

nuclear sciences

Gathered at the 1969 Nuclear Science Symposium of the Institute of Electrical and Electronics Engineers last week in San Francisco

RADIATION

Safe limits assailed

An additional 17,000 cancer victims annually might result if the current U.S. guidelines for safe radiation limits are reached, warn two cancer researchers.

Drs. John W. Gofman and Arthur R. Tamplin of the Lawrence Radiation Laboratory, Livermore, Calif., attack the present allowable levels, saying they are 10 times what they should be. But, they emphasize, the population is not yet receiving anywhere near the allowable dose of 0.17 rads of total body exposure to ionizing radiation annually.

The scientists produced data showing the increased incidence of various forms of cancer under differing radiation conditions, ranging from reports by the atomic bomb casualty commission on those who suffered radiation exposure in Japan, to uranium miners and to people subjected to too much medical radiation.

"To continue the present guidelines is absolute folly," Dr. Gofman declares. They were adopted more than 10 years ago—before scientists began studying the effects of radiation on chromosomes. Yet the industry is only now getting going, and urgently needs a real standard that will hold up over time.

"It is far better to lower the guidelines now and do our engineering design accordingly," says Dr. Gofman. "It would be easy enough to raise them later if future findings indicated," he says.

"In this way we can avoid irreversible injury to a whole generation of humans while we find out the true facts."

MEDICINE

X-rays in pregnancy

A reduction in X-ray doses by factors of 100 to 1,000 allows the safe taking of X-rays in early pregnancy when the fetus is extremely sensitive.

This is one advantage among many seen by Ernest J. Sternglass, professor of radiation physics at the University of Pittsburgh School of Medicine, who has been working for the past two years with new procedures to cut dosages drastically.

Working under a grant from the National Institutes of Health, he has achieved dose reductions of up to 1,000 times through the development of high-resolution X-ray image intensifiers, storage-type television camera tubes and magnetic disk systems.

"I feel very strongly that we must cut back on the dose per picture taken," he says. "It is important because of the growing use of X-rays. By doing this we can take many more X-rays safely—even during pregnancy."

He referred to a recent radiation committee report from the United Nations describing a noticeable and determinable increase in brain tumors, leukemias, mental retardation and chromosome breaks where women had received "5 or 10 abdominal X-rays prior to and during pregnancy." These had occurred at levels only

10 to 20 times the normal background radiation.

"We want to cut down on the doses generally, but especially in the younger generation still to produce children," says Dr. Sternglass.

OCEANOGRAPHY

Fallout tracks tuna

The Scripps Institution of Oceanography at La Jolla, Calif., is using global fallout to follow the below-surface motions of the great Pacific Ocean and discover much that isn't yet known about tuna fish migration.

Despite the decline in explosions since the Test Ban Treaty, huge nuclear tests have thrown fallout all over the world, but especially near Japan. In the course of three years this material collected, submerged and moved toward California, says Theodore R. Folsom of Scripps. The main body has passed California and is now going back toward Japan south of Honolulu.

"Tuna fish that have gone by here show some evidence they have experienced these radioactivities, and we hope we are able to follow their migration by means of these fallout tags within them," he says. The tuna migrate to California from close to Japan every year and then return.

"We are working with cesium 137, a neighbor and having some similarities with strontium 90, but much easier for us to measure," explains Folsom. He stresses that there is no evidence fallout is contaminating any fish in the ocean.

ARCHAEOLOGY

Uranium dating questioned

The credibility of uranium-series dating is being questioned because of what is called the Valsequilla Reservoir dilemma. The method uses the decay rate of uranium into thorium 230 and protactinium 231 to date when living substances died.

Uranium-series dates on bone samples excavated from several sites at a reservoir near Puebla, Mexico, indicated man's presence more than 20,000 years ago. But some bone dates, according to the uranium measurements, exceed 200,000 years.

"So we must either defend the dates against an onslaught of archaeological thought, or abandon the uranium method in this application as being so much wasted effort," says Dr. John Rosholt of the U.S. Geological Survey laboratories in Denver, Colo.

Archaeologically, the extremely old uranium-series dates cannot be correct, he says. One sample was from the same layer that yielded sophisticated stone tools such as bifacially worked knives, scrapers, burins and tanged projectile points.

It was doubtful that these tools were in use at Valsequilla more than 200,000 years before the date generally accepted for development of analogous tools in the Old World, or indeed more than 150,000 years before the appearance of *Homo sapiens*, he says.