TO: Secretary of the Commission
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555
Attention: Docketing & Service Branch

DATE: JANUARY 10, 1980

DOCKET NUMBER
PROPOSED RULE PR-32(44FR68853)

(17)

FROM: Catherine Quigg, research director
Pollution & Environmental Problems, Inc.
Box 309, Palatine, Illinois 60067

RE: Ionization Smoke Detectors, U.S. NRC Rules Proposal, Federal Register, Vol. 44, No. 232, Nov. 30, 1979

The Nuclear Regulatory Commission (NRC) proposed regulation puts a band-aid on an open festering wound -- the already serious problems created when the NRC allowed ionization detectors to be manufactured and marketed in the first place. Our concerns include, but are not limited to, the following:

1. Ionization detectors are not necessary for the detection of fires. Photoelectric detectors can do the job without bringing dangerous radioactivity into the workplace, marketplace and our homes -- and ultimately, when disposed, into our soil, air and water.

2. The americium-241 in ionization smoke detectors can get out and affect the health of humans by ingestion and inhalation. There are "thousands of lethal doses" in one microcurie of americium-241, according to Dr. Edward Martell, a radiochemist for the National Center for Atmospheric Research in Boulder, Colorado.

The NRC proposes to label ionization smoke detectors with the statement: THIS DETECTOR CONTAINS RADIOACTIVE MATERIAL WHICH PRESENTS NO SIGNIFICANT HAZARD TO HEALTH IF USED IN ACCORDANCE WITH DIRECTIONS." This statement is false and misleading.

Consumers who use ionization detectors in accordance with directions could suffer the following significant hazards to their health:

1. A fire could destroy the seal containing the americium -- and its dispersal could be injurious to homeowners, firemen and cleanup crews.

2. Children playing with installed or discarded detectors can disassemble the seal surrounding the americium and injest its carcinogenic contents.

3. The NRC has no rules or regulations regarding disposal of discarded detectors. The release of americium to the air after incineration or to ground water after landfill disposal are injurious to public health and safety.

In conclusion, ionization detectors should not be labeled -- they should be banned. Please add my comments and the enclosed documents to the public record on your new proposed rule on ionization smoke detectors.

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Acknowledged by card. 1/18

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TO: Whom It May Concern

SUBJECT: Statement on Smoke Detectors presented to the Fire Prevention Division for entry into the official records of hearings on this subject in the District of Columbia on July 28, 1976 by Dr. Karl Z. Morgan, School of Nuclear Engineering, Georgia Institute of Technology, Atlanta, Georgia 30332

Over the past 35 years I have been involved as a scientist and as a member of national and international committees to look into radiation hazards similar to those posed by ionization type (e.g., ^{241}Am or ^{226}Ra) smoke detectors and have recommended appropriate action. The hazards of ionization type smoke detectors are small from the standpoint of risk to an individual, but when a small individual risk is applied to a large population, the grim result is the unnecessary loss of many lives. Some of my similar involvements have been: shoe fitting machines, mass chest X-ray programs, luminized watch dials, X-ray from the voltage regulator of TV tubes, shipment of radioactive material by passenger aircraft, mammograms, etc.

I strongly encourage the use of non-ionizing radiation smoke detectors (e.g., photoelectric) but oppose the ionizing type detectors primarily for two reasons as follows:

1. They present a radiation risk that is small in the individual case but significant when hundreds of thousands of them are in use. Common types use either Am-241 or Ra-226. It would be difficult to say which is the more hazardous. My calculations indicate that when Am-241 and Ra-226 may become deposited inside the body, Am-241 is about 16 times more hazardous than Ra-226. However, if kept outside the body, the gamma radiation is greater from the Ra-226 than from the Am-241.

In the case of the Am-241 smoke detector the Am-241 must be placed on a solid backing (e.g., a silver disk) and then it must be covered with a protective layer (e.g., gold film) to prevent its escape into the environment. Here to start with is a serious conflict of technical requirements. The gold layer must be only a few molecules thick so the alpha particles can escape and ionize the air and yet we would like it very thick to prevent escape of this dangerous Am-241 into the environment. Just the spallation (recoil ions) will remove some of the intact Am-241 or Ra-226 and when the devices are discarded, scratches or even brushing over a rough hard surface will remove some of the Am-241 or Ra-226.

