PRELIMINARY Public Health Assessment for

BROWARD COUNTY-21ST MANOR DUMP
FT. LAUDERDALE, BROWARD COUNTY, FLORIDA
CERCLIS NO. FLD981930506
DECEMBER 15, 1992

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
PUBLIC HEALTH SERVICE
Agency for Toxic Substances and Disease Registry

PRELIMINARY PUBLIC HEALTH ASSESSMENT

BROWARD COUNTY-21ST MANOR DUMP

FT. LAUDERDALE, BROWARD COUNTY, FLORIDA

CERCLIS NO. FLD981930506

Prepared by:

Florida Department of Health and Rehabilitative Services
Under Cooperative Agreement With the
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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SUMMARY

The 21st Manor Dump site is adjacent to Meadowbrook Elementary School in Ft. Lauderdale, Broward County, Florida. It was originally a borrow pit or natural depression where uncontrolled dumping occurred. No records exist describing what was disposed of in the dump. Following the construction of the elementary school, Broward County filled the remainder of the dump with dirt. The county then rerouted the street, 21st Manor, so that it now runs approximately through the middle of the dump area, and extended the school grounds over a portion of the site.

Low levels of dieldrin are present in the subsurface soil on the site. However, no surface soil samples (0 - 3 inches deep) have been analyzed to allow us to assess the exposure potential to children. Children or other individuals may also have come in contact with contaminated soil and water when the dump was open.

On-site shallow groundwater contains arsenic, chromium, lead and vanadium. Off-site groundwater is contaminated with vinyl chloride, trichloroethene, 1,1-dichloroethene, 1,2-dichloroethene, and chloroform, but this contamination does not appear to be site-related. However, this off-site contamination is a public health concern and has resulted in the closure of eight municipal supply wells and seven private wells within a one mile radius of the site. Broward County has extended the main public water supply lines, making them accessible to the 74 residences still using private wells. Those households with condemned wells and the majority of the others have been connected to the system.

Based on the available information, we classify the Broward County-21st Manor Dump site as an indeterminate public health hazard. There is insufficient information about surface soil contamination on-site and on the school grounds for us to assess the exposure potential to children. No deep groundwater sampling has been conducted directly under the site to enable us to determine if off-site groundwater contamination is coming from the dump.

In consultation with the Health Activities Recommendation Panel, we recommend that on- and off-site surface (0-3 inches deep) soil samples and on-site deep groundwater samples be analyzed for site-related contaminants. In addition, public health education is needed to assist community members whose wells were contaminated in understanding their potential for exposure and possible health effects. We propose to develop appropriate educational materials for distribution to the community and to evaluate additional sampling data to determine the public health significance of any contaminants found.

BACKGROUND

The Florida Department of Health and Rehabilitative Services (Florida HRS), in cooperation with the Agency for Toxic Substances and Disease Registry (ATSDR), will evaluate the public health significance of this site. Specifically, Florida HRS will determine whether health effects are possible and will recommend actions to reduce or prevent them. ATSDR, located in Atlanta, Georgia, is a federal agency within the U.S. Department of Health and Human Services and is authorized by the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended, to conduct public health assessments at hazardous waste sites.

A. Site Description and History

The 21st Manor Dump Superfund site is located on property owned by the Broward County School Board in Ft. Lauderdale, Broward County, Florida (Figs. 1-3, Appendix A). Currently, there is no visible evidence of the dump. The original pit, which constitutes the dump site itself, has been filled to grade. The grounds of the Meadowbrook Elementary School extend over a portion of this filled-in pit and a road, 21st Manor, now runs approximately through the middle of the site (Fig. 4, Appendix A).

The site was originally a borrow pit or natural depression roughly rectangular in shape and approximately 1,100 feet long, 250 feet wide and 30 feet deep. It was used from the 1950's to the late 1960's for the disposal of trash and other debris. It was classified as an open dump by the Broward County Public Health Unit (Broward CPHU) which exercised no control over the dumping. Dumping by unknown parties occurred at the site and no records were kept describing what was disposed of in the dump. The dump was closed by the Broward CPHU in the late 60's.

The 18 acres which included the dump were purchased by the Broward County School Board in April 1957 for the construction of a new elementary school. In May 1957, a State Department of Education site inspector noted a "water hole or pond" along the south and west edges of the property and suggested filling and/or fencing the area (1). However, there are no records indicating whether any action was taken to implement these suggestions. Meadowbrook Elementary School was constructed in 1958 and the "water hole" was used as a dump by the the School Board for the disposal of brush, grass clippings, dirt and concrete construction debris, and by unknown individuals for dumping trash and other materials.

In 1968 the school board began to fill the rest of the dump pit with clean sand to bring it up to grade with the surrounding area. Filling of the pit was completed with additional loads of sand added in 1974 and 1975. Although the site was posted and the dump pit filled, unauthorized dumping at the site continued as late as November 1976. In 1978-79 the county moved the road, 21st Manor,

from just north of the dump to approximately the middle of the site. In December 1979, the Broward County School Board Safety Department received complaints from parents concerning a large pool of standing water (200 feet long, 40 feet wide, 4.5 feet deep) which formed in the southwest corner of the site during periods of heavy rainfall. The Safety Department continued to receive complaints until the problem was corrected in June, 1981 when the low area was filled and brought up to grade (2).

While testing a piece of analytical equipment in December 1986, the Ft. Lauderdale City Utilities Department discovered 1,2-dichloroethene in a public supply well approximately 500 feet east of the dump. As a result of this discovery, the Florida Department of Environmental Regulation (FDER) (3) and the Broward CPHU (4) conducted more extensive surveys and found widespread groundwater contamination in the area surrounding the dump.

Because of concern over the groundwater contamination and the possibility that the contaminants may be originating from the site, 21st Manor Dump is being evaluated for possible inclusion in the National Priorities List (NPL) of Superfund cleanup sites. The NPL is maintained by the U.S. Environmental Protection Agency (EPA) and lists those hazardous waste sites that require cleanup action under the "Superfund" law, the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA). This Public Health Assessment is being prepared by Florida HRS for ATSDR as part of the evaluation process.

B. Site Visit

Mr. Bruce Tuovila and Mr. Randy Merchant, Florida HRS; Mr. Willard Galbreath, Broward CPHU; and Mr. Mark Commiskey, Broward County School Board visited the site on December 11, 1991. There is no visible evidence of the presence of the dump and no signs, fences or other markers to distinguish the dump area from the elementary school grounds. In this section, the term "dump area" will be used to indicate the area encompassed by the now filled-in dump pit. Although we did not observe any children in the school yard during our visit, Mr. Commiskey indicated that children play on the entire school grounds, part of which extends over the dump area. A chain link fence surrounds the school grounds; however, it does not restrict access to the dump area. We observed that both the school grounds and the dump area are covered by well-maintained grass. In addition, the school grounds contain some shrubs and shade trees and the dump area is covered in part by the road, 21st Manor. The entire area is relatively flat with no large depressions, mounds or evidence of dump material.

During our drive-through tour of the neighborhood surrounding the site, we observed that "backyard" repair of motor vehicles occurs, and Mr. Commiskey and Mr. Galbreath indicated that small-scale repair businesses of this nature have operated in the past. No

information was available concerning how many such businesses may exist. Adjacent to a municipal supply well located about 500 feet east of the site is a fenced and locked enclosure that contains two 50 x 100 foot aeration impoundments. According to Mr. Commiskey, the Ft. Lauderdale City Utilities Department used them for several months in 1987 as percolation impoundments. Groundwater pumped from the well was aerated, collected in the impoundments and allowed to percolate back into the aquifer in an attempt to reduce levels of 1,2-dichloroethene and other volatile organic compounds. When the effort proved ineffective, the well was shut down and use of the impoundments was discontinued. Approximately 600 feet north of the site is a long, narrow wooded area that contains four additional municipal supply wells. Although this is not a recreational area (the area is posted) we observed evidence, such as tracks, trails and paths, that the area is trespassed regularly. Mr. Commiskey indicated that older children occasionally operated various recreational vehicles in the area. Approximately three-quarters of a mile north of the site is a light industrial/ commercial area containing various businesses such as auto repair shops and a tool-and-die company.

C. Demographics, Land Use, and Natural Resource Use

Demographics

Approximately 13,000 persons live within a one mile radius of the 21st Manor Dump site. The neighborhood surrounding the site is low- to middle-income and the homes are generally well maintained. The Meadowbrook Elementary School has approximately 470 students in grades K-5. There are two other public schools, which provide instruction to exceptional students, within one mile northeast of the site with a total student population of about 480 (5).

