Interview: Niel E. Nielson

Commercializing food irradiation in the Pacific Rim

Niel E. Nielson, a high-technology entrepreneur, has been on the leading edge of applied technology throughout his scientific career. He is now working on the commercialization of food irradiation, particularly for nations of the Pacific Rim. He was interviewed July 21 by Marjorie Mazel Hecht.

EIR: What sparked your interest in food irradiation?
Nielson: It started when I was working at Lockheed in the military space program in 1961-68, where one of my tasks was to identify how Lockheed would do business 10 years into the future. One of the programs I was involved with was the manned orbiting laboratory, where my assignment was to identify how to keep the astronauts from getting ill, looking at water, food, and personal waste. It was obvious for water and food that radiation was the answer—going up there with food that was completely sterilized. That's where I stumbled upon the work going on at the Army lab in Natick, Massachusetts, and universities around the country. It was then that I realized that this technology, which we now call picowaving, could be used in large-scale applications for the benefit of mankind—environmental cleanup, water pollution, medical sterilization, and food processing.

With the specific intention of getting into water and waste management, I helped form the corporation International Nutronics in 1968, then Aqueonics in 1969. In 1979, Aqueonics changed its name to Emergent Technologies, which I left in April 1987. Now I am an entrepreneur with the objective of commercializing all that we have been able to accomplish through Congress and the regulatory agencies and international bodies, and to continue the market development work and the public education work that we began many many years ago. It's a tall order, but it's something that has to be done.

EIR: So, since the 1960s, the astronauts have been eating irradiated food.
Nielson: Yes, both in the United States and in Russia. In fact, until Russia had its own cobalt facilities, our Natick laboratory processed their astronauts' food. Most people don't know that.

EIR: What are you working on now?
Nielson: We're working on a series of plants initially principally to serve products going into foreign nations or originating in foreign nations. . . . These plants would process both frozen and fresh fruits and vegetables, fresh fish and seafood, and processed meats (those that have been partially cooked).

We're talking here about beef, pork, etc. The reason that the beef is first partially cooked is that the low-level picowaving will not kill off all viruses, but the partial cooking will. This eliminates the viral content and then the radiation processing eliminates the bacterial content.

EIR: Where are you building these plants?
Nielson: We're negotiating several plants in the United States and the Pacific Rim. I've been negotiating with some of these people for a long time, but they've gotten increasingly interested in the last two or three months. Now the negotiations are starting all over again with a whole new concept—making a business of it with these people, instead of a research project or a scientific demonstration. They are saying that the only way that all this effort over all of these years is meaningful is if we commercialize it, so that the public really appreciates its benefits and buys the food.

EIR: Certainly in Asia and the Mideast, where food irradiation projects exist, there has been no problem with the public accepting the products.
Nielson: Essentially none. As a matter of fact, China is so far along that they may mandate the use of this technology before fresh fruits and vegetables, and other foods, can be shipped into China! That is in the works now, and I would expect that we'll see something like that out of more and more nations as they realize the public health improvement, which is statistically very tangible. That's an important observation in the face of those who conjecture and imagine problems simply because we haven't been using this technology for 50 years on 50 million people.

EIR: What operations do you foresee in the Pacific Rim?

Nielson: A significant percentage of the fish and seafood harvested in the tropics contains enough bacteria that, if it isn't frozen almost immediately as it is caught, it is not going to be acceptable to the U.S. Food and Drug Administration standards. As a result of that, and in some cases as a result of poor handling, the food that could be exported from those countries to the United States, is rejected in the range of 3-15%. We could prevent a large part of the rejection of good foods—not decomposed foods—by use of routine picowave processing, which would drop down the bacteria count by 90-99% at only 100 kilorads.

This is a big number—90%—if you put it in perspective. In terms of sterility, it is not a big number. But you don't need sterility if you are going to eat the foods right away. All you need to do is knock the bacteria count down by 90%.

EIR: Are you talking about putting your picowave processing facility right at the site where the fish is caught or near the harvest site for vegetables and grains to preprare food for export or internal consumption?

