

Health Assessment for

UPPER DEERFIELD TOWNSHIP SANITARY LANDFILL

CERCLIS NO. NJD980761399

UPPER DEERFIELD TOWNSHIP, CUMBERLAND COUNTY, NEW JERSEY

JUN 20 1990

Agency for Toxic Substances and Disease Registry
U.S. Public Health Service

THE ATSDR HEALTH ASSESSMENT: A NOTE OF EXPLANATION

Section 104(1)(7)(A) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended, states "...the term 'health assessment' shall include preliminary assessments of potential risks to human health posed by individual sites and facilities, based on such factors as the nature and extent of contamination, the existence of potential pathways of human exposure (including ground or surface water contamination, air emissions, and food chain contamination), the size and potential susceptibility of the community within the likely pathways of exposure, the comparison of expected human exposure levels to the short-term and long-term health effects associated with identified hazardous substances and any available recommended exposure or tolerance limits for such hazardous substances, and the comparison of existing morbidity and mortality data on diseases that may be associated with the observed levels of exposure. The Administrator of ATSDR shall use appropriate data, risk assessments, risk evaluations and studies available from the Administrator of EPA."

In accordance with the CERCLA section cited, this Health Assessment has been conducted using available data. Additional Health Assessments may be conducted for this site as more information becomes available.

The conclusions and recommendations presented in this Health Assessment are the result of site specific analyses and are not to be cited or quoted for other evaluations or Health Assessments.

**HEALTH ASSESSMENT
UPPER DEERFIELD TOWNSHIP LANDFILL
CUMBERLAND COUNTY
UPPER DEERFIELD TOWNSHIP , NEW JERSEY**

Prepared by:
Division of Science and Research
New Jersey Department of Environmental Protection (NJDEP)
and
Environmental Health Service
New Jersey Department of Health (NJDOH)

Prepared for:
Agency for Toxic Substances and Disease Registry (ATSDR)

BACKGROUND

The Upper Deerfield Township Landfill (UDTL) is listed by the U.S. Environmental Protection Agency (EPA) on the National Priorities List (NPL). In the late 1970s, local groundwater users began to complain about water discoloration and odor. Subsequent investigation by the Cumberland County Health Department revealed contamination by mercury and volatile organic compounds (VOCs) in samples taken from test wells at the UDTL, as well as samples taken from residential wells. After repeated recommendations and citations by the NJDEP, the site was closed in December 1983. All but three local area residents now use an alternative public water supply system.

The UDTL is located on 22.72 acres of sparsely populated farmland in Upper Deerfield Township, Cumberland County, New Jersey (Appendix 1). The site lies between Woodruff-Husted Station road (County Route 687) to the east and Centerton Road (County Route 553) to the west. The UDTL was originally a gravel pit owned by Seabrook Farms, Inc. Upper Deerfield Township purchased the land in 1960 and operated it as a municipal sanitary landfill. EPA is the lead agency for remediation efforts at the UDTL site.

COMMUNITY CONCERNS

In the late 1970's, residents near the site experienced a severe degradation of ground water quality. Initially, local officials discounted any connection with this phenomenon to the

municipal landfill. Water quality became a local election issue, and as a result in 1982 the Township obtained financing for a new municipal water system, and in 1983 began to supply bottled water to affected residents (USEPA 1987). In 1986, the municipal water system began operation.

Present community concerns may be summarized as follows:

- * The nature and extent of groundwater contamination. Also of concern is the proximity of the new supply wells to the landfill.
- * Health and safety. Issues include a perceived high cancer incidence in local neighborhoods and the use of the landfill for recreational purposes by local children.

Other community concerns include a lack of a clear and viable system of information exchange between residents and government agencies, a perceived decrease in property values, a negative community image, and the financial responsibility of the township. Designation of the Township as a responsible party could mean a large financial liability and subsequent tax increase for local residents.

SITE VISIT

The UDTL was visited by the NJDEP, Division of Science and Research, on August 30, 1988. The site was well posted, but the north side of the site was unfenced. This side of the site is partially protected by soil piles and heavy vegetation, but there were several paths offering relatively easy access (especially for children) to the site.

