NRR-DMPSPEm Resource

From: Mary Lampert <mary.lampert@comcast.net>
Sent: Sunday, November 11, 2018 11:11 AM
To: Lamb, John
Subject: [External_Sender] questions and comments regarding Pilgrim EP Exemption RAI, October 16, 2018.
Attachments: RAI Pilgrim Emergency Planning -PW to NRC 11.11.18.pdf

Mr. Lamb:

Attached please find questions and comments regarding Pilgrim EP Exemption RAI, October 16, 2018.
If you have difficulty downloading the document or any questions, please contact us.
A courtesy of notice of receipt by return email is requested.

Thank you

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Sent Date: 11/11/2018 11:11:08 AM
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From: Mary Lampert

Created By: mary.lampert@comcast.net

Recipients:
"Lamb, John" <John.Lamb@nrc.gov>
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TO: John Lamb
DATE: November 11, 2018
SUBJECT: RAI - Pilgrim EP Exemption RAI, October 16, 2018

Mr. Lamb:

RA1-PNPS-1 asks the licensee to: "Please provide additional details regarding the diverse mitigation strategies, to include the identification of the trained on-shift personnel designated for carrying out the necessary tasks and the timeframe for implementation of these diverse mitigation strategies."

<u>Questions:</u>

- We note that Entergy has requested deletion of "onsite protective actions during hostile action" from 10 CFR 50 Appendix E (IV)(1), but that its requested deletion of "hostile action" A(7) retains the requirement to address "attack by air, land, or water using guns, explosives, projectiles, vehicles, or other devices used to deliver destructive force." Will Entergy in its response be required to consider, as it should, terrorist threats or does it improperly assume a zero chance of sabotage or terrorist act? A successful terrorist attack could produce a significant consequent radiation field making it unlikely that there will be a sufficient number of "trained on-shift personnel designated for carrying out the necessary tasks and timeframe for implementation of these diverse mitigation strategies."

- If Entergy does not factor in a terrorist threat, on what basis could or would the NRC accept Entergy's response and grant Entergy an exemption, recognizing the undeniable fact that a terrorist attack scenario could cause partial drain-down and a local radiation field precluding access?

RAI-PNPS-3 considers a request for exemption from the requirement that "licensees shall establish and maintain the capability to assess, classify, and declare an emergency condition within 15 minutes to 30 minutes.

The RAI asks Entergy to: "Please provide documentation that the Commonwealth of Massachusetts and the Town of Plymouth is in agreement with the proposed 30-minute declaration time and the 60-minute timeframe for notification."

<u>Questions:</u>

- Why does the RAI ask only for documentation that the Commonwealth and the Town of Plymouth agrees with the proposed 30- minute declaration time and 60-minute notification time, and not also require the same information from each of the other EPZ towns and the reception centers host communities? Much of Duxbury, including our residence, is far closer to Pilgrim NPS than are many parts of Plymouth.

- More basic, the NRC should ask Entergy for the facts, both those supporting its apparent assumption that it will take offsite communities less time to mobilize offsite emergency response resources when the impacted communities and Commonwealth no longer receive radiological emergency funding from the licensee and consequently loses essential EP resources, and any facts to the contrary.

RAI-PNPS-4 concerns the exemption for item 104 in Table 2; and asks Entergy to provide further justification for Footnote 3.

Entergy's exemption request item 104, Table 2 reads:

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104	10 CFR 50 Appendix E Footnotes 3, 4, 5, and 6 are proposed for exemption. [3] ~~Use of site specific simulators or computers is acceptable for any exercise.~~ [4] ~~Full participation when used in conjunction with emergency preparedness exercises for a particular site means appropriate~~	ENO considers PNPS to be exempt from Footnotes 3, 4, 5, and 6 because PNPS will be exempt from the umbrella provisions of Section F.2.

Contrary to what Entergy said in its exemption request, our understanding is that Entergy is not exempt, and it certainly should not be exempt, from the umbrella provisions of Section F-2 that require plans that "describe provisions for the conduct of emergency preparedness exercises," and require Entergy to "test the adequacy of timing and content of implementing procedures and methods, test emergency equipment and communications networks, test the public alert and notification system, and ensure that emergency organization personnel are familiar with their duties."

This being so, there is no apparent justification for Entergy's requested exemption from footnotes 4 (that defines "full participation", or footnote 5 (that defines "partial participation."