Ordinarily the inhalation hazard is much greater than that of ingestion because for the usual chemical forms the uptake of these materials in the GI tract is low (i.e., 2.5×10^{-5} for ^{241}Am and 0.04 for ^{226}Ra) but studies with other similar radionuclides would indicate there is a very high risk of skin cancer if such alpha emitting radionuclides enter the skin through open wounds.

If all these devices could be kept track of and returned for suitable disposal when discarded or involved in a fire, the risk would be greatly reduced, but I do not believe this is possible.

There is no question but that Am-241 and Ra-226 when inside the body can cause cancer. I was chairman of both the national and international committees (National Council on Radiation Protection and the International Commission on Radiological Protection) that set the maximum permissible body burden of Am-241 at 0.05 μCi for the radiation worker based on the risk of bone cancer. This would be only one hundred and fifty millionths of a gram (a speck to small to see with the naked eye) and the amount should be set at no more than 1/10 this level for members of the public. Even this amount of ^{241}Am in the body increase the risk of a person dying of bone cancer by about 5 percent (i.e., the risk would be about 5×10^{-2} bone cancer per person with 0.005μCi ^{241}Am in his skeleton).

2. The second reason I oppose the ionization type smoke detectors is that their response time is so slow and other types are far better for smoke detection. In a test we ran here in Atlanta on seven different types, the photoelectric types all sounded an alarm at smoke densities of less than 2% per foot while the ionization type did not respond until the smoke levels were 4 to 7% while the commonly recommended level is some value less than 4% per foot. I doubt I could have escaped my home at these higher smoke levels. I am told that in a flash fire some of the ionization types respond satisfactorily, but, unfortunately, over 90% of the lives lost in fires in the U.S. is from smoke inhalation.

Maybe from the point of view of some businesses it is satisfactory to put on the market a product that will be a very small risk percent wise per person, but, if it causes only 10 to 50 deaths per year in the United States, this is a serious matter to those directly concerned. Perhaps, of even greater importance would be the hundreds of persons that could die of smoke inhalation because they depended on a device that responds early enough only for flash fires.

Respectfully submitted for the offical record.

Karl Z. Morgan
Neely Professor

KZM:rs

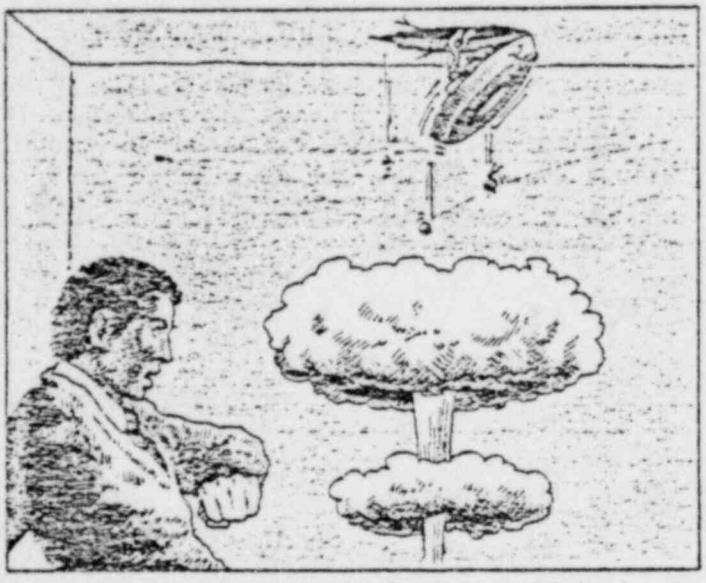
Consumer Aware/Kathy McManus

SMOKE GETS IN YOUR EYES

"... Smoke detectors could reduce fire deaths in American homes by 40 percent. They could also be emitting cancer-causing radiation ..."

Smoke detectors—the devices credited with having the potential to reduce fire deaths in American homes by more than 40 percent—have recently become hot sellers in California, ranking right alongside CB radios and pocket calculators. But in the rush to protect themselves from fire, millions of consumers may have unwittingly exposed themselves to the more subtle, long-term danger of radiation poisoning. "People don't know what the hell they're buying," says Dr. John Gofman, professor emeritus of medical physics at UC Berkeley. "Detectors are a built-in source of lung cancer."