ENVIRONMENTAL CONTAMINATION

A. On-site Contamination

Contamination of groundwater with mercury and VOCs was confirmed in January 1984, by NJDEP. Samples were taken from the three on-site monitoring wells and elevated concentrations of mercury, benzene, and vinyl chloride were observed (Table 1). On-site samples taken in 1981 and 1982 by NJDEP revealed levels of trichloroethylene, 1,1,1-trichloroethane, trans-1,2-dichloroethylene, and lead above New Jersey State standards (Table 1). Soil samples have not yet been taken. However, the source of the groundwater contamination is likely to be the soil and debris in the Landfill.

During the initial site investigation in March 1987, Organic Vapor Analysis (OVA) readings were taken and were higher than background. It is likely that most of the OVA readings were due to escaping methane gas, but the presence of other organic vapors, including vinyl chloride, cannot be ruled out.

The initial site characterization noted isolated puddles of water and several drainage ditches on the UDTL. These areas, as well as the old gravel burrow pit (located just north of the landfill) receive run-off water from the landfill.

Table 1. Contaminants Exceeding New Jersey Standards or Guidelines in UDTL Groundwater.

	Maximum Contaminant Concentration(ug/L) (1)	Standards or Guidelines(ug/L) (2)
Benzene	7.0	1.0
Trans-1,2-dichloroethylene	720.0	10.0
1,1,1-trichloroethane	27.0	26.0
Trichloroethylene	7.0	1.0
Vinyl Chloride	354.0	2.0
Lead	130.0	50.0
Mercury	400.0	2.0

(1) All maximum concentrations are taken from 1981 or 1982 data, except mercury, benzene, and vinyl chloride, which are from 1984 data.

(2) All heavy metal standards are from New Jersey Safe Drinking Water Act (N.J.A.C. 7:10-5.1 et seq.). All VOC standards are New Jersey Maximum Contaminant Levels (MCLs) (N.J.A.C. 7:10-16.7).

B. Off-site Contamination

In January 1984, the NJDEP detected VOCs and mercury in samples taken from residential wells in the area (Table 2). The site lies atop the shallow Cohansey-Kirkwood Aquifer and there is the possibility of contamination of the Aquifer. A 1982 geophysical survey indicated a possible plume of groundwater contamination traveling southeast from the landfill. However, the UDTL may be on a groundwater divide and further testing is needed to confirm the exact direction of contamination spread. Further testing is planned in future RI/FS studies.

Local residents currently use water from two wells located approximately 1/2 mile north of the landfill. The NJDEP agreed to the design and location of this alternative system in March 1985. Samples taken from these two wells by the township in December 1987, revealed levels of trichloroethylene and tetrachloroethylene slightly above New Jersey MCLs. Trichloroethylene was also found in the groundwater beneath the UDTL. VOCs were not detected when NJDEP/Division of Water Resources resampled these wells in September 1988. It is unlikely that the contamination detected in 1987 is from the site, since the wells are topographically upgradient from the site. Delineation of the plume and a determination of the exact flow of the groundwater is included in future RI/FS studies.

The closest stream down-gradient of the UDTL is the Lebanon Branch which is almost three miles from the site. Significant contamination of the Lebanon Branch is unlikely, due to the distance of the Branch from the site, the dilution of the contaminants by the surface water, and the unlikelihood of run-off reaching the Branch.

Table 2. Contaminants Exceeding New Jersey Standards and Guidelines in Groundwater from Residential Wells Near UDTL (January 1984).

Contaminant	Maximum Concentration(ug/L)	Standards or Guidelines(ug/L)
Mercury	130.0	2.0 (1)
Benzene	3.0	1.0 (2)
Vinyl Chloride	38.0	2.0 (2)

(1) New Jersey Safe Drinking Water Act (N.J.A.C. 7:10-5.1 et seq.).

(2) New Jersey MCLs (N.J.A.C. 7:10-16.7).

C. Physical Hazards

The surface of the landfill is very irregular with numerous hills and much vegetation. The burrow pit is very deep and steep-sided. These characteristics create the potential for "slip and fall" type injuries. During a recent site visit by the NJDEP, Division of Science and Research, various pieces of debris and equipment (drums, chemicals, pipes and machinery) were seen at the site. This material is supposedly locked in the maintenance shed at night, but the shed is dilapidated and easily entered. The presence of this

material increases the possibility of injury, especially to curious children who might venture onto the site.

