

# Groundwater Contamination Modeled to Subside by 2052

FairLawnPatch

By Zak Koeske

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A seven-year long investigation into tetrachlorethylene (PCE) contamination of the soil and groundwater at the former Topps Dry Cleaners site has determined that the scope of contamination is decreasing naturally over time and should subside by 2052, environmental consultants informed the public Tuesday at an open meeting.

Ellen Ivens of Anderson Mulholland & Associates (AMAI), the environmental firm hired to conduct Topps' site investigation, proposed establishing a Classification Exemption Area (CEA) -- a zone where groundwater use is restricted until safety standards are met -- while allowing the contaminated groundwater to attenuate naturally over the next forty years.

AMAI will continue to monitor PCE contamination levels in the groundwater and indoor air every two years as long as the remediation is ongoing, to ensure the passive remediation process is working as expected, Ivens said. In the event that PCE contamination levels reverse and begin to elevate over time, AMAI will step in and take the appropriate measures to mitigate the problem, likely through some form of enhanced remediation.

Investigation at the Topps site began in 1990, after PCE contamination was discovered during remedial investigation of the adjacent Exxon gas station on Fair Lawn Avenue.

PCE is a common dry cleaning solvent that at high concentrations can cause dizziness, headache, sleepiness, confusion, nausea, difficulty speaking and walking, unconsciousness and sometimes death, according to the Agency for Toxic Substances and Disease Registry. It is classified as a carcinogen by the Department of Health and Human Services.

After PCE was discovered at Topps, the New Jersey Department of Environmental Protection required that additional remedial investigations be conducted there. However, the site's owner failed to perform them. It wasn't until the late 1990s, when unrelated remedial investigations found PCE contamination outside of the boundaries of the Topps site, that the NJDEP concluded Topps Cleaners was the source of both on-site and off-site PCE contamination.

In May 2003, the NJDEP directed Topps' owner to investigate the site and develop a cleanup plan. AMAI was hired to perform the investigation.

Through their investigation, AMAI discovered that PCE contamination in the soil beneath the Topps building had migrated into groundwater and off-site into the surrounding residential neighborhood.

Approximately 90 on-site and off-site ground water monitoring wells have been installed and sampled since the investigation began in order to determine the range and extent of the contamination.

Analyses found that PCE plumes have spread approximately 2,400 feet from the Topps site in a southeasterly direction beneath Archery Plaza and east of Plaza Road, and approximately 1,400 feet south-southwest toward 20th Street.

Some homes in the area have experienced PCE vapor intrusion, which occurs when fumes from the PCE-contaminated soil or ground water seep through cracks in the foundations of buildings and accumulate in basements, crawl spaces or living areas.

Through six phases of testing, a total of 71 homes along Plaza Road, Townley Road, Ramapo Terrace, Ramsey Terrace, Reading Terrace and Randolph Terrace were investigated for vapor intrusion.

Of those 71 homes, 15 were found to have PCE vapors at concentrations that exceeded NJDEP's residential screening levels. Those homeowners were given the option of having AMAI install sub-surface depressurization systems to prevent PCE vapors from entering the home.

In 2008, AMAI sought to eliminate the contamination source by treating the PCE-contaminated soil and groundwater directly beneath the Topps site using a process called electrical heating resistance.

It was the first time this particular technology had been used at a site in New Jersey.

"We put in giant electrodes, rods we drilled in down to 28 feet so that they're at the top of the bedrock," Ivens said, explaining the electrical heating resistance process. "When you put a current between these rods, these electrodes, the current heats up the soil and the soil moisture and it vaporizes the contamination...We captured all the vapor, all the steam that was coming off and sent it through carbon filter system and so forth to clean it up."

The procedure, which removed the on-site source of PCE, reduced on-site soil PCE levels by 99.9 percent and on-site groundwater PCE levels by more than 95 percent.

