NFPA
The Food Safety People

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ASSOCIATION

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March 7, 2003

Dockets Management Branch
Food and Drug Administration
5630 Fishers Lane, Room 1061
Rockville, MD 20852

RE: FAP 9M4697 – Comments for Docket No. 99F-5522

Dear Sir/ Madam:

The National Food Processors Association (NFPA) is the voice of the $500 billion food processing industry on scientific and public policy issues involving food safety, food security, nutrition, technical and regulatory matters and consumer affairs. NFPA's three scientific centers, its scientists and professional staff represent food industry interests on government and regulatory affairs and provide research, technical services, education, communications and crisis management support for the association's U.S. and international members. NFPA members produce processed and packaged fruit, vegetable, and grain products, meat, poultry, and seafood products, snacks, drinks and juices, or provide supplies and services to food manufacturers.

The Federal Food, Drug, and Cosmetic Act requires that a food that has been irradiated may not be sold in the United States unless the Department of Health and Human Services finds that the food is safe. The Food Additive Petition (FAP 9M4697) submitted to the Agency for the irradiation of multi-ingredient, "ready-to-eat" foods addressed the toxicological safety of the proposed application of irradiation.

The petition states that the proposed irradiated foods will be safe and these conclusions are based on scientific studies in the literature, reports by expert committees and the application of the chemi-clearance concept as suggested by Basson (1977) and as validated by Merritt and Taub (1983). The use of the chemi-clearance is proposed in the case of this petition since we are requesting approval of classes of multi-ingredient foods and not individual foods. This approach to "class approval" has been utilized previously by FDA for the approval of "fresh foods" (undefined fruits and vegetables) for growth and maturation control, not to exceed 1 kGy and for undefined "culinary herbs, seeds, spices, vegetable seasonings" at up to 30 kGy for microbial disinfection. Also, the application of the chemi-clearance concept is scientifically compatible with the safety assessment process of determining substantial equivalence, proposed by experts in the field. In our petition, we propose that there is a consensus as to the soundness and validity of basing toxicological safety on this principle among competent, knowledgeable, experienced and authoritative professionals who have

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studied food irradiation and considered its use for foods over a period of many years. However, some organizations have chosen to comment in opposition against the advancement of the technology and approval of the petition. The benefits of food irradiation to inactivate deadly foodborne bacteria like *Listeria monocytogenes, Escherichia coli* or *Salmonella* spp. are well known and will not be reviewed here. It would be inappropriate and contrary to sound public health policy to disallow a proven technology that can save lives because of the accusations and unsubstantiated conclusions by one vocal opposition group. Those in opposition to irradiation and to the petition have remarked:

1) Numerous unresolved concerns remain related to the safety and wholesomeness of irradiation as a food additive. The main problem with high-energy irradiation is that it can break apart molecular bonds on a chemical level and create mutagens within otherwise safe food.
2) More than one-third of published studies indicate mutagenicity of irradiated food substances.
3) *In vivo* results show that a unique marker substance [cyclobutanone] in irradiated foods has failed standard safety testing using the 100-fold safety margin required by 21 CFR 170.22.

We feel the body of literature and statements by experts in the field support the conclusion that irradiated foods are safe to eat and that there are no health risks greater than those associated with eating conventional foods. Further, we propose that any important food safety technology (such as irradiation) should be held to the same food safety standard as traditional food processing approaches. Critics have made continuing accusations that it is unsafe, while being unable to provide scientifically sound research and analysis to support their claims. The use of irradiation for ready-to-eat foods would decrease the health risk of these foods, not increase it as these groups suggest. Food irradiation is perhaps the most thoroughly tested and studied food processing technology that exists today. Experts in the field have weighed the body of evidence on this proven technology and have concluded food irradiation, even at high doses, is safe for the purposes of pathogen reduction, shelf-life extension and insect disinfestation.

Safety

Perhaps the most compelling arguments for safety of irradiated foods are developed in the World Health Organization (WHO) Technical Report # 890, Geneva 1999. The conclusions of the experts are based on their assessment of the safety of irradiation-sterilized foods. It should be noted that the petition for ready-to-eat foods would be using irradiation doses that would be perhaps 5 to 20 times lower than "high-dose" sterilization levels, which are the basis for most of the Report's conclusions.

