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## Why Fluoride Is an Environmental Issue

by *Gar Smith*

While fluoride compounds occur naturally in some water supplies, the past 50 years have seen a dramatic - and troubling - increase in the volume of man-made industrial fluoride compounds expelled into our water and air.

Pouring fluorides into water supplies has generated controversy and opposition for five contentious decades. Meanwhile, little attention has been paid to the fluoride pollution that pours into the atmosphere from thousands of industrial plants around the world.

Fluoride pollution is not a new problem. As the two reports cited below show, concerns about the dangers of fluoride contamination were well known 25 years ago.

### **Fluoride Pollution: In Our Water, Our Air and Our Food**

"Fluorides are pollutants with considerable potential for producing ecological damage," Edward Groth III warned in an article in the April/May 1975 issue of *Environment*. By the end of the 1960s, the EPA estimated that 155,000 tons of fluoride (calculated as hydrogen fluoride) was pouring into the atmosphere each year from aluminum smelters, phosphate processing, coal combustion and the manufacturing of steel, bricks and glass products.

Several types of coniferous forests are vulnerable to fluoride damage at one part per billion (ppb) or less. Because fluoride does not break-down, it slowly accumulates in the environment. As early as 1971, the National Research Council warned that fluoride pollution from US industry (in concentrations as low as 1 ppb) had caused serious damage to plants and posed a threat to livestock as far as 20 miles downwind of the emission points. Some grasses consumed by livestock have been found to contain 200,000 times more fluoride than in the ambient air.

A 1971 National Park Service study of the area downwind of an Anaconda aluminum company smelter and a phosphate plant found excessive elevations of fluoride in pines, firs, grasses, shrubs, herbs and hay. Honey bees had the highest fluoride levels among insects. Wildlife, from birds and ground squirrels to larger mammal predators, had fluoride levels that reached as high as 13,333 parts per million (ppm).

Foraging on grasses containing 30 to 40 ppm of fluoride can be toxic to cattle. Mussels, oysters, crabs, shrimp and prawns have been killed by aquatic fluoride pollution.

Groth noted that some plants can synthesize organic fluoride compounds like fluoroacetates which Fluoride Quarterly Reports identified as "among the most poisonous substances known." Fluoro-organic residues have turned up in soybeans, lettuce, tea and oatmeal.

Airborne pollution dusts food crops with sodium fluoroacetate (which is sold commercially as Compound 1080, a deadly rodenticide). Groth observed that "a general buildup of fluoro-organic compounds in natural food webs" risks severe ecological damage.

Groth also noted that "fluoride may interact synergistically with other environmental pollutants to produce greater effects than either pollutant could cause were it acting alone." This synergistic "boost" has been demonstrated between fluoride and copper and between airborne hydrogen fluoride and sulfur dioxide.

Fluoridating the water for 100 million people requires dumping approximately 20,000 tons of fluoride into municipal reservoirs each year. About half of the ingested fluoride winds up stored in human teeth and bones. The rest returns to the environment via the household toilet.

A 1964 scientific study of fluoride levels in sewage in 56 California cities "demonstrated that domestic sewage already contained fluoride over and above that naturally present in water or added for dental health," Groth reported.

The study discovered that even residents in cities without fluoridated water were consuming so much excess fluoride in their foods and beverages that they were flushing "significant fluoride into receiving streams in their sewage."

### **The "Unpublicized Pollutant"**

In a 1973 report in the International Journal of Environmental Studies, researchers Elise Jerard and J.B. Patrick identified fluoride as "a highly unpublicized pollutant" that the President's Science Advisory Committee once classified as a "highest priority" contaminant.

"During the past three decades, fluoride discharges from fossil fuel combustion - and more than 50 types of major industries - have steadily increased the burden of airborne contamination," Jerard and Patrick wrote. "Invisible but potent, these emissions in both gaseous and particulate form, with their repertoire of ecological effects, pollute rain, soil, plant life and animals, surface waters [and] ... both directly and through interactions of this cycle - man."