Dr. Gofman's charges apply to the *ionization* smoke detector, which contains a highly toxic, cancer-causing radioactive substance, usually americium-241. Placed inside the detector, the americium emits radiation, which results in a very small electrical-current flow. This current remains constant until smoke particles enter the chamber and reduce the current, triggering the alarm.



Illustrated by Jean Francois Arbus

Such detectors account for about 80 percent of the approximately 30 million detectors currently in home use nationwide, even though there is a safe and reliable alternative—the *photoelectric* detector. Working with a light source and a photosensitive device, the photoelectric detector contains no radioactive material. But because of a four-year head start and an industry campaign touting the ionization detector as superior, this dangerous device continues to corner the market.

Dr. Gofman is but one of a growing number of scientists and consumer advocates who are convinced that the everyday use of such radioactive materials presents a serious threat to human health and to the environment. Though scientists agree that the ionization smoke detector does not present an immediate health hazard, they feel the problem will most likely become apparent in about fifteen years—the time it usually takes for cancer to develop and be diagnosed after the initial radiation exposure. And because americium-241 has a half-life of 458 years, it can retain potentially lethal properties for several centuries.

"There is no great risk with a single detector," says Georgia Tech's Dr. Karl Z. Morgan, "but eventually many millions will end up in scrap heaps and in junk shops. A small risk now turns out to be a great concern later . . . It took decades before people realized the danger of cigarette smoking." Since americium must actually enter the body in order to cause cancer, critics of the devices are focusing their concern on the long-range effects that will take place when improper disposal of the detectors allows the radioactive material to enter the food chain. Government officials at the Nuclear Regulatory Commission (NRC) seem to be spinning a web of contradictions. "The NRC has no objections to throwing them [ionization detectors] into the wastebasket," says NRC's Nathan Bassin. "They're normal garbage."

Though the NRC may view such detectors as "normal garbage," posing only minimal potential hazards, there still exist strict NRC regulations for disposal of radioactive wastes, including americium-241. Since the americium in most ionization detectors is contained in a foil-covered "pod," Bassin dismisses the chance of any kind of americium leakage as "highly unlikely." Consequently, no environmental impact statement regarding the detectors has been filed, nor have tests been conducted to determine the effects of americium on factory workers.

Anti-ionization forces contend, however, that there is ample opportunity for trouble. Some of the devices require periodic maintenance and cleaning, thereby exposing the americium-filled pod to possible mishap. And, until inquisitive children become extinct, the chance that one may play with a dangerous, improperly discarded detector cannot be overlooked; ingestion of even a minute amount of americium can cause cancer.

Under NRC guidelines, a damaged or used detector should be returned to the manufacturer for disposal. But because warnings of radioactivity are hazily worded and many detectors contain barely perceptible warnings, the chances are slim that many of the devices will be disposed of properly by consumers. And the NRC figures the average life of a detector to be only about five years, due to the rate at which most Americans redecorate and move. Moreover, there is no guarantee that the company that produced the detector will continue to be in business years later, so even the environmentally conscious may be left with no place to deposit the detectors except in the trash can.

Though the problem appears to have crept silently by California officials, it has not gone unnoticed elsewhere. The issue is under investigation by the Massachusetts attorney general's office, while members of the Illinois attorney general's office have recently completed their own nine-month investigation of ionization detectors. "The odds of something [serious] happening are enough to give us concern," states Dean Hansell, assistant attorney general in Chicago. "Most consumers don't know what an

"... Ionization smoke detectors can retain their potentially lethal properties for centuries ..."

ionization detector is . . . They don't know what they're getting." Ionization detectors, excluded from home use in Japan because of their "undesirable" characteristics, may soon be shelved in the United States as well. Legislation to ban their sale has been introduced at the federal level by New York Congressman Ted Weiss, but until such legislation is approved, the industrywide battle over which type of detector is better will continue.

It seems as though supporting test results can now be produced for each claim regarding safety or superiority. The long-accepted conclusion that ionization detectors respond faster to open-flaming fires, whereas photoelectric devices are much quicker in detecting smoky fires, is being disputed, as are the testing conditions under which those results were produced. The Nuclear Regulatory Commission bases its standards on tests conducted in the sixties and sees "no need to revise them."

