UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

BEFORE THE U.S. NUCLEAR REGULATORY COMMISSION

Pilgrim Watch's Comments Regarding NRC's Enhancements to Emergency Preparedness Regulations [SECY-11-0053, Final Rule: Enhancements to Emergency Preparedness Regulations (10 CFR Part 50 and 10 CFR Part 52) (RIN-3150-AI10)

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TABLE OF CONTENTS

NRC Commissioners
Secretary, U.S. NRC
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RE: Pilgrim Watch's Comments Regarding NRC's Enhancements to Emergency Preparedness Regulations [SECY-11-0053, Final Rule: Enhancements to Emergency Preparedness Regulations (10 CFR Part 50 and 10 CFR Part 52) (RIN-3150-AI10)

To The Honorable NRC Commissioners:

Pilgrim Watch appreciates the opportunity to provide comment and hopes that that the Commission remains open to re-consideration of the rule.

There is reason to question what the intended role is for the panel participants at the public Commission meeting, May 3, 2011. We understood that the Commission is interested in hearing our comments on the emergency preparedness rule and requested our written comments by April 26; however the Final EP rule only became available April 26, although the final document was provided to the Commission on April 8th (SECY-11-0053 not publicly distributed). Further, on April 19, 2011, the NRC issued RIS 2005-02, Revision 1, *Clarifying the Process for Making Emergency Plan Changes.* (ML100340545) That issue is part of the Draft EP Rule and on the agenda for "discussion," May 3.

We respectfully recommend that the Commission does not finalize this rule, as written. (1) The Final Draft Rule is flawed; it will not provide reasonable assurance; it does not address many non-security issues that need change; it fails to address lessons already learned from Fukushima. (2) We believe that until more lessons are learned from Japan, it is premature to finalize any EP rule.

In early April, the Commission formed a Task Force to evaluate Fukushima. The Task Force charter says that the group's "objective" includes emergency preparedness (e.g., emergency communications, radiological protection, emergency planning zones, dose projections and modeling, protective actions); and to develop recommendations, as appropriate, for potential changes to NRC's regulatory requirements, programs, and processes, and recommend whether generic communications, orders, or other regulatory actions are needed. We assume that the Commission was serious when it established the Task Force; therefore, we believe that NRC should wait to get the Task Force's analysis before finalizing the EP Rule. This process has gone on for years so that an additional few months to "get it right" should not present a problem.

The deadline for the stakeholder panel to submit slides and written material on the Final Emergency Preparedness Rule & Guidance is April 26, the Chernobyl anniversary. Chernobyl along with TMI and Fukushima, a major accident every 11 years, remind us that accidents can and do happen; and that as a nation we better get properly prepared. Comments herein are provided in that spirit.

I. COMMENTS ON DRAFT FINAL EMERGENCY PLANNING RULE

A. SECURITY RELATED ISSUES

The hostile action based rules described in SECY-11-0053 share a common deficiency. The rules provide to the licensees flexibility; but, in doing so, they lack accountability. The Staff provided capability based rules, with the exception of Emergency Operations Facilities (EOF), that provides flexibility for the licensees and saves them money. In contrast, performance based rules that Pilgrim Watch advocates are: enforceable; assure that the licensee is accountable; and provide the public with reasonable assurance. At the same time, we appreciate that all sites are not the same; but what has to be accomplished to meet the threat and best protect the public is the same. Therefore it is reasonable to require the licensees to show to the NRC how precisely they are going to accomplish needed tasks – how they will meet specified criteria – to demonstrate accountability.

1. On-Shift Multiple Responsibilities

What's wrong, summary? (1) The rule should include a requirement that the licensee fill out a staffing table so that it is clear to NRC how the tasks that need to be accomplished will be accomplished. (2) More basically, an accurate range of possible accidents and hostile threats are not considered resulting inaccurate analyses of on-site personnel responsibilities.

NRC's Proposed Changes:

Problem Identified: NRC aims to avoid the potential that in a hostile action event on-shift Emergency Response Organization ("ERO") personnel assigned to implement the emergency plan may have competing responsibilities that would prevent them from performing their primary emergency planning job.

NRC Solution: The final rule does not specify, by position or function, which responsibilities must be assigned, but allows nuclear power reactor licensees the

flexibility to determine the limit of assigned responsibilities for effective emergency plan implementation on a site-specific basis. However, licensees need to ensure that the duties assigned to on-shift staff are reasonable for one person to perform and are not so burdensome as to negatively impact emergency response.

PW Comment: Pilgrim Watch believes that the NRC must enhance its regulations to be more explicit in the number of ERO staff necessary for response to nuclear power plant emergencies. Specifically, the NRC should incorporate the once- proposed idea of a staffing table that provided proposed staff functions and minimum staffing levels for the on-shift and augmenting ERO. The table was a modification of the guidance found in Table B-1 of NUREG-0654/FEMA-REP-1, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants," dated November 1980.

The NRC's rationale to not require a staffing table is unconvincing. It said,

> The NRC acknowledges that because each site is different and site characteristics may dictate the size of the ERO staff, requiring compliance with standard staffing requirements would be an unreasonable approach to resolving this issue. For example, the NRC has approved some emergency plans with additional ERO staff due to site-specific circumstances, such as the lack of a local fire department or hospital."

We appreciate that all sites are not the same; but what has to be accomplished is the same. Therefore it is reasonable to require a staffing table to show to the NRC how precisely they are going to accomplish those tasks – accountability.

The final revision is considerably weaker than the previous draft. It does not require licensees to "provide a detailed analysis;" instead it only calls for licensees to "perform a detailed analysis." The final rule "does not specify, by position or function, which responsibilities must be assigned, but allows nuclear power reactor licensees the

flexibility to determine the limit of assigned responsibilities for effective emergency planning implementation on a site-specific basis."

The rule amounts to a self-evaluation with no specific criteria – no pass/fail standards. Instead, the rule needs to require a description of the responsibilities required; a list of responsible personnel; and if the party responsible has a competing job, who then is responsible to perform that competing duty to assure all bases are covered.

More basically, Pilgrim Watch agrees with the comment made by Riverkeeper, December 2009 that said:

> The effectiveness of this proposed regulatory change is dependent upon consideration of an accurate range of possible accidents and hostile threats at a nuclear power plant. However, the present DBT, adopted in January 2007, is not reflective of all potential terrorist threats to a nuclear power plant. While the actual DBT is not publicly available, published descriptions reveal that NRC requires a comparatively light defense for nuclear power plants and their spent fuel.[1] Thus, it would seem that the current DBT does not reflect the level of threat which licensees may be confronted with. For example, the NRC has explicitly stated that the DBT rule "does not require protection against a deliberate hit by a large aircraft."[2]
>
> Accordingly, requiring licensees to only address accidents defined in their licensing basis will not be broad enough to require consideration of all relevant hostile threats. Emergency response tasks will undoubtedly vary depending on the type of threat contemplated. Clearly, more severe hostile threats will cause concomitantly more severe consequences resulting in more including those discussed in above. Failing to do so will render NRC's proposed regulatory changes here largely ineffective due to resulting inaccurate analyses of on-site personnel responsibilities.

[1] *See* Thompson Report at 38-39 (citing NRC Press Release No. 07-012, Jan. 29, 2007).
[2] Thompson Report at 38-39.

2. Emergency Action Levels for Hostile Action Events

What's wrong, summary? It is not clear from the documents provided to us April 26, 2011 whether SECY-11-0053 Enclosures still provided a capability criterion or whether it was deleted, as it should have been.

NRC's Proposed Changes: It is unclear from documents provided what exactly the final rule establishes. We believe it has a capability criterion to allow nuclear power reactor licensees some degree of flexibility in addressing extenuating circumstances that may arise during an actual emergency. An example given in the previous draft said that an emergency declaration may need to be delayed in the interest of performing plant operations that are urgently needed to protect public health and safety. They said that these delays could be found acceptable if they did not deny State and local authorities the opportunity to implement actions to protect the public health or safety under their emergency plans and the cause of the delay was not reasonably within the licensee's ability to foresee and prevent

PW Comment: We believe that there should be a performance criterion, not a capability criterion because, to use the draft's own language, "timeliness is of the utmost importance because EALs are used as criteria for determining the need for notification and participation of State and local agencies."

The previous draft says that, "… delays could be found acceptable if they did not deny State and local authorities the opportunity to implement actions to protect the public health or safety under their emergency plans and the cause of the delay was not reasonably within the licensee's ability to foresee and prevent." There is no basis to determine before the event that delay would not "deny State and local authorities the opportunity to implement actions to protect the public health or safety under their emergency plans and the cause of the delay was not reasonably within the licensee's ability to foresee and prevent?"

3. Emergency Response Organization Augmentation at Alternative Facilities

No comment

4. Licensee Coordination With Offsite Response Organizations During Hostile Action

What's wrong, summary? Require instead a performance criterion with more specific guidelines to ensure proper coordination between licensees and OROs during hostile based events.

NRC's Proposed Changes: The NRC is amending Part 50, Appendix E, Section IV.A.7, to include hostile action at the site as one of the types of emergencies that define the State, local, and Federal agencies that nuclear power reactor licensees must identify in their emergency plan along with the assistance licensees expect from these agencies. The former regulations did not explicitly require the licensee to identify ORO resources for responding to the site during hostile action. The NRC is revising Section IV.A.7 by inserting the words "a description of the" immediately before "assistance expected from, appropriate State, local, and Federal agencies"

The final rule is watered down from the previous draft. In a previous draft Part 50, Appendix E, Section IV.A.7, would have been modified to add the following: "Nuclear power plant licensees shall ensure that offsite response organization resources (e.g., local law enforcement, firefighting, medical assistance) are available to respond to an emergency including hostile action at the nuclear power plant site;." And that this requirement would be enforced through routine inspections and observation of emergency exercises.

PW's Comments: NRC's proposal simply requires the licensees to establish ORO availability but this would not guarantee capability for sufficient coordination in the event of an emergency. The proposal lacks specific, enforceable, performance-based standards. These standards should include, for example:

- Medical: Demonstrated ability of offsite responders and emergency medical personnel at trauma centers serving the EPZ (but outside the likely area of contamination in a large scale event) to treat large numbers (range provided by NRC) of injured or contaminated individuals. This includes capability to monitor and decontaminate and to separate contaminated from patients already at the hospital. Demonstration that a sufficient number of trained transportation providers have signed MOUs.
- Demonstrated familiarity of local police, state police and FBI with the plant‘s physical layout and security procedures; and can onsite security identify them as “good guys?”
- Demonstrated communication interoperability between onsite and offsite emergency response organizations and responders on the ground; and the communication equipment is encrypted to support the exchange of sensitive information.
- Exposure limits/protective gear: Nuclear workers and emergency responders typically have different exposure limits and protective gear/clothing. It would seem reasonable to have consistency in exposure limits and protective gear provided. Explaining to fire fighters and police going into the plant that workers assigned to less threatening environment have lower exposure limits and better protective gear would be difficult.

