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June 11, 2002

The Honorable Richard A. Meserve
Chairman
Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Chairman:

I am writing to request information related to the security of radioactive irradiators used in the U.S. I believe that in light of yesterday's arrest of a suspected Al Qaeda terrorist who allegedly planned to detonate a radioactive dirty bomb, there are some important public policy questions that Congress and the Commission need to consider about these irradiation facilities.

At my direction, earlier this year my staff requested information from the NRC staff regarding the number, size, and location of irradiators in the U.S. I received the NRC's response to this inquiry on May 2, 2002, which provided the requested information, but asked that this unclassified information not be released publicly at this time due to security concerns. While the type of information requested appears to be available from a wide variety of public sources, including the NRC's web site, I will, of course, honor the NRC's request for confidential treatment. After receiving the NRC response, I directed my staff to undertake an analysis of the data that summarized how many of these facilities are located around the country and classifying them by size, not disclosing any specific information regarding their identities and locations. A copy of this document was subsequently provided by my staff to the NRC staff, who concurred that this information did not raise the same security concerns and that it was acceptable for public release and discussion.

Irradiators are radioactive materials used for the purposes of irradiating objects or materials[1]. According to the materials you provided to me, there are hundreds of these facilities located in 48 States. Table 1 provides a list of the number (and radioactive activity) of irradiators in each State, which are generally located in industrial facilities, hospitals, and research institutions. I am concerned that radioactive materials at these facilities, which can range from activities of fractions of a Curie to several

[1] According to the NRC, an irradiator is a facility that uses radioactive sealed sources for the irradiation of objects or materials, and in which radiation dose rates exceeding 5 grays (500 rads) per hour exist at 1 meter from the sealed radioactive sources in air or water, as applicable for the irradiator type, but does not include irradiators in which both the sealed source and the area subject to irradiation are contained within a device and are not accessible to personnel. See http://www.nrc.gov/reading-rm/doc-collections/cfr/part036/part036-0002.html

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millions of Curies and are used for everything from research to the irradiation/sterilization of food and medical equipment, could also be acquired and assembled into dirty bombs. I want to know what measures are being undertaken to prevent this from happening.

Numerous reports, including yesterday's arrest of an Al Qaeda operative alleged to be involved in a plot to detonate a dirty bomb in the U.S., have confirmed terrorists' desires to use radioactive materials as weapons. As you know, the amount of damage such a device could do depends on the amount of conventional explosives used to detonate and disperse the device as well as on the amount of radioactive material used. In your April 15, 2002 letter to me[2] you stated that a dirty bomb containing a mere 1 Curie of radioactive materials could "spread low-level contamination over an area of several city blocks, possibly resulting in restriction of the area until the area was surveyed and decontaminated." An analysis recently performed by the Federation of American Scientists[3] (FAS) modeled three different dirty bomb case studies. One scenario, which involved the detonation of a single rod of cobalt (these rods are typically 1 inch in diameter and a foot long) obtained from a large food irradiation plant, was found to result in the contamination of 1000 square kilometers, with a 10% risk of death from cancer for residents living inside a 300 city block area for 40 years following the detonation.

In addition to the possibility that a terrorist could steal radioactive materials and then construct and detonate a dirty bomb, I am also concerned that a terrorist could attack a facility in which irradiators are stored/used, and detonate a bomb inside the facility itself. This could also lead to the spread of dangerous radioactive materials. Some large (millions of Curies) irradiators are used to sterilize food or medical equipment. A diagram of such a large facility, which appears on the NRC web site, is provided in Figure 1.

Under normal conditions, a shipment of goods requiring sterilization would be delivered into the facility. The cobalt rods would be lifted out of the cooling pool, the shipment would be irradiated, the rods would be replaced into the cooling pool, and the shipment removed. I am concerned that terrorists could plant a conventional bomb inside the shipment intended to be sterilized and then detonate the conventional bomb once the cobalt rods are lifted out of the cooling pools. This could blow a hole in the roof of the facility and result in the dispersal of radioactive cobalt into the surrounding community.

