

Health Consultation

Fair Lawn Wellfields

Fair Lawn Borough, Bergen County, New Jersey

Cerclis No. NJD980654107

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Prepared by:

New Jersey Department of Health
Environmental Health Service

Under Cooperative Agreement with the
Agency for Toxic Substances and Disease Registry

By early 1979, groundwater contamination was confirmed in five of Fair Lawn's municipal wells and several local industrial wells. The total volatile organic concentration of water tested in these bedrock wells ranged from 50 to 19,141 ppb. The compounds with the highest concentrations were 1,1,1-trichloroethane (TCA), tetrachloroethylene (PCE), trichloroethylene (TCE), carbon tetrachloride, and chloroform.

In an attempt to locate the source(s) of the ground-water contamination, the NJDEP initiated an industrial survey of the area. Many commercial businesses and light industries are located within this area. This survey identified Fisher Scientific Company (FSC) and Sandvik, Inc., whose handling, storage, and/or disposal of volatile organic chemicals may have contributed to the Fair Lawn groundwater contamination problem. FSC is located on Block 4902 Lot 1 in Fair Lawn Industrial Park in Fair Lawn Borough. FSC has owned the 10-acre site since 1955 and has been formulating, distilling, repackaging, and distributing high purity laboratory grade reagents and solvents since that time. Sandvik is a manufacturer of cutting tools and has used various volatile organic compounds, including 1,1,1-trichloroethane, in its manufacturing process.

The area surrounding the Park is urbanized and heavily populated with approximately 300,000 people living within 4 miles of the site. The Fair Lawn Wellfields are located in a developed area, and several companies have been documented to have spilled organic chemicals on nearby properties.

Private Wells:

There are many private wells in the Borough of Fair Lawn. Although the majority of private wells are used for irrigation purposes, some are used for domestic purposes. The Environ Corporation conducted a Preliminary Assessment of the potential sources of contamination to the Fair Lawn Wellfields site for Fisher Scientific Company, and published their findings in October 1993. In addition, in March 1994, Environ Corporation conducted a well survey (private wells) of the Borough of Fair Lawn and a section of the Borough of Glen Rock within one-half mile of the Fair Lawn Industrial Park.

USEPA, in conjunction with the Fair Lawn Department of Health, has extensively researched the possibility of usage of private wells in the town of Fair Lawn. USEPA, gathered information from several sources including the Fair Lawn Water Department, the Fair Lawn Health Department, the Fair Lawn tax assessor's office and a well survey report prepared by Environ Corporation.

USEPA distributed one hundred and fifty one (151) well usage surveys to residents of Fair Lawn to verify the possible use of a private well on their property. USEPA has received a total of eighty (80) responses. USEPA has attempted to contact every non-respondent resident

at least twice. If the resident did not respond the first time, a follow up letter was sent reiterating the purpose of the sampling program. If the letter was returned due to an incorrect address, the USEPA made every attempt to locate the correct address and re-send the letter. Of the eighty (80) responses fifty one (51) stated that the well is no longer operational or present on the property, and the household is connected to the municipal water supply. Twenty seven (27) responses stated that their private well water was used for drinking and/or irrigation purposes. Two (2) responded that they did their own sampling of water and did not want USEPA to sample their private wells. Therefore, USEPA collected water samples from twenty seven (27) operational private wells. USEPA has provided all data and copies of survey responses to the Borough of Fair Lawn Health Department (FLHD).

On May 9, 1995, USEPA conducted the first sampling event which included the collection of samples from ten private wells. The results indicated that the water from nine wells to be of acceptable drinking water quality. One sample indicated the presence of tetrachloroethylene at 55 parts per billion (ppb). USEPA and Fair Lawn Department of Health immediately contacted this homeowner and explained the situation. The homeowner stated that he is aware of the presence of contamination in his well and, therefore, does not use the well water for potable purposes.

On June 27, 1995, USEPA conducted the second sampling event which included the collection of samples from seventeen private wells (including a re-sample of the well which indicated contamination with tetrachloroethylene in the May 1995 sampling). Seven of the residences where private well water samples were collected are also connected to the municipal water supply. USEPA is planning on distributing additional well usage surveys to those residents who did not respond to the previous letter and conduct well water sampling if necessary.

On November 15, 1995, Narendra P. Singh, and Jim Pasqualo of the NJDOH conducted a site visit of the Fair Lawn Borough wellfields accompanied by the Representative of Fair Lawn Health Department (FLHD).

