Road Salt Contaminates Well, Causes Health Hazard

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The extensive use of salt to clear ice and snow from roads and highways during winter months is a benefit to travelers; however, it may present health hazards, particularly water pollution from runoff and leaching into the soil.

During the winter of 1966–67, over 6,320,000 tons of salt (NaCl) were applied to roads and highways in the United States. In addition, 247,000 tons of $CaCl_2$ were used, as well as 8,400,000 tons of abrasives. New York State alone used 2,171,000 tons of salts and abrasives to clear the roads. It is currently common to apply 1,000 lbs of salt per mile of 2-lane highway following a one-inch snowfall. Plows follow shortly after salting, with repeating cycles as long as the snow falls (5).

Abrasives are mixed in a 15:1 ratio with salt to keep them from freezing. This paper tells of an incident of groundwater contamination resulting from improper storage of a sand-salt mixture for use in road deicing in New York State.

Prior to 1975 and until November 1980, the town of Schodack, Rensselaer County, New York, stored piles of deicing abrasives mixed with salt on a dirt lot outside the town garage on Route 20. The mounds of abrasives (sand and gravel) were left uncovered in the lot and used as needed. Salt was poured on top of the mounds. In the fall of 1979, these sand-salt mounds were dumped directly on top of a 100 ft deep driven well shaft cover.

In November 1980, a resident who lived near the garage became ill from complications of kidney disease. Her physician could not easily diagnose the problem; threfore, her parents began looking for possible environmental problems that might be contributing to the complications. They asked the county health department to test the water from their privately owned driven well, and it was discovered that the water was contaminated with high levels of chloride and bacteria. From 1980 to 1983, the well was tested periodically and continuously found to be unsafe for drinking. In 1983, contamination was below safe levels designated by the State Board of Health (11); however, a few months later, salt levels increased again (Figure 1).

In a 1950 statewide water survey, the area wells were analyzed for chloride content and other contaminants, and the average chloride concentration of wells in the county was 12 ppm. with one well over 100 ppm. One well less than 2 miles from the well in question during the period 1980–1983 had only 2.4 ppm chloride. The current salt level in the well in question is 100 times greater than this, and has been as high as 250 times greater (3).

These high salt levels may have adverse effects on human health under certain conditions. The TDlc (lowest lethal toxic dose published) for human consumption of NaCl is 12,357 mg/kg for 23 consecutive days, or 12.3g/kg body weight (7). A large increase in daily salt intake will result in short term high blood pressure (8); other studies have demonstrated a definite link between essential hypertension and chronic high salt intake in otherwise healthy individuals (4,9), and more severe problems can arise in persons with pre-existing heart or kidney conditions (4). The Safe Drinking Water Act (1974) recommends maximum allowable concentrations of 250 mg/l for potable water (2). Concentrations between 100 and 300 ppm can lead to corrosion and salty taste (10). Topical applications of salt of only 50 mg/day have resulted in mild skin irritations in rabbits (7).

The family that owned the contaminated well have been using bottled water for drinking and cooking since the daughter's problem was discovered. Because of the nature of her illness, it is not possible to assess the exact effect the high salt intake from the well water had; however, it seems certain that the illness was complicated by it.

The family operates a pet grooming business on the premises and houses numerous large and small animals. Before discovery of the well water contamination, many of the small animals died. Since that time, the animals are given bottled water, and there has been no difficulty with small animal deaths.

The unusually high alkalinity of the water caused by the high salt content has caused corrosion of their plumbing, problems with the hot water heater, dishwasher and faucets, and deterioration of aluminum and stainless steel cooking utensils. Black flakes from pipe corrosion appear in the water, presenting further health hazards (1,6).

In addition, the property has been devalued by 40% since the well has become contaminated, and there is no safe water supply for domestic use. The residents asked the town to correct the storage and distribution of road salt to prevent contamination of the water supply. When no help was forthcoming, the State Department of Environmental Conservation was asked for assistance.

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The town was required to strip the upper layer of soil, replace it with gravel, dig a drainage ditch for the property, and remove the sand-salt piles.

The work was begun in April 1981. The salt is now stored indoors. A survey of other area wells showed that 15 others had high levels of salt. A well at the town garage was also contaminated and could not be used. A new well showed salt levels as high as 7,000 ppm. Pumping efforts to clean it out resulted in dropping the water in the residential well in question 15–20 feet. In May 1983, there were signs that the well was recovering; however, it is still not usable for drinking water, and the owners have planned to move.

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The Indiana State University chapter of the Student National Environmental Health Association will sponsor a Hazardous Waste Conference, March 20, 1985. For information, contact Bill V. Hickey, 933 South 5th, Terre Haute, IN 47807.