Land Use

The area within one mile of the site is mostly residential with one light industrial/commercial area approximately three-quarters of a mile to the north and another approximately one-half mile to the south across the New River Canal. A city waterworks facility is approximately three-quarters of a mile to the northeast of the site. There is a 500 foot wide wooded area that starts about 600 feet north of the site and extends north for approximately one-half mile. This area contains four public supply wells and is not used for agricultural purposes.

About two dozen homes border the site on the south and west. Those to the south are within 50 feet of the site; those to the west are approximately 200 feet across a street. Groundwater flow in the vicinity of the site is to the south and there are no potable wells in this direction. Beginning approximately 600 feet north of the site and extending north about one-half mile are 74 homes that use private wells for drinking water. The eleven municipal supply

wells of the South Dixie Wellfield, of which the eight closest to the site are now closed, are also within one mile to the north and east of the site. The Meadowbrook Elementary School borders the site to the north, and part of the school grounds extend over the site. There is a recreational lake approximately 400 feet southwest of the site and other recreational facilities, such as ball parks, are located approximately 2000 feet to the north (6).

Natural Resource Use

The Biscayne Aquifer is the sole source of potable water in this area. Rainfall averages 60 inches per year and is the primary source of recharge for the aquifer which is considered to be at land surface with some thin, water permeable, surficial deposits present. The Biscayne Aquifer is primarily composed of sand in Broward County and has a total thickness of approximately 165 feet. Municipal and private wells are generally 90-100 feet deep in this area. Natural groundwater flow at the site is southward. However, considerable local influence on flow direction may have resulted when pumping occurred in the South Dixie Wellfield (3).

There is a recreational lake approximately 400 feet southwest of the site. A water ski school is located at the lake which is also used for recreational swimming and boating. The North Fork of the New River, which runs northwest-southeast about 2000 feet south of the site, serves for flood control and also provides ocean access for pleasure craft.

D. Health Outcome Data

Guided by community health concerns, HRS epidemiologists reviewed the state cancer registry for the 33317 zip code. This zip code includes neighborhoods around 21st Manor Dump (Fig. 2, Appendix A). Although there have been no allegations or indications of elevated birth defect rates near this site, HRS epidemiologists also reviewed the state birth defects registry. The cancer data base covers cancers reported from 1981 to 1987 and the birth defects data base covers birth defects reported from 1980 to 1982. Neither the Broward CPHU nor the Broward County School Board have conducted any independent health studies or investigations in this area. We will discuss the results of these reviews in the Public Health Implications, Health Outcome Data Evaluation section.

COMMUNITY HEALTH CONCERNS

Residents of the community which borders the site have expressed little concern over possible health effects from the dump site itself. However, from telephone conversations with community members, county public health officials and the Broward County School Board Safety Department, we are aware that residents of the neighborhood around the site who have obtained their drinking water from private wells are concerned about possible unspecified health effects to themselves and their children from drinking contaminated water.

ENVIRONMENTAL CONTAMINATION AND OTHER HAZARDS

In this section, we will review the environmental data collected at this site. We will evaluate the adequacy of the sampling that has been conducted, select contaminants of concern, and list the maximum concentration and frequency of detection of the contaminants found in various media. The maximum concentrations found will then be compared to background levels and to standard comparison values. The following comparison values are used in the data tables:

1. CREG--Cancer Risk Evaluation Guide--calculated from EPA's cancer slope factors, is the contaminant concentration that is estimated to result in one excess cancer in a million persons exposed over a lifetime.

2. EMEG--Environmental Media Evaluation Guide--derived from ATSDR's Minimal Risk Level (MRL), which provides a measure of the toxicity of a chemical, is the estimate of daily human exposure to a chemical that is likely to be without an appreciable risk of adverse effects, generally for a period of a year or longer.

3. LTHA--Lifetime Health Advisory for Drinking Water--is EPA's estimate of the concentration of a contaminant in drinking water at which adverse health effects would not be anticipated to occur over a lifetime of exposure. LTHAs provide a safety margin to protect sensitive members of the population.

4. MCL--Maximum Contaminant Level--is the contaminant concentration that EPA considers protective of public health over a 70 year lifetime at an exposure rate of 2 liters of water per day. MCLs are regulatory concentrations.

5. Chronic RfD--Reference Dose--is EPA's estimate of the daily exposure to a contaminant that is unlikely to cause adverse health effects.

We have reviewed the environmental sampling data and selected the following chemicals as contaminants of concern:

Arsenic	Chromium	Lead
Vanadium	Chloroform	1,1-Dichloroethene
1,2-Dichloroethene	Trichloroethene	Vinyl chloride
Dieldrin		

For chromium, the analysis reports did not specify whether chromium metal (chromium 0), trivalent chromium (chromium III) or hexavalent chromium (chromium VI) was detected. Since chromium VI is the most toxic form of the metal, we feel it is most protective of public health to assume the presence of chromium VI and have used the appropriate comparison values throughout this assessment.

We selected these contaminants based on the following factors:

1. Concentrations of contaminants on- and off-site.

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

3. Comparison of on-site and off-site concentrations with health assessment comparison values for (1) noncarcinogenic endpoints and (2) carcinogenic endpoints.

4. Community health concerns.

In addition, twenty other chemicals were detected in various media at this site. There are Toxicological Profiles available for eight of these chemicals. For these eight, there is insufficient human health data available to determine their public health significance. These chemicals are listed in Appendix B. For the remaining twelve chemicals, there are no toxicological data available upon which to base an assessment of their public health significance. These chemicals are listed in Appendix C.

Identification of a contaminant of concern in this section does not necessarily mean that exposure will cause adverse health effects. Identification serves to narrow the focus of the public health assessment to those contaminants most important to public health. When selected as a contaminant of concern in one medium, we have also reported that contaminant in all other media. We will evaluate these contaminants in subsequent sections and determine whether exposure has public health significance.

To identify industrial facilities that could contribute to the contamination near the 21st Manor Dump site, we searched the 1987, 1988, and 1989 EPA Toxic Release Inventory (TRI) data base. EPA developed TRI from the chemical release information (air, water, and soil) provided by certain industries. The TRI search revealed the presence of one industrial facility in the 33317 zip code area,

which includes the site, that had reported releases between 1987 and 1989. Erickson Industries (now Lilly-Ram Industries, Erickson Div.) is located at 2355 SW 66th Terrace in Davie approximately two miles west of the site. They estimated the release of 37,803 pounds of styrene into the air between 1987 and 1989 and 2,666 pounds of methyl methacrylate into the air between 1988 and 1989. Because of the distance from the site and the direction of the prevailing winds, which are generally from the east and southeast, releases from this facility are unlikely to have produced any contamination on or around the 21st Manor Dump site.

In this assessment, the contamination that exists **on** the site will be discussed first, separately from the contamination that occurs **off** the site.

A. On-site Contamination

For the purposes of this evaluation, "on-site" will be defined as the area within the original dump. This area is entirely within the property owned by the Broward County School Board and includes a major portion of the road, 21st Manor, and a limited area within the southern part of the Meadowbrook Elementary School yard (Fig. 4, Appendix A)

We compiled data in this subsection from the following EPA reports: the 1988 site screening investigation, the 1989 soil sampling study, and the 1990 listing site inspection (6, 7, 8). Additional data were compiled from a 1988 report by the Florida Department of Environmental Regulation (FDER) of the Peele-Dixie Wellfield contamination in Broward County (3).

On-Site Surface Soil

EPA has not collected any surface soil samples (0 - 3 inches) from this site. Since no surface soil data exist on the site, a significant data gap exists in assessing the site's public health implications.

On-Site Subsurface Soil

As part of the reports listed above, EPA contractor NUS Corporation collected a total of 28 subsurface (1.5 to 30 feet deep) samples from various locations on the site (Fig. 5, Appendix A). On-site concentrations of arsenic and chromium were at levels below background samples. Dieldrin in on-site samples was found above the levels found in background soil samples and at a concentration exceeding the Cancer Risk Evaluation Guide (CREG).