Conditions at the site, since the 1994 SRU, have not changed physically. Additional site data are now available that further characterize the contamination at the site. The most recent sampling of residential water wells was conducted in June 1995. The samples were analyzed for organic compounds. In a conversation with the FLHD's Environmental Specialist, she had expressed concerns regarding use of private wells for potable purposes at two residences, which have not been sampled by USEPA. She has requested USEPA to include these two private wells to their list of private wells to be sampled in near future. USEPA has already agreed to add the additional two private wells to the next sampling event.

DISCUSSION

Based on the current site conditions, site-related contamination is present in groundwater and remains as the primary media of concern. The primary public health issue associated with the Fair Lawn Borough wellfields site pertains to the potential impact of the groundwater plume on existing private potable wells.

The groundwater plume flow is in a south-southwest direction along the fractures and down the hydraulic gradient toward the Passaic River. The primary source of drinking water in the site vicinity consists of aquifers developed within the Brunswick Formation, which provides water for municipal, private, and industrial use. The direction of groundwater flow in the deep aquifer (bedrock aquifer) is estimated to be southwesterly. Groundwater flow in the shallow region of the bedrock aquifer (defined at the site by a series of wells with open boreholes in bedrock between 15 and 55 feet below grade) is in a west-northwest direction. The groundwater flow direction in the deep bedrock aquifer (between 70 and 125 feet below grade) system fluctuates, significant changes in the direction of groundwater flow is attributed to the pumping of production wells in the area.

The Remedial Investigation (RI) conducted at the site has confirmed the presence of site related contaminants in both shallow and deep aquifers underlying the site. The deep aquifer is the major source of potable water in the vicinity of the Fairlawn Borough wellfields site. The bedrock aquifer showed a high level of contamination with VOC's. Private potable wells farther downgradient of the site are at risk due to the continued off-site migration of the contaminated groundwater.

At the time the original ATSDR preliminary health assessment was written, there was a great deal of concern regarding off-site groundwater contamination. Private potable wells have been sampled by USEPA, in the month of May and June 1995, and tested for the presence of volatile organic compounds (VOC's).

The ATSDR/NJDOH have public health concerns regarding resident's past exposures to the contaminated municipal well water and potential exposures to the private well users in the area. NJDOH has not identified any additional community health concerns.

In this section, NJDOH will discuss the health effects in persons exposed to specific contaminants. To evaluate health effects, ATSDR has developed a Minimal Risk Level (MRL) for contaminants commonly found at hazardous waste sites. The MRL is an estimate of daily human exposure to a contaminant below which non-cancer, adverse health effects are unlikely to occur. MRLs are developed for each route of exposure, such as ingestion and inhalation, and for the length of exposure, such as acute (less than 14 days), intermediate (15 to 364 days), and chronic (greater than 365 days). ATSDR presents these MRLs in the Toxicological Profiles.

These chemical-specific profiles provide information on health effects, environmental transport, human exposure, and regulatory status. In the following discussion, NJDOH used ATSDR Toxicological Profiles for the contaminants of concern at the site. The NJDOH will use a USEPA Reference Dose (RfD) as a health guideline, when a MRL is not available. The RfD is an estimate of daily human exposure of a contaminant for a lifetime below which (non-cancer) health effects are unlikely to occur.

Private Well Pathways

The toxicological evaluation of the completed human exposure pathway at the FLW site is based upon chronic oral ingestion of contaminants in private well water. The completed exposure pathway at the Fair Lawn Wellfield site (FLW) is based upon a duration of thirty (30) years for the ingestion pathway. The use of a 30 year exposure duration represents ten years from the beginning of operations at the FSC (1955) to the detection of contaminants in private potable wells (1995). The maximum reported concentrations of contaminants in private potable wells during 1995 sampling were: trichloroethylene - 3.0 ppb (range- 2-3 ppb, detected in 5 out of 27 wells sampled), tetrachloroethylene - 74.0 ppb (range- 1.4-74 ppb, detected in 6 out of 27 wells sampled), and benzene - 48.0 ppb (detected only in one sample collected from a well located at a warehouse. The water from this well is used primarily for cleaning various machine parts and vehicles).

The toxicological effects of the contaminants detected in private potable wells have been considered singly. The cumulative or synergistic effects of possible mixture of contaminants may serve to enhance their public health significance. Additionally, individual or mixtures of contaminants may have the ability to produce greater adverse health effects in children as compared to adult.

