DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service
Agency for Toxic Substances
and Disease Registry

Memorandum

Date October 31, 1985

From Acting Director
Office of Health Assessment

Subject Health Assessment, LiPari Landfill, Gloucester County, New Jersey

To Mr. William Nelson
Public Health Advisor
EPA Region II

Executive Summary

The Agency for Toxic Substances and Disease Registry has performed a health assessment on data obtained from chemical and microbiological analyses of groundwater, surface water, soils, sediments, and air samples collected in the vicinity of the LiPari Landfill in Gloucester County, New Jersey. Groundwater--specifically the three municipal wells serving the Borough of Pitman--appears uncontaminated. Within the limitations of the data, discussed in the body of the report, and assuming that the present restrictions on public use of surface waters are enforced, there should be no significant human exposure to, and hence no health threat from, chemical and bacterial contaminants present in surface waters and sediments. Certain pesticides, apparently unrelated to the LiPari Landfill, were found in some soils taken from public parks. The limited information available on the extent of the pesticide contamination is inadequate to assess the public health significance of the contamination. No other significant chemical contaminants were identified in the park soils. Available information on atmospheric contamination and variables affecting such contamination suggests, but does not prove, that there is no significant public health threat from acute exposure to chemical contaminants by inhalation. Clarification of this issue, and the possible public health threat from long-term chronic exposure to air pollutants would require additional evaluation.

Background

The Agency for Toxic Substances and Disease Registry (ATSDR) has been requested by the U.S. Environmental Protection Agency (EPA) Region II to perform a health assessment based on data resulting from the analysis of air, soil, and water samples collected off-site in the vicinity of the LiPari Landfill.

Location and Land Use--The LiPari Landfill, ranked #1 on the October, 1984 EPA National Priorities List, is an approximately 15 acre site located in a mixed agricultural and residential area adjacent to the towns of Pitman (pop. 9,691) and Glassboro (pop. 14,644). The site is bordered by two streams, Chestnut Branch and Rabbit Run. Chestnut Branch flows in a northerly direction along the eastern side of the landfill; and Rabbit Run originates from a small spring adjacent to the site, flows along the full length of the northwestern edge of the landfill, and empties into Chestnut Branch. Approximately 1500 feet north (downstream) of the site, Chestnut Branch empties into the 26-acre man-made Alcyon Lake. The outflow from Alcyon Lake enters Mantua Creek which discharges into the Delaware River approximately nine miles northwest of the site. Two public parks border Alcyon Lake, Betty Park to the northeast and Alcyon Park to the northwest. A third public park, Holly Den Park, lies northeast of, and immediately downstream from, the spillway which empties Alcyon Lake. Residential housing in the community of Pitman lies within several hundred feet of the site east of Chestnut Branch. Apple and peach orchards form the remaining boundaries and are the predominant land use northwest and southwest of the site [Doc. #1].

Hydrogeology--The landfill is situated in and underlain by the Cohansey Sand Formation which is differentiated into two zones, the Upper and Lower Cohansey Sand, which differ in textural and hydrologic properties. The Upper Cohansey generally occurs above an elevation of 100 feet (MSL), and is believed to be the primary source of sand and gravel removed from the site when it was used as a borrow pit. Beneath the Cohansey Sand Formation is a second aquifer known as the Kirkwood Sand Formation. The Cohansey and Kirkwood Formations are separated by a dense silty clay formation known as the Kirkwood clay. The Kirkwood clay is believed to form a continuous layer 9-16 feet thick between the Cohansey and Kirkwood formations. In the Pitman area the Cohansey aquifer has historically been used for farm and domestic water supplies, although the naturally high levels of iron in the water have made it undesirable for domestic use. The Kirkwood Sand Formation has not been utilized in the area of the landfill because of its relatively low permeability and insignificant water yield. Beneath the Kirkwood Sand Formation are several other aquifers in the following descending order: Manasquan Formation; Vincentown Formation; Hornerstown-Navesink Sands; Mount Laurel-Wenonah Sands; and the Raritan-Magothy Formation.

