Public Health Assessment for

FLORIDA PETROLEUM REPROCESSORS
DAVIE, BROWARD COUNTY, FLORIDA
CERCLIS NO. FLD984184127
AUGUST 13, 1999

U.S. DEPARTMENT OF HEALTH & HUMAN SERVICES
Public Health Service
Agency for Toxic Substances and Disease Registry

THE ATSDR PUBLIC HEALTH ASSESSMENT: A NOTE OF EXPLANATION

This public health assessment was prepared by ATSDR pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund) section 104 (i)(6) (42 U.S.C. 9604 (i)(6)), and in accordance with our implementing regulations (42 C.F.R. Part 90). In preparing this document, ATSDR has collected relevant health data, environmental data, and community health concerns from the Environmental Protection Agency (EPA), state and local health and environmental agencies, the community, and potentially responsible parties, where appropriate.

In addition, this document has previously been provided to EPA and the affected states in an initial release, as required by CERCLA section 104 (i)(6)(H), for their information and review. The revised document was released for a 30-day public comment period. Subsequent to the public comment period, ATSDR addressed all public comments and revised or appended the document as appropriate. The public health assessment has now been reissued. This concludes the public health assessment 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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PUBLIC HEALTH ASSESSMENT

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DAVIE, BROWARD COUNTY, FLORIDA

CERCLIS NO. FLD984184127

Prepared by:

Florida Department of Health
Bureau of Environmental Toxicology
Under Cooperative Agreement with the
Agency for Toxic Substances and Disease Registry

FOREWORD

The Agency for Toxic Substances and Disease Registry, ATSDR, was established by Congress in 1980 under the Comprehensive Environmental Response, Compensation, and Liability Act, also known as the *Superfund* law. This law set up a fund to identify and clean up our country's hazardous waste sites. The Environmental Protection Agency, EPA, and the individual states regulate the investigation and clean up of the sites.

Since 1986, ATSDR has been required by law to conduct a public health assessment at each of the sites on the EPA National Priorities List. 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. (The legal definition of a health assessment is included on the inside front cover.) If appropriate, ATSDR also conducts public health assessments when petitioned by concerned individuals. Public health assessments are carried out by environmental and health scientists from ATSDR and from the states with which ATSDR has cooperative agreements. 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 or it could be a compilation of several health consultations - the structure may vary from site to site. Nevertheless, the public health assessment process is not considered complete until the public health issues at the site are addressed.

Exposure: As the first step in the evaluation, ATSDR 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, ATSDR does not collect its own environmental sampling data but reviews information provided by EPA, other government agencies, businesses, and the public. When there is not enough environmental information available, the report will indicate what further sampling data is needed.

Health Effects: If the review of the environmental data shows that people have or could come into contact with hazardous substances, ATSDR scientists evaluate whether or not these contacts may result in harmful effects. ATSDR recognizes that children, because of their play activities and their growing bodies, may be more vulnerable to these effects. As a policy, unless data are available to suggest otherwise, ATSDR considers children to be more sensitive and vulnerable to hazardous substances. Thus, the health impact to the children is considered first when evaluating the health threat to a community. The health 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 the evaluation.

ATSDR uses existing scientific information, which can include the results of medical, toxicologic and epidemiologic studies and the data collected in 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. When this is so, the report will suggest what further public health actions are needed.

Conclusions: The report presents conclusions about the public health threat, if any, posed by a site. When health threats have been determined for high risk groups (such as children, elderly, chronically ill, and people engaging in high risk practices), they will be summarized in the conclusion section of the report. Ways to stop or reduce exposure will then be recommended in the public health action plan.

ATSDR is primarily an advisory agency, so usually these reports identify what actions are appropriate to be undertaken by EPA, other responsible parties, or the research or education divisions of ATSDR. However, if there is an urgent health threat, ATSDR can issue a public health advisory warning people of the danger. ATSDR can also authorize health education or pilot studies of health effects, full-scale epidemiology studies, disease registries, surveillance studies or research on specific hazardous substances.

Interactive Process: The health assessment is an interactive process. ATSDR solicits and evaluates information from numerous city, state and federal agencies, the companies responsible for cleaning up the site, and the community. It then shares its conclusions with them. Agencies are asked to respond to an early version of the report to make sure that the data they have provided is accurate and current. When informed of ATSDR's conclusions and recommendations, sometimes the agencies will begin to act on them before the final release of the report.

Community: ATSDR also needs to learn what people in the area know about the site and what concerns they may have about its impact on their health. Consequently, throughout the evaluation process, ATSDR actively gathers information and comments from the people who live or work near a site, including residents of the area, civic leaders, health professionals and community groups. To ensure that the report responds to the community's health concerns, an early version is also distributed to the public for their comments. All the comments received from the public are responded to in the final version of the report.

Comments: If, after reading this report, you have questions or comments, we encourage you to send them to us.

Letters should be addressed as follows:

Attention: Chief, Program Evaluation, Records, and Information Services Branch, Agency for Toxic Substances and Disease Registry, 1600 Clifton Road (E-56), Atlanta, GA 30333.

Table of Contents

Summary

The Florida Petroleum Reprocessors (FPR) Site in Davie, Florida was listed on National Priorities List on March 27, 1998. Between 1978-1992, it was a waste oil transfer station. The groundwater, soil and sediments are contaminated with volatile organic chemicals, metals and polycyclic aromatic hydrocarbons.

In this public health assessment, The Florida Department of Health (FDOH) evaluates the potential for health effects from exposure to contaminated groundwater, soil and sediment. Surface water was not contaminated.

Currently, this site poses an indeterminate public health hazard because of contaminated groundwater. In the past, the site posed a public health hazard because private wells in the northern part of the site were contaminated. As a result, these residents are at an increased risk of cancer and non-cancer illnesses from household use of 1,1-dichloroethene and vinyl chloride contaminated groundwater. We do not know if there are private wells south of the FPR property; however, the contamination is moving south, people could be exposed in the future.

People installing private wells over the contaminated aquifer in the future could be exposed to chemicals in the groundwater. Public access to the FPR property is restricted by a fence. Future potential exposure to subsurface soil could occur if construction or similar activities disturb the subsurface soil.

As a result of our analysis, FDOH makes the following recommendations:

1. Sample private wells to determine if they are contaminated and prohibit domestic use.
2. Inform residents of the potential public health threat from use of contaminated private wells.
3. Continue to sample municipal water for volatile organic chemicals on a regular basis.
4. Survey the area south of FPR property to make sure there are no private wells.
5. Prohibit any domestic use of the groundwater under the FPR property until it meets all state and federal drinking water standards.
6. Determine the extent of groundwater contamination south of FPR. Sample any private wells in the area of contamination.
7. Continue to maintain security and post hazardous waste warning signs around FPR property.

Background

A. Site Description and History

In this public health assessment, the Florida Department of Health (FDOH) in cooperation with the Agency for Toxic Substances and Disease Registry (ATSDR), evaluates the public health significance of the Florida Petroleum Reprocessors site. Specifically, FDOH reviews environmental data, community health concerns and health outcome data to determine whether people in the community might be exposed to site contaminants, and if so, at levels which might cause harm. The Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA or Superfund) authorizes the ATSDR to conduct public health assessments at hazardous waste sites. The ATSDR, in Atlanta, Georgia, is a federal agency within the U.S. Department of Health and Human Services.

Florida Petroleum Reprocessors (FPR) is in Davie, Florida (See Figure 1, 2, 3). For the purpose of this assessment, we define the site as the area shown in Figure 3. The site includes most of the south Peele-Dixie Well field and is bounded by Peters Road on the north, US Highway 441 on the east, the Florida Turnpike on the west, and Oakes Road on the south. The source of contamination is a 1 25 acre parcel of land at 3211 S.W. 50th Avenue (See Figure 4). From 1978-1992, various companies including Barry's Waste Oil Service, Oil Conservations Inc., South Florida Fuels and Florida Petroleum Reprocessors used the property as a waste oil transfer station. The facility received, stored, blended and delivered waste oil to asphalt plants, phosphate mines and other waste oil reprocessors. The facility stored wastewater in an unlined pit, stored tanks in an area surrounded by an earthen dike, and spilled waste oil on the ground. The facility is currently unoccupied (EPA 1997).

The Florida Department of Environmental Protection (FDEP; formally known as the Department of Environmental Regulation) frequently cited the facility for violations. In 1981, FDEP found highly contaminated soil, possible groundwater contamination and "sloppy" facility operations. In response, the owners placed their storage tanks on a concrete pad and surrounded the area with an elevated mound of soil. FDEP's follow-up inspection found significant improvements (EPA, 1997).

In 1984, FDEP discovered chlorinated volatile organic compounds (VOC's) in two of the facility's monitoring wells. They found chemicals floating on top of the groundwater and in 4500 cubic yards (yd^3)of contaminated soil. In addition, 1,1-dichloroethene, cis-1,2-dichloroethene, trichloroethene, and vinyl chloride were dissolved in the groundwater above FDEP standards. In response, the owners removed 225 gallons of chemicals floating on the groundwater (EPA 1997).

In 1986, the Ft. Lauderdale City Utilities Department discovered elevated levels of volatile organic compounds (VOCs) in drinking water from the southern Peele-Dixie wellfield, one mile north of FPR (See Figure 3). The levels exceeded federal and state maximum allowable concentrations in groundwater used for public drinking (1994 EPA Fact Sheet). The City of Ft. Lauderdale shut down the southern half of the wellfield. They connected some area homes with private drinking water wells to municipal water lines. The northern part of the wellfield is still operational (EPA 1997).

The Environmental Protection Agency originally suspected the source of the contaminated wellfield was from the nearby 21st Street Manor Dump (See Figure 3; EPA 1997). However, the EPA concluded the dump was not the source of contamination (EPA 1997). Since many chemicals in the wellfield were also in the groundwater on the FPR property, the EPA identified FPR as the primary source for contamination of the Peele-Dixie wellfield. Between 1994 and 1995, EPA conducted a two-phase Remedial Investigation (RI).

Several agencies conducted assessments on private wells near the contaminated wellfield. In 1988, FDEP sampled 38 private wells within 1 mile of the 21st Street Manor dump. Between 1987 and 1992, the Broward County Health Department sampled nine private drinking water wells along SW 44th Terrace (see Figure 5). The Health Department found elevated levels of 1,1-dichloroethene, 1,2-dichloroethene and vinyl chloride (Florida HRS 1992).

In 1992, the Florida Department of Health (FDOH) assessed the public health implications of the groundwater contamination in the 21st Street Manor Dump Public Health Assessment. The report concluded that VOCs in private wells near the 21st Street Manor Dump site could be a health concern and recommended providing households with private wells an alternate drinking water source. The people with private wells were transient and predominantly Spanish-speaking (FDOH 1997).

In 1995, the city constructed an air stripping treatment system to clean the wellfield. Air stripping removes VOCs from contaminated groundwater by forcing air through the water causing the compounds to evaporate (EPA 1997).