In light of the devastating consequences of such an event, and the clear indications that there has been a credible threat that terrorists are seeking to use radiological dirty bombs to attack America, I ask for your prompt response to the following questions:

1) Are individuals who have access to these materials required to undergo criminal and security background checks to ensure that they do not pose a security risk? If not,

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[2] See Page 41 of http://www.house.gov/markey/iss_terrorism_ltr020502.pdf
[3] See http://www.fas.org/faspir/2002/v55n2/dirtybomb.htm

why not? If there are different regulations for different amounts of radioactivity, please describe the regulations for each category of material.

2) Please describe the physical security measures (locks, guards, etc.) used to safeguard these materials. If there are different regulations for different amounts of radioactivity, please describe the regulations for each category of material.

3) Are individuals who are making deliveries (or transporting the shipments that are being irradiated) to large irradiation/sterilization facilities required to undergo criminal and security background checks to ensure that they do not pose a security risk? If not, how can you be certain that a truck driver charged with delivering a shipment of food or medical equipment for sterilization does not pose a risk of planting a conventional bomb in the shipment to be delivered into the facility?

4) Are all shipments that are being delivered to irradiation/sterilization facilities searched to ensure they do not contain explosives? If not, how can you be certain that a shipment does not contain a conventional explosive in the shipment that will then be detonated upon entry to the facility?

5) Please describe the manner in which the NRC and/or Agreement States ensure that licensees of these materials keep them secure. Are audits performed to ensure that all the materials can be accounted for? If so, how often? If not, then how do you know that all the materials are where they should be? Are these sources identified with serial numbers or some other means of identifying them if they are lost? If not, why not, and do you intend to implement such a system in the future?

6) Has the NRC conducted or funded any studies or analyses of the public health, safety and environmental risks of a terrorist attack on an irradiation/sterilization facility? If not, why not? If so, what are the worst-case risks of such an attack? Please provide copies of all studies or analyses prepared by or for the NRC on this subject.

7) Does the NRC believe the dirty bomb scenarios described in the FAS study to be credible, and the posited health, safety, and environmental consequences to be accurate? If so, what action is the NRC taking to address these possible attack scenarios? If not, please indicate the basis for any disagreement.

Thank you for your prompt attention to this important matter. Please provide your response by Friday June 28, 2002. If you have any questions or concerns, please have your staff contact Dr. Michal Freedhoff or Mr. Jeffrey S. Duncan of my staff at 202-225-2836.