Articulating more specific guidelines in this manner would be a much more effective approach towards ensuring proper coordination between licensees and OROs during hostile based events. Moreover, making such standards enforceable benchmarks which licensees must meet would make the NRC‘s requirement for coordination a meaningful part of the —reasonable assurance determination.

Simply requiring that licensees identify ORO availability and what they expect them to do amounts to a mere procedural requirement which does not guarantee sufficient personnel, training and proper equipment provided for the ORO, nor coordination in the event of an actual emergency resulting from a hostile event.

5. Protective Actions for Onsite Personnel

What's wrong, summary? The new requirement does not direct any specific actions, but will allow licensees flexibility to determine the most effective protective measures for onsite personnel protection on a site-specific basis. It amounts to an unenforceable lofty-sounding goal.

NRC Proposed Changes: The NRC is revising Appendix E by creating new Section IV.I, to require licensees to protect onsite personnel during hostile action and to ensure the continued ability of the licensee to safely shut down the reactor and perform the functions of the licensee's emergency plan, as discussed in Section IV of this document. The new requirement does not direct any specific actions, but will allow licensees flexibility to determine the most effective protective measures for onsite personnel protection on a site-specific basis. It also will allow licensees to take advantage of new technologies or other innovations that can further enhance the protection of workers

PW's Comments: The rule is meaningless absent: a description of specific actions required to protect onsite personnel during a hostile action (actions to ensure the continued ability of the licensee to safely shut down the reactor and perform the functions of the licensee's emergency plan); and a checklist provided to the licensee to demonstrate to NRC that it has met those requirements.

6. Challenging Drills and Exercises

What's wrong, summary? More frequent and challenging exercises required; all exercises must require releases that trigger offsite PARs.

NRC's Proposed Changes: The rule change properly recognizes that current regulations addressing drills and exercises are general in nature and do not explicitly require licensees to include hostile action event scenarios; do not allow the NRC to

require specific scenario content; and have become predictable- “responders may be preconditioned to accident sequences that are not likely to resemble the accidents they could realistically face.”

The proposed rule says that during each exercise planning cycle, licensees will be required to vary the content of exercise scenarios to provide ERO members the opportunity to demonstrate proficiency in the key skills necessary to respond to several specific scenario elements, including (Secy-11-0053, Encl 3, page 149):

- hostile action directed at the plant site;
- no radiological release or an unplanned minimal radiological release that does not require public protective actions;
- an initial classification of or rapid escalation to a Site Area Emergency or General Emergency;
- Implementation of strategies, procedures, and guidance developed under § 50.54(hh) (2); and integration of offsite resources with onsite response.

The final rule identifies the exercise planning cycle as 8 calendar years, which must begin by the date of the licensee’s first biennial exercise conducted after (date that is 395 days after the date of publication in the federal register). A licensee’s first exercise with a hostile action scenario must be held no later than its first biennial exercise conducted after (date 395 days after the date of publication in the federal register).

PW’s Comments

a. Hostile Action Based Exercises: PW incorporates comments provided by Riverkeeper into our testimony. Also, we include lessons learned from Pilgrim’s recent HAB exercise.

(1) Frequency of Hostile Action Based (HAB) Exercises**:** NRC’s proposal says that the frequency of exercises involving response to a hostile action event is not to exceed 8 years. Pilgrim Watch objects. Eight years is too infrequent to prepare for the challenges presented by a hostile action event. This is especially true at reactors that are likely viewed as preferred targets, such as: Pilgrim, located in

America's Hometown, a symbolic target; Indian Point located in close proximity to NYC; and TMI, known throughout the world due to its previous accident. This is not to say that any reactor is immune to acts of malice; because all reactors are prime targets due to the severity of potential consequences and costs to the nation.

(2) Challenging Licensee Drills and Exercises for HABs**:** NRC must require more specific criteria for determining the appropriate scope of hostile-based-drills to ensure that all site-specific, relevant factors are considered. For example, exercises should include: a fast-breaking and significant radiological release caused by an attack on the spent fuel pool and/or dry cask storage system; significant shadow evacuation inside and outside the EPZ; simultaneous attacks resulting in loss of offsite power; multi-pronged attacks resulting in an attack on the plant itself, coupled with an attack on a major evacuation route.

(3) All HAB exercises must include a "General Emergency" so that offsite protective actions are exercised. We know and learned during Pilgrim's exercise that the public will respond differently and emergency response resources will face different challenges. For example:

(a) Self-evacuation/ Shadow evacuation: A major concern from local responders during the Pilgrim HAB exercise was a recognition that a HAB event would result in a panicked and uncontrolled evacuation by the public. The public will observe fire, bullets, and explosions and will self-evacuate – not just those in Plymouth or within the EPZ. However law enforcement usually counted on for traffic control in an event will be occupied otherwise dealing with the onsite hostile action. Plymouth Police have about 15 officers who normally would be assigned to traffic control in a non-hostile event; plans call for officers from the immediate surrounding EPZ towns to be called in.

(b) Traffic Control: Who will manage traffic, inside and outside the EPZ? Are there the requisite numbers for traffic control personnel from the Sheriff's Department or is their first duty to manage the attack? What about communities outside the EPZ, do they have officers for traffic

control to manage their own population's shadow evacuation and to assist the EPZ? Have they been part of the exercises and trained? NRC/FEMA must carefully check the numbers of responders available in a HAB event, response times, and MOUs, annually. More basically, specific requirements need to be established and responders included in varied and challenging HAB exercises that consider significant shadow evacuations inside and outside the EPZ.

(c) Notification Offsite Response Organizations during HAB Events: Another concern after the Pilgrim HAB exercise was a recognition that the plant may not be able to realistically notify and update local EOCs in a timely manner. They would be preoccupied with the hostile action event. Therefore would local EOCs be operating in the dark, when their own populations are likely to be responding? Is there an offsite facility with identical information to what is available in the plant to take over and provide timely information and updates to the EOCs and other offsite responders? This has to be worked out, tested and requirements established. Additionally do all EOC's have interoperable radio equipment with advanced microwave technology? Duxbury, for example, does not. The licensees must be required to pay for this equipment.

b. General Emergency Not Required**:** NRC's Proposal says that*, during each exercise cycle licensees would be required to vary content – including no radiological release or a minimal release that does not require public protective actions.* However a scenario involving no radiological release or a minimal radiological release that does not require public protective actions is not an acceptable exercise. Biennial Exercises are meant to identify weaknesses in planning so that they can be fixed before a real emergency occurs. Allowing no release violates a basic planning principle that if responders are trained and prepared for a more serious emergency than they will be prepared and trained for a minor or no offsite release but it does NOT work the other way around. Just as, if college math students are tested simply on simple addition and subtraction

problems, their scores will not be indicative of how well they are prepared to meet the challenges presented in a job requiring advanced math skills.

c. Add Realism & Variety to Exercise Scenarios: One of the stated goals in the Enhancements is to add realism to exercises therefore to include likely scenarios an 8-year cycle is needed. Scenarios to enter into the mix would include, for example: fast breaking events; hydrogen explosions; spent fuel pool fires; infrastructure failures, such as loss of offsite power, damage to evacuation routes, attack on another reactor impacting the state; exercises held in the evenings, during holidays, and unannounced; exercises involving the ingestion pathway; shadow evacuation.

B. NON-SECURITY RELATED EMERGENCY PLANNING ISSUES [RULE, II. B]

7. A. ALERT AND NOTIFICATION SYSTEM - BACKUP MEANS

What's wrong, summary? We agree that back-up must be required but it should not take 3 years from the time the rule is finalized to implement; and the proposed Rule lacks sufficient specificity, reminding us of, "Wouldn't it be nice if…"

Proposed Rule:

(1) The rule requires backup capability should the primary means of public alerting and notification is unavailable – good.

(2) Unlike the previous draft rule, there are no time limits on backup ANS in the final rule - bad.

(3) Implementation - ANS backup methods must be ready for demonstration no later than their first biennial exercise conducted more than one year after the effective date of this final rule, which will result in a maximum of approximately 3 years for implementation across the industry - bad.

PW Comments on Draft:

1. NRC's rule does not specify which backup measures are required to allow "flexibility."

It is acceptable not to specify which particular backup measures are required; however it is necessary for NRC to require that whatever backup measure is chosen that it must have the same capability to be heard and understood by the public. In other words, a standard of capability must be set.

2. NRC's rule does not impose specific time requirements for using a backup method based on the assumption that, "State and local officials will have substantial time available to make a judgment regarding activation of the warning system to alert and notify the public."

PW Comment:

a. The assumption underlying the proposal is incorrect. NRC assumes that the accident is slow breaking. NRC specifically said that, "State and local officials will have substantial time…" The luxury of "substantial time" cannot be assumed[3] and especially post Fukushima and 9/11.

b. NRC's own emergency management specialist recently said that a short and specified time for using a backup method must be required. See *What's in the Black Box Known as Emergency Dose Assessment*, Stephen LaVie, Sr. Emergency Management Specialist, NRC, 2009 National Radiological Emergency Planning

[3] NUREG-0654 FEMA-REP 1 Rev. 1 Supp.3, July 1996, P. 1-17; 1-18

Example BWR Sequences

a. Transient (loss of offsite power) plus failure of core shut down systems (scram). Could lead to core melt in several hours with significant potential for containment failure. More severe consequences if pumps trip does not function.
b. Small or large LOCAs with failure of ECCS to perform leading to core melt degradation or melt in minutes to hours with significant potential of loss of containment integrity.

Example PWR Sequences

a. Small and large LOCAs with failure of ECCS to perform leading to severe core degradation or melt in from minutes to hours. Ultimate failure of containment possible for melt sequences. (**Several hours likely** to be available to complete protective actions unless containment is not isolated.)

b. Transient initiated by loss of feedwater and condensate systems (principal heat removal system) followed by failure of emergency feedwater system for extended period. Core melting possible in several hours. Ultimate failure of containment possible if core melts.

Estimates of containment performance under severe accident conditions are based on information in Chapter 9 of NUREG-1150, "Severe Accident Risks: An Assessment for Five U.S. Nuclear Power Plants," December 1990.

Conference [4] in which he said, “timely protective actions, preferably prior to the start of the release, were necessary for protecting the public” [slide 5].

3. *NRC: Guidance provided regarding the need to ensure that the backup methods could alert and notify the public in the entire plume exposure pathway EPZ. However the backup means could be designed to be implemented using a phased approach in which populations most at risk are alerted and notified first, followed by notifying those in less immediately affected areas within the EPZ.[Emphasis added]*

PW Comment:

a. In order to provide “reasonable assurance” requirements are needed. In first line change “Guidance provided” to “there is a requirement that;” change “could alert” to “shall alert.”

b. PW objects to a phased approach inside the EPZ for the following reasons.

(1) Licensees and planning officials have no clear idea what populations are most at risk. This is because: (a) NRC allows licensees to use a straight-line Gaussian plume model that ignores that in coastal areas, river valleys and hilly terrain, the plume travels in a variable manner so that it will not be possible for authorities to accurately determine which populations within the EPZ are most at risk. (b) NRC allows licensees to assess meteorological conditions on the basis of the onsite anemometer which can tell where the plume is going onsite but not where it goes offsite.