Nielson: Yes. In the case of fish and seafood, it would be processed, frozen, and then picowaved. In the case of fruits and vegetables, it would be pre-cooled and then picowave processed. This process would prevent insect problems that exist with a lot of these fresh fruits and currently prevent them from being brought to the United States. In many cases, the effective chemical fumigants, like EDB, are banned in the United States; in other cases, the alternative fumigant procedures are ineffective or damage the fruit.

For example, avocados in Mexico can't be fumigated or sprayed, because the only effective chemical damages the fruit. To bring mangoes out of the Philippines in a special stage of ripeness, the problem is that the insect inside can't be reached; the mango seed weevil, for instance, can't be reached by the insecticide when fumigated. There are many other examples of tropical fruits that nations would like to export to the United States, and the United States would like to have them, and there are many ethnic groups that would jump at the chance of having these products, but they can't be imported because of the insect problem.

Picowave processing would take care of this problem.

EIR: What countries are you talking with?

Nielson: Thailand, the Philippines, India, Japan. Japan is just waiting for a precedent. They already know the benefits and they are just waiting for enough precedent so that they can go to their public with it. China will be into it heavily, as I've already told you. Sri Lanka is an area that is just terribly wealthy in terms of the foods it can produce, but they have some insect and bacteria problems. Australia is moving aggressively to use the technology. They have some hang-ups with cobalt and cesium sources, however. Then there are nations like Chile and Peru and the nations of Central America. These are the great growing regions, not just for the food that we want, but for the insects we don't want. Often these foods don't have a long enough shelf-life to get them here by normal transportation routes.

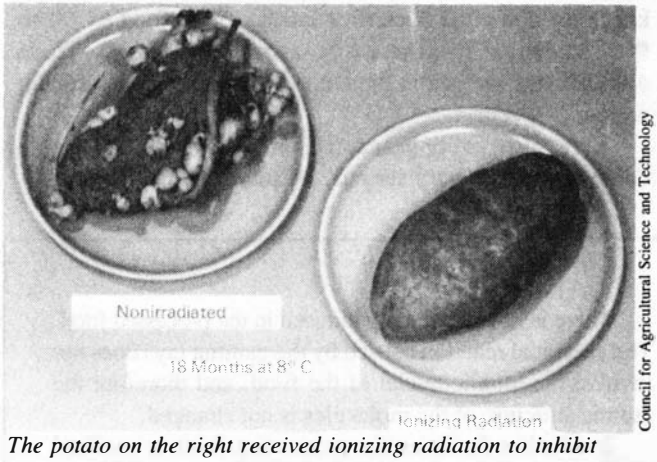
Keep in mind that for a developing nation, many of them, if not most, the one commodity that they can quickly produce in higher quantity, if they could overcome the insect and bacteria problem, is food. They would not have to build up a heavy industrial base to do it. This is part of the theme of the President's Caribbean Initiative and his encouragement in Central America is letting these people help themselves. Mexico's biggest self-help potential, for example, is in food.

EIR: But certainly countries like Mexico need to produce more food for their own population. . . .

Nielson: But without the exports, they can't afford this processing for their own population, with current economics.

EIR: That's true—they need LaRouche's economics in order to do it, debt moratoria and new credit at low interest rates to build infrastructure and industry and modernize agriculture!

Nielson: Now you're hitting it. If we are able to concentrate on the economics of export, this could then support the use



The potato on the right received ionizing radiation to inhibit sprouting. The one on the left was not irradiated. Both were then stored at 8°C (47°F) for 18 months.

of the technology internally, this would be the best of both worlds for them.

EIR: You mean a double purpose facility. . . .
Nielson: And that's our whole program—double purpose facilities.

EIR: What is the cost of a facility for a developing country, for example, in a port city, where it could be used for export and domestic use?
Nielson: The cost per unit throughput comes down exponentially with the increase in the size of the plant. This motivates you to build the largest plant that can be justified in terms of what can be processed. An ideal size, one that is making this cost per unit throughput approach a reasonable asymptote, speaking mathematically, would be processing something on the order of 50 to 75 megarad/tons per day. This would mean disinfesting 2,000 to 4,000 tons per day of fresh fruit and vegetables, or knocking the bacteria count down in 800 to 500 tons a day of frozen fish and seafood.