Critics of the NRC, including Berkeley's Dr. Gofman, scorn the agency for failing to conduct "real world" tests. Gofman says he has "zero faith" in any NRC findings for one reason: The commission does its testing in a "technological paradise." Gofman says that the NRC's findings apply "only if everyone does everything perfectly and everything goes right . . . and there are no fires." The NRC's conclusions, he adds, do not allow for "some guy to walk out of the plant with the stuff on his shoes."

Supporters of the photoelectric detector discount the NRC's findings and turn to the results of tests conducted by private industry. As more and more tests indicate improvements in the photoelectric detector, many consumers who previously bought one of each kind may now see this precaution as unnecessary.

Los Angeles City Fire Department Inspector Ed Reed admits that if he "had it to do over again" he would have two photoelectric detectors in his house instead of his present system, which includes one of each type. Though Reed insists that the radiation danger posed by the ionization detector is "minimal," he notes that smoky fires account for approximately 90 percent of fatal home fires, and that, therefore, for residences the photoelectric detector is the better choice. Congressman Weiss echoes Reed's choice in much stronger terms: "Since the photoelectric detector will also function well and save lives, there is absolutely no justification for sanctioning the widespread use of a device containing dangerous carcinogenic material."

Continuing operational problems with ionization detectors may make photoelectric detectors even more attractive. The National Fire Protection Association's Sectional Committee on Household Fire Warning Equipment is currently circulating a memo among industry members suggesting the possible banning of ionization detectors in small apartments. The problem of false alarms is increasing, particularly in smaller units, where the detector is necessarily placed near the kitchen. The memo makes note of an apartment building in a Chicago suburb where battery-operated ion chambers were installed in all the apartments and in the public corridors: "The false alarms, particularly from cooking, were so frequent and annoying that most of the tenants had removed the batteries to silence the detectors. As the batteries were not replaced after the incidents, the detectors are, for all practical purposes, permanently silenced." Failure to reconnect detectors in similar situations has resulted in several deaths in Canada, as well as in the United States.

Since no mandatory safety standard has ever been established by the Consumer Product Safety Commission, faulty detectors occasionally pass unnoticed until they are in operation, making a recall difficult. Still outstanding in homes across the country are 65,000 defective ionization smoke detectors manufactured in 1974–75 by BRK Electronics and distributed under different labels. The devices cannot adequately withstand regular household current. The following models should be returned to BRK Electronics, Project 749, 780 McClure Avenue, Aurora, Illinois 60507, 800 323-9005; BRK will send a replacement smoke detector. Models being recalled are the BRK plug-in type SS 749SL, BRK direct-wire type SS 749ACS and SS 749AC, AMF-Paragon plug-in type 2000 ACL, AMF-Paragon direct-wire type 2000 AC, ITE plug-in type ITO 1-AC (no direct-wire types), Sears plug-in type 9-57047 and 9-57048, and the Sears direct-wire type 9-57049 (return to Sears).

When shopping for a smoke detector, check the box. If it is not clearly marked "photoelectric" or "ionization," remove the face of the detector itself and look for an NRC warning. This denotes an ionization detector, and though it may guard against the immediate danger of fire, it may actually contribute to future environmental and health damage. ■

FROM: Catherine Quigg, research director
Pollution & Environmental Problems, Inc.
Box 309, Palatine, Illinois 60067
312/381-6695

October 16, 1978

THE SMOKE DETECTOR DEBATE: IONIZATION VERSUS PHOTOELECTRIC

TYPES OF SMOKE DETECTORS

Ionization detectors operate on the principle that ionized air will conduct electricity. Radioactive material (americium-241) ionizes the air in a sensing chamber. A voltage is applied across the chamber and a small current is carried by the ionized air. When smoke particles enter the chamber and combine with the ionized air, the current (ion flow) is reduced, tripping the alarm.

Photoelectric detectors use a light scattering principle called the 'Tyndall effect.' A beam of light from a small bulb of light-emitting diode is aimed across a sealed chamber to a light trap. A photocell looks at the side of the beam and senses no light as long as the air in the changer is clean. If smoke enters the chamber, light is reflected in all directions. When reflected light hits the photocell, the resulting change in resistance triggers the alarm.