The Raritan-Magothy formation contains the most important and productive aquifer in the area and is used for most public drinking water. The community of Pitman receives public drinking water from three wells 525 feet deep screened in the Raritan-Magothy formation. Although the majority of residents utilize the public water supply, several homeowners have private wells believed to be completed in the Cohansey aquifer [Doc. #1].

Waste Disposal Activities--The land on which the site is located was purchased in 1958 by Nick LiPari and was used as a sand and gravel pit. Trenches measuring 30-50 feet in width and 50-85 feet in length were excavated to a depth of 6-15 feet on the western six acres of the site. After excavation the trenches were backfilled with municipal and household wastes, liquid and semi-solid chemical wastes, and other industrial wastes. Liquid wastes were dumped at the site from 1958 to 1969 and solid wastes from 1958 to 1971. Although there are no detailed records of the type or quantity of wastes dumped at the site, estimates are that 12,000 cubic yards of solid and 2.9 million gallons of liquid wastes were placed in the landfill. It is thought that the liquid wastes disposed at the site were dumped uncontained into the landfill, although some investigators report that the site contains unbroken drums of liquid waste. Wastes disposed on-site reportedly include solvents, paint thinners and paints, formaldehyde, phenol and amine wastes, dust collector residues, resins, and ester press cakes.

In 1971 the New Jersey Department of Environmental Protection (NJDEP) closed the site following complaints by local residents of odors emanating from the site and observations of leachate entering Chestnut Branch [Doc. #1].

On-Site Remedial Activities--A removal action initiated in July, 1982 by the EPA Region II Emergency Response and Hazardous Materials Investigation Branch resulted in the installation of a chain link fence to limit public access to the landfill. In August, 1983 a second chain link fence was installed along the eastern side of Chestnut Branch to limit public access to the contaminated marsh bordering Chestnut Branch. The construction of a 30-inch-wide, low-permeability, soil/bentonite slurry wall keyed into the underlying Kirkwood clay was initiated in September, 1983, to segregate the bulk of the contaminants in the landfill from the surrounding Cohansey aquifer.

A 40-mil thick synthetic cap of high-density polyethylene (HDPE) was installed over the site and a surface water drainage system put in place above the HDPE cap to prevent the accumulation of water above the cap. The area was then covered with 18 inches of soil overburden and 6 inches of topsoil graded to facilitate surface run-off and planted with grass to prevent erosion. A passive gas-venting system with five surface vents underlies the cap above the six acres originally used as a borrow pit. A series of eight pairs of monitoring wells were installed to the top of the Kirkwood clay layer. One of each pair of wells is located within the containment system and the other is located outside the containment system. These wells are monitored at regular intervals to assess the integrity and adequacy of the containment system [Doc. #1].

Remedial alternatives for final cleanup of the site were presented and discussed in a report ["Final Draft Report, Onsite Feasibility Study for LiPari Landfill"] submitted to EPA Region II in August, 1985 by Camp Dresser and McKee, Inc. under EPA Contract No. 68-01-6939 [Doc. #1].

Off-Site Remedial Activities--A remedial investigation to determine the nature and extent of off-site contamination attributable to the LiPari Landfill and to define appropriate off-site remedial actions are currently in progress by personnel from EPA Region II and Camp Dresser and McKee, Inc. A report on these activities and recommendations is scheduled for completion in December, 1985 [Doc. #1].

As mentioned above, the Agency for Toxic Substances and Disease Registry has been requested by EPA Region II to perform a health assessment of the data accumulated from these off-site investigations. In the review which follows consideration was given only to that data which passed EPA quality control/quality assurance audits. No consideration was given to tentatively identified or unknown compounds.

Documents Reviewed

This review is based on an analysis of information contained in the following documents and data packages. This material was given to ATSDR by Mr. Robert A. Hyde of Camp Dresser and McKee, and Mr. Ronald Borsellino and Mr. John Frisco of EPA Region II at a meeting with ATSDR staff in Atlanta, Georgia on October 17, 1985. No written protocols for collection, transport, storage, and analysis of samples were provided for review. Some questions regarding specific techniques employed during the off-site remedial investigation were addressed by the individuals mentioned above, or by other members of their organizations.