In 1996, the EPA discovered oil, grease, organic chemicals, gasoline and chlorinated solvents in the surface and subsurface soils 60 feet deep on the FPR property. They found chemicals on top of the water table and in the groundwater as deep as 200 feet. In early 1997, the EPA removed the remaining storage tanks, 13,000 gallons of free product and 26,000 gallons of wastewater. In April 1997, the EPA proposed the site to the Superfund National Priorities List. In September 1997, the EPA released the Draft Remedial Investigation report (EPA 1997).

In May 1997, the FDOH conducted a health consultation for groundwater contamination near the FPR site. The consultation concluded that groundwater was a public health hazard based upon the potential for consumption and that illness may occur from exposure to vinyl chloride in groundwater. The consult further concluded that contamination of municipal wells in the Peele-Dixie wellfield may increase if contaminated groundwater under the FPR property migrates northward. FDOH recommended that EPA limit human exposure to contaminated groundwater and annually monitor groundwater north of the FPR. They conducted community health education to assist the residents to understand potential exposure routes and ways to reduce their exposure (FDOH 1997).

In 1997, as a follow-up to previous sampling, the Broward County Health Department identified seven homes on SW 44th Terrace with private wells and analyzed for volatile organic compounds (VOC's; see Figure 5). All other homes in the area use municipal water. The levels found in all wells were below levels of concern (J. Winter, personal communication, April 6, 1998).

In November 1997, the FDOH developed a brochure in English and Spanish warning people not to use private well water. The brochure was developed as a precautionary measure since the FDOH health consultation report identified contaminated groundwater near homes in the area and since some people hooked up to city water might still be using their private wells. The brochure targeted households with private wells within 1.5 miles or less from the FPR property. The brochure describes reasons citizens should be concerned and where to get more information. In November 1997, the Broward County Health Department distributed the brochure door-to-door to all 77 households on SW 44th Terrace.

In June 1988 the EPA proposed a cleanup plan but based on public comment, the EPA decided to collect additional data. They decided to aggressively remove chemicals, pump and treat contaminated groundwater and to prevent chemicals from traveling farther from the source (EPA 1999).

B. Site Visit

On December 13, 1996, Ms. Carolyn Voyles, FDOH visited the site and performed a windshield survey of the industrial area surrounding the site. She observed Terra Construction on the north, Florida Turnpike to the west, wetlands to the south and Atlas Waste Magic Inc. and a lumber supply company on the east. She observed a crane company occupying the FPR property. A locked chain link fence surrounded the property but, the gate had a gap that a person could slip through. Inside the fence, she observed two trailers, a shed, old FPR tanks in the containment structure, heavy equipment, old cars, tires, furniture and pluming pipes from the containment structure. She saw "no trespassing" signs posted on the fence. She noticed the ground inside the fence and surrounding areas was sandy with no grass or plant cover.

Ms. Voyles observed the area surrounding the FPR property as mixed residential and industrial. She observed the Twin Lakes Travel Park about one-quarter mile east of the fenced in area. She observed another residential area about one-quarter mile west of the fenced area (beyond the turnpike). She observed a human-made lake about one-quarter mile southeast of the fenced area and canals in the wetland area south of the fenced area.

On April 9, 1998, Randy Merchant and Julia Winter of the FDOH visited the site. They observed a chain-link fence topped with barbed wire around three sides of the property. The western side of the property boarding the Florida Turnpike did not appear to be fenced. The two gates to the property were locked. Mr. Merchant and Ms. Winter observed a shed, an abandoned house trailer, and an abandoned travel trailer on the property. They also observed a 3-foot high, "U"-shaped, concrete-block, retaining wall in the middle of the property. They observed 10 to 20 55-gallon drums. (Florida Department of Environmental Protection officials report these drums contain water and soil from the installation of ground water monitoring wells.) Mr. Merchant and Ms. Winter did not observe any evidence of trespass.

Mr. Merchant and Ms. Winter observed the area immediately around the property was highly industrial. Residents of the nearby mobile home park have municipal water but some use shallow wells for irrigation. Residents of duplex homes about 1.5 miles southeast of the property on SW 43rd Avenue have municipal water.

C. Demographics, Land Use and Natural Resource Use

<u>Demographics</u>

According to the 1990 census, the racial makeup of the area around the site is 81% white, 6% African-American, and 13% Hispanic. About 17,000 people live within a mile of the FPR property. Three public schools are within a mile of the property. The neighborhoods in this area are middle income. The median family income is about $28,500 (FDOH 1997).

In the area south of the New River Canal including the FPR property, we estimate there are about 4,700 people. Children aged 0-4 comprise 8.3% of the population and children aged 5-9 comprise about 6.7% of the population (Census tract 701; Bureau of Census, 1990).

In the area north of the New River Canal including the southern Peele-Dixie wellfield, we estimate there are about 6,260 people. Children aged 0-4 comprise almost 9% of the population and children aged 5-9 comprise about 8.3% of the population (Census tract 611; Bureau of Census, 1990).

Land Use

The area north of the New River Canal is residential. The eleven public supply wells the city took out of production due to contamination are in this part of the site. The public supply wells are between 110 and 125 feet deep. A recreational lake and a baseball field are north of the FPR property. A few homes may use private wells (Florida HRS, 1992).

The southern part of the site contains a trailer park and light industrial facilities. We do not know of any private wells in this part of the site. The city supplies public water for this area (FDOH, 1997). Recent development along Oaks Road includes of light industry, warehouses, and commercial office parks. The City of Davie and Broward County does not have any specific plans regarding future development of this area (EPA, 1997).

Natural Resource Use

Groundwater under the FPR property is contained in the Biscayne aquifer. Water in the Biscayne aquifer is first encountered about 10 feet below land surface. It is called the "water table". The upper portion of the Biscayne aquifer (from land surface to 50-60 feet below land surface) is located in sand. The lower portion of the Biscayne aquifer (greater than 50-60 feet below land surface) is located in limestone. The Peele-Dixie wellfield produces drinking water from the Biscayne aquifer for 54,000 people including some residents of Fort Lauderdale. The Biscayne aquifer is the only source of potable water in the region and is replenished by rainfall. Municipal and private residential wells tapping this aquifer are generally 90 to 100 feet deep (EPA 1997).

Groundwater flow in this area is strongly influenced by pumping activities in the wellfield. Peele Dixie wellfield pumping caused the groundwater to flow northward, but since the wellfield pumping decreased when the city took some contaminated wells out of production, groundwater flow is currently to the southeast.

D. Health Outcome Data

Health outcome data for the community around this site was not evaluated because health-outcome databases capable of searching for effects in such a small population size do not yield fruitful results. If future environmental investigations find larger areas of exposed populations, FDOH will evaluate health outcome data as appropriate.

Community Health Concerns

In response to a March 1996 EPA mail survey, one person expressed concern over carcinogenic chemicals in their water. At a September 10, 1997, EPA-sponsored public meeting, one person was concerned that her multiple chemical sensitivity was caused by exposure to the contamination in the water.

On June 12, 1998 the FDOH mailed 425 fact sheets to area residents The fact sheet summarized the draft assessment's conclusions and recommendations and announced the report's availability. It also gave notice of an EPA-sponsored public meeting on June 18, 1998. A FDOH representative presented the findings of the draft assessment at the public meeting and requested public comments. Two people were concerned about chemical sensitivity and asthma.

The FDOH solicited public comments on the draft version of this public health assessment at the EPA-sponsored public meeting through June 30, 1998. Stories regarding the draft assessment appeared in the Sun Sentinel on July 7, 1998, after the public comment period ended. The FDOH received no written comments during the public comment release.

Environmental Contamination and Other Hazards

In this section, we review the environmental data collected at the site, evaluate sampling adequacy, and identify contaminants with the greatest potential of harming health (contaminants of concern). We select contaminants of concern based on the following factors:

1. Concentrations of contaminants on and off the site.
We compare maximum concentrations at the site with published ATSDR standard comparison values. ATSDR's published standard comparison values are media-specific concentrations used to select contaminants for further evaluation. They are not used to predict health effects or to select clean-up levels. Contaminants with media concentrations above an ATSDR standard comparison value do not necessarily represent a health threat, but are selected for further evaluation. Contaminants with concentrations below an ATSDR standard comparison value are unlikely to cause illness and are not evaluated further, unless the community has specific concerns about the contaminant.

2. Field data quality, laboratory data quality, and sample design.

3. Community health concerns.

4. Completed and potential exposure pathways.

5. Toxicological Information.
We compare maximum concentrations with toxicological information including information from ATSDR toxicological profiles. These profiles are chemical specific and summarize toxicological information found it the scientific literature.

We used the following ATSDR standard comparison values (ATSDR 1998a), in order of priority, to select contaminants of concern.

1. EMEG–'Environmental Media Evaluation Guide'- ATSDR derived the EMEG from the ATSDR's minimal risk level (MRL) using standard exposure assumptions, such as drinking two liters of water per day and body weight of 70 kg (150 pounds) for adults. MRLs estimate the level of contamination that a person could be exposed to without increasing the risk of noncancerous illness.

2. CREG–'Cancer Risk Evaluation Guide'--ATSDR calculated CREGs from the EPA's cancer potency factors, a contaminant concentration estimated to result in no more than one excess case of cancer per million persons exposed over a lifetime.

3. RMEG–'Reference Dose Media Evaluation Guide'--ATSDR derived RMEGs from the EPA's reference dose (RfD) value, using standard exposure assumptions. RfDs estimate the maximum amount of a contaminant that a person could be exposed to without increasing the risk of noncancer illness.

Identifying a contaminant of concern does not necessarily mean that exposure to a contaminant will be associated with illnesses. Identification serves to narrow the focus of the public health assessment to those contaminants most important to public health. We evaluate the contaminants of concern in subsequent sections and decide whether exposure has public health significance.

Environmental sampling data for contaminants of concern is summarized in Tables 1 through 8 in the Appendix.

A. On-Site Contamination

Because groundwater contamination has public health implications extending beyond the FPR property and includes most of the south Peele-Dixie Well field, we defined the site as the area bounded by Peters Road on the north, US Highway 441 on the east, the Florida Turnpike on the west, and Oakes Road on the south (Figure 3). We subdivided the site into northern and southern areas using the New River Canal as the dividing line (Figures 4 and 5). Three groundwater exposure sources were analyzed: groundwater directly under the FPR property; groundwater outside of the FPR property but south of the New River Canal; and, groundwater outside of FPR property, north of the New River Canal (Figure 4 and 5). For soil and sediment contamination, we refer to the area outside and inside the fenced FPR property. We defined all soil and sediment contamination as on site.

Groundwater directly under the FPR Property

The source of groundwater contamination is spilled waste oil and volatile organic compounds (VOCs). Some lighter VOCs float on the top of the aquifer (water table). Other heavier VOCs sank to the bottom of the aquifer, or deep groundwater (EPA 1997).