WHICH IS BETTER AT DETECTING FIRES AND SAVING LIVES?

Fire expert Richard Bukowski reports that both types of smoke detectors respond well to fires. The photoelectric type seem to respond better to the smoldering type fires and the ionization type respond better to flaming fires. Both types, however, provide adequate escape time for all fires.

In the May 1977 issue of 'Specifying Engineering', author Patrick Phillips indicates that "a very slow smoldering fire can generate extremely heavy smoke densities without causing an ionization detector to respond. This may be because smoke, although dense, contains relatively large particles and relatively few particles per unit volume."

A recent study concludes: "A residential smoke detector with small lag time, of either the ionization or photoelectric type, would provide more adequate life saving potential under most residential fire conditions, when properly installed. Even in the case of rapidly building fires the detectors would provide adequate warning before dangerous conditions were reached in the primary escape path...Under expected residential fire conditions, it appears that there is no difference in lifesaving potential between ionization and photoelectric detectors."
(Richard W. Bukowski of the Center for Fire Research, Institute for Applied Technology, National Bureau of Standards, Washington, D.C.)

From available statistical data, it appears that most dwelling fires start by smoldering. For example, the LosAngeles Fire Department reported the results of a study of 4,151 dwelling fires that occurred during 1960 in their city and concluded that 75 percent began as slow, smoldering fires...In general, it can be stated that if the fire is a slow, smoldering fire without any flame, a good photoelectric detector will be superior to a good ion chamber detector in terms of detection time." (Fire Journal, November 1964)

Both the ionization and photoelectric detectors have been studied by the National Bureau of Standards and they both perform well in their purpose of detecting fire in the home.

DETECTS LIKE A DRAG—WHAT'S THE DEBATE?

There is one important difference between the ionization and the photoelectric detectors. The ionization detector contains radioactive americium-241, a by-product of plutonium which is produced by the fissioning of uranium. It can seriously affect human health and the environment if it escapes thru destruction of the detector or in the disposal of the detector. Those who are marketing radioactive ionization smoke detectors fail to properly address these concerns. There is a safe alternative to the ionization detector. It is the photoelectric detector which contains no radioactivity, only bulbs or diodes.

SHORT-TERM HEALTH AND ENVIRONMENTAL HAZARDS OF IONIZATION SMOKE DETECTORS

Immediate health dangers are significant. Smoke detectors can be and have been destroyed in fires, according to Richard Bright of the National Bureau of Standards. When that happens, the americium can vaporize and oxidize. The gold foils that contain the americium are thin and will melt at only 1,063 degrees centigrade. Firemen risk exposure to radiation while fighting fires in facilities where smoke detectors are installed or stored. There is also the possibility that americium exposure presents a hazard to workers in facilities where ionization smoke detectors are assembled.

LONG-TERM HAZARDS OF IONIZATION DETECTORS

Radioactive detectors have a useful life of about 15 years, according to Richard Bright, fire research engineer for the National Bureau of Standards. But americium-241 has a radioactive half-life of 460 years, meaning that it will be a potential threat to human health and safety for thousands of years.

Americium, which is soluble, accumulates in soil and water--from which it enters the food chain in drinking water, plant foods, fish and animals. Once ingested, it moves readily from the gastro-intestinal tract into the blood stream, where it remains to cause cancer of the liver and bone.

HOW MANY DETECTORS ARE WE TALKING ABOUT?

Four-million ionization detectors have already been purchased for homes and offices. They are being put on the market at the rate of 9 million per year, compared to one-million per year for the photoelectric type according to the National Bureau of Standards.

WHAT RADIATION EXPERTS SAY

There are "thousands of lethal doses" in one microcurie of americium-241 according to Dr. Edward A. Martell, an environmental radiochemist for the National Center for Atmospheric Research in Boulder, Colorado. He is "horrified" by the widespread distribution of radioactive ionization detectors.

Dr. William J. Bair, a radiobiologist and manager of Battelle Pacific Northwest Laboratories' biomedical and environmental research program, Richland, Washington, says americium "constitutes a hazard comparable to plutonium." He adds, "Americium and curium are largely translocated from lung to liver to skelton, even when inhaled as oxide..."