Doc. #1 Final Draft Report, Onsite Feasibility Study for LiPari Landfill, EPA Contract No. 68-01-6939, Document Control No. 104-RI1-RT-BFCV-2; prepared for U.S. EPA Region II by Camp Dresser and McKee, Inc., Clement Associates, Inc., and Woodward-Clyde Consultants, August, 1985.

Doc. #2 Record of Decision, Remedial Alternative Selection, (and attachments); dated 8/3/82; signed for Rita M. Lavelle, Assistant Administrator, OSWER, EPA.

Doc. #3 Final Responsiveness Summary for the On-Site Remedial Investigation and Feasibility Study, Lipari Landfill Site; (undated).

Doc. #4 Record of Decision, Remedial Alternative Selection, Lipari Landfill Site; (and attachments); signed 9/30/85 by Christopher J. Daggett, Regional Administrator, EPA.

Doc. #5 Analytical data package for Alcyon Lake sediment boring location B-1.

Doc. #6 Analytical data package for Alcyon Lake sediment boring location B-2.

Doc. #7 Analytical data package for Alcyon Lake sediment boring location B-3.

Doc. #8 Analytical data package for Alcyon Lake sediment boring location B-4.

Doc. #9 Analytical data package for surface water and sediment samples SW01-SW06 and SE01-SE06.

Doc. #10 Analytical data package for surface water and sediment samples SW07-SW11 and SE07-SE09.

Doc. #11 Analytical data package for soil samples, Alcyon Park, (I AP).

Doc. #12 Analytical data package for soil samples, Betty Park and Holly Den Park (II BP & HD).

Doc. #13 Analytical data package for soil samples, west of Chestnut Branch (III WCB).

Doc. #14 Analytical data package for air samples.

Doc. #15 Analytical data package for bacteria sample locations, Betty Park, Alcyon Park, Holly Den Park.

Doc. #16 Analytical data package for groundwater samples and soil sample C-27.

Doc. #17 Analytical data package for Pittman Department of Public Works, Municipal Wells #2, #3, #4.

Doc. #18 Analytical data package for surface water, round 3.

Doc. #19 Analytical data package for sediment samples, round 1, re-do.

Doc. #20 Analytical data package for sediment samples, round 3.

Doc. #21 Analytical data package for groundwater, sample C-27.

Principle Contaminants

Numerous studies of leachate samples from the LiPari Landfill have been conducted in the past several years. A summary of the chemicals measured in leachate from the landfill is presented in Table 1-1 of Doc. #1. Of those chemicals, thirteen have been identified by EPA as "chemicals of concern" on-site [Tables 1-2 & 1-3, Doc. #1]. These include four volatile organic compounds [benzene; 1,2-dichloroethane; toluene; methylene chloride]; one acid extractable compound [phenol]; one base/neutral extractable compound [bis (2-chloroethyl)ether]; and seven inorganic compounds (metals) [chromium; nickel; lead; mercury; selenium; arsenic; silver]. The highest concentrations of these "chemicals of concern" recently reported in leachate samples from the landfill are as follows [from Table 1-3, Doc. #1]:

Benzene	29	ppm
1,2-dichloroethane	75	ppm
methylene chloride	61	ppm
toluene	87	ppm
bis (2-chloroethyl) ether	83	ppm
phenol	22	ppm
chromium	51	ppm
nickel	0.7	ppm
lead	0.9	ppm
mercury	0.13	ppm
selenium	0.21	ppm
arsenic	0.09	ppm
silver	0.08	ppm

The off-site samples which are the subject of this review were analyzed for the same "chemicals of concern" identified in the landfill leachate as well as other priority pollutants. Some off-site samples were collected for microbiological screening.

Environmental Contamination Pathways

The location, construction, and past disposal practices at the LiPari Landfill present the potential for contamination of all environmental pathways: soil, groundwater, surface water, air, and at least one food chain with potential human receptors.

The nature and extent of the contamination found at the areas studied during the off-site remedial investigation will be addressed in the Discussion section below.

