

Milk Contamination in the Windscale Incident

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RADIOACTIVITY in foodstuffs, particularly milk, is a new public health consideration associated with the atomic age. To my knowledge, the first situation in which radioactivity was reported in milk in sufficiently high concentration to be of immediate concern was the "Windscale incident," which occurred in England on October 10, 1957.

Windscale is located in the northwest corner of England on the Irish Sea. The British Atomic Energy Authority operated a breeder-type nuclear reactor in Windscale which when overheated resulted in a uranium fire. Because the reactor was air-cooled, the air going out the exhaust stack carried with it vast quantities of fission products. The accident admittedly occurred because of faulty instrumentation and human error; the fire was in progress for 24 hours before adequate diagnosis of the situation was made. It should be pointed out, however, that the Windscale reactor is obsolete by present standards. Newer reactors of this type have built-in control and safety features which greatly reduce the probability of such an event recurring.

There are many different radionuclides contributing to the usual spectrum of gross fission products. The one that has received the most public health attention is strontium-90, but it is not too well appreciated that there are other radionuclides to be considered in evaluating the public health aspects of nuclear fission. Radioactive iodine, in particular iodine-131, is a sig-

nificant component of freshly produced fission products. At Windscale a disproportionate amount of the iodine, because of its volatility, was driven off as a result of the fire, bringing about environmental contamination. Only a small fraction of the many other fission products escaped from the stack.

As soon as the situation was recognized, the immediate concern of the health and safety authorities was the possibility of a fallout from the stack exhaust which could result in hazardous levels of external radiation in the downwind area. An immediate evaluation of the downwind external radiation levels was ordered. In the interim, the local constabulary was alerted to assist in an evacuation of the residents in the affected areas if deemed necessary. It was soon determined that the levels of external radiation were extremely low.

The next consideration was the possibility of milk being contaminated. Cattle had been in the fallout area and possibly had ingested contaminated pasture. This fear was realized. Analysis of milk indicated that high levels of radioactivity, most of which was ultimately identified as iodine-131, was being secreted in the milk of the dairy cattle in the fallout area.

The authorities soon realized that they were confronted with a serious problem of milk contamination for which there were no standards of emergency permissible levels that could be appropriately applied. British authorities, guided by certain biological considerations and the exigencies of the situation, set up an emergency permissible level of 0.1 microcurie of iodine-131 per liter of milk and then set up a wide-scale sampling program to delineate the affected milksheds.

The occurrence of radioactive iodine as a contaminant and milk as the vehicle compounded the seriousness of such an incident. Iodine will

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concentrate in a relatively small volume of tissue, the thyroid gland, and milk certainly constitutes the major dietary item for infants and children. The net result would be the deposition of radioactive iodine in the thyroids of children in much higher concentration than in the adult population.

It was necessary to condemn about 250,000 gallons of milk from about 600 herds of cattle, over an area from 200 to 300 square miles. The population of the area was approximately 100,000 people. Because of the short half-life of iodine-131, the emergency situation lasted about 2 or 3 weeks. It should be pointed out that this milk could have been used for manufacturing purposes or the feeding of livestock but, because of public apprehension, it was decided not to salvage the milk.

The accident created an extraordinary degree of disturbance. One outcome was recognition of the need for more public as well as scientific understanding of the risks associated with such an incident and for considerably more competence in health and safety as related to atomic radiations.

Recent evidence indicates that the thyroid glands of infants and young children, contrary

to previous belief, are relatively sensitive to radiation. The dosages to children's thyroids closest to the areas in which the milk was condemned were in the order of 10 rad. The unresolved question, therefore, is whether or not the carcinogenic effect associated with radiation exposure of the tissue is a threshold phenomenon. To date there are good epidemiological data indicating that radiation levels as low as 150 rads are associated with a significant incidence (in the order of 1 percent) of thyroid cancer.

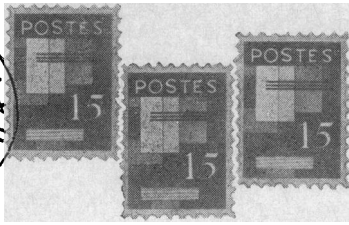
As previously pointed out, the radionuclide receiving almost exclusive attention as an internal radiation hazard had been strontium-90. However, it should be remembered that there are other sources which should be considered in evaluating the total dose. The recent report by the Public Health Service on its radioactivity surveillance of milk in selected milksheds supports this point. Although the reported levels of milk radioactivity are appreciably below the presently accepted permissible levels, over the past year the relation of iodine-131 to its permissible levels has been almost the same as that of strontium-90 to its permissible levels.