If you priced such a plant in the United States today, it would be in excess of $10 or $12 million. That's a big nut to chew for a lot of people, and that's one of the reasons that you don't see this technology widespread yet, because the heavy players haven't gotten into it yet, and the heavy players have to get into it before you get the economics to the point where you're talking about just 1 to 2 cents per pound for processing instead of 4 to 6 cents per pound. You have to have large enough traffic to justify a large enough plant to bring the cost down so that it is not a burden for the processing. Many of the cost analyses I've seen don't consider numbers like return on investment and profit, excellent preventive maintenance, outstanding quality control, etc., which has to be there, and they make assumptions on safety and energy costs, staffing costs, and food-handling costs that are inappropriate. Unless you have all this done properly, you really don't have a good estimate of costs. When I give an estimate, it's based on years or years of study of what it will take to do it right.

The idea of using machine-generated picowaves as contrasted to radio-isotope-generated picowaves, is gaining in popularity rather quickly around the world. And so again, we will be able to cause people to refocus, for so many of the anti-nuclear factions are focused on the handling and storage of the radioactive cobalt. Now we can tell them, now that we've eliminated that concern, what are your concerns? This throws out the most sensational part of their argument. . . .

The bottom line is once we eliminate the radioisotope question, no argument brought up by the anti-nukes, in perspective, has merit. That's a bold statement from somebody with a scientific background, but it's true. The anti-nukes bring up arguments that have been defeated, that are irrational, and in the face of overwhelming, established scientific-community rejection of their arguments, they continue to bring them up.

EIR: In the less developed countries, unlike the United States, food irradiation is a life or death issue, because they lose 50 to 60% of their fruit, vegetables, fish, and grain crops.
Nielson: Actually, the developing nations lose a higher percentage—numbers like 70 to 90% of their own production. If you took the whole world's production, then it's 50% that is lost before it ever gets on its way to market.

EIR: So we're talking really about doubling the available world food output.
Nielson: That's right. There's another perspective on the same numbers that was first brought up by [nuclear pioneers] Libby and Black many years ago: There is more food lost to insects and spoilage than would be required to overcome all the malnourishment problems worldwide.

EIR: That's an amazing statement when you consider the numbers of people dying today of malnutrition. Then when you think of the activity in this country to stop this technology, you see how immoral and how anti-people the anti-nuclear movement is. These are people out there purporting to protect Americans from the so-called horrible nuclear industry but in reality they are contributing to world starvation.
Nielson: I have two comments on that. First, it must be kept in focus that in order for us to be successful with developing nations' internal use of this technology, the rest of the infrastructure has to be there—the storage that prevents recontamination, the transportation system that gets it from where it's grown to where it's processed. All of that has to be there, and that's lacking also. . . .

The other side of it is, if you set that issue aside and you just look at the statistics coming out of the Centers for Disease

Control and USDA, and others, on food-borne illness, they are just now beginning to realize that what was formerly ascribed to things like low-level viral infections can be traced instead to food-borne bacterial illness, most of which could be prevented by routine picowave processing. These researchers in CDC, USDA, FDA, etc. now trace about 4,000 deaths per year to complications arising from these food-borne illnesses—deaths that could have been prevented by knocking down the bacteria content of that food by 90 to 95%. Radiation does that easily, at only 100 kilorads. These 4,000 deaths are just in the United States alone, an affluent nation.

Here, also, every year some 160,000 to 400,000 people come down with very serious, hospitalization-requiring ill-

