



COMMONWEALTH of VIRGINIA

Department of Health

P O BOX 2448

RICHMOND, VA 23218

E. ANNE PETERSON, M.D., M.P.H.
STATE HEALTH COMMISSIONER

TDD 1-800-828-1120

VIRGINIA DEPARTMENT OF HEALTH (VDH) GUIDELINE FOR ISSUANCE OF FISH-EATING ADVISORY DUE TO CONTAMINATION OF FISH WITH KEPONE (CHLORDECONE)

Kepone is the trade name of the synthetic organochlorine insecticide chlordecone, which is a degradation product of mirex. Kepone is a tan-white crystalline solid that does not occur naturally in the environment. Kepone is soluble in fats and oils while only minimally soluble in water. The technical grades usually contained 88.6% to 99.4% chlordecone as an active ingredient.

Production and Use of Kepone

Kepone was produced in Hopewell, Virginia, by Allied Chemical Company from 1966 until 1973. In 1974, Allied began to rely on Life Science Products Company to manufacture the pesticide ingredient. In July 1975, the VDH ordered termination of production by the sole manufacturer of Kepone when several workers developed serious neurological disorders. Before the shutdown, the estimated average annual production was 882,000 pounds. More than 99% of the production was exported; only 0.84% was available for domestic use.

Kepone was commonly used until 1978 as an insecticide to control insects that attack bananas, citrus trees with no fruits, tobacco, and ornamental shrubs. It was also used in household products such as ant and cockroach traps. In 1978, the registration of all products containing Kepone was cancelled in the United States. Kepone is no longer manufactured or used in the United States.

Sources of Kepone in the Environment

Production of Kepone at a manufacturing plant in Hopewell, Virginia, from 1966 to 1975 resulted in the release of approximately 90,720 kilograms of the compound to the environment through atmospheric emissions, wastewater discharges, or bulk waste disposal. As a result, the James River and its tributaries were contaminated with Kepone. The U.S. Environmental Protection Agency (EPA) estimated in 1978 that 9,070 to 18,140 kilograms of pesticide were deposited in the James River sediment. Due to Kepone contamination in the James River by Life Science Products Company, the State Health Commissioner issued an Emergency Rule on December 18, 1975. This Rule stated that there was to be no commercial or recreational fishing or other use of the James River and its tributaries from the fall line in Richmond to the Hampton-Norfolk Bridge Tunnel. The Rule was relaxed several times over the years to allow harvesting of various aquatic species as Kepone levels declined. The last commercial ban on finfish expired on June 30, 1988. A fish-eating advisory has been in place since that time from the fall line at Richmond to the Hampton-Norfolk Bridge Tunnel, including all tributaries.

Kepone contaminated water and soil while it was being manufactured and used in the 1960s and 1970s. Kepone can still enter surface water through runoff of contaminated soil at facilities that once manufactured Kepone, or by seeping from waste disposal sites. Kepone does not evaporate to any great extent into the air. It does not dissolve easily in water. Most of the Kepone in water attaches to soil particles suspended in the water or to sediment. When Kepone binds to soil particles in water, it can travel long distances. Kepone binds strongly to soil. Kepone can stay in soil, water, and sediments for years, breaking down slowly. Fish or animals that live in waters that contain Kepone, or that eat other animals contaminated with Kepone, can build up Kepone in their bodies. The amounts of Kepone in their bodies may be several times greater than the amount in their prey or in surrounding water.

Toxicity of Kepone

Most people are exposed to very low levels of Kepone. The most likely way for people in the general population to be exposed to Kepone is by eating food, particularly fish, taken from contaminated waters. Kepone is well absorbed following oral, respiratory, or dermal administration. Once Kepone is taken up in the body, it is carried by the blood stream throughout the body and is stored in adipose tissue for a long time. Kepone is broken down to Kepone alcohol, which is a less harmful product. Kepone and its breakdown product slowly leave the body through the feces.

Studies in workers exposed (more than one year) to Kepone have shown harmful effects on the liver, the nervous system, skin, and male reproductive systems. Workers exposed to high levels of Kepone during its manufacture experienced trembling, irritability, blurred vision, and headaches. Male workers experienced some harmful reproductive effects. However, there was no evidence that the permanent ability to father children was affected. Some workers exposed to high levels of Kepone developed skin rashes and enlarged livers. Animal studies with Kepone have shown effects similar to those seen in people, as well as harmful kidney effects, developmental effects, and effects on the ability of females to reproduce. Kepone is carcinogenic in laboratory animals and considered a potential human carcinogen.

Fish Consumption Advisory on Kepone

VDH is currently using the Food and Drug Administration's (FDA) action level of 0.3 parts per million (ppm) in edible portion of fish for issuing the fish consumption advisories for Kepone. VDH would continue to use this action level for any future advisories. At the present time, Kepone contamination in the sediment and fish is limited to James River and its tributaries. Since Kepone is no longer manufactured or used, it is unlikely that other bodies of water would ever become contaminated with Kepone.

*Prepared by: Ram K. Tripathi, Ph.D.
Toxicologist
Division of Health Hazards Control
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Approved by: *R. Lane Peterson, MD, MPH*
Approved by: *CSJ*
Approved by: *Khizar Wasti*