Jerard and Patrick reported that "airborne fluoride accumulates in plants and can concentrate in the leafy portions by a factor of 2- to 260-fold without any visible sign of the contamination."

Jerard and Patrick reported that in some regions of Florida, "25,000 acres of citrus trees have been destroyed" within 50 miles of the phosphate processing plants and apparently "normal" specimens of orange juice were found to contain 3-12 ppm of fluoride.

In 1966, Professor of Atmospheric Sanitation Morris Katz noted that, while most air pollutants are measured in parts per million, atmospheric fluoride must be monitored in parts per billion. Katz warned that prolonged exposure to airborne fluoride concentrations of less than 1 ppb "may create a hazard [since] ... fluorides are more than 100 times more toxic than sulfur dioxide."

In 1969, a massive fish kill that turned Placentia Bay, Newfoundland into "a biological desert" was traced to fluoride effluent from a plant that produced elemental phosphorus for metal finishing and consumer goods. Some 22,800 pounds of fluoride effluent poured into the bay each day, primarily in the form of hydrofluosilicic acid - the same substance used to fluoridate city water supplies.

According to US Department of Agriculture Handbook No. 380: "Airborne fluorides have caused more worldwide damage to domestic animals than any other air pollutant." The handbook's list of fluorosis symptoms included: "dental mottling, respiratory distress, stiffness in knees or elbows or both" and concluded with the observation that "Man is much more sensitive than domestic animals to F [fluoride] intoxication."

In a 1970 report on "The Effects of Fluorides on Man," Harold C. Hodge (See Earth Island Journal, Winter, Spring '98) listed some of the symptoms of fluoride poisoning found in industrial workers: osteosclerosis, ossifications of ligamentous attachments, sinus trouble, perforation of the nasal septum, chest pains, coughs, thyroid disorders, anemia, dizziness, weakness and nausea.

### **Fluoride in the Food Chain**

Twenty-five years ago, Jerard and Patrick issued an alarm about the growing presence of fluorides in the food chain. The researchers listed numerous examples of severe fluoride pollution on foods ranging from spinach, lettuce and tubers to the milk and meat of cows. In addition to contamination from atmospheric fluorides, Jerard and Patrick discovered that farm produce also picks up fluoride pollution from phosphate fertilizers and fluoride-bearing pesticides applied to apples, pears, celery and raspberries.

Coal-burning electric powerplants and the petroleum industry are major sources of urban fluoride pollution. Jerard and Patrick also noted a

"considerable fluoride content, up to 16% or more, in a number of important drugs, including tranquilizers, corticosteroids, some preparations used in cancer therapy and anesthetics."

"Fluoride-emitting factories, once scattered with wide exclusion zones, have proliferated and become more closely concentrated," Jerard and Patrick observed in 1973. "Foods grown in fluoride-polluted regions are distributed over great distances... Foods and beverages processed with fluoridated water are mass-distributed."

Each liter of fluoridated water, at 1 ppm concentration, contains a one milligram dose of fluoride - the so-called "recommended" daily amount. Water, however, is only one source of ingested fluoride. In 1991, the US Public Health Service estimated that the total daily intake for a 110-pound adult from all sources in an "optimally" fluoridated city, ranged as high as 6.6 milligrams. In 1997, the EPA estimated that Americans were ingesting nearly five times more fluoride than in 1971 - from food and drinks alone.

Children are more at risk of over-exposure than adults. A 1991 study by the Journal of Clinical Pediatric Dentistry found that every sample of bottled fruit beverages tested contained fluoride. One sample of Gerber's grape juice contained 6.8 ppm - 70% higher than the EPA's Maximum Contaminant Level of 4 ppm for fluoride in drinking water and 240% higher than the EPA's 2 ppm standard set to protect against dental fluorosis.

Currently there is no federal program to detect or label the fluoride content in US foods or drinks. We hope that this special report will help to encourage a fundamental review of the health and ecological impacts of fluorides in the environment.