the vulnerability of the Millstone Unit 3 pool to aircraft impact can be obtained from the PRA for the Seabrook plant. The Seabrook and Millstone Unit 3 plants both employ 4-loop Westinghouse pressurised-water reactors (PWRs) and large, dry containments. Thus, PRA findings for Seabrook are roughly indicative of findings for Millstone Unit 3. The Seabrook PRA finds that any direct impact on the containment by an aircraft weighing more than 37 tonnes will lead to penetration of the containment and a breach in the reactor coolant circuit. Also, the Seabrook PRA finds that a similar impact on the control building or auxiliary building

⁶¹ Tom Gervasi, *Arsenal of Democracy* (New York: Grove Press, 1977), page 177.

will inevitably lead to a core melt.⁶² All of the typical, commercial aircraft mentioned in paragraph VI-6 weigh considerably more than 37 tonnes. Also, the Seabrook PRA does not consider the effects of a fuel-air explosion and/or fire as an accompaniment to an aircraft impact. Thus, one could plausibly infer from the Seabrook PRA that the impact of a typical, commercial aircraft on the Millstone Unit 3 pool would lead to a loss of water from that pool, followed by a pool fire.

(VI-10) Analytic techniques are available for estimating the effects that aircraft impact will have on the structures and equipment of a nuclear power plant. However, those techniques focus on the kinetic energy of the impacting aircraft. The effects of an accompanying fuel-air explosion and/or fire are given, at best, a crude analysis. A 1982 review by Argonne National Laboratory of the state of the art for aircraft impact analysis stated:⁶³

"Based on the review of past licensing experience, it appears that fire and explosion hazards have been treated with much less care than the direct aircraft impact and the resulting structural response. Therefore, the claim that these fire/explosion effects do not represent a threat to nuclear power plants has not been clearly demonstrated."

My experience in reviewing PRAs and related studies for nuclear facilities leads me to conclude that the Argonne statement remains valid today. Indeed, in view of the large amount of energy that can be liberated in a fuel-air explosion (see paragraph VI-7), I conclude that previous analyses of aircraft impacts may have grossly underestimated the vulnerability of nuclear plants to such impacts.

(VI-11) To my knowledge, there exists no thorough, credible analysis of the vulnerability of any spent fuel pool to the impact of a modern commercial aircraft. The conduct of such an analysis would be a necessary part of the preparation of a credible EIS for the proposed expansion of capacity in the Millstone Unit 3 pool. The analysis would consider the potential for overturning of the pool, causing water to be spilled, and for the creation of a breach in the pool boundary, causing water to leak out. Also, the analysis would consider the potential for water to be displaced from the pool by blast or the falling of objects into the pool. In the latter connection, it is noteworthy that the roof above the Millstone Unit 3 pool is a comparatively lightweight structure. Finally, the analysis would consider the potential for

⁶² Pickard, Lowe and Garrick Inc, Seabrook Station Probabilistic Safety Assessment, Main Report (Irvine, California: PLG, December 1983), pp 9.3-10 to 9.3-11.

⁶³ C A Kot et al, Evaluation of Aircraft Crash Hazards Analyses for Nuclear Power Plants, NUREG/CR-2859 (Washington, DC: NRC, June 1982), page 78.

loss of water by evaporation, which would occur over a period of days if pool cooling and makeup were unavailable.

(VI-12) In the context of the spent fuel pools at the Harris plant, the NRC Staff has conceded (see paragraph IV-13) that a fire in one pool would preclude the provision of cooling and makeup to nearby pools. This situation would arise mostly because the initial fire would contaminate the site with radioactive material, generating high radiation fields. An analogous situation could arise in which the release of radioactive material from a damaged reactor precludes the provision of cooling and makeup to nearby pools. For example, an aircraft impact on the Millstone Unit 3 reactor could lead to a rapid-onset core melt with an open containment, accompanied by a raging fire. That event would create high radiation fields across the site, potentially precluding any access to the site by personnel. One can envision a variety of "cascading" scenarios, in which there might eventually be fires in all three pools at Millstone, accompanied by core melt events at Unit 2 and Unit 3. (Unit 1 is no longer operational.) The potential for such scenarios should be carefully investigated.

(VI-13) A pool fire could begin comparatively soon after water is lost from a pool. For example, suppose that most of the length of the fuel assemblies is exposed to air, but the flow of air to the base of the racks is precluded by residual water or a collapsed structure. In that event, fuel heatup would be approximately adiabatic. Fuel discharged for 1 month would ignite in less than 2 hours, and fuel discharged for 3 months would ignite in about 3 hours. The fire would then spread to older fuel. Once a fire has begun, it could be impossible to extinguish. Spraying water on the fire would feed an exothermic zirconium-steam reaction which would generate flammable hydrogen. High radiation fields could preclude the approach of firefighters.

(VI-14) In the absence of a thorough, credible analysis of the potential for a loss of water from the Millstone Unit 3 pool, one is obliged to resort to judgment. In light of the various studies and factors discussed in this declaration, my judgment is that a loss of water, sufficient to initiate a pool fire, could occur through a variety of realistic scenarios, none of which is remote or speculative. For example, the impact of a large commercial aircraft, on or close to the Millstone Unit 3 reactor or pool, would be likely to lead to a pool fire.

VII. OFFSITE CONSEQUENCES OF A FIRE AT THE MILLSTONE UNIT 3 POOL

(VII-1) Paragraph III-4 explains that cesium-137 is a useful indicator of the potential offsite consequences of a pool fire. The same paragraph shows that it is reasonable to assume that 100 percent of the cesium-137 in a pool would be released to the atmosphere in the event of a pool fire. The cesium-137 would be released to the atmosphere in small particles that would travel downwind and be deposited on the ground and other surfaces. The deposited particles would emit intense gamma radiation, leading to external, whole-body radiation doses to exposed persons. Cesium-137 would also contaminate water and foodstuffs, leading to internal radiation doses.

(VII-2) One measure of the scope of radiation exposure attributable to deposition of cesium-137 is the area of land that would become uninhabitable. For illustration, I assume that the threshold of uninhabitability is an external, whole-body dose of 10 rem over 30 years. This level of radiation exposure, which would represent about a three-fold increase above the typical level of background (natural) radiation, was used in the NRC's 1975 Reactor Safety Study as a criterion for relocating populations from rural areas.

(VII-3) For a postulated release of cesium-137 to the atmosphere, the area of uninhabitable land can be estimated from calculations done by Dr Jan Beyea. My use of these calculations is described in a report that I prepared for Orange County, North Carolina.⁶⁴ Three releases of cesium-137 are postulated here, drawn from paragraph III-6. The first release is 31 million Curies, representing the present inventory in the Millstone Unit 3 pool. The second postulated release is 38 million Curies, the anticipated inventory in the latter part of 2004, when the present racks will be almost full. The third release is 74 million Curies, the anticipated inventory in 2026 if new racks are added to the pool, the inventory of fuel in the pool rises to 1,860 assemblies in 2026, and all of these assemblies are from the Unit 3 reactor.

(VII-4) For typical weather conditions, a release of 31 million Curies of cesium-137 would render about 75,000 square kilometers of land uninhabitable, while a release of 38 million Curies would render about 90,000 square kilometers uninhabitable. A release of 74 million Curies would render uninhabitable about 150,000 square kilometers. For comparison, note that the area of Connecticut is 13,000 square kilometers. The use of a little imagination shows that a pool fire at Millstone Unit 3 would be a regional

⁶⁴ Thompson, February 1999 (op cit), Appendix E.

and national disaster of historic proportions, with health, environmental, economic, social and political dimensions.

VIII. ALTERNATIVE OPTIONS FOR STORING SPENT FUEL AT MILLSTONE

(VIII-1) Paragraph V-2 describes the design basis that was used by ASEA-Atom in developing a preliminary design for the PIUS reactor. The design basis included takeover of the plant by saboteurs, aerial bombardment, and abandonment by operators. A similar or more robust design basis could be specified for a spent fuel storage facility. Such a facility could, for example, be explicitly designed to withstand the impact of a fully-fueled Boeing 747. Meeting that requirement would not be difficult from an engineering standpoint. However, greater robustness would typically involve greater cost, and could have other implications.

(VIII-2) In examining options for storing spent fuel, the design basis for a particular storage facility is only one consideration. Other considerations include: (a) the timeframe required to implement the option; (b) whether the option involves facilities that store fuel from more than one reactor or site; (c) the extent to which the option involves transport of spent fuel between sites; (d) the closeness of storage sites to population centers; (e) security aspects of storage sites (e.g., proximity to highways or air corridors); (f) the relationship of a storage option to the national strategy for long-term management of radioactive waste; and (g) cost. These and other considerations would be addressed in a credible EIS for the expansion of spent fuel storage capacity at Millstone Unit 3.

(VIII-3) Here, by way of illustration, I sketch a storage option that might be implemented at the Millstone site. I do not recommend this option above others, but offer it as a storage option that might, upon closer examination, prove to be quickly implementable at Millstone. The option would involve dry storage of spent fuel in metal casks that are robust against fire and explosion. Some of the casks that are now approved by the NRC for dry storage of spent fuel may be sufficiently robust.⁶⁵ A fuel assembly that has been discharged from the reactor comparatively recently would be stored in a low-density, open-frame rack in a pool, and would be transferred to a cask when its heat output fell to an appropriate level. Each cask would be placed on an individual concrete pad, and would be completely surrounded by a high, earth-and-gravel berm. (The berm would be completed after placement of the cask on its pad.) The storage facility would be surrounded by a security

⁶⁵ NRC-approved designs for dry storage of spent fuel are listed in: US Nuclear Regulatory Commission, Information Digest, NUREG-1350 (Washington, DC: NRC, annual).

fence, would be guarded, and would be equipped with cameras and motion detectors. The facility would not be adjacent to the Millstone reactors.

(VIII-4) The storage option sketched in paragraph VIII-3 would be safe against a wide variety of influences, but it would not prevent a release of radioactive material in the event of a severe attack from the air. However, the magnitude of the release could be limited. For example, the release of cesium-137 as a result of an aircraft impact might be limited to the inventory in one cask. Metal casks approved by the NRC for dry storage of PWR fuel have capacities ranging from 21 assemblies to 56 assemblies.⁶⁶ At present, as described in paragraphs III-1 and III-2, the Millstone Unit 3 pool contains 585 assemblies, and DNC proposes to increase its capacity to 1,860 assemblies.

(VIII-5) It would be possible to construct a spent fuel storage facility at the Millstone site that would be more robust against attack from the air than the storage option sketched in paragraph VIII-3. Meeting this objective would probably require underground placement of the spent fuel. An option of this kind should be included in an EIS for the proposed expansion of capacity in the Millstone Unit 3 pool.

IX. SENSITIVE INFORMATION ABOUT THE VULNERABILITY OF NUCLEAR FACILITIES

(IX-1) A perpetrator of an act of malice or insanity at a nuclear facility will typically seek information about the facility's vulnerability, before committing the act. Information of this kind could improve the perpetrator's likelihood of damaging the facility, and could increase the magnitude of the radioactive release that is caused by his act. Thus, some items of information about a facility's vulnerability to acts of malice or insanity may be inappropriate for general distribution. Hereafter, such items of information are referred to as "sensitive". In the following paragraphs of Section IX, I identify a category of information that is potentially sensitive, and I sketch a process whereby sensitive information could be managed in the context of an NRC licensing proceeding. None of the information in this declaration is sensitive, and the declaration is appropriate for general distribution.