(2) The phased approach ignores the fact that today’s communication capabilities assure that news will travel quickly – emails, text messaging, cell phones, etc. We are a highly interconnected society. News of the disaster will travel fast and those not considered by authorities as being “most at risk” will self evacuate anyway. It is both naïve and dangerous to think otherwise; dangerous because permitting a phased approach means that it is unlikely that sufficient personnel and equipment will be available and at the ready to control a large scale evacuation.

[4] *What’s in the Black Box Known as Emergency Dose Assessment*, Stephen LaVie, Sr. Emergency Management Specialist, NRC, 2009 National Radiological Emergency Planning Conference Adams Accession Number ML091050226

(3) The phased approach ignores "shadow evacuation." Studies regarding "shadow evacuation" inside and outside the EPZ indicate that the public will respond once they become aware. Examples: Three Mile Island: the Pennsylvania Governor issued an evacuation advisory (note, it was not an order). It was expected to have precipitated the flight of only 3,400 people (pregnant women and pre-school children within five miles of the plant); instead, a total of 144,000 people (a government figure) evacuated the surrounding region. Subsequent surveys in New York by Dr. Zeigler indicated that the public outside the 10-mile EPZ would evacuate once they heard there was a nuclear emergency. Recognizing that the public has a greater fear of radiation than natural disasters, a shadow evacuation occurred during Hurricane Floyd in 1999 and Hurricanes Katrina and Rita. Again in a chemical accident, the shadow evacuation was studied and documented in the Graniteville South Carolina chlorine spill in 2005. [5]

(4) Employing a phased approach will undermine authority. It is essential for planning that the public trust the authorities in order for there to be some assurance that the public will follow directions. If the authorities only inform some of the population, or appear to inform the population in a piecemeal fashion, irrespective of intentions, they will lose all credibility, increasing the likelihood of a chaotic response.

(5) The draft left many issues hanging so that it is not possible to comment. The draft final rule says that

> NRC and FEMA are providing guidance, issued contemporaneously with this final rule, for determining the acceptability of the backup methods based on the alerting and notification capabilities of the methods selected, administrative provisions for implementing and maintaining backup methods, identification of resources to implement backup methods, and periodic demonstration of the backup methods. Guidance is also being provided to nuclear power reactor licensees and offsite officials regarding the need to ensure that the backup methods can alert and notify the public in the entire

[5] Zeigler, Donald, Johnson, James, Jr., "Evacuation Behavior In Response To Nuclear Power Plant Accidents," The Professional Geographer, May, 1984; Zeigler, Donald, Testimony Prepared for Westchester County Legislature, Dec 13, 2001, http://www.closeindianpoint.org/evacuation_testimonial.htm; Witt, James Associates, "Review of Emergency Preparedness of Areas Adjacent to Indian Point and Millstone," James Lee Witt Associates, March 2002, http://www.wittassociates.com/index.xml; Seminole County Division of Emergency Management, Evacuation Plans, http://www.seminolecountyfl.gov/dps/em/emprep_evacuation.asp; Duke, Evacuation Behavior in Response to the Graniteville, South Carolina, Chlorine Spill, Hazards Research Lab, University South Carolina, 2005, http://www.colorado.edu/hazards/research/qr/qrl178/qr178.html

plume exposure pathway EPZ, that the personnel and resources required to implement the backup methods will be available during any type of emergency (including hostile action), and that designated personnel know how to implement backup methods.

Back-up notification becomes less important if the primary notification system has adequate redundancy, discussed below.

7. B. ALERT & NOTIFICATION- PRIMARY NOTIFICATION

What's Wrong, Summary?

(1) The proposed rule fails to provide a required time to complete initial notification. There has to be a time limit beyond which it is unacceptable. (2) The rule does not specify, as we believe it should, that multiple primary systems should be required at each site to provide reasonable assurance. (3) The rule does not address, as it should, notification issues for emergency workers.

Proposed Rule- timing notification

The wording of the primary ANS design objective is revised to clarify that notification of the public need not be completed within 15 minutes but that initiation of the notification process must begin within 15 minutes.

PW Comments

Not requiring completion notification in 15 minutes makes sense; but not requiring an end time does not make sense. A reasonable end time should be achievable with current technological advances in communication.

Proposed Rule – not require multiple (redundant) systems at each site

The rule simply makes a statement that, "the predominant method used around U.S. nuclear power plants for alerting the public is an ANS based on sirens to provide an acoustic warning signal. Some sites employ other means, such as tone alert radios and route alerting, as either primary or supplemental alerting methods. The public

typically receives information about an event and offsite protective actions via emergency alert system (EAS) broadcasts or other means, such as mobile loudspeakers."

PW Comments: Notification is a key component in emergency preparedness and planning. Multiple primary systems are needed at each site; and systems that can be heard outside, indoors and in vehicles. Sirens are essentially outdoor warning systems and cannot be assumed to be heard inside – landscaping, large lots, air conditioning, storm windows. Other systems include:

a) Rapid dialing systems have the capability to notify workers and every household and business within the EPZ in less than 15 minutes by telephone, fax, email, text messaging. They should be required and tested regularly. These telephone systems, today's version of the Town Crier, are on the market and readily available today. FEMA's IPAWS system is long over-due.

(b) Electronic, battery powered reader boards should also be required along our roadways to provide notification to motorists that there is an accident; the protective action recommended; and alternative routes, if required. They, too, belong in test scenarios and are multi-functional.

(c) Low frequency dedicated radio capability should be utilized along our major evacuation routes and roadways.

(d) EAS must be tested; and testing designed to determine whether citizens with Satellite dishes can receive EAS TV alerts.

Problems with current notification systems are underscored in a recent GAO document, EMERGENCY PREPAREDNESS, Improved Planning and Coordination Necessary for Development of Integrated Public Alert and Warning System, Sept 30, 2009, GAO-09-1044T. Although the report does not reference nuclear reactor accidents; it seems clear that GAO's comments apply here. GAO concludes at page 12 that,

> Emergency communications are critical in crisis management and for protecting the public in situations of war, terrorist attack, or natural disaster; yet, FEMA has made

> limited progress in implementing a comprehensive, integrated alert system as is the policy of the federal government. Management turnover, inadequate planning, and a lack of stakeholder coordination have delayed implementation of IPAWS and left the nation dependent on an antiquated, unreliable national alert system. FEMA's delays also appear to have made IPAWS implementation more difficult in the absence of federal leadership as states have forged ahead and invested in their own alert and warning systems. In order that IPAWS achieve the federal government's public alert and warning goals, it is essential that FEMA define the specific steps necessary in realizing a modernized and integrated alert system and report on the progress toward achieving that end. Additionally, effectively implementing an integrated alert system will require collaboration among a broad spectrum of stakeholders.

Notification of Emergency Responders

The Proposed enhancements do not properly address issues relating to notification of emergency responders.

- Emergency responders must have communication equipment that is interoperable. For example, not all equipment is currently interoperable at Pilgrim's EPZ.
- RACES equipment must be treated as back-up, not as a primary means of communication.
- EOC's require encrypted radio capabilities to support the exchange of sensitive information.

Information Notice 2009-19, Hostile Action-Based Emergency Preparedness Drills, dated November 24, 2009 (ML092260360), provides valuable lessons. At 6, it says that,

- Lack of compatible communications equipment between site personnel and offsite responders required them to trade radios with one another at the scene in order to communicate directly. The security situations created by the scenarios may have precluded these trades.

- Radios did not work because of the lack of sufficient repeaters, terrain between the site property and Incident Command Post location, or weather conditions.
- Cellular phones did not receive a signal because of signal dead areas around the remote location of the Incident Command Post or site property.
- Cellular phone batteries did not have sufficient duration, and replacement batteries were not readily available.
- There were not enough telephone land lines available at the Incident Command Post location to accommodate all parties. A good practice was the deployment and use of designated ORO communications vehicles during drills

8. EMERGENCY DECLARATION TIMELINESS

What's Wrong, Summary? Require performance criterion instead of capability criterion because offsite planners need to be notified to decide upon and implement an action to protect the public.

Proposed Rule: The NRC considers the 15-minute criterion to commence when plant instrumentation, plant alarms, computer displays, or incoming verbal reports that correspond to an EAL become available to any plant operator. The final rule establishes a capability criterion, rather than an inflexible performance criterion, to allow nuclear power reactor licensees some degree of flexibility in addressing extenuating circumstances that may arise during an actual emergency.

PW Comment: PW recommends a requirement to notify within 15 minutes because, as the Draft Final Rule acknowledges, "The steps that need to be taken by offsite officials to consider the licensee's recommendation and to decide upon and implement an action cannot start until the licensee has classified and declared the emergency and provided the appropriate recommendation. As such, time is of the essence. Although the Draft says that, "Nonetheless, the NRC expects licensees to establish the capability to initiate and complete these analyses with a reasonable sense of urgency," it sounds good but is not enforceable – and even if it were, it may be too late.

9. EMERGENCY OPERATIONS FACILITY-PERFORMANCE BASED APPROACH

What's Wrong, Summary? (1) The rule provides an escape clause for licensees. It says not required to abide by rule if licensee has an approved EOF that does not meet the distance criteria for a primary or backup EOF, or does not have provisions for a facility closer to the site if the EOF is located more than 25 miles from a nuclear power reactor site. (2) The rule does not require licensee to indicate to NRC that they consulted with offsite agencies that send representatives to the EOF prior to relocating or consolidating such facilities and offsite agencies approved.

Proposed Rule: The final rule provides criteria in Part 50, Appendix E, Section IV.E.8, regarding EOF distance from a nuclear power reactor site and for a performance based approach for EOFs, specifying that these facilities must meet certain functional requirements rather than requiring that they be located within a certain distance of the plant. Further options for EOF locations should be available to all licensees as long as the EOF meets the applicable functional requirements associated with consolidated EOFs previously approved by the NRC and licensees provide a facility closer to the site in situations where the EOF is more than 25 miles from a site. The functions that an EOF must address include the capability to obtain and display plant data and radiological information for each reactor unit or plant that the facility serves

PW Comment: PW has three problems with the proposed rule.

1. It provides an "escape clause" that says,

> The NRC is also adding new Section IV.E.8.e to permit a nuclear power reactor licensee, that, on the day the final rule becomes effective, has an approved EOF that does not meet the distance criteria for a primary or backup EOF, or does not have provisions for a facility closer to the site if the EOF is located more than 25 miles from a nuclear power reactor site, to not be subject to the requirements of Section IV.E.8.b. These licensees have already received approval from the Commission for variances from existing

requirements (and guidance) regarding EOF locations, backup EOF facilities, or other EOF characteristics

2. The NRC does not require notification of offsite agencies and a showing to NRC that they approved. The proposed rule says that, “Although not included in the final rule language of Section IV.E.8.b or IV.E.8.c as a requirement, the NRC believes it is important for licensees or applicants to consult with offsite agencies that send representatives to the EOF prior to relocating or consolidating such facilities. This consultation is particularly important when a licensee or applicant intends to use an EOF located more than 25 miles from a site to ensure that response times to the facility would be acceptable to offsite responders, adequate communications with offsite responders at other locations would be available, and there would be no jurisdictional concerns with the EOF location (e.g., when the EOF is located in a different State than a nuclear power plant).”
3. The proposed rule says that, “Additional criteria regarding EOF habitability, size, staffing, and other characteristics will remain as guidance.” The problem is that Guidance is not enforceable therefore set criteria should be set down in the rule.