The EPA sampled 40 wells within the fenced FPR property. The highest number and highest concentrations of contaminants were detected under the FPR property. Groundwater is discolored and has a distinct sweet odor indicative of solvents. Contaminated soil and chemicals floating on top of the water are the source of contamination and continue to dissolve in the groundwater thereby increasing concentrations since 1989 (EPA 1997). See Table 1 in the Appendix for the maximum levels of chemicals of concern and their screening values.

Groundwater Contamination outside of FPR Property

The EPA sampled 72 wells outside of the fenced property and one production well north and south of the New River Canal. Natural attenuation (breakdown) and a change in groundwater flow has reduced contamination of the Biscayne aquifer since 1992, but a distinct area of groundwater contamination still exists. The area of groundwater contamination is 8,000 feet long (more than 1½ miles). It is about 2,800 feet (or more than ½ mile), wide under FPR property (south of New River Canal). It is 1,300 feet wide (about 1/4 mile) under the wellfield, north of New River Canal. EPA's 1997 Remedial Investigation revealed groundwater in the Biscayne aquifer is currently migrating southeast - identical to the regional groundwater flow path.

Contamination was detected from the 190-200 foot sample in the lower portion of the Biscayne Aquifer, indicating that contamination has spread to the entire vertical extent of the aquifer, including the drinking water aquifer. The deeper contamination under FPR property migrated north to the Peele-Dixie wellfield. See Table 2 and 3 in the Appendix for the maximum levels of chemicals of concern and their screening values.

Surface Soil in the fenced FPR property (0-2 feet)

The EPA sampled 19 surface soil locations within the fenced area. See Table 4 in the appendix for the maximum levels of chemicals of concern and their screening values.

Subsurface Soil in the fenced FPR property (greater than 2 feet deep)

Soil contamination under the fenced property increases with depth. Soils greater than 4 feet below the surface, near the water table, are the most highly contaminated. Contaminants pool in the soil just above the water table and contribute to the groundwater contamination. See Table 5 in the appendix for the maximum levels of chemicals of concern and their screening values.

Surface Soil outside of the fenced FPR property (0-2 feet deep)

The EPA sampled five locations outside of the FPR property. Three samples were south and southeast of the fenced property and two samples were north of FPR in the southern portion of the Peele-Dixie wellfield. See Table 6 in the appendix for the maximum levels of chemicals of concern and their screening values.

Subsurface Soil outside of the fenced FPR property(Greater than 2 feet deep)

The EPA sampled five locations outside of the FPR property. See Table 7 in the appendix for the maximum levels of chemicals of concern and their screening values.

Sediment

The EPA sampled sediment in five locations in the drainage ditch outside of the fence. All sediment sampling locations receive runoff from the Florida Turnpike. They detected polycyclic aromatic hydrocarbons (PAHs) which are components of asphalt pavement and automobile oil and fuel. The EPA found low levels of metals and pesticides probably due to past agricultural activities in the area. See Table 8 in the appendix for the maximum levels of chemicals of concern and their screening values.

Surface Water

Most of the property runoff flows into SW 50th Street and can flow into wetlands south of the property. The wetlands discharge into the Florida Turnpike drainage system (channels, culverts and a borrow pit lake northwest of the property). The EPA collected five surface water samples from the drainage ditch between FPR property and the Florida Turnpike and two from the North New River Canal. The EPA did not find any organic chemicals, elevated metals, pesticides or polychlorinated biphenyls (PCBs).

Air

There is no air monitoring data. Therefore, FDOH cannot assess the public health threat from breathing site-related contaminants. We do not expect significant air contamination from soil because contamination is concentrated below the surface. We do not expect significant air contamination from groundwater into ambient outdoor air. We assessed the release of chemicals from household use of contaminated water using levels of contaminants in groundwater and modeling levels of chemicals released into the air.

B. Off-Site Contamination

We did not define any areas as off-site. We defined the site as the area bounded by Peters Road on the north, US Highway 441 on the east, the Florida Turnpike on the west, and Oakes Road on the south (Figure 3). The EPA defined the on-site area as the FPR property and all other areas as off-site.

C. Quality Assurance and Quality Control

In preparing this public health assessment, FDOH relied on the existing environmental data. We assumed consultants who collected and analyzed these samples followed adequate quality assurance and quality control measures concerning chain-of-custody, laboratory procedures, and data reporting. The completeness and reliability of the referenced information determines the validity of the analyses and conclusions drawn for this public health assessment.

In each of the preceding subsections, we evaluated the adequacy of the data to estimate exposures. We assumed that estimated data was valid because chemicals were found in the samples, but the exact amount was unknown. We did not include presumptive data because the exact amount and the identity of the chemicals was unknown. We did not carry tentatively identified compounds through the quantitative assessment due to uncertainty surrounding their identification and concentration (EPA 1989).

D. Physical and Other Hazards

Inside the FPR property are two trailers, a shed, old FPR tanks in the containment structure, heavy equipment, old cars, tires, furniture and pluming pipes from the containment structure. Potentially, a trespasser could fall on the debris; however, since the property is not near residential areas, this possibility seems remote.

To identify industrial facilities that could contribute to the contamination near this site, we searched the EPA Toxic Chemical Release Inventory (TRI) databases. The EPA developed TRI from the chemical release information (air, water, and soil) provided by certain industries. We found two nearby facilities, using ZIP codes, reporting releases from 1987-1993. These ZIP codes covers an area including FPR and the Peele-Dixie wellfield. However, these facilities did not report releases of the same chemicals found at FPR.

Pathway Analysis

The amount of contact that people have with hazardous substances is essential to assessing the public health significance of a chemical. Chemical contaminants in the environment have the potential to harm human health, but only if people have contact with those contaminants.

An exposure pathway is the way an individual comes into contact with contaminants. To decide whether nearby residents have contacted contaminants at the site, we looked at the human exposure pathways. An exposure pathway consists of five elements: The first element is an original source of contamination, like an industrial site. The second element is an environmental media, like air or groundwater, that moves contamination from the source to a place where people can contact the contamination. The third element is a place where people could contact the contaminated soil or groundwater, like topsoil or a drinking water well. The fourth element is the route of exposure, like drinking contaminated water or touching contaminated soil. The fifth element is a group of people who can potentially come in contact the contamination, like people living or working near the contaminated site. A completed exposure pathway includes all of these elements.

An exposure pathway is eliminated if at least one of five elements is missing and will never be present. For completed pathways, all five elements exist and exposure to a contaminant has occurred, is occurring, or will occur. For potential pathways, exposure to a contaminant could have occurred, could be occurring, or could occur in the future.

The public health findings for communities surrounding the FPR site are based on a review of past and present environmental data to identify past, present, and future exposure pathways. We identified exposure pathways that we determined are of public health significance in this assessment (See Table 9 in the Appendix).

A. Completed Exposure Pathways

Groundwater north of the New River Canal
Groundwater north of the New River Canal was a completed exposure pathway in the past. The Peele-Dixie wellfield is contaminated and there are seven private wells remaining in the area. Currently these homes are supplied with municipal water, but it is possible that they may still be using their private wells. Routes of exposure would include ingestion, dermal contact and inhalation of volatilized contaminants.

B. Potential Exposure Pathways

Groundwater north of the New River Canal

A future potential exposure pathway may result from contaminated groundwater north of the New River Canal. We do not expect people using municipal water to become exposed because it is unlikely the city will pump from the wells in the future if the aquifer is still contaminated. However, people may potentially become exposed to contaminated groundwater from drinking or washing with private well water in this area.

Groundwater south of the New River Canal

A future potential exposure pathway may result from contaminated groundwater south of the New River Canal from drinking or washing with private well water. Residences are over the contaminated aquifer and no restrictions exist to prevent property owners from drilling a well into the contaminated aquifer. Current and past potential exposure pathways do not exist because no private wells have been identified in this area.

Groundwater under the fenced FPR property

The aquifer under the property is contaminated but there are currently no drinking water wells on the property. However, there are no deed or other restrictions preventing new drinking water wells on the FPR property. If land use at the site changes in the future, the exposure pathway may also change..

Surface soil and sediment outside of the fenced FPR property

Future exposure pathways may result from contaminated surface soil outside of the FPR fenced property and contaminated sediment in the drainage ditch between the FPR property and the Florida Turnpike. There are no controls to limit human exposure to surface soil outside of the fenced area. If more people start living in the area, they may come in contact with the contaminated surface soil or sediment through ingestion or dermal contact

C. Eliminated Exposure Pathways

Subsurface soils (inside and outside of the fenced FPR property)

Subsurface soil is contaminated but currently there is no access to this soil. If, in the future, remediation activities or building activities disturb the subsurface soil, the exposure pathway may be completed.

Surface soil inside the fenced FPR property

The FPR property is fenced and there are not many people living close to the property that would trespass.

Surface Water
There is currently no contamination in the surface water.

Public Health Implications

A. Toxicological Evaluation

We estimated exposures that people might be exposed to by calculating a dose based on levels of contaminants in the various media (See Attachment 1).

<u>Health Guidelines</u>

To evaluate each contaminant of concern, we compared our estimate of exposure with EPA health guidelines. These health guidelines provide perspective on the relative significance of human exposure to contaminants at the site. These values alone, however, cannot determine the potential health threat of a particular chemical. If exposure estimates were less than the health guideline, the contaminant was not evaluated further. If exposure estimates exceeded the health guideline or if there was no health guideline, exposure estimates were compared with doses in human or animal studies.

For non-cancerous contaminants of concern, the estimated exposure doses were compared to health guidelines such as ATSDR's Minimal Risk Level (MRL's) and EPA's Reference Doses (RfD's; see Table 10). RfD's and MRL's are an estimate of daily exposure of a human being to a chemical that should not cause illness over a specified length of exposure (EPA 1989). When multiple MRLs were available for a specific chemical, we used long-term MRLs as the first preference followed by intermediate and acute MRLs.

We eliminated chemicals if they were below MRLs or well below levels reported it the toxicological literature. These chemicals included methyl butyl ketone (2-hexanone), dibutylphthalate, naphthalene, methylene chloride, aluminum, lead, copper, endrin aldehyde, chloromethane, 1,1,2,2-tetrachloroethane, bromodichloromethane, polycyclic aromatic hydrocarbons, 2-methylphenol (o-cresol), 1,1-dichloroethane, cobalt, tetrachloroethene (PCE), benzene and chloroethane (ATSDR 1992a,1999a, 1995a, 1993a, 1997a, 1997b, 1990a, 1996a, 1997f, 1996b, 1989, 1995b, 1992b, 1990b, 1992c, 1997d, 1995c, 1997e). We discussed the chemical further if it was above the MRL. We do not have enough information to assess the health effects of 2-methylnaphthalene, carbazole or dibenzofuran.