WHAT RADIATION EXPERTS SAY (continued)

Dr. Karl Z. Morgan, former director of the Health Physics Division at Oak Ridge National Laboratory and now with the School of Engineering at Georgia Tech, Atlanta: "The risks are identical for plutonium-239 and americium-241. Once in the environment, americium is more of a risk than plutonium, because it is more readily taken up by animals and plants that are part of the human chain."

Dr. Dean E. Abrahamson, physicism, physicist and professor in the School of Public Affairs, University of Minnesota: "There is no question about the toxicity of americium, especially if it gets into the food chain."

Dr. Donald P. Geesaman, noted biophysicist claims it is "insidious" to manufacture and distribute radioactive smoke detectors and states "it's inevitable that some of this americium will end up in our food chain."

WHAT THE PROPONENTS OF IONIZATION DETECTORS SAY:

The manufacturers of ionization detectors and the U.S. Nuclear Regulatory Commission have ignored concerns expressed in this paper. They have not addressed the short-term problem of ionization detector destructibility nor the long-term problem of retrieving and permanently and safely disposing of radioactive ionization smoke detectors.

DISPOSAL OF IONIZATION DETECTORS

Although ionization detectors are supposed to carry instructions for their transportation and disposal, some do not. Some detectors will wind up in trash cans, incinerators, and junkyards. "Some americium will certainly seep into the soil and water," claims Dr. Karl Z. Morgan. "The only question is where and how much. Even though the risk may be small and I am not saying that it is--when you have millions of these smoke detectors, and you multiply 'small risk' by a large number, the risk can be much larger."

In our society, the convenient and most common way to dispose of garbage is to burn it. The question arises: what happens to americium when it is burned? It becomes an aerosol conveying radioactivity to the surrounding populations. No one has addressed this problem.

WHAT DO THE PROPONENTS RECOMMEND FOR DISPOSAL?

Theoretically, these radioactive detectors are to be returned eventually to the company that manufactured them which in turn, will hand them over to the U.S. Nuclear Regulatory Commission for disposal. Most people don't know whether they have ionization or photoelectric smoke detectors--let alone when and where to return them. Among four brands of ionization detectors in a local discount store, only one had literature recommending return to manufacturer and that was in small print. It will be hard to remember fifteen years from now...or ever, if you move into a home that already has a smoke detector.

WHAT SHOULD BE DONE NOW THAT WE HAVE RADIOACTIVITY IN OUR HOMES AND STORES ETC?

Each village should alert its citizens to the long and short term dangers of radioactive smoke detectors. Villages should pass resolutions against the sale and use of ionization detectors and in support of photoelectric detectors.

The ionization detectors already on the markets and in homes and offices should be returned to the manufacturer and thence to the U.S. Nuclear Regulatory Commission. Credits should be given for photoelectric detectors. The NRC doesn't know what to do with americium; but at least it should not disperse it throughout the country in smoke detectors. They can try to find containment for the quantities they have already produced with nuclear fission.

WHAT IS THE RATIONALE FOR BANNING IONIZATION DETECTORS?

If we have any regard for humanity, we will not want to leave an irreversibly poisoned planet to those who must follow in our footsteps. People who have been fatally exposed to low-level radiation may not immediately fall down and die, but that does not mitigate the horror and suffering from cancer and other diseases that will claim them many years later.

IS ONE PHOTOELECTRIC SMOKE DETECTOR AS GOOD AS ANOTHER?

The Mutone, Captain Kelly, Sylvania brands use light-emitting diodes instead of lamps. The diodes can be expected to last for years, whereas lamps (or bulbs) must be replaced fairly often. These brands have all been tested and approved by Underwriters Laboratories.

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NOTE: Many communities are passing ordinances requiring smoke detectors; if such a proposal comes up in your town it is an ideal time to ask that it ban ionization-type alarms.

The following is Mrs. Quiqq's request to her village board asking that ionization detectors be banned there. Please take the matter up with your board too!

Reprinted by the TASK FORCE AGAINST NUCLEAR POLLUTION, INC.
P.O. Box 1817, Washington, D.C. 20013.