QUALITY ASSURANCE/QUALITY CONTROL

Quality assurance/quality control (QA/QC) information that may have been generated by both NJDEP/DHSM and the consultants could not be located. Since the health assessment relies heavily on the environmental data from the site, this information is essential to know how much confidence one has in the quality of the data. Future data on the site must be accompanied by QA/QC information and/or verification. The review of the QA/QC data on this site (during the RI/FS) will be conducted by the USEPA.

POTENTIAL ENVIRONMENTAL AND HUMAN EXPOSURE PATHWAYS

A. Environmental Pathways

Groundwater is the primary medium in which contamination has been detected. Although groundwater flow is probably in a southerly direction (based on the 1982 geophysical survey data), the site may be on a groundwater divide and groundwater may flow in more than one direction.

B. Human Exposure Pathways

Dumping at the site may have started as early as the 1940s (when it was owned by Seabrook Farms, Inc.) and continued until the Landfill was closed in late 1983. In December 1983, the township provided bottled water to residents until they could be hooked up to the alternate distribution system (2 wells located up-gradient) in June 1986. If the supply wells are being contaminated by chemicals from the UDTL, exposure pathways associated with that water supply are a concern. As of September 1987, three residents had refused hook-up. Further investigation is needed to determine if these three residents are still being exposed to the contaminated groundwater.

Little exposure from contaminated groundwater should have occurred after June 1986. Prior to this date, considerable human exposure could have occurred from ingesting contaminated groundwater, crops irrigated with contaminated water, or livestock fed contaminated feed or water. Exposure is likely to have been greatest for those residences located southeast of

the UDTL. Dermal exposure may have occurred from cleaning or bathing activities. Inhalation exposure may have occurred from showering or other activities where water is vaporized or misted.

Exposure may have also occurred from ingestion of contaminated soils or surface water by children playing at the site or by laborers on-site. Inhalation of contaminants, both volatile organic compounds and contaminants adsorbed to dust, is also a potential exposure pathway.

DEMOGRAPHICS

The UDTL is located in a sparsely populated rural area. The 1980 census placed the population of Deerfield Township at 6,810 persons. The nearest population centers to the site are Seabrook and Carlls Corner, both about 2 1/2 miles from the site. Only about 100 people live within one mile of the site with the nearest residence about 100 feet to the south. The nearest large population center topographically downgradient from the UDTL is Bridgeton (pop. approximately 20,000) which is located over five miles away. Sensitive populations near the site (e.g., children, elderly) have not been identified or characterized.

PUBLIC HEALTH IMPLICATIONS

The UDTL was registered to accept only normal household refuse. However, the high levels of VOCs and mercury in the groundwater indicate that unauthorized waste may have been dumped there. The 1980 to 1984 groundwater analyses found levels of mercury, lead, vinyl chloride, trichloroethylene, trans-1,2-dichloroethylene, 1,1,1-trichloroethane, and benzene that exceeded New Jersey drinking water standards or guidelines. (New Jersey's drinking water standards and guidelines are more stringent than federal standards.) Only chronic exposure is of concern since contaminant concentrations are too low to cause acute toxicity.

Mercury used extensively in the chloralkali industry, can be found in fossil fuels (may contain up to one ppm mercury), and can also be found in household waste. Chronic exposure to mercury results primarily in central nervous system effects such as paresthesia, ataxia, tremor, and excitability. Mercury can also cause kidney damage (either directly or indirectly through immunologic mechanisms) and all forms of mercury readily cross the placenta.

Lead is a common contaminant of some paints and petroleum products. Chronic lead exposure leads to central nervous system damage similar to mercury, as well as more subtle behavior and learning disorders (especially in children). Exposure to lead can also result in renal and hematopoietic effects.

Volatile organic compounds are common products and solvents of the petrochemical industry. Benzene and vinyl chloride have been classified as human carcinogens (EPA Group A). Trichloroethylene has been classified as a probable human carcinogen (EPA Group B2). Chronic exposure to vinyl chloride, 1,1,1-trichloroethane, and trichloroethylene can result in liver damage and exposure to benzene has been associated with bone marrow depression. Little data are available on chronic exposure to trans-1,2-dichloroethylene, but 1,1-dichloroethylene has been classified as a possible human carcinogen (EPA Group C) and is associated with liver toxicity after chronic exposure. Exposure to several VOCs (at higher concentrations than those found at the site) has resulted in CNS depression.