10. EVACUATION TIME ESTIMATES

What’s wrong, summary? The Draft rule's trigger for updates between decennial censuses is either a change in population of 25% or 30 minutes evacuation time, whichever is less. It does not make sense. Simply a change in evacuation times should be sufficient, provided that the ETE’s, unlike now, are based on correct assumptions and include all pertinent variables; and the evacuation end- time is based on when the evacuees reach the Reception Centers, not simply the EPZ border.

Proposed Rule: Licensees required update ETE during the years between decennial censuses, when there is a change in population of 25% or 30 minutes evacuation time, whichever less; change measured within area that gives longest ETE value for 2-mile zone, 5-mile zone or 10 mile zone to change by 25% or 30 minutes.

PW Comments: The NRC should require the end time, evacuation completed, when evacuees reach the Reception Centers, not simply the EPZ border; and NRC add functional requirements that specify the precise conditions that must be calculated by the contractor when performing the ETE.

The draft says that, “NRC dismissed adding additional variables in order to achieve “*a reasonable balance between the burdens on the licensees…and need to ensure that the ETE is accurate.”* Here the NRC’s priorities are imbalanced; NRC’s number one responsibility is to protect public safety.”

a. ETE Time estimates should be measured to the Reception Center, not simply to the EPZ boundary. NUREG, J-12 was explicit that 100% of the population evacuated shall be monitored for contamination within 12 hours. It uses "shall." Therefore an evacuation is not complete until the evacuees are at the Reception Center.

b. **Functional Requirements**: The Enhancements to ETEs lack specific functional requirements.

Example: Deficiencies *KLD Pilgrim Nuclear Power Station Development of Evacuation Time Estimates*, Prepared for Entergy Nuclear Northeast by KLD Associates, Inc. October 2004, KLD TR-382 - Pilgrim’s KLD is fundamentally similar in its assumptions and methodology to ETEs prepared by KLD for other reactor sites. These deficiencies need to be corrected by adding functional requirements to the proposed enhancements. For example:

a. KLD ignored peak traffic periods. NRC must require that ETEs consider peak traffic periods - holidays, peak commuter traffic, summer week-end traffic during the morning and early evening hours, and inclement weather coinciding with peak traffic periods.

b. KLD incorrectly assumed the straight-line Gaussian Plume Model. However in coastal locations, lake regions, river valleys and hilly terrain a variable trajectory model is required. KLD by incorrectly assuming a straight-line Gaussian plume

incorrectly assumes that not everyone within 10 miles of the reactor would have to evacuate, instead of only those 2-miles around and others in the direction of the narrow radiation plume, most within the 2-5 mile wedge. If a variable trajectory model was used clearly a greater number of people would be required to evacuate. NRC must require that ETEs base their estimates on a site appropriate plume model.

c. KLD does not consider a severe accident in making evacuation time estimates whereby citizens beyond 10 miles would be required to take protective action. NRC cannot claim to be "conservative" if the full range of accident scenarios (small, medium and large) is not considered. This is true especially post 9/11 and with large inventories of assemblies stored onsite in spent fuel pools never designed to hold that large of an inventory.[6]

d. KLD ignored shadow evacuation of those outside the 10 mile zone. NRC must require the consideration of shadow evacuation occurring both inside and outside the EPZ.

For Example, the Pilgrim ETE [KLD Associate, Inc. Rev. 6 2004, page 2-3, 2. 2 - Study Methodology Assumptions at 6] - A total of 12 "scenarios" representing different seasons, time of day, day of week and weather were considered.

Scenarios	Season	Day Week	Time Day	Weather
1	Summer	Weekend	Midday	Good
1A	Summer	Weekend	Evening	Good
2	Summer	Weekend	Midday	Rain
2A	Summer	Weekend	Evening	Rain
3	Summer	Midweek	Midday	Good
4	Summer	Midweek	Midday	Rain
5	Off-Season	Midweek	Midday	Good
6	Off-Season	Midweek	Midday	Rain
7	Off-Season	Midweek	Midday	Snow

[6] See for example: Comment (26) of Texans for a Sound Energy Policy, et. al., on PR 51 Waste Confidence Decision Update and PR-51 Regarding Consideration of Environmental Impacts of Temporary Storage of Spent Fuel After Cessation of Reactor Operation, February 6,2009, Adams Accession ML090700781;Massachusetts Attorney General's Request for a Hearing and Petition for Leave to Intervene with Respect to Entergy Nuclear Operations Inc.'s Application for Renewal of the Pilgrim Nuclear Power Plant Operating Licensee Massachusetts, May 2006 -Adams Accession Number ML061630088;

8	Off-Season	Midweek, Weekend	Evening, All Day	Good
9	Off-Season	Midweek, Weekend	Evening, All Day	Rain
10	Off-Season	Midweek, Weekend	Evening, All Day	Snow

Referring to the chart above, the heavy traffic periods avoided in KLD's estimates include: Summer Week-end: estimating traffic at mid-day, avoids the morning traffic jams of folks getting an early start to get to the beach or resort early; estimating evening traffic ignores the fact that traffic spreads out over the day on the return home trip. Summer, Week-day – Midday: avoids commuter traffic. Off –Season Midweek- Midday avoids the heavy rush hour commuter traffic. Snow: estimating snow delays Midweek- Midday avoids the rush hour commute; and estimating snow on week-ends avoids the heavy work-week commuter traffic. On week-ends traffic is lighter and spreads out over the day. KLD estimates avoid holidays – also peak traffic periods.

11. Emergency Plan Change Process

What's wrong, summary? The licensee, not NRC, determines whether to ask the NRC for an amendment based on their determination if the change decreases effectiveness.

Proposed Rule: Pilgrim Watch is confused whether this is a proposed rule or whether it has been finalized, prior to going to the Commission on May 3, because on April 19, 2011 NRC issued a RIS (ML100340545). It said:

> The only change that the licensee determines reduces the effectiveness of the plan is reviewed by the NRC prior to implementation. The U.S. Nuclear Regulatory Commission (NRC) is issuing this regulatory issue summary (RIS) revision to (1) clarify the meaning of decrease in effectiveness, as stated in 10 CFR 50.54(q); (2) clarify the process for evaluating proposed changes to emergency plans; (3) provide a method for evaluating proposed changes to emergency plans; and (4) provide clarifying guidance on the appropriate content and format of applications submitted to the NRC for approval prior to implementation.

Rationale: Prior NRC approval was required for any change that decreased the effectiveness of the emergency plan. The NRC and licensees experienced significant difficulties in implementing this portion of § 50.54(q) because the former rule language did not define what constituted a decrease in effectiveness of an emergency plan nor did it identify the type of changes that would constitute a decrease in effectiveness of the plan. The lack of clear evaluation criteria resulted in regulatory inefficiencies. The final rule specifies that the license amendment process of § 50.90 is used when submitting a proposed emergency plan change that the licensee has determined constitutes a reduction in effectiveness of the plan.

PW Comment: The licensee should be required to keep a dated record of all changes so that NRC can review the changes made; and submit to the NRC for approval nay change that has the POTENTIAL for decreasing effectiveness. This leaves the determination of what does/does not decrease effectiveness to the regulator not the licensee.

12. Removal One-Time requirements -No comment

II. FUKUSHIMA LESSONS LEARNED

In the introduction, we respectfully recommended that the Commission not finalize this rule. (1) The Final Draft Rule, like previous drafts and current planning, is flawed as shown in the foregoing. The rule as written will not provide reasonable assurance; it does not address many non-security issues that need change; and it fails to address lessons already learned from Fukushima. (2) Until more lessons are learned from Japan, it seems premature to finalize any EP rule. This rulemaking process has been going on for a very long time; an additional few months to "get it right" should not matter.

In early April, the Commission formed a Task Force to evaluate Fukushima. The Task Force charter says that the group's "objective" includes emergency preparedness (e.g., emergency communications, radiological protection, emergency planning zones, dose projections and modeling, protective actions); and to develop recommendations, as appropriate, for potential changes to NRC's regulatory requirements, programs, and processes, and recommend whether generic communications, orders, or other regulatory actions are needed. If the Commission was serious when it established the Task Force, and we hope and want to believe that it was, then NRC will wait to get the Task Force's analysis before finalizing the EP Rule.

FUKUSHIMA TASK FORCE CHARTER - EMERGENCY PLANNING

Pilgrim Watch provides comments on areas the Task Force plans to review to develop recommendations for potential changes: emergency communications; radiological protection; emergency planning zones; dose projections and modeling; and protective actions.

A. EMERGENCY PLUME EXPOSURE PLANNING ZONE

EMERGENCY PLANNING ZONE – 20/25 MILES

- **NRC advised U.S. citizens in Japan within 50 miles to evacuate**
- **NRC says advice was an … "ABUNDANCE OF CAUTION"**
- **Why not same "ABUNDANCE OF CAUTION" for Citizens here?**

The plume exposure pathway is limited to about 10-miles from the reactor. This ignores ample evidence indicating that consequences can spread much further from: accidents in reactors; spent fuel pool accidents; the potential interaction between the spent fuel pool and the reactor in the context of accidents; fires; and hydrogen explosions. Fukushima has shown that the frequency of accident events and the astronomical damage they would cause are vastly underestimated. Also, a 10-mile EPZ ignores scientific evidence regarding meteorology and geography that work to contain, not disperse, a plume.

Spent Fuel Pool Accident Consequences, examples:

License Renewal Adjudications Pilgrim, EVY, Indian Point: Vulnerability analyses of spent fuel pools show that spent fuel pools are not immune to accidents resulting from equipment failure, personnel mishaps, natural disasters or acts of malice. The consequences of a spent fuel pool accident are likely to exceed the consequences from a core accident because of the far greater amount of radioactivity in the pool.[7] For example, at Pilgrim the inventory of long-lived radionuclides, such as Cesium-137, in the spent fuel pool is eight times that in the reactor core. For reference, consider that the 1986 Chernobyl accident released 2,403,000 curies of C-137; whereas Pilgrim's core, for example, during license extension will have 5,130,000 curies of C-137; and at Pilgrim the inventory of long-lived radionuclides, such as Cesium-137, in the spent fuel

[7] The Massachusetts Attorney General's Request for a Hearing and Petition for Leave to Intervene With respect to Entergy Nuclear Operations Inc.'s Application for Renewal of the Pilgrim Nuclear Power Plants Operating License and Petition for Backfit Order Requiring New Design features to Protect Against Spent Fuel Pool Accidents, Docket No. 50-293, May 26, 2006 includes a Report to The Massachusetts Attorney General On The Potential Consequences Of A Spent Fuel Pool Fire At The Pilgrim Or Vermont Yankee Nuclear Plant, Jan Beyea, PhD., May 25, 2006.

pool is eight times that in the reactor core.[8] However emergency planners ignore accidents in spent fuel pools despite analyses performed by the Massachusetts and New York Attorney General's Offices in license renewal adjudication cases.

