SJR

33

(7)

HOUSE COMMITTEE REPORT

Date referred: 2/10/88 FURTHER REFERRALS: HESS

DATE: 3/10/88

The Labor & Commerce Committee has considered CSSSSJR 33(Rls)

Relating to the labeling of irradiated food.

RECOMMENDS:

[ ] replace with _____ [ ] the same title

[ ] attached amendment(s) [ ] a new title

[X] do pass

[ ] do not pass

[ ] no recommendation

[ ] individual recommendations

[ ] additional referral to the _____ Committee

ADOPTS: [ ] _____ letter of intent

ATTACHES NEW FISCAL NOTE(s):

[ ] fiscal impact

[X] zero fiscal note

[ ] zero with analysis

[ ] same as previous fiscal note published _____

[ ] same as previous zero fiscal note published _____

SIGNING DO PASS:

Dave Dooley

Clay Davidson

Mike E Kopperman

SIGNING OTHER RECOMMENDATIONS:

Wfurnace

Dave Dooley

Chairman's signature

STATE OF ALASKA
THE LEGISLATURE

POUCH V - STATE CAPITOL
JUNEAU, ALASKA 99811
907-465-3800

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May, 1988

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Mary Van Nimwegen

House Labor & Commerce:

March 10, 1988

STATE OF ALASKA
1988 LEGISLATIVE SESSION

BILL VERSION: CS SS SJR 33 (Rules)
PUBLISH DATE: 2-9-88

90

FISCAL NOTE

REQUEST:

Revision Date: 2-4-88
Title: Labeling of irradiated foo
Sponsor: Kerttula
Requestor:

Agency Affected:
BRU:
Components:

EXPENDITURES/REVENUES: (Thousands of Dollars)

OPERATING	FY 88	FY 89	FY 90	FY 91	FY 92	FY 93
PERSONAL SERVICES						
TRAVEL						
CONTRACTUAL						
SUPPLIES						
EQUIPMENT						
LAND & STRUCTURES						
GRANTS, CLAIMS						
MISCELLANEOUS						
TOTAL OPERATING	0	0	0	0	0	0
CAPITAL	0	0	0	0	0	0
REVENUE	0	0	0	0	0	0

FUNDING: (Thousands of Dollars)

GENERAL FUND						
FEDERAL FUNDS						
OTHER						
TOTAL						

POSITIONS:

FULL-TIME						
PART-TIME						
TEMPORARY						

ANALYSIS: (Attach a separate page if necessary)

Prepared by: Senate Rules Committee
Phone: 465-4916
Division:
Date:

Approved by Commissioner: Chairman: Sen. Dick Eliason
Date: 2-4-88
Agency:

Distribution (by preparer):
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Alaska State Legislature

Senate

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State Capitol
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RECEIVED
FEB 10 1937

2-10-88

To: Representative Dave Donley, Chair House Labor & Commerce

From: Senator Jay Kerttula

Re: SJR-33, Relating to the labeling of irradiated food.

SJR-33 passed the Senate on February 9 and was referred to the House Labor & Commerce Committee today.

I would greatly appreciate your scheduling this bill for a hearing in the House Labor & Commerce committee as soon as possible. I know that you are extremely busy with the workers' compensation hearings, but hope that you could schedule this bill soon.

SJR-33 requests that the FDA continue the labeling requirement on irradiated food so that consumers know that they are buying treated food. Even proponents of irradiation have little argument against consumers' right to know about their food.

I have met with industry representatives (Safeway, Fred Meyer) and they support the labeling requirement.

Thank you for your consideration of SJR-33. I have enclosed a packet of information for your use, and please contact Beth Kerttula in my office if you have any questions.

Food Fight over Gamma Rays

Critics bombard irradiation as a preservative

To Michael Fey, it is the "most important advance in dietary health since the invention of pasteurization." To Denis Mosgofian, it is the "massacre of the American food supply." Fey, a food scientist, works for a company called Radiation Technology. Mosgofian is director of the National Coalition to Stop Food Irradiation. The two men are talking—yelling, really—about one of the most emotional health issues of the 1980s: the use of irradiation as a preservative. The mixing of gamma rays with edibles has set off a nuclear food-chain reaction, releasing high rhetoric, short tempers and mass uncertainty.

The Food and Drug Administration approved the process for harvested wheat and potatoes more than 20 years ago; dried spices and slaughtered pork were added to the list in the 1980s. Last April the agency gave the go-ahead for irradiating fruits and vegetables, and a furor erupted. Despite the FDA's consent, the process until now has been used mainly to preserve herbs and spices. But last week gamma ray–treated fruit made its first U.S. appearance wher Laurenzo's Farmer's Market in North Miami Beac' began offering irradiated Puerto Rican mangoes. The FDA is now considering whether to extend approval to fish and poultry. Nineteen other countries have also endorsed irradiation for a wide array of foodstuffs.

The method, which like radiology was developed around the turn of the century, is simple: food passes through a lead-shielded concrete chamber where radioactive cobalt 60 or cesium 137 bombards it with gamma rays, killing insects and bacteria and sometimes slowing ripening. The food does not become radioactive. "There's nothing in common at all between a nuclear reactor like Chernobyl and an irradiator," says Karl Abraham, a spokesman for the Nuclear Regulatory Commission (NRC). "It's like comparing bananas to tigers." Treated food "can be immediately eaten," says George Giddings, director of food irradiation at Isomedix.

Supporters claim that gamma-ray exposure offers an alternative to controversial pesticides, fumigants and preservatives, and protects human health by killing parasites like trichina worms in pork and bacteria like salmonella, which causes food poisoning. Irradiation, they note, can extend shelf life. "We see the day when you can go into a supermarket and buy a barbecued chicken that has been cooked, vacuum-packed and irradiated. It can sit on the shelf for eight years, and all you'll have to do is heat it up," predicts Physicist Martin Welt, founder of Radiation Technology.

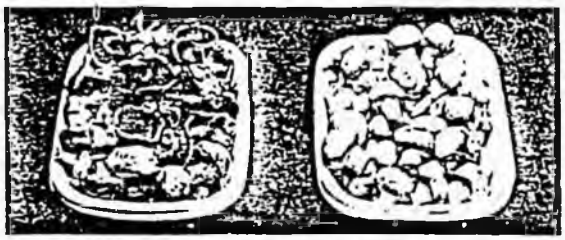
Giving treated mangoes the once-over at Laurenzo's in North Miami Beach

Critics bombard irradiation with objections. It can be expensive, adding as much as 5¢ a lb. to the price of some fresh produce. Since it can be used only on harvested crops, pesticides will still be needed in the fields. Moreover, say opponents, the low level of radioactivity set by the FDA for produce (100 kilorads) is not strong enough to slow the ripening of most fruits and vegetables. Plant Biologist Noel Sommer of the University of California at Davis has concluded that 200 kilorads is needed to retard the growth of gray mold on picked strawberries, and at that level the berries turn squishy. Other claimed advantages may have drawbacks. Irradiation "can kill the organisms that produce the signals and odors that warn people they are eating spoiled food," cautions Leonard Solon, director of New York City's Bureau for Radiation Control. "But it may not be able to kill the bacteria that cause food poisoning."

Still more debate centers around safety concerns. Adversaries contend that the treatment changes the chemical composition of food and can create carcinogens, such as benzene, formaldehyde and substances called unique radiolytic products (URPs). Those who favor the process respond that the quantities of toxic chemicals are minute, that they occur naturally (like benzene in eggs), and that some cooking methods—frying, for example—also generate small amounts of carcinogens. As for the URPs, they are not new creations at all, says the FDA, but simply existing chemicals that have not been detected before in the human diet. "There's no food that is completely known," points out FDA Biochemist Clyde Takeguchi. "You can't identify everything that's in an apple. The basis for establishing safety is not absolute safety. It's reasonable safety."

Security is at the heart of another charge. Noting that the Department of Energy plans to help build demonstration food-irradiation plants in Oklahoma, Iowa, Hawaii, Florida, California and Washington, opponents complain that the resulting spread of radioactive material will increase the chances of mishaps during transport, use and disposal. Nor has the supervision of existing irradiation plants been reassuring. The NRC acknowledges that it may inspect a facility only once in three years. Radiation Technology's license to operate a New Jersey plant was recently suspended for two months after the NRC found that company officials tried to hide a safety violation. Next month International Nutronics goes on trial for, among other things, flushing radioactive water into the sewage system of Dover, N.J.

The controversy seems headed for a congressional showdown. California Democrat Douglas Bosco is pushing a House bill, with 39 co-sponsors, to void the FDA's approval of irradiation for pork, fruits and vegetables. The industry's supporters, however, are convinced that they will prevail. Says Physicist Welt: "It took 50 years for canned food to be accepted by your grandmother. It took frozen food 20 years to be accepted by your mother. It will take the housewives of today five years to accept irradiated food." —*By Anastasia Toufexis. Reported by Janice M. Horowitz/New York and Dick Thompson/Washington*



Nonirradiated and irradiated test mushrooms

As great as pasteurization, or a dietary massacre?

Produce and pork can be treated with radiation before marketing, but consumers are leery

Irradiated food: Is it safe?

■ Imagine sinking your teeth into a feast of irradiated pork chops, asparagus zapped with gamma rays and, for dessert, strawberries à la cobalt 60.

Yummy or not, it's an American menu of tomorrow—if some federal officials and food processors get their way.

Radiation is being touted by the nuclear industry and food companies as a safe alternative to chemical pesticides and a way to kill parasites like trichina found in some swine herds.

The Food and Drug Administration in April approved its use on fruits, vegetables and fresh pork, and the U.S. Agriculture Department wants the FDA to authorize it for poultry as a way of controlling salmonella, bacteria that kill 2,000 Americans yearly.

Sometime this fall, in a limited-market test of consumer acceptance, a few stores will begin selling radiation-treated potatoes or onions in the Pacific Northwest. The industry will keep locations secret for fear of protesters. And there's the hitch. FDA rule making on irradiation has drawn more mail from worried consumers than any issue in recent times. Resolutions urging a ban on irradiation or stricter labeling have been introduced in at least six states. Faced with rising opposition, the food industry is taking a wait-and-see attitude before pushing treated meats and produce to market.

The process leaves no radiation residue on food, and agencies from the FDA to the World Health Organization say that foods exposed to low doses are safe for human consumption. However, the subject is shrouded in fear and scientific unknowns. The few tests of irradiated food on people have been brief, and critics charge that not enough reliable animal studies have been done. Irradiation does break down chemical bonds in food, potentially creating toxins that, in sufficient strength, could cause cancer. But advocates contend that cooking can create as many food toxins.

"The health effects of food irradiation are simply unknown," asserts Dr. John Gofman, professor emeritus of medical physics at the University of California at Berkeley. He says an enormous human experiment lasting 20 years would be needed for a definitive answer.

Public concerns over safety extend to the handling of radioactive cobalt used in the process. In June, the Nuclear Regulatory Commission accused Radiation Technology, Inc.—which had planned to sell irradiated pork, asparagus, avocados and mangoes this summer—of lying to investigators about disconnecting a safety lock on a radiation room door. The firm's license at its Rockaway, N.J., plant was yanked, and the company now faces possible criminal prosecution. Another irradiation firm, International Nutronics, Inc., was indicted on charges of conspiring to cover up a 1982 accident in which radioactive water seeped into soil at its Dover, N.J., plant.

Defenders of the technology contend that the 45 U.S. irradiation plants now used to sterilize medical instruments have a fairly clean safety record. Only two workers have been injured through accidental exposures in the past 20 years. And because no nuclear core is involved, it is impossible for a meltdown to occur.

The food-treatment process is simple. Foods put on a conveyor belt pass near a concrete-and-lead-shielded chamber housing the radioactive source, typically cobalt. Emitted gamma rays destroy insects and bacteria. Higher doses—generally above those allowed by the FDA—also could extend the shelf life of perishables. The process does not work on all foods: It causes leafy vegetables to lose their green color, grapes to become soft and bananas to develop brown spots.

Americans have been eating some irradiated ingredients for the past three years, including dried spices used in some prepared foods such as frozen pizza and cookies. But authorities say less than 1 percent of the spices consumed in the U.S. are treated this way.

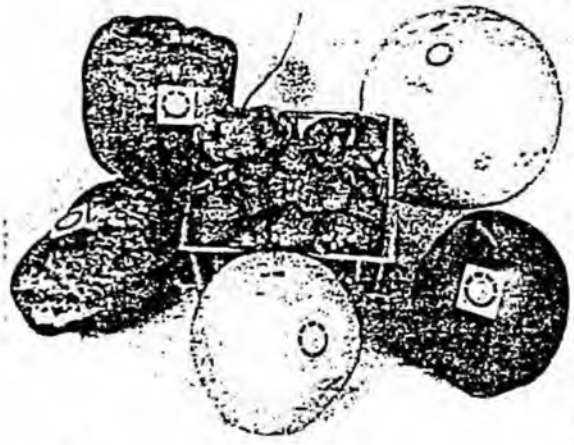
The labeling of irradiated food is nearly as controversial as its safety. Surveys show most shoppers would not buy produce labeled as irradiated. However, the FDA plans in two years to drop its rule that foods display the phrase "treated with radiation." Instead, it will continue to require only an international symbol for irradiation—a broken black circle and geometric design—used in countries such as Japan and Holland, where irradiated food has been sold for several years.

Consumer groups are charging that shoppers are kept in the dark because prepared foods that include irradiated ingredients are not required to be labeled. Mark Rosengarden of the National Coalition to Stop Food Irradiation complains: "I don't want my 3½-year-old son eating irradiated food, and there's no way of keeping it out of his mouth."

"This industry will develop slowly," says Bahar Gidwani, a stock analyst at Kidder, Peabody & Company. By the year 2000, though, some promoters envision hundreds of irradiation plants sending such perishables as mangoes to Minnesota and fresh shrimp to South Dakota, and irradiation rivaling canning as a way to preserve foods. Predicts Gidwani: "Within a decade, we'll see every food processor worth his salt in this industry." ■

by Peter Dworkin

SCOTT THODE—USN&WR



These fruits and vegetables are good candidates for gamma-ray treatment to kill insects

BRION SARINGSOCK

FDA approval of process draws protest from the National Coalition to Stop Food Irradiation

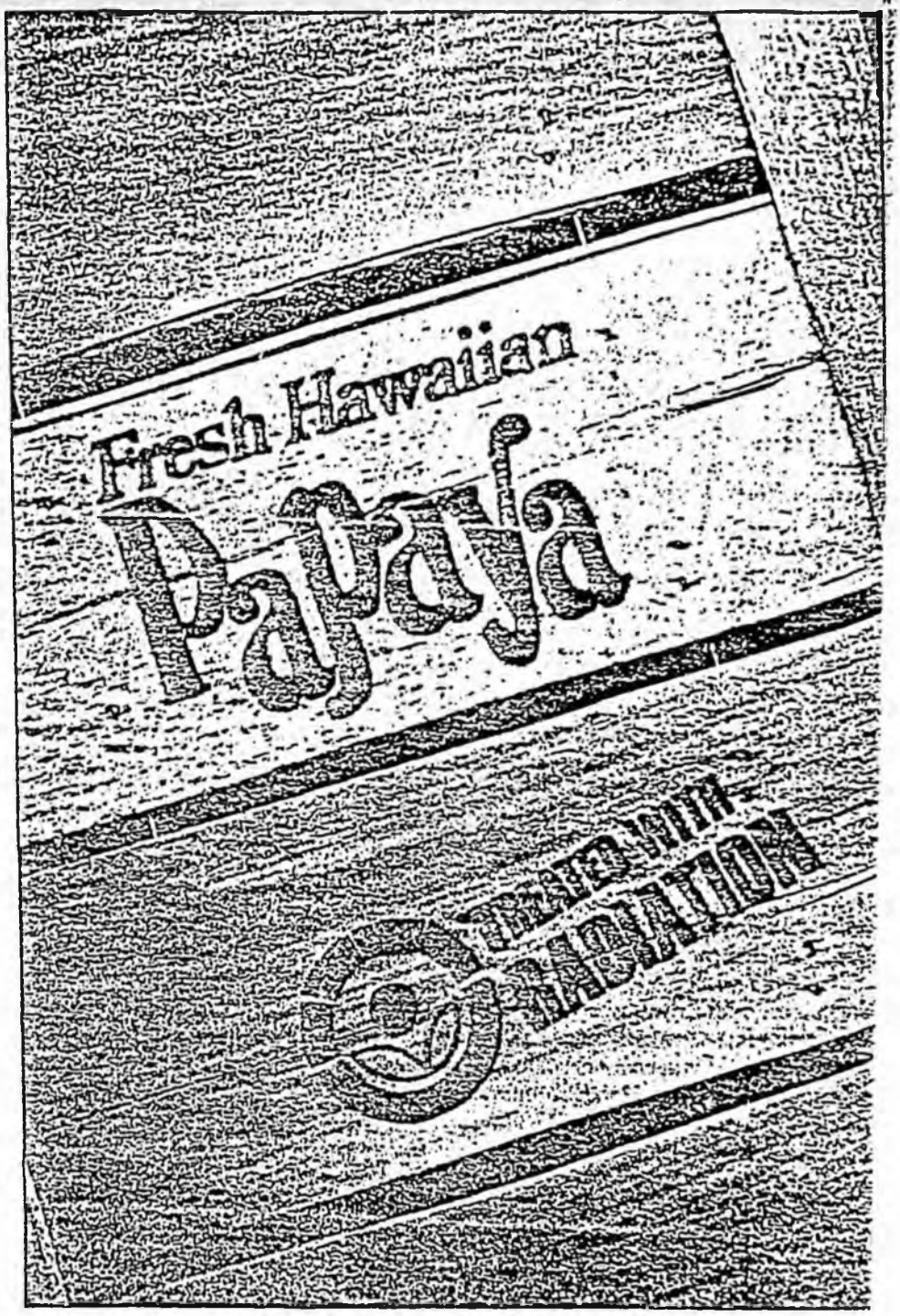
Plant safety also is a concern

SCOTT THODE—USN&WR

Trouble in Paradise

By Kirk Johnson
Photo by Meg Landsman

Ever since the United States government embarked on an "atoms for peace" program after World War II, it has encouraged the use of irradiation as a way of preserving food. Bombarding food with radioactivity prolongs shelf life by killing the organisms that damage food: insects, mold, bacteria. It also brings up unsettling images for consumers which is one reason the food industry has been reluctant to try it. What the irradiation hopefuls have needed is a workable crop, an agreeable industry, and a receptive community to house an irradiator. They may have found all three in Hawaii, where a vigorous campaign to push food irradiation has centered on a peculiar yolk-colored fruit that tastes somewhere between a cantaloupe and a peach. If all goes according to the government's plan, the papaya could become the first irradiated whole food to appear in American supermarkets.



