

Health Consultation

A Summary of Monitoring Well Sampling
Conducted in Support of Public Health Assessments for

CIBA-GEIGY CORPORATION - EPA FACILITY ID: NJD001502517

REICH FARM - EPA FACILITY ID: NJD980529713

AND

DOVER TOWNSHIP MUNICIPAL LANDFILL - EPA FACILITY ID: NJD980771570

DOVER TOWNSHIP, OCEAN COUNTY, NEW JERSEY

MAY 7, 2001

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Agency for Toxic Substances and Disease Registry
Division of Health Assessment and Consultation
Atlanta, Georgia 30333

Health Consultation: A Note of Explanation

An ATSDR health consultation is a verbal or written response from ATSDR to a specific request for information about health risks related to a specific site, a chemical release, or the presence of hazardous material. In order to prevent or mitigate exposures, a consultation may lead to specific actions, such as restricting use of or replacing water supplies; intensifying environmental sampling; restricting site access; or removing the contaminated material.

In addition, consultations may recommend additional public health actions, such as conducting health surveillance activities to evaluate exposure or trends in adverse health outcomes; conducting biological indicators of exposure studies to assess exposure; and providing health education for health care providers and community members. This concludes the health consultation process for this site, unless additional information is obtained by ATSDR which, in the Agency's opinion, indicates a need to revise or append the conclusions previously issued.

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Prepared by:

New Jersey Department of Health and Senior Services
Hazardous Site Health Evaluation Program
Consumer and Environmental Health Services
Division of Epidemiology, Environmental and Occupational Health
Under a Cooperative Agreement with the
Agency for Toxic Substances and Disease Registry

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Abbreviations

AL	Action Level
ATSDR	Agency for Toxic Substances and Disease Registry
BDL	Below Detection Limit
CGC	Ciba-Geigy Corporation
CREG	Cancer Risk Evaluation Guide
CV	Comparison Value
DTML	Dover Township Municipal Landfill
EMEG	Environmental Media Evaluation Guide
LTHA	Lifetime Health Advisory
MCL	Maximum Contaminant Level
MRL	Minimal Risk Level
MTBE	Methyl tertiary-Butyl Ether
NJDEP	New Jersey Department of Environmental Protection
NJDHSS	New Jersey Department of Health and Senior Services
NPL	National Priorities List
PCE	Perchloroethylene (tetrachloroethylene)
ppb	parts per billion
ppm	parts per million
RF	Reich Farm
RfD	Reference Dose (EPA)
RMEG	Reference Dose Media Evaluation Guide
SAN trimer	Styrene-acrylonitrile trimer
SVOC	Semi-volatile organic chemical
TCE	Trichloroethylene
UCC	Union Carbide Corporation
USEPA	United States Environmental Protection Agency
VOC	Volatile organic chemical

Summary

The New Jersey Department of Health and Senior Services (NJDHSS) and the Agency for Toxic Substances and Disease Registry (ATSDR) have conducted sampling and analyses of monitoring wells associated with the Ciba-Geigy Corporation (CGC) and Reich Farm (RF) National Priorities List sites, and the Dover Township Municipal Landfill (DTML). The purposes of these analyses were to supplement existing data and to apply specific analytical methods. These analyses are part of an overall Public Health Response Plan, which includes Public Health Assessments of the above-mentioned sites. This Public Health Consultation describes and discusses the methods and results of the monitoring well analyses.

Analyses of monitoring well samples collected in 1997 near the CGC site showed contamination with a variety of volatile and semi-volatile organic chemicals, including benzene, chlorinated benzenes and solvents such as trichloroethylene and tetrachloroethylene. Contamination was heaviest in certain on-site wells, and extends into off-site areas. The kinds of contaminants observed were consistent with the results of periodic monitoring of the groundwater at the site. Similarly, the observed geographic and depth distribution of contamination was consistent with previous observations.

Analyses of monitoring well samples collected in the RF groundwater contamination plume in 1997 and 1998 confirmed the presence of trichloroethylene and tetrachloroethylene, and documented the geographic distribution of styrene-acrylonitrile trimer within the plume for the first time. The highest levels of contamination are downgradient and to the south of the site.

Monitoring well samples collected in 1999 and 2000 at the DTML site show contamination with benzene and chlorinated benzenes. For the first time, the presence of styrene-acrylonitrile trimer was documented in on-site wells, confirming that wastes containing this substance were deposited at the landfill.

At the CGC and RF sites, the NJDHSS and the ATSDR support continued efforts to monitor and remediate site-related groundwater contamination. At the DTML site, the NJDHSS and the ATSDR recommend continued delineation and monitoring of the extent of the groundwater contamination and contaminant source areas, and the eventual development of appropriate remedial plans. Maintenance of existing private well restriction areas in the vicinity of all three sites is also recommended.

Purpose and Health Issues

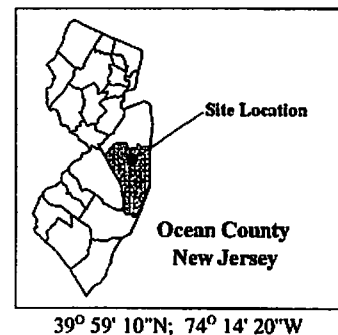
The New Jersey Department of Health and Senior Services (NJDHSS) and the federal Agency for Toxic Substances and Disease Registry (ATSDR) are conducting an investigation of the incidence of childhood cancers in Dover Township (Ocean County), New Jersey. Components of this investigation were outlined in a Public Health Response Plan (NJDOH and ATSDR, 1996). Included in the plan were Public Health Assessments evaluating the nature, extent, and significance of human exposure pathways associated with two National Priorities List (NPL) sites located in Dover Township: the Ciba-Geigy Corporation (CGC) site (NJDHSS and ATSDR, 2001a) and the Reich Farm (RF) site (NJDHSS and ATSDR, 2001b). A Public Health Assessment was also developed for the Dover Township Municipal Landfill (DTML) (NJDHSS and ATSDR, 2001c). In addition, the NJDHSS, the ATSDR, and the New Jersey Department of Environmental Protection (NJDEP) conducted an extensive evaluation of the community water supply (NJDHSS, NJDEP and ATSDR, 2001).

During the health assessment process, the NJDHSS and the ATSDR participated in the collection and analysis of water samples from monitoring wells associated with the CGC, RF and DTML sites. The purposes of these analyses were to supplement existing data, and to apply analytical methods that had been used in other aspects of the overall investigation. This Public Health Consultation summarizes and discusses the results of these monitoring well tests.

Background

Dover Township is located in Ocean County, New Jersey (see inset). The CGC site is located in the western part of the township. The RF site is located in the Pleasant Plains section, about 1.5 miles from the CGC site, and the DTML is located about 1.5 miles east of the RF site. The Public Health Assessments contain additional detail on site histories, environmental contamination, and remedial activities (NJDHSS and ATSDR, 2001a, 2001b and 2001c).

Each of the sites has been associated with contamination of groundwater, as will be discussed below. The Kirkwood-Cohansey aquifer system underlies much of southern New Jersey, including Dover Township. These formations consist of fine- to medium-grained quartz sands with occasional deposits of silt, gravel, and clay. A stratigraphic representation of these formations is given in Figure 1. Most of the community and private potable and irrigation water is drawn from wells which are screened in the Upper, Primary and Lower Cohansey, and Kirkwood No. 1 aquifer elements. Drinking water is less frequently drawn from the Lower Sand elements of the aquifer system. Other sources of ground water for drinking include elements of the much deeper Potomac-Raritan-Magothy aquifer system.



Ciba Geigy Corporation

The CGC site in West Dover is surrounded by residential areas of Dover and Manchester Townships. The Toms River forms the northeastern boundary of the site. The Winding River Park, a recreational area located within the flood plain of the Toms River, is adjacent to the site on the east.

The Ciba-Geigy Corporation (formerly Toms River Chemical Company) manufactured organic dyes and pigments at the Toms River Plant from 1952 through 1996. Epoxy resins were also manufactured at the CGC plant site from 1959 through 1991. Process wastes and waste water treatment sludge were deposited in approximately 20 areas on the CGC site. Wastewater from the manufacturing processes was directed to the Toms River until 1966; after that time, treated wastewater was discharged to the Atlantic Ocean via a 10 mile pipeline. Groundwater beneath the CGC site has been contaminated with a variety of organic chemicals and metals. Surface waters of the Toms River were contaminated during the time of direct wastewater discharge, and also from discharges from on-site waste storage lagoons. Contamination of the Holly Street Well Field was documented in the mid-1960s. All manufacturing, including dye standardization activities, ended at the CGC Toms River Plant in 1996.

