EDWARD J. MARKEY
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www.house.gov/markey

ENERGY AND COMMERCE COMMITTEE
RANKING MEMBER
SUBCOMMITTEE ON
TELECOMMUNICATIONS AND
THE INTERNET
RESOURCES COMMITTEE

Congress of the United States
House of Representatives
Washington, DC 20515–2107

2108 RAYBURN BUILDING
WASHINGTON, DC 20515–2107
(202) 225–2836

DISTRICT OFFICES:
5 HIGH STREET, SUITE 101
MEDFORD, MA 02155
(781) 396–2900

188 CONCORD STREET, SUITE 102
FRAMINGHAM, MA 01702
(508) 875–2900

September 20, 2001

Dr. Richard A. Meserve
Chairman
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Chairman Meserve,

In the wake of the terrible tragedies of September 11, I am writing once again regarding the security of our nation's nuclear power plants. In 1991, I wrote letters expressing concern about the security of nuclear power plants during the Gulf War. More recently, I have written several letters to the U.S. Nuclear Regulatory Commission (NRC) opposing its elimination of the counter-terrorism program known as Operational Safeguards Response Evaluations (OSRE). The events of the past week serve to highlight and heighten my long-standing concerns regarding security at nuclear power plants. There are several areas about which I am particularly concerned.

1. Assumptions made by the NRC in assessing the risk to nuclear power plants.

The OSRE program is focussed on repelling terrorists attacking on the ground, but it is clear that an attack from the air is also possible and must be considered. I am also concerned that previous probabilistic risk assessments for airplane crashes into nuclear power plants may have underestimated the risk since the assumption was that such crashes would be accidental. However, if the crash were deliberate, then such a risk assessment would be strikingly different.

Furthermore, NUREG-1628, "Staff Responses to Frequently Asked Questions Concerning Decommissioning of Nuclear Power Reactors",[1] includes the question: "What would happen to the fuel in the spent fuel pool if an earthquake ruptured the pool, or if an airplane crashed into the pool?" The answer given includes the statement: "In the unlikely event that an aircraft crashed into the spent fuel pool, the pool structure could be severely damaged and not capable of maintaining coolant level. … However, the staff has evaluated the possibility of an aircraft impacting the spent fuel pool and consider it a very low probability event." As discussed above, the probability of an aircraft strike must now be reconsidered.

2. Assumptions made by the NRC about fires near spent fuel storage.

A number of references on the NRC website to the hazards of airplane crashes are in the context of damage to spent fuel stored in casks. In particular, some comments on three

[1] http://www.nrc.gov/NRC/NUREGS/SR1628/sr1628.html, sec. 5.8.5.

NRC rulings made in April and May of 2000 regarding additions to the list of approved spent fuel storage casks under 10 CFR Part 72.214 concerned the duration of fires that the casks should survive. Specifically, 50 to 200 gallons of conventional fuel are what is assumed to feed the fire, since that is all the on-site transporter vehicle is assumed to be carrying. The NRC cites 200 gallons as the approximate amount of fuel to supply a 15-minute fire.[2] Concerns about airplanes impacting the site and spilling a greater quantity of fuel were dismissed by the NRC with statements such as: "Other modes of transport causing the fire (e.g., airplanes, trains, delivery trucks or missiles) are not considered as plausible and are beyond the scope of this rule."[3] Considering that a Boeing 767 can carry over 20,000 gallons of fuel, simple math would suggest that an airplane crash could feed a day-long fire in the vicinity of the spent fuel casks. Clearly, the NRC must now consider different scenarios in its approach to safeguarding spent fuel from terrorist attacks.

3. NRC's assumptions regarding duration of fire at nuclear power plants.

Fires could also pose a significant threat to control systems in the plant and hence the safety of the reactor. I have previously written to the NRC regarding passive fire barriers, and it is important to revisit that issue. In particular, the passive fire barriers in nuclear power plants are rated to withstand fires for either 1 hour or 3 hours, depending on whether the plant has automatic fire detection and suppression systems. I am concerned that an airplane fully loaded with jet fuel crashing into a nuclear power plant could support a fire that would last far in excess of these time scales as well as prevent the fire from being easily extinguished.