(IX-2) Before considering the potential need to limit the distribution of information in the context of an NRC licensing proceeding, it is important to consider the countervailing need for openness. There are two powerful arguments for openness about the issues that are addressed in NRC licensing proceedings. First, experience shows that the safety of nuclear facilities is

⁶⁶ NUREG-1350 (op cit), 1998 edition, Appendix G.

significantly and adversely affected by a culture of secrecy. Second, secrecy about civil nuclear facilities is incompatible with democracy.

(IX-3) I have studied, observed and written about the adverse effects that a culture of secrecy has on the safety of nuclear facilities.⁶⁷ One of my findings is that the culture of secrecy in the former USSR was a major factor contributing to the occurrence of the 1986 Chernobyl reactor accident. Through direct experience, I have observed the adverse effects that a culture of secrecy has on the safety of nuclear facilities. Secrecy inhibits the development of accurate knowledge about safety problems, promotes complacency, and discourages actions that are needed to address safety problems. My direct experience has been in three contexts. In each instance, the culture of secrecy has been less intense than in the USSR, but the effects on safety have been significant and adverse. One context has been the operation of defense materials production reactors at the Savannah River site in South Carolina. The second context has been the operation of the Sellafield site in Britain. The third context has been the operation of the La Hague site in France.

(IX-4) The US nuclear industry exists to supply a commercial product -- electricity -- to the citizens of a democracy. Thus, the nuclear industry should exhibit, at a minimum, the level of openness that is expected for any industry. In addition, the operation of nuclear facilities raises significant issues related to public safety and environmental protection. Moreover, the industry's liability for damages is limited, and state governments have no power over the industry in regard to safety issues. Thus, if the operation of the nuclear industry is to be compatible with democracy, then the industry and the NRC must exhibit a level of openness that is much greater than that of other industries.

(IX-5) In light of the considerations addressed in paragraphs IX-3 and IX-4, any action to limit the distribution of information generated during the course of an NRC licensing proceeding must be regarded as a temporary measure under emergency conditions, and restriction of the distribution of information must be applied sparingly. The information that I define as "sensitive" is not commercially confidential information, classified information or safeguards information. Instead, it is information that would enter the public record during a normal licensing proceeding. The NRC Staff has stated that "discussion of the potential vulnerabilities of SFPs [spent fuel pools] to

⁶⁷ Gordon Thompson, "Science, democracy and safety: why public accountability matters", in F Barker (editor), Management of Radioactive Wastes: Issues for local authorities (London: Thomas Telford, 1998). See also: Thompson, June 1998 (op cit), Appendix E; and Thompson, May 2000 (op cit).

radiological sabotage is Safeguards Information (SGI)....."⁶⁸ This statement shows that the Staff uses a narrow definition of "sabotage", and does not understand the full potential for acts of malice or insanity to cause a pool fire. There are many similarities between: (a) pool fire scenarios that have been thought of as "accidents"; and (b) pool fire scenarios that are initiated by acts of malice or insanity. For example, pool fire scenarios initiated by cask drop or aircraft impact have been thought of by the Staff as "accidents", and have been examined accordingly. The Staff has never categorised information about these scenarios as safeguards information. Yet, similar scenarios could be initiated by the deliberate dropping of a cask or the deliberate impact of an aircraft.

(IX-6) If a licensing proceeding were to address the CCAM/CAM contention that this declaration supports, the proceeding would generate a flow of information. A portion of this flow of information would relate to the potential for an act of malice or insanity to initiate a fire in the Millstone Unit 3 pool, and the consequences of such a fire. All items of information that are sensitive, as defined in paragraph IX-1, would be found within this portion of the overall flow of information. Within this portion, there would be three major categories of information. The first category of information would pertain to the consequences of acts of malice or insanity. Information in this category should be generally distributed. The second category of information would pertain to the potential for acts of malice or insanity to be undertaken. For example, information about the history of terrorist events would fall into this category. Information in the second category should be generally distributed, with one possible exception. The possible exception would be detailed information about specific vulnerabilities that were exploited during past acts of malice or insanity. The third category of information would pertain to the vulnerabilities of facilities on the Millstone site. Information in this category would be potentially sensitive. It may be appropriate to limit the distribution of some information in this category.

(IX-7) Paragraph IX-6 identifies a category of information that is potentially sensitive. The category encompasses information pertaining to the vulnerabilities of nuclear facilities. However, there is already a large body of related information in the public domain. For example, there is a large, widely-available engineering literature about explosions and aircraft impacts, in general and in the context of nuclear facilities. Limiting the distribution of such literature, in the context of a licensing proceeding, would be a fruitless and unnecessary exercise. Instead, efforts to identify sensitive information should focus on detailed, highly-specific information. For example, a

⁶⁸ SECY-01-0100, 4 June 2001 (op cit), page 8.

drawing showing the precise location of a vulnerable component could be sensitive information. Judgment would have to be exercised in identifying the items of information that are sensitive. Cooperation and mutual respect among the parties to a licensing proceeding would make the process of identifying sensitive information go more smoothly.

(IX-8) Items of information that are determined to be sensitive would be freely available to individuals who are designated by each party to a licensing proceeding. Sensitive information would not be generally distributed. A separate, limited-distribution record would be made of any oral or written arguments that disclose sensitive information.

X. REQUIREMENTS FOR A CREDIBLE EIS FOR THE PROPOSED EXPANSION OF CAPACITY IN THE MILLSTONE UNIT 3 POOL

(X-1) In 1979, the NRC published a generic EIS for the handling and storage of spent fuel.⁶⁹ This EIS did not mention the potential for a pool fire. In fact, the NRC has never published an EIS that addresses the potential for a pool fire. Thus, there exists no EIS that provides useful guidance about the risks associated with high-density storage of spent fuel in pools.

(X-2) At various points in this declaration, I discuss requirements for a credible EIS for the proposed expansion of capacity in the Millstone Unit 3 spent fuel pool. Here, I summarize these requirements. These are necessary but not sufficient requirements for a credible EIS. I focus on requirements that address: (a) the potential for a pool fire; (b) the offsite consequences of a pool fire; and (c) alternative options for storing spent fuel.

(X-3) Paragraph IV-8 sets forth requirements for a thorough, credible study of the potential for a pool fire, and the importance of these requirements is discussed in paragraph VI-2. The study should consider the factors mentioned in paragraph VI-11. Also, the study should consider potential interactions among facilities at the Millstone site, including the potential for "cascading" scenarios that is discussed in paragraph VI-12. It is possible that sensitive information, as defined in Section IX of this declaration, would contribute to the findings of the study. In that case, the sensitive information should be cited in the study, and the sensitive information itself should be made available to authorized persons. Authorized persons would include individuals designated by the parties to any licensing proceeding related to the potential for a fire at the Millstone Unit 3 pool.

⁶⁹ US Nuclear Regulatory Commission, Final Generic Environmental Impact Statement on Handling and Storage of Spent Light Water Power Reactor Fuel, NUREG-0575 (Washington, DC: NRC, August 1979).

(X-4) Section VII of this declaration provides a limited, illustrative discussion of the offsite consequences of a fire at the Millstone Unit 3 pool. A credible EIS would provide a much more detailed examination of potential consequences. Analytic techniques suitable for such an examination are readily available. It is especially important that the EIS provides a thorough analysis of the long-term effects of contaminating the environment with radioactive material. Relevant effects include health, environmental, economic and social effects.

(X-5) Section VIII of this declaration provides a limited, illustrative discussion of alternative options for storing spent fuel. A credible EIS would identify, and examine in detail, a range of alternative options, including the options sketched in paragraphs VIII-3 and VIII-5. The examination should consider, among other factors, the issues mentioned in paragraph VIII-2. Also, the examination should assess the risk profiles of the alternative options and high-density storage in the Millstone Unit 3 pool, on a common basis. The risk profiles should be assessed by estimating the radioactive release potential for each option, for a common set of influences, and the attendant consequences.

XI. CONCLUSIONS

(XI-1) The Millstone Unit 3 pool is now licensed to contain 756 fuel assemblies, equivalent to about 4 reactor cores. DNC requests a license amendment to expand the pool's capacity to 1,860 assemblies, equivalent to about 10 reactor cores. If DNC's request is granted, it can be expected that the inventory of cesium-137 in the pool will rise to about 74 million Curies in 2026. For comparison, the 1986 Chernobyl accident released about 2.4 million Curies of cesium-137.

(XI-2) The NRC Staff concedes that a loss of water from the Millstone Unit 3 pool, exposing the top of the fuel racks, will lead to a fire in the pool. The Staff assumes that such a fire would release to the atmosphere 100 percent of the cesium-137 in the pool.

(XI-3) The NRC has never performed an EIS that addresses the potential for a pool fire. In defense of this omission, the NRC asserts that a pool fire is a "remote and speculative" event.

(XI-4) The NRC Staff has conducted a number of studies related to the potential for a pool fire. There are numerous deficiencies and omissions in

these studies. Notably, the Staff's studies have neglected the potential for a pool fire to be caused by an act of malice or insanity.

(XI-5) The occurrence of a highly-destructive act of malice or insanity at a nuclear power plant has been foreseeable for many years, and has been foreseen. The terrorist attacks of 11 September 2001 on the World Trade Center and the Pentagon provide additional information. These attacks demonstrate conclusively that a highly-destructive act of malice or insanity at the Millstone site is not a remote and speculative event.

(XI-6) Available information indicates that acts of malice or insanity at the Millstone site, including but not limited to the deliberate impact of a large aircraft, could initiate a pool fire at Unit 3. A pool fire at Unit 3 would be a likely outcome of the impact of a large aircraft on or close to the Unit 3 reactor or pool.

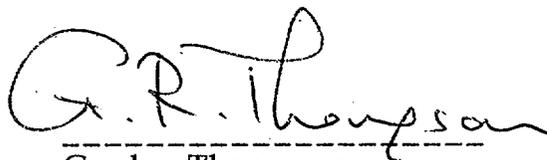
(XI-7) The offsite consequences of a pool fire at Millstone Unit 3, if DNC's request for a license amendment is granted, could include the rendering uninhabitable of a land area of about 150,000 square kilometers. For comparison, the area of Connecticut is 13,000 square kilometers.

(XI-8) Alternative options for storing spent fuel are available. Some of these options would be much more robust than the Millstone Unit 3 pool in terms of their ability to withstand accidents or acts of malice or insanity.

(XI-9) An EIS should be prepared for the proposed expansion of storage capacity in the Millstone Unit 3 pool. Some necessary, but not sufficient, requirements for such an EIS are set forth in Section X of this declaration.

I declare, under penalty of perjury, that the foregoing facts are true and correct to the best of my knowledge and belief, and that the opinions expressed above are based on my best professional judgment.

Executed on 31 October 2001.



Gordon Thompson

INSTITUTE FOR RESOURCE AND SECURITY STUDIES

Curriculum Vitae: GORDON R. THOMPSON

December 2000

Professional expertise

Consulting technical and policy analyst in the fields of energy, environment, sustainable development, and international security.

Education

- D.Phil. in applied mathematics, Oxford University (Balliol College), 1973.
- B.E. in mechanical engineering, University of New South Wales, Sydney, Australia, 1967.
- B.Sc. in mathematics & physics, University of New South Wales, 1966.

Current appointment

- Executive director, Institute for Resource & Security Studies (IRSS), Cambridge, Massachusetts.