At present, there are two plumes of contaminated groundwater in the Cohansey aquifer elements beneath the CGC site. One plume extends from the site to the east and southeast toward the Toms River. A second plume of groundwater contamination extends to the east and northeast to the river. Contamination does not appear to have progressed down to the Kirkwood No. 1 element. A purge-well system to capture and treat contaminated groundwater was installed in 1985. The U.S. Environmental Protection Agency (USEPA) required the installation of a larger scale groundwater extraction and treatment system, which was in full operation in 1996. Plans to remediate the on-site contaminated areas have been developed by the USEPA.

The Public Health Assessment identified completed human exposure pathways related to past use of the Holly Street community water supply wells and private wells (used for irrigation). Potential exposure pathways may have occurred in the past through air emissions and on-site access (NJDHSS and ATSDR, 2001a).

Reich Farm

The Reich Farm NPL site is located near the intersection of U.S. Route 9 and Church Road, in Dover Township. The site occupies an area of approximately 3 acres. The terrain is generally flat and sandy. The RF property is surrounded by small commercial facilities, residences, and wooded areas.

In 1971, the Union Carbide Corporation (UCC) contracted with an independent waste hauler to dispose of 5,000 to 6,000 drums of chemical wastes from its Bound Brook (Somerset County, New Jersey) plant. The wastes consisted of organic solvents, still bottoms, and residues from the

manufacture of organic chemicals, including plastics and resins. Approximately 4,500 of these drums were found to have been illegally dumped on the RF property. Under the supervision of the NJDEP, most of the drums were removed from the RF site by UCC in 1972; the remaining drums and contaminated soils were removed in 1974. Excavation and treatment of contaminated soils on-site was completed by UCC, under the supervision of the USEPA, in 1995.

Groundwater beneath the site was contaminated with a variety of organic chemicals, including styrene-acrylonitrile (SAN) trimer, and a plume of contaminated water extends from the site toward the Parkway Well Field of the United Water Toms River community water system. Wells at this well field are currently being used to capture the contaminated groundwater plume; treated water is pumped to waste (but may be available for use in the community water supply under high water demand conditions).

The Public Health Assessment identified completed human exposure pathways related to past use of private wells and community water supply wells contaminated by the RF groundwater plume (NJDHSS and ATSDR, 2001b).

Dover Township Municipal Landfill

The DTML is located in the Silverton section of Dover Township, approximately 1 mile east of the RF site. It is bounded by the Garden State Parkway and North Bay Avenue on the west, and by Silverton Road and Church Road on the north and south respectively. Ocean County Community College is located about 1 mile southeast of the site. The DTML site encompasses approximately 91 acres; the landfill itself is contained within an area of about 22 acres.

The DTML operated from 1956 through 1981. It was certified by NJDEP in 1970 to accept household, commercial, and industrial wastes. In 1971, an unknown number of drums from the UCC Bound Brook plant were deposited in the DTML. In 1978, permitted waste at DTML was restricted to household, commercial, institutional, and vegetative waste classes. Methane gas vents and six monitoring wells were installed on the DTML site, and the landfill was closed in 1981. In 1982, lead, arsenic, and volatile organic chemicals (VOCs) were found in the on-site monitoring wells. In 1987, private wells on Silverton Road adjacent to the DTML site were found to have contaminants similar to those found in the on-site monitoring wells, and were subsequently sealed. Dover Township is currently conducting a Remedial Investigation of the DTML site under the supervision of the NJDEP.

The Public Health Assessment identified a completed human exposure pathway related to past use of private wells adjacent to the DTML on Silverton Road (NJDHSS and ATSDR, 2001c).

Statement of Issues

Groundwater in the Vicinity of Ciba Geigy Groundwater on and near the CGC site is known to have been contaminated in the past by site-related chemicals. Over the past 40 years more than 400 monitoring wells have been installed on or near the CGC site. About 120 of these wells are now sampled as part of the Site-Wide Monitoring Program of the Long-Term Monitoring Plan. This Public Health Consultation will present the results of sampling by NJDHSS of 31 of the monitoring wells that are on and near the CGC site.

Groundwater in the Vicinity of Reich Farm Monitoring wells have been installed on the Reich Farm site and in the area between the site and the United Water Toms River Parkway Well Field. There have also been private potable and irrigation wells in the vicinity of the site, that have been sampled in the past. This Public Health Consultation will discuss the results of sampling of 11 monitoring wells that are located on or near the Reich Farm site.

Groundwater in the Vicinity of Dover Township Municipal Landfill Approximately 30 monitoring wells have been installed on or near the DTML site. This Public Health Consultation will present the results of water quality testing of 13 on-site monitoring wells, 6 nearby off-site monitoring wells, and 2 private wells that are adjacent to the site.

Methods

Monitoring well sampling was conducted in accordance with standard procedures, and laboratory analysis methods incorporated appropriate quality control and quality assurance procedures, as documented in each data package report (see NJDHSS references). At each site, samples were split with representatives of other organizations: CGC personnel at the CGC site, Malcolm Pirnie (contractor for Union Carbide) at the RF site, and Dan Raviv Associates (contractor for Dover Township) at the DTML. All split samples taken by NJDHSS were analyzed by the NJDHSS Public Health and Environmental Laboratory. Lancaster Laboratories (of Lancaster, Pa.) conducted analyses of the split samples for the other organizations. Only the NJDHSS results will be discussed in this Public Health Consultation. However, it should be noted that results obtained by both laboratories were consistent.

Sampling and Analyses

Ciba-Geigy Corporation Site Monitoring Wells

In cooperation with CGC site personnel, the NJDHSS split-sampled 31 of the CGC monitoring wells in August and September 1997. Monitoring wells were selected to represent a variety of depths: sampled wells were screened in the Primary Cohansey (16), Lower Cohansey (6), Kirkwood No.1 (5), and Lower Sand (4) aquifer elements of the Kirkwood-Cohansey aquifer

system. Wells were also chosen to represent on-site areas with the most contamination, the periphery of the site, and off-site areas. The locations of the 31 sampled wells are shown in Figure 2.

Samples were analyzed for a comprehensive list of volatile organic chemicals (VOCs, USEPA Method 524.2), semi-volatile organic chemicals (SVOCs, USEPA Method 525.2, including SAN trimer, and USEPA Method 625), and metals (arsenic, cadmium, chromium, lead, mercury and nickel). A complete list of organic chemical analytes is given in Table 1.

Reich Farm Site Monitoring Wells

Seven of the Reich Farm monitoring wells were sampled in May 1997. Samples were analyzed for VOCs (USEPA Method 524.2), SVOCs (USEPA Method 525.2, including SAN trimer), mercury, and radiological activity (gross alpha activity, radium-226 and radium-228). In June 1998, four additional monitoring wells were sampled by the UCC contractor and analyzed for SVOCs (including SAN trimer). The locations of the 11 sampled wells are shown in Figure 3.

Dover Township Municipal Landfill Monitoring Wells

In June 1999, 10 of the 16 monitoring wells on site at the DTML, and two private wells immediately adjacent to the site, were sampled. Samples were analyzed for VOCs (USEPA Method 524.2), SVOCs (USEPA Methods 525.2, including SAN trimer, and 625), and metals (arsenic, cadmium, chromium, lead and mercury). In September 2000, 11 monitoring wells were sampled at the DTML (including two that had been sampled in June 1999) for VOCs (USEPA Method 524.2), SVOCs (USEPA Method 525.2, including SAN trimer), and metals. The locations of the sampled Dover Township Municipal Landfill monitoring wells are shown in Figure 4.

Data Interpretation

In this Public Health Consultation, results are reported for target analytes as recorded in the NJDHSS Laboratory data packages (see NJDHSS references), except as follows. Results qualified with a "B" (denoting presence in the laboratory blank) are not reported. Results for a target analyte from a sample are reported as below the detection limit (BDL) if the analyte was also reported to be found in a trip or field blank from the same batch of samples. Results for acetone, 2-butanone (methyl ethyl ketone) and chloromethane from VOC analyses are not included because these were considered to be probable laboratory contaminants by the NJDHSS Laboratory. (Laboratory contaminants are substances detected in samples as a result of handling in the laboratory.) Phthalates from water samples are not reported if the concentration was less than 3 parts per billion (ppb), because these were considered to be possible laboratory contamination. Results were compared to health-based Comparison Values (CVs) (see Appendix).

Discussion

Results of Analyses

Ciba-Geigy Corporation Site Monitoring Wells - Results

The results of the analyses of samples from the Ciba-Geigy monitoring wells are shown in Table 2 (on-site wells) and Table 3 (off-site wells) (NJDHSS, 1997a). These results are generally consistent with previous, routine sampling episodes conducted as part of the CGC site monitoring program. Numerous VOCs and SVOCs continue to be present in both on- and off-site monitoring wells. Organic chemical contaminants in the highest concentrations in on-site wells (particularly 0133 and 0131) include tetrachloroethylene (perchloroethylene, or PCE), trichloroethylene (TCE), chlorobenzene, dichlorobenzenes, trichlorobenzenes, 2-chlorotoluene, 1,2,3-trichloropropane, toluene, 1,1,1-trichloroethane, and chloroform. Off-site wells of particular interest include Well RI-04D, located near Oak Ridge Parkway at Cardinal Drive, and Well RI-09, located near Oak Ridge Parkway at Coulter Street, which show contamination with a similar profile of organic chemical contaminants found in on-site wells; several contaminant levels in these two wells exceeded health-based CVs. Mercury was found above the CV in on-site wells 0131 and 0133, and at lower levels in several other on-site and off-site wells. Cadmium and lead were present in several of the monitoring wells at concentrations that exceeded the CV levels, but these were apparently not associated with organic chemical contamination.