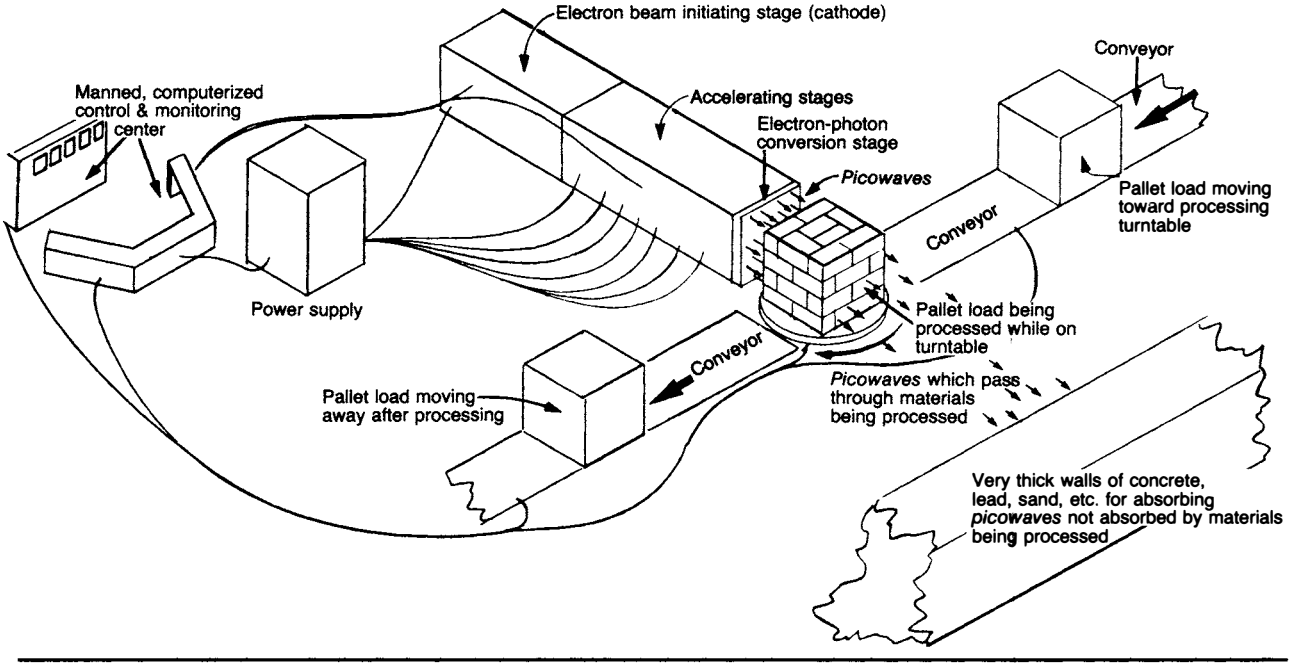
Food irradiation: how it works

Most of the food irradiation plants now in operation use cobalt-60 as their radiation source. The ionizing energy from the decaying radioactive source sends very short wavelength gamma rays into the food or produce being ionized. The gamma rays penetrate inside solid particles and kill microorganisms by breaking down the cell walls or destroying the metabolic pathways of the organism so that the cell dies. At higher doses, all microorganisms are killed, sterilizing the processed food.

There is no radioactivity induced in the processed food. The chemical reaction caused by the gamma rays does not involve the atomic nuclei of the food, and therefore the atomic structure of the molecules is not changed.

Irradiation facilities for processing food or medical supplies are not elaborate. There is a radiation source with its shielding, a conveyor system that transports the produce to and from the source, various control systems to manage the processing, and storage facilities. Usually, the cobalt-60 is embedded in thin rods, which are then submerged in a well of water that serves as a shield. The dose of radiation received depends on the time of exposure and on the product's distance from the source. Another method that has been researched, but not yet commercialized, uses accelerated electrons as the source of ionizing energy.

Principal elements of the picowave processing centers



Source: Niel E. Nielson.

nesses, which can be traced to food-borne illnesses. They are estimating numbers of well over 2 million and possibly over 4 million for people who end up so ill that they take time off from work and stay home with everything from diarrhea to stomach cramps to flu symptoms to feeling just plain lethargic, and are actually suffering from food poisoning caused by bacteria like salmonella and campylobacter.

EIR: I think that the U.S. Department of Agriculture's official figure for salmonella is that 40% of American poultry is infected with it.

Nielson: That's correct. The problem is very real and very complex, and it highlights the importance of the routine use of picowave processing. The problem becomes obscured by the obvious fact that when you cook the poultry, you kill the salmonella, so you don't get it from the poultry you eat. You get it from the raw poultry contaminating things that aren't going to get cooked—salads, for example, picking it up from a cutting board, or the kitchen help's hands. So this is a two-step affair, but the result is the same: People get sick. And that says that you have to prevent the salmonella from getting into the kitchen in the first place.