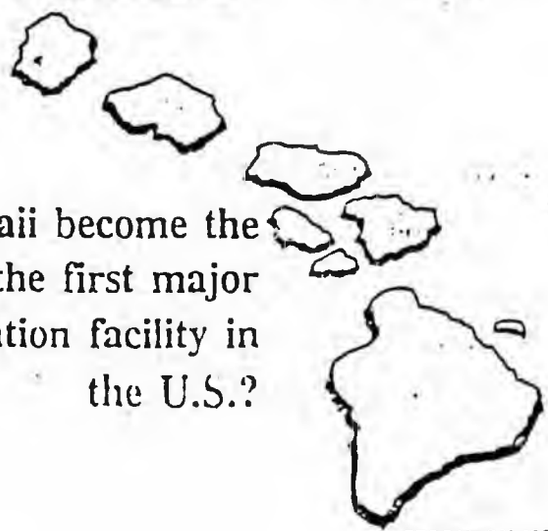
Why the papaya? Why not something a little more ordinary, like potatoes, or maybe wheat? Twenty years ago, potatoes and wheat were in fact the first foods sanctioned by the Food and Drug Administration (FDA) for irradiation. On April 18, 1986, the agency went a giant step further and extended its approval of

irradiation to all fruits and vegetables. You can't find these irradiated commodities in any store today because they aren't being marketed. At least not yet. The reason? "Economics," says one industry veteran. "Irradiation is a very expensive process, and as long as we have other ways to ensure a reasonable shelf life, we'll use them."

Economics is one reason attention has turned to the papaya. Its tropical growing season generates a year-round supply of fruit, and the more food you move through an irradiator, the lower the cost per pound of treatment.

There is also the issue of pest control. Hawaii is the home of three species of fruit fly with an affinity for ripe papaya. For years, the papaya industry relied on the fungicide ethylene dibromide (EDB) to disinfect the fruit. But when EDB was banned in 1983 after it was found to cause cancer, the industry faced the prospect of having its papayas denied entry to the U.S. mainland and other countries that do not have these fruit flies—and don't want them. Low-dose irradiation emerged as one alternative to EDB. The dose isn't strong enough to kill the insects, but it sterilizes them so they cannot reproduce once they leave the islands.

The U.S. Department of Energy



Will Hawaii become the site of the first major food irradiation facility in the U.S.?

(DOE) likes irradiation because it would help get rid of radioactive wastes. Cesium-137, the radioactive heart of an irradiation facility, is a byproduct of nuclear weapons production. The government has been searching for ways to manage these wastes, and as much as some states have recoiled at the thought of burying the stuff on their turf, there has been considerable support within DOE for considering nuclear waste as a valuable national resource.

Why? Food irradiation puts weapons waste to what DOE considers a constructive use, and that means more than just food preservation. DOE is dangling before Hawaii the inducement of a six-year supply of free cesium-137—nearly $3 million worth—after which the material would be leased from the federal government. If the state accepts the offer, a byproduct of nuclear weapons production would create revenue for the U.S. Treasury. Moreover, since cesium-137 accounts for a hefty 55 percent of the radioactivity in the nation's nuclear weapons waste bin, food irradiation would cut DOE's waste management tasks by half. Finally, the process of extracting cesium-137 from nuclear waste generates bomb-grade plutonium, which is needed to arm the roughly 17,000 nuclear warheads that the Reagan Administration has requested for the next six to seven years. All of these factors help explain why, for the past two decades, DOE has been pulling cesium-137 from its growing mound of nuclear weapons waste and saving it for food irradiation.

The state of Hawaii is thumbs-up on irradiation. In fact, former Governor George Ariyoshi liked the idea so much that he asked the state legislature for $2.5 million to build a facility on the island of Hawaii, where the papaya industry is based. The more cautious legislature voted instead to spend $200,000 for a study to investigate the technical and economic feasibility of such a facility. The state circulated a request for proposals to conduct a feasibility study, and from the seven respondents selected an internationally known engineering and consulting firm by the name of CH_2M Hill.

When news of the state's plans began to circulate around the island, the environmental community was the most alarmed. The front page of the environmentalist newspaper *Save Hawaii* was blanketed by a long story on the dangers of irradiation. The concerns ranged from the possibility of environmental contamination in the event of a leak of radioactive material to the health hazards of eating irradiated food. Kathy Dorn was one of many Hawaiians who first learned about irradiation from the *Save Hawaii* piece. Dorn, a gardener, musician, and mother, had always been proud that Hawaii was the first region in the United States to declare itself a nuclear-free zone, despite a last-minute exemption for agricultural uses. She was upset that the state seemed unconcerned about the potential for danger, and, she says, when she realized how closely food irradiation was tied to nuclear weapons production, "I was angry for a fight." Dorn went on to help organize a group called the East Hawaii Coalition to Stop Food Irradiation.

The papaya industry has an obvious stake in the issue, and the recommendations of its trade association carry substantial weight with state decision-makers. When the Hawaii Papaya Industry Association held its 22nd annual meeting last September, it was a logical place for all the interested parties to converge.

I happened to be vacationing in Hawaii at the time, lured by the promise of black sand beaches and 6,153 miles of separation from my office phone. But after several days and nights of steady rain, I was grateful for the distraction of a story to cover. I spent four days criss-crossing the little city of Hilo on Hawaii's eastern coast, sitting in on meetings, questioning officials, listening to people's reaction to a plan that seemed quietly out of step with Hawaii's history as an earth-loving land. I drove away from the city feeling that what is transpiring there is significant not only because it is the closest we have come to irradiated foodstuffs. I had also watched a preview of a drama that will play itself out in every community that wrestles with the uncertain risks and equally unclear benefits of food irradiation.

Thursday morning, September 25

Hilo was drying after yet another night of showers, and a Japanese groundskeeper was raking the parking lot leaf by leaf when I drove up to the Naniloa Hotel. It was an unlikely spot for a press conference. With one side of this resort hotel protected by stately banyan trees, the other open to gently rolling surf, the scenery beckoned me from thoughts of nuclear disaster.

In one corner of the lobby, a trio facing a ring of reporters. Denis Mosg fian, a lithographer by trade, told t gathering that he had come to the irrad tion issue through his job as a health a safety officer to his industry. He h learned about mishaps at several gove ment and commercial facilities used to radiate (and thus sterilize) disposa medical instruments—miscues that l left several workers hospitalized w acute radiation sickness. The more he vestigated food irradiation, the more c cerned he became and the more he compelled to inspire others to stop a l idea dead in its tracks. Mosgofian n heads the National Coalition to Stop Fr Irradiation, a San Francisco-based coli tion of fifty-five national, state, and lc organizations coast to coast.

In Santa Cruz, California, the c paign to stop irradiation is headed Food Irradiation Response, an organi tion that successfully lobbied to estab Santa Cruz as the first county in the tion to adopt irradiation labeling l more stringent than FDA's. The direc of the group, a veteran consumer acti by the name of Brion Sprinsock. I flown in to appear with Mosgofi Together, the two men explained their jections to irradiation in the smooth, s cadence of speakers who have laid their arguments many times before. Tl had four major concerns:

•The impact on the environme Bringing in fresh cesium-137 from mainland and returning the spent isot would involve transporting radioact material over Hawaii's roadways. If accident along the way caused a leak, toxic material might easily contamir the groundwater, since the soil on Hav is porous lava, cesium-137 is wa soluble, and the eastern half of the isla where the irradiation facility would built, has one of the highest annual r fall rates in the world.

Mosgofian suggested that the tr record of existing irradiation facilities fers little assurance that sophisticated c tainment systems will not fail or be liberately overridden. After leaks at t such facilities (International Nutroni Inc. of Dover, N.J., and Isomedix (of Parsippany, N.J.), workers were structed by plant managers to pour rac active water down bathroom drains : toilets, where it was released into put sewer systems. In another incident, Radiation Technology plant in Rockaw N.J., was shut down by the Nucl Regulatory Commission (NRC) beca the firm had repeatedly dismantled a s

KIRK JOHNSON is an associate editor for *East West*

...ty interlock device that prevents employee access to the radioactive isotope. The closure order said that the NRC "no longer has reasonable assurance. . . that the public health and safety, including the safety of the Licensee's employees, will be protected." The Department of Energy is now paying the former head of Radiation Technology, Dr. Martin Welt, for technical advice on Hawaii's papaya irradiation facility.

•The impact on the food itself. Showering food with radioactivity doesn't make it radioactive. But these fast-moving gamma rays rearrange the configuration of the food molecules they strike, producing new substances known as radiolytic products. Are these radiolytic products safe to eat? The FDA went about answering that question by examining some 441 studies of irradiated food. According to a 1982 internal FDA memo, by the time the agency had whittled the list to sixty-nine studies for in-depth review, only five studies "appeared to support safety." This was the agency's basis for extending its approval of irradiation to all produce in April, 1986.

Other evidence suggests that radiolytic products may pose a serious health threat, most notably by inducing cancer. In the only human study of irradiated food reported in the scientific literature, children in India who were fed freshly irradiated wheat developed abnormal cells associated with leukemia, a form of cancer. When alarmed researchers halted the study, the cells returned to normal. In 1980, the FDA itself published a study reporting that irradiation produces dramatic increases in aflatoxin, a carcinogenic mold estimated to be one thousand times more potent than EDB. Nuclear physicist and physician John Gofman, whose expertise dates back to his work on the Manhattan Project, wrote to former Health and Human Services Secretary Margaret Heckler, "Our ignorance about these foreign compounds [radiolytic products] makes it simply a fraud to tell the public that 'we know' irradiated foods would be safe to eat." Gofman went on to say that because cancer has a long latency period, only a thirty-year study of at least 200,000 people would indicate whether irradiated food is safe for human consumption. That kind of study, he said, "simply has not been done."

In addition to adding new chemicals to food, irradiation destroys existing ones. "Radiation can't discriminate between the reproductive cells of a fruit fly and a molecule of vitamin C," Mosgofian told the reporters, citing studies showing how irradiated fruits had lower vitamin levels. When the FDA decided to allow broad-scale fruit and vegetable irradiation, it announced, "Destruction of nutrients is not a concern in this rulemaking."

•The impact on the food industry. Will consumers buy irradiated food? In a word, Sprinsock promised, no. A 1984 study prepared by the Department of Energy found that 84 percent of the respondents in a national telephone survey expressed major or minor concern about the idea of food irradiation, or were undecided. The pollsters suspected that such reservations stemmed from a lack of information, so they recited some of the benefits of food irradiation and asked them again for their views. This time, 79 percent voiced major or minor concerns or indecision. Sprinsock said that this and other surveys suggest that most Americans are unwilling to accept the irradiation concept, and that their feelings cannot be changed through education. "Hawaii is being caught between a rock and a hard place—between DOE, which is pushing for irradiation, and consumers, who are almost certain to reject it," he said.

> "Hawaii is caught between a rock and a hard place—between DOE, which is pushing for irradiation, and consumers, who are almost certain to reject it," said Sprinsock.

•Labeling. If an irradiator were built on Hawaii and irradiated papayas sent to market, the fruit would be labeled to distinguish it from untreated papayas. But there's a catch—several catches, actually. For fruits, vegetables, grains, and other so-called whole foods like the papaya, FDA regulations require labeling with a flower-like symbol known as the "radura," along with the words "treated with radiation." Sprinsock thinks the flower symbol is a misleading euphemism that glosses over the potential danger of irradiation. What's more, the wording requirement is due to expire on April 18, 1988, leaving consumers no clue but the symbol that a food has been irradiated. Finally, as the law now stands, processed foods that contain irradiated *ingredients* do not have to be labeled. Critics see FDA's labeling laws as an attempt to circumvent almost certain consumer rejection, and as a denial of everyone's right to know about a processing technique that, unlike canning or freezing, leaves no visible clues.

While Mosgofian and Sprinsock were impressive, it was Kathy Dorn who revealed the most startling news of the day. Dorn released government documents detailing an accident at an experimental food irradiator on the nearby island of Oahu. The state-run facility had been built in 1967 to test for the effects of irradiation on tropical fruit.

In 1967, officials there received a shipment of cobalt-60, another radioactive source often used in irradiators. The cobalt was housed inside a defective steel capsule that was already leaking by the time it arrived on-site. When officials decided to return the capsule to the mainland, most of the leaking cobalt was confined to a pool of water that was used to shield workers from the radioactivity. But when a lead shipping cask was lowered through the roof to receive the defective capsule, it too became contaminated with radioactive water. As the cask was raised out of the building, the water dripped onto the roof, where subsequent rains carried it through a drainspout and onto a grassy area outside the building. There the radioactivity remained undetected for twelve years until a consultant toured the area with a geiger counter in 1979. Work crews ripped out fifty tons of radioactive steel, concrete, and earth from the facility for burial at a DOE disposal site in Hanford, Washington, and the plant was permanently shut down.

Dorn said a person standing one meter away from the contaminated lawn would have unknowingly received the equivalent of seven and a half chest x-rays an hour in 1968 and two chest x-rays an hour in 1980, when the strength of the radiation had declined. In her mind, the 1968 spill was just one step from disaster. Had the radioactive fuel been water-soluble cesium-137 instead of the relatively insoluble cobalt-60, the leak would have trickled into the groundwater, inevitably leading to increased risks of cancer, birth defects, and immune system problems. What bothered Dorn was the apparent reluctance of state officials to draw lessons from the 1968 accident. "The earlier facility was built with the same

confident assurances that we're hearing now about the new facility: fail-safe design, a new era in food processing," she said. "That project was an utter and complete failure. There's no need to repeat this scenario with a much more dangerous isotope."

The timing of the press conference was strategic. Held the day before the papaya industry meeting, it would ensure that papaya growers would read about the accident over their morning coffee. The growers were not to be won over so easily—for one thing, they would be hearing quite a different set of facts from the other side—but the press conference gave the activists a brief moment in the sun.

Next on the agenda: the Hawaii Medical Association was holding a dinner meeting that night to talk about food irradiation. The group had invited Mosgofian and Sprinsock to present their views along with Dr. Garth Tingey, an engineer under contract to the Department of Energy. By reputation, Tingey was as utterly convinced of the need for food irradiation as the activists were opposed to it. His job was to get three food irradiators across the country onto the drawing board. Hawaii's was the first. It promised to be quite a show.

Thursday night, September 25

I had not been invited to the doctors' meeting, which was slated for a Japanese restaurant in the center of town. When my phone calls to the Hawaii Medical Association failed to reach the president of the group, I decided to place my faith in the legendary graciousness of the islands. Sure enough, no one so much as lifted a chopstick as I approached the doorway of the room where two dozen physicians were attending to sushi and spareribs.

After dinner, Mosgofian and Sprinsock led off by urging the physicians to consider irradiated papayas in terms of costs and benefits. Apart from sterile fruit flies, they asked, what does Hawaii gain by having an irradiator? And what might it lose, when the safety record of existing irradiation facilities is poor, when there has already been one accident on the islands, when the soil is permeable and cesium-137 is water-soluble?

Tingey's presentation was designed to familiarize lay persons with the design and workings of a food irradiator: what irradiation is, how it works, its effects on food at various doses. He spoke of a half dozen benefits of irradiation, including its ability to kill insects, delay molding and ripening, and inhibit spoiling.