Organic chemical results from well 0179, a deep on-site well, are likely to be inaccurate since the trip blank associated with the batch of samples to which it belongs was found to have been contaminated. This sample and its trip blank were transported and analyzed with samples from the heavily contaminated wells 0131 and 0133, and cross-contamination probably occurred. Contaminants have not previously been found in well 0179.

Reich Farm Site Monitoring Wells – Results

Results of the analyses for the 7 monitoring wells sampled in May 1997 are shown in Table 4 (NJDHSS, 1997b). VOCs, particularly TCE and PCE, were found in several of the wells at levels above CVs. Wells CHMW-4 and Swain Ave., located near the Garden State Parkway, had the highest concentrations of TCE. SAN trimer was found in the highest concentration (estimated 25 ppb) in the CHMW-4 well, and was found at lower levels in five other wells. These samples were the first to generate data on the distribution of SAN trimer in the RF groundwater contamination plume.

One of the wells (MP-8) contained mercury at 0.37 ppb, which is below the CV of 2 ppb. Three of the seven wells (MP-2R, MP-8 and MW-8S) approached or exceeded the maximum contaminant level (MCL) for gross alpha radioactivity (15 picoCuries per liter, or pCi/l), but none

exceeded the MCL for combined radium-226 and radium-228 (5 pCi/l). Radiological activity is naturally occurring and is not considered to be site-related.

Four Reich Farm monitoring wells were sampled in June 1998 and analyzed for SVOCs only. SAN trimer was measured in two of the four wells (MP-10, at 24 ppb, and MP-1R, at 2.9 ppb). MP-10 is upgradient and to the northwest of the CHMW-4 well. SAN trimer was absent in MP-13 and CHMW-2 (NJDHSS 1998).

Dover Township Municipal Landfill Monitoring Wells – Results

The analytical results for monitoring wells sampled in June 1999 are shown in Table 5 (NJDHSS, 1999). Benzene, chlorobenzene, and dichlorobenzenes were detected in several of the wells, and benzene exceeded the CV in four wells. Contaminant levels were generally highest in MW-3, MW-5S, MW-7S, MW-6 and MW-9S, which are located on-site to the east and southeast of the landfill. SAN trimer was detected in four wells, with the highest level in MW-7S (4.2 ppb). These measurements documented for the first time the presence of this substance in the groundwater near the DTML site. Three of the 10 sampled monitoring wells showed cadmium in excess of the CV (5 ppb). No organic chemical contaminants were detected in the two private wells that were sampled.

Results of analyses of samples taken in September 2000 are shown in Table 6 (NJDHSS, 2000). Three (all on-site) of the eleven sampled monitoring wells were found to contain benzene at concentrations in excess of the CV (1 ppb). Three of the 10 sampled monitoring wells showed cadmium in excess of the CV of 5 ppb. SAN trimer was not detected in any of the wells split-sampled in September 2000.

Pathways Analysis and Public Health Implications

Because the samples discussed in this Public Health Consultation were taken from monitoring wells (rather than potable wells), there are no direct human exposure pathways associated with these data. As noted in the Background section, public health implications of past and present human exposure pathways related to the CGC, RF and DTML sites are discussed at length in the respective Public Health Assessments (NJDHSS and ATSDR 2001a, 2001b and 2001c).

Conclusions

Analyses of monitoring wells from groundwater near the CGC site showed contamination with a variety of VOCs and SVOCs, including benzene, chlorinated benzenes and solvents such as TCE and PCE. Contamination is heaviest in certain on-site wells, and extends into off-site areas. The contaminants observed were consistent with the results of periodic monitoring of the

groundwater at the site. Similarly, the geographic and depth distributions of contamination were consistent with previous observations.

Analyses of monitoring wells confirmed the presence of TCE and PCE in the RF groundwater contamination plume, and documented the geographic distribution of SAN trimer within the plume for the first time. The highest levels of contamination are downgradient and to the south of the site.

Monitoring wells at the DTML site show contamination with benzene and chlorinated benzenes. For the first time, the presence of SAN trimer was documented in on-site wells, confirming that UCC wastes containing this substance were deposited at the landfill.

Recommendations

At the CGC and RF sites, the NJDHSS and the ATSDR support continued efforts to monitor and remediate site-related groundwater contamination. At the DTML site, the NJDHSS and the ATSDR recommend continued delineation and monitoring of the extent of the groundwater contamination and contaminant source areas, and the eventual development of appropriate remedial plans. Maintenance of existing private well restriction areas in the vicinity of all three sites is also recommended.

Public Health Action Plan

The Public Health Action Plans (PHAP) for the Ciba-Geigy, Reich Farm, and Dover Township Municipal Landfill Public Health Assessments contain descriptions of the actions to be taken by ATSDR and/or NJDHSS at or in the vicinity of these sites. The purpose of a PHAP is to ensure that a Public Health Assessment not only identifies public health hazards, but provides a plan of action designed to mitigate and prevent adverse human health effects resulting from exposure to hazardous substances in the environment. Included is a commitment on the part of ATSDR and NJDHSS to monitor this plan to ensure that the plan is implemented. ATSDR will provide follow-up to this PHAP, outlining the actions which have been completed, and those actions in progress, as needed. The public health actions undertaken by the ATSDR and/or the NJDHSS in relation to this Public Health Consultation are as follows:

Actions Undertaken

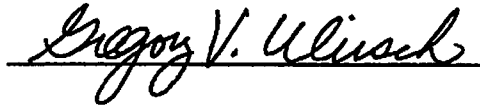
The NJDHSS and the ATSDR sampled and analyzed water from monitoring wells in the vicinity of the CGC, RF and DTML sites, to supplement existing data and to apply analytical methods employed in other aspects of the overall Dover Township childhood cancer investigation. Results of these analyses have been released at previous meetings of the CACCCC; this Public Health Consultation compiles and discusses the results of all of these monitoring well tests.

Actions Planned

No further actions are planned in relation to the activities described in this Public Health Consultation.

Certification

This Public Health Consultation summarizes the results of the sampling of groundwater monitoring wells, an investigation conducted in support of Public Health Assessments on the Ciba-Geigy Corporation site, the Reich Farm site, and the Dover Township Municipal Landfill in Dover Township (Ocean County), New Jersey. It was prepared by the New Jersey Department of Health and Senior Services (NJDHSS) under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). This document was prepared in accordance with approved methodology and procedures existing at the time this document was initiated.



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The Division of Health Assessment and Consultation, ATSDR, has reviewed this Health Consultation and concurs with its findings.



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References

NJDHSS, 1997a. *Analytical Data Report Packages*, Volumes 97 through 106, New Jersey Department of Health and Senior Services, Trenton, N.J.

NJDHSS, 1997b. *Analytical Data Report Packages*, Volumes 111 through 113, New Jersey Department of Health and Senior Services, Trenton, N.J.

NJDHSS, 1998. *Analytical Data Report Package*, Volume 131, New Jersey Department of Health and Senior Services, Trenton, N.J.

NJDHSS, 1999. *Analytical Data Report Packages*, Volumes 196 through 201, New Jersey Department of Health and Senior Services, Trenton, N.J.

NJDHSS, 2000. *Analytical Data Report Packages*, Volumes 225 and 226, New Jersey Department of Health and Senior Services, Trenton, N.J.

NJDHSS and ATSDR, 2001a. *Public Health Assessment - Ciba-Geigy Corporation*, New Jersey Department of Health, Trenton, N.J., and Agency for Toxic Substances and Disease Registry, Atlanta, Ga.

NJDHSS and ATSDR, 2001b. *Public Health Assessment - Reich Farm*, New Jersey Department of Health, Trenton, N.J., and Agency for Toxic Substances and Disease Registry, Atlanta, Ga.

NJDHSS and ATSDR, 2001c. *Public Health Assessment - Dover Township Municipal Landfill and Silvertown Private Well Contamination Investigation*, New Jersey Department of Health, Trenton, N.J., and Agency for Toxic Substances and Disease Registry, Atlanta, Ga.

NJDHSS, NJDEP and ATSDR, 2001. *Public Health Consultation - Drinking Water Quality Analysis March 1996 to June 1999, United Water Toms River*, New Jersey Department of Health and New Jersey Department of Environmental Protection, Trenton, N.J., and Agency for Toxic Substances and Disease Registry, Atlanta, Ga.