For cancerous contaminants of concern, FDOH compared estimates of exposure to EPA's cancer potency factors. We used a potency factor to estimate an upper-bound probability of an individual developing cancer from a lifetime of exposure to a particular level of a potential carcinogen (ATSDR 1992). The basis for estimating carcinogenic risk for humans based on animal studies is that there is no threshold exposure; the risk of cancer has some possibility at any and all exposures. Each exposure carries with it some degree of risk, regardless of how small. Therefore, 'safe exposure' is defined in terms of a reasonable or acceptable degree of risk (for example, one in one million) rather than zero (Williams 1985). We defined the degree of risk for a low increased risk as one in ten-thousand; the degree of risk for a moderate increased risk as one in one-thousand and the degree of risk for a high increased risk as one in one-hundred. When examining cancer risks, it is important to recognize the background cancer rate in United States is about 25% or 250 in one-thousand (ATSDR 1993b).

Trichloroethene (TCE)
Some residents in the area could be potentially exposed to TCE in the future through groundwater under the FPR property.

<u>Groundwater under FPR property</u>

Drinking and Breathing

A child's future potential exposure from drinking TCE contaminated groundwater from under the FPR property is 16 times <u>higher</u> than ATSDR's oral MRL. There is evidence that TCE causes birth defects (increased fetal heart abnormalities) in rats (ATSDR 1997 f). There is limited evidence that oral exposure to TCE in drinking water may cause birth defects in humans; those studies have mixed results. Therefore, we estimate that some children would be at an increased risk of developmental effects such as heart abnormalities if their mother's drink the contaminated groundwater under the FPR property. Since no one is using the groundwater under the FPR property, currently there is little risk of illnesses from groundwater.

A child's future potential exposure from breathing TCE released into indoor air from household use of groundwater under the FPR property is 360 times <u>higher</u> than ATSDR's inhalation MRL (ATSDR 1997 f). The MRL is based on neurological effects (decreased wakefullness during exposure and decreased heart rate) in rats. Our estimate is 5 times <u>lower</u> than the lowest exposure (dose) causing eye irritation, and neurological effects (headaches, fatigue and drowsiness) in people. Since TCE was used as an anesthetic in the past, it can depress the nervous system in people (ATSDR 1997 f). Therefore, we estimate that some residents may be at an increased risk of neurological effects if they use contaminated groundwater under the FPR property. Since no one is using the groundwater under the FPR property for household use, currently there is little risk of illnesses from groundwater.

<u>Cancer Risk</u>

The EPA classified TCE as a probable-possible human carcinogen based on animal studies. However, the American Conference of Governmental Industrial Hygienists

(ACGIH) classified TCE as "not suspected as a human carcinogen". The available studies are inconclusive. The EPA has not developed a potency factor to compare an adult's oral or inhalation exposure (ATSDR 1997 f). We are unable to determine the increased risk of cancer, if any, from TCE at FPR.

1,1,1-Trichloroethane
Some residents in the area could be potentially exposed to 1,1,1-trichloroethane in the future through groundwater under the FPR property.

Groundwater under the FPR property
Drinking Breathing

ATSDR does not have an oral MRL and EPA does not have an oral reference dose to compare drinking 1,1,1-trichloroethane contaminated groundwater. A child's exposure from potentially drinking contaminated groundwater under the site is more than 270 times lower than the lowest exposure (dose) causing adverse effects in humans (ATSDR 1995a). We do not expect illnesses from exposure to 1,1,1-trichloroethane by drinking groundwater under the FPR property.

ATSDR does not have an oral MRL and EPA does not have an oral reference dose to compare drinking 1,1,1-trichloroethane contaminated groundwater. A child's future exposure from potentially breathing 1,1,1-trichloroethane released into indoor air from household use of groundwater under the FPR property is more than 36 times higher than ATSDR's inhalation MRL (ATSDR 1995 d). The MRL is based on the lowest exposure dose causing adverse neurological effects (decreased psychomotor performance) in people. Since the MRL is based on adverse effects in people, we estimate some residents would be at an increased risk of neurological effects if they use 1,1,1-trichloroethane contaminated groundwater under the FPR property for household use. Since no one is using the groundwater under the FPR property, currently there is little risk of illnesses from 1,1,1-trichloroethane in groundwater under the FPR property.

Cancer Potential
At this time, it does not appear 1,1,1-trichloroethane exposure poses a clear cancer risk in animals. Studies available do not allow a definitive assessment of the risk of cancer in humans. The EPA classified 1,1,1- trichloroethane as "not classifiable" for carcinogenicity to humans. The EPA has not developed a potency factor to compare an adult's oral or inhalation exposure (ATSDR 1995 d). We are unable to determine the increased risk of cancer, if any, from 1,1,1-trichloroethane at FPR.

1,1-Dichloroethene
Some residents in the area could have been exposed to 1,1-dichloroethene in the past through groundwater north of the New River Canal. They could potentially be exposed to 1,1-dichloroethene in the future through groundwater south of the New River Canal and groundwater under the FPR property.

Groundwater south of the New River Canal

Drinking and Breathing

A child's potential exposure from drinking 1,1-dichloroethene-contaminated water south of the New River Canal is lower than ATSDR's oral MRL and EPA's reference dose. Therefore, we do not expect any adverse heath effects from children or residents drinking groundwater south of the New River Canal for household purposes.

A child's potential exposure from breathing 1,1-dichloroethene released into indoor air from household use of groundwater south of the New River Canal is slightly higher than ATSDR's inhalation MRL (ATSDR 1994a). The MRL is based on the lowest exposure dose that did not cause adverse effects in mice. Although our estimate of a child's exposure to 1,1-dichloroethene from breathing contaminated indoor air from household use of groundwater south of the New River Canal is above the ATSDR MRL, we do not expect any health effects. Our estimate of a child's exposure is 500 times less than the lowest exposure (dose) causing adverse effects (kidney damage) in mice. There is no data on kidney damage in people. Animal studies show prolonged exposure does not cause adverse kidney effects and short-term exposure effects are reversible. Although the effects of 1,1-dichloroethene in people are not known, they are probably minimal at concentrations generally experienced at hazardous waste sites (ATSDR 1994a). Therefore, we do not expect any adverse heath effects from children or residents using groundwater south of the New River Canal for household purposes.

Groundwater under the FPR property

Drinking and Breathing

A child's future potential exposure from drinking 1,1-dichloroethene-contaminated groundwater under the FPR property is 17 times higher than ATSDR's oral MRL (ATSDR 1994a). The MRL is based on the lowest exposure (dose) causing adverse effects (liver cell changes) in rats. We estimate that residents would be at an increased risk of liver damage if they use 1,1-dichloroethene contaminated groundwater under the FPR property. However, no one is drinking the groundwater under the FPR property. Currently there is little risk of illnesses from 1,1-dichloroethene in groundwater.

A child's future potential exposure from breathing 1,1-dichloroethene released into indoor air from household use of groundwater under the FPR property is about 122 times higher than ATSDR's inhalation MRL. The MRL is based on an exposure dose that did not cause adverse effects in animals. Our estimate of a child's exposure is only 4 times lower than the lowest exposure (dose) causing adverse effects (kidney damage) in mice (ATSDR 1994a). There is no data on kidney damage in people. Animal studies show prolonged exposure to low levels does not cause adverse kidney effects and short term exposure effects are reversible. Although the effects of 1,1-dichloroethene in people are not known, they are probably minimal at concentrations generally experienced at hazardous waste sites (ATSDR 1994a). Therefore, we do not expect any adverse heath effects from household use of groundwater under the FPR property.

Cancer Potential
The EPA classified 1,1-dichloroethene as a possible human carcinogen. 1,1-Dichloroethene has caused kidney cancer in mice (ATSDR 1994a).

Groundwater north of the New River Canal
FDOH estimates that some adults would be at a low increased risk of kidney cancer if they drank this 1,1-dichloroethene contaminated groundwater over a lifetime. We estimate that some adults would be at a low increased risk of kidney cancer if they breathe 1,1-dichloroethene released into the air from household use of this groundwater over a lifetime.

Groundwater south of the New River Canal
We estimate that some adults would potentially be at a low increased risk of kidney cancer if they drank this 1,1-dichloroethene contaminated groundwater over a lifetime. We estimate that some adults would be at a moderate increased risk of kidney cancer if they use this 1,1-dichloroethene contaminated groundwater for household use over a lifetime.

Groundwater under the FPR Property
We estimate that some adults would potentially be at a high increased risk of kidney cancer if they drink this 1,1-dichloroethene contaminated groundwater over a lifetime. We estimate that some adults would be at a very high increased risk of kidney cancer if they use this 1,1-dichloroethene contaminated groundwater for household use over a lifetime.

1,2-Dichloroethene
Some residents in the area could be potentially exposed to 1,2-dichloroethene (total) and cis-1,2-dichloroethene in the future through groundwater from under the FPR property. We discuss exposure to 1,2-dichloroethene (total) as a worst case scenario since it was detected in higher levels in the groundwater.

Groundwater under the FPR Property

Drinking and Breathing

A child's future potential exposure from drinking 1,2-dichloroethene (total) contaminated groundwater under the FPR property is 21 times higher than ATSDR's oral MRL for chronic exposure to trans-1,2-dichloroethene (the most conservative isomer screening value). The MRL is based on an exposure dose that did not cause adverse effects in animals. There are no human studies available, however, our estimate was 22 times lower than the lowest exposure (dose) causing adverse effects (liver and circulatory system effects) in rats (ATSDR 1996c). Even though our exposure dose is lower than the dose causing adverse effects in animals, people may be exposed to additional 1,2-dichloroethene from other sources from the urban environment around FPR increasing the actual dose they receive. At high levels, it is reasonable to expect liver and cardiovascular effects among humans (ATSDR 1996c). Based on animal and human studies and the potential for additional exposure, we estimate that some residents might be at an increased risk of liver and circulatory system effects if they use 1,2-dichloroethene (total)-contaminated groundwater from under the FPR property. Since no one is using the groundwater under the FPR property, currently there is little risk of illness from groundwater.

A child's future potential exposure from breathing 1,2-dichloroethene (total) released into indoor air from household use of groundwater under the FPR property is 337 times higher than ATSDR's MRL. The MRL is based on studies showing adverse effects such as immunological effects (fatty accumulation in Kupfeer cells, decreased leukocyte count), liver effects (slight fatty accumulation), and respiratory effects (slight capillary hyperemia and alveolar system distention) in rats (ATSDR 1996c). Adverse effects to the liver and respiratory system can be expected in people at higher doses, but the data on immunological effects is too limited to draw any conclusions. Even though our dose is slightly lower than the dose that caused adverse effects in animals, people may be exposed to additional 1,1-dichloroethene from other sources like the urban environment around FPR increasing the actual dose they receive. Based on animal and human studies and the potential for additional exposure, we estimate that some residents would be at an increased risk of adverse immunological, liver and respiratory effects if they use 1,2-dichloroethene (total) contaminated groundwater under the FPR property for household use. Since no one is using the groundwater under the FPR property, currently there is little risk of illness from groundwater.

Cancer Potential

Cancer effects of 1,2-dichloroethene have not been studied in humans or animals. The EPA has not developed a potency factor to compare an adult's oral or inhalation exposure (ATSDR 1996c). We are unable to determine the increased risk of cancer, if any, from 1,2-dichloroethene (total) at FPR.