National Academy of Sciences: Prior to the filings of the Massachusetts and New York State Attorney Generals in license renewal, the National Academy of Sciences, *Safety and Security of Commercial Spent Nuclear Fuel Storage Public Report*, April 2005, said that if a terrorist attack on the spent fuel pool leads to a zirconium cladding fire; it could result in large amounts of radioactive material spreading hundreds of miles.

> "Finding 3B … a terrorist attack that partially or completely drained a spent fuel pool could lead to a propagating zirconium cladding fire and the release of large quantities of radioactive materials to the environment. Details are provided in the committee's classified report." NAS, 6
>
> "Such (zirconium cladding) fires would create thermal plumes that could potentially transport radioactive aerosols hundreds of miles downwind under appropriate atmospheric conditions." NAS, 50
>
> "The excess cancer estimates …to between 2,000 and 6,000 cancer deaths." NAS, 45

Brookhaven Report: A 1997 Brookhaven National Lab Report (—A Safety and Regulatory Assessment of Generic BWR and PWR Permanently Shutdown Nuclear Power Plants‖) claims that a disaster from a spent fuel pool could make an area up to 2,790 square miles around the plant uninhabitable.

Waste Confidence Rule Process: The most recent and comprehensive discussion of spent fuel pool vulnerability and consequences were in response to NRC's Waste Confidence Decision Update.[9]

[8] Ibid

Spent Fuel Pool Fire Accompanied by a Reactor Accident

A spent fuel pool fire accompanied by a reactor accident is a credible event and releases would exceed 10- miles.

At typical US nuclear power plants the spent-fuel pool may be located outside but immediately adjacent to the reactor's containment and share some essential support systems with the reactor; or the pool may be inside the main reactor building and again share some essential support systems with the reactor. Thus, it is important to consider potential interactions between the pool and the reactor in the context of accidents. There could be at least three types of interaction. First, a pool fire and a core-damage accident could occur together, with a common cause. For example, a severe earthquake could cause leakage of water from the pool, while also damaging the reactor and its supporting systems to such an extent that a core-damage accident occurs. Second, the high radiation field produced by a pool fire could initiate or exacerbate an accident at the reactor by precluding the presence and functioning of operating personnel. Third, the high radiation field produced by a core-damage accident could initiate or exacerbate a pool fire, again by precluding the presence and functioning of operating personnel. Many core-damage sequences would involve the interruption of cooling to the pool, which would call for the presence of personnel to provide makeup water or spray cooling of exposed fuel. The third type of interaction was considered in a license-amendment proceeding in regard to expansion of spent-fuel-pool capacity at the Harris nuclear power plant.

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[9] NRC's Rulemaking Docket, NRC-2008-0428 at http://www.nrc.gov/reading-rm/doc-collections/rulemaking-ruleforum/rulemaking-dockets/2008/index.html by Texans For A Sound Energy Policy And Commenters On Proposed Waste Confidence Decision Update And Proposed Rule Regarding Consideration Of Environmental Impacts Of Temporary Storage Of Reactor Operations Prepared By Ms. Diane Curran, Esq; New York Attorney General's Office, 02,06,09, comment 26; and Comment of The Offices of the Attorneys General of the States of New York and Vermont and the Commonwealth of Massachusetts on Waste Confidence Decision Update and Consideration of Environmental Impacts of Temporary Storage of Spent Fuel After Cessation of Reactor Operation 2009/02/06, Comment (21)

Local Meteorology/Geology Likely To Contain, Not Disperse, Plume

The likely spread of radiation beyond 10- miles that necessitates protective action for the public requires planners to understand current meteorological understanding concerning the flow of air in coastal areas, river valleys, lake regions, and hilly terrain. Winds are variable in these locations and the spread of a concentrated release of radiation may be carried at a far greater distance. Examples:

Sea Breeze (applies to any large body of water – ocean/lake): There is a misconception that the sea breeze is generally a highly beneficial phenomenon that disperses and dilutes the plume concentration and thereby lowers the projected doses downwind from the release point. However, if the same meteorological conditions (strong solar insolation, low synoptic-scale winds) that are conducive to the formation of sea breezes at a coastal site occurred at a non coastal location, the resulting vertical thermals developing over a pollution source would carry contaminants aloft. In contrast, at a coastal site, the sea breeze draws contaminants downward across the land and inland subjecting the population to larger doses.

Behavior Plumes over Water: Planning should, but does not, reflect understanding of the flow of air over and around large bodies of water. As an example at Pilgrim, located on New England's Coastline, winds initially headed out to sea will remain tightly concentrated due to reduced turbulence over water until the winds blow the puffs back over land.[10] This can lead to hot spots of radioactivity in unexpected places - beyond 10 miles that should be instructed and prepared to take protective actions. For example, the compacted plume could be blown ashore to Cape Cod, directly across the Bay from Pilgrim and heavily populated in summer. The summer population is about 600,000, the year round about 210,000. However because the Cape is outside the 10 - mile EPZ,

[10] Zager M, Tjernstrom M, Angevine W. 2004, New England coastal boundary layer modeling. In: AMS 16th Symposium on boundary Layers and Turbulance, August 2004, Portland, Maine. Angevine WM. Tjernstrom M, Senff CJ, White AB. 2004. Coastal Boundary layer Transport of urban pollution in New England In: 16th Symposium of boundary layers and turbulence Portland, Maine, 13th Symposium on Turbulance and diffusion, August 2004, Portland, Maine. Angevine WM. Tjernstrom M, Zager M. 2006. Modeling of the Coastal Boundary Layer and Pollutant Transport in New England, J. of Appl. Meteorol. & Climatol. 45: 137-154. Scire JS, Strimaitis DG, Yamatino RJ. 2000 A User's Guide for the CALPUFF Dispersion Model (Version 5). Concord MA: Earth Tech, Inc.

there are no plans to evacuate or shelter the population in the event of a radiological disaster at Pilgrim.

Diffusion at Valley Sites – Gravity Drainage:[11] With no solar heating at night, the earth cools. Higher elevations cool faster; cool air flows towards warmer air in the valley. This flow is known as gravity drainage. In the absence of other influences, the drainage, compacted plume, will head downriver.

Emergency Planning Considerations: The aforementioned evidence indicates that NRC should enhance emergency preparedness regulations and guidance by requiring the necessary changes so that they reflect that the plume exposure pathway extends beyond 10-miles. EPZ's should be extended to 20-25 miles, at minimum.

B. DOSE PROJECTIONS & MODELING

DOSE PROJECTIONS

NRC:

- Biological impact and amount likely to be released minimized

What's Wrong?

- PAGs not based on BEIR VII
- Ignores potential releases from large scale accidents - e.g., spent fuel pool fire; accident interaction between pool and reactor; hydrogen explosions; core/containment breach; more than 1% fuel failure

PROJECTED RELEASE: Both the biological impact and amount likely to be released in an accident are minimized in NRC's and FEMA's Emergency Preparedness and Response Plans.

[11] The State Of New York's Motion For Summary Disposition On Use Of Straight Line Gaussian Air Dispersion Model For The Environmental Impact Analysis Of Significant Radiological Accidents At Indian Point And NYS Contention 16/16A, (DPR-26, DPR-64) August 28, 2009, Declaration of Bruce A. Egan, Sc.D., explains that concentrated radiation can spread at distances far greater than 10-miles along river valleys.

Biological Impact from Releases Minimized: Emergency classification levels are based on a determination of whether releases can reasonably be expected to exceed EPA PAG exposure levels off-site for more than the immediate site area.

The National Academy of Sciences BEIR studies have formed the basis for the radiation regulations of EPA and by extension other radiation protection agencies, such as NRC. EPA requested that the National Academy of Sciences conduct the BEIR VII review to update its PAGs, and paid for it. BEIR VII concluded that cancer incidence risks were about a third higher than assumed by current EPA and NRC standards in causing cancer. BEIR VII's cancer incidence risk figure is 1.14 cancers per 1000 person rem. EPA's current figure (from Federal Guidance Report 13) is 0.846 cancers per 1000 person-rem.

Further had EPA and NRC staff wished to consider additional evidence not considered by NAS in BEIR VII, they would have addressed new developments that demonstrate radiation is more dangerous that assumed by the Academy. For example, the largest study of occupational radiation exposures ever conducted was recently released by a large international team headed by Elizabeth Cardis[12] – too late for consideration by the BEIR VII committee. It found, by examining nuclear workers in 15 nations, cancer induction per unit dose is about 6 times higher than currently assumed by EPA and NRC. Similar findings have recently come out from by the Techa River cohort (Krestina et al (2005)[13]. Both studies give similar values for low dose, protracted exposure, namely (1) cancer death per Sievert (100 rem). In the United States a series of other occupational studies, including several from the Department of Energy's Santa Susana Field Laboratory, Oak Ridge, and Hanford nuclear facilities, suggest current agency risk estimates may be low by as much as an order of magnitude. Yet neither EPA nor NRC

[12]Elizabeth Cardis, "Risk of cancer risk after low doses of ionising radiation: retrospective cohort study in 15 countries." *British Medical Journal* (2005) 331:77.
[13] Krestinina LY, Preston DL, Ostroumova EV, Degteva MO, Ron E, Vyushkova OV, et al. 2005. Protracted radiation exposure and cancer mortality in the Techa River cohort. Radiation Research 164(5):602-611.

staffs consider these important new studies or BEIR VII's findings; instead NRC and EPA are on a track to downgrade rather than upgrade radiation risk estimates.

Amount of Projected Releases, Minimized: The amount of radiation released is minimized by NRC and FEMA. (1) Accidents modeled are "best case" for exercises, Evacuation Time Estimates and planning in general. Avoided are credible events such as spent fuel pool fires, spent fuel pool accidents accompanied by a reactor accident and serious core releases. (2) The effectiveness of mitigative measures is overblown – hold-up in the containment, plateout and deposition within plant systems, filtration systems, and radioactive decay.

Minimizing releases began by NRC after TMI when offsite emergency response plans were designed for commercial reactors. NRC mischaracterized the accident then and continues to do so today.

TMI Facts: TMI's radiation monitors onsite were off-scale. All radiation estimates are based upon off-site dose readings to which mathematical assumptions were applied. We know that:

- Early on in the accident, the NRC estimated that 10,000,000 Curies of radiation were released. The NRC estimate is based on a report by NRC manager, Mr. Lake Barrett.NUREG-0637, Appendix C. Barrett used time averaged plume dispersion (Chi/Q); assumed the center (highest concentration) of the plume hits the detector; and then averaged many days of releases. Time averaged plume dispersion can be wrong, on the low side by a factor of 10. Center line Chi/Q can be wrong on the low side by a factor of a 1000. Averaging the data is wrong on the low side by a factor of 3.4. Barrett recorded the maximum curies released each day; the grand total of each day's recording adds up to 36,062,000; yet NRC insists that only 10,000,000 curies were released.
- During the 1994 TMI Trial, John Daniel (industry's expert), determined that 17,000,000 Curies were released. Industry's own expert estimated that more

radiation was released than the NRC, the guardian of public safety. Another industry expert report by Dr. Sinovy V. Reytblatt, structural engineer from the University of Bridgeport, estimated that 8-10% of containment was released as result of the spike in pressure inside the containment. The containment had 10 billion curies – 10%= 1 billion curies.