NJDOH and ATSDR, 1996. *Dover Township Childhood Cancer Investigation Public Health Response Plan*, New Jersey Department of Health, Trenton, N.J., and Agency for Toxic Substances and Disease Registry, Atlanta, Ga.

Appendix

Description of Comparison Values

ATSDR's health-based Comparison Values (CVs) are media-specific concentrations that are considered to be 'safe' under default conditions of exposure. They are used as screening values in the preliminary identification of site-specific chemical substances that the health assessor has selected for further evaluation of potential health effects.

Generally, a chemical is selected for evaluation because its maximum concentration in air, water, or soil at the site exceed one of ATSDR's CVs. However, it cannot be emphasized strongly enough that CVs are not thresholds of toxicity. While concentrations at or below the relevant CV may reasonably be considered safe, it does not automatically follow that any environmental concentration that exceeds a CV would be expected to produce adverse health effects. Indeed, the whole purpose behind conservative, health-based standards and guidelines is to enable health professionals to recognize and resolve potential public health problems before they become actual health hazards. The probability that adverse health outcomes will actually occur as a result of exposure to environmental contaminants depends on site-specific conditions and individual lifestyle and genetic factors that affect the route, magnitude, and duration of actual exposure, and not solely on environmental concentrations.

Screening values based on non-cancer effects are generally based on the level at which no health adverse health effects (or the lowest level associated with health effects) found in animal or (less often) human studies, and include a cumulative margin of safety (variously called safety factors, uncertainty factors, and modifying factors) that typically range from 10-fold to 1,000-fold or more. By contrast, cancer-based screening values are usually derived by linear extrapolation with statistical models from animal data obtained at high exposure doses, because human cancer incidence data for very low levels of exposure are rarely available. Cancer risk estimates are intended to represent the upper limit of risk, based on the available data. Listed and described below are the types of CVs that the ATSDR and the NJDHSS may have used in this Public Health Consultation:

Environmental Media Evaluation Guides (EMEGs) and Reference Dose Media Evaluation Guides (RMEGs) are estimates of chemical concentrations in an environmental medium (such as drinking water or soil) that are not likely to cause an appreciable risk of deleterious, non-cancer health effects, for fixed durations of exposure. These guides may be developed for special sub-populations such as children. EMEGs are based on ATSDR's Minimal Risk Level (MRL) while RMEGs are based on the USEPA's Reference Dose (RfD).

Cancer Risk Evaluation Guides (CREGs) are estimated concentrations of contaminants in an environmental medium (such as drinking water or soil) that are expected to cause no more than one excess cancer case for every million persons who are continuously exposed to the concentration for an entire lifetime (equaling a risk of 1×10^{-6}). These concentrations are calculated from the USEPA's cancer slope factors, which indicate the relative potency of carcinogenic chemicals. Only chemicals that are known or suspected of being carcinogenic have CREG Comparison Values.

Other health-based guides may also be used as CVs, including drinking water Maximum Contaminant Levels (MCLs) or Action Levels (ALs) established by the USEPA or the NJDEP.

Tables

Table 1. Target organic chemical analytes for analyses conducted on monitoring well samples from the Ciba-Geigy Corporation site, the Reich Farm site, and the Dover Township Municipal Landfill.

<u>Volatile Organic Chemicals</u>		<u>Semivolatile Organic Chemicals</u>
USEPA Method 524.2	chlorobenzene	USEPA Method 525.2
1,1,2,2-tetrachloroethane	chloroethane	2,2',3,3',4,4',6-heptachlorobiphenyl
1,3-dichloropropane	chloroform	2,2',3,3',4,5,6,6'-
1,2,3-trichlorobenzene	chloromethane	octachlorobiphenyl
1,2-dibromoethane	cis-1,3-dichloropropene	2,4,5-trichlorobiphenyl
1,1,2-trichloroethane	cis-1,2-dichloroethene	2,2',4,4'-tetrachlorobiphenyl
1,2,4-trichlorobenzene	dibromochloromethane	2,2',4,4',5,6-hexachlorobiphenyl
1,2-dibromo-3-chloropropane	dibromomethane	2,2',3,4,6-pentachlorobiphenyl
1,1-dichloroethene	dichlorodifluoromethane	2,3-dichlorobiphenyl
1,1,1,2-tetrachloroethane	diethyl ether	2-chlorobiphenyl
1,2-dichlorobenzene	ethyl methacrylate	acenaphthylene
1,1-dichloropropanone	ethylbenzene	alachlor
1,2-dichloropropane	hexachlorobutadiene	aldrin
1,4-dichlorobenzene	hexachloroethane	alpha-chlordane
1,3-dichlorobenzene	isopropylbenzene	anthracene
1,2-dichloroethane	m,p-xylenes	atrazine
1,2,4-trimethylbenzene	methacrylonitrile	benzo[a]pyrene
1,3,5-trimethylbenzene	methyl iodide	benzo[b]fluoranthene
1,1-dichloroethane	methyl acrylate	benzo[g,h,i]perylene
1,1,1-trichloroethane	methyl tert-butyl ether	benzo[k]fluoranthene
1,1-dichloropropene	methylene chloride	benz[a]anthracene
1,2,3-trichloropropane	methylmethacrylate	butylbenzylphthalate
1-chlorobutane	n-butylbenzene	chrysene
2,2-dichloropropane	n-propylbenzene	di(2-ethylhexyl)adipate
2-butanone	naphthalene	di(2-ethylhexyl)phthalate
2-chlorotoluene	nitrobenzene	di-n-butylphthalate
2-hexanone	o-xylene	dibenz[a,h]anthracene
2-nitropropane	p-isopropyltoluene	diethylphthalate
4-chlorotoluene	pentachloroethane	dimethylphthalate
4-methyl-2-pentanone	propionitrile	endrin
acetone	sec-butylbenzene	fluorene
acrylonitrile	styrene	gamma-chlordane
allyl chloride	tert-butyl alcohol	heptachlor
benzene	tert-butylbenzene	heptachlor epoxide
bromobenzene	tetrachloroethene	hexachlorobenzene
bromochloromethane	tetrahydrofuran	hexachloropentadiene
bromodichloromethane	toluene	indeno[1,2,3,c,d]pyrene
bromoform	trans-1,4-dichloro-2-butene	lindane
bromomethane	trans-1,2-dichloroethene	methoxychlor
carbon tetrachloride	trans-1,3-dichloropropene	pentachlorophenol
carbon disulfide	trichloroethene	phenanthrene
chloroacetonitrile	trichlorofluoromethane	pyrene
	vinyl chloride	

simazine
THNA trimers
trans-nonachlor

USEPA Method 625
(Not applied to Reich Farm
samples)

1,3-dichlorobenzene
1,2,4-trichlorobenzene
1,2-dichlorobenzene
1,4-dichlorobenzene
2,4,6-trichlorophenol
2,4-dinitrophenol
2,4,5-trichlorophenol
2,4-dimethylphenol
2,6-dinitrotoluene
2,4-dichlorophenol
2,4-dinitrotoluene
2-chloronaphthalene
2-chlorophenol
2-nitrophenol
3,3'-dichlorobenzidene
4,6-dinitro-2-methyl phenol
4-bromophenyl phenyl ether
4-chloro-3-methylphenol
4-chlorophenyl phenyl ether
4-nitrophenol
acenaphthene
acenaphthylene
anthracene
benzo[a]anthracene
benzo[a]pyrene
benzo[b]fluoranthene
benzo[g,h,i]perylene
benzo[k]fluoranthene
bis(2-chloroethoxy) methane
bis(2-chloroethyl) ether
bis(2-chloroisopropyl) ether
bis(2-ethylhexyl) phthalate
butylbenzylphthalate
chrysene
di-n-butylphthalate
di-n-octylphthalate
dibenz[a,h]anthracene
diethylphthalate
dimethylphthalate
fluoranthene
fluorene
hexachlorobenzene

hexachlorobutadiene
hexachlorocyclopentadiene
hexachloroethane
indeno[1,2,3,c,d]pyrene
isophorone
N-nitrosodi-n-butylamine
N-nitrosodi-n-propylamine
N-nitrosodiethylamine
N-nitrosodiphenylamine
N-nitrosopyrrolidine
naphthalene
nitrobenzene
pentachlorobenzene
pentachlorophenol
phenanthrene
phenol
pyrene

Monitoring Well Public Health Consultation

Table 2. Results of analyses of samples from 14 on-site Ciba-Geigy monitoring wells, in micrograms per liter or parts per billion (ppb) unless otherwise noted. Target analytes detected in at least one sample at 1 ppb or more are shown. Samples taken August and September 1997. Source: NJDHSS, 1997a.