With the source removed and no longer able to contribute to the spread of PCE off-site, AMAI projects the levels of PCE in the groundwater to naturally taper off over time until about 2052, when groundwater across the entire affected area will meet NJDEP standards.

"There's nothing new that can come in," Ivens said. "Whatever was creating the plume has been completely removed. There's PCE left in the groundwater, but because we did the treatment and the heating, it's breaking down. And we're seeing natural breakdown, in the other edges of the well, so it's shrinking from both sides."

AMAI will continue monitoring the wells quarterly over the next forty years, or for as long as it takes for the groundwater contamination to subside.

"We will be out there monitoring and modeling and sampling to make sure that the processes are working the way that we expect them to," Ivens said. "We have to recertify [with the NJDEP]...to reestablish the [Classification Exception Area] every two years. And as part of this process too, we will be filing semi-annual progress reports, which I will put in the library...so you will have access to the data."

# Factsheet

## Topps Dry Cleaners

22-02 Fair Lawn Avenue, Fair Lawn, New Jersey  
Block 3609 lot 15  
NJDEP Preferred Identification #G00002822



December 2011

### Site Background

The former Topps Dry Cleaners is a 0.48 acre property located at 22-02 Fair Lawn Avenue, Fair Lawn, NJ. Commercial dry cleaning operations were conducted at the site from 1950 through 2004. The dry cleaning building was demolished in December 2005. In May 2003 the NJDEP issued a Memorandum of Agreement directing the current property owner to investigate the site and develop a cleanup plan. The property owner retained Anderson Mulholland & Associates, Inc. (AMAI) to conduct the investigation and propose a cleanup plan.

### Contamination

Soil and groundwater at the site have been impacted by Perchloroethene (PCE) and its daughter products TCE, 1,1-DCE, cis 1,2-DCE, trans 1,2-DCE, and vinyl chloride. PCE is a common dry cleaning solvent and was the only dry cleaning solvent used at the site. The main PCE source area was located beneath the building close to the location of the former dry cleaning machines. The PCE contamination in soil beneath the former building migrated into groundwater and then off-site. Groundwater sampling has detected PCE in both the overburden aquifer

and the bedrock aquifer on-site and in the overburden aquifer and bedrock aquifer off-site. The PCE plumes have migrated approximately 2,400 ft from the Topps site in a southeasterly direction beneath Archery Plaza and east of Plaza Road, and approximately 1,400 feet south southwest towards 20th Street.

The highest PCE concentration detected in groundwater was 56,500 ug/l collected in the overburden beneath the former dry cleaning building. The overburden is the layer of groundwater closest to the surface. TCE, cis-1,2 DCE and vinyl chloride were also

### Interim Remedial Measure

An Interim Remedial Measure (IRM) was completed at the site in 2008. Electrical Resistance Heating was used to treat the PCE-contaminated soil and groundwater at the former Topps site. The IRM was very successful and reduced PCE in soil by 99.9% and on-site soils meet the NJDEP soil cleanup standards. **Table 1** shows soil concentrations before and after treatment. PCE in on-site groundwater was reduced by more than 95%. The on-site source of PCE was removed and can no longer contribute to any off-site groundwater contamination.

*The following websites provide more information about the site contaminants:*

The Agency for Toxic Substance and Disease Registry:  
[www.atsdr.cdc.gov/toxfaqs/index.asp](http://www.atsdr.cdc.gov/toxfaqs/index.asp)  
U.S. Environmental Protection Agency:  
[www.epa.gov/superfund/health/index.htm](http://www.epa.gov/superfund/health/index.htm)

**Table 1: Ranges of Contaminants in On-site Soil in microgram per kilogram (ug/kg)**

	NJDEP Impact to groundwater Soil Cleanup Criteria	Range of Soil Concentrations before the IRM (2007)	Range of Soil Concentrations after the IRM (2009)
PCE	1,000	ND—288,000	ND-135
TCE	1,000	ND-1,390	ND
1,1-DCE	10,000	ND	ND
Cis-1,2-DCE	1,000	ND	ND
Trans-1,2-DCE	50,000	ND	ND
Vinyl Chloride	10,000	ND	ND

## Contamination cont.

detected in the overburden. PCE concentrations in the bedrock groundwater, which is deeper than the overburden, were much lower. **Table 2** shows a summary of contaminant concentrations in groundwater in 2006 and 2011.

