

Health Consultation

FLASH CLEANERS

POMPANO BEACH, BROWARD COUNTY, FLORIDA

EPA FACILITY ID: FLD8311105

MARCH 17, 2009

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:

Florida Department of Health
Bureau of Environmental Public Health Medicine
Under Cooperative Agreement with the
U.S. Department of Health and Human Services
Agency for Toxic Substances and Disease Registry

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Foreword

Since 1986, ATSDR has been required by law to conduct public health assessment activities at each of the sites on the EPA National Priorities List (NPL). The aim of these evaluations is to find out if people are being exposed to hazardous substances and, if so, whether that exposure is harmful and should be stopped or reduced. If appropriate, the ATSDR also conducts public health assessments when petitioned by concerned individuals. Environmental scientist and health scientists from ATSDR and from the state, tribal and territorial programs with which ATSDR has cooperative agreements, carry out public health assessments. The public health assessment program allows the scientists flexibility in the format or structure of their response to the public health issues at hazardous waste sites. For example, a public health assessment could be one document that takes a comprehensive view of a site and its potential risk to public health. Or it could be a compilation of several health consultations, each of which are focused on answering a single question about a site. Whatever the form of the public health assessment, the process is not considered complete until the public health issues at the site are addressed.

Exposure

As the first step in the evaluation, FDOH scientists review environmental data to see how much contamination is at a site, where it is, and how people might come into contact with it. Generally, rather than collecting its own environmental sampling data, FDOH reviews information provided by EPA, other government agencies, business, and the public. When there is not enough environmental information available, the report will indicate what further sampling data are needed.

The route of a contaminant's movement is called an exposure pathway, which has five elements: (1) a source of contamination, (2) an environmental media (such as, soil, water, or air), a point of exposure, (4) a route of human exposure, and (5) a receptor population. The source is the place where the chemical or radioactive material was released. The environmental media transports the contaminants. The point of exposure is the place where persons come into contact with the contaminated environmental media. The route of exposure (for example, ingestion, inhalation, or dermal contact) is the way the contaminant enters the body. The people actually exposed are called the receptor population.

Health Effects

If there are potential or completed exposure pathways, where people have or could come into contact with hazardous substances, FDOH scientists then evaluate whether these contacts may result in harmful effects. FDOH recognizes that children, because of their play and their growing bodies, may be more vulnerable to these effects. As a policy, unless data are available to suggest otherwise, FDOH considers children likely to be more sensitive and vulnerable to hazardous substances than adults. Thus, the health impact to the children is considered first when evaluating the health threat to a community. The impacts to other high-risk groups within the community (such as the elderly, chronically ill, and people engaging in high-risk practices) also receive special attention during evaluation.

FDOH uses existing scientific information, which can include the results of medical, toxicologic, and epidemiologic studies and data collected in the disease registries, to determine the health effects that may result from exposures. The science of environmental health is still developing, and sometimes scientific information on the health effects of certain substances is not available.

FDOH identifies those types of information gaps and documents public health actions needed in the public health assessment documents.

If, after reading this report, you have questions or comments, we encourage you to send them to us. Letters should be addressed as follows:

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Purpose

The purpose of this report is to evaluate environmental exposures at the Flash Cleaners Site and to identify actions needed to reduce exposures to hazardous substances and protect human health. In March 2008, the US Environmental Protection Agency (EPA) proposed adding the Flash Cleaners Site (FCS) to the National Priorities List (NPL). EPA officially added the FCS to the NPL in September 2008. In preparing this health consultation, Florida Department of Health (FDOH) reviewed reports by the Environmental Protection Agency (EPA), the Florida Department of Environmental Protection (FDEP), the Broward County Department of Planning and Environmental Protection (BCDPEP), and Flash Cleaners. This report is not intended to address liability, remediation, or other non-health issues.

Statement of Issues

FCS is located in a highly urbanized area of Pompano Beach, Broward County, Florida. The facility operated as a dry cleaning facility from 1977 to approximately 2001 and used tetrachloroethylene (PERC or PCE) as the primary cleaning agent. Wastewater from dry cleaning activities were discharged to an on-site septic tank system. That resulted in a confirmed release to on-site groundwater and subsurface soils (Weston 2005).