On-Site Well Number		0187	0179	0132	1004	1015	0150	0146	0135	1024S	1013D	1024D	1024H	1024S	1015
Substance	CV														
chloroform	100	6	BDL	160 _e	0.4	BDL	BDL	BDL	BDL	0.6	BDL	0.8	1.8	1.5	1.4
bromoform		BDL	BDL	1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1,1-dichloroethane	50	4	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1,2-dichloroethane	2	3	BDL	2	0.7	BDL	0.7	0.5	BDL	0.3	BDL	BDL	0.2	BDL	BDL
1,1,1-trichloroethane	30	10	BDL	120 _e	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1,1,2,2-tetrachloroethane	1	5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
vinyl chloride	2	2	BDL	BDL	0.9	BDL	2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1,1-dichloroethylene	2	3	BDL	2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
trans-1,2-dichloroethylene	100	2	BDL	BDL	2	BDL	2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
cis-1,2-dichloroethylene	70	3	BDL	8	30 _d	BDL	38 _d	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
trichloroethylene	1	15	BDL	840 _d	67 _d	BDL	28 _d	0.7	BDL	BDL	BDL	BDL	BDL	BDL	0.6

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On-Site Well Number		0131	0179	0193	100	1212	0150	0136	0157	RI24S	RI24D	RI24D	DMN10	DMN15	1205
Substance	CV														
tetrachloroethylene	1	20 _e	BDL	11000 _d	11	BDL	10	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.6
1,2-dichloropropane	5	BDL	BDL	7	1	BDL	0.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1,2,3-trichloropropane	40	14	BDL	1100 _d	74 _d	BDL	9	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
diethyl ether	NA	9	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
MTBE	70	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1.8	BDL	BDL
t-butyl alcohol	NA	BDL	BDL	11	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
tetrahydrofuran	NA	5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
4-methyl-2-pentanone	NA	BDL	BDL	3	5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
benzene	1	19	BDL	6	2	BDL	3	BDL	18 _d	BDL	BDL	BDL	BDL	BDL	3.6
toluene	1000	9	BDL	2400 _d	4	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
ethylbenzene	700	6	BDL	21 _e	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
m/p-xylene	1000	32 _e	BDL	54 _e	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
o-xylene		12	BDL	25 _e	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL

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On-Site Well Number		0110	0170	0130	1104	1219	0150	0130	0137	0125	0171KD	0191B	01910	01935	1305
Substance	CV														
1,2,4-trimethylbenzene	NA	BDL	BDL	2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
chlorobenzene	50	980 d,tb	3 tb	3700 d,tb	30 d,tb	BDL	190 d	0.8	94 d	BDL	BDL	BDL	BDL	BDL	1.4
bromobenzene	NA	BDL	BDL	0.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1,2-dichlorobenzene	600	490 d,tb	3 tb,@	5300 d,tb	33 tb,e, #,@	BDL	48 d	BDL	3 @	BDL	BDL	BDL	BDL	BDL	BDL
1,3-dichlorobenzene	600	19	BDL	30	BDL	BDL	2 @	BDL	2 @	BDL	BDL	BDL	BDL	BDL	BDL
1,4-dichlorobenzene	75	170 d	0.8	221	1 @	BDL	9	0.4 @	5 @	BDL	BDL	BDL	BDL	BDL	BDL
1,2,3-trichlorobenzene	NA	1000 d,tb	6 tb	680 d,tb	6 tb	BDL	2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1,2,4-trichlorobenzene	9	3400 tb,d,e	4 tb,d, @	3800 d,tb	27 tb,e, #,@	BDL	15	0.4 @	0.7 @	BDL	BDL	BDL	BDL	BDL	0.4 @
2-chlorotoluene	100	990 d,tb	2 tb	4000 d,tb	8 tb	BDL	BDL	BDL	1	BDL	BDL	BDL	BDL	BDL	BDL
4-chlorotoluene	100	49 d	BDL	74 e	0.6	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL

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On-Site Well Number		0131	0179	0133	1104	1212	0150	0136	0187	R124S	R121KD	R124D	DMN-10	DMN-55	1205
Substance	CV														
nitrobenzene	5	10	BDL	18000 e, #	140 e, #, @	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
naphthalene	300	100 d	1 @	140 e	2 @	BDL	BDL	BDL	3 @	BDL	BDL	BDL	BDL	BDL	BDL
phenol	4000	3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
2-chlorophenol	40	BDL	BDL	17	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
n-nitrosodi-n-butylamine	NA	5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
arsenic	50	BDL	1.0	BDL	2.0	BDL	BDL	1.2	5.3	1.3	BDL	BDL	1.3	BDL	BDL
cadmium	5	4.6	2.8	4.1	10.3	BDL	3.4	1.7	7.9	5.7	BDL	1.4	BDL	BDL	BDL
chromium	100	1.9	3.7	13.7	7.7	2.9	5.4	3.9	2.3	4.1	BDL	4.9	3.9	88.7	8.0
lead	15	2.8	2.0	2.9	BDL	2.0	2.7	2.5	1.0	6.8	1.4	73.1	3.3	BDL	1.2
mercury	2	23.2	BDL	3.7	BDL	BDL	0.3	BDL	0.05	BDL	BDL	BDL	BDL	BDL	BDL
nickel	100	5.1	15.2	15.3	15.7	BDL	6.3	BDL	4.1	13.7	2.5	5.7	3.2	12.0	3.6
nitrite + nitrate **	10 ppm	0.1	0.05	0.1	1.1	0.09	0.09	0.08	0.1	0.1	0.04	1.1	0.1	0.7	0.3

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CV	Comparison Value
*	CVs are Maximum Contaminant Levels (MCLs), if available. Otherwise CVs are Environmental Media Evaluation Guide EMEGs, Reference Dose Evaluation Guide RMEGs or LTHAs.
NA	Comparison Value Not Available
**	Results in parts per million (ppm)
Bold	Exceeds CV
J	Estimated concentration
tb	Contaminants found in sample event trip blank. High concentrations of volatile organics in samples 0131 and 0133 may have contaminated other samples in the batch during sample handling and transportation.
d	Result based on laboratory diluted sample
e	Exceeds calibration range
#	Found in original sample, but not in diluted sample; questionable result
@	Chemical detected by volatile organic chemical test method, but not with semi-volatile organic chemical methods.

NOTE: Acetone, 2-butanone, chloromethane and carbon disulfide were sporadically detected in samples and in trip and field blanks; recorded measurements of these chemicals are suspect and are not reported here.

Monitoring Well Public Health Consultation

Table 3. Results of analyses of samples from 17 off-site Ciba-Geigy monitoring wells, in micrograms per liter or parts per billion (ppb) unless otherwise noted. Target analytes detected in at least one sample at 1 ppb or more are shown. Samples taken August and September 1997. Source: NJDHSS, 1997a.

Off-site Well Number		1192	1197	1201XD	0169	1201XD	1202D	1229	1233	RU-03	0190	RU05	0191	0192	1285	0167	0184	1202
Substance	CV																	
chloroform	100	1.4	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.1	BDL	0.3	BDL	BDL	BDL	BDL	BDL	BDL
1,2-dichloroethane	2	BDL	BDL	BDL	BDL	BDL	0.8	BDL	BDL	7.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1,1,2-trichloroethane	3	BDL	BDL	BDL	BDL	BDL	0.2	BDL	BDL	9.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1,1,2,2-tetrachloroethane	1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	75 d	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
vinyl chloride	2	BDL	BDL	BDL	BDL	BDL	9	BDL	BDL	0.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1,1-dichloroethylene	2	BDL	BDL	BDL	BDL	BDL	1	BDL	BDL	0.9	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
trans-1,2-dichloroethylene	100	BDL	BDL	BDL	BDL	BDL	13	BDL	BDL	54 d	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
cis-1,2-dichloroethylene	70	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	130 d	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
trichloroethylene	1	0.6	BDL	BDL	BDL	BDL	26 e	BDL	BDL	16 d, e	1	1.2	BDL	BDL	BDL	BDL	BDL	BDL
tetrachloroethylene	1	0.6	BDL	BDL	BDL	BDL	10	BDL	BDL	1.6	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1,2,3-trichloropropane	40	BDL	BDL	BDL	BDL	BDL	16	BDL	BDL	560 d	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL

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Off-site Well Number		1192	1197	RI030D	0169	RI030D	RI030D	1274	1233	RI009	0190	RI009	0191	0192	1235	0197	0183	1202
Substance	CV																	
diethyl ether	NA	BDL	BDL	BDL	BDL	BDL	2	BDL	BDL	2.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	8
MTBE	70	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	10	BDL	BDL	BDL	BDL
t-butyl alcohol	NA	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1.6	BDL	BDL	3.5
4-methyl-2-pentanone	NA	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.8	7
tetrahydrofuran	NA	BDL	BDL	BDL	BDL	BDL	5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	15
benzene	1	3.6	BDL	BDL	BDL	BDL	10	BDL	BDL	14	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
toluene	1000	BDL	BDL	BDL	BDL	BDL	1	BDL	BDL	1.4	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
ethylbenzene	700	BDL	BDL	BDL	BDL	BDL	4	BDL	BDL	0.2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
m/p-xylene	1000	BDL	BDL	BDL	BDL	BDL	2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
o-xylene		BDL	BDL	BDL	BDL	BDL	2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
chlorobenzene	50	1.4	BDL	BDL	BDL	0.8	290 e	5	BDL	930 d	0.7	0.2	BDL	BDL	BDL	BDL	BDL	BDL
1,2-dichlorobenzene	600	BDL	BDL	BDL	BDL	BDL	95 e	BDL	BDL	1.2 @	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1,3-dichlorobenzene	600	BDL	BDL	BDL	BDL	BDL	5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1,4-dichlorobenzene	75	BDL	BDL	BDL	BDL	BDL	5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL

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Off-site Well Number		011	011	013	016	013	014	024	023	019	019	016	019	012	025	017	018	022
Substance	CV*																	
1,2,3-trichlorobenzene	NA	BDL	BDL	BDL	BDL	BDL	4	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1,2,4-trichlorobenzene	9	0.4	BDL	BDL	BDL	BDL	65 ^e	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
naphthalene	300	BDL	BDL	BDL	BDL	BDL	13	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
2-chloronaphthalene	800	BDL	BDL	BDL	BDL	BDL	3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
arsenic	50	BDL	BDL	1.8	BDL	BDL	2.1	BDL	BDL	2.0	1.3	BDL	BDL	6.2	BDL	BDL	BDL	BDL
cadmium	5	BDL	1.8	10.5	3.5	BDL	8.1	BDL	BDL	8.1	4.2	1.8	5.9	25.6	1.3	18.0	13.2	17.7
chromium	100	1.9	5.6	5.4	1.2	BDL	6.3	BDL	3.0	5.7	6.0	4.6	1.6	5.4	3.9	3.2	3.3	2.9
lead	15	2.6	2.2	1.3	1.4	1.6	1.2	BDL	BDL	27.5	2.0	BDL	21.6	2.1	1.5	12.7	1.5	2.5
mercury	2	BDL	BDL	BDL	BDL	BDL	0.09	BDL	BDL	0.08	BDL	BDL	BDL	BDL	BDL	2.0	BDL	0.09
nickel	100	11.7	2.6	9.0	3.7	BDL	16.0	3.1	59.7	14.0	10.7	6.6	4.5	8.7	3.7	4.2	16.5	4.3
nitrite + nitrate **	10	0.7	0.2	0.9	0.1	0.1	0.2	0.08	0.2	0.1	0.2	1.9	1.4	0.2	0.2	0.2	2.0	0.2

Monitoring Well Public Health Consultation

CV	Comparison Value
*	CVs are Maximum Contaminant Levels (MCLs), if available. Otherwise CVs are Environmental Media Evaluation Guides (EMEGs), Reference Dose Evaluation Guides (RMEGs) or Lifetime Health Advisories (LTHAs).
NA	Comparison Value Not Available
**	Results in parts per million (ppm)
Bold	Exceeds CV
J	Estimated concentration
d	Result based on laboratory diluted sample
e	Exceeds calibration range
@	Chemical detected by volatile organic chemical test method, but not with semi-volatile organic chemical methods.

NOTE: Acetone, 2-butanone, chloromethane and carbon disulfide were sporadically detected in samples and in trip and field blanks; recorded measurements of these chemicals are suspect and are not reported here.

Monitoring Well Public Health Consultation

Table 4. Results of analyses of samples from seven Reich Farm monitoring wells, in micrograms per liter or parts per billion (ppb) unless otherwise noted. Target analytes detected in at least one sample at 1 ppb or more are shown. Samples taken May 1997. Source: NJDHSS, 1997b.

Well Number		CHMW-4	Swam	Dugan	MP-2R	MP-8	MW-8S	MW-6S
Substance	Comparison Value							
styrene-acrylonitrile trimer	NA	25 _e	1.3	BDL	2.2 J	1.3	0.27 J	0.16 J
1,1-dichloroethylene	2	2	BDL	BDL	BDL	0.4	BDL	BDL
MTBE	70	BDL	9	BDL	0.4J	BDL	1	5
1,1-dichloroethane	50	0.7	BDL	BDL	0.3J	0.2J	2	0.3J
cis-1,2-dichloroethylene	70	2	BDL	BDL	0.08J	BDL	0.6	BDL
1,1,1-trichloroethane	30	10	BDL	BDL	0.8	4	11	4
1,2-dichloroethane	2	0.6	1	BDL	BDL	BDL	BDL	BDL
trichloroethylene	1	18	16	BDL	4	1	3	0.6
tetrachloroethylene	1	5	1	BDL	5	1	3	0.7
1,2-dichlorobenzene	600	BDL	BDL	1	BDL	BDL	BDL	BDL

* CVs are Maximum Contaminant Levels (MCLs), if available. Otherwise CVs are Environmental Media Evaluation Guides (EMEGs), Reference Dose Evaluation Guides (RMEGs) or Lifetime Health Advisories (LTHAs).

NA Comparison Value Not Available

Bold Exceeds CV

J Estimated concentration

NOTE: Acetone, 2-butanone, chloromethane and carbon disulfide were sporadically detected in samples and in trip and field blanks; recorded measurements of these chemicals are suspect and are not reported here.

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Table 5. Results of analyses of samples from ten Dover Township Municipal Landfill monitoring wells and two nearby private wells, in micrograms per liter or parts per billion (ppb) unless otherwise noted. Target analytes detected in at least one sample at 1 ppb or more are shown. Samples taken June 1999. Source: NJDHSS, 1999.

On-Site Well Number		MW-3	MW-5S	MW-5D	ROP	MW-9S	MW-9D	Insulte	MW-6	MW-11S	MW-8S	MW-7S	MW-7D
Substance	ICV *												
diethyl ether	NA	11	2	BDL	BDL	2	BDL	BDL	7	0.6	BDL	3 d	BDL
t-butyl alcohol	NA	BDL	7	BDL	BDL	5	BDL	BDL	BDL	BDL	BDL	6 d	BDL
MTBE	70	1	BDL	BDL	BDL	0.3 J	BDL	BDL	0.8	0.2 J	0.2 J	0.2 J	BDL
tetrahydrofuran	NA	33	16	BDL	BDL	8	BDL	BDL	6	2	BDL	25 e	BDL
benzene	1	8	4	BDL	BDL	0.6	BDL	BDL	2	0.2 J	BDL	7 d	BDL
chlorobenzene	50	44 e	21 d	BDL	BDL	13	BDL	BDL	14	1	BDL	25 d	BDL
propylbenzene	NA	2	0.2 J	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1	BDL
butylbenzene	NA	2	BDL	BDL	BDL	BDL	BDL	BDL	0.6 J	BDL	BDL	BDL	BDL
1,2-dichlorobenzene	600	14	1	BDL	BDL	BDL	BDL	BDL	1	BDL	BDL	BDL	BDL
1,4-dichlorobenzene	75	BDL	3	BDL	BDL	1	BDL	BDL	8	0.2 J	BDL	2 d	BDL
naphthalene	300	34	0.9	BDL	BDL	0.2	BDL	BDL	BDL	BDL	0.2 J	1 d	BDL

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On-Site Well Number		MW-3	MW-5S	MW-5D	EGP	MW-9S	MW-9D	Insultite	MW-6	MW-11S	MW-8S	MW-7S	MW-7D
Substance	CV's												
styrene-acrylonitrile trimer	NA	BDL	1	BDL	BDL	0.15	0.03 J	BDL	BDL	BDL	BDL	4.2	BDL
arsenic	50	7.3	BDL	BDL	BDL	BDL	BDL	BDL	4.7	BDL	BDL	2.5	BDL
cadmium	5	2.3	BDL	BDL	BDL	BDL	BDL	BDL	8.3	5.3	BDL	7.7	BDL
chromium	100	3.0	BDL	BDL	BDL	1.4	BDL	BDL	BDL	BDL	1.2	1.6	BDL
lead	15 AL	2.0	BDL	BDL	5.4	BDL	BDL	7.7	BDL	1.8	1.5	BDL	BDL

- CV Comparison Value
 * CVs are Maximum Contaminant Levels (MCLs), if available. Otherwise CVs are Environmental Media Evaluation Guides (EMEGs), Reference Dose Evaluation Guides (RMEGs) or Lifetime Health Advisories (LTHAs).
 NA Comparison Value Not Available
 ** Results in parts per million (ppm)
Bold Exceeds CV
 J Estimated concentration
 d Result based on laboratory diluted sample
 e Exceeds calibration range

NOTE: Acetone, 2-butanone, chloromethane and carbon disulfide were sporadically detected in samples and in trip and field blanks; recorded measurements of these chemicals are suspect and are not reported here.

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Table 6. Results of analyses of samples from eleven Dover Township Municipal Landfill monitoring wells and a nearby surface water feature, in micrograms per liter or parts per billion (ppb) unless otherwise noted. Target analytes detected in at least one sample at 1 ppb or more are shown. Samples taken September 2000. Source: NJDHSS, 2000.