As for footnote 3 ("Use of site- specific simulators or computers is acceptable for any exercise"), we are uncertain why Entergy has requested this be exempted. The only apparent reason is that Entergy does not intend to conduct either real or simulated exercises, which should be plainly unacceptable.

Question

Practice makes perfect. Does Entergy assume that a problem requiring emergency response actions, such as cask leakage, terrorist attack, etc., would not require robust emergency planning exercises? If so, on what bases does NRC find the assumption defensible and acceptable?

Summary

A disturbing theme in Entergy's exemption requests is that it assumes a zero chance of sabotage or terrorist act that could cause problems sooner than 10 hours. This is exacerbated by NRC allowing security measures to be significantly reduced after permanent closure; without security measures, the security threat would seem to rise, not disappear.

Therefore, if NRC accepts Entergy's exemption requests, we ask NRC to provide its basis for doing so by responding specifically (with reference to studies) that would refute each point raised below.

Reactors make ideal targets for outside or inside attackers for the simple reasons that they contain large amounts of radioactivity that could create severe impacts, and their defense is "light" in a military sense. The design of GE BWR Mark I reactors like Pilgrim makes those reactors highly vulnerable to attack because their spent fuel pools are in the top floor of the reactor, outside primary containment with a light roof structure overhead. In addition, Pilgrim's spent fuel when removed from inside the reactor is placed in thin-walled dry casks. The casks are stacked vertically out in the open making them vulnerable to attack. Each cask contains about ½ the Cesium-137 released during the Chernobyl accident.

The following table, prepared by Dr. Gordon Thompson for the Massachusetts Attorney General,[1] summarizes available means of attack. It shows that nuclear power plants are vulnerable.

[1]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 Vulnerability of Pilgrim's Spent Fuel Pool - Risks and Risk-Reducing Options Associated with Pool Storage of Spent Nuclear Fuel at the Pilgrim and Vermont Yankee Nuclear Power Plants, Gordon Thompson, May 25, 2006

Mode of Attack	CHARACTERISTICS	PRESENT DEFENSE
Commando-style by land	• Could involve heavy weapons/sophisticated tactics • Attack requiring substantial planning and resources	Alarms, fences, lightly-armed guards, with offsite backup
Commando-style by water	• Could involve heavy weapons/sophisticated tactics • Could target intake canal • Attack may be planned to coordinate with a land attack	500 yard no entry zone – marked by buoys – simply, "no trespassing" signs Periodic Coast Guard surveillance by boat or plane
Land-vehicle bomb	• Readily obtainable • Highly destructive if detonated at target	Vehicle barriers at entry points to Protected Area
Anti-tank missile	• Readily obtainable • Highly destructive at point of impact	None if missile is launched from offsite
Commercial aircraft	• More difficult to obtain than pre-9/11 • Can destroy larger, softer targets	None
Explosive-laden smaller aircraft	• Readily attainable • Can destroy smaller, harder targets	None

Dr. Gordon Thompson also analyzed the impact of a shaped charge as one potential instrument of attack.[30] The analysis shows that the cylindrical wall of the canister is about 1/2 inch (1.3 cm) thick, and could be readily penetrated by available weapons. The spent fuel assemblies inside the canister are long, narrow tubes made of zirconium alloy, inside of which uranium oxide fuel pellets are stacked. The walls of the tubes (the fuel cladding) are about 0.023 inch (0.6 mm) thick. Zirconium is a flammable metal.

[30] Gordon R. Thompson, *Environmental Impacts of storing Spent Nuclear Fuel and High- Level Waste from Commercial Nuclear Reactors: A Critique of NRC's Waste Confidence Decision and Environmental Impact Determination* (Cambridge, Massachusetts: Institute for Resource and Security Studies, 6 February 2009). Tables also in Declaration of 1 August 2013 by Gordon R. Thompson: Comments on the US Nuclear Regulatory Commission's Draft Consequence Study of a Beyond-Design-Basis Earthquake Affecting the Spent Fuel Pool for a US Mark I Boiling Water Reactor