Table 1. Maximum Concentrations in On-Site Subsurface Soil

Contaminants of Concern	Maximum Concentration (mg/kg)	Total # positive* / Total # samples	Background Concentration (mg/kg)	Comparison Value (mg/kg)	Source
Arsenic	1.5	0/5	10	15	RfD
Chromium	13	0/28	27	250	RfD
Lead	130	0/28	10	NONE	----
Vanadium	4.7	0/19	2.8	NONE	----
1,1-Dichloroethene	ND	0/5	ND	.058	CREG
1,2-Dichloroethene	ND	0/5	ND	----	----
Chloroform	NA	----	----	----	----
Trichloroethene	ND	0/5	ND	----	----
Vinyl chloride	NA	----	----	----	----
Dieldrin	.065	2/12	ND	.044	CREG

NA - not analyzed
ND - not detected
mg/kg - milligrams per kilogram
* - concentration exceeds at least one health-based comparison value
RfD - Reference Dose
CREG - ATSDR Cancer Risk Evaluation Guide
Sources: 1988 EPA Site Screening Investigation (6)
1990 EPA Listing Site Inspection (8)

On-Site Shallow Groundwater

As part of the site screening investigation and listing site inspection, EPA contractor NUS Corporation sampled the shallow groundwater (20-30 feet deep) from a total of ten temporary wells on the site (Fig. 6, Appendix A). Three off-site temporary wells were sampled to establish background conditions. The Florida Department of Environmental Regulation (FDER) analyzed two samples from an on-site monitoring well as part of their 1988 Peele-Dixie Wellfield contamination investigation. On-site shallow groundwater was contaminated with arsenic, chromium, lead and vanadium. Lead concentrations in both background and on-site samples exceeded the Florida MCL for drinking water. Concentrations of arsenic, chromium and vanadium were above the background in all samples in

which they were detected.

Table 2. Maximum Concentration in On-Site Shallow Groundwater

Contaminants of Concern	Maximum Concentration (ug/L)	Total # positive* / Total # samples	Background Concentration (ug/L)	Comparison Value (ug/L)	Source
Arsenic	29	2/11	ND	3	RfD
Chromium	300	3/11	ND	50	RfD
Lead	120	8/11	39	15	FL MCL
Vanadium	120	2/11	ND	20	LTHA
1,1-Dichloroethene	ND	0/13	ND	.058	CREG
1,2-Dichloroethene	ND	0/14	ND	70	LTHA/ MCL
Chloroform	ND	0/8	ND	5.7	CREG
Trichloroethene	ND	0/14	ND	5	MCL
Vinyl chloride	ND	0/4	ND	0.2	EMEG
Dieldrin	NA	----	----	----	----

NA - not analyzed
ND - not detected
ug/L - micrograms per liter
* - concentration exceeds at least one health-based comparison value
LTHA - EPA Lifetime Health Advisory
CREG - ATSDR Cancer Risk Evaluation Guide
EMEG - ATSDR Environmental Media Evaluation Guide
RfD - EPA Reference Dose
MCL - EPA Maximum Contaminant Level
FL MCL - Florida Maximum Contaminant Level
Sources: 1988 EPA Site Screening Investigation (6)
1988 FDER Peele-Dixie Wellfield Contamination (3)
1990 EPA Listing Site Inspection (8)

On-Site Deep Groundwater

EPA has not collected any deep groundwater (>60 feet) samples from the site. Since no deep groundwater data exist on the site, a significant data gap exists in assessing the site's public health implications.

B. Off-site Contamination

For this assessment, "off-site" will be defined as the area outside of the dump itself, including the remainder of the Meadowbrook Elementary School property (Fig. 4, Appendix A). We compiled data in this subsection from the following EPA reports: the 1988 site screening investigation, the 1989 soil sampling study, and the 1990 listing site inspection (6, 7, 8). Data were also compiled from the 1988 Florida DER Peele-Dixie Wellfield Contamination study and the results of private well sampling conducted by the Broward CPHU from 1987 to 1991 (3, 4).

During the site visit, we observed several small businesses in the area, notably a tool and die company. Mr. Commiskey and Mr. Galbreath provided anecdotal information concerning the existence of backyard automobile and motorcycle repair businesses in the neighborhood surrounding the site. Although these and other activities may have contributed to the groundwater contamination in the area, it is not possible to confirm or quantify any contamination originating from these sources.

Chloroform, trichloroethene, 1,1-dichloroethene, vinyl chloride, and 1,2-dichloroethene occur in off-site groundwater. The drinking water aquifer in the area surrounding the site is sufficiently contaminated that many of the municipal supply wells in the South Peele-Dixie Wellfield and several private wells in an area north of the site have been closed or condemned (Fig 7, Appendix A).

Off-Site Surface Soil

EPA has not collected any surface soil samples (0 - 3 inches) from around this site. Since no off-site surface soil data exist, a significant data gap exists in assessing the site's public health implications.

Off-Site Subsurface Soil

As part of its 1990 listing site inspection, EPA contractor NUS Corporation collected nine subsurface (1.5-30 feet deep) soil samples from the area immediately surrounding the dump site (8) (Fig. 8, Appendix A). Analysis of these samples included dieldrin, lead, chromium and vanadium. All concentrations were below levels of concern.

Table 3. Maximum Concentrations in Off-Site Subsurface Soil

Contaminants of Concern	Maximum Concentration (mg/kg)	Total # positive* / Total # samples	Background Concentration (mg/kg)	Comparison Value (mg/kg)	Source
Arsenic	NA	----	----	----	----
Chromium	4.6	0/5	27	250	RfD
Lead	19	0/5	10	NONE	----
Vanadium	3.5	0/2	2.8	NONE	----
1,1-Dichloroethene	NA	----	----	----	----
1,2-Dichloroethene	NA	----	----	----	----
Chloroform	NA	----	----	----	----
Trichloroethene	NA	----	----	----	----
Vinyl chloride	NA	----	----	----	----
Dieldrin	.0011	0/2	ND	.044	CREG

NA - not analyzed
ND - not detected
mg/kg - milligrams per kilogram
* - concentration exceeds at least one health-based comparison value
RfD - EPA Reference Dose
CREG - ATSDR Cancer Risk Evaluation Guide
Sources: 1990 EPA Listing Site Inspection (8)

Off-Site Groundwater

For its December 1988 wellfield contamination study, the Florida Department of Environmental Regulation sampled 21 monitoring, 1 public and 38 private wells located within a radius of 1 mile of the dump site (3). Fourteen of these wells were screened in the shallow groundwater (<60 feet) and the rest were screened in the deep groundwater (>60 feet). Also, between 1987 and 1991, the Broward CPHU monitored nine private drinking water wells along SW 44th Terrace, which is within one-half mile north of the site (4). All of these wells were screened in the deep groundwater. Not all wells were analyzed for all contaminants and some wells were sampled more than once (Fig. 9, Appendix A).

Concentrations of 1,1-dichloroethene and 1,2-dichloroethene above comparison values were detected in two of the fourteen shallow wells and thirteen of the forty-six deep wells analyzed by FDER. In addition, seven of the nine deep drinking water wells along SW 44th Terrace, which were analyzed by the Broward CPHU, contained concentrations of 1,1-dichloroethene and vinyl chloride above comparison values. Background concentrations of these contaminants in both the shallow and deep groundwater samples were below detection limits.

Table 4. Maximum Concentration in Off-Site Shallow Groundwater

Contaminants of Concern	Maximum Concentration (ug/L)	Total # positive* / Total # samples	Background Concentration (ug/L)	Comparison Value (ug/L)	Comparison Value Source
Arsenic	ND	0/5	ND	3	RfD
Chromium	1	0/6	ND	50	RfD
Lead	7	0/6	39	15	FL MCL
Vanadium	12	0/6	ND	20	LTHA
1,1-Dichloroethene	68	3/19	ND	.058	CREG
1,2-Dichloroethene	310	2/31	ND	70	LTHA
Chloroform	16	1/29	ND	5.7	CREG
Trichloroethene	6	1/30	ND	5	MCL
Vinyl chloride	25	1/6	ND	.2	EMEG
Dieldrin	NA	----	----	----	----

NA - not analyzed
ND - not detected
ug/L - micrograms per liter
* - concentration exceeds at least one health-based comparison value
FL MCL - Florida Maximum Contaminant Level
Sources: 1988 FDER Peele-Dixie Wellfield Contamination (3)
1990 EPA Listing Site Inspection (8)

Table 5. Maximum Concentration in Off-Site Deep Groundwater

Contaminants of Concern	Maximum Concentration (ug/L)	Total # positive* / Total # samples	Background Concentration (ug/L)	Comparison Value (ug/L)	Source
Arsenic	ND	0/6	ND	3	RfD
Chromium	ND	0/6	ND	50	RfD
Lead	ND	0/6	ND	15	FL MCL
Vanadium	ND	0/6	ND	20	LTHA
1,1-Dichloroethene	24	79/140	ND	.058	CREG
1,2-Dichloroethene	252	23/143	ND	70	LTHA
Chloroform	110.7	2/87	ND	5.7	CREG
Trichloroethene	9	1/130	ND	5	MCL
Vinyl chloride	4.9	10/29	ND	.2	EMEG
Dieldrin	NA	----	----	----	----