FDOH began evaluating possible health risks associated with FCS in March 2008, when the Florida Department of Environmental Protection (FDEP) referred the FCS to EPA after they determined that the site was not eligible for state funding, because FDEP does not fund sites that qualify for the federal Superfund program. EPA received a letter of support for placing the FCS on the National Priorities List (NPL) from the state of Florida in March 2008. EPA added the FCS to the finalized NPL in September 2008.

FDOH evaluated regional groundwater flow patterns (site-specific potentiometric maps are not available) and determined that it is possible that on-site groundwater may flow east toward off-site private irrigation wells. Solvents with high mobility such as PCE and its by-products would tend to sink through limestone and could migrate quickly. The limestone is more transmissive than unconsolidated sand or sandstone; it is from the more transmissive zones of the Biscayne Aquifer that local water supplies are drawn (Klein, Tull 1978).

Existing data, however, are insufficient to determine the extent of off-site groundwater contamination. As such, FDOH cannot determine the public health threat from exposure to contaminated groundwater. Due to the close proximity of municipal wells and surface water bodies, additional vertical and lateral assessment of the contaminated groundwater plume is needed.

Background

The FCS is located at 4131 North Federal Highway Pompano Beach, Florida in a densely populated setting adjacent to a busy street and access is unrestricted. Land uses surrounding the property is predominately commercial and residential with notable growth within the past 20 years. A school is located approximately 1,500 feet southwest of the property and several residential areas are nearby, including one residential area adjacent to the western side of the property. A vacant building is located adjacent to the property to the north and an auto repair business (4-Wheel Parts) is located adjacent to the property to the south. U.S. 1/North Federal Highway is located to the east of the property. Access to the property is unrestricted by any

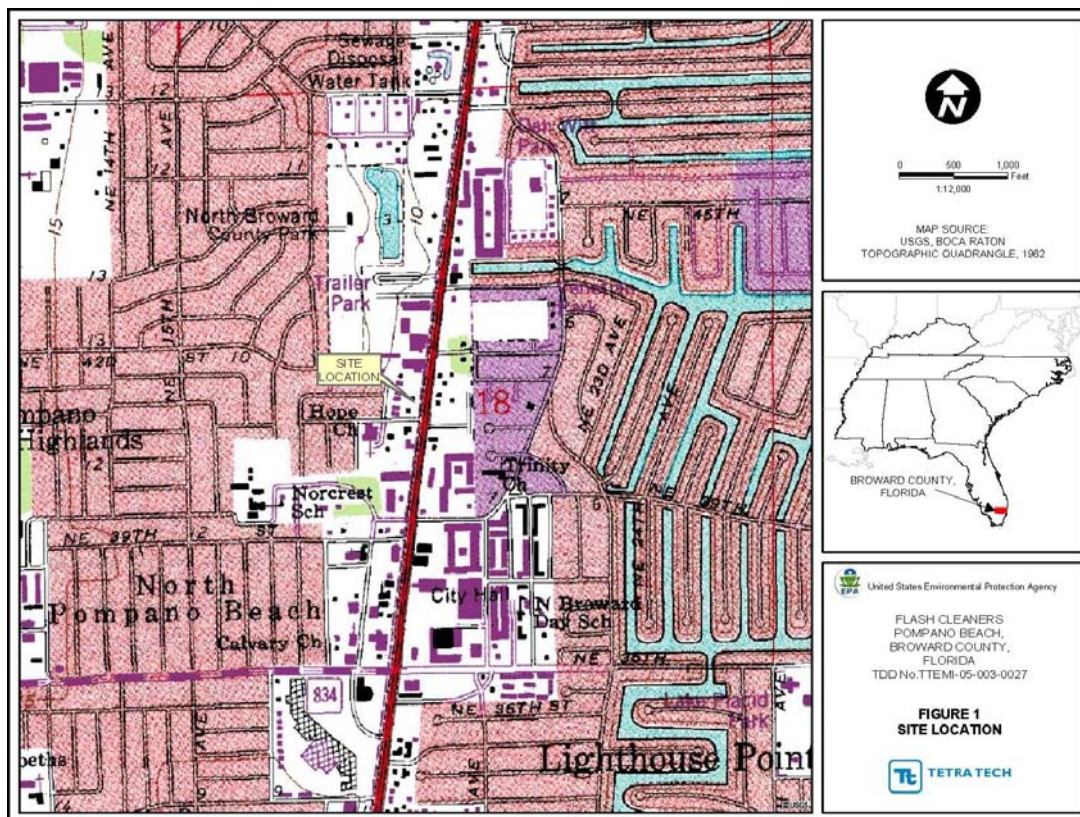
natural or manmade barriers. Residents use the access road as a shortcut to the residential area to the west of the facility (Weston 2005).