Non-potable domestic usage of contaminated water (showers) may be associated with significant exposure through the inhalation and dermal contact routes. Current literature suggests exposure doses from these routes may approach or exceed those associated with direct ingestion. There is no data available to estimate the exposure doses to these secondary routes of exposure. This toxicological discussion recognizes their potential contribution to exposure dose estimates (EED) and consequent public health implications.

Cancer estimates are based on an intake of 2 liters of water per day for a 70 kilogram adult for a lifetime (70) years. Cancer estimates for children are not calculated as residents have emphasized that children use water from municipal water supply or bottled water.

An exposure duration of 30 years was used to estimate exposure doses and resultant lifetime excess cancer risk estimates. Toxicological evaluation was completed for volatile organic compounds (VOC's) detected in private potable wells and exposure dose calculations were based

upon the maximum concentrations detected, thus representing a worse case exposure scenario.

Table 1 presents the maximum concentrations of contaminants detected in the private wells in the vicinity of the Fair Lawn Borough wellfields site detected during sampling in May and June 1995.

Table 1. Chemicals of Public Health Concern in Private Well Water Samples (1995).

CHEMICAL	MAX. CONC.. (ppb)	COMPARISON VALUE (ppb)	BASIS	ESTIMATED EXPOSURE DOSE (mg/kg/d)
trichloroethylene (TCE)	3.0	3.0	CREG	0.00008
tetrachloroethylene (PCE)	74.0	0.7	CREG	0.00211

ppb - parts per billion.

CREG - ATSDR cancer risk evaluation guide.

Trichloroethene (TCE)

A 30 year exposure duration was assumed for this compound. No chronic oral MRL or RfD is available for trichloroethene to evaluate the potential for non-carcinogenic health effects. However, Estimated Exposure Doses (EED) calculated from the maximum reported concentration of trichloroethene (3 ppb) in 1995 was below the No Observed Adverse Effects Level (NOAEL) for animal studies presented in the ATSDR Toxicological Profile for TCE. At such concentrations, it is unlikely that non-carcinogenic adverse health effects would occur.

Currently, there is scientific debate regarding the carcinogenicity of TCE in humans. However, animal studies have shown that tumors can result from oral exposure to TCE. TCE is under consideration for placement into either probable human carcinogen or possible human carcinogen by the USEPA. NJDOH concurs with USEPA regarding trichloroethene's potential carcinogenicity in humans. Chronic oral exposure to TCE at maximum concentrations found in private potable well for a duration of 30 years would result in insignificant or no increased cancer risk. Although adverse health effects are unlikely if persons are currently being exposed to detected concentrations of TCE in private potable wells. However, TCE is a potential human carcinogen and exposures should be minimized.

Tetrachloroethylene (PCE)

A 30 year exposure duration was assumed for this compound. Based upon maximum reported levels of tetrachloroethylene (74 ppb) detected in private potable well in 1995, estimated exposure dose was below the USEPA chronic oral RfD of 0.01 mg/kg/day. No chronic oral MRL is available. However, Estimated Exposure Dose (EED) calculated from the maximum reported concentration of tetrachloroethylene was below the No Observed adverse Effects Level (NOAEL) for animal studies presented in the ATSDR Toxicological Profile for this chemical. At such concentrations, it is unlikely that non-carcinogenic adverse health effects would occur.

Currently, there is scientific debate regarding the carcinogenicity of PCE in humans. However, animal studies have shown that tumors can result from oral exposure to PCE. PCE is under consideration for placement into either probable human carcinogen or possible human carcinogen by the USEPA. NJDOH concurs with USEPA regarding tetrachloroethylene's potential carcinogenicity in humans. Chronic oral exposure to tetrachloroethylene at maximum concentrations found in private potable well for a duration of 30 years would result in no apparent increased cancer risk. Although adverse health effects are unlikely if persons are currently being exposed to detected concentrations of PCE in private potable wells. However, PCE is a potential human carcinogen and exposures should be minimized.

CONCLUSIONS

1. Based on the Remedial Investigation, site-related contamination is present only in groundwater. Based upon current data and information, the site is evaluated by the ATSDR and the NJDOH to present no apparent public health hazard. The former conclusion that the site presents a indeterminate public health concern has been re-evaluated and revised.
2. Currently, ingestion of contaminated groundwater remains a potential human exposure pathway associated with the site, however, the most recent private potable well water sampling results showed the presence of site related contaminants at levels which do not constitute a public health concern. Although adverse health effects are unlikely, exposure to known or suspected carcinogens should be minimized.