NA - not analyzed
ND - not detected
ug/L - micrograms per liter
* - concentration exceeds at least one health-based comparison value
LTHA - EPA Lifetime Health Advisory
CREG - ATSDR Cancer Risk Evaluation Guide
EMEG - ATSDR Environmental Media Evaluation Guide
RfD - EPA Reference Dose
FL MCL - Florida Maximum Contaminant Level
Sources: 1988 FDER Peele-Dixie Wellfield Contamination (3)
1987-1991 Broward CPHU Private Well Monitoring (4)

C. Quality Assurance and Quality Control

We requested, but were unable to obtain, a data review summary from EPA. We assume these data are valid, however, since the environmental samples were collected and analyzed by governmental agencies or their contractors. In preparing this public health assessment, we relied on the information provided by these agencies and assumed that adequate quality assurance and quality control measures were followed with regard to chain-of-custody, laboratory procedures, and data reporting. The validity of the analysis and conclusions drawn for this public health assessment are determined by the completeness and reliability of the referenced information.

In each of the preceding On- and Off-Site Contamination subsections, we evaluated the adequacy of the data to estimate exposures. We assumed that estimated data (J) and presumptive data (N) were valid. This second assumption errors on the side of public health by assuming that a contaminant exists when actually it may not exist.

Although quality assurance and quality control information is unavailable for the Broward CPHU private well sampling data, there are no indications that these data are not reliable. Samples collected and analyzed for all other referenced studies in this public health assessment were performed according to the Engineering Support Branch Standard Operating Procedures and Quality Assurance Manual, U.S. Environmental Protection Agency, Region IV, Environmental Services Division, April 1, 1986.

D. Physical and other Hazards

No physical hazards were observed during the site visit and none were mentioned in any of the site-related documents reviewed for this public health assessment.

PATHWAYS ANALYSES

To determine whether nearby residents are exposed to contaminants migrating from the site, we evaluated the environmental and human components of exposure pathways. Exposure pathways consist of five elements: a source of contamination, transport through an environmental medium, a point of exposure, a route of human exposure, and an exposed population.

An exposure pathway can be eliminated if at least one of the five elements is missing and will never be present. We categorize exposure pathways that are not eliminated as either completed or potential. For completed pathways, all five elements exist and exposure to a contaminant has occurred, is occurring, or will occur. For potential pathways, at least one of the five elements is missing, but could exist. For potential pathways, exposure to

a contaminant could have occurred, could be occurring, or could occur in the future.

A. Completed Exposure Pathway

Private Well Pathway

Past and current exposure pathways are possible from contaminated groundwater present in private wells. Approximately 74 residences within one-half mile north of the site use private wells as their source of drinking water. The only completed exposure pathway involves those residents who use private well water for drinking, cooking and other domestic purposes.

The contaminants present in these wells do not occur in the shallow groundwater on-site and are not believed to be site-related. Seven of the nine wells sampled by the Broward CPHU between 1987 and 1991 contained contaminants such as 1,1-dichloroethene and vinyl chloride. Although the Broward CPHU provided alternate sources of drinking water, contaminated water was still used for other purposes, such as showering and laundering.

We do not know how many of the remaining 65 private wells are contaminated. However, since municipal supply wells within a few hundred feet of these private wells are contaminated and they all draw on the same aquifer, it appears likely that other private wells are contaminated. Therefore, until we have better data, we will assume that all private wells are contaminated.

We do not know how many persons use private wells. However, these persons would be exposed to 1,1-dichloroethene and vinyl chloride through ingestion, inhalation and skin contact. 1,1-Dichloroethene and vinyl chloride both evaporate into the air from contaminated water during showers and baths so that persons may be exposed as they breathe the air in their homes (9, 10). In addition, 1,1-dichloroethene may absorb across the skin during showers and baths thus increasing exposure (10).

The Broward CPHU issued its first bottled water notice in May, 1988 to inform residents using private wells of the contamination in their well water and of the availability of alternate sources of drinking water. Although well water probably was used for various domestic purposes, including drinking, all residences having condemned wells and most of the remaining households were connected to a municipal water supply by May, 1992 (pers. comm., Willard Galbreath, May 1992). Thus, these residents would have had a maximum exposure period of about four years.

Table 6. Completed Exposure Pathway

EXPOSURE PATHWAY ELEMENTS

PATHWAY NAME	SOURCE	ENVIRONMENTAL MEDIA	POINT OF EXPOSURE	ROUTE OF EXPOSURE	EXPOSED POPULATION	TIME
Private Wells	Unknown	Groundwater	Residence (taps)	Ingestion Inhalation Skin Absorption	Residents Using Private Wells	Past

B. Potential Exposure Pathways

Surface Soil Pathway

Since no surface soil (0 - 3 inches) samples have been analyzed, we do not know what contaminants may be present. Dieldrin is present in the subsurface soil (1.5-30 feet) and there is the possibility that this and other contaminants may also be present in the surface soil both on- and off-site. There is the potential for exposure via incidental ingestion to children at the Meadowbrook school. However, until we receive surface soil data, we cannot assess the importance of this exposure pathway and no further evaluation of this pathway will be made in this public health assessment.

Municipal Well Pathway

Monitoring of municipal supply wells in 1984 by the Ft. Lauderdale Public Utilities Department detected no contamination. In December 1986, 1,1-dichloroethene was detected in one municipal supply well which was immediately taken off line. Discovery of more widespread contamination led to immediate closing of all affected municipal wells. Thus, there is very little likelihood of current or future contamination from this source. It is currently unknown if data exist for the period between 1984 and 1986 and until this information becomes available, we cannot assess the importance of this exposure pathway and no further evaluation of this pathway will be made in this public health assessment.

On-Site Subsurface Soil Pathway

The subsurface soil within the dump site is contaminated with dieldrin. During the approximately twenty year period when the dump was open, access to the area was unrestricted. Individuals using the dump, children or other trespassers would have had the potential for exposure to these contaminants through incidental ingestion. However, no information is available concerning the number of children or other trespassers on the site, the frequency and duration of their visits or their identity. Because this information is not available and is not likely to ever be available, we cannot fully assess the importance of this exposure pathway.

On-Site Shallow Groundwater Pathway

The shallow groundwater on-site is contaminated with lead, arsenic, vanadium and chromium, that have not been detected in the groundwater off-site. Since this contamination is not present in the groundwater off-site and residences that had obtained drinking water from private wells are now supplied by municipal water, current and future exposure by this pathway is unlikely. During the period when the dump was open, this groundwater was exposed at the surface, allowing the potential for exposure to these

contaminants through incidental ingestion if swimming occurred. However, no information is available concerning the persons who may have been on the site. Because this information is not available and is not likely to ever be available, we cannot fully assess the importance of this exposure pathway.

Table 7. Potential Exposure Pathways

	EXPOSURE PATHWAY ELEMENTS					
PATHWAY NAME	SOURCE	ENVIRONMENTAL MEDIA	POINT OF EXPOSURE	ROUTE OF EXPOSURE	EXPOSED POPULATION	TIME
Surface Soil	Dump site	Surface soil	School yard	Ingestion	School children	Past Present Future
Muni-cipal Wells	Unknown	Groundwater	Residence (taps)	Ingestion Inhalation Skin Absorption	Residents	Past
Sub-surface Soil	Dump site	Subsurface soil	Dump site	Ingestion	Children Trespassers	Past
Shallow Ground-water	Dump site	Groundwater	Dump site	Ingestion	Children Trespassers	Past

PUBLIC HEALTH IMPLICATIONS

In this section we will discuss the health effects for persons exposed to specific contaminants, evaluate state and local health databases, and address specific community health concerns.

