Hooper Bay, Alaska: Mass Fluoride Poisoning Blamed on Pump, Government

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Mass Fluoride Poisoning Blamed on Pump, Government

by David Hulen

ANCHORAGE — More than 260 villagers in Hooper Bay, Alaska — nearly 10 times more than previously reported — may have suffered fluoride poisoning in May after drinking water laced with dangerous levels of the chemical, according to a new state study.

A 41-year old man died after drinking large amounts of water from a village well. The Hooper Bay incident is now believed to be the largest reported outbreak of fluoride poisoning, according to a new study released Tuesday by doctors in the state's Section of Epidemiology.

The report describes a string of serious blunders — from malfunctioning pumps to a barely functioning local government — that led to fluoridation at nearly 40 times the level considered safe by the federal government.

Dominic Smith died and his 37-year old sister was hospitalized on Memorial Day weekend after high levels of fluoride made their way into one of two public watering points in Hooper Bay, a sprawling Yup'lk Eskimo settlement of about 950 people on the Bering Sea coast.

In Hooper Bay, as in nearly 150 other rural Alaskan communities, fluoride has been added to drinking water for many years to reduce the risk of tooth decay. The village has no running water or sewer system, and fluoride and chlorine are added at two public wells. People haul water home in buckets.

The new report lays blame for the problems in various directions and defends the practice of adding fluoride to public water supplies.

"The outbreak occurred because of multiple deficiencies that existed in design, operation, maintenance, training, communication, management and regulation of the village townsite water system," the report concludes.

The Hooper Bay episode highlights a number of chronic, widespread problems that plague many village water systems, the report notes. Steps are being taken by several agencies to make sure the specific problems that happened in Hooper Bay don't occur elsewhere.

Specifically:

* Virtually everyone who drank water drawn from the village's old townsite well May 21 or May 22 got sick. Initially, doctors reported that about two dozen villagers sought treatment at the clinic for symptoms that included nausea, diarrhea, vomiting, numbness and tingling in face and hands.

A team of epidemiologists who went to the village, however, found many more residents had symptoms. Based on the number of people believed to have drawn water from the well, the report estimates 261 villagers reported symptoms or were believed to have suffered from them.

* The people who became sickest appeared to have drunk the most water. The report says Smith woke the morning of May 22 and drank a glass of water drawn from the well the previous day. He quickly vomited.

"In order to maintain his hydration he continued to drink water at a rate estimated by his wife to be one 8-ounce glass every 15 minutes. By late morning he felt weak, and needed to lie down." By afternoon, Smith and several of his children were vomiting.

That evening, one of his children brought home more water from the village pump. Smith drank four more glasses of water. "According to his wife, by this time her husband was unable to walk and was complaining of 'weak muscles and sore feet.'" His wife found him dead in his bed the next morning.

Hooper Bay had problems with high — but not dangerous — levels of fluoride dating at least to January 1991. In fact, according to the report, the fluoride pump was rebuilt April 7 by workers for the state Department of Environmental Conservation.

Within a month, routine sampling of water again showed elevated levels of fluoride, and officials with the regional health agency in Bethel ordered the pump shut off. The report questions whether the pump was actually shut off by the village operator.

The report offers no conclusive reasons for the high level of fluoridation in water drawn from the well but says several failures occurred. For example, the pump drawing water from the ground into a holding tank apparently malfunctioned and higher-than-normal levels of fluoride were pumped into the tank.

Sven Brandt-Erichsen, the department's south-central regional director, said Tuesday the department's workers wouldn't necessarily have spotted the problems.

“It’s not clear to us whether we could have spotted any of the mechanical problems there. Based upon what I’ve heard from our staff, it would have been extremely difficult…with just an occasional visit.”

The village water-plant operator had no formal training. In addition, Hooper Bay only recently hired a village administrator after the job had been vacant for a year.

The study said, “A review of DEC records revealed that, despite requirements for weekly monitoring and monthly reports to DEC by the water system operator, no reports had been received from Hooper Bay since July, 1990…

“When elevated fluoride levels were discovered in early May, implementation of recommendations apparently did not occur. Since Hooper Bay was without a city administrator for a year, assurance of compliance…was difficult,” the study said.

Hooper Bay vice mayor Maria Green said the current water operator, whom she wouldn’t name, had resigned recently and city officials were looking for someone more qualified.

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excerpts from:

Final Report: Hooper Bay Waterborne Outbreak — Fluoride

April 12, 1993

State of Alaska Department of Health and Social Services

Division of Public Health
Section of Epidemiology

Based on fluoride levels of water collected from water system 1, the level during May 21-23 was most likely < 150 mg/L. In order to calculate fluoride doses, we assumed that the fluoride concentration of all water collected during May 21-23 was 150 mg/l. Using this assumption, fluoride doses ranged from 0.3 to 21.0 mg/kg; the man who died consumed an estimated 17.9 mg/kg. Among case patients, 10 (16%) had an estimated fluoride dose < 1.0 mg/kg and 21 (34%) had an estimated dose < 2.0 mg/kg; 13 (21%) had an estimated dose > 8.0 mg/kg. If the actual fluoride concentration in water system 1 was <150 mg/L, the estimated fluoride doses would be smaller. The urine (r=0.81) and serum (r=0.73) fluoride levels and the duration of illness (r=0.57) were linearly related to the estimated fluoride dose.

Assuming that the outbreak was caused by drinking water with a fluoride concentration of 150 mg/L, the minimum estimated fluoride dose which caused illness was 0.3 mg/kg or approximately 28 mg of total fluoride. This level is lower than other reports (5-7) and 27 times less than than the the 8.0 mg/kg recommended as a maximum safely tolerated dose in another report (4). Furthermore, for case-patients whose fluoride dose was estimated, 16% consumed <1.0 mg/kg and 34% consumed <2.0 mg/kg. This implies that both acute gastrointestinal symptoms and systemic toxicity may result from doses lower than previously believed.

We found that following acute fluoride poisoning, symptoms and toxic serum levels persisted longer and toxicity occurred at lower doses than previously reported.