No data exists prior to 1980 to confirm the duration of the contamination. It is likely that human exposure has occurred since at least the late 1970s, when drinking water degradation was noted.

CONCLUSIONS AND RECOMMENDATIONS

On the basis of the information reviewed, the Upper Deerfield Township Landfill Site is a potential public health concern because humans have probably been exposed to hazardous substances at concentrations that may result in adverse health effects. As noted in environmental pathways and exposure pathways section, human exposure to high levels of VOCs and mercury in the ground water has probably occurred in the past via drinking water.

Samples taken from 1980-1984, confirmed groundwater contamination with VOCs and heavy metals both at the site and in the local area. The health threat from this site has lessened considerably since it was closed in 1983 and since residents began using the alternative supply system in 1986. However, there are further measures that need to be taken while the site is awaiting clean up.

Phase II of the RI/FS was designed to further delineate the spread, direction, and level of contamination from the UDTL. Phase II includes soil, sediment, surface water, as well

as air samples, and a determination of the direction and extent of the groundwater contamination. Radar and conductivity studies will determine the depth and amount of the deposited waste and to aid in the placement of the drill holes. Data that is used in the assessments of the site need to have passed a QA/QC review. QA/QC information will be included with all future data and will be reviewed by USEPA.

It is recommended that the site be completely fenced (including the burrow pit) to eliminate it as an attractive nuisance to children.

The groundwater from the alternate supply wells needs to be monitored routinely. This monitoring is currently occurring under New Jersey's A-280 program. It needs to be determined if the contamination in the monitoring wells is from UDTL or from another source. In addition, if the three potable wells that were not closed in 1986 are still in use, they need to be resampled to determine if the contamination in those wells has increased or is still present.

In accordance with CERCLA as amended, the Upper Deerfield Township Landfill site has been evaluated for appropriate follow-up with respect to health effects studies. Since human exposure to on-site and off-site contaminants may currently be occurring and may have occurred in the past, this site is being considered for follow-up health studies. After consultation with Regional EPA staff and State and local health and environmental officials, the Division of Health Studies, ATSDR and NJDOH, will determine if follow-up public health actions or studies are appropriate for this site.

This Health Assessment was prepared by the State of New Jersey Departments of Health and Environmental Protection, under a Cooperative Agreement with the Agency for Toxic Substances and Disease Registry. The Division of Health Assessment and Consultation and the Division of Health Studies of ATSDR have reviewed this Health Assessment and concur with its findings.

REFERENCES

A-280 Report, 1988. NJDEP, Division of Water Resources.

New Jersey Safe Drinking Water Act (N.J.A.C. 7:10-1.1 through 7.3)

Final RI/FS Work Plan for the Upper Deerfield Township Landfill Site, Cumberland County, New Jersey. Volume 1, September, 1987. EPA WA# 363-2LG2