Previous operations at the FCS include a dry cleaning operation, but prior to 1977, the operational history is unknown. In 2001, the facility ceased its dry cleaning operation but continued to operate as a retail drop off location. Flash Cleaners is currently not operating as a dry cleaning facility. The primary cleaning agent used was tetrachloethene (also known as perchloroethylene, PERC, or PCE). Past investigations identified elevated concentrations of PCE and its breakdown products in groundwater beneath the site.

About 251,000 people reside within a 4-mile radius of the site. Four municipal water systems in this area draw from the surficial Biscayne Aquifer. The nearest municipal well field is approximately 0.8 miles to the northeast of the site. In addition, canals and the Hillsboro River are nearby (Figure 1) (Weston 2005).

Drainage from the site flows toward a series of residential saltwater canals approximately 1,500 feet east of the site. The canals enter the Hillsboro River, which connects to the Atlantic Ocean through the Hillsboro Inlet (Figure 1). The canals and the Hillsboro River are used for boating, swimming and recreational fishing. Commercial fish harvested from the Atlantic Ocean include snook and snapper.

Figure 1. Site Location [Source: Tetra Tech 2008]



Since 1949, the South Florida Water Management District (SFWMD) has provided drinking water to residential, commercial, and industrial customers throughout Broward County. The

principle source of municipal water is the Biscayne aquifer system. The EPA designates the Biscayne aquifer as a sole-source aquifer.

The Biscayne aquifer is composed of limestone, sandstone, and sand; however, in Broward County, the aquifer is primarily composed of sand (Weston 2005). The formation is approximately 300 feet thick in the area of the property. Water in the aquifer is replenished by rainfall and water flowing from Lake Okeechobee and conservation areas through an extensive canal system (Hazen and Sawyer, P.C and Milian, Swain & Associates 2006).

Because the Biscayne aquifer is near land surface, it is susceptible to contamination. Pollutants enter the aquifer by direct infiltration from land surface canals, septic tanks, drain fields, drainage wells, and solid waste dumps. Most pollutants that enter the aquifer are concentrated in the upper 20 to 30 feet. The ultimate fate of pollutants in the aquifer is the ocean, although the aquifer materials en route may adsorb some pollutants, and some are diverted to pumping wells (Klein, Tull 1978). Groundwater in the aquifer generally flows east toward the coast (PBS&J 2003). Some nearby residents use private irrigation wells.

What is Tetrachloroethene or “PERC?”

Tetrachloroethene (Perchloroethylene, PCE, or “PERC”) is a synthetic chemical widely used for dry cleaning of fabrics and for metal-degreasing operations. It is also used as a starting material (building block) for making other chemicals and is used in many consumer products.

Regulatory History

FDEP Southeast District inspected FCS in February 1999. They found two dry cleaning machines: one operational and one non-operational. The non-operational machine lacked secondary containment and still contained dry cleaners solvents. Following the inspection, the non-operational machine was drained and its contents transferred to the operational machine. The non-operational machine’s filters were manifested as hazardous waste and removed from the site. The facility owners claimed all waste was placed in drums for disposal. FDEP, however, concluded that waste manifests did not support that claim. The inspection report also indicated that dry cleaner solvents were discharged into the facilities septic tank (Weston 2005).

In May 1999, the site owners applied for the state’s dry cleaner program. FDEP found FCS to be ineligible for the program due to lack of secondary containment and grossly negligent operations. Broward County Department of Planning and Environmental Protection (BCDPEP) required the owners to submit a Limited Site Assessment Report (Weston 2005).

