

# Radiation and Public Health Project

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March 28, 1996

To Joseph T. Larkin  
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As a retired epidemiologist and resident of Suffolk County long concerned with the health effects of radioactive releases from the Brookhaven National Lab, I would like to submit to the Committee, by Federal Express, two articles by Dr. Ernest H Sternglass, emeritus radiology professor at the U. of Pittsburgh Medical School and myself on the relation of fission products in the diet to breast cancer and low birthweights and other immune deficiency diseases.

In Long Island there are many families living near BNL who have been troubled by a recent finding by the Suffolk County Health Department that contaminated groundwater under the Lab may be responsible for small amounts of tritium and strontium -90 found in some private wells close to BNL.

We have been repeatedly asked to comment on the significance of these findings, characterized by the Suffolk County Health Department as well below "safe drinking water standards".

We have prepared the following statement for attorneys representing these families, which in non-technical language, suggest that the dangers of low -level radiation have been greatly underestimated, and indeed implicate BNL as a possible source of the contamination of our drinking water and as a contributor to our epidemic rise of cancer and other immune deficiency diseases. Long Island has the highest age-adjusted cancer rates in the US.

I will focus first on the fact that three wells, sampled in September 1995, reported levels of 310 picocuries per liter (pCi/l) of tritium, for which the safe standard set by federal agencies is 20,000 pCi/l. This observed value may appear to be harmless, being equivalent to only 2 percent of the "safe" standard. But Canada has recently set 540 pCi/l of tritium in water as a more suitable safe standard, which means that the observed level is 57 percent of what Canada now regards as "safe".

Unfortunately there exist little epidemiological data on the health effects of tritium ingested by humans, but there is much published experimental evidence that so-called "safe" tritium levels harms the immune response of very young fish. If young fish are harmed, it is probable humans will also be similarly effected, especially

because at the fetal stage ingested tritiated water is known to affect certain crucial hormonal developments. So we must ask: How and by whom are these so-called safe standards set?

Again, all three wells near BNL reported 3 pCi/l of radioactive strontium, which is about 40 percent of the current EPA "safe" level of 8 pCi/l. How did this standard for humans come into being?

The U.S. federal agencies responsible for our radioactivity standards, operated under great pressure to set them at extremely high levels in order to win public acceptance for nuclear operations considered vital for national security reasons. For example, they knew as far back as 1943, that animal experiments demonstrated that ingested radioactive strontium (with a half-life of 28 years) would cause both immediate and delayed harm to the immune response. (These experiments remained classified as secret until 1969)

They knew of course that high levels of exposure would be harmful to humans, but it was really quite difficult to discover just how high or low an exposure to ingested strontium-90 would be "safe", for it had never been found in food or water prior to the Nuclear Age. Animals are a poor substitute for human experience, since you cannot not give millions of mice small doses of strontium-90 and collect morbidity data on how they were feeling. So necessarily a limited number of mice would be injected with high doses so that the percentage that died at given high doses would indicate what is called the *dose response*. They then assumed that when there was no exposure at all there would be no deaths at all and that therefore there may be some exposure level low enough so the few deaths at that level could be regarded as an "acceptable" risk. Thus they assumed that the dose response to radiation was linear. The Pentagon may have had some misgivings about this assumption, because DOE Secretary Hazel O'Leary has recently revealed that some 19,000 human guinea pigs have been unknowingly been subjected to low radiation levels, with results that have yet to be published.

But this assumption that the dose response to low levels of radiation was linear turned out to be dead wrong. In 1972, Dr. A. Petkau of the Canadian Atomic Energy Commission showed that the dose response was not linear but concave downward so that at low levels of radiation exposure, the dose response rises very quickly, and flattens out at high levels.

Thus the federal nuclear agencies underestimated the harmful effects of very low levels of radiation by hundreds to thousands of times. It is universally believed that there are no "safe" radioactivity levels, especially now that we understand from Petkau's work what is the bio-chemical mechanism by which the ingestion of a fission product like radioactive strontium promotes the formation of "free radicals" that can penetrate and destroy the

cells that constitute our immune system. The radioactive strontium, like calcium, concentrates in the bone and in this way harms the bone marrow where the cells of the immune response originate.

The highest single recorded level of strontium-90 found in milk during the peak years of US/USSR atmospheric bomb test was about 70 pCi/l. An extremely high monthly average of 26 pCi/l was measured in Connecticut milk in 1961-62, a level high enough to influence the Kennedy/Khrushchev decision to stop above-ground testing in 1963. After the cessation of above ground tests, the average amount of tritium found in New York City drinking water in 1968 was as low as .5 pCi/l.

A person in Long Island drinking water with an average of 3 pCi/l of strontium-90 would in the course of a year ingest 360 times 3= 1,080 pCi. But even this calculation greatly underestimates the harmful effects of such a massive annual ingestion of radioactive strontium on the human immune response. Since the chemical properties of radioactive strontium are similar to that of bone-seeking calcium, the presence of a given amount of strontium-90 in water is more harmful than the same amount in milk, because the body prefers to take up the calcium in milk, which tends to offset the strontium-90 in milk to a considerable degree. But the strontium ingested in drinking water has no calcium to mitigate its harmful effect.

It is clear from just these three wells how valuable it would be to have objective measures of tritium, strontium-90 and other reactor fission products present in drinking water in all parts of Long Island. It also suggests the desirability of Long Islanders switching to the consumption of bottled water (preferably distilled) or water treated by reverse osmosis, which eliminates heavy radioactive chemicals, along with calcium supplements and such anti-oxidant vitamins as C and E to deactivate free radicals.

Supporting references can be found in the booklet available without charge from Fish Unlimited (749 3474) entitled "Health Effects of Radioactivity of Long Island Drinking Water".