Project sponsors and tasks (selected)

- Massachusetts Water Resources Authority, 2000: evaluated risks associated with water supply and wastewater systems that serve greater Boston.
- Canadian Senate, Energy & Environment Committee, 2000: reviewed risk issues associated with the Pickering Nuclear Generating Station.
- Greenpeace International, Amsterdam, 2000: reviewed impacts associated with the La Hague nuclear complex in France.
- Orange County, North Carolina, 1999-2000: assessed safety issues associated with spent fuel storage at the Harris nuclear power plant.
- Government of Ireland, 1998-2000: developed framework for assessment of impacts and alternative options associated with the Sellafield nuclear complex in the UK.
- Clark University, Worcester, Massachusetts, 1998-1999: participated in review of a major foundation's grant-making related to climate change.
- UN High Commissioner for Refugees, 1998: developed a strategy for conflict management in the CIS region.
- General Council of County Councils (Ireland), W Alton Jones Foundation (USA), and Nuclear Free Local Authorities (UK), 1996-2000: assessed safety and economic issues of nuclear fuel reprocessing in the UK; assessed alternative options.

Curriculum Vitae for Gordon R. Thompson

December 2000

Page 2

- Environmental School, Clark University, Worcester, Massachusetts, 1996: session leader at the Summer Institute, "Local Perspectives on a Global Environment".
- Greenpeace Germany, Hamburg, 1995-1996: a study on war, terrorism and nuclear power plants.
- HKH Foundation, New York, and Winston Foundation for World Peace, Washington, DC, 1994-1996: studies and workshops on preventive action and its role in US national security planning.
- Carnegie Corporation of New York, Winston Foundation for World Peace, Washington, DC, and others, 1995: collaboration with the Organization for Security and Cooperation in Europe to facilitate improved coordination of activities and exchange of knowledge in the field of conflict management.
- World Bank, 1993-1994: a study on management of data describing the performance of projects funded by the Global Environment Facility (joint project of IRSS and Clark University).
- International Physicians for the Prevention of Nuclear War, 1993-1994: a study on the international control of weapons-usable fissile material.
- Government of Lower Saxony, Hannover, Germany, 1993: analysis of standards for radioactive waste disposal.
- University of Vienna (using funds supplied by the Austrian government), 1992: review of radioactive waste management at the Dukovany nuclear plant, Czech Republic.
- Sandia National Laboratories, 1992-1993: advice to the US Department of Energy's Office of Foreign Intelligence.
- US Department of Energy and Battelle Pacific Northwest Laboratories, 1991-1992: advice for the Intergovernmental Panel on Climate Change regarding the design of an information system on technologies that can limit greenhouse gas emissions (joint project of IRSS, Clark University and the Center for Strategic and International Studies).
- Winston Foundation for World Peace, Boston, Massachusetts, and other funding sources, 1992-1993: development and publication of recommendations for strengthening the International Atomic Energy Agency.
- MacArthur Foundation, Chicago, Illinois, W. Alton Jones Foundation, Charlottesville, Virginia, and other funding sources, 1984-1993: policy analysis and public education on a "global approach" to arms control and disarmament.
- Energy Research Foundation, Columbia, South Carolina, and Peace Development Fund, Amherst, Massachusetts, 1988-1992: review of the US government's tritium production (for nuclear weapons) and its implications.
- Coalition of Environmental Groups, Toronto, Ontario (using funds supplied by Ontario Hydro under the direction of the Ontario government), 1990-1993: coordination and conduct of analysis and preparation of testimony on accident risk of nuclear power plants.

- Greenpeace International, Amsterdam, Netherlands, 1988-1990: review of probabilistic risk assessment for nuclear power plants.
- Bellerive Foundation, Geneva, Switzerland, 1989-1990: planning for a June 1990 colloquium on disarmament and editing of proceedings.
- Iler Research Institute, Harrow, Ontario, 1989-1990: analysis of regulatory response to boiling-water reactor accident potential.
- Winston Foundation for World Peace, Boston, Massachusetts, and other funding sources, 1988-1989: analysis of future options for NATO (joint project of IRSS and the Institute for Peace and International Security).
- Nevada Nuclear Waste Project Office, Carson City, Nevada (via Clark University), 1989-1990: analyses of risk aspects of radioactive waste management and disposal.
- Ontario Nuclear Safety Review (conducted by the Ontario government), Toronto, Ontario, 1987: review of safety aspects of CANDU reactors.
- Washington Department of Ecology, Olympia, Washington, 1987: analysis of risk aspects of a proposed radioactive waste repository at Hanford.
- Natural Resources Defense Council, Washington, DC, 1986-1987: preparation of testimony on hazards of the Savannah River Plant.
- Lakes Environmental Association, Bridgton, Maine, 1986: analysis of federal regulations for disposal of radioactive waste.
- Greenpeace Germany, Hamburg, 1986: participation in an international study on the hazards of nuclear power plants.
- Three Mile Island Public Health Fund, Philadelphia, Pennsylvania, 1983-1989: studies related to the Three Mile Island nuclear plant.
- Attorney General, Commonwealth of Massachusetts, Boston, Massachusetts, 1984-1989: analyses of the safety of the Seabrook nuclear plant.
- Union of Concerned Scientists, Cambridge, Massachusetts, 1980-1985: studies on energy demand and supply, nuclear arms control, and the safety of nuclear installations.
- Conservation Law Foundation of New England, Boston, Massachusetts, 1985: preparation of testimony on cogeneration potential at a Maine papermill.
- Town & Country Planning Association, London, UK, 1982-1984: coordination and conduct of a study on safety and radioactive waste implications of the proposed Sizewell nuclear plant.
- US Environmental Protection Agency, Washington, DC, 1980-1981: assessment of the cleanup of Three Mile Island Unit 2 nuclear plant.
- Center for Energy & Environmental Studies, Princeton University, Princeton, New Jersey, and Solar Energy Research Institute, Golden, Colorado, 1979-1980: studies on the potentials of renewable energy sources.
- Government of Lower Saxony, Hannover, Federal Republic of Germany, 1978-1979: coordination and conduct of studies on safety aspects of the proposed Gorleben nuclear fuel cycle center.

Other experience (selected)

- Principal investigator, project on "Exploring the Role of 'Sustainable Cities' in Preventing Climate Disruption", involving IRSS and three other organizations, 1990-1991.
- Visiting fellow, Peace Research Centre, Australian National University, 1989.
- Principal investigator, Three Mile Island emergency planning study, involving IRSS and Clark University, 1987-1989.
- Co-leadership (with Paul Walker) of a study group on nuclear weapons proliferation, Institute of Politics, Harvard University, 1981.
- Foundation (with others) of an ecological political movement in Oxford, UK, which contested the 1979 Parliamentary election.
- Conduct of cross-examination and presentation of evidence, on behalf of the Political Ecology Research Group, at the 1977 Public Inquiry into proposed expansion of the reprocessing plant at Windscale, UK.
- Conduct of research on plasma theory (while a D.Phil candidate), as an associate staff member, Culham Laboratory, UK Atomic Energy Authority, 1969-1973.
- Service as a design engineer on coal-fired plants, New South Wales Electricity Commission, Sydney, Australia, 1968.

Publications (selected)

- *The Potential for a Large, Atmospheric Release of Radioactive Material from Spent Fuel Pools at the Harris Nuclear Power Plant: The Case of a Pool Release Initiated by a Severe Reactor Accident*, a report for Orange County, North Carolina, 20 November 2000.
- *A Review of the Accident Risk Posed by the Pickering 'A' Nuclear Generating Station*, a report for the Standing Committee on Energy, Environment and Natural Resources, Canadian Senate, August 2000.
- *High-Level Radioactive Liquid Waste at Sellafield: An Updated Review*, a report for the UK Nuclear Free Local Authorities, June 2000.
- *Hazard Potential of the La Hague Site: An Initial Review*, a report for Greenpeace International, May 2000.
- *A Strategy for Conflict Management: Integrated Action in Theory and Practice* (with Paula Gutlove), Working Paper No. 7, IRSS, Cambridge, Massachusetts, March 1999.
- *Risks and Alternative Options Associated with Spent Fuel Storage at the Shearon Harris Nuclear Power Plant*, a report for Orange County, North Carolina, February 1999.
- *High Level Radioactive Liquid Waste at Sellafield: Risks, Alternative Options and Lessons for Policy*, IRSS, Cambridge, Massachusetts, June 1998.

- "Science, democracy and safety: why public accountability matters", in F. Barker (ed), *Management of Radioactive Wastes: Issues for local authorities*, Thomas Telford, London, 1998.
- "Conflict Management and the OSCE" (with Paula Gutlove), *OSCE/ODIHR Bulletin*, Volume 5, Number 3, Fall 1997.
- *Safety of the Storage of Liquid High-Level Waste at Sellafield* (with Peter Taylor), Nuclear Free Local Authorities, UK, November 1996.
- *Assembling Evidence on the Effectiveness of Preventive Actions, their Benefits, and their Costs: A Guide for Preparation of Evidence*, IRSS, Cambridge, Massachusetts, August 1996.
- *War, Terrorism and Nuclear Power Plants*, Working Paper No. 165, Peace Research Centre, Australian National University, Canberra, October 1996.
- "The Potential for Cooperation by the OSCE and Non-Governmental Actors on Conflict Management" (with Paula Gutlove), *Helsinki Monitor*, Volume 6 (1995), Number 3.
- "Potential Characteristics of Severe Reactor Accidents at Nuclear Plants", "Monitoring and Modelling Atmospheric Dispersion of Radioactivity Following a Reactor Accident" (with Richard Sclove, Ulrike Fink and Peter Taylor), "Safety Status of Nuclear Reactors and Classification of Emergency Action Levels", and "The Use of Probabilistic Risk Assessment in Emergency Response Planning for Nuclear Power Plant Accidents" (with Robert Goble), in D. Golding, J. X. Kasperson and R. E. Kasperson (eds), *Preparing for Nuclear Power Plant Accidents*, Westview Press, Boulder, Colorado, 1995.
- *A Data Manager for the Global Environment Facility* (with Robert Goble), Environment Department, The World Bank, June 1994.
- *Preventive Diplomacy and National Security* (with Paula Gutlove), Winston Foundation for World Peace, Washington, DC, May 1994.
- *Opportunities for International Control of Weapons-Usable Fissile Material*, ENWE Paper #1, International Physicians for the Prevention of Nuclear War, Cambridge, Massachusetts, January 1994.
- "Article III and IAEA Safeguards", in F. Barnaby and P. Ingram (eds), *Strengthening the Non-Proliferation Regime*, Oxford Research Group, Oxford, UK, December 1993.
- *Risk Implications of Potential New Nuclear Plants in Ontario* (prepared with the help of eight consultants), a report for the Coalition of Environmental Groups, Toronto, submitted to the Ontario Environmental Assessment Board, November 1992 (3 volumes).
- *Strengthening the International Atomic Energy Agency*, Working Paper No. 6, IRSS, Cambridge, Massachusetts, September 1992.
- *Design of an Information System on Technologies that can Limit Greenhouse Gas Emissions* (with Robert Goble and F. Scott Bush), Center for Strategic and International Studies, Washington, DC, May 1992.