RECOMMENDATIONS

1. After a review of the most recent documents and the current site conditions for the FLW, the ATSDR and the NJDOH have determined that exposure to the contaminated groundwater at the levels most recently detected do not constitute a public health concern. Two additional residences, identified by FLHD, using private well water for potable purposes should be tested for site related contaminants. USEPA has agreed to add these two private wells to their list of wells to be sampled in the near future.
2. Any residence currently not connected to the municipal water supply should be strongly encouraged to do so by the municipality/local health department and/or the USEPA. If necessary, health education/risk communication should be provided to residents to ensure comprehension of the potential health risk with continued use of contaminated groundwater.
3. New environmental, toxicological, health outcome data, may determine the need for additional actions at site.

RECOMMENDATIONS OF THE HEALTH ACTIVITIES RECOMMENDATIONS PANEL (HARP)

The data and information developed in this Public Health Consultation have been evaluated to determine whether HARP follow-up actions may be indicated by ATSDR's Health Activities Recommendation Panel (HARP). No HARP evaluation is indicated at this time.

PUBLIC HEALTH ACTION PLAN

The purpose of the public health action plan (PHAP) is to ensure that this Public Health Consultation not only identifies public health hazards but also provides a plan of action designed to mitigate and prevent adverse human health effects resulting from exposure to hazardous substances in the environment.

Actions Undertaken by ATSDR/NJDOH:

1. Environmental data and proposed remedial activities have been evaluated within the context of human exposure pathways and relevant public health issues.

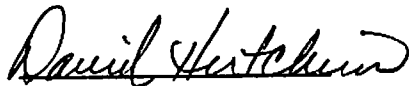
Actions Planned by ATSDR/NJDOH:

1. NJDOH, with the assistance of the FLHD, will contact the residents who did not responded to well usage survey conducted by USEPA.
2. Physician education, in form of appropriate Case Studies in Environmental Medicine and Bergen County Environmental Resource Guides for Health Care Professionals, will be provided to area physicians.
3. ATSDR and the NJDOH will evaluate all future private wells data related to the FLW site for public health implications.
4. ATSDR will provide an annual follow up to this PHAP, outlining the actions completed and those in progress.

ATSDR will reevaluate and expand the Public Health Action Plan (PHAP) when needed. New environmental, toxicological, health outcome data, or the results of implementing the above proposed actions may determine the need for additional actions at this site.


CERTIFICATION

The Public Health Consultation for the Fair Lawn Wellfields site was prepared by the New Jersey Department of Health under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with approved methodology and procedures existing at the time the Public Health Consultation was initiated.



Technical Project Officer, SPS, SSAB, DHAC

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



Branch Chief, SSAB, DHAC, ATSDR

DOCUMENTS REVIEWED

1. USEPA, Private Potable Well Sampling, Fair Lawn Wellfield Site, Bergen County, New Jersey. May 1995
2. USEPA, Private Potable Well Sampling, Fair Lawn Wellfield Site, Bergen County, New Jersey. June 1995
3. Environ Corporation, Well Survey Results, Fair Lawn Wellfield Site, Bergen County, New Jersey. March 1994
4. Environ Corporation, Groundwater Monitoring And Remedial Action Progress Report, FSC, Fair Lawn Wellfield Site, Bergen County, New Jersey. Second Quarter 1994
5. IT Corporation, Groundwater Monitoring Report, Sandvik, Inc., Fair Lawn Wellfield Site, Bergen County, New Jersey. First Quarter 1994
6. Environ Corporation, Preliminary Assessment Of The Potential Sources And Circumstances Of Release To The Fair Lawn Well Fields Site, Borough Of Fair Lawn, Bergen County, New Jersey. October, 1993
7. ATSDR, preliminary health assessment document for Fair Lawn Borough wells, Fair Lawn Borough, Bergen County, New Jersey. January 1989
8. Movement of Volatile Organics through a Fractured Rock Aquifer by Steven E.Spayd, New Jersey Geological Survey, Division of Water Resources, NJDEP. 1985
9. Garden State Laboratories, Inc.- Report of Analysis - VOC's (Municipal well # 24 water sampling), Fair Lawn Wellfield Site, Bergen County, New Jersey. May 1985
10. Ram, N.M., Christman, R.F., and Cantor, K.P., Eds., "Significance and Treatment of VOC's in Water Supplies", Chelsea, Maine, Lewis Publishers, pp.485-504.
11. Agency for Toxic Substances and Disease Registry. Toxicological Profile for Benzene. Atlanta, ATSDR, 1994.
12. Agency for Toxic Substances and Disease Registry. Toxicological Profile for Tetrachloroethylene, Atlanta, ATSDR, 1993.
13. Agency for Toxic Substances and Disease Registry, Draft Toxicological Profile for Trichloroethylene, Atlanta, ATSDR, 1993.