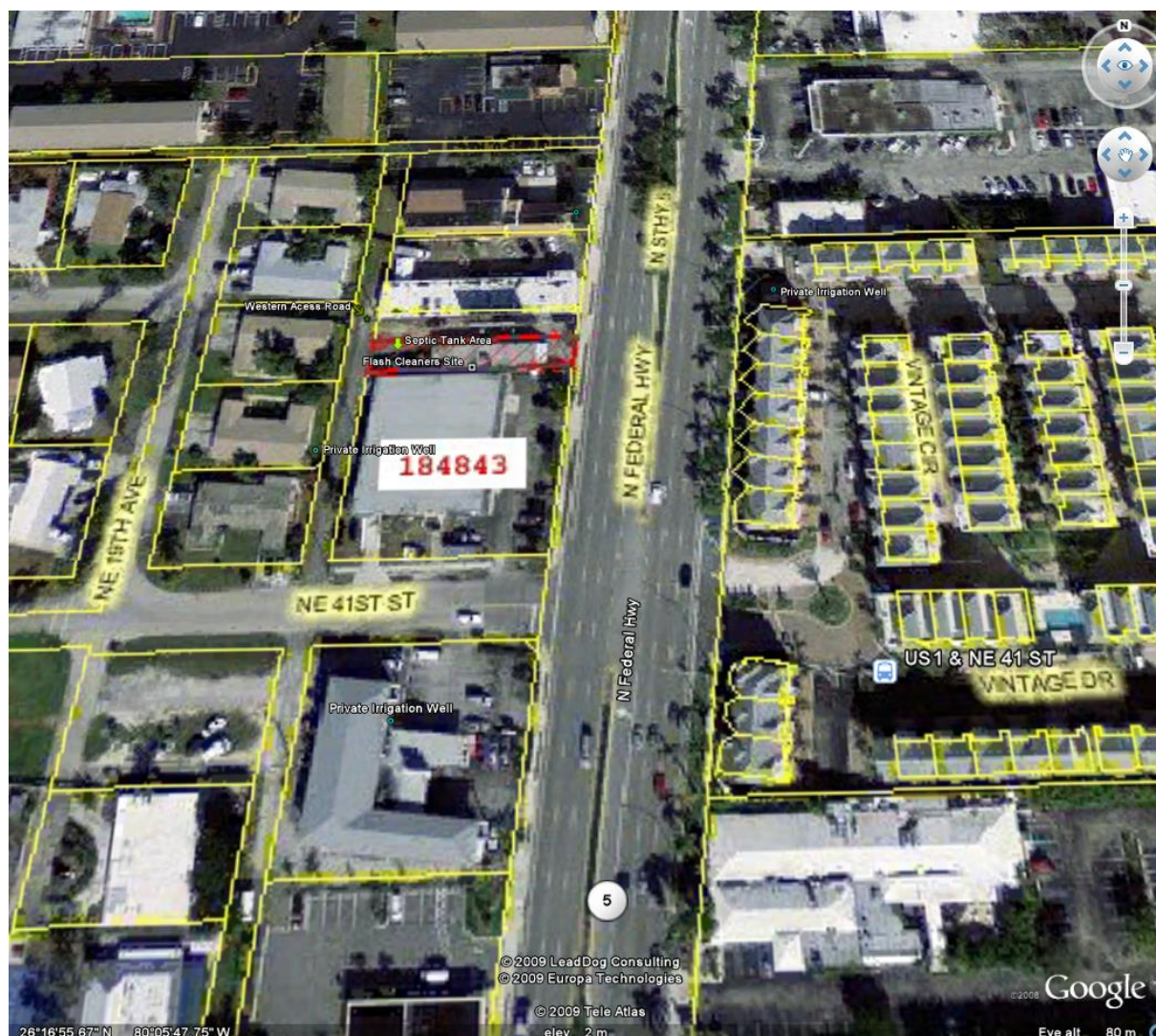
Flash Cleaners failed to continue with assessment activities or remediate the site as required by the BCDPEP. The BCDPEP issued a violation order in 2002. The BCDPEP then forwarded the site to the FDEP, which forwarded the site to the EPA. In March 2008, EPA proposed adding FCS to the National Priorities List (NPL). The EPA added the FCS to the NPL in September 2008 (Weston 2005).