Vinyl Chloride
Some residents in the area could have been exposed to vinyl chloride in the past through groundwater north of the New River Canal. Some residents in the area could be potentially exposed to vinyl chloride in the future through groundwater north and south of the New River Canal groundwater from under the FPR property.

Groundwater north of the New River Canal

Drinking and Breathing

A child's exposure from drinking vinyl chloride-contaminated water north of the New River Canal is 70 times higher than ATSDR's oral MRL. The MRL is based on the lowest exposure dose causing adverse liver effects (basophilic foci of cellular alteration) in rats (ATSDR 1997 g). Changes in liver cellular structure have been observed in people expose to vinyl chloride via inhalation. Based on these human studies and animals studies supporting liver damage when vinyl chloride is eaten, we estimate that residents would be at an increased risk of liver damage if they drink vinyl chloride contaminated groundwater north of the New River Canal.

A child's exposure from breathing vinyl chloride released into indoor air from using contaminated groundwater north of the New River Canal is slightly higher than ATSDR's inhalation MRL. Although our estimate of a child's exposure to vinyl chloride is above the ATSDR MRL, we do not expect any health effects. Our estimate was almost 118,000 times lower than the lowest exposure (dose) that did not cause adverse effects in people (ATSDR 1997 g).

Groundwater south of the New River Canal

Drinking and Breathing

A child's potential exposure from drinking vinyl chloride-contaminated water south of the New River Canal is 260 times higher than ATSDR's oral MRL. The MRL is based on the lowest exposure dose causing adverse liver effects (basophilic foci of cellular alteration) in rats (ATSDR 1997 g). Changes in liver cellular structure have been observed in people expose to vinyl chloride via inhalation. Based on these human studies and animals studies supporting liver damage when vinyl chloride is given orally, we estimate that residents would be at an increased risk of liver damage if they drink vinyl chloride-contaminated groundwater south of the New River Canal.

A child's potential exposure from breathing vinyl chloride released into indoor air from using groundwater south of the New River Canal is 4 times higher than ATSDR's inhalation MRL. Although our estimate of a child's exposure to vinyl chloride is above the ATSDR MRL, we do not expect any health effects. Our estimate was almost 32,000 times lower than the lowest exposure (dose) that did not cause adverse effects in people (ATSDR 1997 g).

Groundwater under the FPR Property

Drinking and Breathing

A child's future potential exposure from drinking vinyl chloride contaminated groundwater under the FPR property is 14,000 times higher than ATSDR's oral MRL. The MRL is based on the lowest exposure dose causing adverse liver effects (basophilic foci of cellular alteration) in rats (ATSDR 1997 g). Changes in liver cellular structure have been observed in people expose to vinyl chloride via inhalation. Based on these human studies and animals studies supporting liver damage when vinyl chloride is given orally, we estimate that residents would be at an increased risk of liver damage if they use vinyl chloride contaminated groundwater under the FPR property.

A child's potential exposure from breathing vinyl chloride released into indoor air from using groundwater under the FPR property is almost 230 times higher than ATSDR's inhalation MRL. The MRL is based on studies showing liver effects (increased liver weight) in rats. Our estimate was almost 600 times lower than the lowest exposure (dose) that did not cause adverse effects in people. We do not expect adverse effects from vinyl chloride released into the air from household use of groundwater under the FPR property.

Cancer Potential

The EPA classified vinyl chloride as a human carcinogen. A large number of studies have reported a greater than expected incidence of a rare type of cancer, angiosarcoma of the liver, among workers breathing air contaminated with vinyl chloride. In addition, these workers have had increased cancer of the brain, central nervous system, lung and respiratory tract, and the lymphatic/hematopoietic system. Although no human studies examine cancer from ingesting vinyl chloride, animal studies support cancer from ingesting vinyl chloride (ATSDR 1997 g).

Groundwater north of the New River Canal

We estimate that some adults would be at a moderate increased risk of cancer if, in the past, they drank this vinyl chloride contaminated groundwater over a lifetime. We estimate that some adults would be at a moderate increased risk of cancer if, in the past, they used this vinyl chloride contaminated groundwater for household use over a lifetime.

Groundwater south of the New River Canal

We estimate that some adults would be at a moderate increased risk of cancer in the future if they drink or use this vinyl chloride contaminated groundwater over a lifetime.

Groundwater under the FPR property

We estimate that some adults would be at a very high increased risk of cancer in the future if they drink this vinyl chloride contaminated groundwater over a lifetime. We estimate that some adults would be at a very high increased risk of cancer in the future if they use this vinyl chloride contaminated groundwater for household use over a lifetime.

Toluene
Some residents in the area could be potentially exposed to toluene in the future through groundwater under the FPR property.

Groundwater under the FPR property

Drinking and Breathing

A child's future potential exposure from drinking toluene-contaminated water under the FPR property is lower than EPA's reference dose (ATSDR 1994b). Exposures below a reference dose are unlikely to cause adverse effects, therefore, we do not expect any adverse effects from toluene by drinking groundwater under the FPR property.

A child's future potential exposure from breathing toluene released into indoor air from household use of groundwater under the FPR property is 2 times higher than ATSDR's inhalation MRL. The MRL is based on the lowest exposure dose causing adverse effects (lower test scores for spacial tests) in humans (ATSDR 1994b). Since the is based on adverse effects observed in people, we estimate that some residents would be at an increased risk of adverse neurological effects if they use toluene-contaminated groundwater under the FPR property. Since no one is using the groundwater under the FPR property, currently there is little risk of illness from groundwater.

Cancer Potential

None of the available data suggest that toluene is carcinogenic (ATSDR 1994b). We are unable to determine the increased risk of cancer, if any, from toluene at FPR.

3,4-Dimethylphenol
Some residents in the area could be potentially exposed to 3,4-dimethylphenol in the future through groundwater under the FPR property.

Groundwater under the FPR property

Drinking and Breathing

A child's future potential exposure from drinking 3,4-dimethylphenol contaminated groundwater under the FPR property is 2 times higher than EPA's reference dose. The reference dose is an estimate of daily exposure to the human population, including sensitive subgroups like children and the elderly, which will not cause illness. The reference dose is based on the lowest exposure dose that did not cause adverse effects in rats. Although our estimate of a child's exposure to 3,4-dimethylphenol from FPR is above the reference dose, we do not expect any illnesses. Our estimate was 7000 times lower than the lowest exposure dose causing adverse effects (blood pressure changes and body weight and pathological changes in liver kidney, liver and spleen) in rats (IRIS 1998).

We do not have enough information to assess potential exposures from breathing indoor air with 3,4-dimethylphenol contaminated groundwater (Risk Assistant 1994).

Cancer Potential
The EPA has not evaluated 3,4-dimethylphenol for evidence of human carcinogenic potential. We are unable to determine the increased risk of cancer, if any, from 3,4-dimethylphenol at FPR (IRIS 1998).

Manganese
Some residents in the area could have been exposed to manganese in the future through groundwater under the FPR property.

Groundwater under the FPR property
Drinking
A child's future potential exposure from drinking manganese contaminated groundwater under the FPR property is slightly higher than EPA's reference dose for manganese in water (ATSDR 1997h). Although our estimate of an adult's exposure to manganese is above the MRL, we do not expect any illnesses. Our estimate was about 10 times lower than the lowest exposure dose causing adverse effects (mild neurological signs) in people (ATSDR 1997h).

Cancer Potential
The information on the carcinogenic potential of manganese is limited and the results are difficult to interpret. The results of animal studies and human studies suggest the potential for cancer in humans is probably low. The EPA classified manganese as not classifiable as to its carcinogenicity to humans. They have not developed a potency factor to compare an adult's oral or inhalation exposure (ATSDR 1997h). We are unable to determine the increased risk of cancer, if any, from manganese at FPR.

B. Children's Health

There are about 1800 children under the age of nine living in the area bounded by Peters Road on the north, US Highway 441 on the east, the Florida Turnpike on the west, and Oakes Road on the south (Figure 3). We do not know how many children live in the homes on S.W. 77th Terrace with private wells. About 700 children under age nine live in the area south of the New River Canal. It is unlikely children could come into contact with contaminated surface soil both on FPR property and outside FPR property because the site is surrounded by large highways and the main property is fenced. Since children represent a sensitive subpopulation, we used children specific exposure scenarios to estimate the potential threat (See Toxicological Evaluation Section).

C. Community Health Concerns Evaluation

In this subsection, we address the community health concerns in terms of our findings presented in the Toxicological Evaluation subsection above.

Although we interpret the health concerns in terms of our toxicological findings, it is important to remember that many individual symptoms, conditions, and illnesses reported by the community have more than one cause. Similarly, any one suggested cause may be associated with many different illnesses. It is not the intention of this review to link a particular case of an illness with exposure to site chemicals. Our findings in this subsection suggest health problems that are possible, instead of health problems that are likely.

We address community health concerns as follows:

1. A few residents were concerned about poor water quality and carcinogens in municipal (Peele-Dixie wellfield) water.

The city is currently not using the southern Peele-Dixie wellfield to serve the area and it is reasonable to expect they will not use the wellfield in the future if the is aquifer still contaminated. Past exposures are unlikely because water from the south Peele-Dixie wellfield is combined with groundwater from many different wells before treatment and distribution. Therefore, the concentration of volatile organic compounds in contaminated wells were likely diluted before distribution.

2. One person was concerned about multiple chemical sensitivity.

There are no set, well defined symptom or diagnostic criteria in the medical community for "multiple chemical sensitivity." Multiple chemical sensitivity has been cited for over 100 common problems, ranging from headaches to dizziness to trouble sleeping. There are no verifiable, reliable, or valid measurements a person can undergo to determine whether or not a person suffers from this ailment. Until there is more research on multiple chemical sensitivity, we are unable to draw any conclusions about its association with the Florida Petroleum Reprocessors site.

3. One person was concerned about asthma.

Asthma primarily affects the bronchial tube system. Asthma is a very treatable disease either by eliminating the causes or with appropriate treatment. The substances producing asthma vary widely, as do some of the immunologic responses (Williams 1985). Without more definitive information on exposure, it is very difficult to draw any conclusions about its association with the Florida Petroleum Reprocessors site.

Conclusions

We classify the Florida Petroleum Reprocessors Superfund hazardous waste site as an indeterminate potential public health hazard because people could be exposed to contaminated groundwater in the future.

1. People living over the area of contaminated groundwater north of the New River Canal could install new private wells or use existing private wells and use contaminated groundwater in the future. If people used the contaminated groundwater, they might be at an increased risk of cancer and non-cancer illnesses.

2. We classify the site as a past public health hazard because residents living in the seven homes on SW 44th Terrace (north of the New River Canal) using private wells were exposed to contaminated groundwater. People are at risk of increased cancer and non-cancer illnesses due to 1,1-dichloroethene and vinyl chloride in the groundwater.