Then he turned to the "concerns expressed" about the process, including the fear that irradiated food might become radioactive, saying, "I suspect I don't have to spend much time talking with you doctors about this, what with your experience x-raying patients and such." On the question of the safety of the radiolytic products formed when gamma rays meet food molecules, Tingey pointed to the astronauts, who eat irradiated meals while in orbit, as well as certain cancer patients, whose immune systems are so damaged (by radiation therapy, ironically enough) that they can no longer tolerate the germs and bacteria of regular food. If the astronauts were ailing, I doubted that NASA would tell us. But I made a mental note to ask Tingey whether the cancer patients had been followed to check for possible ill effects from the food. A claim of safety made sense if someone had looked for potential health problems and found none; if they hadn't checked, they might miss a problem or attribute it to other causes. Even more important, since the only true test of irradiated food would involve large numbers of people studied over many years, the relevance of these isolated cases was questionable.

As for the potential for accidents, Tingey assured the physicians that "a great deal of work" had been done to insure the integrity of the containment capsules for the nuclear material. The facility itself would have numerous structural safeguards to protect against spills and accidents. If a spill did occur, Tingey assured the group, it would be mopped up safely and at no risk to the workers.

Tingey's comments about accidental spills would have been unremarkable in another setting, but here it was difficult to listen without blinking hard. These promises were being offered to people whose state had suffered an irradiator accident whose full dimensions no one even knew about for twelve years.

A small group remained after the presentations to talk with the speakers. The atmosphere grew heated as one man peppered Tingey with questions:

"If we [the islands] are going to assume the risks of irradiation, will the farmers and the growers get the benefits, too?"

Tingey: "Why are you so concerned about irradiated food when there are studies showing it's safe?"

"I'm not concerned about irradiated food. I'm concerned about food irradiation."

"Any modern situation involves risks. There's no such thing as risk-free life."

"We're talking about reliance o technical mindset."

"The same applies to automobile

"Except we're dealing with prod that hang around for 300 years dama human cells."

"We've got this cesium very contained. It's safe."

"Isn't that the same rationale we for nuclear power plants?"

Later I asked Tingey for his thou on the exchange. His smile was ti with regret. "It's unfortunate that irr tion carries such a stigma," he said ly. "It's a proven technology with no relationship to nuclear power." W you hear people's misgivings, I a him, about the safety problems, a Oahu's own accident, does it bring tions to your mind about how advi irradiation might be? "No," he quickly. "It tells me we have to tig up on our controls and improve our nology. Just because two airplanes c I don't stop flying." He concluded, haven't had a loss of life from a foo radiation facility."

A final question. Those cance tients—had they been followed? moment. Tingey seemed poised to r something, but he changed his min can't comment."

Tingey's remark brought to m statement made the previous day by official about the 1967 irradiator acc No injuries resulted from the spi official told the *Honolulu Star-Bu* But a second statement he made was precise: no injuries were *known* to

Papayas: An irradiation test ca

Photo by Brian Sprinsock

"Tryapapaya!" say growers. But will consumers go for irradiated ones?

resulted from the spill. He went on to explain that at the time of the spill, state and federal officials "didn't think it was that much of a hazard," which raises the issue of whether workers at the irradiation plant were ever surveyed for the health problems they supposedly didn't have.

What was beginning to amaze me about the irradiation debate was that when the confident promises of the irradiation backers were brought into question by new information—the larger reality—presented by the activists, the contradiction often fazed no one, least of all the pro-irradiators. During the doctors' meeting, Mosgofian pointed out how fruits and vegetables in some countries are not labeled to show they have been irradiated. He singled out South Africa by name. Moments later, Tingey spoke of widespread consumer acceptance given irradiated produce worldwide. As evidence, he, too, mentioned South Africa. Few seemed to notice the significance of the moment. Tingey certainly didn't. He repeated the same claim the next day.

Like me, Brion Sprinsock had been trying to understand how the proponents of irradiation handle conflicting information. Many of them seemed unwilling to process facts that clashed with their position. When I would challenge the activists with, say, a study supporting irradiation, they would patiently explain how the study was flawed. When I challenged people like Tingey, they would usually bring up a different study that supported their position, or shift the topic to a new point altogether. Sprinsock suggested that their belief in irradiation might be overwhelming their objectivity. "They can't conceive of the down side of irradiation," he suggested, "because they're not willing to let themselves think of it."

I was anxious to find out which way the doctors were leaning, so I approached the young president of the association. It had occurred to me that Mosgofian, Sprinsock, and Tingey had all sounded well informed, and I wondered how the physicians would go about arriving at a consensus. Dr. Barry Shitamoto smiled broadly as he shook my hand, a gesture, like his blue jeans, that I took as a sign of openness. I explained my impression that all three speakers struck me as credible.

"You have cases well articulated by reasonable-sounding people," I said. "How do you take a stand?"

His response stunned me. "You *don't* take a stand!" he said.

"No resolutions?" I asked. "No testimony before the state legislature?"

"This is a very, very difficult issue," he expained. "You have to understand that the issue is extremely political, so much so that we're just not going to take a position."

The Hawaii Medical Association's decision would keep it off the hot seat, but it wouldn't do much for the island's residents. It meant that if people wanted medical advice on whether irradiated food was safe to eat, or whether it was safe to live near an irradiation facility, they would have to turn to state health officials, who, as I was to discover later, already seemed pressured to support the governor's position on irradiation. Ironically, this special dinner meeting had been called precisely because doctors were unsure how to respond to an increasing number of questions about food irradiation that they were getting from their patients.

It felt like midnight before the banquet room finally cleared. Someone was nipping good-naturedly at Tingey's heels, trying to push the tight-lipped consultant into concessions. "Now come on, Garth," I heard him begin. "You and I both know . . ." I for one needed a break. As I passed by the restaurant lobby, the chef was unwinding in front of a television, stripped down to his undershirt. Together we watched the remainder of a Sumo wrestling tournament that was being beamed from Tokyo. I listened attentively to his occasional translation, grateful to be stepping away from a long day that wasn't entirely making sense.

Friday morning, September 26

The papaya industry meeting was crowded. Perhaps a hundred people had shown up at the basement function room of a nearby hotel for a day-long discussion of the state of the industry. I arrived late for the session on irradiation, but there were still plenty of "Tryapapaya!" promotional pens to go around, along with paper cups of papaya nectar, compliments, said the sign, of one of the growers. These were working people, most of them—whites, Philippinos, Hawaiians—and their work clothes fit well on an island where a necktie is taken as a sign that a person is from the mainland.

Bob Souza, president of the Papaya Industry Association, spoke first. Souza's was an interesting case. He had spoken out against irradiation some two years before, when the process had been proposed in the wake of the EDB ban. Souza had argued for an alternative called double dipping, in which papayas are immersed in two hot-water baths that kill fruit flies and their eggs. At the time, researchers at the Department of Agriculture were still ironing out kinks in the process, such as the tendency of the water baths to harden the fruit and prevent proper ripening. But Souza supported it nevertheless. For some reason, now that the double dip method had been improved enough to be used by all the major papaya packers, Souza had changed his mind and come out in support of irradiation. "The double dip method isn't always feasible," he told the growers at the meeting, "because it has to be used within eighteen hours after harvest. This can be difficult."

Souza hadn't been the only official to flip-flop on irradiation. Four months before the trade association meeting, the state's largest papaya packer had come out against the idea. Amfac Agribusiness president Dennis Teranishi had said, "I don't want to fool with it." Now there were rumors that Amfac was not only supporting irradiation, but actually lobby-

Photo by Jerma Jackson

ing to have a facility built on company property. It made sense: the giant packer probably read the writing on the wall and reasoned that if the facility was inevitable, better to have it constructed where the company could best use it. Teranishi was circumspect when I asked him about his apparent change of heart. "We're giving the idea [irradiation] serious thought," he said.

After Bob Souza, Denis Mosgofian held the stage for some twenty minutes. This time his eloquence seemed spent in minutiae. Determined to emphasize the nutritional losses of irradiated fruit, Mosgofian used precious minutes driving home a point more germane to an audience of consumers than producers. As he took his seat to polite applause, I wondered if he had considered making the likelihood of consumer rejection the cornerstone of his talk. Or for that matter, whether Kathy Dorn had thought to speak. Who better to discuss consumers' misgivings than a mother?

The next man bent to have his speaker's lei draped around his neck. His name was Scott Ahlstrom, and he represented the engineering firm CH_2M Hill. CH_2M Hill is already in the irradiation business. A subsidiary, Iotech, sterilizes medical instruments at the largest cesium-137 irradiator in the country, located near Denver, Colorado. CH_2M Hill is also being paid by DOE to develop commercial uses for nuclear weapons waste. While critics wonder whether a firm with such ties can complete the Hawaii feasibility study with objectivity, the company sees no conflict of interest. One spokesman told the *Honolulu Star-Bulletin*, "I like to think we were selected on the basis of our qualifications."

That was justification enough for the state of Hawaii. Denis Mosgofian relates a conversation he had with an official of the state Department of Planning and Economic Development, which had awarded CH_2M Hill the feasibility study contract. "CH_2M Hill has a vested interest in telling you an irradiation facility is feasible," Mosgofian had argued.

"But they're the experts," the official responded. "Who else can we look to? Look, if I have chest pains and I feel I need a bypass operation, who do I go to?"

"A cardiologist."

"Right."

"But what do you do after you see the cardiologist?" Mosgofian countered.

"I don't know."

"You get a second opinion. Otherwise you're relying on the word of a person who has a personal stake in operating on you. You have no way of knowing whether his motivation is his own financial interest or your health."

If the argument made an impact, it was imperceptible. The papaya growers at the meeting didn't seem bothered by the point either. Ahlstrom showed slides of spotless irradiation facilities throughout western Europe, and spoke of the need to deal with irradiation "as a non-emotional issue. Only then can we come to an informed decision." Ahlstrom talked about the safety features built into irradiators, and concluded, as Garth Tingey had the night before, "It is very difficult for us to imagine a credible scenario for the awful things people have predicted."

One of Ahlstrom's slides was a photograph of two crates of papayas, one conventionally processed, the other irradiated, both batches evidently stored for some time. The untreated fruit was dark and splotchy; the irradiated box was remarkably well preserved. It was one of the more indelible images of the afternoon, and it helped set the tone for Garth Tingey and the final speaker, an agricultural researcher and well respected expert on papaya irradiation who assured the audience that irradiated fruit was perfectly safe to eat. "I've probably eaten more irradiated fruit than anyone in the world, and as you can see," he smiled, "I'm perfectly healthy."

By the time the session broke up, it was clear that the last several speakers represented the cautious voice of reason. The papaya growers I spoke with fully supported irradiation. One man talked to me at some length about how risks are a necessary condition of progress, alluding to the space shuttle disaster as unfortunate but the price we pay for achievement. When I asked about the possibility of consumers rejecting irradiated papayas, he cited a CH_2M Hill figure that 66 percent of consumers surveyed support the idea of irradiation. He did not mention the survey cited by Mosgofian that found just the opposite.

As I talked with more growers, it became clear that in their own individual assessments of the costs and benefits of irradiation, hope springs eternal. It was a hope borne of years of economic depression. Hawaii's tropical fruit growers had been hard hit by the loss of the pineapple industry, which had moved to the Philippines for cheaper labor, as well as the declining mango crop, which, without EDB, was rapidly losing ground to voracious worms. The papaya industry itself was emerging from a disastrous 1985. Record production levels the year before had driven market prices so low that farmers could not recoup the cost of production. Farmers cut back on new plantings as a result. The new double dip method had been causing headaches, too, as mainland consumers were refusing to buy hard fruit. These and other problems had caused a 30 percent decline in the papaya harvest, and the growers were eager to return to relative prosperity.

An irradiator promised such prosperity in the form of expanded markets. Proponents of food irradiation saw the process as a way to make papayas available to countries like Japan, where irradiated food has already appeared on the market. Opponents doubted the market expansion theory and promised near-certain rejection of irradiated papayas on the health conscious U.S. mainland, which buys up half of the Hawaiian papaya harvest. Opponents also pointed out that the Japanese have largely rejected irradiated produce because of its indelible association with the atomic bomb.

The growers had no way of confirming either set of facts, but the hope for better times made it easier to accept the version of reality that offered the chance to expand their market. It was a frame of mind that pushed the possibility of disaster to the periphery as the potential benefits took center stage. But the risk had a way of creeping back into the spotlight. It was interesting to hear the growers support the new facility with words that downplayed the negative instead of emphasizing the positive. One grower I spoke with gave a single reason for his support of irradiation: "We're all going to have to die anyway at some point. That's how I see it." When I asked him whether he was concerned about cor-

One papaya grower said that risks are a necessary condition of progress, alluding to the space shuttle disaster as unfortunate but the price we pay for achievement.

sumner rejection, he thought for a moment, then smiled in the direction of the trade association president, and answered, "Talk to Bob Souza about that."

There was a noticeable fraternity at the meeting between state officials, DOE, and CH$_2$M Hill. They sat at the same table and clustered together afterwards. I had noticed the same closeness the night before as Garth Tingey, a contractor to DOE, referred to a state official as his "host." If state officials were concerned about at least the appearance of impartiality, one might have expected them to place some distance between themselves and the irradiation advocates. A local reporter who had been following the irradiation story helped me put some of what I was seeing in perspective. Gesturing that we walk out of earshot, he explained that Hawaii's state government is populated largely by Japanese. And just as the Japanese show great deference to the Emperor, so too are Hawaiian bureaucrats more prone than most to defer to the desires of the governor. It was an atmosphere, he suggested, that leads to the creation of political machines. "You won't hear it being talked about, but believe me, the machine is putting everything it can into a food irradiation facility."

Sunday evening, September 28

The machine theory was certainly consistent with the broad support that irradiation had received from the major actors on the island. Even public health officials, who might have been expected to voice some concern about irradiation, had been strangely quiet. Bob Sumner-Mack, M.D., the island's chief medical officer for the state Department of Health, had gone so far in private as to call irradiation "a gift from the devil." But when he was invited by the *Hawaii Tribune-Herald* to write a guest column on the subject, Sumner-Mack limited his discussion to the health effects of eating irradiated food—effects he judged negligible—instead of considering the broader range of potential health problems a facility might pose. When I caught up with him, Sumner-Mack hinted at the strain of working in an environment where political considerations often collide with professional judgment. "You have to remember that the heads of this agency are political appointees. The other doctors and I here in the department spend a great deal of our time trying to educate these people in ways that don't always work, because they have different priorities."

But what was happening in Hawaii had a less conspiratorial explanation as well—that everyone was simply aiming to satisfy their own individual interests. What Denis Mosgofian said was true: by having a food irradiator, the world gains papayas with sterile fruit flies. But there are other benefits to be had, too. The Department of Energy gains a way of reducing a growing pile of nuclear waste. The Department of Defense gains one less constraint on the production of nuclear weapons. Consulting firms like CH$_2$M Hill gain lucrative contracts. The papaya industry gains the hope of new prosperity. Bureaucrats gain favor with their department heads by quietly carrying out the will of their superiors. The state medical society, by ducking the action, gains by not being drawn into a difficult and potentially divisive controversy. Irradiation was rolling ahead not because everyone supported it for the same reason, but because a confluence of interests worked in its favor.

With everyone determined to advance their own cause, who would see to it that consumers' interests were served? Who but consumers themselves? Sunday evening, three days after the press conference that began this unlikely odyssey, I drove out to a small town on the edge of Hawaii's volcano district to sit in on a community meeting about irradiation. Bob Sumner-Mack was there. So were the activists. State Rep. Andrew Levin was there, too. Levin, who represents the city of Hilo, told me he was confused by the mixed messages he was getting from the experts. "Groups like the American Medical Association have gone on record as supporting irradiation. The FDA says it's safe and so does the U.N. But when I ask the Nuclear Regulatory Commission what you do in the event of a problem, I can't get them to respond to any of my letters." Levin was at the meeting not in his official capacity, but to learn more about the issue, just like everyone else.

It was a spirited discussion that lasted well into the night. And while it was evident that not all of the island's residents would resist food irradiation, it was also clear that the more people knew about the interests that lay behind the information they were (or were not) receiving, the more irradiation raised disturbing questions. Together the group pondered how to broach the distance between where they stood and where they wanted to be.

One woman who was now planning to approach her state representative was not certain that her message would get across. "How do we make our representatives listen to us?" she asked. Brion Sprinsock had a ready answer. "Politicians need the public to articulate the political will of the community," he said. "It's their job to represent you, and you help them do their job when you let them know what's on your mind."

As Sprinsock outlined some principles of effective lobbying, something in the room seemed to lighten. The whole irradiation question had arrived on the island with a palpable fatalism. One didn't have to be familiar with machine politics to sense something was awry. If residents suspected that these men were presenting less than the total picture, it was because they were saying what they had to say to win public approval, and believing what they had to believe to convince themselves of the correctness of their mission. In the process, Hawaii was seeing the politics of expediency rather than real democracy. The public meeting, I realized, was simply making the debate more democratic, opening it to a broader spectrum of participants and making sure government worked more the way it was intended to.