Environmental Contamination

After detecting on-site groundwater and subsurface soil contamination near the FCS septic tank and drain field, EPA, FDEP, and BCDPEP took two actions to evaluate the nature and extent of contamination. First, beginning in the late 1990s, contractors for FDEP, EPA, and Flash

Cleaners installed several on-site monitoring wells in the Biscayne Aquifer to determine whether groundwater contaminants were migrating off-site. Second, they collected several groundwater, subsurface and surface soil samples to identify former waste disposal locations. That led to the discovery and removal of PERC-contaminated sludge in the on-site septic tank (Figure 2) (Tetra Tech 2008).

Figure 2. Site Vicinity



Surface Soil. From 2000 to 2005, contractors for FDEP, EPA and Flash Cleaners collected nine on-site surface soil samples from 0 to 12” below land surface (bls). They were analyzed for volatile organic compounds (VOCs). The only constituent detected at elevated levels was acetone, which is a common laboratory contaminant and is not considered site related (Weston 2005). For the purpose of this report, surface soil quality has not been adequately characterized due to the lack of off-site data.

Subsurface Soil. From 2000 to 2005, contractors for FDEP, EPA, and Flash Cleaners collected 25 subsurface samples from 2 to 50 feet bls. They were analyzed for VOCs. PCE, TCE, and *cis-*

1, 2-dichloroethene (DCE), were detected below ATSDR soil comparison values. Soil contamination appears to be primarily in the subsurface soil near the septic tank and drain field (Table 1) (Weston 2005). For the purpose of this report, subsurface soil quality has not been adequately characterized due to the lack of off-site data.

Table 1. Chemicals of Concern in On-site Subsurface Soil (2 to 50 feet deep)

Chemical of Concern	Frequency of Detections	Average Detection (ppm)	Maximum Detection (ppm)	Comparison Value (ppm)	Source of Comparison Value
Tetrachloroethene (PCE)	12/25	0.17	0.55	500/7,000	Child/Adult RMEG
Trichloroethylene (TCE)	4/25	0.24	0.7	400	Child/ Pica RMEG
<i>cis</i> -1,2-Dichloroethylene (<i>cis</i> -1,2 DCE)	6/25	0.76	2.26	20,000/2,000	Child/Adult Intermediate EMEG

ppm=parts per million

RMEG=Reference Dose Media Evaluation Guide

EMEG=Environmental Media Evaluation Guide

Groundwater. From September 2000 thru July 2005, contractors for BCPEP, FDEP EPA, and Flash Cleaners collected 47 groundwater samples from existing on-site monitoring wells and from the aquifer using direct push technology. No groundwater samples have been collected beyond the site boundaries. They collected groundwater samples from three intervals: shallow (15 feet bls), intermediate (35 feet bls), and deep (50 feet bls). They analyzed the samples for VOCs (Table 2) (Tetra Tech 2008).

Table 2. Chemicals of Concern in On-site Groundwater

Chemical of Concern	Frequency of Detections	Range Detected (ppm)	Comparison Value (ppm)	Source of Comparison Value
Tetrachloroethene (PCE)	16/47	BDL to 4.0	0.005	MCL
Trichloroethylene (TCE)	14/47	BDL to 2.4	0.005	MCL
<i>cis</i> -1,2-Dichloroethylene (<i>cis</i> -1,2 DCE)	20/47	BDL to 14.5	0.07	MCL
Vinyl Chloride	7/47	BDL to 6.8	0.002	MCL

BDL=below detection limits

ppm = parts per million

MCL=Maximum Contaminant Level

Concentrations of PCE, TCE, *cis*-1, 2-dichloroethene, and vinyl chloride were all above their respective EPA maximum contamination level (MCL). Groundwater contamination has spread downward and northeast of the septic tank (Weston 2005). For the purpose of this report, however, groundwater quality has not been adequately characterized due to insufficient off-site data.