Human Exposure Pathways

Human exposure to hazardous chemicals may result from (1) dermal absorption of a chemical or chemical mixture following direct contact with the chemical(s) or some chemically-contaminated material (e.g., soil, water); (2) ingestion of chemical(s) or contaminated materials (e.g., soil, water, food); (3) inhalation of air which has been contaminated with chemical(s) by the processes of (a) chemical volatilization and/or (b) mechanical dispersion of contaminated dust or aerosols.

In the following Discussion section each of these potential pathways for human exposure will be considered for each location studied during the off-site remedial investigation.

Discussion

In the following paragraphs each of the environmental contamination pathways studied during the off-site remedial investigation will be considered with respect to (1) the chemical/microbiological contaminants identified; (2) the potential for the pathway to result in human exposure; and (3) the public health significance should human exposure occur.

Ground and Surface Waters

Pitman Municipal Wells--Perhaps the greatest potential for human exposure to hazardous chemicals from the LiPari Landfill would result from the contamination of the three municipal wells (MW-2, MW-3, MW-4) upon which most of the community relies for drinking water.

No significant levels of any assayed inorganics (metals), pesticides, PCBs, or semi-volatile organics were identified in any of the samples taken from the three municipal wells used by the community. Several volatile organics at very low levels were identified in some, but not all of the samples analyzed. Chloroform was detected at 1-4 ppb in five duplicate samples from MW-2. Other volatile organics found in MW-2 are: Ethylbenzene at 1 ppb in three of five duplicate samples; pyrene at 6 ppb in one of five duplicate samples; fluoranthene at 6 ppb in one of five duplicate samples; acetone at 5 ppb and 8 ppb in two of five duplicate samples; methylene chloride at

26 ppb and 21 ppb in two of five duplicate samples; and total xylenes at 14 and 15 ppb in two of five duplicate samples. Acetone and methylene chloride were identified in the field/laboratory blanks, and may therefore represent contamination of the samples during collection or analysis. The other volatiles present in MW-2 are common environmental contaminants apart from hazardous waste sites. The only volatile organic found in MW-3 and MW-4 was ethyl benzene at 1 ppb.

The data suggest that no contamination of the municipal wells has occurred, and hence there is no present threat to the public health from the use of these wells for drinking and other domestic purposes.

Information reviewed indicates that the three municipal wells are drilled to a depth of 525 feet and screened in the Raritan-Magothy Formation [Doc. #1]. While this aquifer is separated from the contaminated Cohansey and Kirkwood aquifers by several geological formations, each probably separated from the other by clay aquitards, it would seem prudent to monitor the municipal wells on an annual basis until such time as the threat of contamination from the LiPari Landfill (or some other site) can be discounted.

Other Groundwater--Groundwater samples were taken at six locations west of Chestnut Branch/east of LiPari Landfill (Samples CP-5, -6, -7, -8, -9, -10), at three locations east of Chestnut Branch/west of Howard Avenue (Samples C-27, -29, -31), and at two locations east of Howard Avenue (Samples C-28, -30). No gross chemical contamination of the samples was evident from the data provided for review. No pesticides/PCBs were found in any of the wells except for CP-7 (4,4'-DDD and 4,4'-DDT at 0.02 ppb) and C-30 (endosulfan I at 0.02 ppb). Semi-volatiles were absent or negligible in all samples. Inorganics were unremarkable, with the possible exceptions of arsenic, chromium, nickel, lead, and in four samples, vanadium. These inorganic elements may be naturally present in the groundwater of this area. Lead was present in field and trip blanks, suggesting that contamination during sample collection or analysis may contribute to the results. Some volatile organics were identified in various samples, but

generally those volatiles most consistently found were also present in laboratory/field/trip blanks (e.g., acetone, 4-methyl-2-pentanone, dichloromethane).

Without further information on the nature and uses of the wells sampled for this off-site groundwater study, and more reliable laboratory data, no definitive statement can be made regarding the potential for human exposure or the possible consequences should such exposure occur.