Then you have to throw another factor in. The public health people will tell you that it isn't just a single bacteria that causes the problem; it's having ingested so many bacteria that the body's natural immune system can't counteract the infection. This means that there is a threshold below which the quantity of salmonella, or campylobacter, or whatever, is not going to cause distress, because the body is going to be able to handle it. Above that threshold, the body is not going to be able to handle it, and you get the illness. With that as background, then you realize that if you can kill 90 to 99% of the bacteria, you can take it from an illness-causing situation down to one which the body can handle. The significance of that number is that with the present U.S. Food and Drug Administration regulation of 100 kilorads as the upper limit across the board for irradiation processing, you can demonstrably reduce illness from food.

That's a very important issue, because the anti-nuclear people, who are trying to put off the use of this technology, use the argument that "unknown" illnesses are possible because you haven't tested 50 million people for 50 years. They are saying, "We think there is a remote, very remote, possibility of food irradiation causing a problem and therefore you should not use the technology." Yet they completely overlook the fact that people are dying right now who could be prevented from dying if we could use the technology. That means that anyone who gives credibility to the idea that we haven't done enough research has lost perspective.

EIR: After 40 years of research, it seems to me that we know a lot more about food irradiation than we did about the effects of canning when we began to use canned food.

Nielson: We know far more. The problem is that in the last 40 years, we've also learned so much about foods in general, that we're just beginning to understand what it is we don't know. That's alarming to a lot of people, because every few months they see something else that was perfectly acceptable or most desirable in the way of processing or selecting foods in years gone by that now is suspect.

EIR: It's a question of accepting *some* risk. Obviously when people cook food they produce changes in the food's composition far greater than those produced by food irradiation.

Nielson: Take that a bit further: There's never been a chemical identified in the processing of food by picowaves that is not already in our diet.

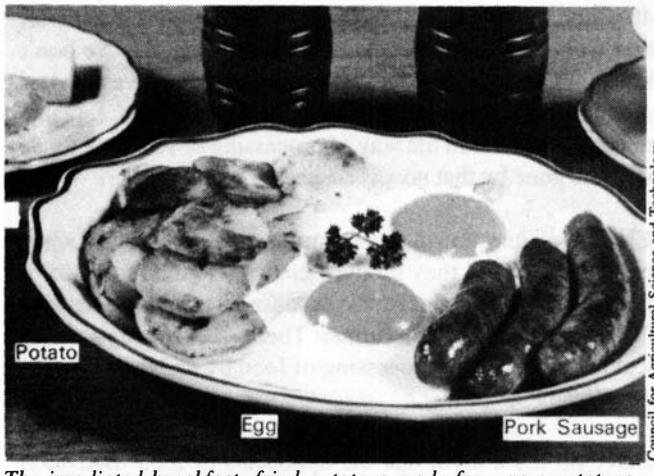
EIR: So it's a myth that the opponents of food irradiation like to scare people with, that unique radiolytic products appear in food that has been treated with low-dose radiation. These unique radiolytic products are like UFOs—frequently sighted, but not there.

Nielson: Yes. The people who conveniently use this argument to further their purposes typically don't have anything to do with public or environmental health. This is an indictment of a lot of people, and I guess there are a lot of people out there who are followers, whom I should apologize to for making this all-encompassing indictment. But certainly those technologists who encourage those people or who let themselves be used as references for those people, need to be indicted because they are misleading people. They are just not playing it straight.

EIR: When you say indicted, I think of it in the criminal sense, because of the numbers of lives that are lost in this country—4,000 per year—and the significant number of people starving to death in the rest of the world. Effectively it is the anti-nuclear actions in this country that are preventing this technology from being more widely used. I'm convinced that the developing sector will go ahead and commercialize it as you and others are working on it. But it's been a good 40 years that this technology has been researched, and it could have moved much faster had the environmentalist movement not spread so many lies about it.

Nielson: There'a second, very important, underlying theme to the antis' argument. In science, nothing is absolute. But much of the public likes things all black or all white, not wanting to recognize the fact that most everything is gray.