The Report states:

> "The [joint FAO/IAEA/WHO] Study Group concluded that food irradiated to any dose appropriate to achieve the intended technological objective is both safe to consume and nutritionally adequate."

The Report further states:

> "Abundant and convincing data indicate that high-dose irradiated foods do not contain either measurable levels of induced radioactivity or significant levels of any radiolysis products distinct from those found in unirradiated foods. The theoretical maximum levels that might be formed would be so low as to be of no toxicological consequence. Accordingly, none of the toxicological data derived from extensive animal feeding studies reveals any teratogenic, carcinogenic, mutagenic or other harmful effects that are ascribable to high-dose irradiated foods. For these reasons, the application of 'risk assessment' in the currently accepted sense is not appropriate to the toxicological assessment of foods preserved by high-dose irradiation. In this context, the concept of 'substantial equivalence' may be more appropriate. High-dose irradiated foods are indeed as safe as food materials sterilized by thermal processing, which humans have been eating for more than a century."

We support our conclusion of the safety of irradiated multi-ingredient foods based upon the global consensus that the technology is safe. And unlike the critics, we are not alone in our evaluation. In about 37 countries, radiation processing of food for human consumption has been approved for more than 40 different types of foods. In fact in one country, Brazil, food irradiation is approved for all foods at all dose levels. Brazil has based their approvals and safety conclusions on the 1999 WHO Technical report.

In the United States, the use of food irradaition has been approved by FDA for many foods including wheat, flour, fresh fruits, vegetables, dry spices, seasonings, enzymes, pork, poultry, meats, shell eggs and seeds for sprouting. The U.S. National Fisheries Institute (NFI) currently has a petition before FDA to allow irradiation processing of live and processed molluscan shellfish products to eliminate potentially pathogenic, naturally occurring *Vibrio spp.* bacteria and reduce other potential microbial pathogens like *Salmonella* spp., *Staphylococcus aureus, and Listeria monocytogenes.* Another NFI petition has been submitted to FDA requesting approval for irradiation to reduce the food safety risk associated with consuming crustaceans. Many national and international agencies have actively investigated, supported, or approved the health and safety of irradiation technology to address the issues of foodborne disease throughout the world and in the United States. They include the World Health Organization (WHO), Food and Agricultural Organization (FAO), International Atomic Energy Agency (IAEA), the United States Food and Drug Administration (USFDA), the American Medical Association (AMA), the American Dietetic Association (ADA), the American Veterinary Medical Association (AVMA), and the *Codex Alimentarius Commission.* Many U.S. industry trade groups support the technology including the 31 groups representing the Food Irradiation Coalition (see Attachment).

Mutagenicity

Critics of food irradiation point to their interpretation of mutagenicity testing data to support their conclusion that food irradiation is unsafe. The experts of the joint FAO/IAEA/WHO Technical Committee have reached an opposite conclusion in their review. We again rely on the

conclusions of experts, which is concisely expressed in the WHO Technical Report (1999). The report states that for the toxicology studies reviewed "A few of these *in vitro* studies, but none of the *in vivo* studies, have shown mutagenic effects of certain irradiated substrates. However, the *in vitro* studies are of less relevance, since such data are not as valid as those from animal studies for the purpose of estimating risk to humans on the basis of extrapolation." They have acknowledged that it is possible for some mutagenicity studies to be positive as is pointed out by irradiation critics; however, this can occur and still allow the conclusion that irradiated foods are safe. The safety conclusion by the Expert Committee is further supported by the fact that numerous animal feeding studies did not indicate significant mutagenic effects.

Cyclobutanones

Food irradiation critics point to the work done by German scientists in the Karlsruhe Irradiation Research Facility as confirming their concern of mutagenicity properties of irradiated foods. Scientists there identified a compound in irradiated fat-containing meats that was not observed in unirradiated meat. Irradiation of fat-containing food generates a family of molecules, namely 2-alkylcyclobutanones (2-ACB), that result from the radiation-induced breakage of triglycerides. First investigated as a possible marker for irradiation, the focus of research shifted to its toxicological properties. Much effort has been made by irradiation critics to draw attention to the possible mutagenic activity of cyclobutanones. The scientists at Karlsruhe have recently published their toxicological findings in a report as part of the final INTERREG II project report No. 3.171 (2002).