3. The levels of volatile organic chemicals in the municipal water supply from the South Peele-Dixie wellfield are unlikely to have caused any illness. Since the city of Ft. Lauderdale combines the groundwater from many wells before treatment and distribution, the concentrations of the volatile organic chemicals from the contaminated wells were likely diluted well below levels of health concern. In addition, as soon as the city identified contaminated municipal wells, they stopped pumping, reducing the duration of any possible exposure.

4. If, in the future, people living over the area of contaminated groundwater south of the New River Canal install private wells, they could be exposed to the contaminated groundwater. People are at risk of increased cancer and non-cancer illnesses due to 1,1-dichloroethene and vinyl chloride in this groundwater. Currently no one is using the contaminated groundwater south of the New River Canal. Use of private wells south of the area of concern (Oakes Road) is not known.

5. If people install private wells on the FPR property in the future, they could be exposed to the contaminated groundwater. If they are exposed to the contaminated groundwater, they would be at risk for both cancerous and non-cancerous illnesses from 1,1-dichloroethene, 1,1,1-trichloroethane, vinyl chloride, TCE, 1,2-dichloroethene, and toluene.

6. The extent of groundwater contamination south of FPR (Oakes Road) is unknown.

7. The fenced FPR property lacks hazardous waste warning signs.

Recommendations

The recommendations and advice in this public health assessment are based upon the referenced data and information. Additional data could alter these recommendations.

1. Identify and sample private wells north of New River Canal to determine if they are contaminated. Prohibit domestic use of any contaminated private wells in the area north of the New River Canal. Government officials should prohibit domestic use of the contaminated groundwater unless it meets all state and federal drinking water standards. Prohibit new wells in the area of contamination.

2. Continue to inform residents north of the New River Canal of the potential public health threat resulting from use of contaminated private wells.

3. Continue to sample municipal water for volatile organic chemicals on a regular basis.

4. Survey the area south of FPR property to make sure there are no private wells. Prohibit new wells in the area of contamination.

5. Prohibit any domestic use of the groundwater under the FPR property until it meets all state and federal drinking water standards.

6. Determine the extent of groundwater contamination south of FPR (Oakes Road).

7. Maintain security and post hazardous waste warning signs around FPR property.

The conclusions and recommendations in this report are based on the information reviewed. If additional information becomes available, we will evaluate it to determine what, if any, additional actions are necessary. The conclusions and recommendations in this report are site specific and are not necessarily applicable to other sites.

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Certification

This Petroleum Products Corporation Health Assessment was prepared by the Florida Department of Health and Rehabilitative Services 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 assessment was begun.

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

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Appendix

Figure 1
State Map Showing Location of Broward County (Source FDOH Files)

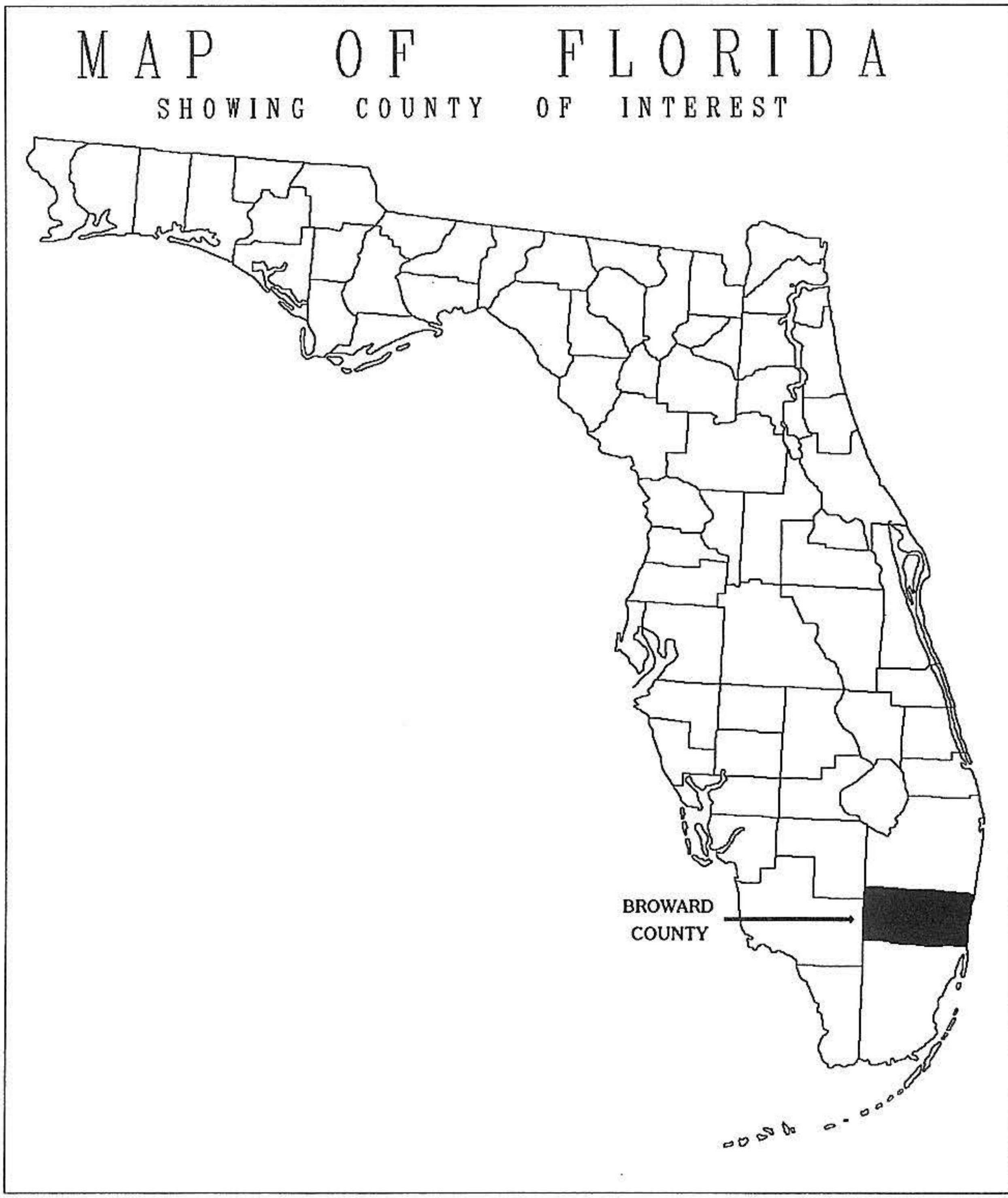

Figure 2. Location of Florida Petroleum Reprocessors Superfund National Priorities List Site in Broward County (Source: FDOH Files)

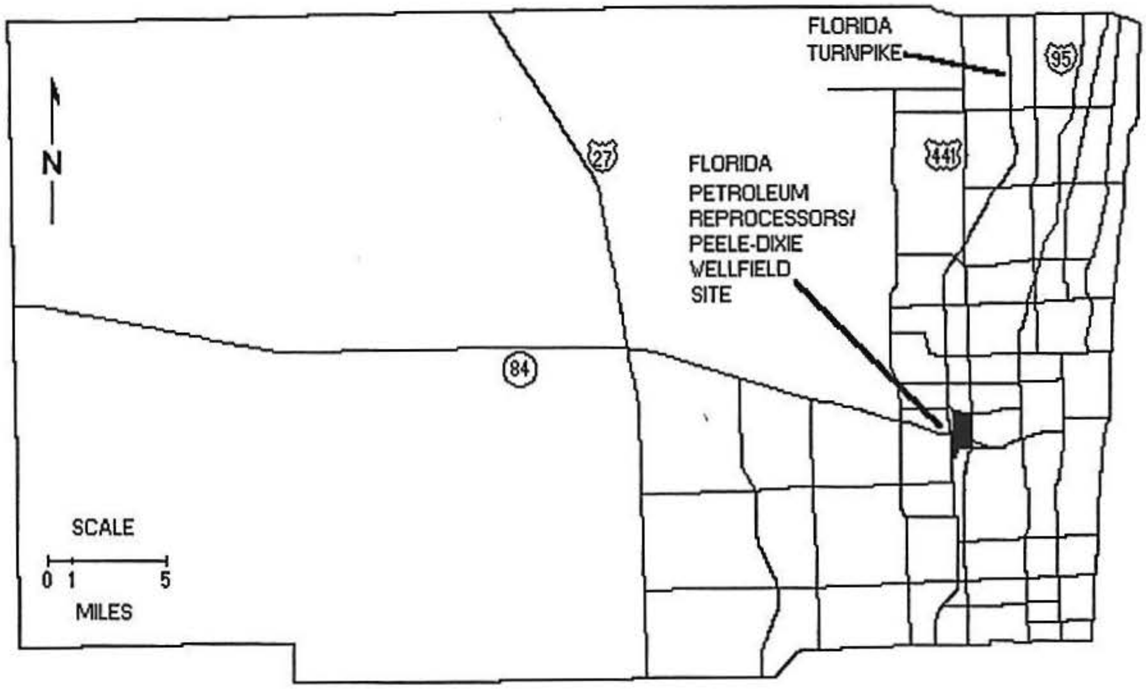

Figure 3. FPR Site as defined by Florida Department of Health Source: FDOH Files)