On-Site Well Number		MW-22D	MW-24	MW-21	MW-22S	MW-25	MW-20	SS-7	MW-9S	MW-3S	MW-13	MW-14	MW-18
Substance	CV*												
nitrobenzene	5	4.1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
benzene	1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1.3	BDL	2.7	2.4	BDL
chlorobenzene	50	BDL	BDL	BDL	BDL	BDL	BDL	BDL	19	BDL	BDL	14	BDL
MTBE	70	BDL	BDL	1.3	BDL	BDL	BDL	1.3	BDL	BDL	BDL	BDL	0.1 J
diethyl ether	NA	BDL	BDL	BDL	BDL	BDL	BDL	BDL	4.1	BDL	5	7.5	BDL
t-butyl alcohol	NA	BDL	BDL	BDL	BDL	BDL	BDL	BDL	6.1	BDL	5.5	5.9	BDL
tetrahydrofuran	NA	BDL	BDL	BDL	BDL	BDL	BDL	BDL	12	BDL	BDL	BDL	BDL
1,4-dichlorobenzene	75	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1.9	BDL	2.2	3.1	BDL
arsenic	50	1.1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	2.5	BDL
cadmium	5	23	BDL	BDL	BDL	BDL	BDL	BDL	1.3	1.1	13.5	8.9	2.7
chromium	100	4.0	8.4	3.4	14	3.9	8.8	BDL	9.9	BDL	6.1	3.3	1.1
lead	15 AL	2.2	2.3	8.0	1.8	3.8	3.8	BDL	BDL	1.2	BDL	1.5	1.0

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CV Comparison Value
* CVs are Maximum Contaminant Levels (MCLs), if available. Otherwise CVs are Environmental Media Evaluation Guides (EMEGs), Reference Dose Evaluation Guides (RMEGs) or Lifetime Health Advisories (LTHAs).
NA Comparison Value Not Available
Bold Exceeds CV
J Estimated concentration

NOTE: Acetone, 2-butanone, chloromethane and carbon disulfide were sporadically detected in samples and in trip and field blanks; recorded measurements of these chemicals are suspect and are not reported here.

Figures

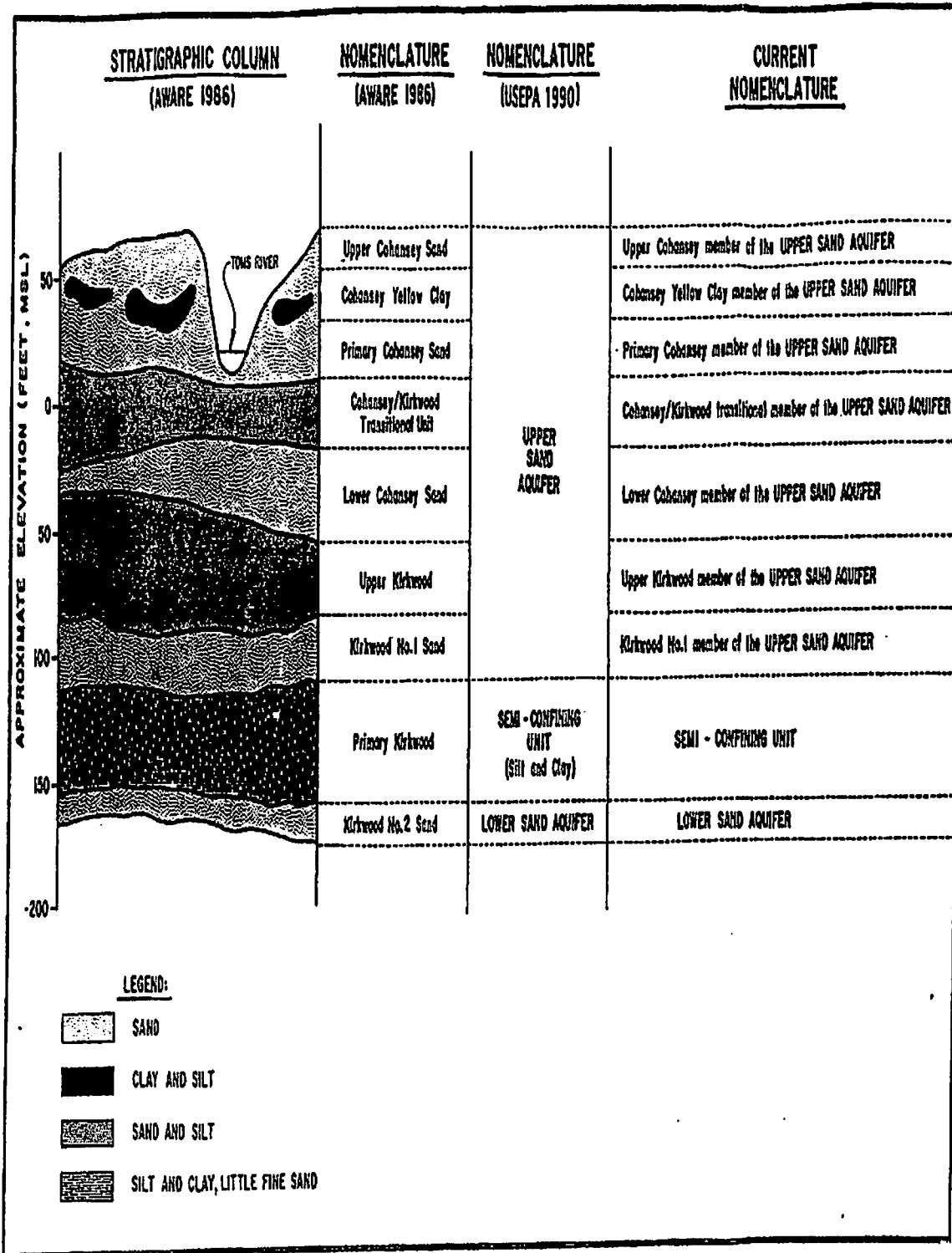


Figure 1. Groundwater Stratigraphy Near Toms River

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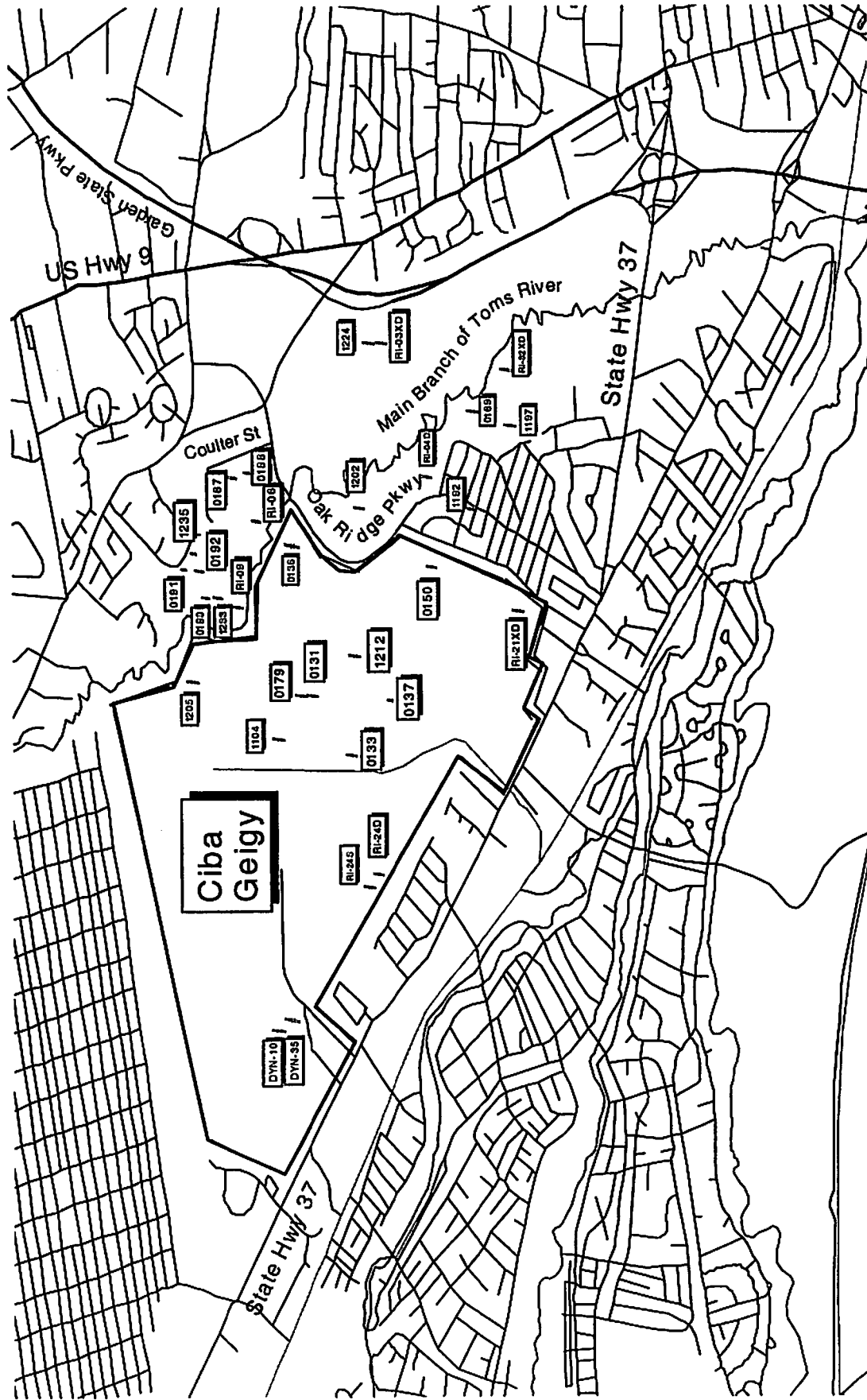