Septic Tank Sludge. In February 2001, contractors for Flash Cleaners collected a single sludge sample from the on-site septic tank and analyzed for VOCs. They found PCE (61,000,000 µg/kg) and *cis*-1, 2-DCE (4,900,000 µg/kg) (Tetra Tech 2008).

In April 2001, contractors for FCS removed sludge from the septic tank. Following sludge removal, they pressure washed and inspected the septic tank. They found a plug blocking the line leading from the septic tank to the drain field, which apparently caused effluent to discharge near the septic tank inlet (Tetra Tech 2008). It is not known how much solvent waste was disposed of into the septic tank, or for how long.

Discussion

FDOH's assessment of environmental public health issues is driven by exposure, or contact. A primary role of FDOH is to identify exposure pathways and characterize actual exposure situations. To accomplish this, FDOH reviews site information about the releases of contaminants from the site and evaluates how people might come into contact, or be exposed to, contaminated groundwater, soil, dust, indoor air, sediment.

What is exposure?

The release of a chemical does not always result in exposure. Exposure may occur by breathing, eating, or drinking the substance or skin (dermal) contact with substance. If no one comes into contact with a contaminant then no exposure occurs, and thus no adverse health effects could occur.

When do health effects occur?

Exposure does not always result in adverse health effects. The type and severity of health effects that occur in an individual as the result of contact with a contaminant depends on the exposure concentration.

FDOH scientists evaluate site-specific conditions to determine whether people are being exposed to site-related contaminants. If exposure is occurring or may possibly occur in the future, FDOH considers whether environmental contamination is present at levels that might affect public health. FDOH evaluates environmental contamination using available sampling data and, in some cases, modeling studies. FDOH selects contaminants for further evaluation by comparing environmental contaminant concentrations to **health-based comparison values**. ATSDR develops comparison values from available scientific data concerning exposure and health effects. Comparison values are derived for different environmental media. A comparison value is an estimated amount of a contaminant in the environment that is not expected to harm anyone, no matter how people contact the contaminant.

What is a comparison value?

A comparison value is used by ATSDR and FDOH to screen chemicals to determine which chemicals need additional evaluation.

On the other hand, if a contaminant is present in the environment at a level greater than the comparison value, contact with it does not necessarily mean that adverse health effects will occur. ATSDR comparison values are contaminant concentrations many times lower than the levels at which no effects were observed in studies on experimental animals or epidemiological studies. If contaminant concentrations are above ATSDR comparison values, FDOH further evaluates the contaminant and exposure. FDOH does this by calculating exposure doses (see text box below for definition) and comparing the doses to protective health guideline values, including Cancer Risk Evaluation Guide (CREG). A CREG is the contaminant concentration estimated to result in no more than one excess cancer per 1 million persons exposed during a lifetime (i.e., 70 years). ATSDR calculates CREGs from EPA-established cancer slope factors (ATSDR 1992). ATSDR derives an EMEG (Environmental Media Evaluation Guide (EMEG)) from a Minimal Risk Level (MRL), using standard exposure assumptions (e.g., ingestion of 200 milligrams of soil per day and body weight of 30 kilograms (kg) for children). ATSDR establishes chronic MRLs as levels of daily human exposure to a chemical for a period of 1 year or longer which is likely to be without any appreciable risk of noncancerous illnesses. Estimated exposure doses that are less than the health guideline values are not considered to be of health concern.

What is an exposure dose?

An exposure dose is the amount of chemical a person is exposed to over time.

If health guidelines are exceeded, FDOH conducts a more in-depth analysis, studying the likelihood of adverse health effects under site-specific conditions and closely examining the scientific literature on the toxicity of the contaminant.

Pathway Analysis

Florida DOH determines exposure to environmental contamination by identifying exposure pathways. An exposure pathway is generally classified by environmental medium (e.g., water, soil, air, food). A completed exposure pathway consists of five elements: a source of contamination; transport through an environmental medium, a point of exposure, a route of exposure, and a receptor population. A completed exposure pathway exists when people are actually exposed through ingestion or inhalation of, or by skin contact with, a contaminated medium (Table 3)

