The Dangers of Food Irradiation Facilities Worldwide
Provided by Public Citizen
Washington, DC

Introduction:

In irradiation facilities, food products are moved on a conveyor belt past a radiation source, where it is exposed to radioactive cobalt-60 or cesium-137, X-rays, or speed-of-light electron beams from linear accelerators. The irradiation industry promotes irradiation with the use of electron beams (e-beams) as "new and improved" but e-beams cause the same problems as radioactive isotope irradiation.

Since the 1960's, dozens of accidents – as well as numerous acts of wrongdoing – have been reported at irradiation facilities throughout the world. Radioactive water has been flushed down the toilets into the public sewer system. Radioactive waste has been thrown into garbage. Radiation has leaked. Facilities have caught fire. Equipment has malfunctioned. Workers have lost fingers, hands, legs and their lives. Company executives have been charged with cover-ups and, in one case, sentenced to federal prison.

The United States Environmental Protection Agency recognizes that all ionizing radiation, including cobalt-60 and cesium-137, are known to cause cancer. Exposures to gamma radiation from cobalt-60 and cesium-137 result in an increased risk of cancer. External exposure is usually considered a greater threat, because stronger gamma rays are emitted. The magnitude of the health risk depends on the quantity of the radioactive isotope involved, length of exposure, distance from the source (for external exposure) and whether the cobalt-60 was ingested or inhaled.

International Atomic Energy Agency (IAEA):

The International Atomic Energy Agency's mission is to preserve the nuclear industry, yet the IAEA is also expected to monitor those activities. Despite the contradiction of responsibilities that the IAEA holds, the agency has recognized serious hazards associated with irradiation facilities. IAEA reports have cited numerous accidents arising from lost, abandoned and utilized radioactive cobalt-60 and cesium-137. The worst of the accidents occurred in the Brazilian city of Goiânia in September 1987, when scavengers dismantled an abandoned metal canister left in a junkyard. About 300 people were exposed and four ultimately died.

During this time of heightened security throughout the world, the IAEA recently published in a 2002 press release, the possible use of radioactive materials to develop a "dirty bomb." They say that the materials " . . . can be found in almost any country around the world, and more than 100 countries may have inadequate control and monitoring programs to prevent or even detect the theft of these materials." This is not the time to be unnecessarily transporting and employing radioactive isotopes.

European Union:

The European Union is taking a precautionary approach in allowing the widespread use of irradiated foods; and thus, the construction of irradiation facilities. The European Parliament recently voted against expanding the list of approved foods that could be irradiated, maintaining the status quo of only spices, dried herbs and seasonings. It can be inferred that this measure will

prevent the construction of new facilities; thus, the potential hazards of new accidents associated with the transfer to or operation of facilities using radioactive isotopes.

United States of America:

According to the U.S. Nuclear Regulatory Commission (NRC), 45 accidents and violations at U.S. irradiation plants were recorded from 1974-89. Irradiation plant workers were exposed to dangerous radiation hazards. Several have died or been exposed to near-fatal doses of radiation at facilities throughout the world. Certain irradiation plants emit smog-forming, ground-level ozone into the environment. Plants that use radioactive cobalt-60, which must be replenished after several years of use, endanger neighbors and the environment. Increased threat arises when radioactive isotopes are mined elsewhere in the world, then transported thousands of miles. For example, most of the world's cobalt-59 is mined and then converted into radioactive cobalt-60 in Canada, and has to be transported great distances, raising the possibility of accidents involving radioactive materials.

Accidents:

Gamma-Ray Accidents in the United States:

- Parsippany, New Jersey: In June 1974, William McKimm, the radiation director at an Isomedix cobalt-60 facility, was exposed to a near-fatal dose of 400 rems while irradiating medical supplies. McKimm was critically injured and hospitalized for a month. Two years later, a fire near the cobalt storage pool released chemicals into the pool that caused the cobalt rods to corrode and leak. Radioactive water was then flushed down the toilet into the public sewer system. Eventually, concrete around the cobalt-60 pool, as well as the toilet and bathroom plumbing, was found to be radioactive and taken to a nuclear waste dump. The amount of radiation released into the public sewer system was never determined.
- Rockaway, New Jersey: In 1977, Michael Pierson was exposed to a near-fatal dose of 150-300 rems at a Radiation Technology facility when a system designed to protect workers from radioactive cobalt-60 failed. In 1986, the NRC cited company executives for intentionally disabling the system. In 1988 – after more than 30 NRC violations, including one for throwing out radioactive garbage with the trash – company president Martin Welt and nuclear engineer William Jouris were charged in federal court with 11 counts of conspiracy to defraud the NRC, making false statements and violating the Atomic Energy Act. Welt, who threatened to fire workers who didn't lie to NRC investigators, was also charged with obstruction of justice. Both men were convicted. Jouris was sentenced to probation; Welt was sentenced to two years in prison, placed on three years probation and fined $50,000.
- Honolulu, Hawaii: In 1979, decontamination began at the state run Hawaiian Developmental Irradiator at Fort Armstrong where, years earlier, radioactive water leaked onto the roof and the front lawn. Nearly 100,000 pounds of steel, 250 cubic feet of concrete and 1,100 cubic feet of soil were removed and taken to the nuclear waste dump in Hanford, Wash. The plant was shut down in 1980 and the remaining cobalt-60 was shipped to the University of Hawaii. Hawaii taxpayers paid most of the $500,000 cleanup.
- Dover, New Jersey: In June 1986, two senior executives of Palo Alto, CA-based International Neutronics were indicted on federal charges of conspiracy, mail fraud and wire fraud in connection with an October 1982 spill of 600 gallons of water contaminated by radioactive

cobalt-60. After a pump malfunctioned, workers were instructed to pour the radioactive water down a shower drain that emptied into the public sewer system. Workers were also ordered to wear their radiation detection "badges" in such a way to falsify radiation levels. In the words of a federal prosecutor, company executives "bamboozled" Nuclear Regulatory Commission (NRC) inspectors by delaying an inspection of the facility, where food, gems, chemicals and medical supplies were irradiated. A $2 million cleanup included the cost to dispose of radioactive material at a nuclear waste dump in South Carolina. Company vice president Eugene O'Sullivan, a former member of the U.S. Atomic Energy Commission, was convicted of conspiracy and fraud in October 1986.

- Decatur, Georgia: In June 1988, a capsule of radioactive cesium-137 - a waste product from nuclear weapons production - sprung a leak at a Radiation Sterilizers plant near Atlanta. Though the leak was contained to the site, two of the three exposed workers spread radioactivity to their cars and homes. And an estimated 70,000 milk cartons, contact lens solution boxes and other containers were shipped out after they were splashed with radioactive water. Only about 900 of the contaminated containers were recalled. The ensuing taxpayer-funded cleanup cost more than $30 million, after which a government report concluded, "the public health and safety could have been compromised."

<u>Gamma Ray Accidents Throughout the World</u>:

- In 1975, an Italian worker was exposed to cobalt-60 when he bypassed all safety controls, climbed onto a conveyor belt and entered the irradiation chamber. He died 12 days later.
- In 1982, a Norwegian worker received a 1,000-rem cobalt-60 dose while trying fix a jammed conveyor belt. He died 13 days later.
- In the South-Central Brazilian city of Goiânia in 1987, scavengers dismantled a cesium-137 irradiation canister while rummaging through a junkyard and took it home. Over the next week, several hundred people were unwittingly exposed. Some children and adults, thinking the cesium powder was pretty, rubbed it over their bodies. Others inadvertently ate food that had been contaminated with the radioactive powder. More than 100,000 people were monitored for radiation exposure. 300 of whom were contaminated with cesium-137. Four people eventually died. Homes and businesses were also contaminated, requiring a major clean-up operation that lasted six months.
- In February 1989, three workers were poisoned when they entered the irradiation chamber at a cobalt-60 irradiation facility near San Salvador, El Salvador. Responding to a malfunction, a worker bypassed the safety system and entered the radiation room with two others, neither of whom had formal training to operate the equipment. All three men were exposed when they stood directly in front of the cobalt source. One man was sick for more than six months. Another had his legs amputated. The most-exposed worker was hospitalized for radiation syndrome throughout his body and extensive radiation burns to his legs and feet. His right leg was amputated and, 197 days after the accident, he died. The company was unaware of the accident for several days because the workers were incorrectly diagnosed as having food poisoning.
- At a cobalt-60 irradiator in Soreq, Israel in 1990, a worker entered the irradiation chamber after an alarm sounded. Acting against operating and safety instructions, he did not notify his