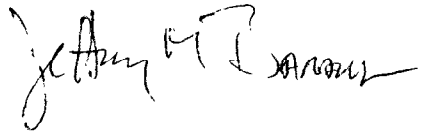
Their study was undertaken in order to evaluate the toxicological properties of purified 2-alkylcyclobutanones (2-ACB) which arise from radiation-induced scission of triglycerides in irradiated fat-containing foods. In their work, they conclude that 2-ACB has cyto- and genotoxic properties under precise experimental conditions. It was also noted that 2-ACB has not been shown to be carcinogenic, per se. The fact that this compound is toxigenic would only be significant if it were produced in food at sufficient levels to constitute a health concern to humans and exhibited a toxigenic effect in a food matrix environment. We believe that other types of compounds are generated in foods during heat processing such as cooking, grilling, etc. that also in pure form, have properties as described for cyclobutanones. Therefore, we note that this compound is not especially unique in that regard. We agree with the authors who have concluded that cyclobutanones in irradiated foods are not a risk. The authors state:

"We warn against misuse of the data presented here, aiming at disqualifying food irradiation. It should be recognized that our studies were all carried out only with highly pure substances (and not with irradiated food containing a large number of complex components) in cell systems and laboratory animals. We did find that purified 2-ACB exhibited toxic effects in cell cultures, bacteria, and laboratory animals. We did not investigate whether 2-ACB are toxic for humans (or laboratory animals) consuming irradiated foods. Thus, at present on the basis of our results, it seems not appropriate to draw a final conclusion concerning to the risk associated with human consumption of irradiated fat-containing foods."

The lack of significance of cyclobutanones to animal and human health is supported by a significant number of animal and human feeding studies where cyclobutanones would have been generated by the radiation sterilization treatments and consumed. These feeding studies have been reviewed and evaluated (WHO, 1999) without finding this, or any other irradiation-produced compound in the diet, presented a health problem.

Thank you for the opportunity to comment on the petition and if you should have any questions, please contact me at NFPA.

Sincerely,



Jeffrey T. Barach, PhD
Vice President, Special Projects

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Merritt, C., Jr. and I. A. Taub. 1983. Commonality and predictability of radiolysis products in irradiated meats. In "Recent Advances in Food Irradiation", P. S. Elias and A. J. Cohen, editors, Elsevier Biomedical Press, Amsterdam.

High-Dose Irradiation: Wholesomeness Of Food Irradiated With Doses Above 10 kGy, Report # 890 of a Joint FAO/IAEA/WHO Study Group, Geneva 1999

Etude toxicologique transfrontaliere destinee a evaluer le risqué encouru lors de la consommation d'aliments gras ionizes. Rapport final/ Schlussbericht INTERREG II Projet/ Projekt No. 3.171. Edited by E. Marchioni and H. Delincee, Bundesforschunganstalt fur Ernahrung, Karlsruhe, 2002

Attachment -- Food Irradiation Coalition Members

American Association of Meat Processors
American Bakers Association
American Meat Institute
American Spice Trade Association
Food Distributors International
Food Marketing Institute
Food Safeguards Council
Food Technology Services Inc.
Grocery Manufacturers of America
Infection Control Advisory Network Inc.
Infectious Diseases Society of America
Institute of Shortening and Edible Oils inc.
International Association of Color Manufactures
International Fresh Cut Produce Association
Kansas State University
National Cattleman's Beef Association
National Chicken Council
National Fisheries Institute
National Food Processors Association
National Meat Association
National Restaurant Association
National Turkey Federation
Nebraska Food Processing Center
North American Meat Processors
Ozark Food Processors Association
Pacific Seafood Processors Association
Snack Food Association
Society of Plastics Industry Inc.
SteriGenics International Inc.
STERIS Corporation-Isomedix Services
Titan Scan Corporation.