Sprinsock said it best when he explained how the coalition plans to handle the feasibility study once it is released later this spring. If the study addresses the full range of issues, Sprinsock feels it will only help the coalition by pointing out genuine areas of concern. If the study contains important omissions, the coalition will expose them. Either way, he said, the coalition will win. "I see the costs and benefits as a scale," he said, gesturing with his hands. "The benefits are much lighter. The only way the irradiation facility will be built is if someone lays a hand on the scale. What we're going to do," he promised, "is take the hand off the scale." □

Resources

National Coalition to Stop Food Irradiation, P.O. Box 59-0488, San Francisco, CA 94159; (415) 566-2734.

East Hawaii Coalition to Stop Food Irradiation, P.O. Box 1559, Pahoa, HI 96778; (808) 935-0604.

Papaya Administrative Committee, Robert A. Souza, Pres., 1100 Ward Ave., Rm. 860, Honolulu, HI 96814; (808) 533-3841.

Food and Drug Administration, Clyde A. Takeguchi, Center for Food Safety and Applied Nutrition (HFF-334), 200 C St. SW, Washington, D.C. 20204; (202) 472-5690.

IRRADIATED FOOD: A MARKETING HOT POTATO

The FDA has approved use of the process to delay spoilage in fruits and vegetables. But the big food companies are not exactly lining up to irradiate. "A lot of pioneers were shot by the Indians," says a Campbell Soup executive.

By Robert Steyer

The food industry's embrace of radiation to kill pests and microbes and extend product shelf life has all the inner tension of a teenager's first junior-high-school dance. His hormones are in perfect working order, but he doesn't quite know how to ask the girl onto the dance floor.

"When it comes to food irradiation, you've got a lot of companies wanting to be second into the market," says Richard Greenberg, Ph.D., director of scientific public affairs for the Institute of Food Technologists, a professional society of 23,000 food scientists.

"We certainly don't want to be last," says Tony Adams, director of marketing research and planning for the Campbell Soup Company, but adds: "It's important to take a balanced approach to this, because a lot of pioneers were shot by the Indians."

In April, the Food and Drug Administration approved the irradiation of fruits and vegetables, greatly expanding the range of products that may be treated. At the same time, the FDA required conspicuous labels stating that a product has been treated with radiation. The big food producers and processors find radiation's benefits worth pursuing. But they worry about cost, safety, and, most important, consumer acceptance. Food irradiation presents a frustrating, almost frightening, marketing puzzle.

The giant food companies have been prodded by a few Government agencies, the more zealous members of their fraternity, and the few entrepreneurs who earn a living irradiating food and other products. Proponents say low doses of radiation can be used safely, effectively, and—when economies of scale kick in—cheaply. They trumpet radiation as an alternative to pesticides, herbicides, additives, and preservatives in many foods. They say radiation will delay spoilage, improve U.S. food exports, and help alleviate world hunger by protecting shipments of food for longer periods.

Opponents—primarily consumer groups and some scientists—contend that tests to gauge the long-term effects of eating irradiated foods are inadequate and inconclusive. They say that the proponents' push to irradiate will create nuclear-safety as well as food-safety problems. Implicit in their objections, and sometimes explicit, is the threat of public protests against irradiated products and the companies that make them.

In the midst of the debate are the majority of consumers, who know little about radiation's effects on food or are confused about the conflicting claims. (See box on page 20.) Consumer research tells the companies to forget trying to convert the hard-core opponents—just concentrate education and marketing strategies on that great group of "undecideds."

But first, the companies have to convince themselves. "We have no intention of using irradiation unless it solves a problem that couldn't be solved in any other way," says Val Fischer, director of new technology for General Foods. The United Fresh Fruit and Vegetable Association, which represents growers, shippers, brokers, and wholesalers, found in a recent poll that 37 percent of its members would not sell irradiated food.

In three decades of mostly Government-sponsored research since President Eisenhower put food preservation in his Atoms for Peace program, food irradiation has remained a minuscule business. In the early 1960s, the FDA approved low-dose radiation treatments for killing insects in wheat and delaying sprouting in white pota-

Robert Steyer is a business journalist in New York.

toes. The FDA regulation, however, meant very little in reality because the products were plentiful, the technology was not readily available, and the savings were nonexistent.

Three years ago, the FDA approved radiation for killing bacteria in certain spices and herbs, and it has just approved higher treatment doses. But less than 1 percent of the spices consumed in the United States last year were irradiated. Merle Eiss, an official with McCormick & Company, a major spice producer, says cost comparisons depend on the type of spice and alternative treatment. "Some cost less, and some do not," she says.

The FDA has been stepping up its food-irradiation approvals. Last July, it gave the go-ahead for zapping pork to prevent trichinosis. The announcement in April that fruits and vegetables may be irradiated was its most sweeping regulation to date. Proponents of radiation, however, want the agency to do even more. They have petitioned to allow the treatment of poultry, fish, and shellfish.

The food giants, however, are not exactly lining up to irradiate. In fact, with only two exceptions, food companies have not petitioned the FDA to approve radiation treatments. "We're just not taking a lead role," says a spokesman for Del Monte, a major fruit processor. "We don't feel it's appropriate to discuss our plans." The Committee for Radiation Applications, a unit of the Atomic Industrial Forum, predicts "at best" some test-market efforts in the near future. "Don't expect to see an abundance of food products on supermarket shelves anytime soon," says its recent newsletter.

About 30 food companies, radiation firms, and food trade associations have created the Coalition for Food Irradiation to promote the process. The coalition develops pamphlets and documents, meets with journalists (especially food editors), holds workshops for food companies, and talks to health and food-service workers. "Perhaps there's safety in numbers," says Ellen Green, secretary of the coalition. "I don't think any one company wants its products highlighted in the eyes of those groups that claim irradiation is unsafe."

The first and most important thing to know about irradiation is that it does not make food radioactive, though high doses may alter the chemical composition. Irradiation is usually performed by gamma rays—produced by the radioactive isotope cobalt-60 or cesium-137—which pass through the food much as an X-ray goes through the body without leaving any residue. Other methods are high-energy electron beams (beta rays) and X-rays. Cobalt-60 is an expensive isotope that must be manufactured in nuclear reactors. Cesium-137 is a byproduct of nuclear fission. Although cesium-137 accounts for 3 percent of nuclear waste by volume, it generates 50 percent of the heat and 55 percent of the radioactivity.

Typical irradiation facilities include a warehouse to store products before and after treatment; a processing chamber with thick concrete walls; a conveyor system that moves the products through the chamber in metal containers; and the radiation source. Food-irradiation units must be designed differently from those used to sterilize medical equipment—the products most commonly treated with radiation. "Food generally requires lower doses of radiation, but it's processed in larger volumes," says Bahar Gidwani, an analyst for Kidder Peabody. "Dosage levels must be more closely controlled for food because it is more sensitive to overdoses." Depending on

the fruit, an overdose can cause rind damage, uneven ripening, or faster spoilage.

Doses are measured in rads—an amount of energy absorbed from radiation. A kilorad (1,000 rads) represents about 100,000 times the dose a human would receive from a normal chest X-ray. The FDA permits maximum doses of 100 kilorads for pork, fruits, and vegetables, and up to 3,000 kilorads for spices.

The fact that the FDA is making more foods eligible for irradiation does not push the intense scientific debate off center stage—even though such organizations as the American Medical Association and the World Health Organization endorse low doses for certain foods. When the FDA announced its fruit, vegetable, and labeling regulation in April, it said that only five of the 441 surveys it had reviewed had been properly conducted. The agency threw out some tests claiming that food irradiation was safe. It also rejected studies asserting that radiation caused increased tumors in rats, lower weight in dogs, fewer offspring in fruit flies, and chromosome damage in humans.

"We have no intention of using radiation unless it solves a problem that can't be solved in any other way," says Val Fischer of General Foods.

The FDA said that the five approved tests "indicate no adverse effects" from irradiated foods fed to animals. Dr. Sanford Miller, director of the FDA's center for food safety and applied nutrition, says the agency relied on chemistry tests more than animal studies. He says that force-feeding animals enormous amounts of any food—irradiated or not—can yield unusual results. "We're not worried about low doses," he says.

The FDA does not have to prove a product's absolute safety; the law says that's impossible. Safety requires competent scientists to establish a "reasonable certainty" that a food additive is "not harmful under intended conditions of use." That does not mollify such public-interest groups as the Environmental Policy Institute and the Health & Energy Institute, which want more long-term animal-feeding tests. They cite discredited tests as a reason for the FDA to go slowly. For example, they note that the agency allowed irradiation of canned bacon in 1963 based on Army research. Five years later the FDA rescinded the approval, saying that the tests had been improperly structured and sloppily conducted. The research was so bad that the FDA even dismissed comments by critics, who used the Army data to claim that irradiated foods caused problems. The FDA decision discouraged a group of private companies from building a pilot meat-irradiation plant.

Even some food executives would feel more comfortable with more tests on specific products. "I want to make sure there are no problems with taste or consistency or toxicology," says the food-science director of a large food company. He says that foods with high protein or fat contents raise the most questions. "Once I get past my concerns, I think the future for irradiated foods is excellent," he says.

The ideal test has never been done, nor is it likely to be done, says Dr. John W. Gofman, professor emeritus of medical physics at the University of California at Berkeley. In a 1984 letter to the FDA, Gofman, who is often quoted by critics, said that a test should control the diets of 200,000 people of various age groups for 30 years and follow their health histories for at least 50 years—preferably for their whole lives. Gofman said in the letter that he had no objection to the sale of irradiated food so long as it was clearly labeled as such.

The scientific combatants, who often interpret the same test data differently, clash over several issues:

☐ Critics say that radiation passing through foods causes "unique radiolytic products"—changes in chemicals that could turn into carcinogens. Radiation supporters say that radiation is less troublesome than charcoal broiling. The FDA says it found no evidence that radiation could cause harmful chemical changes at the dosage levels it has approved.

☐ Critics say radiation diminishes the nutritional value of food. The FDA responds that its analysis of medical literature shows "no nutritional differences" between untreated foods and products treated at FDA-approved levels.

☐ Several studies done in India in the 1970s indicated that radiation spurs the production of aflatoxin, which is produced by spores and mold and is 1,000 times more carcinogenic than the chemical ethylene dibromide (EDB), banned in the United States. Supporters say that the aflatoxin was caused by other sources. The FDA says that the studies "did not replicate normal food handling practice" and that aflatoxin cannot be cited as a radiation problem.

☐ Irradiation could produce mutant or radiation-resistant bacteria, say the critics. The FDA says that mutant bacteria produced during food irradiation "are essentially the same as those that occur naturally." It concedes that "specific conditions and indiscriminate irradiation" could

produce mutants, but says that "the possibility that such mutants would be more virulent or more harmful would be remote."

The first U.S. patent for food irradiation was granted in 1905 for a process suggesting that ionizing radiation could kill food bacteria. Sixteen years later, X-rays were tested to prevent trichinosis in pork. By 1943, scientists at the Massachusetts Institute of Technology were trying to preserve hamburger with X-rays, and in 1947 the first scientific paper discussing food preservation through irradiation was published. Food irradiation tests accelerated in the 1950s, with the Army and the Atomic Energy Commission taking the lead.

About 25 foreign countries currently irradiate a wide variety of foods, ranging from frozen frogs' legs to strawberries, although the number of items treated in any one country remains relatively small. The Netherlands, Chile, and the Soviet Union treat the most varieties of food. The Russians were the first to irradiate products for commercial use, in 1958

At the proper doses, radiation can destroy insects and larvae, kill bacteria and fungi that cause spoilage, and delay mold growth. But gamma rays that delay the ripening of some fruits can prevent ripening in others. The wrong dose can interfere with a product's normal metabolism, cause softening, increase the chances of rotting, and provoke uneven ripening. Heavy radiation levels can destroy nutrients and, in high-protein products, such as poultry and meat, cause offensive taste and odor. In some of the early Army tests, people complained that food treated with very high doses tasted like a "wet dog." The key is to find a radiation dose for each food that kills the pests but leaves the taste, texture, and nutrients alone.

An estimated $30 million to $40 million worth of food was treated here last year, providing only about $1.5 million in revenues to professional irradiators, says Bahar Gidwani of Kidder Peabody. The 43 radiation facilities in North America derived 92 percent of their $45 million in revenues in 1985 from sterilizing medical equipment and supplies. Only a small number of these units have been adapted for food.

Food-industry experts predict that Hawaiian papaya will be the first fruit irradiated; gamma rays kill papaya insects and delay ripening by several days. "But it may take a year because they haven't built a facility out there," says Sharon Bomer, government-affairs manager for the United Fresh Fruit and Vegetable Association. Papayas, apples, cherries, guavas, mangoes, and strawberries are among the fruits most likely to benefit from the new rules, because tests show little radiation damage, such as uneven ripening or spots on the skin. Avocados, cucumbers, lemons, limes, olives, and bell peppers exhibit "significant documented irradiation injuries," according to research compiled by the Dole Fresh Fruit Company.

Proponents say that radiation will improve U.S. food exports and help alleviat world hunger.

Grapefruit offers an intriguing problem. Citrus growers can no longer fumigate grapefruit sold domestically with EDB, because the Environmental Protection Agency has declared it a carcinogen. The growers can use EDB in diminishing amounts until 1989 for grapefruit shipped to Japan. Although the Japanese irradiate onions and potatoes, their Government has not permitted the importing of irradiated grapefruit. If Japan bans EDB-treated grapefruit and does not accept irradiated fruit, then citrus growers' choices will be sharply reduced. They can treat their products with methyl bromide, which is more expensive and less effective than EDB. Or they can try the experimental "cold treatment," in which fruits are exposed to near freezing temperatures for two weeks to kill pests. Research shows that radiation is effective in killing pests, but causes too much rind damage at doses needed to extend shelf life.

Pork presents another riddle. Regulations permitting radiation treatments to sexually sterilize trichinella spiralis—the parasite that causes trichinosis—have been on the books for a year, but there are no takers yet. "Major packers have inquired about it, but they won't do it themselves because of the cost," says Robin Kline, consumer-affairs director for the National Pork Producers Council. "Some small [irradiation] companies say they are getting ready."

Irradiated pork would cost consumers "a few cents more per pound," says Kline. But a new test that detects trichinae in live pigs would raise the price even less. Because the council has asked the Agriculture Department for permission to use the test, and trichinosis has dropped dramatically to about 150 reported cases per year in the United States anyway, why would pork producers risk the consumer-education headaches of irradiation? "That's a valid question," Kline says. "We think radiation has promise, but one way or another, we want to have trichina-free pork by next year."

Radiation supporters cite a recent Agriculture Department report showing that the costs of

chicken and pork irradiation are far exceeded by the benefits of preventing deaths, disease, medical costs, and lost wages caused by the bacteria and parasites in these products. The authors say, however, that they did not measure the costs of transportation, radioactive-waste disposal, and promotion, or the "unforeseen health effects of consuming irradiated foods." The report did not compare irradiation with other treatments.

When the FDA ruled in April that irradiated foods must bear labels reading "Treated with radiation" or "Treated by irradiation," many food companies and radiation firms worried about consumers' reactions. They wanted no label, or a more innocuously worded label, or just the symbol used in some foreign countries—an abstract flower design encased in a circle.

A study by the Department of Energy and the National Pork Producers Council reported that "irradiation" triggered the most concern of seven labels shown consumers. The United Fresh Fruit and Vegetable Association said its members considered mandatory labeling the biggest problem in selling irradiated food. A study for the Commerce Department's National Marine Fisheries Service warned that a mandatory label "could not only be misleading, it could be dangerous." And the Department of Health and Human Services, to which the FDA reports, wanted a label saying that the food was "picowaved," a term describing one one-trillionth of a meter on the electromagnetic spectrum. Industry members, who liked this term, said it was as easy to understand as "microwave."

The gamma rays pass through the food without leaving any residue, much as X-rays pass through the body.

The FDA rejected all the euphemisms. It said that "picowave" was not commonly used within the scientific community or industry. Any confusion created by a label, the agency said, "can be corrected by proper [industry-sponsored] consumer education." The labels could even include such explanations as "treated with radiation to kill pests."

Much confusion surrounds the labeling issue. If a spice producer sells an irradiated retail product, he must label it. If the same producer sells an irradiated spice to a food company, which uses it in a frozen pizza, then the pizza producer does not need a label. What about the producer of mixed-fruit preserves who uses irradiated strawberries? What about the maker of frozen chicken dinners who uses irradiated peas? The FDA will make case-by-case determinations.

The discrepancy between "first generation" (retail items requiring a label) and "second generation" products fuels opponents' criticism. "There could be some emotional backlash if consumers feel that the companies are hiding something from them," says Gidwani.

The regulations allow producers to put labels on point-of-purchase counter signs or bulk containers when it is not feasible to label individual items of unpackaged irradiated foods. Wholesalers must clearly label products so that foods are not zapped twice. That encircled flower logo will accompany all labels; and the FDA will decide in two years whether to drop the words and keep only the symbol.