INTERVIEWS / PERSONAL COMMUNICATIONS

1. **USEPA:**
 - Site Manager

2. **Site Remediation Program/NJDEPE:**
 - Site Manager

3. **Fair Lawn Department of Health Services:**
 - Environmental Health Specialist

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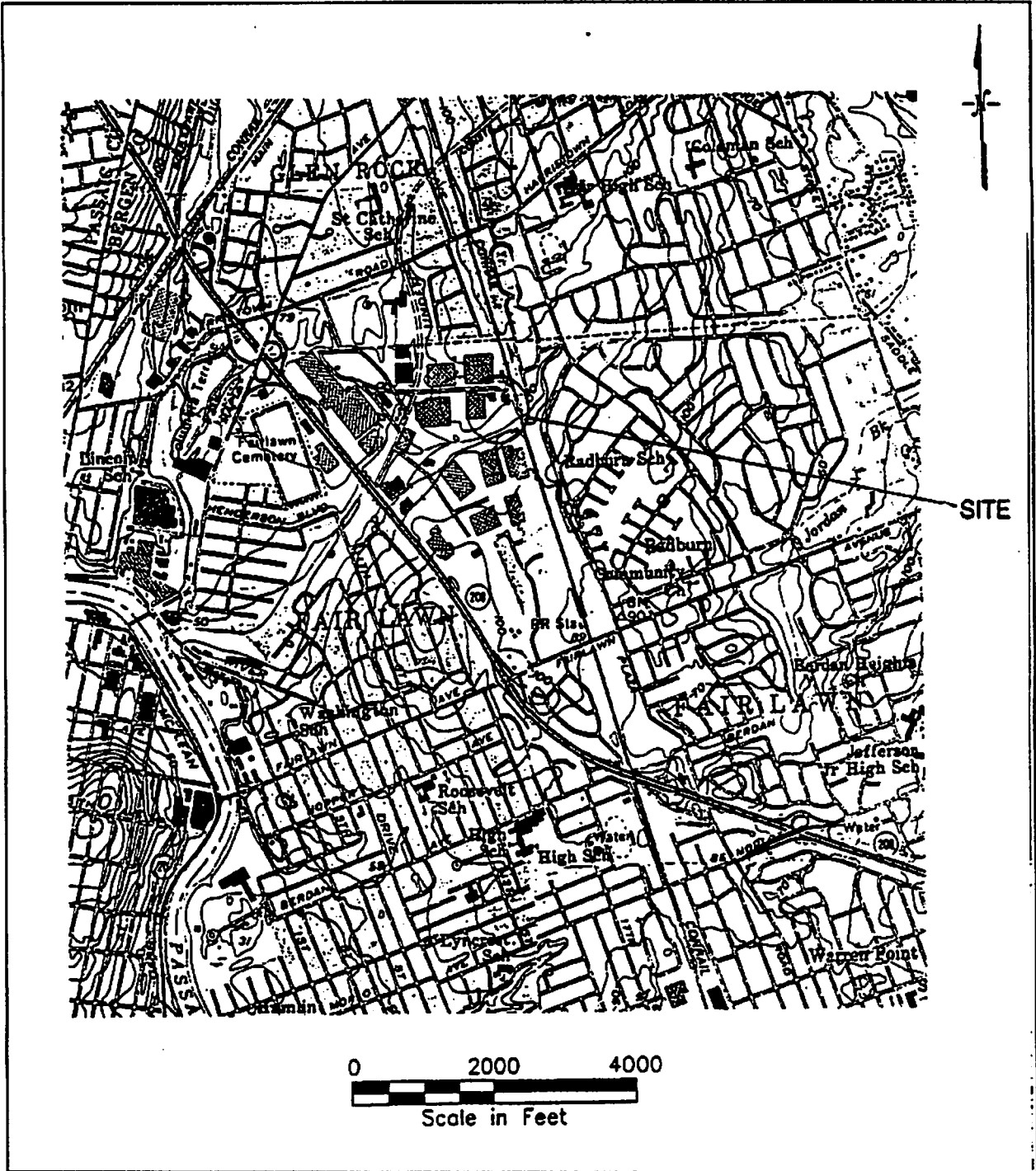


Figure 1 - General Site Location