Sincerely,

Edward J. Markey

Edward J. Markey

Figure 34. **Commercial Gamma Irradiator**

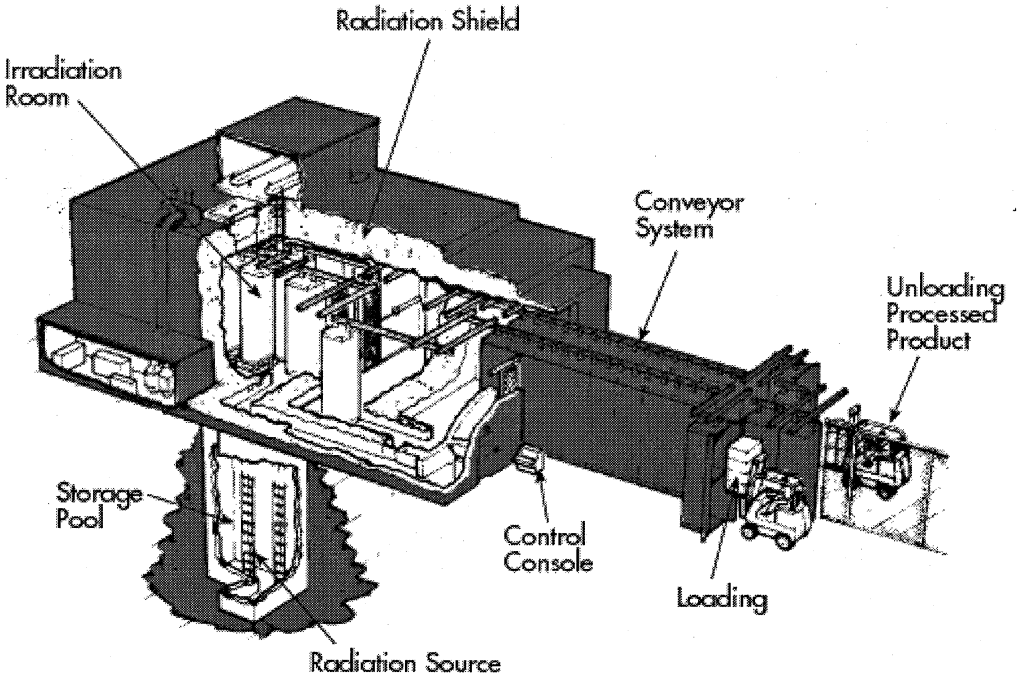

Figure 1: From http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1350/v13/fig034.html

Table 1: State by State List of Irradiator Sources as compiled from information provided by the NRC

State	# with less than 9.999 Curies	# with 10,000 – 49,999 Curies	# with 50,000 – 99,999 Curies	# with 100,000 – 499,999 Curies	# with 500,000 – 999,999 Curies	# with 1-5 million Curies	# with more than 5 million Curies
Alabama	2	1	0	0	0	0	0
Alaska	1	0	0	0	0	0	0
Arizona	9	1	0	0	0	0	0
Arkansas	4	0	0	0	0	1	0
California	96	14	4	1	1	2	3
Colorado	19	0	0	0	0	0	0
Connecticut	5	1	0	0	0	0	0
Delaware	2	0	0	0	0	0	0
DC	5	1	1	0	0	0	0
Florida	30	6	0	0	0	2	0
Georgia	14	1	0	1	0	0	0
Hawaii	1	0	0	0	0	0	0
Iowa	6	0	0	0	0	0	0
Illinois	74	3	1	0	1	3	2
Indiana	2	0	0	0	0	0	0
Kansas	10	3	0	0	0	0	0
Kentucky	11	0	0	0	0	0	0
Louisiana	16	2	0	0	0	0	0
Maine	2	1	0	0	0	0	0
Maryland	42	6	1	3	1	2	0
Massachusetts	63	5	0	0	0	1	0
Michigan	9	0	1	0	0	0	0
Minnesota	6	1	0	0	0	1	0
Mississippi	5	1	0	0	1	0	0
Missouri	3	0	0	0	0	0	0
Montana	2	0	0	0	0	0	0
Nebraska	7	1	0	0	0	3	0
Nevada	4	0	0	0	0	0	0
New Hampshire	2	1	0	0	0	0	0
New Jersey	31	3	1	1	0	3	0
New Mexico	6	1	0	1	0	0	1
New York	59	3	0	1	0	1	0
North Carolina	27	7	0	0	0	2	1
North Dakota	6	0	0	0	0	0	0
Ohio	22	1	0	0	0	2	0
Oklahoma	13	0	0	0	0	0	0
Oregon	11	0	0	0	0	0	0
Pennsylvania	53	8	0	0	0	1	0
Puerto Rico	5	0	0	0	0	2	0
Rhode Island	2	1	0	0	0	0	0
South Carolina	4	0	0	0	0	3	0
Tennessee	23	8	0	0	0	0	0
Texas	62	5	0	1	0	4	3
Utah	7	0	0	0	0	1	0
Vermont	2	0	0	0	0	0	0
Virginia	16	1	0	1	0	0	0
Washington	40	5	0	0	0	0	0
Wisconsin	15	2	0	0	0	0	0

25 States have 10 or more irradiator sources.
13 States have 25 or more irradiator sources.
7 States have more than 50 irradiator sources.
17 States have at least one source that is greater than 1 million Curies.