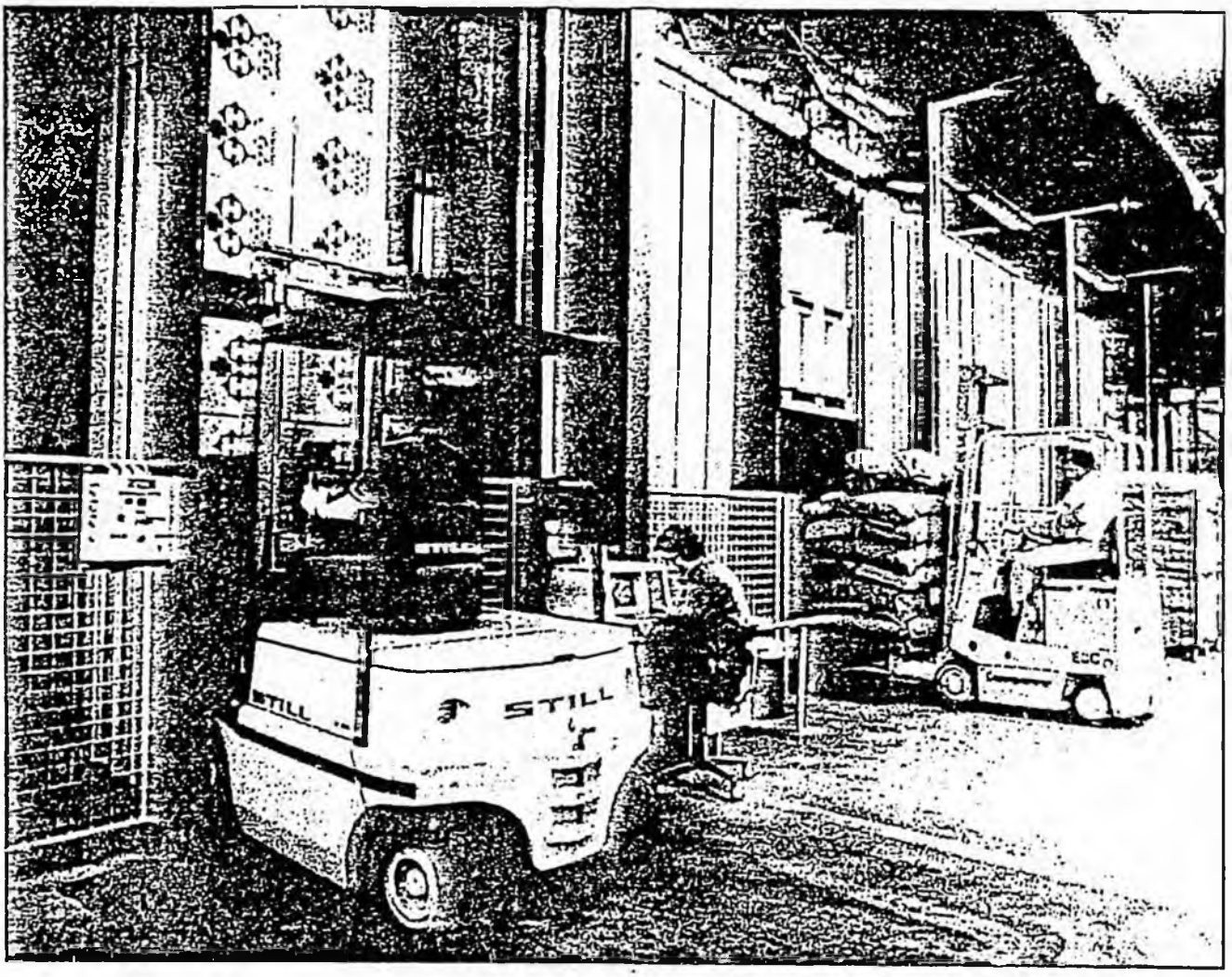
Some radiation proponents protested the label regulation, and one threatened to petition the FDA to overrule it, but most food companies appear to offer grudging acceptance. "This won't make marketing any easier," says one executive, "but we might as well call a spade a spade."

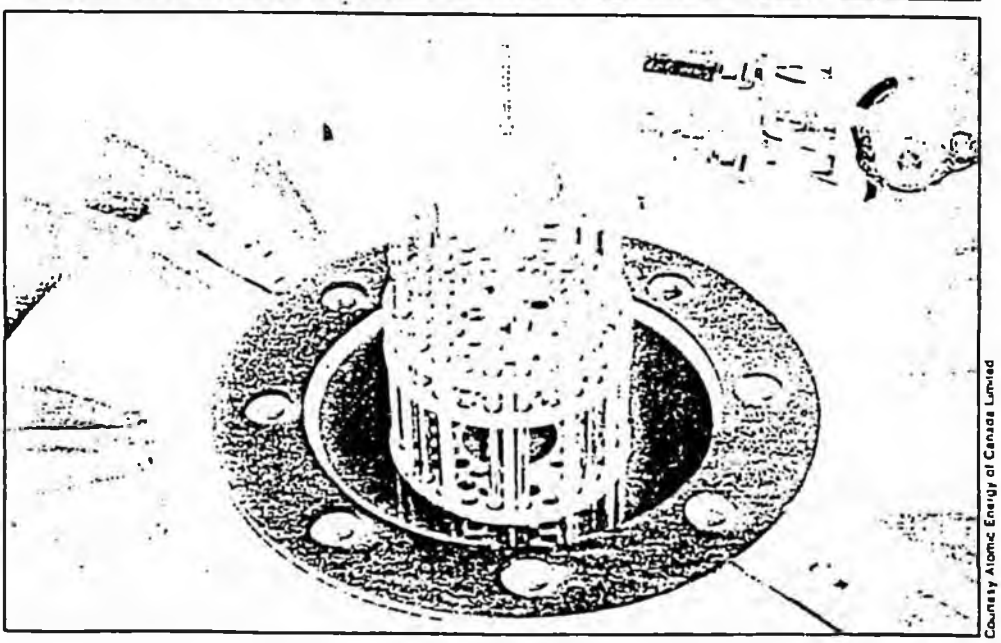
With consumers confused, costs a major question mark, and scientific debate raging, no wonder the big companies don't want to talk about their goals or test-marketing. Food companies are not even sure whether they want to do their own treatments. They must balance the desire to control the technique against the costs and potentially damaging public relations if they are cited for safety violations.

Charles J. Bauman, senior vice president of Dole Fresh Fruit, says it would cost $2 million to $5 million annually to run a radiation facility. "It's very hard right now, given all the problems, like consumer acceptance, to see any cost benefit," he says.

Lee S. Harrow, Ph.D., corporate technical director for the H.J. Heinz Company, says that "tremendous volumes" of food would be needed to justify the company's building its own unit. "We would lower our capital expenses by having the treatment contracted out," he says. "That's the normal practice in Europe." As with companies to which Heinz contracts the packing of its foods, Harrow says, Heinz would insist in any contract with an irradiator on conducting periodic inspections.

"If we leave it to the large companies, it may never happen," says Martin Welt, Ph.D., founder and chairman of Radiation Technology Inc. Welt is an indefatigable promoter of food irradiation and has initiated many successful food petitions to the FDA. Welt says he will sell pork under his own brand name, Picofresh, as soon as he gets the requisite approvals from several Federal agencies. "All we ask is an opportunity to





Courtesy Atomic Energy of Canada Limited

Safe handling? Above, products being loaded into an irradiator designed by a Canadian firm. At right, cobalt-60, encapsulated in long rods, is lowered into a shielded container for shipment to an irradiating plant. Cobalt-60, a byproduct of nuclear fission, emits gamma rays used in food irradiation. Opponents of the process argue that more transportation and handling of nuclear materials will lead to more accidents.

Can Consumers Be Convinced?

Market research shows that consumers are not necessarily unwilling to try irradiated products; they're simply unsure and uninformed. Researchers agree that companies should stress the benefits of irradiation rather than get tangled in technical explanations of the process. Follow those guidelines, says Bahar Gidwani, an analyst with Kidder Peabody, and food irradiation could become a $1 billion business by the mid-1990s.

"If it's presented as a choice to irradiate or not irradiate, almost nobody will think it's a great idea," says Tony Adams of Campbell Soup, who likens the radiation debate to the water-fluoridation controversy. "You have to get over the irrational response, and you have to build a foundation of understanding."

Market researchers say informed consumers are less apprehensive and more willing to sample irradiated products. Researchers emphasize the need for finely honed, carefully monitored education programs, especially aimed at women. A 1984 Kidder Peabody survey reported that 42 percent of the men, but only 16 percent of the women, would buy irradiated products. Women were more undecided about buying even when they were told that the food would cost no more than regular food and stay fresh longer.

A private research firm, commissioned by the National Marine Fisheries Service, found that consumers can be divided into rejectors (5 percent to 10 percent), acceptors (25 percent to 30 percent), and undecideds (55 percent to 60 percent). The percentages represent consumers' acceptance, based on a description of the technique and how radiation affects foods. When the pollsters described the benefits of irradiation to another group, without delving into the technology, the acceptor score shot up to 72 percent and the rejector only stayed at 6 percent. Sell the product, the survey concluded, not the process.

A private study for the Department of Energy and the National Pork Producers Council suggests that education can convert some people but may increase the doubts of others. The survey asked opinions about food irradiation and classified respondents as those with "major," "minor," or "no" concerns, and undecideds. Then researchers explained the attributes of food irradiation and reexamined the groups' attitudes.

In the major-concern class, 9 percent said their fears were alleviated, 3 percent became undecided, and 25 percent said they had minor concerns; the rest retained their major concern. Of those who at first had expressed minor concerns, 20 percent said they had no problems, 3 percent were undecided, and 24 percent developed major concerns.

Among the undecideds, 13 percent expressed no concern, 38 percent developed major concerns, and 22 percent had minor concerns. Of those who had said they had no concern, nearly 40 percent developed major or minor concerns. Researchers speculated that the interviews were less convincing than a consumer-education program would be.

Several studies suggest that companies market the benefits of irradiated foods as an alternative to foods treated with chemicals—an opinion shared by many food executives. The National Marine Fisheries Service study, however, warns against making a hard-sell comparison implying that chemicals are bad. Consumers' stated preference for irradiated foods over chemically treated products, the study says, reflects an anti-chemical rather than pro-radiation stand.

Surveys found other strong selling points: the absence of radiation in foods, the fact that irradiated foods have been fed to patients with immunological disorders, and the appeal to ease world hunger. Some radiation supporters consider the hunger issue to be weak. "A lot of world hunger benefits are overstated," says Richard Greenberg, a food scientist. "Solving world hunger is more of a distribution question than a supply question. They need roads, trucks, and a distribution system." The surveys did not mention whether well-fed Americans who support irradiation to help world hunger would buy the products themselves.

—R.S.

get it in the store," says Welt, who is fond of quoting a New Zealand entomologist to reflect his lack of fondness for bureaucracy: "The one insect that radiation will not destroy is the political mite."

Welt concedes that he has become a lightning rod for opponents of radiation; other food irradiators take a lower profile. He has also become a symbol of the problems that critics warn about. Welt's company is on the EPA Superfund toxic-dump list. Radiation Technology has been cited several times and fined once, and has had its operations suspended twice by the Nuclear Regulatory Commission for license and safety violations. The NRC recently closed one of Welt's plants for 10 days.

Other irradiators have also had brushes with the NRC. The food-irradiation opponents, who have hammered hard at the nuclear-safety issue, have not been loath to publicize those incidents. They argue that more food irradiation means more transporting and handling of nuclear materials—and more accidents.

The opponents have jumped on legislation, proposed in the last two sessions of Congress, that encourages the Government to lease nuclear waste for use as a food-irradiation source. The bills were introduced by Representative Sid Morrison and Senator Slade Gorton, both of Washington; the waste in question is cesium-137, and the Hanford Nuclear Reservation in Richland, Washington, is one of the largest producers of that byproduct. The bills still languish in their respective houses.

The Department of Energy has encouraged the use of cesium-137 for food irradiation as part of its "byproducts-utilization program." Congress allocated $5 million in the 1986 fiscal year for several Energy Department food-irradiation projects. Unfortunately, it has not yet found a place to build its Cesium Agricultural Commodities Irradiator. At first, the DOE proposed to build it in Miami at an Agriculture Department facility; but Agriculture said the unit would not meet its needs and objectives. Then the DOE made an agreement with the National Food Processors Association to house the unit in the association's new research center in Dublin, California. The association backed out, saying that the project would take too long and be too costly.

The DOE also has been developing a Transportable Commodities Irradiator, which puts a cesium unit on a flatbed truck. The unit, which was due in 1985 but has not yet been completed, would travel to ports and packing houses for irradiation research. Longtime critics are joined by some irradiation supporters in hooting at this idea. "It's a boondoggle," says Martin Welt. "It's one of the stupidest things I ever heard of," says Bahar Gidwani of Kidder Peabody.

The Morrison and Gorton bills create another controversy by removing radiation from the FDA's classification as a food additive. Under an amendment passed in 1958, the FDA must approve the safety of a substance before it can be marketed. Critics say the bills would make irradiated foods subject to fewer controls and tests. The bills also preempt states from imposing tougher food-labeling rules than are required by Federal law. The food industry wants the definition switched from "additive" to "process" because, it says, radiation is a process no different from canning or freezing. Opponents retort that the FDA requires the labeling of certain processes, such as pasteurization, because the consumer cannot tell what has been done to the food. Another bill would revoke the regulations for pork, fruits, and vegetables, and would require an independent test on the human health effects before any foods could be irradiated.

"If we leave it to the large companies, it may never happen," says the chairman of Radiation Technology.

When the food industry has entered the political fray, the results have been disconcerting. The attempt to tone down the label on irradiated products only delayed passage of the fruits and vegetables regulation for several months and mobilized opponents who claimed that the industry had something to hide. Pushing the change in classification from "additive" to "process" enabled the critics to play up their demands for more tests. The attempted change seems most incongruous now, since virtually no company takes advantage of existing food-irradiation opportunities.

The industry reduces its risk by not stepping to the forefront of the issue. But it increases its risk by being swept up in matters it cannot control or limit, since it is not leading the food-irradiation drive.

Food-company executives—who must grind their teeth whenever the NRC criticizes an irradiator, or when *any* nuclear problem gets dragged into the food debate—must make intricate calculations of cost, profit, and consumer acceptance. Joining a coalition can bring them only so far. Companies must decide whether to be firmly identified with irradiation through their products, or step away from it. The teenager won't dance with the girl unless he asks. ■

CLINIC

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Food Irradiation: 'Genetic Roulette'?

By Jeanne Sharpe, D.C.

Food irradiation has become a reality. The Food and Drug Administration (FDA) recently announced that it is permitting irradiation of fresh fruits and vegetables. Some foods, however, had already been undergoing this process—pork, wheat, potatoes, and more than 60 spices and seasonings. The FDA's rule legalizing irradiation tripled the dose currently permitted to be used on spices.

The FDA approval follows more than 30 years of scientific research and is based on reviews of 441 toxicity studies. Opponents of the process, however, contend there still are too many unknowns to make it safe for the public.

How Food Irradiation Works

Irradiation is a process in which foods are exposed to gamma rays, roentgenograms (X-rays), or electron bombardment to kill insects, molds, and/or bacteria that can lead to spoilage or disease. The food itself does not become radioactive.

Foods that are to be irradiated are placed on a conveyor belt, which travels into a chamber protected by thick concrete walls. A radioactive source, such as cobalt-60 or cesium-137, a waste product of the nuclear power industry, emits the radioactive rays.

At this time little definitive documentation concerning the long-term safety of this process on humans is available, and little is known about the chemical changes that occur in irradiated food. It has been observed that irradiation of grains and vegetables stimulates the production of highly toxic and carcinogenic toxins, which are 1,000 times more carcinogenic than EDB, a fumigant banned in 1984 by the Environmental Protection Agency.

Irradiation also produces free radical formation, which, in turn, creates radiolytic products. These new molecules can produce cytotoxic substances. In a paper entitled, "Basic Effects of Radiation on Food Matter," H. Glubrecht, of the Institute of Biophysics, noted that formaldehyde has been observed following the irradiation of carbohydrates where oxygen was present. Peroxide formation can be another problem. Benzene can be formed in irradiated beef. Irradiated meats can also produce hydrocarbons, carbonyls, and sulfur compounds. These volatile products can be traced to either fat or protein, and they are responsible for the somewhat unpleasant odors caused by irradiation.

Destroys Vitamin Content

Irradiation destroys vitamins, especially vitamin A and its precursor, carotene; it also is a destroyer of vitamin B fractions, vitamin C, and vitamin E. Radiation does not stop oxidative reactions that lead to rancidity in meat, poultry, and fish nor enzymatic reactions in these foods.

Food safety is in question again with regard to the possibility that food irradiation may spawn irradiation-resistant strains of bacteria and viruses. There is also the risk of improperly monitored and calibrated machines, including radioactivity in foods. Because no long-term studies have been done, the final word on the safety of irradiated food is not in, wrote Mark Robinowitz, assistant director of the Health and Energy Institute, a public-interest group concerned with the health effects of radiation, in *The New York Times,* June 1, 1986 (p. F2). Moreover, because irradiation produces scores of compounds, of unknown identity, the harmfulness of the process cannot be fully appraised at this time.