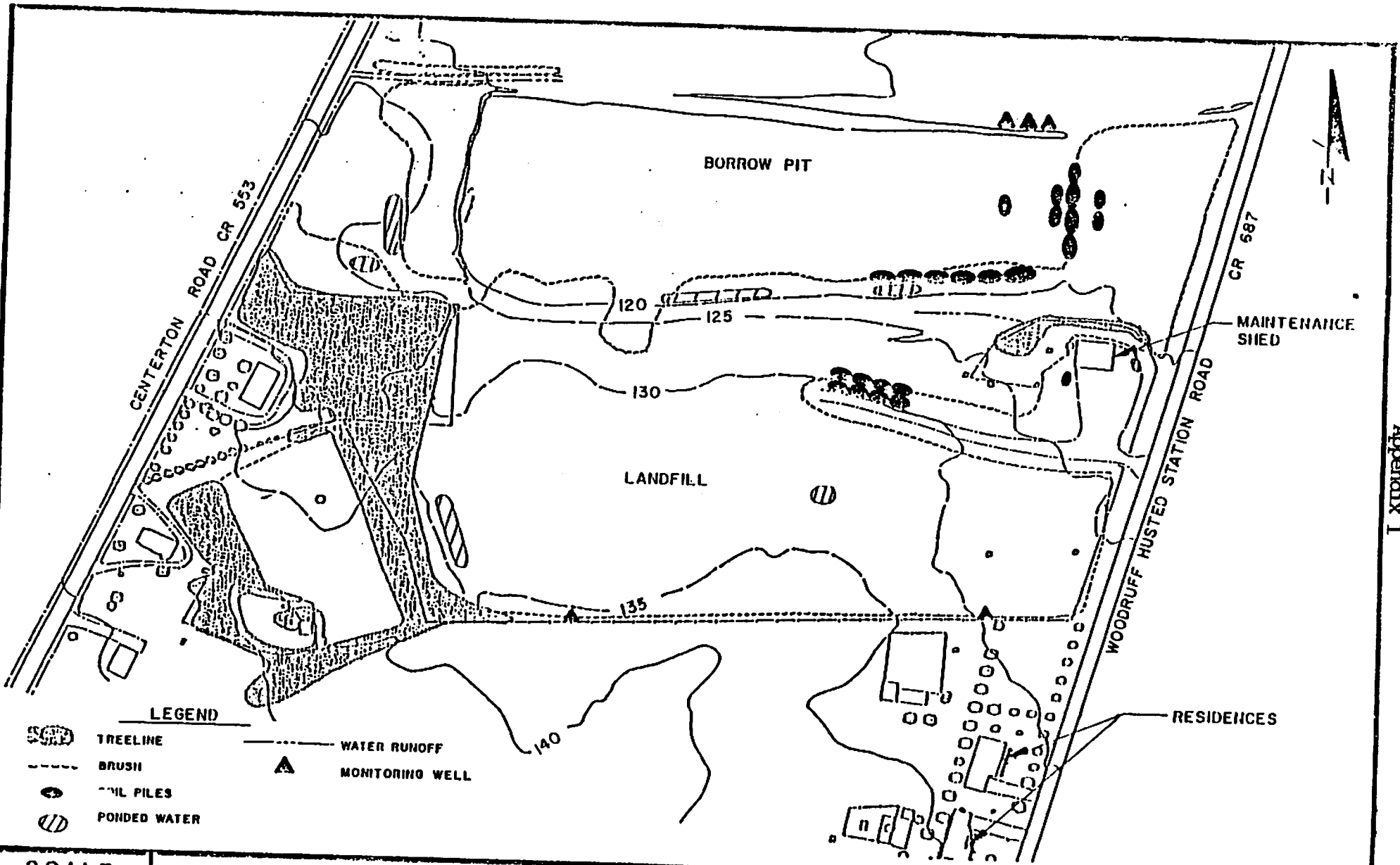
New Jersey Drinking Water Quality Institute, 1987. Maximum contaminant level recommendations for hazardous contaminants in drinking water. Appendix B Health-based maximum contaminant level support documents. Submitted to NJDEP, Trenton, New Jersey.

Klaassen, C., Amdur, M. and Doull, J., 1986. Cassarett and Doull's Toxicology: The Basic Science of Poisons, pp.598-609. New York:Macmillan.

Site Manager, NJDEP, Division of Waste Management. Personal Communication, 1988.

Upper Deerfield Township Landfill - Update
April 23, 1990

Additional Superfund documents on the Upper Deerfield Township Landfill have been finalized, since this health assessment was drafted. Reportedly, the documents have verified groundwater as the primary environmental pathway (Personal communication, NJDEP). Information from these documents will be included in the health assessment, in the form of an addendum, when the Upper Deerfield Township Landfill Health Assessment is updated.



LEGEND

- TREELINE
- BRUSH
- PILE PILES
- PONDED WATER
- WATER RUNOFF
- MONITORING WELL

SCALE
1" = 200'

DATE
AUGUST, 1987

UPPER DEERFIELD SITE

UPPER DEERFIELD TOWNSHIP LANDFILL SITE

SOURCE: INITIAL SITE CHARACTERIZATION, MARCH 6, 1987

C.C. JOHNSON & MALHOTRA, P.C.