A. Toxicological Evaluation

Introduction

To evaluate health effects, ATSDR has developed Minimal Risk Levels (MRLs) for contaminants commonly found at hazardous waste sites. MRLs are an estimate of daily human exposure to a contaminant below which non-cancer, adverse health effects are unlikely to occur. ATSDR developed MRLs for each route of exposure, such as ingestion and inhalation, and for the length of exposure, such as acute (less than 14 days), intermediate (15 to 364 days), and chronic (greater than 365 days). ATSDR presents these MRLs in Toxicological Profiles. These chemical-specific profiles provide information on health effects, environmental transport, human exposure, and regulatory status. In the following discussion, we used ATSDR Toxicological Profiles for the following chemicals:

Arsenic	Chromium	Lead
Vanadium	Chloroform	1,1-Dichloroethene
1,2-Dichloroethene	Trichloroethene	Vinyl chloride
Dieldrin		

In this section, we used standard assumptions to estimate human exposure from ingestion of soil and groundwater. To estimate exposure from incidental ingestion of contaminated soil, we made the following assumptions: 1) children between the ages of 6 and 18 ingest an average of 200 milligrams (mg) of soil per day, 2) these children weigh about 35 kilograms (kg), and 3) they ingested soil on the site at the maximum concentration measured for each contaminant. To estimate exposure from ingestion of contaminated drinking water, we made the following assumptions: 1) adults drink 2 liters of water each day and weigh 70 kg, 2) children drink 1 liter of water each day and weigh 10 kg, and 3) they ingested water at the maximum concentration measured for each contaminant.

During the period when the dump was open, the shallow groundwater on-site was exposed at the surface. Although there are no reports that this water was used for swimming, this possibility cannot be ruled out. In order to estimate potential past exposure from this source, we made the following assumptions: 1) children between the ages of 6 and 18 ingest an average of 0.05 L of water per hour during swimming, 2) each swimming event lasts 1

hour, 3) they swim 72 times per year (3 times/week and 24 weeks/year), 4) these children weigh about 35 kg, and 5) they were exposed to the maximum concentration measured for each contaminant.

ARSENIC

When the dump was open, trespassers on the site may have been exposed to arsenic via incidental ingestion of contaminated water when swimming. These exposures, however, are unlikely to have caused adverse health effects.

The estimated daily dose of arsenic from incidental ingestion of contaminated water (during swimming) is less than the ATSDR chronic Minimal Risk Level (MRL) (11). Arsenic is classified as a human carcinogen by inhalation exposure and has been shown to increase cancer incidence in humans when ingested in water. However, exposure to arsenic at the concentrations found in the water on-site when the dump was open would result in no apparent increase in the risk of developing cancer. Arsenic may also enter the body through the skin, but this is not usually an important consideration.

EPA did not analyze for arsenic in off-site subsurface soil. Arsenic was analyzed for, but not detected, in off-site groundwater.

CHROMIUM

When the dump was open, trespassers on the site may have been exposed to chromium via incidental ingestion of contaminated water when swimming. These exposures, however, are unlikely to have caused adverse health effects.

Since the analysis reports did not specify which of the three major forms of chromium was present, we have assumed the presence of chromium (VI), the most toxic form. The estimated daily dose of chromium (VI) from incidental ingestion of contaminated water (during swimming) is less than the ATSDR chronic Minimal Risk Level (MRL) (12). Exposure to chromium at the concentrations found in the water on site when the dump was open would not have been likely to cause any adverse health effects. Dermal contact with chromium (VI) may result in skin sensitivity. However, information on the doses of chromium (VI) required to produce this sensitization are not available.

Chromium was analyzed for but not detected in off-site deep groundwater.

LEAD

When the dump was open, trespassers on the site may have been exposed to lead via incidental ingestion of contaminated water when swimming. Although ATSDR and EPA have no lead exposure guidelines (MRLs or RfDs) for comparison (13), we estimate that the maximum concentrations in the on-site water are unlikely to have caused adverse health effects.

Although the maximum concentration of lead in the water on site (120 ug/L) is eight times greater than the Florida drinking water standard (15 ug/L), we estimate the annual volume of water that could have been ingested while swimming would have been about 100 times less than the annual volume of water ingested from drinking water sources. Therefore, we estimate that the dose of lead from incidental ingestion during swimming would have been about 12 times less than the dose from drinking water at the Florida standard.

Lead was analyzed for but not detected in off-site deep groundwater.

VANADIUM

When the dump was open, trespassers on the site may have been exposed to vanadium via incidental ingestion of contaminated water when swimming. These exposures, however, are unlikely to have caused adverse health effects.

The estimated daily dose of vanadium from incidental ingestion of contaminated water (during swimming) is less than the draft ATSDR intermediate Minimal Risk Level (MRL) (14). A chronic MRL is unavailable. Vanadium has not been identified as causing cancer. Therefore, incidental ingestion of vanadium-containing water when swimming would be unlikely to cause adverse health effects. Since vanadium does not pass readily through the skin, adverse health effects from skin exposure are also unlikely.

Vanadium was analyzed for but not detected in off-site deep groundwater.

CHLOROFORM

Residents of the 74 homes north of the site who obtained their drinking water from private wells have been exposed to chloroform by ingestion in drinking water. Exposure has also probably occurred through skin absorption and inhalation of evaporated chloroform during showering or bathing. The maximum concentration detected, however, is unlikely to cause adverse health effects.

The estimated daily dose of chloroform from ingestion is less

than the estimated chronic Minimal Risk Level (MRL) (9). Although exposure has probably also occurred through inhalation and skin absorption, there is no information available to enable us to estimate the possible adverse health effects from exposure via these routes. Chloroform is a probable human carcinogen based on animal exposure studies. At the maximum concentration detected, however, there would be no apparent increase in the risk of developing cancer.

EPA did not detect chloroform in on-site shallow groundwater and did not analyze for chloroform in on-site or off-site subsurface soil.

1,1-DICHLOROETHENE

Residents who obtained their drinking water from private wells have been exposed to 1,1-dichloroethene by ingestion. Exposure has also probably occurred through skin absorption and inhalation of evaporated 1,1-dichloroethene during showering or bathing. The maximum concentration detected, however, is unlikely to cause adverse health effects.

The estimated daily dose of 1,1-dichloroethene from ingestion is less than the estimated chronic Minimal Risk Level (MRL) (15). Exposure has probably also occurred through inhalation and skin absorption. However, there is no information available to enable us to estimate the possible adverse health effects from exposure via these routes. Although animal studies indicate that 1,1-dichloroethene can adversely affect the liver, kidneys, lungs, heart and blood, there is insufficient information from human exposure studies to estimate what the health effects may be in humans. 1,1-Dichloroethene is a possible human carcinogen based on limited animal exposure studies. Lifetime exposure to 1,1-dichloroethene at the maximum concentration detected would result in a low increase in the risk of developing cancer. Because the maximum duration of exposure to 1,1-dichloroethene for residents using private well water is four years, however, the actual risk is considered to be negligible.

EPA did not detect 1,1-dichloroethene in on-site subsurface soil or shallow groundwater and did not analyze for 1,1-dichloroethene in off-site subsurface soil.

1,2-DICHLOROETHENE

Residents who obtained their drinking water from private wells have been exposed to 1,2-dichloroethene by ingestion. Exposure has also probably occurred through skin absorption and inhalation of evaporated 1,2-dichloroethene during showering or bathing. The maximum concentration detected, however, is unlikely to cause adverse health effects.

The estimated daily dose of 1,2-dichloroethene from ingestion is less than the estimated intermediate Minimal Risk Level (MRL) (10). A chronic MRL is not available. Exposure has probably also occurred through inhalation and skin absorption. However, there is no information available to enable us to estimate the possible adverse health effects from exposure via these routes. Although animal studies indicate that 1,2-dichloroethene can adversely affect the liver, lungs and heart, these effects have not been observed in studies involving humans.

EPA did not detect 1,2-dichloroethene in on-site subsurface soil or shallow groundwater and did not analyze for 1,2-dichloroethene in off-site subsurface soil.

TRICHLOROETHENE

Residents who obtained their drinking water from private wells have been exposed to trichloroethene by ingestion. Exposure has also probably occurred through skin absorption and inhalation of evaporated trichloroethene during showering or bathing. The maximum concentration detected, however, is unlikely to cause adverse health effects.

The estimated daily dose of trichloroethene from ingestion is less than the estimated intermediate Minimal Risk Level (MRL) (16). A chronic MRL is not available. Exposure has probably also occurred through inhalation and skin absorption. However, there is no information available to enable us to estimate the possible adverse health effects from exposure via these routes. Trichloroethene is a suspected human carcinogen. However, its potential as a human carcinogen is currently under review by EPA. Based on estimates from animal studies and because the maximum duration of exposure to trichloroethene for residents using private well water is four years, the risk of developing cancer at the maximum concentration detected is negligible.

EPA did not detect trichloroethene in on-site subsurface soil or shallow groundwater and did not analyze for trichloroethene in off-site subsurface soil.