The PCE plume migrated beneath a residential area east of the Topps site and PCE vapors were detected in soil gas beneath certain homes. A vapor intrusion investigation of 68 homes in that area has been completed. The PCE plume also migrated west of the Topps site but only in the bedrock groundwater. Clean groundwater located above the bedrock plume serves as a barrier that blocks the PCE vapors from migrating upwards and therefore a vapor intrusion investigation was not required for the western part of the groundwater plume.

## Vapor Intrusion Investigation

In 2005 groundwater sampling showed that shallow contaminated groundwater had migrated off-site beneath a residential area. Topps began to investigate if PCE vapors from the contaminated groundwater were entering into the homes, a process known as vapor intrusion. A total of 68 homes along Plaza Road, Townley Road, Ramapo Terrace, Ramsey Terrace, Reading Terrace, and Randolph Terrace have been investigated for vapor intrusion. The investigation revealed that 15 homes had PCE vapors beneath the basement slab above the NJDEP soil gas screening level of 34 ug/m<sup>3</sup> and PCE in indoor air that exceeded the NJDEP residential indoor air screening level of 3 ug/m<sup>3</sup>. Of those 15 homes, if the home owner permitted, AMAI installed a sub-surface depressurization system to prevent the PCE vapors from migrating into the home. AMAI is also monitoring homes where PCE was detected beneath the houses above the soil gas screening levels but not in the indoor air. If monitoring shows PCE in indoor air above the NJDEP standards in any of these homes, the home owner will be offered a sub-slab depressurization system at no cost.

**Table 2: Ranges of Contaminants in Groundwater in microgram per liter (ug/L)**

	NJDEP Groundwater Quality Criteria	Range of Groundwater Concentrations 2006	Range of Groundwater Concentrations 2011
PCE	1	ND—56,500	ND-124
TCE	1	ND—1520	ND-39
Cis-1,2-DCE	70	ND—864	ND-662
Vinyl Chloride	1	ND-35.8	ND-20.6

## Proposed Remediation

The investigation at the Topps site has been completed. More than 80 groundwater monitoring wells have been installed and monitored to determine how far the contamination has migrated in groundwater from the Topps site and how the levels of PCE in groundwater have changed over time. Topps is proposing a Classification Exception Area (CEA) and Natural Groundwater Remediation (NGR) for the contaminated groundwater.

Groundwater monitoring data collected to-date indicates that the PCE groundwater plumes appear to be stable and decreasing naturally. As part of the December 2011 Remedial Action Work Plan proposing Natural Groundwater Remediation, Topps will continue to monitor the groundwater wells to demonstrate that the natural degradation processes continue and the PCE concentrations continue to decrease. If groundwater monitoring shows that NGR is not effective an alternative remedial action will be implemented.

The CEA will function as an institutional control to restrict the use of groundwater within the area of PCE contamination. Please see **Figure 1** for the extent of the proposed CEA.

### Contact Information:

Please contact AMAI, Topps' environmental consultant, if you have any questions about the investigation or remediation at the Topps site. You can reach Ellen Ivens at 914-251-0400 extension 311 or [Toppsinfo@amaiconsult.com](mailto:Toppsinfo@amaiconsult.com).  
Anderson Mulholland & Assoc.  
110 Corporate Park Drive  
White Plains, NY 10604

You can also contact the NJDEP Office of Community Relations at 609-984-3081.  
Office of Community Relations  
NJ Department of Environmental Protection  
401 E. State Street 6<sup>th</sup> floor PO Box 413  
Trenton, New Jersey 08625-0413

Site reports are available at the Maurice M Pine Library, Reference Section

