LETTERS

To the Editor

A long, *long* time

Dear Sir:

In reference to "Uranium Mining Doubly Risky" in your 20 May issue, it would appear that someone high up in Washington has not been doing his homework for a long time.

Merril Eisenbud's "Environmental Radioactivity" (McGraw-Hill, 1963) gives both of the Federal Radiation Council's Memoranda first to President Eisenhower, and approved by him and published the FEDERAL REGISTER of 5/18/60 and second to President Kennedy, likewise approved by him and published in the REGISTER 9/20/61. Both deal with radiation hazards, the second mentioning radium 226, iodine 131, strontium 90 and strontium 89 specifically. They both approach the subject as far as exposing laboratory and labor personnel are concerned, but not including mining workers.

Apparently no consideration was given to the basic source of uranium ore and the human beings who are engaged in digging it out of the mines. Like many other official reports the herd-bound mind too often relies on previous reports. Possibly the F.R.C. were following the accumulated reports of the McGraw-Hill Manhattan Project series, which is concerned with the potential dangers of working with uranium and its particulate dusts in the production of the bomb.

Nowhere in any of this literature can one find mention of radon, the disintegration product found in all uranium mines.

Yet, in his article "Primary Lung Cancer," Kucha (American Cancer Society 1967) starts off with a reference to Agricola (A.D. 37-93) and others who described an unusual disease of the lungs found among miners working in the Schneeberg and Joachimsthal mines, generally referred to as tuberculosis, "Miners Lung" and lymphosarcoma of the bronchial glands.

Among others who may be quoted on the toxicology, not of uranium but of its most dangerous concomitant, radon, one may cite:

N. Irving Sax, and others, in their "Dangerous Properties of Industrial Materials" (Reinhold *1937*) specifically single out radon as a material deposited in the lung "and has been considered to be a major causative agent in the high incidence of lung cancer found in

(*See p. 590*)

Nature Note

The Silent Fog

Silently, majestically, the gray veil of fog fills the air, drifting around the trees, settling on mosses and encompassing each twig, leaf and stone in a moist gray cloud.

Fog is exactly that—a cloud whose base touches ground. This mass of billions of tiny suspended water droplets is formed when temperatures of the atmosphere drop low enough so the water vapor in the air condenses. Fog usually occurs on cool nights when the wind is still, creating a sense of unreality, ghostliness and tranquil beauty as the mist softens harsh outlines and mutes colors to more somber hues.

Yet some of these tranquil fogs have been the cause of death and disaster, especially along the ocean shipping lanes where they blot out visibility, and on land along the coasts—in California, for instance, where the fog rolls in over super-highways and causes speeding cars to pile upon each other.

There are various kinds of fogs. Radiation fog, also called ground fog or summer fog, occurs when the heat of the atmosphere radiates upward and water vapor condenses. This usually takes place during a long clear night, often in hollows, valleys and other low depressions of the land. These fogs are short-lived, however, disappearing in the morning as warm rays of the rising sun burn them off.

Another kind of fog is advection fog, which is more dense and persistent, sometimes covering very large areas and standing several thousand feet deep. These fogs are formed when warm moist air moves over cold surfaces of either land or water. The great marine fogs of the Grand Banks off Newfoundland are formed when warm moist air over the Gulf Stream meets the cold Labrador current flowing from the Arctic. Coastal fogs around Nantucket and along the coasts of California, Peru and southwest Africa are formed when moist ocean air meets cool conditions.

Fog sometimes consists of ice crystals rather than condensed water vapor. This is then called ice fog, usually occurring in higher latitudes of our planet, where temperatures are low enough to change the water vapor directly into ice.

German and Czechoslovakian uranium mines."

Coming back to Eisenbud, one finds several disturbing items. Page 12: "It has long been known that men who worked in mines in Joachimsthal, Czechoslovakia, were prone to a fatal lung disease, but only in recent times was it learned that the disease was bronchiogenic carcinoma. The mines had been operated for centuries as a source of many metals, and from the beginning of the 20th century as a source of pitchblende. When it was realized that cancer could result from chronic irradiation by radionuclides deposited within the body, it was suggested that the high incidence of lung cancer among miners of radioactive ores in Joachimsthal might be explained by their exposure to radioactive substances in the atmospheres of the mines (Lorenz, J. NCI, 5:1 (1944). Studies of the mine air revealed the presence of high concentrations of radon, and this radioactive gas came to be regarded by many as the etiological agent in the high incidence of lung cancer. . . . More recently (Holaday, U.S. Dept. of H.E.W. Report 494, 1957) high concentrations of radon were found in the mines of the Colorado Plateau."

Eisenbud has another citation, p. 173, which is too long to quote here. However, Hogertons "Atomic Energy Deskbook" (Reinhold 1963, p. 459) under radon categorically states "radon is inherently associated with radium in uranium ores. Radon and its radioactive daughters, radium A and radium C, constitute a potential health hazard in uranium mining and ore handling operations. The latter are particulate and tend to be retained in the lungs. Thorough ventilation is required to prevent dangerous accumulations of radon and its daughters in any confined space."

The photographs in your 20 May issue might be convincing if one knew just what kind of respirators the miners pictured in two illustrations were wearing. One man using a detector was not so equipped.

Deputy Surgeon General Leo Gehrig says that deaths of these miners will be due to years of breathing radioactive dust. He does not mention breathing radon gas. Yet, the Congressman from California who blames the possible closing of the mines on those who are campaigning for additional safeguards for uranium miners, sounds like some "Public Be Damned" antique out of the dim distant past of the bituminous coal industry. Haven't we progressed at all in this age?

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