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UNITED STATES
NUCLEAR REGULATORY COMMISSION

WASHINGTON, D.C. 20555-0001

June 27, 1994

The Honorable James P. Moran
United States House of
Representatives
Washington, DC 20515-4608

Dear Congressman Moran:

I am responding to your letter, dated May 20, 1994, to Chairman Selin, in which you enclosed a letter written by [redacted] dated April 27, 1994, to the editor of Consumer Reports, expressing concerns on the use of ionizing smoke detectors containing americium-241 (Am-241). ex 6

All entities that initially distribute ionizing smoke detectors to the general public are required to obtain a distribution license (E-license) from the U.S. Nuclear Regulatory Commission. This includes all domestic smoke detector manufacturers and U.S. distributors of imported foreign-manufactured smoke detectors. Additionally, each smoke detector model is required to have an approved certificate of registration, that certifies that the model has met NRC's design, manufacture, prototype testing, and quality control requirements, before smoke detectors for that model are authorized for distribution under the NRC E-license.

NRC approval is required for both the ionizing source and the smoke detector model. The ionizing source is typically a composite mixture of gold and Am-241 with a silver foil backing and covered by a gold foil, pressed to a desirable thickness. A NRC funded study entitled, "High Temperature Testing of Smoke Detector Sources" (NUREG/CR-4003), published in September, 1978, found only between 0.01 and 0.2 percent of the Am-241 source activity may be released at a fire temperature of 1200 degrees Centigrade. This ionizing source is further confined to inside a metallic ionization chamber, and covered by an outer case, which also houses the electronic circuitry, the AC power supply or battery, and the alarm. NRC requires that the smoke detector be designed and manufactured such that access to the source can only be accomplished by a deliberate destructive act. Furthermore, even if a person were to gain access to the Am-241 foil, the integrity of the source makes it unlikely that the individual would be able to inhale or ingest any significant amount of Am-241.

In November 1979, NRC published an environmental assessment (EA) (NUREG/CR-1156) on the use of ionizing smoke detectors in the United States. This EA was based on an annual distribution of 14 million smoke detectors, with each detector containing 3 microcuries of Am-241, and on an assumption that each smoke detector had a useful life of 10 years. Based on the EA, the

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the number of hypothetical fatal cancers from the use of the Am-241 smoke detectors was calculated to be 0.14 (far less than one mortality) over a ten year period, as compared to 18,000 to 29,000 lives saved per hypothetical mortality. This is supported by the article in Consumer Reports, referenced in [] letter, which states, "Studies have shown that having a smoke detector in your home cuts your risk of dying in a fire in half."

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The average smoke detector distributed today contains less than 1 microcurie of Am-241, as compared to 3 microcuries over a decade ago. The EA had assumed that 14 million smoke detectors distributed in 1978 represented the peak year. Contrary to the EA, the annual distribution of smoke detectors has not dropped and has been relatively stable the last several years, at around 14 to 18 million units per year. Since the average activity of Am-241 in a smoke detector has decreased by a factor of 3, and the total number of units distributed annually has not increased significantly from the 14 million units used in the EA, we believe the conservative analysis performed in the EA is even more conservative when applied to the present-day situation.

NRC, in its EA, had discussed the different alternatives required by the National Environmental Policy Act, to the use of ionizing smoke detectors containing Am-241. Among the alternatives is a smoke detector containing a photoelectric cell. Described accurately in both the NRC EA and the recent Consumer Reports, neither the ionizing smoke detector nor the photoelectric smoke detector is more sensitive than the other for detecting all fires. Each type of smoke detector is better at detecting a certain type of fire (e.g., smoldering versus flaming) than the other.

NRC cannot speak for the Department of Energy (DOE) on [] concerns with DOE activities. However, on the issue of distributing Am-241 to unknowing members of the general public, through smoke detector manufacturers, the public is informed as to the radionuclide and the amount of activity in each smoke detector, through NRC's requirement that each smoke detector and point of sale package be labeled with the pertinent consumer product information.

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In addition to the EA, NRC also funded a report by Oak Ridge National Laboratory (ORNL) to assess radiation doses from residential smoke detectors that contain Am-241 (ORNL-5807, October 1981). This report looked at the dose to firefighters in typical building and warehouse fires. Similar to the EA, this report also estimated the dose to the public caused by disposal of ionizing smoke detectors to incinerators and to landfills, and was in essential agreement with the conclusion of the EA. [] is correct in stating that Am-241 has daughter products such as neptunium-237 and uranium-233. However, the contribution of these daughters is small in comparison to the parent and would not affect the conclusions of either the EA or the report by ORNL. Based on the EA and ORNL-5807, the amount of Am-241 in ionizing smoke detectors is so small as to pose no significant health or environmental threat.

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NRC currently has a contractor study underway to reevaluate and update the dose to the public from the distribution of radioactive consumer products, including ionizing smoke detectors. When completed, these reports, consistent with NRC practices, will be made available to the public.

Sincerely,

Original signed by
James M. Taylor

James M. Taylor
Executive Director
for Operations

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