Figure 2. Ciba-Geigy Monitoring Wells

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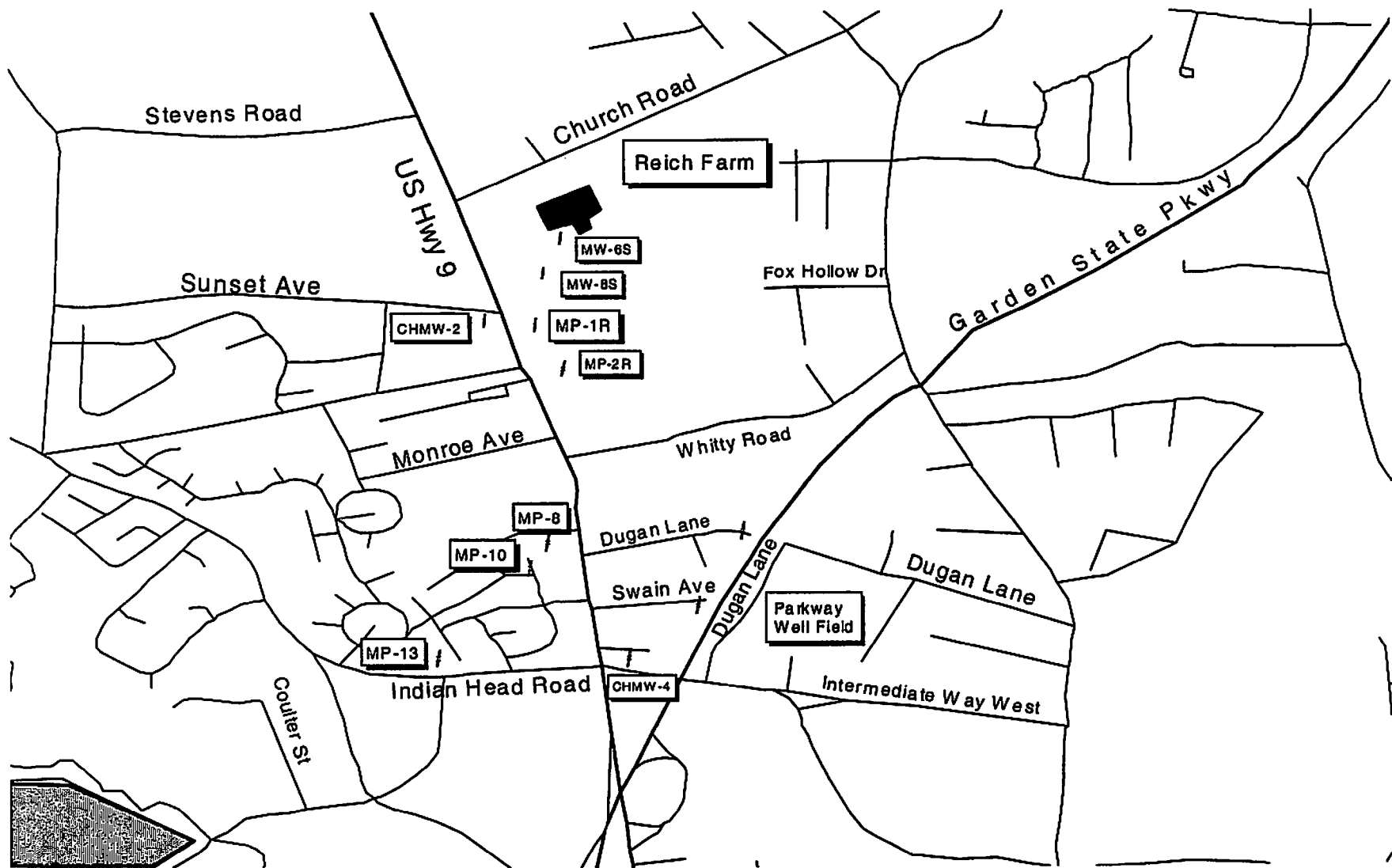


Figure 3. Reich Farm Monitoring Wells - 1997,1998

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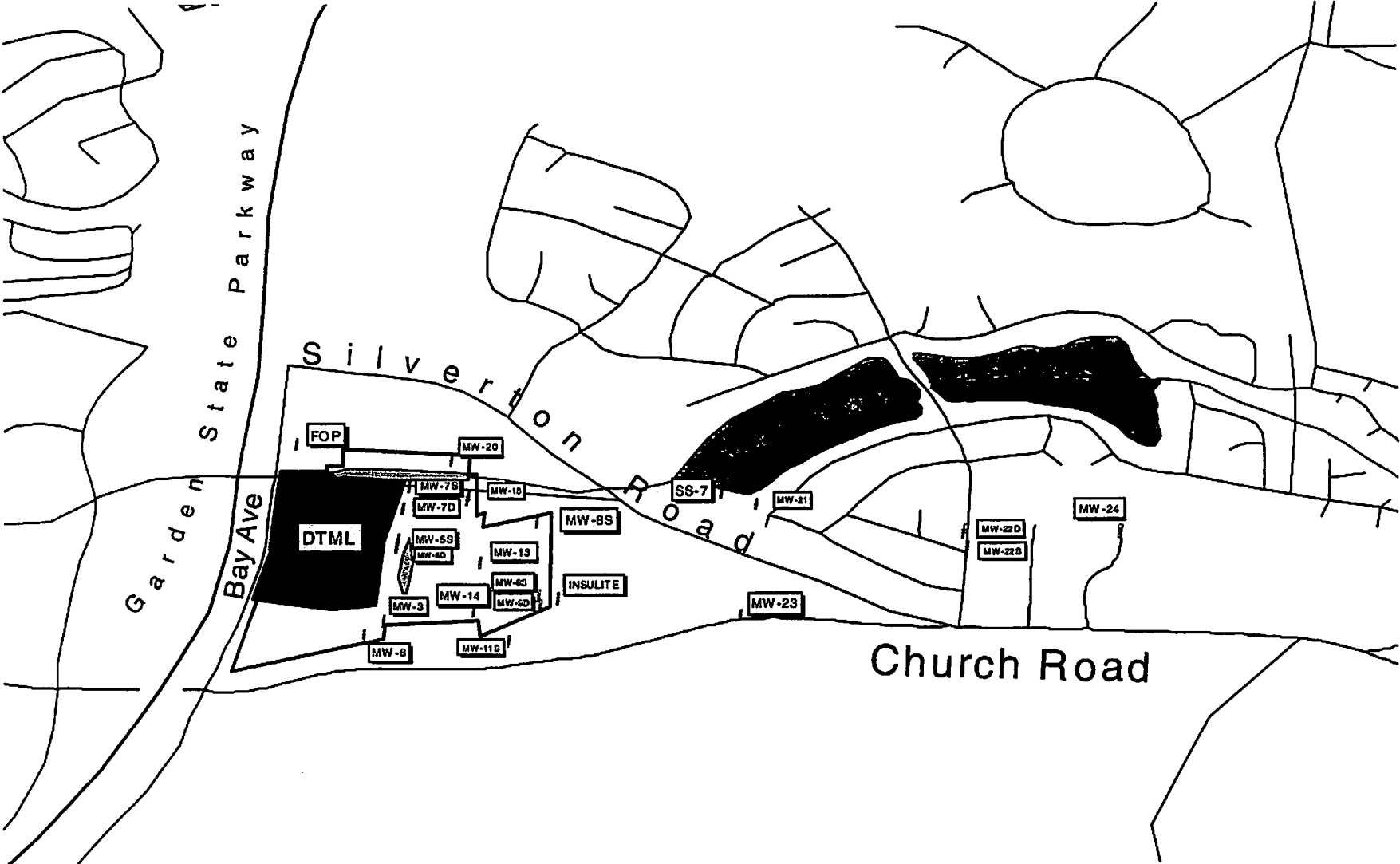


Figure 4. Dover Township Municipal Landfill Monitoring Wells - 1999,2000