Table 3. Exposure Pathways

Pathway Name	Source of Contamination	Fate and Transport	Point of Exposure	Route of Exposure	Potentially Exposed Population	Time Frame for Exposure
Potential Pathways						
Private irrigation wells	Dry cleaner solvents released from septic tank drain field	No off-site groundwater assessment data to make conclusion	Private Irrigation Wells	Skin Contact, Inhalation	Residents with private irrigation wells within 0.25 mile of the site	Past, Current, Future
Municipal water wells	Dry cleaner solvents released from septic tank drain field	No off-site groundwater assessment data to make conclusion	Tap water in homes and business	Skin Contact, Ingestion, Inhalation	Residents on municipal water	Future
Indoor vapor intrusion from ground water	Dry cleaner solvents underneath building sub slabs	Extent of ground water contamination not characterized	Indoor air	Inhalation	Residents and business over the contaminated ground water	Past, Current, Future
Surface water bodies east of site	Dry cleaner solvents released from septic tank drain field	No off-site sampling data	Surface water canals east of site	Skin Contact, Ingestion, Inhalation	Local boaters and swimmers	Past, Current, Future

Currently, residents cannot access areas on-site that would result in frequent contact with contaminants due to asphalt covering most of the site. However, access to the property is unrestricted by any natural or manmade barriers. Residents frequently use the access road as a shortcut to the residential area to the west of the facility.

Chlorinated solvents have contaminated groundwater under the site. Due to the high mobility of PCE in sandy soils, the possibility exists that considerable lateral and vertical migration of the contaminate plume could or has occurred. Off-site ground water sampling data has not been collected. Consequently, FDOH cannot evaluate this environmental medium and classifies off-site ground water as an "indeterminate public health hazard."

The full aerial extent of off-site soil contamination is unknown, including in adjacent residential areas. As new off-site data becomes available, FDOH will re-evaluate the public health significance.

Public Health Implications

Currently, residents living within 4 miles of FCS do not use private potable water wells for drinking, showering, or other household uses. The FDEP, however, will require groundwater cleanup to restore the resource and protect the public. FDOH does not expect the following to be a current public health concern: inadvertent ingestion and dermal contact of surface and subsurface on-site soils.

On-site groundwater and subsurface soil is contaminated, and although off-site contamination data has not been collected, the potential for human exposure exists. Therefore, potential exposure from private irrigation well water and indoor vapor intrusion remain a public health concern.

Dry cleaning chemicals, like PCE and its by products, can pose a health risk if they enter drinking water or indoor air. PCE, for example, is a probable carcinogen, and has been shown to cause health effects such as kidney or liver damage in animals exposed at much higher concentrations than encountered by most people. ATSDR reports that the health effects of drinking water or breathing air containing low levels of PCE are unknown (ATSDR 1997). Further investigation of the FCS is necessary to determine whether contaminants released at this site pose a health risk.

Child Health Considerations

In communities faced with air, water, or food contamination, the many physical differences between children and adults demand special emphasis. Children could be at greater risk than are adults from certain kinds of exposure to hazardous substances. Children play outdoors and sometimes engage in hand-to-mouth behaviors that increase their exposure potential. Children are shorter than are adults; this means they breathe dust, soil, and vapors close to the ground. A child's lower body weight and higher intake rate results in a greater dose of hazardous substance per unit of body weight. If toxic exposure levels are high enough during critical growth stages, the developing body systems of children can sustain permanent damage. Finally, children are dependent on adults for access to housing, for access to medical care, and for risk identification. Thus, adults need as much information as possible to make informed decisions regarding their children's health.

Conclusions

The Florida Department of Health classifies the Flash Cleaners Site as an *Indeterminate Public Health Hazard*.

- The extent of groundwater contamination has not been determined.
- Groundwater contamination may extend off-site to nearby private irrigation wells.
- Migration of VOCs from the groundwater up into overlying buildings (vapor intrusion) is possible, but has not been measured. Consequently, FDOH cannot fully evaluate these potential pathways, because critical information is missing.

- The full aerial extent of soil contamination is unknown, including adjacent residential areas.
- No remedial clean up of contaminated soils or groundwater has yet occurred.
- The impact to surface water quality has not been determined.
- Soil contamination appears to be confined to the subsurface near the septic tank.