Certain Food Additives Listed as Safe by FDA

A list of 188 food chemicals, generally regarded as safe for their intended use, has been proposed by the Food and Drug Administration for exemption from testing required by law. The list appears in the *Federal Register*, December 9, 1958, pp. 9516-9517, along with regulations proposed in compliance with the 1958 Food Additives Amendment to the pure food law.

Including some already sanctioned for use, the group comprises 61 preservatives, 39 buffers and neutralizers, 35 nutrients, 5 non-nutritive sweeteners, 5 coloring agents, 5 stabilizers, 4 emulsifiers, and 34 other additives. Thirty-six are limited as to quantity or foods in which they may be used. Other chemicals may be added if they meet the legal criteria.

The proposed regulations take into account that a chemical might be both a new drug and a food additive, in which case only one petition need be filed.



The 13th Round

By early 1959 we hope to end the yaws campaign in Esmeraldas Province, Ecuador, and turn over responsibility for residual cases to the ordinary health services. Eradication is virtually complete in the southern part of the province. The only active cases are appearing in the north, along four rivers, where the efforts of the 13th house-to-house round are being concentrated.

—JAMES D. CALDWELL, *chief, Health Division, U. S. Operations Mission, Ecuador.*

Cholera and Smallpox

Before the monsoon began in June 1958, we were fighting cholera and smallpox in East Pakistan. Cholera cases averaged 150 to 200 a week, and smallpox, 1,700 cases and 850 deaths a week.

In April, the Provincial Government asked for help in combating smallpox, and within 2 months a total of 28.4 million doses of smallpox vaccine, sent by 17 countries and the World Health Organization, arrived here. About half the vaccine was distributed and the rest stockpiled.

A United States Navy medical research team based in Taiwan and nine epidemiologists from the Communicable Disease Center in Atlanta, Ga., headed by Dr. Alexander D. Langmuir and Dr. Glenn S. Usher, came in response to the Pakistani Government's request for additional personnel to control the epidemics.

The Navy team began research on cholera and studied the effectiveness of smallpox vaccine after varying periods without refrigeration. The epidemiologists studied the extent of the cholera and smallpox epidemics, the effectiveness of the smallpox vaccinations, and the percentage of those effectively vaccinated.

Reports of this work indicated the practicability of smallpox eradication. We now have ample supplies of vaccine and the people are receptive to the neces-

sary measures. We plan to try various ways to persuade more people to be vaccinated. Each woman will be given the sewing needle used to vaccinate her. Teams of women vaccinators will operate where purdah is observed.

The field tests showed the usefulness of the dried vaccine in East Pakistan. In the past, lack of refrigeration and transportation forced vaccinators to use vaccine lymph of questionable potency, and vaccinating was suspended in the summer months in some parts of the country. The dried vaccine, requiring refrigeration only after it is mixed, will make it possible to vaccinate throughout the year.

We arranged to set up a plant which will prepare dried smallpox vaccine for East Pakistan and to supply a consultant to install the equipment and instruct the Pakistanis who will operate it.

Control of cholera may take years, since it depends upon improvement of water supplies, general sanitation, and health education. Until this is achieved, we can only hope to limit the number of cases.

—JOHN A. BELLIZIA, *acting chief, Health and Sanitation Division, U. S. Operations Mission, East Pakistan.*

Decentralization

I went to Neyriz, a town of 12,000 in Fars Ostan, Iran, to take a trained sanitary aide to his new post and to introduce him to the mayor and the council, who are extremely interested in improving sanitation. While there we selected a site for the slaughterhouse for which 200,000 rials are allocated. They have also submitted a candidate to go to the Palasht School for training sanitarian aides.

The response in Neyriz is typical of other municipalities in Fars Ostan. Their demand for sanitarians exceeds the supply. The idea of local responsibility for public health services seems to be catching on; 6 municipalities have submitted candidates for Palasht.

However, we refuse to place a trained sanitarian aide in a town if we cannot get a satisfactory commitment that the town will assign a qualified municipal employee who will work with the aide and then go to Palasht himself the following year. Thus we get the maximum use out of the training given the people in our placement program.

—DAVID S. REID, *sanitary engineer, U. S. Operations Mission, Iran.*