The implications of food irradiation technologies on public health and the environment could be quite serious. The largest subsidizer of food irradiation is the Department of Energy. The Coalition for Food Irradiation is composed of 30 of the largest food-processing companies which stand to create enormous profits from cornering the market on such an expensive and centralized procedure. The DOE has allocated $5 million of its 1986 budget to promote food irradiation. Among its other responsibilities, the DOE produces all of the nuclear material for nuclear weapons. Cesium-137 is a by-product of processing plutonium for missiles. Thus, food irradiation seems a convenient way to be rid of nuclear waste material.

Manufacturing more cesium-137 presupposes more plutonium which increases already existing problems of storage, handling, transport, and terrorist threat of attack. The two legislators who first introduced the food irradiation bill are from the State of Washington, home of the largest cesium-137 storage site in the country.

(Continued on page 8)

Keeping Pace

Bulemia, the Closet Illness

By Jeanne Sharpe, D.C.

Bulemia, the binge-purge syndrome, seems in current society to be a problem experienced for the most part by women. It is a desperate attempt to deal with many forms of anxiety, depression, intimacy, stress, and/or loneliness. Being thin, that is, controlling one's weight, is rewarded today and comes to determine closely one's self-worth.

This syndrome has existed since Roman times when huge food orgies took place, followed by vomiting, then eating again. The cycle of this behavior seemed endless, continuing for days.

The Nature of the Syndrome

Bulemia follows often discrete patterns of binge eating—rapid consumption of food usually in less than two hours. The food is most often high in calories and eating is terminated by abdominal pain, sleep, social interruption, or self-induced vomiting. Laxatives are frequently used, and it is not unusual to observe frequent weight fluctuations of 10 pounds or more.

The bulemic is aware that the eating pattern is abnormal and fears not being able to stop eating voluntarily. Bulemic individuals are preoccupied with food, and depression and guilt follow the binge episodes.

Bulemics indicate that they have a constant and continuous concern about their body size, and they most often perceive their bodies as being ugly and unattractive. As a group, bulemia patients experience a significant amount of fluctuating mood states, impulsive behavior, low frustration tolerance, and high anxiety. They have difficulty with self-esteem and self-criticism.

Bulemia is not viewed solely as an eating disorder, but rather as an extremely rigid pattern of thinking, feeling, and relating to the world. The bulemic's family members tend to manifest some type of enmeshment, overprotectiveness, rigidity, and lack of conflict resolution. There tends to be involvement of the bulemic in parental need issues.

Commonly, not until binging has gone on for five or more years does the bulemic patient seek assistance. It takes that long for self-regulation to break down. This amount of time in binging and purging takes its toll, and some common abnormalities can result, including metabolic alkalosis, hypochloremia, hypokalemia, edema, kidney dysfunction, and a predisposition to cardiac abnormalities. Dental cavities and tooth erosion also occur.

The Role of Food

Food and its preparation and enjoyment is indeed a social event. For bulemics, in particular, food has become an addiction, a source of stress, something to be feared. Food serves as a substitute for the "missing" pleasures in life. It soothes these missing basic needs. A single binge can obliterate an entire week's worth of problems.

Treatment of bulemia is best accomplished in centers that specialize in eating disorders. Cognitive behavioral techniques, group therapy, and journal-keeping all assist in helping the bulemic realize and deal effectively with the underlying emotional causes of this disorder. Family support and understanding are essential. Societal parameters concerning attractiveness and individual feelings of self-worth need to be reevaluated. ▲

Food Irradiation: 'Genetic Roulette'?

(Continued from page 1)

International Irradiation Symbol

To mark and identify foods that have been irradiated, an international symbol is to be used—a broken circle with a small ball and two leaves in the center (see first page of this issue)—and the words, "treated by radiation" or "treated by irradiation." The first foods to bear this symbol will likely be papayas, nectarines, peaches, strawberries, and melons.

Use of the symbol, however, is suspect, as the FDA has no empirical test to detect irradiated foods.

Among organizations formed to attack food irradiation, is the National Coalition to Stop Food Irradiation, whose address is Box 59-0488, San Francisco, CA 94159. In addition, a bill now before the House of Representatives would block implementation of the recent FDA rule until effects of irradiated food on public health and the environment are better understood. The bill, among other things, would also require irradiated ingredients to be labeled. Persons interested should pressure Congress to block the FDA action until more is known about food irradiation.

Food irradiation can be perceived as the fulcrum of the 1980s, uniting peace activists, environmentalists, and nutritionists. Interfering with food, our main life-force, can only result in irreparable consequences to planetary evolution. ▲

THE BLAST SUPPER

It's the winter of 1985 and your first day on the job with Agriculture Canada. You and eighty other people have an important task to perform: you must determine if irradiated food is fit for the palates of Canadian consumers. Whether it is fit, period, is another matter, but you are not concerned. Your employer says it's safe. The World Health Organization says it's safe. The UN Food and Agriculture Organization says it's safe. Long before anyone else, the International Atomic Energy Agency declared it safe; but, of course, you never took their self-interested word seriously, did you?

But then the Consumers' Association of Canada declared it fit and desirable, and, well, even if Nader's Raiders south of the border declared food irradiation a health hazard, who are you to doubt Canadian content?

Seriously, you think, would national and international government regulators be cozying up to food irradiation so quickly if the risks weren't acceptably outstripped by the benefits?

So you sit in Ag Can's Building 55 safe from Ottawa's winter brittleness, comfortable, wrapped in a softly backlit booth. Three pieces of chicken breast; cubed and tender, rest on a tray before you. You spear each cube and savour its taste and texture.

"Surprise," you exclaim, "they taste equally of palatable chicken!"

"Food irradiation tastes OK, eh!"

And now you find your opinion cited and your words broadcast, while behind your ail-in-a-day's-work the atomic regulators, safety speculators, public health negotiators and consumer raters spin their soft web of seductive technology.

Zap! No more salmonella in chicken.

Zing! Onions and potatoes give up the bad habit of life and stop sprouting.

Whish! No more germs in the spices.

Whoosh! A longer unrefrigerated shelf life for veggies, fruits and grains that might otherwise rot amidst the rest of the world's 300 million tonnes of market-surplus food.

Presto! An end to world hunger.

Better yet, "This technique may prove as revolutionary as the discovery of canning nearly 175 years ago." (Frank Fraser, vice-president of Atomic Energy of Canada Ltd.'s food irradiation division.) Best of all, within ten years "it could grow into a billion-dollar-a-year industry in Canada."

But the small voices niggle away. Like Energy Probe's David Poch, in his recent book *Radiation Alert*: "There is very little understanding of the subtle long-term effects on human health due to food irradiation, and we may all become experimental guinea pigs."

Heard it before, haven't you? But you rationalize it off; heck, life itself's nothing more than an extended crap shoot, especially in the technological fast-lane. I mean, there've been over 400 studies and scientists who work for government (well, at least for those governments that haven't banned irradiation) and scientists who work for industry say the balance of the findings are no cause for concern.

There'll always be some scientists bringing up the mouse cancer stuff. But those were mice, right? Sure, there were those kids in India whose irradiated diet gave them chromosome damage, but we're taking safer doses here, aren't we? Besides, the industry says that study was no good.

As for vitamin loss in the food itself, the same thing happens when you wok it, steam it, broil it or braise it.

Yeah. You thought about the irradiators themselves, beaming that glow-in-the-dark cobalt 60 (the Canadian stuff) or cesium 137 (the U.S. leftovers). You remember, too, the story a couple years back of the Canadian cobalt from a U.S. hospital irradiator that started off in a Mexican scrap-metal yard before click-clicking its way across North America as recycled furniture steel. All the way north to a restaurant in Winnipeg – and you laugh a little nervously.

That *was* a close call!

But you read the newspapers. We're getting tougher on acid rain. The U.S. has almost agreed to dig up its Niagara waste-dumps. The dangerously leaded soil will be raised from Toronto's South Riverdale neighbourhood. Besides, the cancer-disaster of Eliott Lake's uranium movers has gotten really sympathetic media and legislative reports of late.

So you're confident that *this* time, we'll do it right.

You savour the three cubes of chicken, honestly unable to tell the irradiated flesh from the other two. You claim that unique radiolytic products, URPs, the left-overs of irradiation, have no taste.

And you declare irradiated food fit for

FOOD IRRADIATION AND THE NUCLEAR INDUSTRY

by Nick Fillmore and Anne Wordsworth

Canadian consumers, grist for the regulators and the industry lobbyists poised to fast-track Canada into the safe(r) new era of the peaceful atom.

But now, for a few moments, shift your point of view. You no longer taste-test for Ag Can. Instead, you are one of Canada's discriminating magazine readers. And you are about to find out how and why the regulators once again have shafted safety in the name of industrial *status quo*.

Let us start by saying that the Ag Can taste test really took place. The fact that no one who took the test could tell which piece of chicken had been irradiated has given the government one small piece of evidence to justify its decision to plan for substantial increases in the use of food irradiation in Canada. Canada already permits the use of irradiation on potatoes, onions, grains and spices, although no one is currently using the process. Irradiation of chicken to destroy salmonella is expected to be approved in the spring; fruit and vegetables would be next.

This planned greater use of food irradiation is the result of an aggressive no-holds-barred campaign by the nuclear industry world-wide to try to demonstrate the benefits of nuclear technology. The industry fears its existence is threatened because of the collapse of nuclear energy programs in most countries since Three Mile Island and Chernobyl. The industry wants to prove itself – and justify its survival – by showing the world the benefits of food irradiation.

An investigation by *This Magazine* suggests that the food irradiation industry cannot survive on its own, but some governments – particularly the U. S. – may prop it up through heavy subsidies because their political objective (an increased nuclear arsenal) matches the economic objectives of the nuclear industry. Public-interest groups and the peace movement in the U.S. are enraged that the government is planning to use nuclear bomb waste material as fuel for food irradiation.

The Canadian nuclear industry needs a success story. It's facing a crisis because it hasn't sold a Candu reactor since 1982. Nor are there good prospects for future sales, although the industry still maintains a large infrastructure with the government underwriting most of the bill.

Not surprisingly, then, the push for food irradiation in Canada is being led by Atomic Energy of Canada Ltd. (AECL), a government-owned Crown corporation. AECL is the world's largest manufacturer of medical and food irradiators. It has designed and built seventy-one of the world's 132 irradiators, provides ninety per cent of the cobalt 60 and, together with the Armand Frappier Institute and the engineering firm Lavalin, is launching the country's first commercial food irradiator in Laval, Quebec. A six-million-dollar joint venture, the new company, Biopreserv Inc., intends to make a profit. In Richmond, B.C., the plans of QIX Facilities Corp. to build a private food irradiator now appear to be stalled because of financial problems. Other private companies, already involved in the irradiation of medical equipment, are gearing up in anticipation of wider use of food irradiation.

The AECL is also aggressively promoting the sale of its food irradiators around the world, especially to developing countries. It has already sold food irradiators to China and South Korea; sales to Jamaica and Thailand are believed to be nearing completion and the company is involved in feasibility studies in Chile, Mexico, Brazil and Egypt.

While capitalizing on food irradiation as much as it can, AECL is not the real force behind irradiation-for-all-the nations. That task falls to the International Atomic Energy Agency (IAEA), a nuclear industry lobby whose specific mandate is to promote the peaceful uses of nuclear energy. For the past twenty years, the IAEA has been laying the groundwork to win wide approval for food irradiation. It has successfully manipulated how the safety of irradiation was decided in the international community, paving the way for countries like Canada to introduce their own legislation.

In recent years the IAEA has devoted a large part of its budget to the difficult task of trying to prove food irradiation beneficial. "By the early seventies, the scientific basis for the testing of food irradiation was in a total mess," noted Tony Webb of the London Food Commission, a British public-interest group that has published two reports critical of food irradiation. "That's when you find the IAEA stepping in to try and clean up the act."

Originally the nuclear industry had cast its lot with the U.S. Army. It start-

The list of products that AECL recommends for irradiation in its promotional brochures includes many kinds of medical supplies from gloves to syringes, and many foods from grains, to apples, to chicken to fish.

ed its research in 1953 and spent more than fifty-one million dollars attempting to prove the safety of irradiated food, and, for a limited period, the U.S. permitted the army to use irradiated canned bacon. But a review of the animal testing revealed increased deaths in the offspring of rats, and the permit was revoked. Even though the army kept on trying, the real thrust moved to the IAEA.

The IAEA developed a strategy to rebuild the credibility of food irradiation by convincing prominent government and food industry officials from many countries to join IAEA's International Consultative Group. An IAEA document "Communications Guidelines for the Acceptance and Use of Food Irradiation" said the campaign is targeting government and non-government groups, the food industry and consumers. "The tactics are straight infiltration," said a person who has considerable knowledge of IAEA activities but asked not to be named. "They pick out key people and go for it." It's estimated that the IAEA is spending up to thirty per cent of its budget (which comes from the United Nations and twenty-three countries, including Canada) to get food irradiation approved.

Key to the IAEA's strategy was a carefully stage-managed review of the hundreds of studies on food irradiation. The IAEA must have realized that a review committee set up and managed by only the nuclear industry would not be trusted, so it somehow convinced two prestigious groups – the World Health Organization and the Food and Agriculture Agency – to set up a joint Expert Committee. Ten years later, in 1980, this committee, dominated by the IAEA, produced a report claiming food irradiation was safe and there was no need for further toxicological testing at the low doses that were being proposed.

The committee did not explain how it came to its conclusions. The report includes references to a number of studies, but there is no information on why many critical studies failed to influence their final decision. "There are two key weaknesses," an expert source told *This Magazine*. "One is a tendency to gloss over any experiments that show adverse effects. The other is to, stage by stage, water down the actual amount of vitamin loss of food that has been irradiated. The original papers say there is vitamin loss. In the review they talk about possible vitamin loss, and when you finally get to the expert committee, it's insignificant vitamin loss."

Dr. Takahashi Kosei of Japan, who reviewed the expert committee's findings, showed how many adverse effects in studies had been downplayed and strongly criticized the committee's findings on potatoes, rice, onions and wheat. In one instance, a Japanese study which the committee used to approve the irradiation of potatoes showed that irradiated spuds affected a wide range of body organs in the test animals. Kosei concluded that irradiated potatoes should *not* be considered safe for human consumption. Similarly, another Japanese study, used by the committee as proof of the safety of irradiated rice, showed that the rice produced tumours in rats and mice. Again, Kosei considered a proper analysis of the study contradicted the committee's reassuring conclusions and "casts grave doubts on the reliability of international organizations such as FAO, IAEA and WHO."

Kathleen Tucker of the Health and Energy Institute in Washington, a public-interest group opposed to food irradiation, put it more bluntly: "The IAEA is not a public health agency. It is a promoter of nuclear technologies. When the IAEA declares that food irradiation is safe, it is analogous to the American Tobacco Institute claiming cigarette smoke has not been proven dangerous."

The safety debate has centred on whether the thirty-six or so "unique radiolytic products" (URPs) formed in food by irradiation can damage human health. Proponents argue that URPs and other food changes are party to *any* form of food preservation or preparation. Opponents maintain that not only do two wrongs not make a right, the irradiation-caused URPs should be regarded as *definite* human health risks. (It should be noted that food does *not* become radioactive at controlled irradiation doses.)

Their caution is based on two sets of evidence: animal test results, and one human study in India.

Scientific uncertainty over the extrapolation of animal data to the human population persists and will likely remain moot for decades. Human cancer risk assessments based on animal studies, however, have grown quite sophisticated and have earned widespread scientific and regulatory legitimacy. Organ damage, chromosome aberrations and offspring abnormalities are all regarded as signs of

possible "pre-cancerous" developments. Though not consistently, many studies on test animals fed an irradiated diet have shown a variety of adverse effects, including premature death, chromosomal damage, kidney disease, testicular damage, reduced fertility and a decrease in offspring.

Recent studies in particular have failed to support the nuclear industry's food irradiation boosterism. A few years ago Raltech, the research arm of Ralston-Purina fed irradiated chicken to test animals, confident the results would condone the industry position. They did not. One study showed testicular tumours in mice. Another found that feeding irradiated chicken to fruit flies increased the rate of death of their offspring. And in another of the Raltech studies, researchers discovered that mice fed irradiated chicken had a greater incidence of kidney disease than their fellow mice eating non-irradiated chicken. Though the U.S. Food and Drug Administration (FDA, the agency empowered to regulate food irradiation in the U.S.) reviewed these studies and quibbled over the tumor count in one of them, the Ralston-Purina researchers tactfully concluded that "while no single finding from the study is highly illuminating, a collective assessment of study results argues against a definitive conclusion that the gamma-irradiated test material was free of toxic properties."

The most damaging research ever done was a study in India in the seventies. The Indian Department of Atomic Energy had applied to its government to use irradiation to preserve wheat. The Indian government believed irradiation was safe and was considering allowing its use. In an extreme departure from normal research practice, irradiated food was fed to malnourished children, instead of test animals. The sick children, all between the ages of two and five, were admitted to the hospital and put on a supervised diet of wheat and skim milk.

