

Public Health Briefs

Toxic Soluble Waste Disposal in a Sanitary Landfill Site Draining to an Urban Water Supply

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The safe disposal of very large amounts of hazardous substances presents special problems. In the case described here, no one involved realized that a potentially serious situation was being created inadvertently. It is probable that similar situations are occurring elsewhere without notice.

On November 6, 1974 the Jefferson County (Colorado) Health Department was informed that 6,000 pounds of material described as "ineffective rat bait" had been buried at a sanitary landfill site. Disposal of the material had been arranged by the local office of the Fish and Wildlife Service, and the material had been described by a spokesman of that agency as rat bait that had become ineffective through age and was no longer palatable to rats.

The agent in the bait, 1080 or sodium monofluoroacetate (MFA), was thought to be as fully potent as when manufactured. Consultation with the regional poison control center and the pesticide disposal coordinator with the U.S. Environmental Protection Agency disclosed that the substance would have full potency, was very water soluble, and would unlikely be biodegradable when buried in a landfill.¹

It was estimated that between 15 and 30 kilograms of MFA were in the rat bait. According to Dreisbach, the fatal dose for an adult human weighing 70 kilograms varies between 50 and 100 milligrams. Therefore the quantity of MFA in the bait could represent a potential lethal dose for 300,000 to 600,000 adults.²

MFA was considered for use as a chemical warfare agent during World War II, as a water poison.³ It is colorless, odorless, soluble, stable, highly toxic, and has a delayed action which prevents early detection; it is one of the

most toxic non-protein substances known. Production of MFA today in the United States averages about 1200 kilograms each year. Private pest control operators receive about one-half of this production. About one-fifth is sold to state and local governments and about 12 per cent to federal agencies. The use of MFA in the United States is regulated and it is not available to the general public. In this instance, the regulations did not prevent a hazardous situation.

When ingested, fluoroacetate compounds are converted to fluorocitrate which inhibits the enzyme aconitase, necessary to convert citric acid to aconitic acid or isocitric acid. Inhibition of this enzyme leads to a fatal accumulation of citric acid in the cells, resulting in convulsions and death from cardiac or respiratory arrest.

Several cases of human poisoning have been recorded.⁴⁻⁷ There is no specific antidote known.⁸ Early symptoms include vomiting, convulsions, respiratory depression, and cardiac arrhythmia. In man, death is commonly due to ventricular fibrillation. In addition to ingestion, absorption may occur by inhalation, or by absorption through mucous membranes or lesions. Protective clothing should be worn when the material is handled, and should be thoroughly washed afterward.

Because of the highly toxic nature of this substance, the safety of the burial of this quantity of MFA in this sanitary landfill was investigated. A check of drainage maps of the area disclosed that an intermittent stream ran by the disposal site and that within a mile downstream there were eight homes on wells near the stream. The stream continued then for some distance, draining into a reservoir for a large water district. A meeting was called with all agencies involved with the pesticide disposal, and a hydrologist with the U.S. Geological Survey was called into consultation. The U.S. Geological Survey had geologic maps of the area which showed outcroppings of upturned strata of permeable sandstone at this site.

A field visit to the landfill site confirmed that this site was not suitable for disposal of hazardous substances. Although there were some quantities of clay in the area, there

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were also upturned strata of permeable sandstone which were brushed by the heavy machinery used in servicing the site. This sandstone was the exposed, upturned part of the Laramie-Fox Hills sandstone formation and served as a water recharging site for this important aquifer which runs under the city of Denver. It would appear that this was an extremely hazardous location for disposal of any large amounts of soluble toxic material, since a number of wells drew water from this sandstone strata, in addition to a possible problem with surface drainage to an intermittent stream and a reservoir for a public water supply.

The material was promptly removed and arrangements were made for storage. Subsequent meetings with state officials resulted in the decision that the material should be encapsulated before burial. It was found that there were no sanitary landfill sites in the state suitable for this purpose.

Another problem brought to light by this incident was the siting of sanitary landfills at recharging areas for aquifers. This may be a common practice, since old excavations made for removal of sand and gravel at "gravel pits" are convenient for disposal of solid waste. It would be advisable to consult geologists and hydrologists when such sites are selected in order to avoid contamination of water supplies by toxic substances buried at sanitary landfill sites.

This incident illustrates the need for better guidelines concerning the disposal of hazardous substances. First, formal approval of local health departments should be obtained before the disposal of hazardous materials is planned for any particular sanitary landfill site. In addition, hazardous sub-

stances should not be deposited at sanitary disposal sites in any populated area, especially if those areas are located at a recharging location for aquifers or near drainage involving private wells or public water supplies. It is also essential that local health department staff should meet with the supervisory staff of county solid waste control programs to discuss the importance of monitoring substances brought to the landfill site. Procedures should be established so that substances known to be toxic or of questionable toxicity should not be accepted without prior consultation with the local health department.

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Obstetricians' Attitudes toward Genetic Screening

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Considerable interest has been generated recently in screening for genetic diseases, both prenatally and before conception. Among these programs, testing for Tay-Sachs heterozygotes has been introduced into a number of American communities which have large Jewish populations who are at risk. A community-wide screening program for Tay-Sachs disease was initiated in Baltimore, Maryland in 1972 and has been in operation since that time. The success of genetic screening, as measured by the proportion of the at-risk

population who come for testing, is likely to depend upon the attitudes of the physicians who see patients at the appropriate time for screening. Since much of Tay-Sachs screening centers on pregnant women, or on couples contemplating a pregnancy, the obstetrician has a potentially critical role to play. A study was therefore carried out to assess obstetricians' attitudes toward genetic screening and to relate these attitudes to the degree to which they support existing programs.

Materials and Methods

A questionnaire was sent to 194 obstetricians practicing in the Baltimore area, and up to two phone contacts were made with obstetricians who did not respond after the initial mailing. Responses were received from 122 (63 per cent) of the obstetricians contacted. Respondents and non-

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