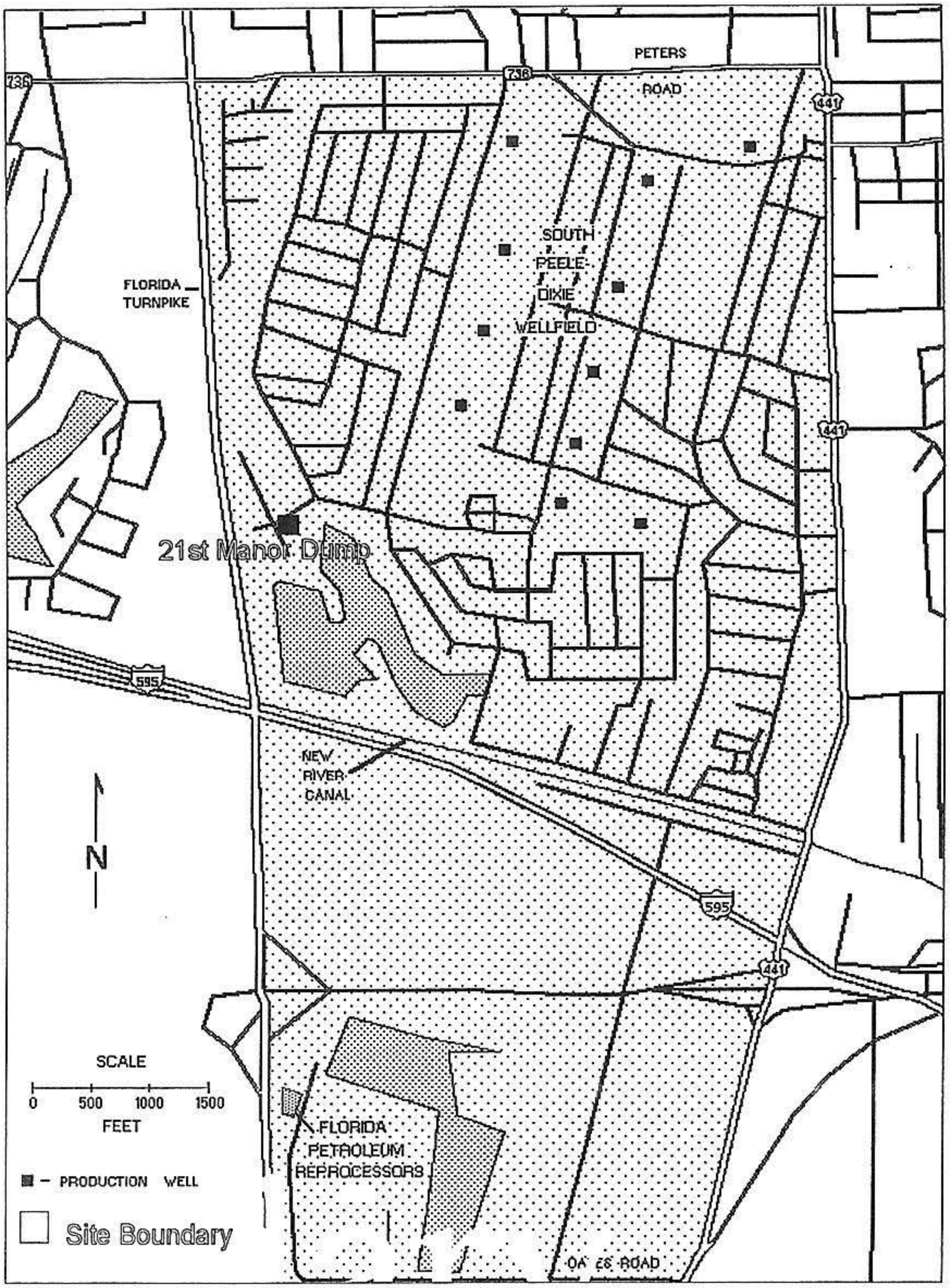

Figure 4. Soil Sample Locations Outside of the Fenced FPR Property (Source: FDOH Files)

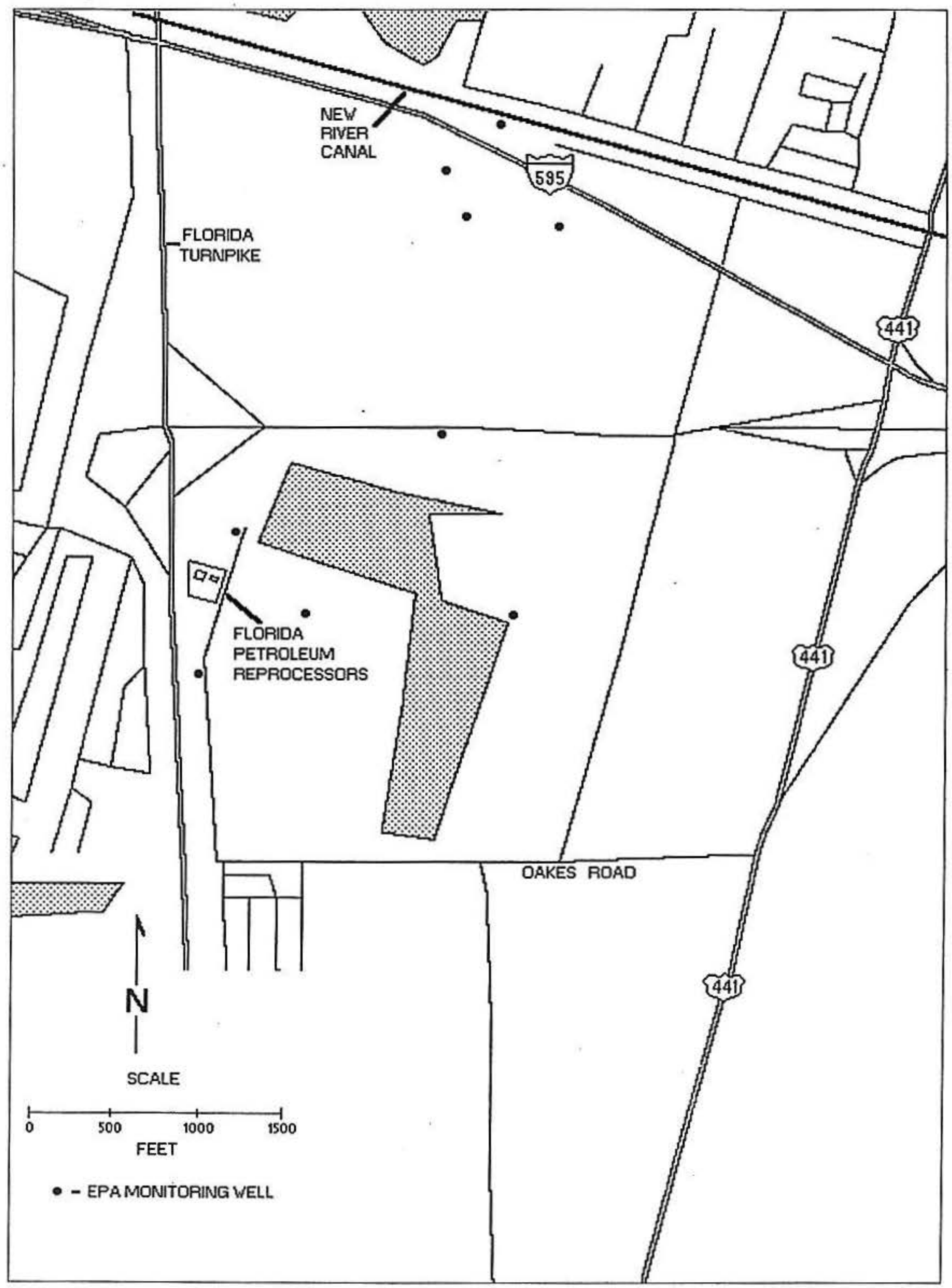

Figure 5. FPR Site as Defined for Groundwater Contamination North of New River Canal and Detail of Location of Residences Currently Using Private Wells (Source: FDOH Files)

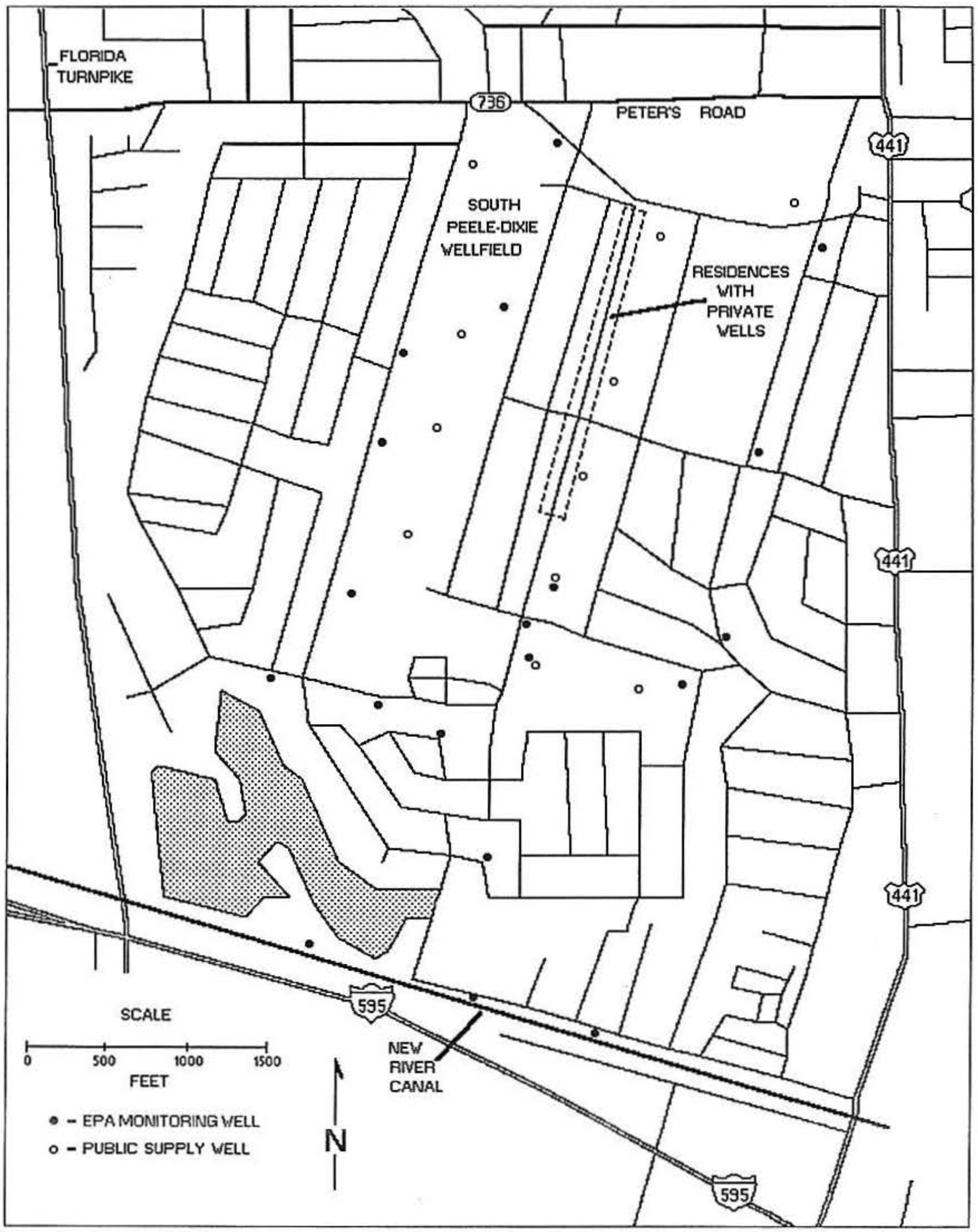

Table 1
Groundwater under FPR Property Chemicals of Concern

Compounds	Maximum ug/L	Screening Value ug/L	Source of Screening Value	Retain Chemical For Further Evaluation
PCE	260	0.7	CREG	YES
TCE	200,000	3	CREG	YES
1,1,1-Trichloroethane	140,000	200	LTHA	YES
1,1-Dichloroethene	9,800	0.06	CREG	YES
1,1-Dichloroethane	30,000	none		YES
1,2-Dichloroethene Total	270,000	2000	Int. EMEG Child	YES
cis-1,2-Dichloroethene	260,000	3000	Int. EMEG Child	YES
Vinyl Chloride	18,000	0.2	EMEG Child	YES
Toluene	7,600	200	Int. EMEG Child	YES
Chloroethane	6,900	none		YES (Default)
Benzene	14	1	CREG	YES
3,4-Dimethylphenol	160	none		YES (Default)
2-Methylnaphthalene	170	none		YES (Default)
2-Methylphenol (o-cresol)	25	none		YES (Default)
Phenanthrene	8	none		YES (Default
Manganese	410	50	RMEG Child	YES