supervisor and instead handled the situation on his own. He turned off the alarm, bypassed the safety system, unlocked the door and entered the radiation room. He did not notice that the cobalt-60 was exposed until he moved a pile of boxes. After a minute of direct exposure, he began to feel a burning sensation in his eyes and left the room. He died 36 days later.

- In 1991, a worker was fatally poisoned at a cobalt-60 irradiation facility in Nesvizh, Belarus about 120 km from Minsk. When a piece of equipment jammed, the worker entered the irradiation chamber after bypassing a number of safety features. The radioactive material became exposed and irradiated the man for about one minute. After undergoing specialized treatment in Moscow, the man died 113 days after the accident.
- In China in 1992, a cobalt-60 source was lost and picked up by an unsuspecting individual. Three persons in the family died of resulting overexposure.
- In 1998 in Istanbul, Turkey, two cobalt-60 sources in their shipping containers were sold as scrap metal. Ten people were inadvertently exposed to radiation, though none were reported to have died. One of the cobalt-60 sources was still missing several months following the incident.

Electron-Beam Accidents:

- In 1991, a Maryland worker ignored safety warnings and received a 5,000-rad dose from a 3 million electron-volt linear accelerator. He lost four fingers.
- In 1992, a mishap at a 15 million electron volt linear accelerator in Hanoi, Viet Nam cost the facility's research director a hand and several fingers.

Sources

Proposal for a Council Directive on the Control of High Activity Sealed Radioactive Sources. Commission of the European Communities, Brussels, 18 March 2002, COM (2002) 130 final. <http://europa.eu.int/eur-lex/en/com/pdf/2002/en_502PC0130.pdf>

"Inadequate Control of World's Radioactive Sources." International Atomic Energy Agency, 24 June 2002. <http://www.iaea.or.at/worldatom/Press/P_release/2002/prn0209.shtml>

Guide for the Preparation of Applications for Licenses for Non-Self-Contained Irradiators. Nebraska Department of Health and Human Services, Regulation and Licensure, Regulatory Guide 19.0. <http://www.hhs.state.ne.us/puh/enh/rad/rg/rggd19.pdf>

González, Abel J. "Strengthening the Safety of Radiation Sources & the Security of Radioactive Materials: Timely Action." *IAEA Bulletin*, 41(3):2-16, 1999.

http://www.iaea.or.at/worldatom/Periodicals/Bulletin/Bull413/article1.pdf

http://www.iaea.org/worldatom/About/Profile/mission.html

http://www.iaea.or.at/worldatom/Press/P_release/2002/prn0209.shtml

"Probe asked at irradiation plant," *Daily Record* (New Jersey), May 3, 1981.

"Feds: Dover radiation spill concealed." *North Jersey Advocate*, June 25, 1986.

"Executive convicted in radiation spill." *North Jersey Advocate*, Oct. 30, 1986.

"Are irradiation facilities safe?" National Coalition to Stop Food Irradiation, San Francisco, 1986.

"Review of events at large pool-type irradiators." U.S. Nuclear Regulatory Commission, Office for Analysis and Evaluation of Operational Data, NUREG-1345, March 1989.

"Accelerator safety: Self-study." Los Alamos National Laboratory, LA-UR-99-5089, April 1999.

"Canadian-made equipment cited in El Salvador irradiation mishap." *Toronto Star*, July 9, 1989.

"Radiation accident spurs new NRC regulations." States News Service, Dec. 21, 1990.

"Fool irradiation: A potential unwanted byproduct of food irradiation?" Health Physics Society, McLean, VA, January 1999.

Compiled By: Andrianna Natsoulas
International Food Irradiation Organizer
Public Citizen
215 Pennsylvania Ave., SE
Washington, DC 20003 USA