We must be vigilant and ensure that current programs to thwart terrorist activities at nuclear power plants are not compromised. And we must also evaluate other, previously unconsidered, modes of attack and develop appropriate measures to prepare for them. Therefore, I ask you to please fully respond to the following questions:

Security response by the NRC to events of September 11, 2001

(1) According to a press release on the NRC website, on September 11 the NRC "recommended" that nuclear facilities go to the "highest level of security". Considering the apparently determined and synchronized nature of the attacks on September 11, why did the NRC choose to issue a "recommendation" instead of an "order"?

(2) How many plants acted to implement the increase to the highest level of security that you recommended? Which plants? What steps did they take? How long do they plan to maintain the elevated level of security? Which plants did not choose to go to the highest level of security and why?

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[2] http://www.nrc.gov/NRC/CFR/FR/20000320/march20.html, Response to Comment C.1.
[3] http://www.nrc.gov/NRC/CFR/FR/20000501/may01.html, Response to Comment C.10.

(3) In light of last week's tragic events, is the NRC considering mandating changes in security at nuclear power plants? If not, why not? If yes, what will these changes be? Will these changes be permanent, or will they be in place for a limited period of time?

(4) Press reports indicated that Canadian nuclear power plants increased security and that Russian nuclear power plant personnel received "additional instructions" to their already high state of security in the wake of the events on September 11. Did these measures and instructions constitute a greater or lesser increase in security than the measures recommended by the NRC for American nuclear power plants? What is the expected time duration of the Canadian and Russian measures?

Defense of nuclear power plants against ground assaults by terrorists

(5) One lesson from the tragedies of September 11 is that the willingness of the terrorists to sacrifice themselves to accomplish their goals facilitated their ability to use commercial aircraft as weapons. Similarly, if a group of terrorists were to attack a nuclear power plant, their ability to cause a core meltdown could be enhanced if they were not interested in keeping themselves safe. As you know, the "design basis threats" are the hypothetical modes of radiological sabotage or theft of special nuclear material and are specified under 10 CFR 73.1. The design basis threat for a team of attacking terrorists describes them as "[w]ell-trained (including military training and skills) and dedicated individuals".[4] Now that we all fully appreciate the potential suicidal nature of the terrorists, would you seek to modify the design basis threat assumptions to include that characteristic?

(6) The letters I have written to the NRC in the last few years have concerned the cancellation of the aforementioned OSRE program, either outright or in favor of an industry proposed program. In light of the events of last week, is the NRC going to reconsider plans to replace the OSRE program with a nuclear industry designed and managed program to test the adequacy of security measures at individual power plants? Instead of eliminating the OSRE program, will the NRC consider making OSRE tests more rigorous, with attacking teams more heavily armed than the specifications listed under 10 CFR 73.1?

Damage due to intentional or accidental airplane crashes

(7) A quick search of the web turned up a guideline from the Swiss Federal Nuclear Safety Inspectorate (HSK), Guideline HSK-R-102, "Design Criteria for the Protection of Safety Equipment in Nuclear Power Stations against the Consequences of Airplane Crash."[5] Does the NRC have any design criteria for protection against airplane crashes? If not, why not? If so, does it apply only at

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[4] Sec. 73.1(a)(1)(i)(A).

[5] http://www.hsk.psi.ch/pub_eng/r-102e.html

plants located within a certain range from airports? If so, why was it not applied to plants all over the country? A recent press report mentioned in passing that nuclear power plant containment vessels are "designed to survive the crash of a falling 747".[6] Where can this specification be found?

(8) A probabilistic risk assessment in the journal *Nuclear Safety*[7] of airplane impacts on nuclear power plants yielded a very small probability (4.6×10^{-5}%) for the impact of a large airplane (greater than 12,500 lbs.) onto a plant that is more than 5 miles away from an airport. But this is assuming an *accidental* impact. In light of the events on September 11, it is clear that *deliberate* impacts must be considered. With a capable pilot committed to a terrorist attack on a nuclear power plant at the controls, the probability of impact is closer to 100%. What would be the result of a Boeing 767 with a full fuel tank making a direct impact onto a nuclear power plant at full speed? What would be the result of other aircraft, larger or smaller, impacting a nuclear power plant at full speed? Please fully assess the different circumstances of aircraft impacting the containment vessel as well as other reactor support facilities, and consider such factors as full or empty fuel tanks and large or small aircraft.