EMEG: ATSDR's Chronic Environmental Media Evaluation Guidelines for a child
RMEG: Reference Dose Media Evaluation Guide for a child
CREG: Cancer Risk Evaluation Guide for a one in a million excess cancer risk
Int. EMEG ATSDR's Intermediate duration exposure Chronic Environmental Media Evaluation Guidelines for a child
ug/l: microgram per liter
ND/NA = no data, not detected, or not analyzed for

Table 2
Groundwater outside of FPR Property, North of New River Canal
Chemicals of Concern

Compounds	Maximum ug/L	Screening Value ug/L	Source of Screening Value	Retain Chemical For Further Evaluation
Manganese	230	50		YES
Bromodichloromethane	1	0.6	CREG	YES
Chloromethane	4	3	LTHA	YES
1,1-Dichloroethene	30	0.06	CREG	YES
1,1-Dichloroethane	27	none		YES
1,2-Dichloroethene Total	160	2000	Int EMEG Child	YES
Chloroethane	10	none		YES
Vinyl Chloride	90	0.2	Chronic EMEG Child	YES

Table 3
Groundwater outside of FPR Property, South of New River Canal
Chemicals of Concern

Compounds	Maximum ug/L	Screening Value ug/L	Source of Screening Value	Retain Chemical For Further Evaluation
1,1-Dichloroethene	94	0.06	CREG	YES
TCE	6	3	CREG	YES
1,1-Dichloroethane	83	none		YES
Vinyl Chloride	330	0.2	Chronic EMEG Child	YES
Benzene	10	1	CREG	YES
Manganese	210	50	RMEG Child	YES
Bromodichloromethane	14	0.6	CREG	YES
1,1,2,2-Trichloroethane	4	0.2	CREG	YES

Table 4
Surface Soil inside the fenced FPR Property
Chemicals of Concern

Compounds	Max mg/kg	Screening Value mg/kg	Source of Screening Value	Retain Chemical for Further Evaluation
2-Methylnaphthalene	3.7	none		YES (Default)
TCE	80	60	CREG	YES
1,1,1-Trichloroethane	87	none		YES (Default)
Phenanthrene	2.1	none		YES (Default)
1,1-Dichloroethane	2.4	none		YES (Default)
Cobalt	1.1	none		YES (Default)
Copper	19	none		YES (Default)
Lead	300	none		YES (Default)
Benzo(a)pyrene	0.11	0.1	CREG	YES
Benzo(bk)flouranthene	0.1	none		YES (Default)
Benzo(ghi)perylene	0.18	none		YES (Default)
Chrysene	0.074	none		YES (Default)

mg/kg: milligram per kilogram

Table 5
Subsurface Soil inside the fenced FPR Property
Chemicals of Concern

Compounds	Max mg/kg	Screening Value mg/kg	Source of Screening Value	Retain Chemical for Further Evaluation
PCE	120	10	CREG	YES
TCE	810	60	CREG	YES
1,1,1-Trichloroethane	490	none		YES (Default)
1,1-Dichloroethane	13	none		YES (Default)
2-Methylnaphthalene	28	none		YES (Default)
Phenanthrene	12	none		YES (Default)
Chloromethane	0.78	none		YES (Default)
Cobalt	1.3	none		YES (Default)
Copper	240	none		YES (Default)
Lead	1600	none		YES (Default)
Methylene Chloride	2	none		YES (Default)
Naphthalene	15	none		YES (Default)
Benzo(bk)flouranthene	0.11	none		YES (Default)
Benzo(ghi)perylene	0.058	none		YES (Default)
Chrysene	0.07	none		YES (Default)

Table 6
Surface Soil outside the fenced FPR Property Chemicals of Concern

Compounds	Max mg/kg	Screening Value mg/kg	Source of Screening Value	Retain Chemical for Further Evaluation
2-Methylnaphthalene	3.7	none		YES (Default)
Phenanthrene	2.1	none		YES (Default)
Endrin Aldehyde	0.0018	none		YES (Default)
Cobalt	0.52	none		YES (Default)
Copper	9.9	none		YES (Default)
Lead	22	none		YES (Default)
Carbazole	0.22	none		YES (Default)
Dibenzofuran	0.065	none		YES (Default)
Benzo(a)pyrene	2.4	0.1	CREG	YES
Benzo(bk)flouranthene	3.8	none		YES (Default)
Benzo(ghi)perylene	0.8	none		YES (Default)
Chrysene	1.5	none		YES (Default)
Dibenzo(ah)anthracene	0.26	none		YES (Default)
Indeno(cd)pyrene	0.81	none		YES (Default)
Benzo(a)anthracene	1.5	none		YES (Default)

Table 7
Subsurface Soil Outside the Fenced FPR Property
Chemicals of Concern

Compounds	Maximum mg/kg	Screening Value mg/kg	Source of Screening Value	Location of Maximum
Phenanthrene	0.044	none		YES (Default)
Copper	1.3	none		YES (Default)
Lead	2.5	none		YES (Default)
Copper	1.3	none		YES (Default)
Chrysene	0.053	none		YES (Default)

Table 8
Sediment Data

Compounds	Max mg/kg	Screening Value mg/kg	Source of Screening Value	Retain Chemical for Further Evaluation
Phenanthrene	0.74	none		YES (Default)
Cobalt	1.5	none		YES (Default)
Copper	64	none		YES (Default)
Lead	85	none		YES (Default)
Aluminum	4600	none		YES (Default)
Benzo(a)pyrene	1.4	0.1	CREG	YES
Benzo(bk)flouranthene	3.6	none		YES (Default)
Benzo(ghi)perylene	0.6	none		YES (Default)
Chrysene	1.4	none		YES (Default)
Indeno(cd)pyrene	0.6	none		YES (Default)
Dibutylphthalate	0.23	none		YES (Default)

Table 9
Completed Exposure Pathway Elements

Pathway Name	Exposure Pathway Elements					Time
	Source	Environmental Media	Point of Exposure	Route of Exposure	Exposed Population	
Groundwater north of New River Canal	FPR property	Groundwater	Private wells	ingestion inhalation	residents	past
Surface soil inside fenced FPR property	FPR property	surface soil	surface soil on FPR property	ingestion inhalation	residents and workers	past, current, future
Surface soil outside fenced FPR property	FPR property, roadways	surface soil	residences, businesses, undeveloped land	ingestion inhalation	residents	past, current, future
Sediment	FPR property, roadways	sediment	ditch	ingestion inhalation	residents	past, current, future

Table 10
Comparison Values

Compounds	Oral MRL mg/kg-d (ATSDR)	Inhalation MRL ppm (ATSDR)	Reference Dose mg/kg-d (IRIS 1998)	Potency factor (mg/kg-d)-1 (IRIS 1998)	Unit Risk (ug/m3)-1 (IRIS 1998)
PCE	0.05	0.04	0.01		
TCE	0.2	0.1			
1,1,1-Trichloroethane		0.7			
1,1-Dichloroethene	0.009	0.02	0.009	0.6	5E-5
1,1-Dichloroethane					
1,2-Dichloroethene Total	0.2 (trans)	0.2			
cis-1,2-Dichloroethene	0.3	0.2			
Vinyl Chloride	0.00002	0.03		2.3	8.4E-5****
Toluene		1	0.2		
Chloroethane		15			
Benzene		0.004		0.29	8.3E-6
3,4-Dimethylphenol			0.001		
2-Methylnaphthalene					
2-Methylphenol (o-cresol)	0.05		0.05		
Phenanthrene					
Manganese	0.005**	0.00004 mg/m3	0.14		
Bromodichloromethane	0.02			0.62	

Compounds	Oral MRL mg/kg-d (ATSDR)	Inhalation MRL ppm (ATSDR)	Reference Dose mg/kg-d (IRIS 1998)	Potency factor (mg/kg-d)-1 (IRIS 1998)	Unit Risk (ug/m3)-1 (IRIS 1998)
1,1,2,2-Tetrachloroethane	0.04	0.4		0.2	5.8E-5
Chloromethane		0.05	0.004*		
Endrin Aldehyde	0.0003***				
Cobalt		0.00003 mg/m3			
Copper					
Lead					
Aluminum					
Methylene Chloride	0.06	0.03		0.0075	4.7E-7
Naphthalene	0.02	0.002			
Carbazole					
Dibenzofuran					
Benzo(a)pyrene				7.3	
Benzo(bk)flouranthene					
Benzo(ghi)perylene					
Chrysene					
Dibenzo(ah)anthracene					
Indeno(cd)pyrene					
Benzo(a)anthracene					
Dibutylphthalate					
2-Hexanone					

*EPA Office of Water reference dose

**Reference dose for water consumption as opposed to manganese in food

***MRL for endrin

**** Calculated from inhalation potency factor 2.98 (mg/kg/d)-1

Attachment 1

Developing an Exposure Dose

Drinking Contaminated Groundwater

We estimated an exposure dose of each contaminant a person might receive by drinking the contaminated groundwater (Risk Assistant, 1994). We used the maximum contaminant level found in groundwater. Children represent a sensitive subpopulation and doses that are protective of children are most likely protective of adults. For non-cancerous compounds, we estimated the exposure dose that an elementary school child, weighing 24 kilograms (50 pounds), would receive drinking about a half liter of contaminated groundwater a day, 250 days a year for 6 years. For carcinogenic compounds, we estimated an exposure dose that an adult, weighing 70 kilograms (150 pounds), would receive over a lifetime (70 years) of drinking 2 liters contaminated groundwater a day.

Household Use of Contaminated Groundwater

Contaminants in domestic water may evaporate from various water sources in the home and contaminate indoor air. People may be exposed to contaminants by breathing contaminated air. To estimate indoor air concentrations, we used the maximum contaminant level found in groundwater. For non-carcinogenic compounds, we estimated an exposure dose an elementary school child would receive from breathing contaminated indoor air, 9 hours a day, 250 days a year. We estimate children breath at a rate of 0.76 cubic meters an hour. For carcinogenic compounds, we estimated an exposure dose an adult would receive from breathing contaminated indoor air, 21 hours a day, 350 days a year for 70 years (Risk Assistant, 1994).

Exposure to Contaminated Soil

Exposure to surface soil is currently a completed exposure pathway and exposure to subsurface soil is a potential exposure pathway. We assume children consume a significant amount of soil, relative to adults, as a result of outdoor play. When children have access to areas of contaminated soil, they may incidentally eat the soil resulting in a significant source of exposure to contaminants. Even though adults are less likely to eat significant amounts of soil, soil ingestion remains a potentially significant source of exposure to environmental contaminants through hand-mouth activities, smoking and eating. We estimated an exposure dose of each contaminant a child (for potential non-cancer effects) and adult (for potential carcinogenic effects) might receive by coming into contact with contaminated soil.

For non-cancerous compounds in soil, we estimated the exposure dose that an elementary school child, weighing 24 kilograms (50 pounds), would receive by incidentally eating 200 milligrams of contaminated soil 350 days a year for 6 years.

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