- *Managing Nuclear Accidents: A Model Emergency Response Plan for Power Plants and Communities* (with six other authors), Westview Press, Boulder, CO, 1992.
- "Let's X-out the K" (with Steven C. Sholly), *Bulletin of the Atomic Scientists*, March 1992, pp 14-15.
- "A Worldwide Programme for Controlling Fissile Material", and "A Global Strategy for Nuclear Arms Control", in F. Barnaby (ed), *Plutonium and Security*, Macmillan Press, UK, 1992.
- *No Restart for K Reactor* (with Steven C. Sholly), Working Paper No. 4, IRSS, Cambridge, Massachusetts, October 1991.
- *Regulatory Response to the Potential for Reactor Accidents: The Example of Boiling-Water Reactors*, Working Paper No. 3, IRSS, Cambridge, Massachusetts, February 1991.
- *Peace by Piece: New Options for International Arms Control and Disarmament*, Working Paper No. 1, IRSS, Cambridge, Massachusetts, January 1991.
- *Developing Practical Measures to Prevent Climate Disruption* (with Robert Goble), CENTED Research Report No. 6, Clark University, Worcester, Massachusetts, August 1990.
- "Treaty a Useful Relic", *Bulletin of the Atomic Scientists*, July/August 1990, pp 32-33.
- "Practical Steps for the 1990s", in Sadruddin Aga Khan (ed), *Non-Proliferation in a Disarming World*, Proceedings of the Groupe de Bellerive's 6th International Colloquium, Bellerive Foundation, Geneva, Switzerland, 1990.
- *A Global Approach to Controlling Nuclear Weapons*, Occasional Paper published by IRSS, Cambridge, Massachusetts, October 1989.
- *IAEA Safety Targets and Probabilistic Risk Assessment* (with three other authors), Greenpeace International, Amsterdam, August 1989.
- *New Directions for NATO* (with Paul Walker and Pam Solo), published jointly by IRSS and the Institute for Peace and International Security (both of Cambridge, Massachusetts), December 1988.
- "Verifying a Halt to the Nuclear Arms Race", in F. Barnaby (ed), *A Handbook of Verification Procedures*, Macmillan Press, UK, 1990.
- "Verification of a Cutoff in the Production of Fissile Material", in F. Barnaby (ed), *A Handbook of Verification Procedures*, Macmillan Press, UK, 1990.
- "Severe Accident Potential of CANDU Reactors," Consultant's Report in *The Safety of Ontario's Nuclear Power Reactors*, Ontario Nuclear Safety Review, Toronto, February 1988.
- *Nuclear-Free Zones* (edited with David Pitt), Croom Helm Ltd, Beckenham, UK, 1987.
- *Risk Assessment Review For the Socioeconomic Impact Assessment of the Proposed High-Level Nuclear Waste Repository at Hanford Site, Washington*

(edited; written with five other authors), prepared for the Washington Department of Ecology, December 1987.

- *The Nuclear Freeze Revisited* (written with Andrew Haines), Nuclear Freeze and Arms Control Research Project, Bristol, UK, November 1986. Variants of the same paper have appeared as Working Paper No. 18, Peace Research Centre, Australian National University, Canberra, February 1987, and in *ADIU Report*, University of Sussex, Brighton, UK, Jan/Feb 1987, pp 6-9.
- *International Nuclear Reactor Hazard Study* (with fifteen other authors), Greenpeace, Hamburg, Federal Republic of Germany (2 volumes), September 1986.
- "What happened at Reactor Four" (the Chernobyl reactor accident), *Bulletin of the Atomic Scientists*, August/September 1986, pp 26-31.
- *The Source Term Debate: A Report by the Union of Concerned Scientists* (with Steven C. Sholly), Union of Concerned Scientists, Cambridge, Massachusetts, January 1986.
- "Checks on the spread" (a review of three books on nuclear proliferation), *Nature*, 14 November 1985, pp 127-128.
- Editing of *Perspectives on Proliferation*, Volume I, August 1985, published by the Proliferation Reform Project, IRSS.
- "A Turning Point for the NPT ?", *ADIU Report*, University of Sussex, Brighton, UK, Nov/Dec 1984, pp 1-4.
- "Energy Economics", in J. Dennis (ed), *The Nuclear Almanac*, Addison-Wesley, Reading, Massachusetts, 1984.
- "The Genesis of Nuclear Power", in J. Tirman (ed), *The Militarization of High Technology*, Ballinger, Cambridge, Massachusetts, 1984.
- *A Second Chance: New Hampshire's Electricity Future as a Model for the Nation* (with Linzee Weld), Union of Concerned Scientists, Cambridge, Massachusetts, 1983.
- *Safety and Waste Management Implications of the Sizewell PWR* (prepared with the help of six consultants), a report to the Town & Country Planning Association, London, UK, 1983.
- *Utility-Scale Electrical Storage in the USA: The Prospects of Pumped Hydro, Compressed Air, and Batteries*, Princeton University report PU/CEES #120, 1981.
- *The Prospects for Wind and Wave Power in North America*, Princeton University report PU/CEES # 117, 1981.
- *Hydroelectric Power in the USA: Evolving to Meet New Needs*, Princeton University report PU/CEES # 115, 1981.
- Editing and part authorship of "Potential Accidents & Their Effects", Chapter III of *Report of the Gorleben International Review*, published in German by the Government of Lower Saxony, FRG, 1979--Chapter III available in English from the Political Ecology Research Group, Oxford, UK.

- *A Study of the Consequences to the Public of a Severe Accident at a Commercial FBR located at Kalkar, West Germany*, Political Ecology Research Group report RR-1, 1978.

Expert presentations and testimony (selected)

- UK Consensus Conference on Radioactive Waste Management, 1999: provided invited testimony on information and decision-making.
- Joint Committee on Public Enterprise and Transport, Irish Parliament, 1999: provided invited testimony on nuclear fuel reprocessing and international security.
- UK and Irish Parliaments, 1998: gave members' briefings on risks and alternative options associated with nuclear fuel reprocessing in the UK.
- Center for Russian Environmental Policy, Moscow, 1996: presentation at a forum in parallel with the G-7 Nuclear Safety Summit.
- Lacey Township Zoning Board, New Jersey, 1995: testimony regarding radioactive waste management.
- Ontario Court of Justice, Toronto, Ontario, 1993: testimony regarding Canada's Nuclear Liability Act.
- Oxford Research Group, seminar on "The Plutonium Legacy", Rhodes House, Oxford, UK, 1993: presentation on nuclear safeguards.
- Defense Nuclear Facilities Safety Board, Washington, DC, 1991: testimony regarding the proposed restart of K-reactor, Savannah River Site.
- Conference to consider amending the Partial Test Ban Treaty, United Nations, New York, 1991: presentation on a global approach to arms control and disarmament.
- US Department of Energy, hearing on draft EIS for new production reactor capacity, Columbia, South Carolina, 1991: presentation on tritium need and implications of tritium production options.
- Society for Risk Analysis, 1990 annual meeting, New Orleans, special session on nuclear emergency planning: presentation on real-time techniques for anticipating emergencies.
- Parliamentarians' Global Action, 11th Annual Parliamentary Forum, United Nations, Geneva, 1990: presentation on the potential for multilateral nuclear arms control.
- Advisory Committee on Nuclear Facility Safety, public meeting, Washington, DC, 1989: submission on public access to information and on government accountability.
- Peace Research Centre, Australian National University, seminar on "Australia and the Fourth NPT Review Conference", Canberra, 1989: proposal of a universal nuclear weapons non-proliferation regime.
- Carnegie Endowment for International Peace, Conference on "Nuclear Non-Proliferation and the Role of Private Organizations", Washington, DC, 1989: options for reform of the non-proliferation regime.

- US Department of Energy, EIS scoping hearing, Columbia, South Carolina, 1988: appropriate scope of an EIS for new production reactor capacity.
- International Physicians for the Prevention of Nuclear War, 6th and 7th Annual Congresses, Koln, FRG, 1986 and Moscow, USSR, 1987: relationships between nuclear power and the threat of nuclear war.
- County Council, Richland County, South Carolina, 1987: implications of severe reactor accidents at the Savannah River Plant.
- Maine Land Use Regulation Commission, 1985: cogeneration potential at facilities of Great Northern Paper Company.
- Interfaith Hearings on Nuclear Issues, Toronto, Ontario, 1984: options for Canada's nuclear trade and Canada's involvement in nuclear arms control.
- Sizewell Public Inquiry, UK, 1984: safety and radioactive waste implications of the proposed Sizewell nuclear plant.
- New Hampshire Public Utilities Commission, 1983: electricity demand and supply options for New Hampshire.
- Atomic Safety & Licensing Board, US Nuclear Regulatory Commission, 1983: use of filtered venting at the Indian Point nuclear plants.
- US National Advisory Committee on Oceans and Atmosphere, 1982: implications of ocean disposal of radioactive waste.
- Environmental & Energy Study Conference, US Congress, 1982: implications of radioactive waste management.

Miscellaneous

- Married, two children.
- Extensive experience in public speaking before professional and lay audiences, and in interviews with print and broadcast journalists.
- Author of numerous newspaper, newsletter, and magazine articles and book reviews.

Contact information

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No. 01-112

September 21, 2001

NRC REACTS TO TERRORIST ATTACKS

In light of the recent terrorist attacks, U.S. Nuclear Regulatory Commission officials and staff have been working around the clock to ensure adequate protection of nuclear power plants and nuclear fuel facilities. This has involved close coordination with the Federal Bureau of Investigation, other intelligence and law enforcement agencies, NRC licensees, and military, state and local authorities.

Immediately after the attacks, the NRC advised nuclear power plants to go to the highest level of security, which they promptly did. The NRC has advised its licensees to maintain heightened security. The agency continues to monitor the situation, and is prepared to make any adjustments to security measures as may be deemed appropriate.

In view of the recent unprecedented events, Chairman Richard A. Meserve, with the full support of the Commission, has directed the staff to review the NRC's security regulations and procedures.

A number of questions have come in from reporters and members of the public since the tragic events of September 11. The following questions and answers are offered in response:

Q: What would happen if a large commercial airliner was intentionally crashed into a nuclear power plant?

A: Nuclear power plants have inherent capability to protect public health and safety through such features as robust containment buildings, redundant safety systems, and highly trained operators. They are among the most hardened structures in the country and are designed to withstand extreme events, such as hurricanes, tornadoes and earthquakes. In addition, all NRC licenses with significant radiological material have emergency response plans to enable the mitigation of impacts on the public in the event of a release. However, the NRC did not specifically contemplate attacks by aircraft such as Boeing 757s or 767s and nuclear power plants were not designed to withstand such crashes. Detailed engineering analyses of a large airliner crash have not yet been performed.

Q: What measures have the NRC and its power plant licensees taken in face of this potential threat?

A: Immediately after the attacks, the NRC advised licensees to go to the highest level of security, which all did promptly. The specific actions are understandably sensitive, but they generally included such things as increased patrols, augmented security forces and capabilities, additional security posts, heightened coordination with law enforcement and military authorities, and limited access of personnel and vehicles to the sites.

Q: What, precisely, did the NRC do in response to the attacks?

A: At 10 a.m. on September 11, the NRC activated its Emergency Operations Center in headquarters and assembled a team of top officials and specialists. The same was done in each of its four regional offices.

In addition to communicating with its licensees about the need to go to the highest level of security, the NRC established communications with the FBI, the Department of Energy, and the Federal Emergency Management Agency, among others. NRC personnel were dispatched to the FBI's Strategic Information Operations Center. The NRC has also established close communications with nuclear regulators in Canada and Mexico.

Q: What would happen if a large aircraft should crash into a spent fuel dry storage cask?

A: The capacity of spent fuel dry storage casks to withstand a crash by a large commercial aircraft has not been analyzed. Nonetheless, storage casks are robust and must be capable of withstanding severe impacts, such as might occur during tornadoes, hurricanes or earthquakes. In the event that a cask were breached, any impacts would be localized. All spent fuel storage facilities have plans to respond to such an emergency, drawn up in consultation with local officials.

Q: What if a large aircraft crashed into a spent fuel transportation cask in a heavily populated area?