The researchers divided the children into three groups. One group was fed freshly irradiated wheat, another stored irradiated wheat and the third, unirradiated wheat. The group fed freshly irradiated wheat showed signs of chromosome damage and developed a condition called polyploidy, an abnormal number of chromosomes. The second group, fed stored irradiated wheat, showed some signs of polypoidy, although not as severe as the first group. The children fed unirradiated wheat showed no signs of polyploidy at all. (As soon as the Indian researchers noticed these abnormalities, they stopped the experiment for ethical reasons.)

The study was published in the peer-reviewed American *Journal of Clinical Nutrition* in 1975. Dr. George Tritsch, a prominent cancer researcher at Roswell Memorial Park Institute in Buffalo, said in an interview with *This Magazine* that the implications were clear, "The Indian study, which the industry would like to discredit, showed eighty per cent of the children fed irradiated wheat had chromosome damage. When you stopped feeding them irradiated wheat, the chromosomes went back to normal. That indicates the wheat was very mutagenic. You could not design a better study to illustrate the mutagenicity of irradiated wheat." It is accepted in scientific research that most mutagenic materials also cause cancer.

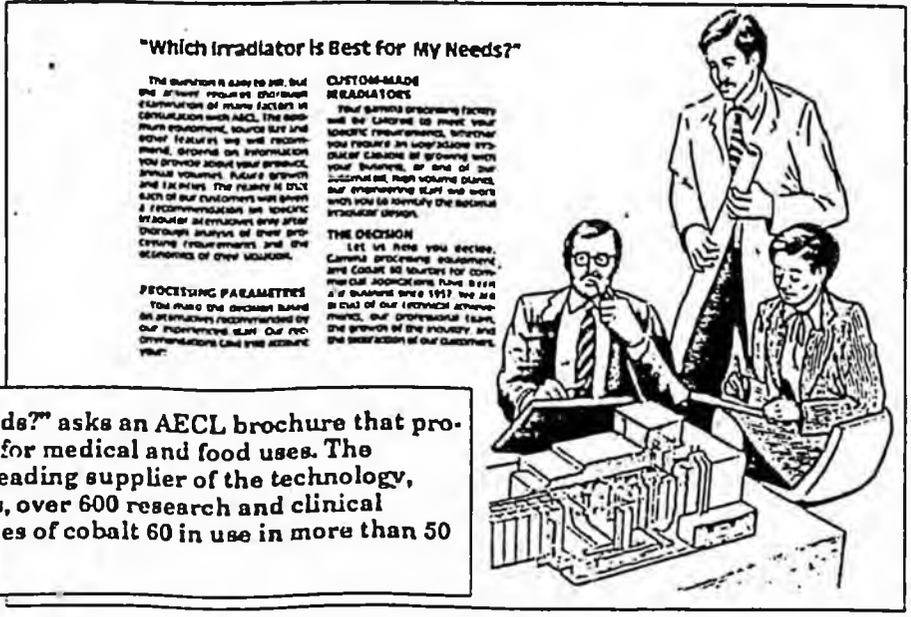
Because the study was so damning of the nuclear industry's propaganda, the industry has struggled hard to discredit it. First off the mark was the Indian nuclear industry, Bhabba Atomic Research Centre. The government-appointed nuclear scientists reviewed the study and submited a critical, but confidential, report to the Indian government. The National Institute for Nutrition, where the original study was done, then submitted a rebuttal of the criticisms made by the two investigators.

Although the review of the Indian study was confidential, copies nevertheless found their way to the IAEA in Vienna and to the U.S. FDA. The latter in particular exploited the review.

When the FDA issued its regulations on food irradiation in April 1986, it specifically rejected any concern raised by the Indian study on the basis that its findings had been dismissed by the Indian government review. Other proponents of food irradiation spread rumours that the study was fraudulent and that the institute had itself refuted it. In fact, the institute has stood by its study, and has done further animal experiments confirming the original results.

In its latest attempt to discredit the Indian study, the nuclear industry cites a study done in China where irradiated food was fed to humans, which claims there was no evidence of polyploidy. But it seems that this study hasn't been subject to review by scientific peers. "We cannot take completely seriously any study purported to demonstrate safety until it is published in a scientific journal," said Linda Pim, in a Pollution Probe presentation to the House of Commons committee that has been looking into food irradiation. "Much of the criticism of studies showing adverse health effects of irradiated food is unpublished, confidential and otherwise not fully accredited."

Back at home, the Canadian nuclear industry has embraced the IAEA's and FDA's food irradiation rhetoric and used it to maximum advantage. It has spent heavily in recent years



"Which irradiator is best for my needs?" asks an AECL brochure that promotes the use of gamma processing for medical and food uses. The brochure says AECL is the world's leading supplier of the technology, with over 65 commercial irradiators, over 600 research and clinical irradiators, and over 80 million curies of cobalt 60 in use in more than 50 countries.

lobbying government and sending its executives across the country to eulogize irradiation to anyone who would listen, from business clubs to home economics' associations. On many occasions, however, AECL officials have misrepresented the true picture concerning food irradiation.

AECL claims in its reports and media statements that the Joint Expert Committee report is the final word on the safety of food irradiation. In a recent appearance before the Commons committee on food irradiation, Bruce Wilson, AECL director of marketing, parroted the IAEA false claim that the Indian study of malnourished children had been discredited.

AECL's main justification for increased use of food irradiation is to fight salmonella in chicken. And AECL officials gave the Commons committee misleading statistics on the number of deaths in Canada each year from salmonella poisoning. Paul O'Neill, president of AECL's food irradiation division, told the committee that "the number of deaths due to salmonella poisoning in Canada are estimated to exceed 750 per year." But this figure is wildly exaggerated. According to Statistics Canada, the actual number of recorded deaths has never been higher than nineteen in any single year since 1970, and while an unknown number of people may die of other complications involving salmonella, the total figure comes nowhere close to AECL's claim.

AECL officials repeat IAEA statements exaggerating the amount of food irradiation going on in different countries. The IAEA distributes a list of twenty-two countries where food irradiation has been technically approved. The list is circulated to the Canadian media and the public by AECL and is used to suggest that these countries are doing extensive food irradiation. But Dr. Takahashi Kosei, who managed to obtain an IAEA survey, found that most of the twenty-two countries were not actually using the technology. The one country that uses it regularly, but only for fresh fruits and vegetables, is South Africa. About five other countries are making limited use of the technology for a very small part of their food supply.

The most vocal and persuasive spokesperson for the Canadian industry is Frank Fraser, vice-president of AECL's food irradiation division. The two other leading industry promoters have been AECL's Bruce Wilson, director of marketing for food irradiation and Dr. Theo Ouwerkerk, who recently left AECL to start his own consulting company in the food irradiation field, Gamma Processing International.

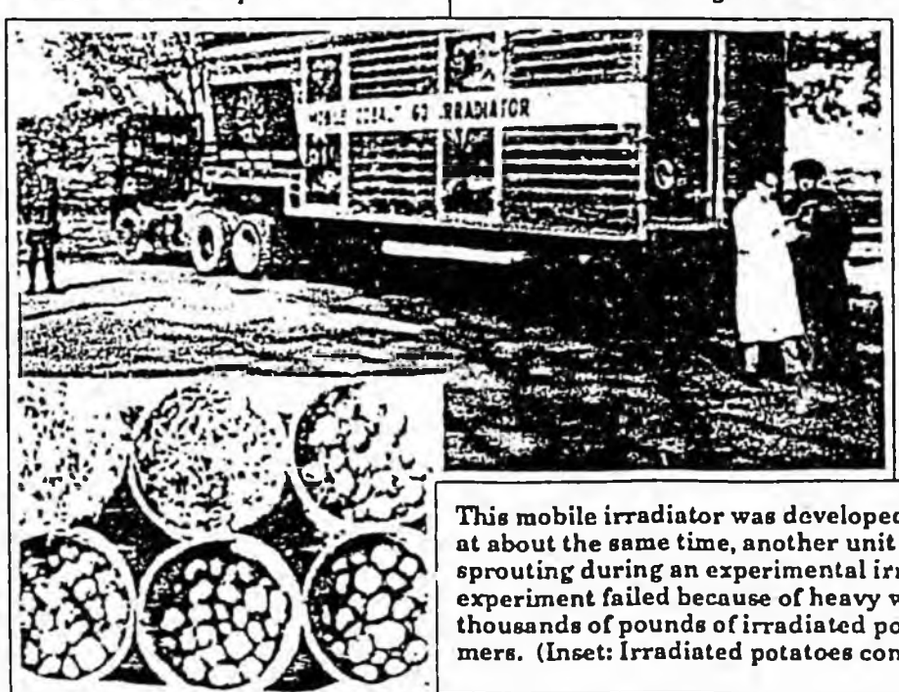
Fraser – an engineer – is zealous on the benefits of food irradiation, claiming that it is absolutely safe. In December 1986, he told the Commons committee that even if a piece of food is irradiated twice it "is not going to cause any toxicological problems at all." He has so much faith in the technology, he irradiates his family's own potatoes.

Just as the IAEA has garnered international legitimacy through its association with the WHO and the FAO, AECL capped its PR strategy by winning the support of the 160,000-member Consumers' Association of Canada (CAC). Fraser and Ouwerkerk spent an evening in 1981 explaining the benefits of food irradiation to the CAC Food Policy Committee and apparently were very persuasive. "It didn't take very long to convince this group," wrote committee chairperson Marilyn Young "that gamma processing could indeed be a valuable tool for the food industry and a benefit to consumers world-wide."

Young prepared resolutions supporting food irradiation that were passed at the 1982 association convention. At the time, food irradiation was almost completely unknown to CAC members, and the prospects of salmonella-free chicken or sproutless onions and potatoes seemed appropriately pro-consumer. Young now speaks at international forums championing food irradiation, though, as she admitted to a conference at the International Centre for Food Irradiation in the Netherlands, she "honestly cannot assess much of the data, nor can other consumers. We must rely on you people to be our health protectors."

Some members of the association are also disturbed by the endorsement given food irradiation. CAC member Hilda Brister is planning resolutions to overturn the food irradiation decision at the convention in Ottawa in mid-June. "I was at the convention in 1982 when it was brought up and nobody knew much about it. I thought we should have waited," Brister said. "I feel we're endangering our health if irradiated food gets on the market and we eat it."

The food irradiation lobby has also been very persuasive in its dealing with the federal government. Seven government departments have joined AECL to create an Inter-Department Committee on Food Irradiation with the goal of bringing together key people who can help promote food irradiation technology. "We are not simply talking about a business of selling food irradiators," said Susan Mills, a food irradiation research officer with the Science Council of



This mobile irradiator was developed by AECL in the 1960s. In Quebec at about the same time, another unit was built to stop potatoes from sprouting during an experimental irradiation program. Officials said the experiment failed because of heavy water content in the potatoes. Still, thousands of pounds of irradiated potatoes were distributed to consumers. (Inset: Irradiated potatoes contrasted with non-irradiated spuds.)

The logo that is proposed for irradiated food is very similar to the logo already used by the U.S. Environmental Protection Agency

Canada who is also on the committee, "we're talking about selling a whole export industry of a food-processing nature, whereby people or companies with complementary goods and services can be gathered together in consortia around AECL and AECL's technology. This will open up a whole export industry for Canadian firms."

The health question is not on the agenda because, according to Dr. Sol Gunner, a committee member and head of the Health and Welfare division responsible for national food safety, the department accepts the safety verdict of the Joint Expert Committee. As a result of IAEA's lobbying, the government is expected to make changes to legislation this spring that will allow for the full development of this technology by removing food irradiation from the "additive" category and making it a "process."

This is an important distinction. U.S. legislation in 1958, quickly copied by Canada, made it mandatory that all food additives undergo safety testing and classified irradiation as an additive. This legislation was intended to protect the public from the quick introduction of new, perhaps unsafe food additives. The food irradiation industry in both countries has made it clear that these requirements are blocking the way to more widespread use of the technology.

By redesignating food irradiation a process, Health and Welfare Canada appears to agree with the IAEA's contention that irradiation has been proven safe with no new toxicological tests necessary, even though the department has conducted none of its own research on food irradiation. Under the proposed regulations, the only information required by Health and Welfare would be the amount of radiation and the conditions under which it would be used. That this so closely resembles the industry demand could reflect the presence of Dr. Norman Tape on the Inter-Department Committee. Besides representing Agriculture Canada, Dr. Tape is also chairperson of IAEA's world-wide Consultation Committee on Food Irradiation.

The United States is moving even more quickly than Canada to introduce food irradiation. Because Canada brings in so much food from the U.S., the first irradiated foods that Canadians are likely to eat will be American imports. The U.S. is also bound to put pressure on Canada to conform to U.S. standards.

President Ronald Reagan clearly had a goal in mind when he named Margaret Heckler as Secretary of Health and Human Services in 1980. Responsible for the Food and Drug Administration, Heckler had been a member of Congress representing a district that included the U.S. Army Natick Research Laboratory outside Boston, where much of the research on food irradiation was done. She was a long-time supporter of food irradiation and critics say she pledged she would sign the authorization for the technology before her term in office was up.

Under Heckler, the FDA disregarded the traditional safety testing procedures when it decided to expand the uses of food irradiation. Although it has not yet changed irradiation from an additive to a process, it has eliminated the requirement for animal testing under its new rules on food irradiation. Industries who want to use food irradiation no longer have to support their application with studies proving the safety of the irradiated food.

The FDA also ignored all the studies that showed adverse health effects in its evaluation of food irradiation. Although it rejected most of the over 400 studies on the process as flawed, of the sixty-nine that were good enough for review, almost half showed adverse health effects. All these negative studies were thrown out by the FDA and deemed to be deficient in the final regulations. It used only five studies showing no adverse effects to support its position that food irradiation was safe. Heckler kept her promise by signing the authorization for increased use of food irradiation on her last day in office. Ralph Nader's Public Citizen's Health Research Group called the FDA's actions "reckless and illegal."

Robert Alvarez of the Environmental Policy Institute, a public-interest group in Washington, says that food irradiation was pushed through because the Reagan administration was concerned about the declining popularity of the nuclear industry and feared that the same feelings might be held about the nuclear weapons program. Food irradiation would be the industry's much-needed success story replacing the still dubiously effective radiotherapy of cancer tumors as the peaceful atom's good news.

Moreover, Alvarez says the latest push to commercialize food irradiation is directly linked to U.S. plans to embark on a huge build-up of nuclear weapons, a troublesome waste product of which is cesium 137. (Cesium 137 has a very long half-life of thirty years which means it would take approximately three hundred years before it becomes harmless.) Alvarez claims the government will give the food irradiation industry huge subsidies to create an artificial demand so the military can get rid of the cesium 137.

The U.S. military, through the Department of Energy (DOE) is pumping ten million dollars into food irradiation with the goal of having products appear on store shelves within two years. Under DOE's Byproducts Utilization Program, cesium 137 from the Hanford nuclear waste storage facility will be used to fuel five regional test-market food irradiators – in Washington state, Hawaii, Oklahoma, Florida and California. In a program that will be heavily subsidized by DOE, the government is cost-sharing with local sponsors in each

of the five states. Hawaii may be the first to go into production – irradiating up to twenty million pounds of papaya per year for distribution in North America. For areas that can't support year-round food irradiation, DOE has built a $1.2 million transportable irradiator that will be used to irradiate seasonal crops.

The U.S. government and the food-irradiation lobby have been prodding the food industry to begin plans to introduce the technology. Individual companies, however, have been reluctant to be identified with the technology, fearing a consumer backlash and possible boycott. Instead, about thirty companies, radiation firms and food trade associations in the U.S. have joined together to create the Coalition for Food Irradiation. (A similar group has been set up in Canada.) The coalition prepares pamphlets, meets with journalists, particularly food editors, and talks to health workers and officials.

The first irradiated food for commercial sale in the U.S. went on sale in Miami last September. Laurenzo's Farmers Market was chosen as a test site to sell mangoes irradiated in Puerto Rico after two national supermarket chains turned down the offer. An Israeli marketing firm was finally convinced to market the product under the name "Pango Mango." Laurenzo's sold the first order of twenty cases of mangoes in four days amid the crush of TV cameras, lights and reporters. The company ordered twenty more cases. "The people who are buying them are mango lovers," David Laurenzo said. "It doesn't matter to them if they are irradiated or not. If they look good, taste good and smell good, they will buy them and come back for more."

Despite the economically boisterous support of the U.S. government, the nu-

ADDITIONAL PROBLEMS ASSOCIATED WITH FOOD IRRADIATION

Vitamin Loss – Irradiation can cause nutritional losses in food by destroying many vitamins, particularly vitamins A, some Bs, C and E. The extent depends on the vitamins, the type of food and the radiation dose. If the food is cooked or canned, even greater vitamin losses occur.

Destruction of Bacteria – Although irradiation may kill some disease-causing bacteria it does not necessarily kill all bacteria in a food. In chicken, irradiation can kill the salmonella bacteria while the bacteria that causes botulism survives. Dr. Venket Rao, a nutritionist at the University of Toronto, says that we may be replacing one type of food poisoning with another.