Surface Water--Surface water samples were collected at several off-site locations along Chestnut Branch, its tributaries, and Alcyon Lake during three rounds of sampling. Chestnut Branch was sampled upstream (south) of the landfill [SW-01]; immediately downstream (north) from the landfill at the convergence of Rabbit Run and Chestnut Branch [SW-06]; further downstream, at Carew Avenue [SW-05]; and at two locations downstream (north) of Alcyon Lake [SW-03, SW-04]. Rabbit Run was sampled at two locations adjacent to the landfill [SW-07, SW-08]. Lost Lake Run was sampled at one location east of Chestnut Branch, immediately before the stream empties into Chestnut Branch [SW-02]. Girl Scout Branch was sampled immediately before it empties into Alcyon Lake [SW-09]. One sample was taken from approximately the center of Alcyon Lake [SW-10], and another at the northeast border of Alcyon Lake and Betty Park [SW-11].

No significant levels of volatile organics were detected in any of the surface water samples, although methylene chloride at an estimated concentration of 5 ppb was reported for some samples. This compound is a common laboratory contaminant and was apparently present in field, trip and/or laboratory blanks. Inorganics were unremarkable, with the exception of lead in some samples (up to 82 ppb in SW-06, Round 1, but not elevated in Rounds 2 & 3). Of the chemicals analyzed during the pesticide/PCBs screen, heptachlor was detected at an estimated concentration of 0.01 ppb in SW-04/Round 2; endosulfan sulfate was detected in SW-09/Round 2 at 0.02 ppb. The presence of these trace levels may reflect past agricultural use rather than contamination associated with LiPari Landfill.

Two semi-volatile compounds, bis(2-chloroethyl)ether and bis(2-chloroethoxy)methane were detected in one or more samples. Bis(2-chloroethoxy)methane was reportedly present at 30 ppb in SW-05/Round 2. Bis(2-chloro- ethyl)ether was found in several samples: SW-03/Round 2 at 10 ppb; SW-04/Round 2 at 11 ppb; SW-06/Round 2 at 30 ppb (25 ppb in duplicate sample); SW-07/Rounds 1 & 2 at 42 and 87 ppb, respectively; SW-08/Rounds 1 & 2 at 22 and 37 ppb, respectively; SW-10/Round 2 at 11 ppb; SW-11/Round 2 at 17 ppb.

Bacteriological sampling was conducted at the same sites as the samples for chemical analysis. In general the fecal coliform levels exceeded the New Jersey State Freshwater Criteria of 200 organisms/100 mL.

These data indicate the presence of environmental contamination in the vicinity of the LiPari Landfill. No significant levels of volatile organics were detected in any of the samples. Lead, which exceeded the Ambient Water Quality Criteria for human health (50 ppb) was the only significant inorganic contaminant detected. Since the surface waters analyzed are not used for drinking water, there does not appear to be any acute or chronic threat to the public health from inorganic compounds. Heptachlor was found at 0.01 ppb in a single sample, and endosulfan sulfate was found at 0.02 ppb in another single sample. The predominant chemical found in surface waters is bis(2-chloroethyl)ether. This semi-volatile compound was found in highest concentrations in the samples collected from Rabbit Run along the border of LiPari Landfill, and in the sample collected at the convergence of Rabbit Run and Chestnut Branch. Lower levels (10-17 ppb) were detected in samples from Alcyon Lake (SW-10, SW-11) and downstream from Alcyon Lake (SW-03, SW-04).

At the levels measured in the surface water samples, none of the chemical contaminants pose an <u>acute</u> threat to public health, although a <u>chronic</u> health threat could result from certain exposure scenarios. Some organics and inorganics may be bioaccumulated by aquatic organisms. Significant <u>chronic</u> human exposure could occur if contaminated organisms (e.g., fish) were consumed over long periods of time. This does not seem to be a significant possibility for the

surface waters in question for the following reasons: (1) the most heavily contaminated waters are enclosed in a restricted-access area; and (2) Alcyon Lake is closed to fishing and other recreational uses. A second possible route of chronic exposure is ingestion of surface waters as drinking water, or during water sports activities (e.g., swimming). Again, this does not appear to be a significant possibility as the contaminated areas are restricted or closed to recreational use, and the surface waters are not used as a source of drinking water. A third possible route of chronic human exposure is dermal absorption following direct contact with contaminated water. This, too, does not appear to be a significant possibility for the same reasons as stated above. A fourth possible route of human exposure is the volatilization of chemicals into the atmosphere which is inhaled by humans. This exposure route will be considered below under Air.