A: Again, the capacity of shipping casks to withstand such a crash has not been analyzed. However, they are designed to protect the public in severe transportation accidents. The cask must be able to withstand a 30-foot drop puncture test, exposure to a 30-minute fire at 1475 degrees Fahrenheit, and submersion under water for an extended period. Moreover, the location of loaded casks is not publicly disclosed and such a cask would present a small target to an aircraft.

If an airliner crashed into a cask, there could be some localized impacts. Regulations require special accident response training of those involved in shipping, as well as coordination with state, local and tribal emergency response personnel. In addition, redundant communications must be maintained during shipment with the transporter vehicle; this would facilitate emergency response, if necessary.

Q: Could such a crash into a nuclear power plant, or a storage or shipping cask trigger a nuclear explosion?

A: No.

Q: What are the consequences if an airliner crashed into a uranium fuel cycle facility?

A: Because of the nature of the material, there would likely be only minimal off-site radiological consequences. Some such facilities use chemicals similar to those found at many industrial facilities. In the event of a release, comprehensive emergency response procedures would be immediately implemented.

Q: Have nuclear power plants been subject to attack in the past?

A: There has never been an attack on a nuclear power plant. On very rare occasions there have been intrusions. For example, there was a 1993 car crash through the gates of Three Mile Island plant by an individual with a history of treatment for mental illness. Such intrusions have not resulted in harm to public health or safety.

Q: What are the normal security measures at commercial nuclear power plants.

A: Licensees are required to implement security programs that include well-armed civilian guard forces, physical barriers, detection systems, access controls, alarm stations, and detailed response strategies. NRC routinely inspects security measures as part of its normal reactor oversight process and periodically undertakes various exercises, including force-on-force exercises, so as to assure that any vulnerabilities are exposed and corrected.

Q: Is an attack using an airplane part of the NRC's design basis threat against which its licensees have to defend?

A: No. The NRC has been in close and continuing contact with law enforcement and the military regarding such a threat.

Q: What exactly is the so-called design basis threat?

A: The details of the design basis threat are classified, but it includes the characteristics of a possible sabotage attempt that NRC licensees are required to protect against. The agency continually assesses the adequacy of the design basis threat in consultation with local law enforcement and federal intelligence agencies.

Q: Is the NRC contemplating a modification of the design basis threat?

A: The agency will continue to coordinate with law enforcement and intelligence agencies to assess the implications of this new manifestation of terrorism. If the NRC determines that the design basis threat warrants revision, such changes would occur through a public rulemaking.

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October 8, 2001

SECURITY MEASURES

U.S. on High Alert as Security Is Stepped Up

By ROBERT PEAR with JUDITH MILLER

ASHINGTON, Oct. 7 — Federal, state and local law enforcement officials, fearing reprisals for the air strikes in Afghanistan, immediately tightened security and increased patrols today at airports, train stations, sports stadiums and public buildings across the country.

The Federal Bureau of Investigation told all law enforcement agencies that they should be at their highest state of alert — "the highest level of vigilance," ready to respond to any act of terrorism or violence.

Officials said that there was no specific intelligence information about whether or when Osama bin Laden's network, Al Qaeda, might strike but that the actions were prudent.

As American warplanes began bombing Taliban strongholds in Afghanistan, immigration officials intensified their scrutiny of foreigners entering the United States. The Energy Department stepped up security at the nation's nuclear plants. Passengers at Pennsylvania Station in New York and Union Station in Washington were advised that they could no longer buy tickets on board trains in the Northeast corridor, and that they would have to show photo identification before buying tickets.

The Coast Guard said it was conducting the largest port defense operation since World War II, establishing special security zones in ports, on waterways and along the nation's coastline. Cruise ships were barred from New York Harbor. Ships that usually call there were sent to Hampton Roads, Va., or to Boston.

Near Detroit, a spokeswoman for Metro Airport said the Federal Aviation Administration notified officials at 2 p.m. that they should put additional security in place.

Soon after the first air strikes on Afghanistan, Americans began to see evidence of the additional precautions. Officials said other steps were

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Alex Quesada/Matrix, for The New York Times
 Pfc. Allan Timmons of the Florida National Guard on patrol Sunday at Miami International Airport, where security has been tightened.

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taken behind the scenes.

In New York, motorists entering tunnels into Manhattan were asked to open their car trunks for searches. Police officials said they were enhancing patrols at bridges and tunnels, courthouses, police stations and other government buildings around the city.

Airport officials tightened security in Chicago, in Kansas City, Mo., and in Florida.

At the F. E. Warren Air Force Base outside Cheyenne, Wyo., where 200 nuclear missiles in Nebraska, Wyoming and Colorado are controlled, Col. Tom Shearer, the base commander, ordered an increase in security to Force Protection Charlie, which means intelligence indicates a terrorist action is imminent.

The emergency measures and precautions put in place today grew out of three weeks of planning, begun soon after the attacks on the World Trade Center and the Pentagon on Sept. 11.

The staff of the National Security Council, anticipating military operations in Afghanistan, has coordinated a largely secret effort to increase protections at the nation's transportation hubs, nuclear power plants, drinking water supplies and other potentially vulnerable sites. Administration officials told Congress last week that some kind of terrorist retaliation against the United States was likely to follow any allied military action against the Taliban.

The effort to protect installations in this country was supervised by two working groups. One, dealing with law enforcement preparations, is led by Larry D. Thompson, the deputy attorney general. The other, responsible for dealing with the consequences of any reprisals, is headed by Michael Brown, the general counsel of the Federal Emergency Management Agency.

Federal officials said Mr. Thompson, Mr. Brown and members of their working groups had spent the last three weeks telephoning governors, mayors and other state and local officials. Bush administration officials also met secretly with managers of the nation's water systems, nuclear power plants, truck companies, railroads and other critical installations. They discussed ways to tighten security and what to do if deterrence failed.

The Environmental Protection Agency took steps to safeguard the nation's drinking water supplies. The agency is working with 168,000 public water systems nationwide, providing advice on how to improve security and monitor the water to ensure that it has not been contaminated.

Cmdr. James B. McPherson, a spokesman for the Coast Guard, said,

"we're at a heightened state of alert at every one of our major ports, over 300 ports," and along 88,000 miles of coastline.

"We have 24-hour armed surveillance at major ports," he said. "It may be cutters, it may be small boats, it may be a truck on the pier with armed guards."

The Coast Guard has established 72 security zones, including one around the United Nations, one around the Statue of Liberty and some around nuclear power plants.

At the Energy Department, Jeanne Lopatto, a spokeswoman, said, "We have gone to a heightened level of security at all sites." The department is the custodian of tons of radioactive waste left over from bomb making and substantial amounts of material useful for building nuclear bombs.

After the Sept. 11 attacks, the Energy Department suspended all shipments of nuclear fuel and radioactive waste, but the shipments resumed a few days ago. Ms. Lopatto said she did not know if they would be suspended again.

Defense Secretary Donald H. Rumsfeld said the United States was attacking suspected terrorist strongholds because it could never increase security enough to prevent every act of terrorism in this country.

"You cannot defend at every place, at every time, against every conceivable, imaginable — even unimaginable — terrorist attack," Mr. Rumsfeld said.

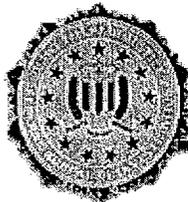
Officials at the Department of Health and Human Services said they had taken steps to protect public health resources like stockpiles of drugs and vaccines. One official said the agency had placed additional security at the Boston offices of Acambis, the designated producer of smallpox vaccine for civilians, and at the Pennsylvania storage facility for stockpiles of smallpox vaccine.

Michigan officials have asked the National Guard to help protect BioPort, the plant in Lansing that is attempting to make anthrax vaccine for the nation's more than 2.2 million men and women in uniform.

In addition, officials said, extra guards have been assigned to the Centers for Disease Control and Prevention in Atlanta, the national repository of the smallpox virus, and at the eight pharmaceutical stockpiles scattered throughout the country.

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U.S. Department of Justice Federal Bureau of Investigation

**For Immediate Release
October 11, 2001**

**Washington D.C.
FBI National Press Office**

Certain information, while not specific as to target, gives the government reason to believe that there may be additional terrorist attacks within the United States and against U.S. interests overseas over the next several days. The FBI has again alerted all local law enforcement to be on the highest alert and we call on all people to immediately notify the FBI and local law enforcement of any unusual or suspicious activity.

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FBI Issues 2nd Global Attack Alert



FBI Director Robert S. Mueller III and Attorney General John D. Ashcroft warn of possible terrorist attacks in the next week.

BY STEPHEN JARFE—AGENCE FRANCE-PRESSE

Credible Reports Indicate Strikes on U.S. Possible In Next Week, Agency Says

By DAN EGGEN and BOB WOODWARD
Washington Post Staff Writers

The FBI issued a second global alert yesterday, warning that more terrorist attacks may be carried out in the next week against U.S. targets at home or abroad. But officials said again that they did not know how or where the attacks might occur.

The warning, which came in the wake of a similarly vague FBI bulletin on Oct. 11, was prompted in part by "big and very credible" intelligence reports from abroad in recent days that seem to forecast new attacks, a senior U.S. official said.

Other intelligence has been gathered indicating that Osama bin Laden and some of his top lieutenants have essentially delegated authority to order and conduct new attacks down the chain of command, perhaps even to individual cells of bin Laden's al Qaeda terrorist network, senior officials said.

The FBI has identified at least a half dozen such cells in the United States. Some members have been detained in the government's roundup of nearly 1,000 people since the Sept. 11 terror attacks on New York and Washington.

Several officials said the apparent instructions from bin Laden mean that al Qaeda terrorists could strike even if the group's leadership has been eliminated, further increasing the difficulty of detecting and preventing attacks. Capturing or killing bin Laden is one of the primary goals of the U.S. military action in Afghanistan, where the Saudi-born fugitive is believed to be hiding.

In a nation still jittery from the Sept. 11 terror attacks, the alert came on the same day as new reports of anthrax contamination in Washington, more confirmed cases of infection in New Jersey, a suspected case in New York and the emergency landing of American Airlines Flight 785 at Dulles International Airport after a report of a threatening note aboard the New York-to-Dallas flight. Four of the plane's 141 passengers received minor injuries while exiting the plane from emergency chutes. [Details, Page A7.]

The national alert set off another round of alarms among local and state law enforcement agencies, most of which have already been on their highest state of alert since the suicide hijackings that left about 4,800 people dead seven

See THREAT, A5, Col. 1

FBI Cites Credible Reports of Possible Attacks Against U.S.

THREAT, From A1

weeks ago.

Administration officials have struggled since Sept. 11 to balance the desire to ease Americans back into their daily routines with the need to keep them alert to the possibility of more terrorist incidents. The effort has led to competing messages from different parts of the government, causing some local and state officials to complain that they have been kept uninformed by the FBI and other federal agencies.

With the new Homeland Security Council meeting for the first time yesterday, the federal government tried to offer a more unified message.

Attorney General John D. Ashcroft, who declined to discuss specifically why the government issued the alert, said at an evening news conference that "we believe this threat to be credible, and for that reason it should be taken seriously." President Bush was informed of the new threats early yesterday, and Ashcroft canceled a trip to Toronto that had been scheduled for today,

officials said.

FBI Director Robert S. Mueller III said that the new threats were serious enough to prompt another general warning. He said he believed the previous alert may have averted a terrorist attack, but he provided no details.