- A thorough analysis of the TMI accident indicates that releases were 100 to 1000 times higher than the NRC estimated and that the containment failed after the hydrogen detonation.[14]
- However NRC and FEMA continue to misrepresent the consequences of TMI to justify reducing the area required for protective actions and generally water down plans and exercise scenarios. NRC's Senior Advisor for Emergency Preparedness, Patricia Milligan, explained this to a class in Boston, August 2008. [15] She said that emergency plans for the public were written right after TMI. At that time the extent of core damage was unknown; NRC maintained that releases were minimal (10,000,000 curies) and claimed that there were no radiation-linked health effects offsite. However she said that today NRC fully appreciates that the accident was far more serious then was thought at the time NRC wrote and required offsite emergency plans. Despite that fact, NRC assures TMI's releases were relatively small and there were no radiation-linked disease in the communities. Therefore, NRC concludes that emergency plans written after TMI were too conservative and now can be scaled back. This is an incorrect conclusion; it rests on false data about the true extent of releases from TMI and health effects in the population. Subsequent studies show radiation-linked disease in the communities exposed from TMI. [16]

Fukushima: Although we hope that a complete and straight-forward assessment is performed at Fukushima; reporting to date are not encouraging.

[14] http://www.nirs.org/reactorwatch/accidents/tmipowerpoint.pdf
[15] Theory explained by NRC Patricia Milligan as lecturer at Harvard School Public Health, Radiological Emergency Planning: Terrorism, Security, and Communication August 7, 2008.
[16] Wing S, Richardson D, Armstrong D, Crawford-Brown D. A Reevaluation of Cancer Incidence Near the Three Mile Island Nuclear Plant: The Collision of Evidence and Assumptions. Environmental Health Perspectives 1997.105(1):52-67; and the utility paid out more than $15 million in settlements to citizens for damages.

PLUME MODELING

What's Wrong?

Plume modeling based simplistic straight-line, Gaussian plume model; not suited complex sites (non-temporal, non-spatial)

What's Needed?

Advanced variable models and multiple meteorological towers for pre-planning &response

Plume Modeling – the key-hole: Currently, the NRC, FEMA, State Emergency Management Agencies and KLD [the primary contractor for preparing Evacuation Time Estimates] base regulation, guidance and time estimates on outdated and simplistic assumptions for plume transport models that do not reflect conditions at many, if not all, reactor sites.

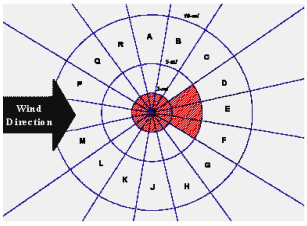
Guidance and regulations use steady-state, straight-line plume transport models. The plume supposedly functions much like a beam from a flashlight; this incorrectly assumes that radiation moves in a relatively narrow plume with a size and shape like a key-hole[17]. However actual wind and weather conditions are variable and complex affected by sea/lake breezes, terrain, river valleys, location/clustering of buildings, and

[17] **NUREG 1887: RASCAL version 3.0.5** is a code, developed in 2007 by NRC. It is currently in use by NRC's emergency operations center for making dose projections for atmospheric releases during radiological emergencies. It uses the **straight-line Gaussian plume** in the "near field" and simply a 2-dimensional puff model in the "far field." Neither the NUREG nor the workbook [NUREG 1889] provides a precise distance for what constitutes the near or far field. Regarding the straight-line Gaussian plume, the NUREG at 4.12 admits that, "…the meteorological *conditions are assumed to be horizontally homogeneous and stationary*. This means that the wind direction and speed responsible for transporting the plume from the release point to the receptor and the turbulence responsible for diffusion are assumed not to change with location throughout the model domain. It also means that the meteorological *conditions do not change as a function of time* during the release and time required for transport. Together, *these assumptions constrain the usefulness of the straight–line plume model* to estimating concentrations and doses at receptors near the release point for short-duration releases; at longer distances another model is required." **Regarding adjusting wind field for topography**, the NUREG counsels that, "If the meteorological stations reporting data are well placed with respect to major topographic features, the wind fields developed by interpolation will give reasonable puff trajectories. However, *with one meteorological station or a small number of stations, the wind fields may not properly reflect the effects of topography*." **Regarding Meteorological Input data** (6.3), the NUREG warns that, "The adjusted wind field is most accurate near stations and along trajectories that pass near stations. Wind fields are less accurate elsewhere. Thus, *it is desirable to have wind data near the release point and, if possible, at downwind locations.*" In summary, RASCAL 3.0.5 rests of 1970's technology; it is a simplistic model.[Emphasis added]

variable precipitation. Radiation in an accident will travel in a complex and variable manner at sites at these locations.[18] Therefore the “key-hole” concept has no basis in reality. It is a figment of planers imagination.

Example: NUREG-0654 FEMA-REP 1 Rev. 1 Supp.3- Appendix I states that,

> The guidance in this document…emphasizes that the preferred initial action to protect the public from a severe reactor accident is to evacuate immediately about 2 miles in all directions from the plant and about 5 miles downwind from the plant, unless conditions make evacuation dangerous. Persons in the remainder of the plume exposure pathway emergency planning zone (EPZ) should be directed to go indoors and listen to the Emergency Alert Stations while the situation is further assessed. P.3



[18] See: State Of New York’s Motion For Summary Disposition On Use Of Straight Line Gaussian Air Dispersion Model For The Environmental Impact Analysis Of Significant Radiological Accidents At Indian Point And NYS Contention 16/16A,(DPR-26, DPR-64) August 28, 2009 and accompanying Declaration Of Bruce A. Egan, Sc.D., Statement of Material Facts not in Dispute, and Exhibits, NRC Electronic Library, Adams Accession Number ML 092610906; Pilgrim Watch Answer Opposing Entergy’s Motion for Summary Disposition of Pilgrim Watch Contention 3, June 2007- Adams Accession Number ML071840568; Declaration Dr. Bruce Egan, June 2007 attached to Pilgrim Watch’s Answer - Adams Accession Number ML071840568; Pilgrim Watch Petition for Review of LBP-07-13, Memorandum and Order (Ruling On Motion To Dismiss Petitioner’s Contention 3 Regarding Severe Accident Mitigation Alternatives), 2-1 Decision, October 30, 2007-Adams Accession Number ML083240599; Pilgrim Watch's Brief in Response to CLI-09-11 (Requesting Additional Briefing), Adams Accession Number ML091830846; Pilgrim Watch's Brief in Response to Entergy's Response to CLI-09-11, Adams Accession Number ML091950452;Pilgrim Watch's Brief in Response to NRC Staff's Initial Brief in Response to CLI-09-11, Adams Accession Number ML091950450; What’s in the Black Box, Dispersion, Prepared for 2009 National Radiological Emergency Planning Conference, Stephen F. LaVie, Sr. Emergency Preparedness Specialist, Nuclear Security and Incident Response, Division of Preparedness and Response, Adams Accession No. ML091050257

Meteorological Data: Licensees are not required by the NRC to use complex plume models and meteorological data from multiple weather stations; instead they are allowed to base inputs to their simplistic straight-line Gaussian plume model from the single or perhaps two meteorological towers onsite. The on-site "met tower" only tells what the wind direction is onsite but not what happens to the plume as it travels offsite. Computerized combination weather-radiation monitors located appropriately in offsite communities are needed and readily available.[19] Only when NRC requires that licensees have such monitors placed in appropriate offsite locations, determined by a meteorological site-specific analysis, will protective action calls be based on fact.[20]

Implications for emergency planning:

By relying on the straight –line Gaussian model to construct a "key hole" planners are likely to make the wrong call - send citizens into a plume; tell folks to stay put when should evacuate; or tell them to evacuate when they should shelter. Complex plume models appropriate to these sites are readily available today and must be required by NRC. For example, the CALPUFF model is appropriate for simulating transport and dispersion in wind fields that change with space and time (Scire, et al., 2000a). It is often coupled to CALMET (Scire, et al., 2000b), a model that computes the needed wind and dispersion fields from meteorological data. CALPUFF may also be coupled to a full mesoscale meteorological flow model such as MM5

Pre-Planning: In the case of a severe and fast-breaking nuclear accident, it is essential that the data and information needed for emergency response measures is available before, and during the accident. There may not be time to plan after-the-fact. Pre-planning is necessary.

[19] Ibid

[20] NUREG 1857: "**Regarding adjusting wind field for topography**, the NUREG counsels that, "If the meteorological stations reporting data are well placed with respect to major topographic features, the wind fields developed by interpolation will give reasonable puff trajectories. However, *with one meteorological station or a small number of stations, the wind fields may not properly reflect the effects of topography*." **Regarding Meteorological Input data** (6.3), the NUREG warns that, "The adjusted wind field is most accurate near stations and along trajectories that pass near stations. Wind fields are less accurate elsewhere. Thus, *it is desirable to have wind data near the release point and, if possible, at downwind locations.*" In summary, RASCAL 3.0.5 rests of 1970's technology; it is a simplistic model."[Emphasis added]

Today, it is possible to predict the direction a plume will follow under a variety of accident conditions and weather scenarios using today's advanced meteorological models and representative meteorological data from multiple well-placed weather stations. Therefore, in a fast breaking release emergency planners can be proactive, a step ahead, rather than making protective action calls after the fact. A key component is the meteorological data collected at the power plant sites.

Pilgrim, Seabrook and Vermont Yankee are all located in complex topographic settings where the winds are variable and complicate emergency response planning and the making of the correct protective action calls for those likely to be impacted.

For example, the fact that Pilgrim and Seabrook are located along the New England coast means that meteorological conditions include spring and summertime sea breeze phenomena that introduce local and highly variable onshore breezes that complicate emergency response planning and actions. If these onshore flows were to occur during an accidental at the plant, key questions would focus on the magnitude and inland penetration of the sea breeze and how much of any effluents would be carried across populated areas or evacuation routes. Sea breeze flows are three dimensional and show a high degree of spatial and temporal variability in winds and in turbulent mixing rates. Wind data at one location will not necessarily be representative of winds not far away. Therefore, meteorological data from more than one meteorological tower in the local area is required to understand the spatial extent and temporal changes of the air flow.

Real-time meteorological models are no longer the sole domain of weather forecasters, our National Laboratories, or Universities. They are now routinely applied in sail boat races and in other applications where predicting or resolving wind conditions is critically important. Certainly a dedicated system for emergency response use at a Nuclear Power Plant would be another appropriate application.