Mutations – Dr. Rao also says that irradiation of food "may induce genetic changes and produce bacteria through mutation that have a higher resistance to any kind of destruction."

Aflatoxins – Aflatoxins are very powerful, naturally occuring cancer-causing agents, produced by some types of fungus associated with grains. Several studies have shown that aflatoxins are produced in greater quantities in irradiated food.

Changes in Food – If doses of irradiation are not carefully applied, changes in the colour, texture and flavour of food may be apparent. These off-flavours have been described as a "wet dog" smell in meat, "musty" or "nutty" tastes in fats, and "scorched" or "chalky" flavours in milk.

Re-contamination – if food is not properly sealed, it can be recontaminated, undermining its primary purpose.

Lack of Monitoring – there is no practical test to determine whether food has been irradiated. This has already caused problems in other countries. In Britain where food irradiation is still banned, a shipment of prawns from Malaysia was found to be contaminated at dockside. This import company shipped the prawns across the channel to the Netherlands, where they were irradiated. Then the prawns were shipped back to England where they were sold to restaurants and caterers. The incident was only later discovered by accident. Tony Webb, who has done an investigation of food irradiation for the London Food Commission, said he believes this practice of concealing bacterial contamination by use of irradiation is more widespread than governments realize. Canada just as easily as Britain could have been the victim.

Increased Environmental Hazards – Irradiation plants containing large amounts of radioactive cobalt 60 are likely to be located in populated areas, near food growing areas and important watersheds. Trucks hauling large amounts of this deadly substance would pass through cities and the countryside.

Potential for Serious Accidents – In the U.S. there have already been several accidents at plants using irradiators for medical sterilization. One accident involved a worker being exposed to an almost fatal dose of radiation when he opened the door to the irradiation chamber while the gamma radiation source was exposed. He worked for a company called Radiation Technology Inc., in Rockaway, New Jersey. The Nuclear Regulatory Commission closed the plant in June 1986 and requested a criminal investigation.

Another American company, International Nutronics Inc., in Dover, New Jersey, has been indicted for trying to cover up a spill of radioactive water from its plant by flushing it down a drain and into the sewer system. The cleanup is estimated to cost two million dollars.

clear industry has yet to prove that food irradiation is either needed or economical. Indeed, according to Ron Krystynak, an economist in the Food Regulation Analysis Section of Agriculture Canada, food irradiation in Canada may never be economical. "The problem in Canada is the economics of scale," Krystynak said in an interview. "There is a wide distribution of agriculture across the country and small quantities. The production is not large enough to justify the cost of irradiation." As for ridding chicken and fish of unwanted bacteria, "there are only a couple of poultry processors who are large enough to have their own irradiators. The other processors are so small they couldn't afford it." Chicken irradiation would also add to the cost of a modestly priced product, and most consumers would be unwilling to pay more for the process.

Krystynak's study, believed to be the only one of its kind in Canada, agrees with another conducted in California in the early seventies that food irradiation would be uneconomical for fresh fruit, like strawberries. Production is seasonal and regional and, according to Krystynak, there are new technologies being developed to preserve foods that would be cheaper and free of the problems associated with food irradiation.

There are also doubts that AECL can make substantial profits from its overseas sales. A recent Science Council of Canada study estimates that the world food irradiation market is worth only $250 million to 1990 – not a lot when spread among several competing countries. AECL can expect very tough competition from the U.S., which is prepared to sell its cesium 137 irradiators at bargain-basement prices in order to end Canada's near-monopoly in the irradiation business.

It's also likely that the Canadian government will spend more money on subsidies than AECL will make selling food irradiators to developing countries. AECL's export program is already being heavily subsidized by the Canadian International Development Agency (CIDA), the government agency with the task of disbursing official foreign aid. CIDA has spent more than $2.3 million to date paying for irradiation research and feasibility studies in several countries. If irradiators are sold to Jamaica and Thailand, as planned, CIDA will likely heavily subsidize their purchase.

Developing countries became interested in irradiators when Canada and the U.S. banned the use of the fumigant ethylene dibromide (EDB) two years ago because it was found to cause cancer. These countries, desperately looking for a substitute to kill insects in the grains and spices they export, have been receptive to the prospect of using food irradiators. The irony for Canadians who do not want irradiated food in their country is that the irradiators in developing countries are likely to be used on food that will be sent back to Canada.

Food irradiation critics thus take exception to nuclear industry claims that food irradiators will help solve the problems of world poverty and starvation. "It's pure fantasy to argue that irradiation will supply food for the poor and starving," says Denis Mosgofian, director of the National Coalition to Stop Food Irradiation, based in San Francisco. "The first foods to be irradiated will be pork, chicken, frogs legs, shrimp, papayas, mangoes and strawberries. Is the public to believe that these products are available in areas where there is drought and hunger? It is the chronically impoverished who perish from hunger, and such impoverishment doesn't occur overnight. Poverty is the product of long-term economic and political denial. It is not simply the result of a lack of food."

The federal government is gauging public reaction to food irradiation by keeping a close watch on the deliberations of the all-party House of Commons committee that has been holding sessions in Ottawa. It's using its majority on the committee to control its activities. Instead of discussing the real issues of food irradiation – safety and economics – the committee is looking primarily at how irradiated foods should be labelled. The government clearly wants to have wide use of food irradiation technology in Canada but it also wants to avoid any public backlash that might be brewing. Though Ottawa was ready to introduce changes last year to allow for much wider use of food irradiation, for instance, it changed its mind because of the Chernobyl accident and because MPs were receiving dozens of letters from people expressing their opposition to food irradiation.

But since then, the anti-food irradiation movement has grown. Now, several organizations – including the Coalition to Stop Food Irradiation in Vancouver, the Nuclear Awareness Project in Toronto, Consumers United to Stop Food Irradiation in London, Ontario and the Canadian Coalition for Nuclear Responsibility – are planning to fight the passing of government legislation.

The nuclear lobby and the government don't want the word "irradiated," or anything like it, to appear on irradiated foods. Instead the government is proposing that packaging carry a green symbol that resembles a flower, a symbol that is very close to the logo of the U.S. Environmental Protection Agency. It would be accompanied by the word "Radura," derived from the statement "durability enhanced by radiation." The government has said more descriptive wording will be added, but the final version has not yet been decided.

Marilyn Young, chairperson of the CAC's Food Policy Committee, supports the industry proposal and strongly believes that the term irradiated should not be used. "Let's not confuse it with a name that associates this process with the much disliked and distrusted nuclear industry," she told a conference on food irradiation in Vienna, saying what is needed is a symbol that "is not to alert or alarm but rather as a piece of information." (The Consumers' Association of Canada, whose views correspond with government policy, have been the only consumer group consulted by the government in its deliberations over labelling.)

"If the government allows AECL and the rest of the industry to get away with euphemistic phrases and meaningless symbols to satisfy labelling requirements," said David Poch, a lawyer for Energy Probe in Toronto, "they are doing a disservice to the public who should be allowed to choose what to eat as we do with food additives. The fact that they are coining new expressions to conceal irradiation is an admission by the government and industry that the public are not going to want to eat irradiated food."

The U.S. has already adopted the Radura flower symbol with "treated by irradiation" written across it, though the words will be dropped from the symbol in April 1988 – coinciding with the expected first appearance of irradiated food on the U.S. market!

The proponents of irradiated food have good reason to oppose any appearance of the word irradiated on food products. Market research shows there is strong public resistance to buying irradiated foods. A 1984 Kidder Peabody survey in the U.S. reported that only twenty-eight per cent of the people surveyed would

buy irradiated food even if it were offered at the same cost as other food. Marketing strategists, however, have already recommended a plan to overcome consumer resistance based on other tests showing that when the benefits of irradiation are emphasized, and the technology is not discussed, there is much greater consumer acceptance. Companies thinking of marketing irradiated food are also being told to emphasize the benefits of irradiated foods as an alternative to foods treated with chemicals, an approach that critics say is dishonest because most irradiated foods will also be chemically treated.

It is clear that neither the food industry nor the public want food irradiation. The case for it has been cooked up by the IAEA and AECL. To survive in Canada the technology will have to be heavily subsidized by the government. So what's really behind this; why are governments supporting such a boondoggle?

The power brokers in Washington and Ottawa couldn't care less if our chicken is zapped with irradiation. What they're concerned about is the survival of peaceful nuclear energy because it provides a cover and a support system for the nuclear weapons industry.

The politicians believe that the public will not so quickly challenge the presence of nuclear weapons if peaceful uses of the technology, like food irradiation, can be shown to be beneficial. On a practical level, governments support nuclear energy because it benefits the weapons industry. Universities that teach the so-called peaceful uses of nuclear energy also turn out scientists who work in nuclear weaponry. The same companies that provide facilities and equipment for peaceful nuclear energy also provide similar supplies for weapons programs. The same mines produce uranium for both nuclear energy and nuclear weapons. And the peaceful nuclear reactors – the Candu in particular – produce many deadly substances that can be of vital use in nuclear weapons production.

The Canadian government, at the highest level, probably supports food irradiation because it indirectly provides support for the U.S. and NATO nuclear weapons that defend Canadian territory.

Some peace activists believe we'll never rid the world of nuclear weapons until the so-called peaceful atom is eliminated. Food irradiation seems like a good place to start. Its use should concern health critics, nutritionists, health workers, labour leaders, environmentalists and the anti-nuclear and peace movements. The nuclear industry should not be allowed to impose an unwanted, dangerous technology on the world that appears to have no benefit other than to itself. If allowed to make it on its own in the commercial marketplace, food irradiation, just like the nuclear-powered airplane or the nuclear-powered toaster, would already be a footnote in the history books. TM

Nick Fillmore is This Magazine's *investigative editor. Anne Wordsworth, a former researcher with Pollution Probe in Toronto, is an environmental researcher with the Ontario NDP. We would like to thank Ron Labonté, a community health activist and educator, for his help in editing this article.*

FIGHTING FOOD IRRADIATION

The following organizations are active in the fight against food irradiation:

Canadian Coalition to Stop Food Irradiation
P.O. Box 190
White Rock, B.C.
V4B 5C6
(604) 574-0527

Canadian Health Food Assn.
6252 Fraser Street
Vancouver, B.C.
V5W 3A1
(604) 324-2121

London Consumers Health Group
1381 Rideau Gate
London, Ontario
NOM 2AO
(519) 438-5801

Consumers United to Stop Food Irradiation
R.R. #1
Ilderton, Ontario
NOM 2AO
(519) 666-0104

Nuclear Awareness Project
730 Bathurst Street
Toronto Ontario
M5S 2R4
(416) 537-0438

International Institute of Concern for Public Health
67 Mowat Avenue, Suite 343
Toronto, Ontario
M6K 3E3
(416) 533-7351

Assn. of Concerned Citizens for Preventative Medicine
415B McArthur Avenue
Ottawa, Ontario
K1K 1G3
(613) 749-1002

Canadian Coalition for Nuclear Responsibility
P.O. Box 236
Snowdon St. P.O.
Montreal, Quebec
H3X 3T4
(514) 842-1471

National Coalition to Stop Food Irradiation
P.O. Box 590 - 488
San Francisco, California
94159 U.S.A.
(415) 566-2734

Health and Energy Institute
236 Massachusetts Ave. NE
Washington, D.C.
20002 U.S.A.
(202) 543-1070

Health Research Group
P.O. Box 19404
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(907) 224-5791

February 20, 1988

Representative Dave Donley
Alaska House of Representatives
P.O. Box V
Juneau, Alaska 99811

Dear Representative Donley:

Senator Kerttula has informed me that SJR 33, dealing with the labeling of irradiated food, is currently in the House Labor and Commerce Committee which you chair.

Alaskans must send a strong statement to Congress about the labeling of irradiated food and other consumer products. American consumers are already being sold irradiated products which are not labeled as such in any way. Without sustained opposition, we will yield yet another means by which to make informed choices.

Under current proposals, only whole irradiated foods would be so labeled; irradiated processed foods, or irradiated ingredients in processed foods, would be exempt. Considering the enormous consumption of processed foods in America, I find this position indefensible. Concerned tourists and restaurant patrons would be thrown into a state of confusion. It would be difficult even for an energetic, able-bodied, conscientious shopper to avoid purchasing irradiated food; patients in hospitals, residents of nursing homes, children in day care centers, students in cafeterias, and inmates in prisons would be a captive market.

Enclosed are copies of various letters I have written concerning irradiation. Please urge your committee members to look at the irradiation subject through clear eyes and not to be misled by the position assumed by the Department of Health and Social Services. Passage of SJR 33 is an extremely important step in resisting the continual undermining of our food supply.

Sincerely,

Patricia C. Erickson

cc: Senator Paul Fischer
Senator Jay Kerttula
Representative Randy Phillips
Senator Mike Szymanski
Representative Bette Cato
Senator Frank Murkowski
Senator Ted Stevens
Congressman Don Young
University of Alaska, Fairbanks
Department of Health and Social Services
Department of Environmental Conservation
The Seward Phoenix LOG
The Anchorage Daily News

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February 20, 1988

Senator Paul Fischer
Alaska State Senate
P.O. Box V
Juneau, Alaska 99811

Dear Senator Fischer:

It is your committee, the Health, Education and Social Services Committee, which will hear SB 355, a bill designed to prohibit the sale of irradiated food in Alaska. I am writing to remind you that, as the name of your committee acknowledges, health is of primary importance for us all.

Although Alaskans are isolated in some respects, we are as besieged as anyone by the contaminants in our food and water supplies and in our environment. We are, in short, besieged enough. Instead of succumbing to the false and irrational promises of the food irradiation proponents, or to pressure from obviously biased powers such as DOE, it is time to hold the line. Passage of SB 355 will give us, as Alaskan residents, a chance to squeeze closed the lid of our own Pandora's box which is now ajar. If SB 355 fails, we have thrown the lid wide open.

Please urge your committee members to examine the real issues involved in the food irradiation controversy when they hear SB 355. Please urge them to view the subject as consumers, and as parents and grandparents, rather than from political postures. And please remind them that they do not need a degree in biochemistry to understand why food and irradiation do not mix, and why the terms "health" and "irradiation" are mutually exclusive.

Enclosed are copies of various letters I have written to express my concerns about food irradiation. I hope your office will furnish copies to each committee member.

Sincerely,

Patricia C. Erickson

cc: Representative Dave Donley
Senator Jay Kerttula
Representative Randy Phillips
Senator Mike Szymanski
Representative Bette Cato
Senator Frank Murkowski
Senator Ted Stevens
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University of Alaska, Fairbanks
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P.O. Box 338
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October 27, 1987

John Zarling, Director
Institute of Northern Engineering
University of Alaska
Fairbanks, Alaska 99701

Dear Mr. Zarling:

My interest and concern were roused after reading about your department's food irradiation feasibility study in the October 14, 1987 issue of the Anchorage Daily News, particularly when I read that the safety of irradiated food will not be studied. I would hope that a study of this type, one funded by public monies and proposed by our own higher educational system, would list food safety as a top priority.

How will your study identify "other improvements in quality attributable to irradiation" without weighing them against the possible deleterious effects of irradiation? How will your study determine "if Alaskans will accept irradiated products" without presenting both sides of the question? Will you be polling Alaskans before the results of the National Academy of Sciences' study is complete? Is your department relying on that study to prove the safety factor of irradition and, if so, on what basis?

I see a disturbing picture developing: We'll be irradiating our wonderul Alaskan produce while we're still rushing air-fresh seafood to Outside markets.

Please include me when polling Alaskans for acceptance of irradiated food products. I would like to see what type of questionnaire you develop.

Sincerely,

Patricia C. Erickson
P.O. Box 330
Seward, Alaska 99664
(907) 224-5791

February 9, 1988

Representative Randy Phillips
Alaska House of Representatives
Pouch V
Juneau, Alaska 99811

Dear Representative Phillips:

I applaud your introduction of legislation to ban food irradiation in Alaska. After reading today's article in the Anchorage Daily News, I wrote Ruthann Swanson at the University, and the Department of Health and Social Services. Copies of both letters are enclosed.

I think enough is already known about food irradiation to pass the legislation. Unless the Department of Health and Social Services can change the scientific nature of free radicals simply by writing a position paper, food and irradiation were not meant for each other. I believe that department has confused democratic principles with scientific principles.

The funding source of the University's grant is of special concern. Why is the Department of Energy becoming entangled with our food supply?

The final quote in the News article, "The consumer would never be exposed to radiation," is overly optimistic considering our track record with formaldehyde and various petroleum products, not to mention PCB's and tear gas. The thought of a mobile irradiation unit, as has been suggested, is even more staggering.

As a consumer, I am already faced with enough unknowns in the marketplace. Our wealth of choice in produce, in the dead of an Alaskan winter, simultaneously delights and worries me. What pesticides are used in the exporting countries? Are they using irradiation? How can I tell? Pesticide notices certainly don't appear in a market and I have little faith that "Proper labeling will allow those opposed to it [irradiation] to exercise their choice" when the irradiation of spices, and tampons, has gone unlabeled for years.

You've introduced an important piece of legislation and have much support for your position on food irradiation

Sincerely,