"I know how difficult it is for . . . state and local officers out there to respond without greater detail," said Mueller, who returned yesterday from a police chiefs' conference in Toronto. "Even given that, I believe it is advisable to alert law enforcement and local authorities as to what knowledge we have received. . . . Doing so gives us a force multiplier that could well prevent another terrorist attack."

Assistant D.C. police chief Terrance W. Gainer expressed annoyance last night, saying he had learned of the high state of alert through telephone calls from reporters about the announcement.

"Being told to turn on CNN or CNBC doesn't seem to be the best way to communicate what law enforcement ought to know," Gainer said. "Having one more breathless

announcement with absolutely no or little substance is not terribly helpful."

Bush and Homeland Security Director Tom Ridge were informed of the latest threats during the president's daily intelligence briefing. That prompted meetings about whether to issue the warning. The decision to do so was made around noon, despite objections from some within the administration, according to White House aides.

Trying to improve on the last alert, which was criticized by some officials as overly vague and alarmist, the president himself telephoned congressional leaders yesterday afternoon, and Ridge phoned others.

Around 3:15 p.m., Ridge notified about 40 governors who could be reached in a conference call that the FBI was planning to issue another warning. The governors were told that while the government had new, credible information of the possibility of another terrorist attack, "no states were named, no location indicated," said a spokesperson for Gov. Gary Locke of Washington.

"Whether this was more serious

or less serious than the last one, [Ridge didn't provide] a quantifying or qualifying indication like that," said Dana Middleton, Locke's spokesperson.

FBI field offices and U.S. attorneys' offices around the country received the latest warning at about 4:30 p.m. yesterday.

The decision to issue a warning was prompted in part by U.S. intelligence analysts' conclusion that terrorist cells no longer need approval for operations from top al Qaeda lieutenants, officials said.

Bin Laden may believe that his communications system—which involves an intricate network of telecommunications, e-mails, telephones and couriers—has been disrupted or is vulnerable, officials said.

U.S. military strikes in Afghanistan and CIA covert actions have specifically targeted bin Laden's communications for destruction.

One senior official said that "all the intelligence just reached a critical mass. It's an accumulation."

A top-secret "Threat Matrix," which is used by U.S. intelligence of-

ficials to weigh terrorist threats, lists 60 to 80 terrorist threats each day that specialists believe are credible enough to pass along to top Bush administration officials, sources have said. At the same time, officials said much intelligence reporting is circular: Sources may be repeating old information and passing it on.

Justice and FBI officials said the new threats are not believed to have any connection with Halloween, nor do they add credence to a widely circulated e-mail claiming that coordinated terror attacks are planned on that day at U.S. shopping malls. The FBI has dismissed those warnings as a hoax.

The warning came on a day when several U.S. cities were attempting to return to normal routines.

In Chicago, Mayor Richard Daley and former president George H.W. Bush were on hand to reopen the sky deck of the Sears Tower, the nation's tallest building, for the first time since Sept. 11.

New York will be on particular watch tonight when the city hosts two major sporting events. At Yankee Stadium in the Bronx, the New

York Yankees will play the Arizona Diamondbacks in Game 3 of the World Series; at Manhattan's Madison Square Garden, the New York Knicks will host the Washington Wizards and Michael Jordan in his official return to the NBA.

The new alert also came on the same day that a coalition of legal, immigration and civil liberties groups demanded that law enforcement agencies disclose more information about hundreds of people who have been detained as part of the effort to avert future attacks and investigate the Sept. 11 attacks.

"We have a situation here where there has been an unprecedented number of arrests, and we don't know whether they have been carried out in accordance with the law, because they've been carried out with an unprecedented veil of secrecy," said Kate Martin, director of the Center for National Security Studies.

Staff writers Paul Duggan, Amy Goldstein, Allan Lengel, Dana Milbank, Rachel Alexander Nichols, Eric Pianin, Robert E. Pierre and Martin Weil, and correspondents Jeff Adler and Pamela Ferdinand, contributed to this report.



NRC NEWS

U.S. NUCLEAR REGULATORY COMMISSION

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No. 01-124

October 18, 2001

THREAT TO THREE MILE ISLAND NUCLEAR PLANT DEEMED NON-CREDIBLE; NRC MONITORING CONTINUES AND WEBSITE RESTORED

A potential terrorist threat directed at the Three Mile Island nuclear power plant near Harrisburg, Pennsylvania, has been determined by the intelligence community to be non-credible.

However, when the threat came into the Nuclear Regulatory Commission, it was taken seriously, resulting in a number of security measures taken by TMI's licensee, Exelon, as well as by other Federal and State authorities.

The Nuclear Regulatory Commission is continuing to closely monitor security at all nuclear reactors and nuclear fuel facilities around the country.

Contrary to some rumors, the agency has not ordered any plants to shut down for security reasons. Some plants are, as usual, shut down for normal refueling and maintenance.

All nuclear power plants have remained at the highest level of security since September 11. Subsequently, the agency has advised all of its licensees of additional actions considered prudent and appropriate to strengthen security further. The NRC is closely monitoring the actions being taken to enhance security.

In the aftermath of the terrorist attacks and the continuing uncertainty about future terrorist intentions, the agency is conducting a comprehensive review of its safeguards and physical security program at the direction of Chairman Richard A. Meserve, with the support of the Commission.

On September 26, Chairman Meserve sent letters to the governors of 40 states that have nuclear power plants or other NRC-regulated nuclear facilities, advising them that it would be prudent to establish clear liaison between nuclear facilities and state authorities in the event that state security forces might be needed to augment security. Clear lines of communication among the State, the NRC and licensees have been established.

The NRC continues to maintain close contact with the Federal Bureau of Investigation, other intelligence agencies and other law enforcement, military and state authorities to assess the latest threat information and to discuss current conditions and plans.

NRC's website, which was closed down last week, was restored Wednesday with a limited amount of information. Taking down the agency website was a precaution to make sure it did not contain information

that could be helpful to terrorists. As the agency's review continues, other information and documents deemed non-sensitive will be added to the site.

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October 21 2001

TERRORISM

**Next: West
Bank killings
set stage for
showdown**

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***Mission aborted: the downed plane's flight path took it
close to five nuclear plants******Photograph: Gary Tramontina***

NUCLEAR MYSTERY: Crashed plane's target may have been reactor

Nicholas Rufford, David Leppard and Paul Eddy

THE hijackers who forced a fourth passenger jet to crash during the September 11 attacks in America may have been intending to use it to bomb a nuclear power station to cause a Chernobyl-type disaster.

The FBI is studying a report that the four terrorists who seized the plane may have been attempting to steer it towards a cluster of nuclear power stations on the east coast of America. The most likely target was Three Mile Island, site of America's most serious nuclear accident in 1979.

United Airlines flight 93 crashed into a field near the tiny town of Shanksville, in Pennsylvania, 90 minutes after taking off from Newark, New Jersey. All 44 passengers and crew on board died.

Until this weekend it had been assumed that the hijackers of the plane, a Boeing 757, were planning to fly it either to the presidential retreat at Camp David, or to Washington and crash it into the White House or the Congress and Senate buildings on Capitol Hill. But security officials have now revealed that within a week of the attacks, the FBI sent a report to MI5 saying that a "credible source" had said that the terrorists might have been planning to hit a nuclear plant.

Had it breached the plant's reactor vessel, such a strike could have caused an incident on the scale of the Chernobyl nuclear plant in Ukraine, which spread radioactive material over thousands of square miles in 1986.

US security sources say that Three Mile Island, which is part-owned by British Energy, was the subject of surveillance by some of the hijackers and their associates in the months before the terrorist attacks. One security official said: "Early on in the investigation we did receive a report from the FBI that the plane may have been heading for a nuclear power station. This was based on their analysis that Pittsburgh is near several power stations.

"There is some plausibility to this and we're not trying to dismiss it. But it may well be that nobody will ever know where the plane was going."

The "nuclear meltdown" assessment has not been independently confirmed but was taken seriously enough by the FBI to pass to European governments, including Britain and France.

The analysis is based on a study of flight 93's flight path and

the fact that there are five nuclear power stations in the area. Experts say that the plane does not appear to have been hijacked until it was passing over West Virginia, some 200 miles beyond Washington. It then made a series of sharp turns before going into a steep descent. Aviation experts say that at this point there were three nuclear power stations between the plane and Washington and directly in its line of flight: Three Mile Island, Peach Bottom and Hope Creek.

Investigators cannot understand why the plane would have descended so early, unless its intended target was much nearer than Washington. The descent could have been an error by one of the hijackers, but if so, they cannot understand why the plane did not then climb again once control was regained.

America has since tightened security around nuclear stations and has taken steps to withdraw maps on the internet showing the location of nuclear plants. A French government minister said last week that fighters would shoot down aircraft heading for its nuclear plants. A missile defence system had been positioned at the Le Havre nuclear reprocessing plant.

In Britain, security around all nuclear sites has also been increased. David Blunkett, the home secretary, has given new powers to the 500-strong police force that guards the sites. Atomic Energy Authority police will be able to patrol an extra 13 civil nuclear sites, including Sizewell, Hinkley Point and Dungeness.

Engineering experts are divided over whether concrete containment shields around nuclear power stations could withstand a direct hit from a large passenger aircraft, especially one carrying 200,000lb of fuel, as was flight 93, enough to reach its destination of San Francisco.

The containment buildings generally have an outer structure, which for much of the dome is 3ft-thick concrete containing large amounts of reinforcing steel. Inside is a steel "lining" 1in-4in thick.

There are usually two more concrete walls close to the reactor, each 1ft thick and with reinforced steel bars. But these walls do not enclose the top of the reactor completely. The reactor vessel itself is about 4in-6in thick and made of high-carbon steel.

All reactors are designed to withstand impact by a light plane. Experts say it is unclear whether a larger modern jet loaded with fuel, deliberately flown at high speed, could break open the reactor vessel. The resultant fire could, however, cause enough damage to allow radioactive material into the air.

The drama aboard flight 93 as a small group of passengers tried to seize control of the plane from the hijackers during its final few minutes has become an emblem of American heroism during the events of September 11.

Delayed 40 minutes in taking off from Newark's congested airport, the plane was in the early stages of its journey when its passengers started hearing that other aircraft had been hijacked and at least one had flown into the twin towers of the

World Trade Center.

Todd Beamer, one of the passengers, called an emergency operator on an onboard telephone after he and fellow passengers learnt of the first attack. He explained that flight 93 had also been hijacked. He said there were three hijackers - two with knives and one with what he thought was a bomb strapped to his waist. In fact, there were four, and by this time the fourth was almost certainly flying the plane.

Beamer, who was married with two young sons, told the operator: "We're going to do something. I know I'm not going to get out of this." He explained that some of passengers had decided to jump on the terrorist thought to have the bomb.

With the telephone left on, he could be heard saying: "Are you guys ready? Let's roll." The operator heard screams and a few minutes later the line went dead.

The FBI is looking into whether another United Airlines flight, scheduled to leave Kennedy International Airport for San Francisco, was a target of hijackers on September 11. When the plane was grounded because of the attacks, four Middle Eastern-looking men refused to return to their seats and hurriedly left as soon as its doors opened.

Next page: West Bank killings set stage for showdown

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EXHIBIT 8

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FAA restricts flights near World Series, nuclear plants

WASHINGTON (CNN) -- Heeding the latest terrorist warning, the Federal Aviation Administration is temporarily restricting flights near the World Series games in New York and around nuclear sites.

The restrictions over New York City prohibit any aircraft operating under visual flight rules from flying within 30 nautical miles of John F. Kennedy International Airport during World Series games. The ban is in effect from 6:45 p.m. until 2 a.m. EST and lasts until midnight, November 6.

