TRITIUM: HEALTH CONSEQUENCES

Nuclear utility Exelon and its subsidiaries have leaked and released millions of gallons of cooling water contaminated with radioactive tritium into the environment, threatening drinking water supplies. From what is currently known, leaks that occurred as early as 1996 were not discovered by the public until recently. While leaks were first revealed at Exelon reactors in Illinois, other leaks have been revealed at reactors in New York, Arizona, and New Jersey. Reports indicate that tritium is being detected in leachate from municipal landfills in Pennsylvania. At this point, we do not know how many other communities are being affected. For further information and to keep up with the growing list of sites, please visit the NIRS website www.nirs.org.

Tritium (^{3}H) is a radioactive isotope of hydrogen; it gives off radiation in the form of a beta particle. Tritium will bind anywhere hydrogen does, including in water, and in plant, animal and human tissue. It cannot be removed from the environment once it is released. Tritium can be inhaled, ingested, or absorbed through skin. Eating food containing ^{3}H can be even more damaging than drinking ^{3}H bound in water. Consequently, an estimated radiation dose based only on ingestion of tritiated water may underestimate the health effects if the person has also consumed food contaminated with tritium. (Komatsu)

First, as an isotope of hydrogen (the cell's most ubiquitous element), tritium can be incorporated into essentially all portions of the living machinery; and it is not innocuous -- deaths have occurred in industry from occupational overexposure.

R. Lowry Dobson, MD, PhD. (1979)

Tritium is primarily a byproduct of the nuclear power industry, which releases large amounts (megacuries) of tritium per year. (Dobson, 1979) Tritium has a half life of 12.3 years which means it will be dangerous for *at least* 120 years, since the hazardous life for a radionuclide is ten to twenty times longer than its half-life. Much of the initial research on health effects of tritium was conducted in the 1970's when an increase in nuclear power was seen as inevitable. Existing nuclear power reactors have been releasing dangerous levels of tritium into our air and water for decades.

The public is only now becoming aware of the magnitude of tritium's hazards. Most studies indicate that tritium in living creatures can produce typical radiogenic effects including cancer, genetic effects, developmental abnormalities and reproductive effects. (Straume) Tritium can cause mutations, tumors and cell death. (Rytomaa) Tritiated water is associated with significantly decreased weight of brain and genital tract organs in mice (Torok) and can cause irreversible loss of female germ cells in both mice and monkeys even at low concentrations. (Dobson, 1979)

Studies indicate that lower doses of tritium can cause more cell death (Dobson, 1976), mutations (Ito) and chromosome damage (Hori) per dose than higher tritium doses. Tritium can impart damage which is two or more times greater per dose than either x-rays or gamma rays. (Straume) (Dobson, 1976)

There is no evidence of a threshold for damage from ^{3}H exposure; even the smallest amount of tritium can have negative health impacts. (Dobson, 1974) Organically bound tritium (tritium bound in animal or plant tissue) can stay in the body for 10 years or more. While tritiated water *may* be cleared from the human body in about 10 days (Garland), if a person lives in an area where tritium contamination continues, he or she can experience chronic exposure to tritium. (Laskey) Tritium from tritiated water can become incorporated into DNA, the molecular basis of heredity for living organisms. DNA is especially sensitive to radiation. (Hori) A cell's exposure to tritium bound in DNA can be even more toxic than its exposure to tritium in water. (Straume)(Carr)

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For abstracts and further information on tritium, please see http://www.nirs.org/radiation/tritium/tritiumhome.htm

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