VINYL CHLORIDE

Residents who obtained their drinking water from private wells have been exposed to vinyl chloride by ingestion. Exposure has also probably occurred through inhalation of evaporated vinyl chloride during showering or bathing. The maximum concentration detected, however, is unlikely to cause adverse health effects.

The estimated daily dose of vinyl chloride from ingestion is less than the estimated chronic Minimal Risk Level (MRL) (17). Exposure has probably also occurred through inhalation. However, there is no information available to enable us to estimate the possible adverse health effects from exposure via this route. Although animal studies have indicated that vinyl chloride can adversely affect the liver, there is no information available from which we can estimate the possible adverse human health effects from exposure to vinyl chloride at the concentrations found at this site. Vinyl chloride is a definite human carcinogen based on both animal and human exposure studies. A lifetime of exposure at the maximum concentration detected would result in a low increase in the risk of developing cancer. However, because the maximum duration of exposure to vinyl chloride for residents using private well water is four years, the actual risk is considered to be negligible.

EPA did not detect vinyl chloride in on-site shallow groundwater and did not analyze for vinyl chloride in on-site or off-site subsurface soil.

DIELDRIN

When the dump was open, trespassers on the site may have been exposed to dieldrin via incidental ingestion of contaminated soil. These exposures, however, are unlikely to have caused adverse health effects.

The estimated daily dose of dieldrin from incidental ingestion of contaminated soil exceeds the draft ATSDR chronic Minimal Risk Level (MRL) (18). However, the dump was open for a maximum of 20 years and trespassers, such as children, would have been unlikely to visit the dump on a daily basis, Therefore, we estimate that the actual health risks from exposure to dieldrin on the site are negligible. Dieldrin is classified as a probable human carcinogen based on animal studies. Although there is no evidence of dieldrin causing cancer in humans, estimates from these animal studies indicate that there may be a moderately increased risk of developing cancer for an individual exposed for a lifetime to the maximum dieldrin concentration found in the on-site subsurface soil. Again, since lifetime exposure on a daily basis is not possible at this site, we consider the actual risk of developing cancer to be negligible. Adverse health effects from exposure to dieldrin in these soils via skin absorption is unlikely since skin

absorption is insignificant compared to ingestion.

EPA did not analyze for dieldrin in on-site or off-site groundwater.

B. Health Outcome Data Evaluation

Guided by community health concerns in the population living near the site, Florida HRS epidemiologists conducted an evaluation of cancer and birth defect incidence in this area. They found that the rates of cancer and birth defects in the 33317 zip code, which includes the 21st Manor Dump site, are not unusual (19).

The Broward CPHU discontinued sampling of the private wells along SW 44th Terrace after these residences were connected to municipal supply water, and has not conducted any independent health studies or investigations. Although there is no systematic, ongoing health monitoring program being conducted, Broward County School Board safety officials have not noticed any pattern of illnesses among children at the Meadowbrook Elementary School that could be linked to exposure at this site. School medical personnel may be able to discern a change in the level or type of illnesses exhibited by the children. However, they may not associate this change with possible exposure to site contaminants.

C. Community Health Concerns Evaluation

We have addressed the community health concern as follows:

1. **Residents of the neighborhood around the site who have obtained their drinking water from private wells are concerned about possible unspecified health effects to themselves and their children from drinking contaminated water.**

Although the off-site private well contamination does not appear to be site-related, seven private wells located just north of the site were condemned by the Broward CPHU when their monitoring program detected 1,1-dichloroethene and vinyl chloride at levels exceeding Florida's primary drinking water standards. Two other private wells in the area also showed traces of these same contaminants.

Monitoring of these wells has been conducted on a regular basis since 1987 and elevated contaminant levels occurred beginning in late 1988. As elevated contaminant levels appeared, the Broward CPHU provided alternate drinking water sources to the affected community members. All residences having condemned wells and the majority of the remaining households have been connected to a municipal water supply.

Based on established comparison values for the contaminants detected in the private well water, the health risk from drinking this water is considered to be low. Further, because the Broward CPHU removed the contaminated wells from use before any significant exposure could occur, we consider the actual health risk to residents on private wells to be negligible.

CONCLUSIONS

Based on the information currently available, it is unlikely that any adverse health effects are possible from exposure to the contaminants at this site. However, because insufficient information is available to assess adverse health effects in all media, this site is classified as an indeterminate public health hazard. Specific reasons for this classification are as follows:

1. No surface soil samples (0 - 3 inches) have been collected and analyzed to determine what contaminants may be present and of public health concern. Dieldrin is present in subsurface soil (>3 inches) both on and off the site and may also be present in the surface soil (0 - 3 inches) and thus accessible to children.

2. The contaminants present in the groundwater surrounding the site do not appear to be site related. However, no deep groundwater sampling has been conducted under the site itself to confirm this or to determine whether contaminants from the site may affect the surrounding groundwater in the future.

3. Most of the residents who obtained their drinking water from private wells have been connected to a municipal water supply. These individuals have been exposed to the contamination in their well water and some exposure may still be occurring. Continued use of this water may result in adverse health effects.

4. On-site subsurface soil and shallow groundwater are contaminated with arsenic, chromium, lead, vanadium and dieldrin. During the period when the dump was open, exposure to these contaminants would have been possible to persons at the site. However, considering that the dump was open for a maximum of twenty years and daily exposure was unlikely, we estimate that the risk of adverse health effects occurring is negligible.

RECOMMENDATIONS

Site Characterization Recommendations

1. Obtain surface soil samples. The appropriate federal, state or local agency should collect a minimum of ten randomly selected surface (0 - 3 inches deep) soil samples from each of the following areas: the dump site, the Meadowbrook Elementary School property excluding the dump, and in the residential area off of the school property within a one-quarter mile radius. Analyze for contaminants including dieldrin, arsenic, chromium, lead and vanadium.

2. Obtain on-site deep groundwater samples. The appropriate federal, state or local agency should collect deep groundwater samples (60-100 ft.) from three random locations on the site. Analyze for contaminants including lead, arsenic, chromium, vanadium, 1,1-dichloroethene, trichloroethene, 1,2-dichloroethene, chloroform and vinyl chloride. It may be desirable to analyze unfiltered samples for comparison purposes.

3. The appropriate agency should contact the city utilities to determine if municipal supply well monitoring data is available for the period between 1984 and 1986.

Public Education Recommendations

1. Conduct a health education program to assist those members of the community who obtained their drinking water from private wells in understanding their potential for exposure and possible health risks. In particular, the health education program should discourage these residents from continued use of their private well water for drinking, cooking or other domestic purposes.

Health Activities Recommendation Panel (HARP) Recommendations

The Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended, requires ATSDR to perform public health actions needed at hazardous waste sites. To determine if public health actions are needed, ATSDR's Health Activities Recommendation Panel (HARP) has evaluated the data and information developed in the 21st Manor Dump Public Health Assessment.

The Panel has determined that the following actions are needed at this site:

1. Although deep groundwater contamination in the area does not appear to be site-related, residents who obtain their drinking water from private wells are being exposed to contaminants in the water. Health education is needed to assist the community in understanding their potential for exposure and possible health

risks, and to inform them of measures they may take to reduce their exposure potential.

2. There is inadequate information to assess the nature and extent of pesticide exposure or whether the site may be a source of future contamination to the deep groundwater.

If information becomes available indicating exposure at levels of concern, ATSDR will evaluate that information to determine what actions, if any, are necessary.

PUBLIC HEALTH ACTION PLAN

This section describes what ATSDR and/or Florida HRS will do at the 21st Manor Dump site after the completion of this public health assessment report. The purpose of a Public Health Action Plan is to ensure that any existing health hazards are reduced and any future health hazards are prevented. ATSDR and/or Florida HRS will do the following:

1. Florida HRS will evaluate surface soil and on-site deep groundwater data, when they become available, to determine the public health significance of any contaminants detected.

2. Florida HRS will develop educational materials to inform the residents who obtained their drinking water from private wells of their potential for exposure and possible health risks. In particular, the material will discourage these residents from continued use of their private well water for drinking, cooking or other domestic purposes.

3. The Broward CPHU will distribute these educational materials to the affected residents and provide consultation to those individuals who require additional information or assistance.

4. ATSDR will assist Florida HRS in the development of these educational materials to ensure that the information is accurate and reflects the most recent scientific findings and agency guidelines.

ATSDR and/or Florida HRS will reevaluate the Public Health Action Plan when new environmental, toxicological, or health outcome data are available.