Restrictions are even tighter during President Bush's appearance at Tuesday's game.

All aircraft flying below 3,000 feet will be prohibited from approaching within three nautical miles of JFK airport from 7:05 p.m. until 7:15 p.m. EST, and from 10:30 p.m. until 10:45 p.m. EST.

The nuclear sites ban, which affects some 80 facilities -- power plants and Energy Department areas -- restricts aircraft flying below 18,000 feet from coming within a radius of 10 nautical miles of each facility.

The restrictions underscore Attorney General John Ashcroft's announcement Monday of "credible reports" that another major terrorist attack may be possible within the week.

"The FAA realizes these restrictions inconvenience general aviation pilots and airports," said FAA Administrator Jane Garvey in a press release. "As the FAA and other federal agencies continuously review measures to ensure national security, we look for the understanding and cooperation of the general aviation community."

"Pilots must make every effort ... to avoid these sensitive areas," said Phil Boyer, president of the Aircraft Owners and Pilots Association.

Elsewhere in Washington, officials said Tuesday that Bush's national security team wants the war in Afghanistan to continue during Ramadan, the Muslim holy period. Letting up on the assaults, said one official, would be interpreted "as a sign of flexibility in what the president himself has called a doctrine."

The president, officials said, would decide whether to press on during Ramadan, which begins about November 17.

The sentiment to continue strikes during Ramadan underscored Army Gen. Tommy Franks' assertion Tuesday that the allied coalition is committed "for as long as it takes" to oust the ruling Taliban and Osama bin Laden's al Qaeda network.

After meeting with Uzbekistan's president, Franks, commander of the U.S. military campaign in Afghanistan, dismissed suggestions that the U.S.-led military operation has bogged down in its fourth week. ([Full story](#))

U.S. airplanes launched another round of airstrikes early Tuesday on the Taliban stronghold of Kandahar, with low-flying jets pounding targets around the southern Afghan city and Taliban forces returning anti-aircraft fire.

CNN's Kamal Hyder reported Kandahar was quiet Tuesday night, but electricity was out to most of the city and

there was no running water. ([Full story](#))

Ashcroft warned Monday that there is a "credible" threat of new terrorist action in the United States in the coming days, and he told law enforcement agencies and the public to be on "highest alert."

The attorney general said intelligence sources had found nonspecific but "credible" information the nation could be the focus again for some sort of terrorist attack.

"We are dealing with an unknown; we are dealing without a lot of specific information," Homeland Security Director Tom Ridge told CNN on Tuesday. "But we also know since September 11 the environment is different, and America has to continue to be on guard."

Latest developments

- Homeland Security Director Tom Ridge said Tuesday that the security alert issued Monday by Attorney General John Ashcroft was a "reiteration" of the October 11 alarm sent to law enforcement agencies. Ashcroft warned that there is a "credible" threat of new terrorist action in the United States in the coming days, and he told law enforcement agencies and the public to be on "highest alert."
- Despite the new threat of more terror attacks in the United States, President Bush plans to be at Yankee Stadium in New York on Tuesday night to throw out the first pitch in the third game of the World Series. ([Full story](#))
- Transportation Secretary Norman Mineta announced Tuesday a new crackdown on security at U.S. airports, including more stringent passenger and bag searches. Mineta said there have been deficiencies in security screening since September 11, and the aviation industry must show improvement "right away." ([Full story](#))
- American Airlines, the world's largest airline, announced Tuesday that it has secured the cockpits of its entire fleet of jet aircraft. American said the new locking devices prevent intruders from accessing the cockpit by securing it from the inside.
- Amid growing criticism of the U.S.-led military campaign, British Prime Minister Tony Blair appealed to the public Tuesday to remember the images of September 11. "Thousands of people were killed in cold blood in the worst terrorist attacks the world has ever seen," Blair said in a keynote speech. ([Full story](#))
- An Egyptian-born man was charged Tuesday with conspiring with others to murder Northern Alliance leader Gen. Ahmad Shah Masood. The opposition leader was killed September 9 by suicide bombers posing as journalists. Yasser Al-Siri, who has lived in Britain for eight years, was charged under Britain's anti-terrorism act. ([Full story](#))
- Iraqi President Saddam Hussein warns that the U.S.-led war in Afghanistan could spread. Calling it a spark that may set "the world on fire," he called Tuesday on other countries to help defeat the United States. ([Full story](#))
- Vice President Dick Cheney on Tuesday was placed again at an undisclosed, secure location, administration officials told CNN. They said Cheney -- who made public appearances Monday in New York -- was returned to the higher level of security through at least next week in response to the latest warning that Ashcroft announced.
- The United Nations refugee agency said Tuesday that thousands of Afghans continue to cross into Pakistan through unofficial entry points. At a briefing in Geneva, Switzerland, a U.N. spokesman said that more than 5,000 people crossed into Pakistan's Northwest Frontier province last weekend.
- The U.N. special envoy to Afghanistan, Lakhdar Brahimi, was meeting Tuesday with Pakistan's President Pervez Musharraf and met with other top Pakistani officials Monday as part of the U.N.'s role in shaping a post-Taliban Afghanistan. Brahimi said the United Nations is considering a proposal by the Taliban ambassador in Pakistan to discuss the situation in Afghanistan.

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Flights Restricted at Groton Airport

Airspace restrictions taking financial toll on local air businesses

By [Georgina Gustin](#) - [More Articles](#)

Published on 11/01/2001

Airspace around Millstone Nuclear Power Station in Waterford was declared off-limits to private pilots late Tuesday when the government issued a ban that restricts flying near 86 nuclear facilities nationwide until early next week.

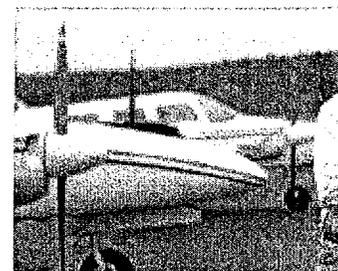
The ban, which affects nearly 100 public airports and hundreds of private airstrips, prohibits private aircraft from flying lower than 18,000 feet within an 11.5-mile radius of a nuclear facility. The restrictions prompted the closing of Groton-New London Airport to most of its daily air traffic, delivering another — some say unfounded — blow to the local general aviation industry, which already was suffering from a ban imposed after the Sept. 11 terrorist attacks.

Brian Ward, owner of two Groton-based flight training businesses, estimated his losses could total \$14,000, a number he can tack on to the \$21,000 he lost amid restrictions put in place shortly after the attacks.

“We had no clue,” Ward said, explaining that the ban took him by surprise. “We heard, and five minutes later the tower closed. That’s it.”

One of Ward's Piper Cherokees was in the air when the ban was issued and was forced to fly to Westerly, where it's now stuck.

Commercial airlines and some charter services are not affected by the ban, and law enforcement or medical evacuation flights are also allowed when authorized. A handful of flights did land and take off in Groton Wednesday. But private pilots were left frustrated on the ground, theorizing about the possible outcome and



Dana J.

Brian Ward, owner of Coastal A flight-training business based at Groton-New London Airport, sits some of his planes that have been due to the recent decision by the restrict air traffic within an 11.5 radius around the nation's nuclear plants -including Millstone in W



Brian Ward, right, owner of Coastal works on rescheduling flying lessons at Groton-New London Airport following government order issued late Tuesday restricting airspace in the vicinity of nuclear power plants. Ward's planes have been grounded because the airport is within an 11.5-mile radius of the Millstone Nuclear Power Station in Waterford. Ward hopes to get permission to move to Westerly Airport so he can continue operating his business.

objectives of the restrictions.

“They said they're going to lift the restrictions in a week,” said Paul Galberd, a pilot from Mystic who came into the airport Wednesday with a plane he'd like to rent when the ban is lifted. “But who knows?”

The ban comes on the heels of U.S. Attorney General John Ashcroft's announcement of “a credible threat” of another terrorist attack within the next week. Just before Ashcroft's announcement, Gov. John G. Rowland sent National Guard troops to patrol the Connecticut Yankee plant in East Haddam.

Airspace around the decommissioned Connecticut Yankee plant has not been restricted according to aviation industry officials.

While private pilots say they understand the need to take steps to protect American airspace, many believe that the ban punishes the wrong people — those who couldn't cause damage even if they wanted to.

“We're trying to accept the fact that there are national security risks,” said Keith Moore, spokesman for the Aircraft Owners and Pilots Association. “But we don't consider general aviation aircraft a significant threat to a nuclear facility.”

General aviation includes all aircraft aside from commercial and military planes, from private two-seaters to corporate-owned jets. According to the Aircraft Owners and Pilots Association, general aviation is a \$20 billion a year industry that has lost hundreds of millions of dollars since restrictions were put in place after the terrorist attacks. Proposed legislation Congress could help failing general aviation businesses, which don't qualify for relief under existing federal programs.

After Sept. 11, all airports were closed and all planes grounded, but gradually the Federal Aviation Administration lifted restrictions until nearly all had been removed. By October, the administration had lifted most restrictions on general aviation, except in Boston, New York, and Washington, D.C.

The ban was issued late Tuesday by the FAA after several government agencies, including the Nuclear Regulatory Commission and the Department of Energy, concluded that it was in the country's best interest. Control towers at affected airports were notified, and pilots got what's called a notam — a notice to all airmen. Before pilots take off, they are required to check with Flight Service, which informs them of any notams.

Tuesday's notam, however, caught many pilots off guard, leaving some stranded.

“They could have said, 'Here's an hour,'” said Ward, who explained that he, like many general aviation business owners, could simply have moved his airplanes to a nearby airport if the ban carried on with business as usual.

Aside from the frustration and loss of business, some pilots also question the logic of the government's decision.

“Even if we wanted to do damage, we couldn't,” said Andrew Marsden, a flight instructor.

Ward's business.

Nonetheless, Marsden said, if a small single-engine aircraft were flying at 120 mph. periphery of the 11.5-mile restricted air zone around Millstone, it would take only five minutes for it to reach the plant, if the pilot wanted to. A corporate jet could cover that distance in minutes.

"They've got five minutes to figure out what to do," said Marsden. "What's going to

A spokesman for the FAA was unable to answer that question Wednesday.

"If a pilot gets into an aircraft and calls flight service, a pilot should be aware of what said Jim Peters of the FAA's eastern district office. "However, if for some reason a pilot wanders into that airspace, the military will be scrambled and would escort the aircraft nearby airport. FAA inspectors would interview the pilot to get the circumstances under which he or she flew into the airspace."

Then, Peters said, depending on the circumstances, the FAA would choose to drop to "pursue enforcement action."

While pilots doubt that military jets could be scrambled quickly enough to prevent a plane from doing harm if he or she wanted to, the Aircraft Owners and Pilots Association, which is working to get the post-Sept. 11 restrictions lifted, says it's relieved the ban isn't more restrictive.

"Are we happy with this at the AOPA? Absolutely not. However, it could have been much worse," said the association's president, Phil Boyer. "Some of the proposed solutions are grounding all general aviation traffic everywhere. Pilots must make every effort to get the latest notams and to avoid these sensitive areas."

Even if they doubt their efficacy, most pilots accept the restrictions as a necessary cost of national security efforts.

"I'm not sure they did all their homework before they did this," said Galberd. "The FAA probably wanted to cover all their bases, and putting out a blanket restriction probably was the best way to do that. If it puts the public's mind at ease for whatever reason, then it's OK."

g.gustin@theday.com ■

B

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In Afghan Jail, a Terrorist Who Won't Surrender

Bin Laden Disciple Held by N. Alliance Would Attack U.S.