It should be emphasized that apart from the public health significance of chemical contamination, these surface waters should be off-limits for primary contact (e.g., swimming) due to the excessive levels of fecal coliforms. While the microbiological data are not unusual for an area where there are many on-going human, animal, and agricultural activities, the data do indicate some continued source(s) of sanitary waste pollution. The source(s) of this pollution cannot be identified from the information reviewed, but could be from farms, septic tanks, or leaking sewer pipes. A map included in Doc. #1 indicates a sewage treatment plant near the LiPari Landfill, but we do not know if this is an active or abandoned facility.

Soils

Public Parks--Soil samples at 6" and 18" were collected from several areas in Betty Park, Alcyon Park, and Holly Den Park. Since no public access (exposure route) is anticipated for soil at 18", this data was not considered in this review.

Microbiological data from the parklands were unremarkable considering the heavy human and animal traffic anticipated on public properties.

Two volatile organics, acetone and methylene

chloride, were found in several soil samples. As noted in an earlier section, these compounds are common laboratory contaminants, an observation borne out by their presence in field and laboratory blanks in this study. The same is true of the two phthalate esters identified in the soil samples [bis(2-ethylhexyl)phthalate and di-N-butylphthalate]. 2-Butanone, another volatile organic, was found in one soil sample from Alcyon Park at 21 ppb (AP-1). This may also be the result of field or laboratory contamination as it was found in at least one blank. Inorganics in the park soil samples were unremarkable. Several compounds belonging to the class of polycyclic aromatic hydrocarbons were detected in one or more samples at levels similar to, or below, what is considered background levels for these ubiquitous products of combustion in urban and rural areas. Several pesticides were found in some of the soil samples: 4,4'-DDD, -DDE, -DDT (range of 1.4-256 ppb); chlordane at 119 ppb was found in one sample from Holly Den Park. This pesticide contamination is probably the result of past agricultural practices rather than any contamination from the LiPari Landfill. Two other compounds were identified in one or more soil samples from the public parks: 4-methylphenol at 330 ppb in one sample from Alcyon Park (AP-5) and benzoic acid at 170-280 ppb in five soils from Betty Park.

While the reported levels of contamination do not indicate an acute health threat, consideration should be given to the possibility that pesticide contamination, particularly from chlordane, might pose a chronic health threat if children have access to surficial soils at these or higher levels. The information available for review was insufficient to evaluate the significance of the pesticide data.

West of Chestnut Branch(WCB)--Several samples were collected from an area west of Chestnut Branch along the perimeter of the landfill. These samples display a different pattern of contamination that those soils collected in the public parks. The discussion in preceeding paragraphs regarding methylene chloride, acetone, 2-butanone, and the two phthalate esters applies to the samples collected in this area.

Of the inorganics assayed, only lead was found at significantly elevated levels (range: non-detectable to 241 ppb). Six volatile organics were found in one or more of the WCB samples: carbon disulfide in samples WCB-1 and -3 at 33 and 24 ppb, respectively; 4-methyl-2-pentanone in WCB-1, -2, and -3 at 19,2, and 6 ppb, respectively; benzene in WCB-2, -3, -4, and -5 at 2, 100, 94, and 97 ppb, respectively; 1,1-dichloroethene in WCB-3 at 3 ppb; ethylbenzene in WCB-4, and -5 at 160 and 110 ppb, respectively; and total xylenes in WCB-1, -2, -4, and -5 at 40, 34, 310, and 69 ppb, respectively (but also observed in blanks).

The data for the WCB soil samples do not indicate a significant acute public health threat for one or more of the following reasons: (1) contaminants found are of low toxicity and/or are present in low levels; (2) public access to this area is restricted; (3) the area is essentially a marshland, hence there would be no significant contaminated dusts generated from the area. The possible acute and chronic health effects resulting from the volatilization of compounds from the contaminated soil into the atmosphere (and subsequent human exposure through inhalation) is considered in a later section (Air).

Sediments

Data provided for sediment samples collected in Alcyon Lake, Chestnut Branch, and its tributaries was not reviewed since at the present time there are no realistic routes for human exposure directly to the sediments or to a food chain (e.g., fish) in direct contact with the sediments.