Why NRC Continues to Use Key-Hole? Although the "key hole" is contradicted by actual weather analysis and, for example, NRC[21], DOE, EPA, the National Research Council of the National Academies and the air dispersion modeling community agree that straight line Gaussian plume models cannot account for the effects of complex terrain on the dispersion of pollutants from a source, NRC persists in using it. Perhaps this is because it allows for limited resources to appear adequate – providing false assurance and guaranteeing that communities will be caught short in a disaster. Example: Pilgrim's Radiological Emergency Response Plan and Standard Operating Procedures say that school busses housed in upwind EPZ communities and other emergency resources may be directed to downwind EPZ community/communities at the time of the emergency call. Because "downwind" and "upwind" communities are a fiction in Pilgrim's coastal environment where winds are highly variable, the so-called "upwind" communities will be left high and dry and there will be needless chaos and suffering because adequate resources were not pre-arranged to respond from communities well outside the Emergency Planning Zone.

C. COMMUNICATIONS/ NOTIFICATION

PUBLIC NOTIFICATION

REQUIRE MULIPLE REDUNDANT SYSTEMS & BACKUP

Sirens- outdoor alert

Reverse 911- indoor alert

Electronic Reader Boards

Emergency Alert System

Public Notification: discussed above at Section 1, at 7.

Communication Equipment, Emergency Workers: It is important for NRC to require that offsite emergency worker's radios are interoperable to allow

[21] What's in the Black Box, Dispersion, Steve Lavie, 2009 National Radiological Emergency planning Conference, NRC ADAMS - ML091050226, ML091050257, and ML091050269

communication between towns so that they can request mutual assistance and provide updates to one another. Duxbury's, for example, are not interoperable. Additionally it is necessary for NRC to require emergency workers are provided with the best technology available in communication equipment; they should not have to do without or continually beg the licensee for required upgrades.

D. PROTECTIVE ACTIONS

KI & MASKS

RADIOLOGICAL PROTECTIONS
Potassium Iodide (KI)
Support Stockpiling to 20 miles (Bioterrorism Act, 2002)
Require Both Tablets & Liquid KI for Young Children
3-M Masks:
Require Stockpile Adult & Child Sizes- Schools & Shelters

Potassium iodide has been found to protect individuals, especially young children, from the cancer-causing releases of radioactive iodine that would occur if a nuclear disaster occurred in the United States. Today, citizens living within the 10 mile radius of nuclear power plants in some states have KI stockpiled for an accident, but others do not and those living out to the 20 mile radius do not receive KI.

Rep. Markey amended the Public Health Security and Bioterrorism Preparedness and Response Act of 2002 to make potassium iodide available to state and local governments to meet the needs of all persons living within a 20-mile radius of a nuclear power plant. However, the Bush administration (encouraged by NRC) chose to ignore these provisions and declined to implement them, thereby denying communities access to stockpiles of KI. NRC knows its importance. For example, NUREG/CR 1433 showed that for children, the following dangers may occur from the inhalation of nuclear materials after a core-melt atmospheric accident (like Fukushima)

Approximate Dangers of a Core-Melt Atmospheric Accident for Children

Distance in Miles	Mean Thyroid Dose (rem) for Exposed Children Outdoors*	Probability of Thyroid Damage to Exposed Children Located Outdoors if not Protected by Stable Iodine (like KI)
1	26,000	100%
5	11,600	100%
10	6,400	100%
25	2,200	**80%**
50	760	**26%**
100	200	7%
150	72	2%
200	32	1%

We urge NRC to support the March 16, 2011 letter sent by U.S. Rep. Edward J. Markey (D-Mass) to Department of Health and Human Services (HHS) Secretary Kathleen Sebelius requesting the department's assistance in urging Presidential Science Advisor Dr. John Holdren to reverse the Bush administration decision that effectively blocks HHS from distributing potassium iodide (KI) to Americans living within a 20 mile radius of a nuclear power plant.[22]

Both tablets and liquid KI should be made available – liquid for babies and small children. Too much time is required to crush tablets and mix with liquid, especially in day care centers or schools where many children must be serviced. KI is most effective given before or very shortly after exposure.

3-M Masks: After the PAG to shelter terminates, the public and all institutionalized populations are advised to cover mouths and exposed skin when leaving the shelter to reduce contamination from radiation deposited on the ground. This is not practical advice for school children, and the rest of the public for that matter. Also masks may be useful inside the shelters, because shelters cannot be 100% effective in eliminating dose.

[22] A copy of the letter to the HHS can be found HERE .

Recommendation: NRC should require that masks are stockpiled in schools; group homes, shelters etc and the public recommended stockpiling them, along with KI, for home use.

3-M Type Masks: The basic N95 mask can be quite inexpensive. 3-M type masks are cheap, about 7 cents each. They come in child and adult sizes. Those with N-95 or better efficiency to screen out > 0.1 microns should be purchased. Most analyses of the particle sizes following a nuclear accident assume an aerosol with particle sizes of either 1 or 10 microns. However, it also is possible for aerosols with a particle size well below 1 micron to be produced, particularly if very hot fires are involved - cesium and some other isotopes could easily form aerosols with sub-micron diameter.

Kimberly Clark makes child sized masks; suitable for ages 3 - 10; particle filtration efficiency > 97% at 0.1 microns.

PROTECTIVE ACTIONS- EVACUATION

- Reception Centers equipped for only 20% of population
  Where will 80% get monitored, decontaminated, serviced?
- "Shadow Evacuation" ignored
- ETEs: based on "best case"

Reception Centers – 20%

Capacity: Plans assume that only one in five (20%) will go to the Reception Center and Reception Centers are only equipped with personnel and materials to handle 20%– despite NUREG 0654 (J-12) that states that Reception Centers should be capable of monitoring 100% of the population within 12 hours.

This policy leaves 80% without an opportunity to be monitored and decontaminated risking their health. The policy is based on the Krimm's Memorandum – a FEMA official who came up with the 20% based on the response of the public to a hurricane warning.

You can't base policy on hurricanes. People react very differently to a nuclear disaster than to a hurricane warning. Public warning for a hurricane is ample –TV & Radio Storm Watch reports give ample warning, often days in advance; in contrast, the time of official notice of a nuclear attack/accident can be very short –less than 30 minutes.

Consequence: if 80% are not monitored and decontaminated they will not only put at unnecessary risk their physical and psychological health; they will contaminate populations in other areas with dirty vehicles. Also, it is likely many more than 20% will go to the Reception Center and it will be overwhelmed so none will be served.

Institutionalized populations may not go to the Reception Centers at all. School children, the most vulnerable population, may simply be sent to the "Host School," facilities that do not have monitors or decontamination capability. Residents at Nursing Homes, Group Homes and detainees in jail are not brought to the Reception Centers. They will be brought to other locations – locations without monitors and decontamination equipment.

Recommendation: NRC must require that Reception Centers are equipped with personnel and materials to be capable of monitoring, decontaminating and otherwise servicing 100% of the population within 12 hours. Large centers, appropriately located, should be developed. They can be multi-functional so that they could be used in a number of different emergencies. Colleges, large business complexes or indoor football/sports stadiums are an example of places to look at in some localities.

Shadow Evacuation: NRC must require shadow evacuation considered in emergency plans and procedures. We know that many in the official 10-mile or whatever mile evacuation zone will try to evacuate, and that they will be joined by people from further out. Three Mile Island provides the best, and perhaps only, realistic example. There, the Pennsylvania Governor issued an evacuation advisory (note, it was not an order). It was

expected to have precipitated the flight of only 3,400 people (pregnant women and pre-school children within five miles of the plant); instead, a total of 144,000 people (a government figure) evacuated the surrounding region.

E. RETURN & RECOVERY

What's wrong?

- No Agreed Clean-Up Standard
- No Federal Agency in Charge
- No Money- Price Anderson pays damages, not clean-up
- MACCS2 used to assess consequences, outdated & underestimates costs

Emergency Plans and Standard Operating Procedures discuss return and recovery as if it is a certainty. However fundamental issues are ignored that make it less certain: there is no clean-up standard; the clean-up method (hosing down buildings and plowing under fields) is anything but a clean-up; no federal agency is in charge, therefore the process will be inefficient (the longer it takes to clean-up the less likely it will be possible); and there is no certainty there will be money to pay for a clean-up, Price Anderson only covers damages, not clean-up.

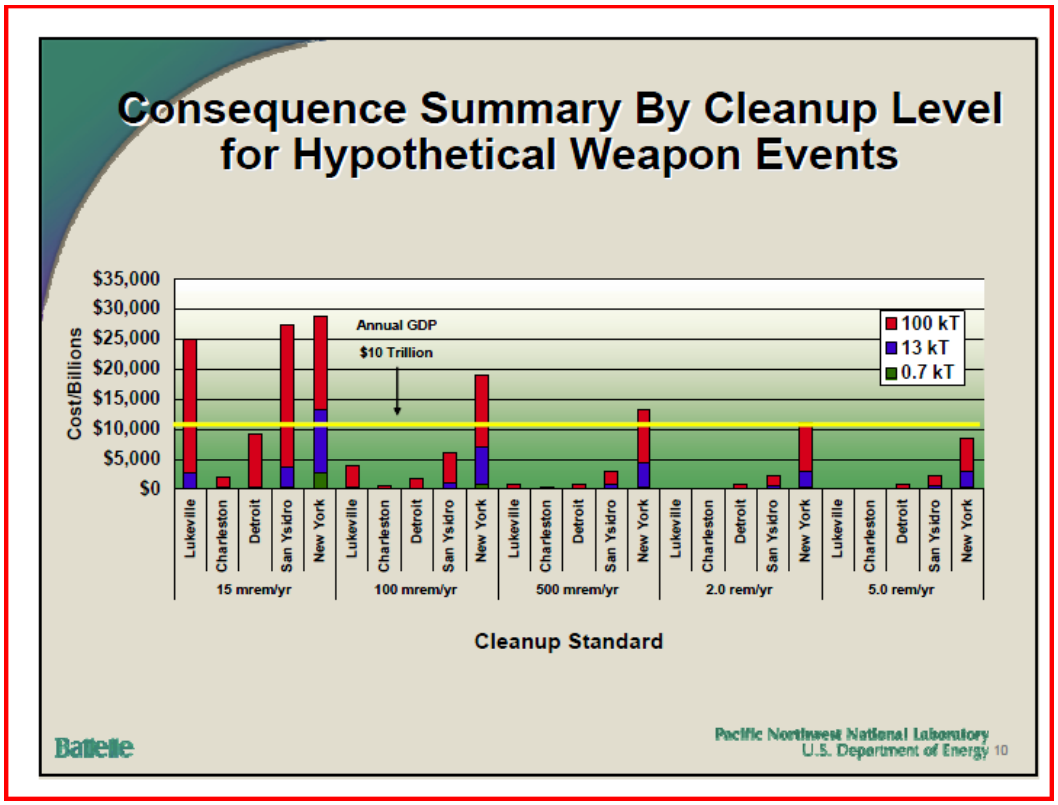
Absent a responsible third party, clean up standard and guarantee of monies there is no reasonable assurance that public health and safety will be protected in the event of a severe accident and talk about return and recovery is pointless.