Table 7-7: Performance of US Army Shaped Charges, M3 and M2A3

Target Material	Indicator	Type of Shaped Charge	
		M3	M2A3
Reinforced concrete	Maximum wall thickness that can be perforated	60 in	36 in
	Depth of penetration in thick walls	60 in	30 in
	Diameter of hole	• 5 in at entrance • 2 in minimum	• 3.5 in at entrance • 2 in minimum
	Depth of hole with second charge placed over first hole	84 in	45 in
Armor plate	Perforation	At least 20 in	12 in
	Average diameter of hole	2.5 in	1.5 in

Notes: (a) Data are from: Army, 1967, pp 13-15 and page 100. (b) The M2A3 charge has a mass of 12 lb, a maximum diameter of 7 in, and a total length of 15 in including the standoff ring. (c) The M3 charge has a mass of 30 lb, a maximum diameter of 9 in, a charge length of 15.5 in, and a standoff pedestal 15 in long.

Table 7-8: Types of Atmospheric Release from a Spent-Fuel-Storage Module at an ISFSI as a Result of a Potential Attack

Type of Event	Module Behavior	Relevant Instruments and Modes of Attack	Characteristics of Atmospheric Release
Type I: Vaporization	• Entire module is vaporized	• Module is within the fireball of a nuclear-weapon explosion	• Radioactive content of module is lofted into the atmosphere and amplifies fallout
Type II: Rupture and Dispersal (Large)	• MPC and overpack are broken open • Fuel is dislodged from MPC and broken apart • Some ignition of zircaloy fuel cladding may occur, without sustained combustion	• Aerial bombing • Artillery, rockets, etc. • Effects of blast etc. outside the fireball of a nuclear weapon explosion	• Solid pieces of various sizes are scattered in vicinity • Gases and small particles form an aerial plume that travels downwind • Some release of volatile species (esp. cesium-137) if incendiary effects occur

Type III: Rupture and Dispersal (Small)	• MPC and overpack are ruptured but retain basic shape • Fuel is damaged but most rods retain basic shape • No combustion inside MPC	• Vehicle bomb • Impact by commercial aircraft • Perforation by shaped charge	• Scattering and plume formation as for Type II event, but involving smaller amounts of material • Little release of volatile species
Type IV: Rupture and Combustion	• MPC is ruptured, allowing air ingress and egress • Zircaloy fuel cladding is ignited and combustion propagates within the MPC	• Missiles with tandem warheads • Close-up use of shaped charges and incendiary devices • Thermic lance • Removal of overpack lid	• Scattering and plume formation as for Type III event • Substantial release of volatile species, exceeding amounts for Type II release

One scenario for an atmospheric release from a dry cask would involve mechanically creating a comparatively small hole in the canister. This could be the result, for example, of the air blast produced by a nearby explosion, or by the impact of an aircraft or missile. If the force was sufficient to puncture the canister, it would also shake the spent fuel assemblies and damage their cladding. A hole with an equivalent diameter of 2.3 mm would release radioactive gases and particles and result in an inhalation dose (CEDE) of 6.3 rem to a person 900 m downwind from the release. Most of that dose would be attributable to release of two-millionths (1.9E-06) of the MPC's inventory of radioisotopes in the "fines" category.

Another scenario for an atmospheric release would involve the creation of one or more holes in a canister, with a size and position that allows ingress and egress of air. In addition, this scenario would involve the ignition of incendiary material inside the canister, causing ignition and sustained burning of the zirconium alloy cladding of the spent fuel. Heat produced by burning of the cladding would release volatile radioactive material to the atmosphere. Heat from combustion of cladding would be ample to raise the temperature of adjacent fuel pellets to well above the boiling point of cesium.

Potential for Release from a Cask and Consequences: Dr. Thompson observed that a cask is not robust in terms of its ability to withstand penetration by weapons that are available to sub-national groups. A typical cask would contain 1.3 MCi of cesium-137, about half the total amount of cesium-137 released during the Chernobyl reactor accident of 1986. Most of the offsite radiation exposure from the Chernobyl accident was due to cesium-137. Thus, a fire inside an ISFSI module, as described in the preceding paragraph, could cause significant radiological harm.

Options to reduce risk are <u>not</u> being used at Pilgrim: Thick-walled metal casks, disperse the casks, and protect the casks by berms or bunkers in a configuration to insure that pooling of aircraft fuel would not occur in the event of an aircraft impact. Other options include placing the ISFSI in a building to reduce line of sight attack; and less effective, erecting blast shields.

We look forward to a timely response.

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