Air

Air samples were collected at several locations on-site and off-site: from the vents located above a portion of the landfill; from several areas in the marshland lying between Chestnut Branch and the landfill; from one location on Chestnut Branch, downstream from the site; and from one location on Alcyon Lake. Some of the data reviewed were included in an analytical data package [Doc. #14].

Additional data were provided by telephone [personal communication from Robert A. Hyde and Ken Skipka, Camp Dresser and McKee, Inc., October 25, 1985]. A number of volatile organics were identified in the various samples including (but not limited to) the following: benzene, toluene, ethylbenzene, xylene isomers; tetrachloroethene; 1,1,1-trichloroethane; bis(2-chloroethyl)ether; phenol; 1,2-dichloroethane; 1,1-dichloroethene; trichloroethene; tetrachloroethene; chloroethane, chloroethane; dichloromethane; and 1,1-dichloroethane.

While no definitive statements can be made at the present time, a preliminary assessment of the data available suggests that there is no significant acute public health threat from the atmosphere. The nature, extent, and consequences of chronic (long-term) exposure depends upon a number of factors, including: (1) the extent of the continued release of leachate into the marsh area between the landfill and Chestnut Branch; (2) the effects of remedial activities on-site and along its borders on the release of volatile compounds; (3) local meteorological conditions.

Conclusions

Groundwater

Municipal Wells--The data reviewed suggest that no contamination of the municipal wells drawing from the deep Raritan-Magothy aquifer has occurred. Continued use of these wells poses no public health threat.

Other Wells--The data reviewed for groundwater wells drawing from the Cohansey and/or Kirkwood aquifers suggest some of the wells may be contaminated with certain pesticides, inorganics, and/or volatile organics. Many of the compounds found in these groundwater samples were also found in sample blanks. Without further information on the nature and uses of these wells, and more reliable laboratory data, no definitive statement can be made regarding the potential for human exposure or possible consequences should such exposure occur.

Surface Water

The data reviewed indicate both chemical and microbiological contamination of surface waters. These surface waters are not used as a source of drinking water and are restricted for other public uses (e.g., swimming, fishing). Assuming these restrictions are effective in preventing direct human contact with the water and aquatic food chains, there does not appear to be a significant public health threat due to any contamination observed.

Soils

Public Parks--Pesticide contamination was observed in some of the soils taken from the public parks. These pesticides are apparently not associated with the LiPari Landfill and their presence is probably indicative of past agricultural use in the area. No comment can be made regarding the possible public health impact of these pesticides without further information on their levels and distribution. Based on the data reviewed, and subject to the limitations of the data discussed in the body of the report, there does not appear to be a significant public health threat from any other compounds identified in soils collected from the public parks.

West of Chestnut Branch--The data reviewed for samples collected in this area indicate a pattern of contamination which differs from that noted in soil samples from the public parks. However, since public access to this area is restricted (area is fenced), no significant human exposure to contaminants in these soils should occur except through volatilization of compounds (see Air, below).

Sediments

The data for sediment samples was not reviewed since human contact with both the sediments, and with food chains in contact with sediments, is restricted. Without an exposure pathway, there is no public health threat.

Air

Based on the data presently available for review there does not appear to be a significant acute threat to public health resulting from the inhalation of contaminated air. The potential for a chronic, long-term public health threat cannot be evaluated on the basis of information presently available.

Recommendations

1. Monitor municipal wells for chemical contamination on an annual basis.

2. Identify and monitor quarterly any residential wells used for domestic purposes which draw from the Cohansey and/or Kirkwood aquifers in the vicinity of the LiPari Landfill.

3. Continue to restrict public use of surface waters in the vicinity of LiPari Landfill.

4. Evaluate the extent of pesticide contamination in the public parks.

5. Further characterize the potential for human exposure to atmospheric contaminants volatilized from surface waters, leachate pools around the landfill, and gas vents on the landfill.

6. Maintain restricted access to the landfill and immediately adjacent areas.

We hope this information is useful to you. Please call me (FTS 236-4551) if you have any questions.

Stephen Margolis, Ph.D.