By William Branigin
 Washington Post Staff Writer
 Tuesday, October 30, 2001; Page A13

KHOJA MAKBUL, Afghanistan -- He sits cross-legged on a carpet, fixing his visitor intently with dark eyes behind thick, oversize glasses. With his flowing black beard, embroidered skullcap and beatific smile, the soft-spoken Pakistani still resembles the Islamic scholar he once was.

But, by his own account, Salahuddin Khaled is a dangerous man. The 27-year-old member of the hard-line Pakistani Muslim group Harkat ul-Mujaheddin is an ally of Afghanistan's ruling Taliban militia, a disciple of Osama bin Laden and a highly trained terrorist. After five years behind bars, he is the longest serving prisoner of war held by the opposition Northern Alliance. And there is a reason he is likely to continue to serve time in a single-story, mud-brick compound in the Panjshir Valley.

If released, he readily acknowledges, he would gladly carry out the kind of terrorist attacks that killed almost 5,000 people in the United States last month.

He talks of using atomic weapons



Abdul Jabar, left, and Noor Mohammed Abdullah, both former Taliban fighters, are captives of the Northern Alliance opposition in Afghanistan. (William Branigin - The Washington Post)

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against America, and wonders whether the Sept. 11 attackers would have better served their cause by flying one of the hijacked planes into a nuclear power plant. "I don't know who did that action," Khaled says in halting English. "If Muslim organizations did that action, I agree, because America is their enemy. . . . They have to hurt America in its military, economic and political centers to make America leave its plans against Islam."

While it may never be possible to fully understand the passions and motives of someone such as Khaled, an interview with him at the Northern Alliance's Baharak Prison provides a glimpse into the mind of a terrorist. Never raising his voice, he explains in his rudimentary English and fluent Dari, the language of the Tajik ethnic group here, the reasons for his implacable hatred of the United States.

He occasionally expresses regret for the deaths of civilians in the Sept. 11 attacks and other operations against the United States. But he makes it clear that these casualties are secondary to the goal of punishing America for a long list of sins, headed by U.S. support for Israel.

He also makes it clear that he sees the United States as the main obstacle to establishing Islamic law in Afghanistan, across Central Asia and elsewhere around the world.

Khaled is among 21 foreigners and 306 Afghan Taliban members held at the Baharak Prison, which opened eight months ago in a desolate spot a couple of miles north of the village of Baharak. It is reached by leaving a dirt road cut into a mountainside, fording a shallow part of the Panjshir River and walking across a narrow metal bridge. The prison sits on a rocky spit of land that juts into a bend in the river and is bordered by barren, forbidding mountains that rise almost vertically from the riverbed.

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The fortress-like prison contains a row of dark cells facing a sunny interior courtyard. Each cell is about 12 feet wide by 28 feet long and crammed with more than 30 inmates. Shoes, bags of clothes and other belongings hang from the walls and from log beams in the ceiling.

The other foreign prisoners are from Burma, China, Yemen and Iraq, as well as Pakistan. Like Khaled, they joined extremist Muslim organizations that urged them to fight for the Taliban in its "holy war" in Afghanistan.

Abdul Jabar, 22, a Pakistani with a slight build and a sparse beard, studied at a veterinary college for two years before coming to Afghanistan in 1999. After three weeks of training, he was sent to the front to fight the Northern Alliance and was promptly captured.

Interviewed in a prison sitting room, he said he still believes in the Taliban cause, admires bin Laden and hates the U.S. government "because it helps Israel." He said he came to Afghanistan believing that he was going to be fighting Russians, but found himself facing only Muslim Afghans. (The Soviet Union withdrew its occupation forces from Afghanistan in 1989.) If he had known that, he said, "I would not fight. I would fight against Israel or in Kashmir or against America."

Would he carry out a suicide bombing? "If I know that [the target] is not Muslim but is Jewish or [of] another religion, I would immediately carry out this action," he said. But if he knew the target were Muslim, he would question the order.

Noor Mohammed Abdullah, 29, a Muslim from China, was also captured two years ago after barely a month in Afghanistan. He came here from a Pakistani Islamic school whose principal has close ties to the Taliban and told students they had an obligation to fight in Afghanistan, he said. He said he was told he would be fighting Russians and Americans.

Abdullah said he now realizes he made a mistake. If released, he would continue his religious studies and no longer fight the Northern Alliance, "because they are Muslim," he said.

Khaled has no such qualms.

"He will not change his ideas," said Abdul Qayyum, an Afghan with gray hair and pale blue eyes who is a deputy warden of the prison.

Another deputy warden, Farouk, said Khaled is the hardest of the hard-liners at Baharak, and probably the most dangerous man in the prison. "Any time he is free, he will work with Osama bin Laden and the Taliban," Farouk said.

Khaled has consistently expressed his radical views to all who will listen, seemingly unconcerned about the chilling effect his words have on any prospect of release or a prisoner exchange. It is as if softening his hard-line positions would be tantamount to renouncing his faith, Farouk said.

At one time, the Northern Alliance held 2,500 Taliban prisoners. Most have since been exchanged for alliance POWs.

In a study this year on foreign prisoners held by the Northern Alliance, Julie Sirrs, a former Afghan analyst for the Defense Intelligence Agency, reported that more non-Afghans are fighting in the country than ever before. She said the foreigners are more difficult to capture because they tend to be more motivated than Afghans on the Taliban side, "many of whom are conscripts."

Contrary to the popular perception, Sirrs said, only 43 percent of the 113 prisoners she interviewed identified themselves as *talibs*, or religious students. Most of the foreign fighters were recruited while working as shopkeepers, laborers, party activists and in other occupations. Only 30 percent of the Pakistanis identified themselves as Pashtuns, the ethnic group that dominates the Taliban.

Khaled said he was born in Baluchistan province, the son of an Islamic studies professor. He earned a degree in Islamic law from the Islamia University of Punjab, where friends recruited him into the fundamentalist Harkat ul-Mujaheddin, which has been implicated in the deaths of Americans and declared a terrorist organization by the U.S. government. Khaled arrived in Afghanistan in 1992 determined, he said, to "defend Muslims" at a time when Serbs were killing Muslims in Bosnia.

He said he underwent training for two years near Khost, south of the capital, Kabul, first in a Harkat camp. He later moved up to a camp for more advanced trainees that eventually was taken over by bin Laden, he said. There, 35 men received instruction in guerrilla tactics, bomb-making and "chemicals and poisons." He said the last instruction covered "poison gas and bombs," but he declined to go into details. He denied any knowledge of anthrax, the disease currently being spread in the United States by biological agents sent through the mail, and said its use was not taught while he was at the training center.

After bin Laden moved to Afghanistan in 1995, he occasionally visited the camp to give pep talks, said Khaled, who was serving as an instructor by then. Bin Laden would tell the trainees, "You should spill more sweat during training so you don't spill your blood during battle," Khaled recalled. He said bin Laden told the students they were "fighting against people who want to finish Islam" and that the U.S. government was an enemy of Muslims.

After his training, Khaled said he went to Kashmir to fight the Indian government, returning a year later to Afghanistan, where he linked up with the Taliban.

He was in command of 30 Harkat fighters when his unit was cut off by Northern Alliance soldiers near Jabal Saraj in October 1996. While his men escaped to Kabul, he said he held off his attackers for five hours, using an AK-47 assault rifle and the sharpshooting skills he acquired during his training. He said he killed more than 10 alliance fighters before he ran out of ammunition and surrendered.

Today, Khaled is as unapologetic about his support for the Taliban as he is about his hatred for America.

"If America didn't work against us, we would never take action against their cities," he said. "Our enemies are America and Israel, but we cannot fight against them face to face. We have to fight against them secretly to make them leave their plans and stop working against us."

Besides support for Israel, including \$3 billion a year in aid, Khaled's catalogue of complaints against the United States includes the activities of the CIA, the presence of U.S. troops on "holy land" in Saudi Arabia since the Persian Gulf War (a major grievance of bin Laden), the U.S. intervention in Somalia, the bombing of Iraq, an airstrike against Libya, the dropping of atomic bombs on Japan during World War II and even Washington's rejection of the Kyoto treaty on global warming.

At one point, he launched into a stream of revisionist history, portraying the United States as the aggressor against Japan in World War II and justifying the attack on Pearl Harbor. Hawaii, he asserted, rightfully belonged to Japan.

Of the Sept. 11 attacks, Khaled said, "the target was not to kill civilian people, but [to cause] important hurt to the American government." There was no other way to achieve the goal, he said. "They had to do that action."

Would he participate in such a mission? "If my commander led me to an action like this, I would do it. If Osama bin Laden told me to do it, I would do it." He added, "I'm from Harkat, but I think that Osama bin Laden is also my leader."

He has no reservations about sacrificing himself in a suicide attack, he said, "because our target is very important, more important than my life." But he said he did not necessarily agree with the specific targets last month.

"In America, there are more important places, like atomic plants and reactors [that] they could attack," he said. "Not only atomic plants, but the CIA center, arms factories and the White House."

"America tries to say to the world that Muslim fundamentalist organizations [are] terrorist," Khaled said. "But we think the American government is terrorist."

He rejected the notion that the terrorist attacks last month were counterproductive, since they did not cause the United States to reconsider its policies but united Americans in a desire for revenge and brought an intervention in Afghanistan aimed at eliminating bin Laden and the Taliban.

"You will see, America will not be successful in [its] goals," Khaled said. The use of U.S. troops will eventually be necessary, he said, and "American ground forces wouldn't be able to fight against us. We're fighting the Americans on three front lines: in Afghanistan, in Pakistan and in the United States."

Even if bin Laden is killed, Khaled said, another leader will quickly take his place. And if the Taliban eventually is defeated, "we will do secret activities, secret action."

Does he mean more terrorist attacks?

Khaled smiled broadly. "That's right."

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November 2, 2001 (11:13AM)

**UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION
BEFORE THE ATOMIC SAFETY AND LICENSING BOARD**

OFFICE OF SECRETARY
RULEMAKINGS AND
ADJUDICATIONS STAFF

In the Matter of: : Docket No. 50-423-LA-~~7~~ **3**
DOMINION NUCLEAR : ASLBP No. 00-771-01-LA
CONNECTICUT, INC. :
(Millstone Nuclear Power Station, :
Unit No. 3; Facility Operating :
License NPF-49) : November 1, 2001

NOTICE OF APPEARANCE BY DIANE CURRAN

Diane Curran hereby enters an appearance in this proceeding as duly authorized co-counsel, with Nancy Burton, to Connecticut Citizens Coalition Against Millstone and Long Island Coalition Against Millstone ("CCAM/CAM"). This notice is limited to the litigation of CCAM/CAM's Motion to Reopen the Record and CCAM/CAM's late-filed environmental contention. Undersigned counsel is a member in good standing of the bars of the District of Columbia, the U.S. District Court for the District of Columbia, and the U.S. Courts of Appeals for the D.C. and First Circuits.

Respectfully submitted,



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November 1, 2001

CERTIFICATE OF SERVICE

I hereby certify that on November 1, 2001, copies of "CONNECTICUT COALITION AGAINST MILLSTONE AND LONG ISLAND COALITION AGAINST MILLSTONE MOTION TO RE-OPEN THE RECORD AND REQUEST FOR ADMISSION OF LATE-FILED ENVIRONMENTAL CONTENTION" were served on the following by E-Mail, except for the Office of Appeals, which was served by first-class mail. The Office of the Secretary, Board members and counsel for the NRC Staff and Applicant were also served by hand.

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