DATE: October 23, 1978

FROM: Catherine Quigg, research director
Pollution & Environmental Problems, Inc.
Box 309, Palatine, Illinois 60067
312/381-6695

TO: Members of the Board of Trustees of the Village of Barrington

SUBJECT: Village Resolution on Smoke Detectors

Smoke detectors for the home have become a popular item. Millions are sold each year. The members of my organization, Pollution & Environmental Problems, Inc., recommend the use of photoelectric detectors in the home but are opposed to the sale and use of radioactive ionization smoke detectors.

There is one important difference between ionization and photoelectric detectors. The ionization detector contains from 0.35 to 4.4 microcuries of radioactive americium-241, a decay product of plutonium-239. Americium has a half-life of 460 years, meaning it remains toxic for at least 4,000 years. There is no known way to permanently and safely dispose of it.

The manufacturers of ionization detectors and the U.S. Nuclear Regulatory Commission (NRC), which is supposed to regulate them, fail to properly address the question of americium's effect on human health and the environment. The NRC states that "if you stand within ten inches of an ionization detector for eight hours a day, every day of the year, the annual radiation exposure would be less than 0.5 millirem. I agree that this could be true. However, americium emits very strong alpha radiation and makes almost no contribution to external exposure. So the amount of time one spends near the detector is completely irrelevant.

Americium is an internal radiation emitter and affects human health when it is inhaled or ingested. Once ingested, it moves readily from the gastrointestinal tract into the bloodstream where it remains to cause cancer of the liver and bone. Once this is understood, the foolishness of measuring the health effects of alpha emitters by external dose rates is readily perceived.

How would the americium in an ionization detector be released to the environment? Unfortunately, very easily. Smoke detectors are not indestructible. According to Richard Bright of the National Bureau of Standards, smoke detectors can be and have been destroyed by fires. When that happens, the americium can vaporize and oxidize. The gold foils that contain the americium are thin and will melt at the burning temperature of a home fire. Microscopic particles of americium can then escape unseen and unfelt to the atmosphere. Firemen could risk exposure to americium particles while fighting fires in facilities where ionization smoke detectors are installed or stored.

The public is at risk when detectors are damaged or destroyed; or in their disposal. Millions of ionization detectors will wind up in trash cans, incinerators, junkyards and landfills. Every landfill could become a radioactive dump, leaching americium into the groundwater and food chain. Garbage fires could disperse americium as an aerosol.

"Some americium will certainly seep into the soil and water," claims Dr. Karl Z. Morgan, former directors of the Health Physics Division at Oak Ridge National Laboratory. Dr. Donald P. Geesaman, a noted biophysicist says "it's inevitable that some of this americium will end up in our food chain."

And for what! We do not even need ionization detectors for our safety from fires. Photoelectric smoke detectors, which contain no radioactivity -- only bulbs or diodes -- are available. In addition, photoelectric detectors are superior in detecting smoldering fires, the kind which occur most often in homes.

Both photoelectric and ionization type detectors have been evaluated by the National Bureau of Standards; and detectors in both categories have been approved by Underwriters Laboratories (UL) and Factory Mutual (FM).

With cancer on the increase every year, the members of Pollution & Environmental Problems, Inc., think it is unconscionable to disperse more radioactivity to the environment.

I respectfully request that the Barrington Village Board pass a resolution to ban the sale and use of radioactive ionization smoke detectors and to encourage the sale and use of photoelectric detectors in the Barrington area.

Thank you.

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Additional Commentary on Background Radiation and What It Means:

"As we know, humanity has always been exposed to naturally occurring background radiation. Dr. Gofman, the co-discoverer of plutonium, has estimated that this naturally occurring radiation causes approximately 19,000 extra cancerm deaths annually and between 58,000 and 580,000 genetic deaths per year in this country alone.

With these figures in mind, it seems almost unbelievable that government policies could advocate the existence of artificially produced radiation, with its consequent cost to human life. However, this has happened, and the average American is exposed to almost twice the radiation that occurs naturally.

We can do little about background radiation, but we can, and must, curb that radiation produced by man. Current regulations permit exposures of 170 mrem annually. A disturbing consequence of every individual receiving this dose could amount to about 32,000 extra cancer and leukemia deaths every year, according to Drs. Gofman and Tamplin."

Statement by Senator Gary Hart
Conference on Low-level Radiation
May 4, 1976
Washington, D.C.