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CERTIFICATION

This Public 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 health assessment was initiated.

Technical Project Officer, SPS, RPB, DHAC

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

Division Director, DHAC, ATSDR

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APPENDICES

APPENDIX A

SITE FIGURES

Figure 1. Location of Broward County

Figure 2. Approximate Location of 21st Manor Dump Site in Broward County with Zip Code Areas

Figure 3. 21st Manor Dump Showing Surrounding Neighborhood

Figure 4. Location of Dump Site in Relation to Meadowbrook Elementary School

Figure 5. Locations of On-Site Subsurface Soil Samples

Figure 6. Locations of On-Site Shallow Groundwater Samples

Figure 7. Locations of Contaminated Public and Private Wells

Figure 8. Locations of Off-Site Subsurface Soil SAmples

Figure 9. Locations of Off-Site Shallow and Deep Groundwater Samples

21ST MANOR

DUMP SITE

LAKE

Closed Production Wells

Condemned Private Wells

Approximate Area of Dump Site

Chain Link Fence

Location of Subsurface Soil Samples

Location of Shallow Groundwater Samples

Location of Groundwater Samples

Supply Well

Monitor Well

Residential Well

Figure 1. Location of Broward County

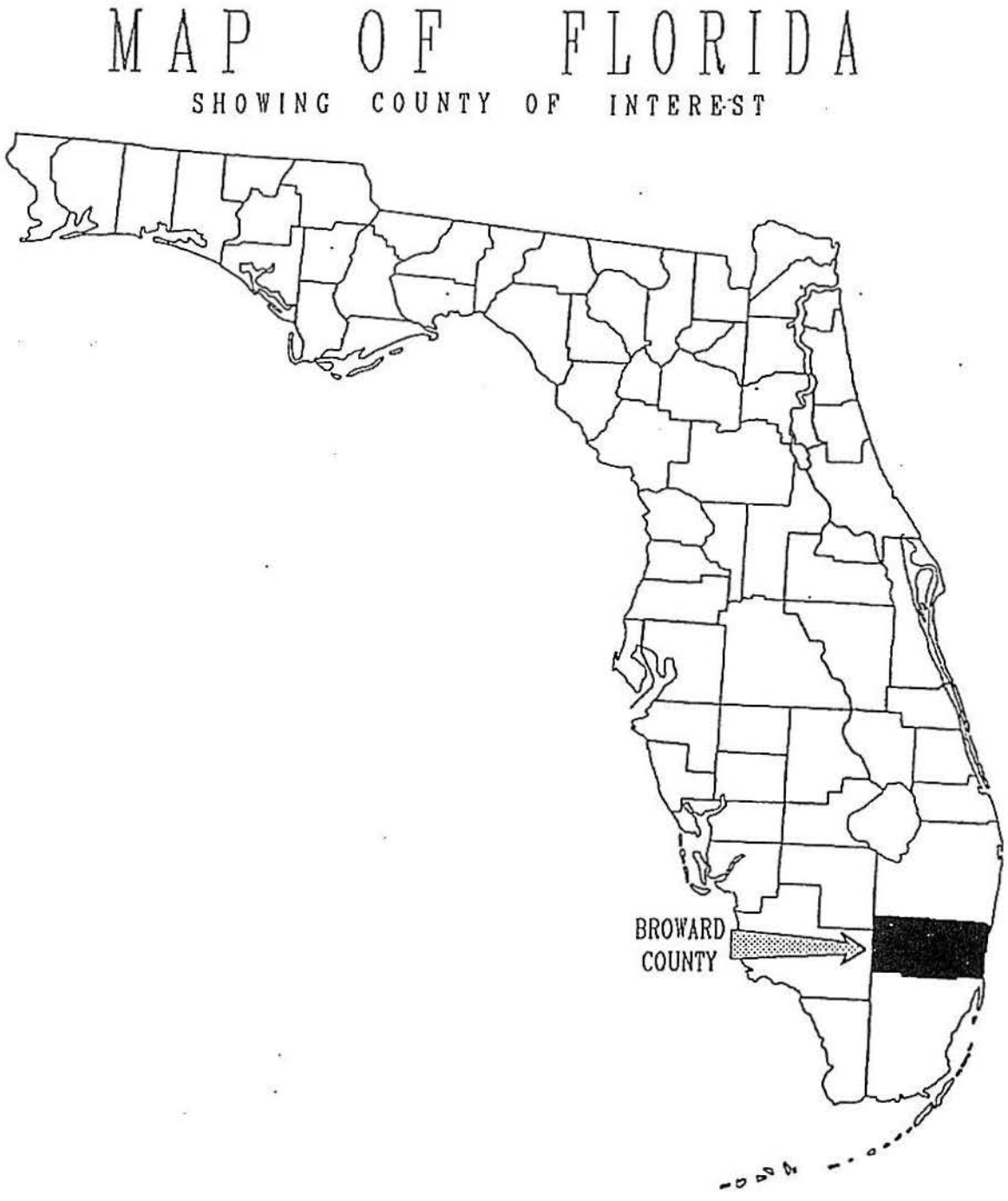
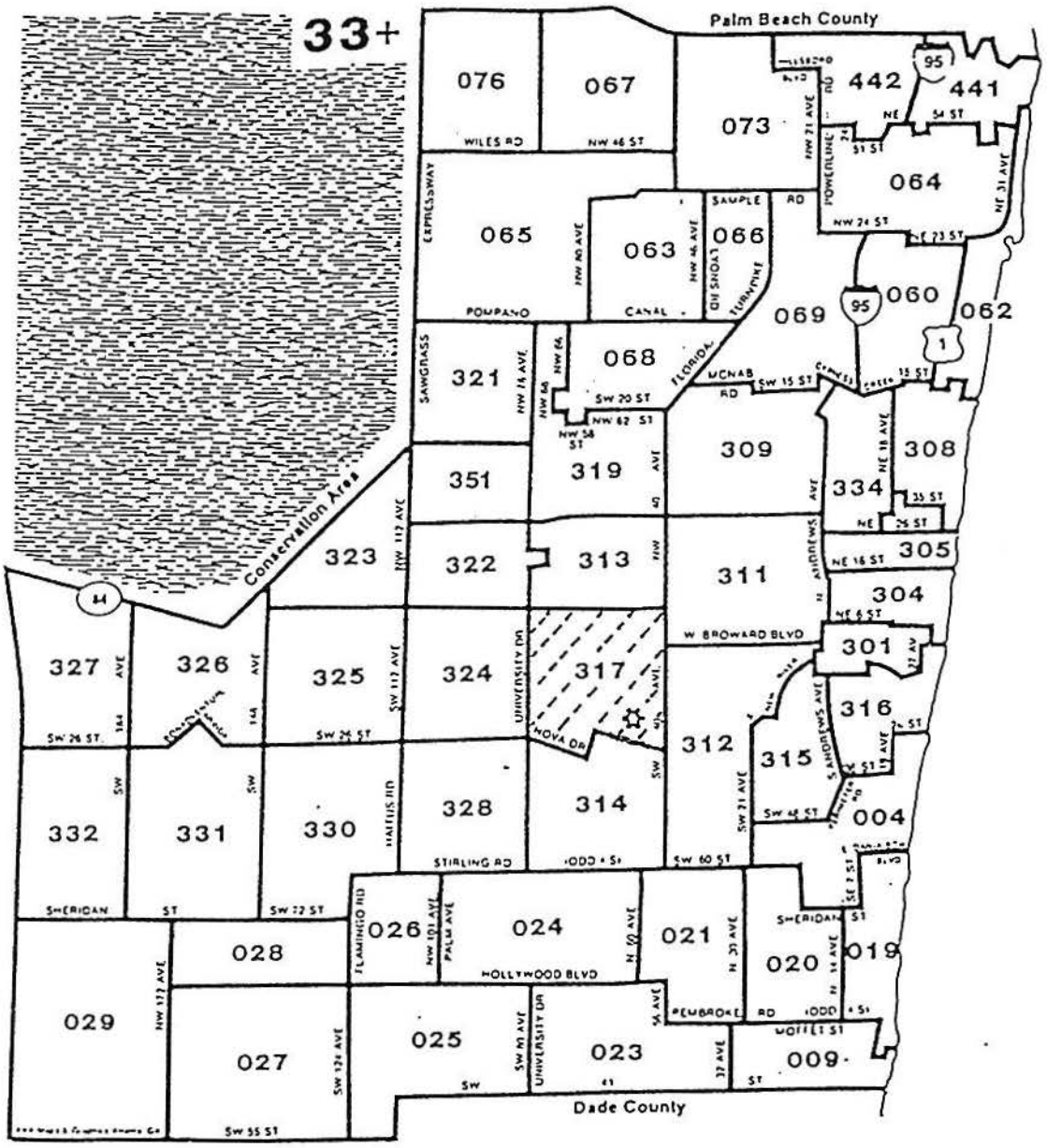