What we've got here is that the established scientific community, as represented by the established scientific organizations, ranging from the Academy of Sciences to the American Medical Association and the Institute of Food Technologists—the people who really know food science—these people have all endorsed picowave processing by organization, which means that the majority of the people in these organizations—responsible scientists, recognized scientists—realize that there is no increase in risk and that there



The irradiated breakfast: fried potatoes made from raw potatoes irradiated to prevent sprouting, fresh eggs irradiated to control Salmonella, *and prefried pork sausage links vacuum packed and stored without refrigeration for two years, after irradiation with a sterilizing dose.*

are potentially very high benefits. The people who are objecting to the use of this technology have no such accreditation, and yet they would pretend to have a large high-technology following in the field, which in truth they don't.

What they are doing is attacking the established institutions, which the public sponsors and which have gotten us so far advanced in the last 50 to 100 years, in so many ways, including just plain quality of life. There is the underlying theme that the establishment is bad. This permeates all these anti-food-irradiation activities.

EIR: In other words, they are saying that the establishment is allied with big industry and they are doing it just for profit.

Nielson: Yes, and in reality, the largest number of the leaders of these anti-nuclear organizations are doing it for profit for themselves. They are doing it because of the popularity they get, the number of lines of press, the exposure on radio and television. So they are feeding their ego, feeding their pockets from it. However, here, as you were pointing out, the stakes are so high that they can be traced to deaths and needless illnesses, needless misery that is not speculative, it's real.

What we have to do is attack everything they are saying and show how they are quoting things out of perspective. For example, the Indian feeding study carried out by the Nutritional Institute there. This study has been thoroughly repudiated by very well respected scientists. The work done by India's Nutrition Institute could not be duplicated, which is one of the cardinal requirements of accepting scientific research. Also, their peers in India would not support this study and, in fact, came out with a policy statement against it. But when the anti-nukes quote this study, they don't tell anybody that it's been discredited. . . .

EIR: I remember congressional hearings on the food irradiation bill where this India study was repeatedly brought up by the anti-nuclear groups testifying. Each time, the scientists would patiently explain why the study has been discredited even by the institute that carried it out, but then the next anti-nuclear witness would bring the same study up again. They don't really care what the truth is. They just grab on to these things and keep repeating them.

Nielson: Another thing they do is distort information. One of these distortions is that you create peroxides in the food. Well, that's true. Food irradiation creates peroxides. But so does the body—and without them we wouldn't live. These people know that the public did not pay attention in high school when these sorts of topics were discussed. So they play on it.

EIR: You might think from what the anti-nukes say that they eat only raw food, since cooking creates all kinds of unnatural particles. And of course, everything has to be grown naturally using only manure, no chemicals. . . .

Nielson: There is a "must" reading for everybody who is seriously interested in the topic of food safety, which is a document put out by the National Academy of Sciences called "Toxic Substances Occurring Naturally in Foods." This has been updated several times over the last 15 years. It is absolutely beautifully written by a group of highly respected specialists in food science and toxicology. For anyone seriously interested in food safety, this explains how you can't eat any food that is absolutely safe.

Let's talk about practicalities. Take aflatoxins in peanut butter. All peanuts carry the microorganisms that produce the toxins. Standards exist—as I understand it from food scientists who have been in the business for a great many years. If they went to the normal standard determination techniques, there would be no peanut butter sold in the United States. In other words, the naturally occurring aflatoxin development in food is so widespread and of such significance, that if they used the normal standard techniques that they apply to foods of several orders of magnitude, or several powers of 10, less than what is known to cause illness, then they probably could not sell peanut butter. Yet, we don't have problems from eating peanut butter, although it all contains aflatoxins. What we do is keep the aflatoxin down to the point where the body's system can handle it. . . . It has to be less than 10 parts per million, and they have to have very good handling conditions, keeping the moisture down, good storage conditions that don't encourage the production of aflatoxins. If they didn't do that, then we would have some problems.

These sorts of things the public isn't aware of. I wasn't even aware of it before I got into this field. What I am emphasizing is having perspective: Aflatoxins are dangerous stuff, if the quantity ingested is larger than the body's system can handle. That's the key.

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