No Agreed Clean-up Standard

Currently it is not clear what cleanup standards would apply. EPA's standards range from 15 millirem a year (EPA, "Establishment of Cleanup Levels for CERCLA Sites With Radioactive Contamination" (e.g., Hanford Site) to 500 mrem/yr (EPA, "Manual of Protective Action Guides and Protective Actions for Nuclear Incidents," 400-R-92-001, … "doses in any single year after the first will not exceed 0.5 rem); to 2 rem a year (EPA, "Manual of Protective Action Guides and Protective Actions for Nuclear Incidents," 400-R-92-001, …"doses in first year will not exceed 2 rem.") However in the

Draft PAG, NRC officials suggested cleanup standards as lax as 10,000 millirem, which equates to a cancer of one (1) in three (3) people. The final cleanup levels have not been determined. The cleanup standard significantly affects the cost of cleanup-necessary for determining that the money will be there if needed.

A study done for DHS by Pacific Northwest labs, "Battelle study," focused on a hypothetical dirty bomb event.[23] It illustrates that the cleanup standard is key to offsite cleanup costs. A reactor accident would affect a far larger area and have a far greater impact than a dirty bomb.



Clean-Up Method

The MACCS User's Guide (NUREG/CR 6613 at 7-10) described decontamination processes as "plowing" and "fire hosing." Fire hosing and plowing does not

[23] Economic Consequences of a Rad/Nuc attack: Cleanup Standards Significantly Affect Cost Barbara Reichmuth, Steve Short, Tom Wood, Fred Rutz, Debbie Swartz, Pacific Northwest National laboratory, 2005

decontaminate, it simply moves the contamination from one place to another –only to reappear again later in groundwater, resuspended into the air, or in food. Therefore cleanup will take far longer, be more expensive and its success (defined as returning to pre-accident status) unlikely. Also forests, wetlands and shorelines cannot realistically be cleaned-up and decontaminated.[24]

No Federal Agency in Charge Clean-up

On November 10, 2010, Inside EPA released a report (published by Inside Washington, Inside EPA/s Superfund Report), *Agencies Struggle to Craft Offsite Cleanup Plan for Nuclear Power Accidents*, by Douglas Guarino, Associate Editor.[25] The report says that:

> EPA, the Nuclear Regulatory Commission (NRC) and the Federal Emergency Management Agency (FEMA) are struggling to determine which agency -- and with what money and legal authority -- would oversee cleanup in the event of a large-scale accident at a nuclear power plant that disperses radiation off the reactor site and into the surrounding area.

The FOIA documents indicate that the agencies began discussions last year after NRC informed the other agencies that it does not plan to take the lead in overseeing such a cleanup

EPA's Role: According to the Inside EPA investigative report, a July 27, 2010 white paper was never completed amid disagreements between EPA staff over what authority the agency may or may not have to clean up after a nuclear power plant accident. The

[24] See also: Chanin, D.; Murfin, W. (1996). *Site Restoration: Estimation of Attributable Costs from Plutonium-Dispersal Accidents*, SAND96-0957, DE9601166, Sandia National Laboratories. Original 300-dpi OSTI version available at: http://chaninconsulting.com/downloads/sand96-0957.pdf (10.4 MB), OCR-readable courtesy S. Aftergood, FAS.

[25] http://environmentalnewsstand.com/Environmental-NewsStand-General/Public-Content/agencies-struggle-to-craft-offsite-cleanup-plan-for-nuclear-power-accidents/menu-id-608.html

paper cited Superfund as a possible source of cleanup funding -- either through EPA's appropriation-driven Superfund trust fund or the agency's authority to sue parties responsible for contamination under Superfund law. But significantly EPA staff disagree on whether Superfund is applicable to cleanup after a nuclear power plant accident, calling into question its viability as both a source of funding and cleanup authority.

Some at EPA contend that “special nuclear material from a nuclear incident” is exempt from the types of toxic releases governed by Superfund, according to the documents. Others suggest that such material is typically commingled with chemicals and other radioactive materials that are covered by the law, meaning EPA would be able to assert its Superfund authority to conduct a cleanup.

In internal e-mails, other EPA staff provided examples of instances where the agency has been involved with cleanups at nuclear power plant sites due to the sites being contaminated with chemicals. But Jean Schumann, a lawyer in EPA's Office of Emergency Management (OEM), criticized suggestions that the presence of chemical contaminants gives the agency the authority to clean up after a nuclear power plant incident. In one August 5 e-mail, Schumann argues it is uncertain whether Superfund law gives EPA such authority when radioactive substances from the accident are commingled with other contaminants. “I think there is enough uncertainty still on what the 'release' exclusion means.”

NRC’s role: Some federal officials previously assumed NRC had authority and would be the lead agency. However, according to the FOIA documents attached, NRC said that it was not the lead agency and tried to “pass the ball” to EPA, suggesting EPA would be the appropriate agency to lead such an effort. But, as said above, in an August 5, 2010 email, EPA’s Ms. Schumann said that it was uncertain whether Superfund Law gives EPA such authority when radioactive substances from the accident are commingled with other contaminants. In the draft white paper

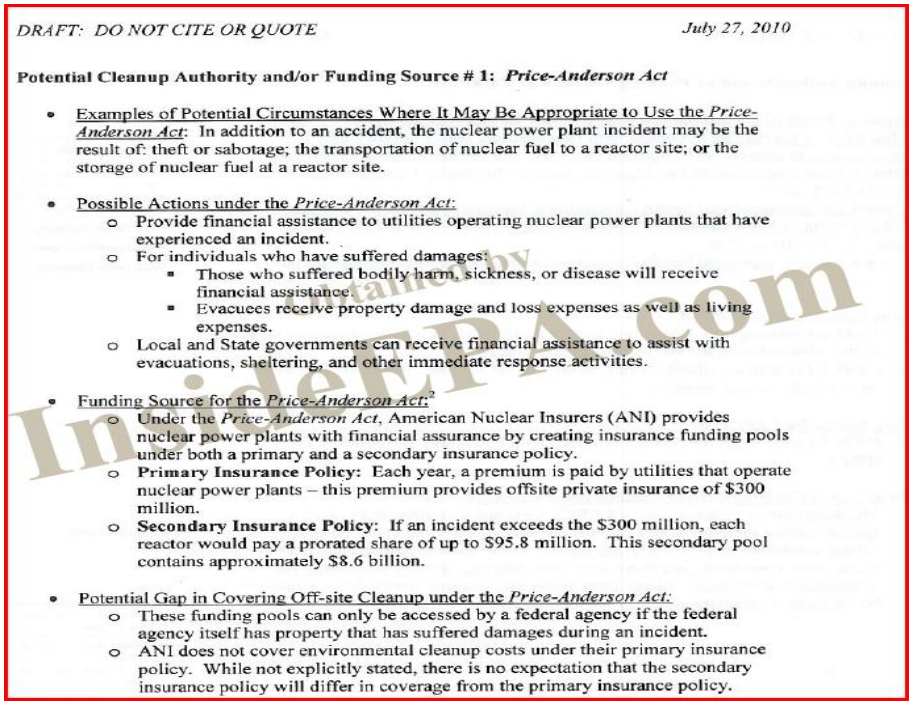
FEMA’s Role: While NRC and FEMA require nuclear plants to have emergency response plans, it is not clear these plans extend beyond the initial aftermath of an accident or apply to radiation dispersed over large areas, the documents say. The

government's emergency response authorities under the Stafford Act, for instance, expire 60 days after an incident, the draft document notes.

U.S. President: A Presidential declaration of an emergency "leads to rather limited financial assistance being made available through FEMA" and a "potentially more useful Presidential declaration of a major disaster" appears limited to "natural events," the document said.

Price Anderson Pays Damages, Not Clean-up - Who Will Pay?

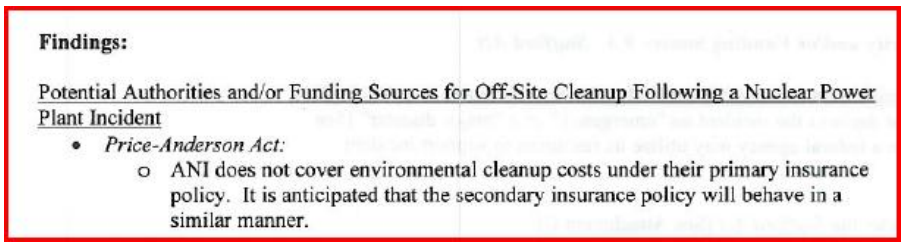
Price Anderson: the industry-funded account established under the Price Anderson Act -- which Congress passed in 1957 in an effort to limit the industry's liability -- would likely not be available to pay for such a cleanup. The account likely could only be used to provide compensation for damages incurred as the result of an accident, such as hotel stays, lost wages and property replacement costs, the documents show, leaving federal officials unsure where the money to pay for a cleanup would come from. If there is no money there will be no clean-up and no recovery and return after an accident.



DRAFT: DO NOT CITE OR QUOTE *July 27, 2010*

Potential Cleanup Authority and/or Funding Source # 1: *Price-Anderson Act*

- Examples of Potential Circumstances Where It May Be Appropriate to Use the *Price-Anderson Act*: In addition to an accident, the nuclear power plant incident may be the result of: theft or sabotage; the transportation of nuclear fuel to a reactor site; or the storage of nuclear fuel at a reactor site.
- Possible Actions under the *Price-Anderson Act*:
  - Provide financial assistance to utilities operating nuclear power plants that have experienced an incident.
  - For individuals who have suffered damages:
    - Those who suffered bodily harm, sickness, or disease will receive financial assistance.
    - Evacuees receive property damage and loss expenses as well as living expenses.
  - Local and State governments can receive financial assistance to assist with evacuations, sheltering, and other immediate response activities.
- Funding Source for the *Price-Anderson Act*:[2]
  - Under the *Price-Anderson Act*, American Nuclear Insurers (ANI) provides nuclear power plants with financial assurance by creating insurance funding pools under both a primary and a secondary insurance policy.
  - **Primary Insurance Policy:** Each year, a premium is paid by utilities that operate nuclear power plants – this premium provides offsite private insurance of $300 million.
  - **Secondary Insurance Policy**: If an incident exceeds the $300 million, each reactor would pay a prorated share of up to $95.8 million. This secondary pool contains approximately $8.6 billion.
- Potential Gap in Covering Off-site Cleanup under the *Price-Anderson Act*:
  - These funding pools can only be accessed by a federal agency if the federal agency itself has property that has suffered damages during an incident.
  - ANI does not cover environmental cleanup costs under their primary insurance policy. While not explicitly stated, there is no expectation that the secondary insurance policy will differ in coverage from the primary insurance policy.



Findings:

Potential Authorities and/or Funding Sources for Off-Site Cleanup Following a Nuclear Power Plant Incident

- *Price-Anderson Act:*
  - ANI does not cover environmental cleanup costs under their primary insurance policy. It is anticipated that the secondary insurance policy will behave in a similar manner.

MACCS2 (MELCOR Accident Code Consequence System) is used to assess offsite damages; but it severely underestimates consequences and costs. Also, this out-dated computer code provides the basis of Price Anderson values. Absent the development of an updated computer code, there will never be a realistic basis to prepare for return and recovery.

Respectfully Submitted,

[Electronically filed]

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