(9) As discussed above, the NRC has previously dismissed as unlikely the prospect of aircraft hitting nuclear waste transportation containers or nuclear waste storage facilities. In light of last week's events, will the NRC revise its estimates of the likelihood of such attacks and require licensees to undertake further preparations for them?

(10) As discussed above, the fuel from a Boeing 767 could feed a fire for long beyond the design requirements of spent fuel casks. What would happen to spent fuel storage casks if they were subjected to a fire for a full day? If the protective covering of the cask were burned away, what would happen to the fuel inside? Could we have a Chernobyl-style accident, where the fire carried radioactive materials into the air? Will there be a redesign of spent fuel casks? Why or why not?

(11) The possibility of severe damage due to a fire at a nuclear power plant has been considered in the past. As discussed above, passive fire barriers in the plants are rated to withstand fires for 1 hour or 3 hours. Were these specifications made with the crash of a commercial airliner in mind? What changes will you make to the length of time that passive fire barriers need to resist a fire?

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[6] Kenneth Chang, "Defending skyscrapers against terror," The New York Times, p. D1, September 18, 2001.

[7] Ian B. Wall, "Probabilistic Assessment of Aircraft Risk for Nuclear Power Plants," *Nuclear Safety*, Vol. 15, No. 3, pp. 276-284, 1974.

Civilian protection from effects of a radioactive release at a nuclear power plant

(12) In the event of a release of radioactive materials from a nuclear power plant, it is crucial that distribution of potassium iodide (KI) be made to affected populations to prevent the uptake of radioactive iodine and the potential development of thyroid cancer and other thyroid disorders. What is the current status of NRC actions to make potassium iodide available to communities surrounding nuclear power plants, so that in the event of a successful terrorist attack against an accident at a U.S. nuclear facility, it could be quickly distributed to local populations? In light of last week's attacks, what is the NRC doing to expedite the distribution of sufficient stockpiles of potassium iodide?

Foreign ownership of and employment at U.S. nuclear power plants

(13) In light of last week's events, will the NRC now reconsider its previous support for allowing foreign entities to acquire nuclear power plant operating licenses? Does the NRC foresee any increase in prospective security risks associated with having foreign entities own or control a nuclear facility? If not, why not?

(14) In light of last week's events, what action, if any, has the NRC taken to evaluate the possibility of "insider threats" to nuclear power plants by members of any terrorist organizations? Who can work at such plants? What sort of background checks are performed as a condition of employment? Do employees have to be permanent residents or citizens of the U.S.?

Export of nuclear technologies to foreign countries

(15) In light of last week's events, does the NRC believe that any new measures are needed to tighten up export controls relating to nuclear materials and nuclear technology, so that such materials and technology do not end up in terrorist hands? If not, why not, and if so, what new measures are necessary?

Acts of terrorism now considered war?

(16) 10 CFR 50.13 provides that nuclear power plants do not need to be protected "against the effects of (a) attacks and destructive acts, including sabotage, directed against the facility by an enemy of the United States, whether a foreign government or other person…". Since the U.S. is preparing for a war on terrorism, I am concerned that the industry will insist that they do not need to provide defense against any terrorist attacks. Ray Golden, San Onofre business manager for Southern California Edison, recently stated, "We would characterize (the terrorist attacks) as President Bush did – an act of war."[8] He further stated, "We are not

[8] Chris Knap, "San Onofre isn't jetliner-proof, either," *The Orange County Register*, September 18, 2001.

certain what could happen to the plant from that type of event, and we cannot protect completely against it. Nor, from a security standpoint, are we required to." In light of the attacks on September 11, do you believe that it is appropriate to change in any way the responsibilities of the NRC and the industry to take appropriate measures to protect the public from the consequences of acts of terrorism directed against nuclear power plants? Why or why not?

I appreciate your attention to these questions. Should you have any questions regarding these requests, please contact Jeff Duncan or Brendan Plapp of my office at 225-2836. I would appreciate a response by October 11, 2001.

Sincerely,

Ed Markey

Edward J. Markey
Member of Congress