Recommendations

- Determine the extent of ground water contamination.
- Test private irrigation wells within 0.25 miles of the site. Residents should not drink from private irrigations wells.
- To prevent future harmful exposures from contaminated subsurface soils, FCS should develop a health and safety plan that informs utility workers of the location and potential hazards.
- Consider the possibility of vapor intrusion and, if necessary, test sub slab air quality.

Public Health Action Plan

Starting in February 2009, EPA is conducting a Remedial Investigation/Feasibility Study (RI/FS) at the FCS. EPA will assess the extent of groundwater, subsurface soil, and surface water contamination. Once EPA's environmental assessment is complete, FDOH will reevaluate the public health threat.

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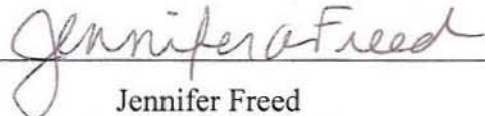
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References

- ATSDR 1997. Agency for Toxic Substances and Disease Registry. Toxicological Profile for Tetrachloroethylene.
- U. S. Environmental Protection Agency (EPA). Hazard Ranking System, HRS Documentation Record March 2008, .15-54 pages
- REP Associates, Inc. Source Removal Report, Flash Cleaners and Laundry. April 30, 2001. 45 pages.
- Tetra Tech. Topographic, Site Location, 2008 Hazardous Ranking System of Flash Cleaners, Pompano Beach, Broward County, Florida. 1 Figure.
- William Denman, P.E., Remedial Project Manager, EPA Region 4, South Site Management Branch. Letter with Attachment to Teresa Kinner, Florida Department of Environmental Protection. Subject: Preliminary Assessment Report, Flash Cleaners, Pompano Beach, Broward County, Florida, EPA ID No. FLD083111005. September 12, 2002. 14 pages.
- Post, Buckley, Schuh & Jernigan (PBS&J). Site Inspection Report for Flash Cleaners, FLD083111005. February 2004. 83 pages.
- Leslie Ann Smith, Florida Department of Environmental Protection (FDEP). Inspection Exit Summary. February 17, 1999. 8 pages.
- H2O Environmental, Inc. Source Removal Report, Flash Cleaners. August 2003. 22 pages.
- Roy F. Weston, Inc. Expanded Site Inspection Report Flash Cleaners. November 4, 2005. Pages 06-118.
- James A. Miller, USGS. Hydrogeologic Framework of the Floridan Aquifer System in Florida and in Parts of Georgia, Alabama, and South Carolina. Professional Paper 1403-B. 1986. Excerpt, 89 pages.
- Melvin C. Schroeder, Howard Klein, and Nevin D. Hoy, U.S. Geological Survey, in cooperation with the Florida Geological Survey. Biscayne Aquifer of Dade and Broward Counties, Florida. Report of Investigations No. 17. 1958. Excerpt, 26 pages.
- H. Klein and J.E. Hull, USGS. Biscayne Aquifer, Southeast Florida. Water-Resources Investigation 78-107. September 1978. 59 pages.
- Broward County Property Appraiser, Flash Cleaners Site Boundaries, Pompano Beach, Broward County, Florida. Figure 1.
- Google Earth. Confirmed Irrigation Well Location, of Flash Cleaners, Pompano Beach Broward County, Florida. Figure 2.

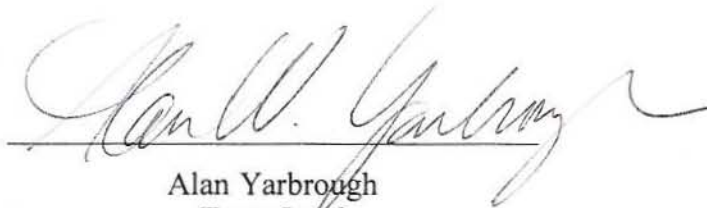
CERTIFICATION

The Florida Department of Health, Division of Environmental Health prepared this Health Consultation under a cooperative agreement with the Agency for Toxic Substances and Disease Registry. It followed approved methodology and procedures existing at the time it began and completed editorial review.



Jennifer Freed
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CAT, CAPEB, DHAC

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



Alan Yarbrough
Team Lead
CAT, CAPEB, DHAC, ATSDR