Figure 2. Approximate Location of 21st Manor Dump Site in Broward County with Zip Code Areas



☼ DUMP SITE

Figure 3. 21st Manor Dump Showing Surrounding Neighborhood

Figure 4. Location of Dump Site in Relation to Meadowbrook Elementary School

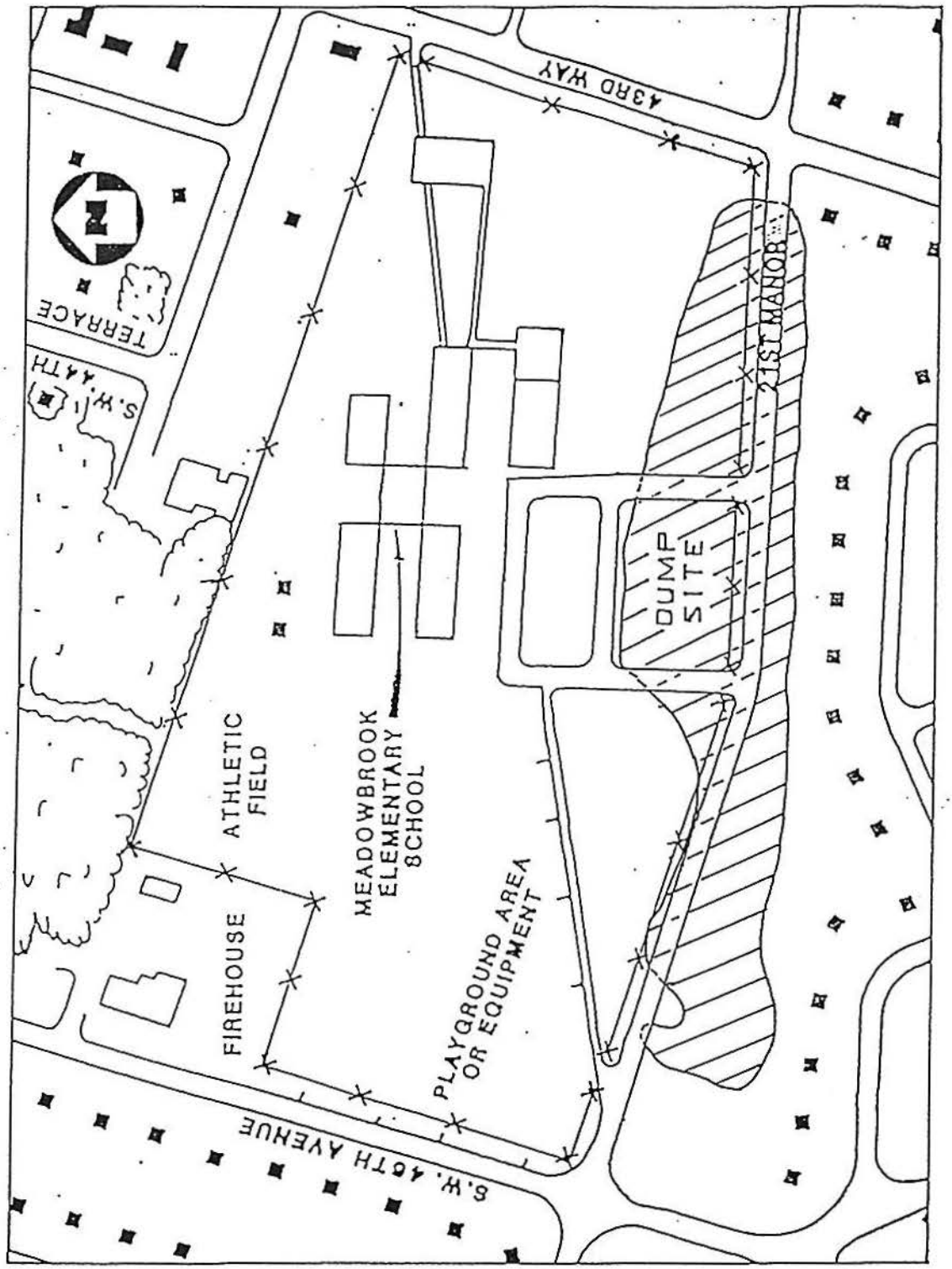
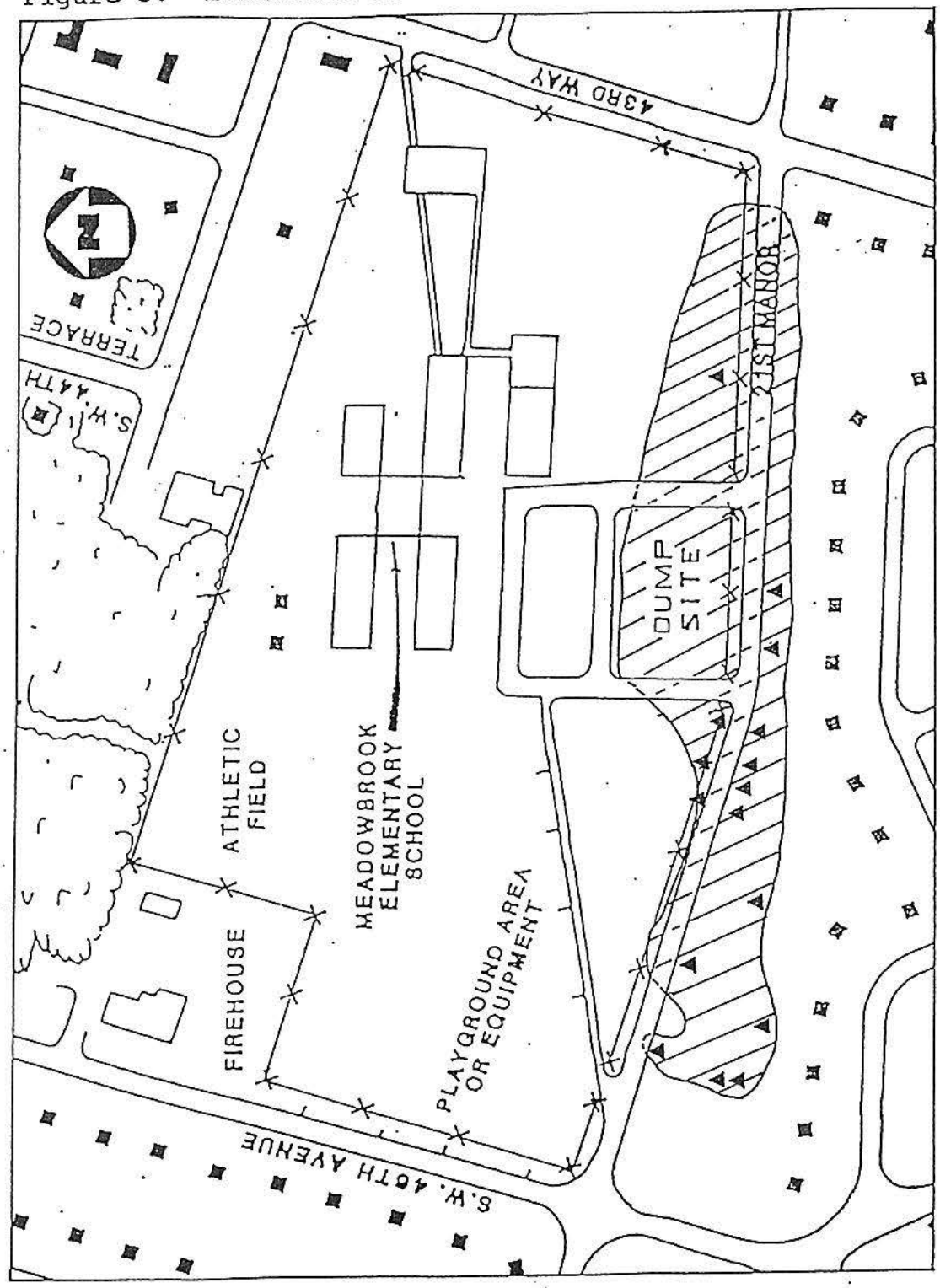
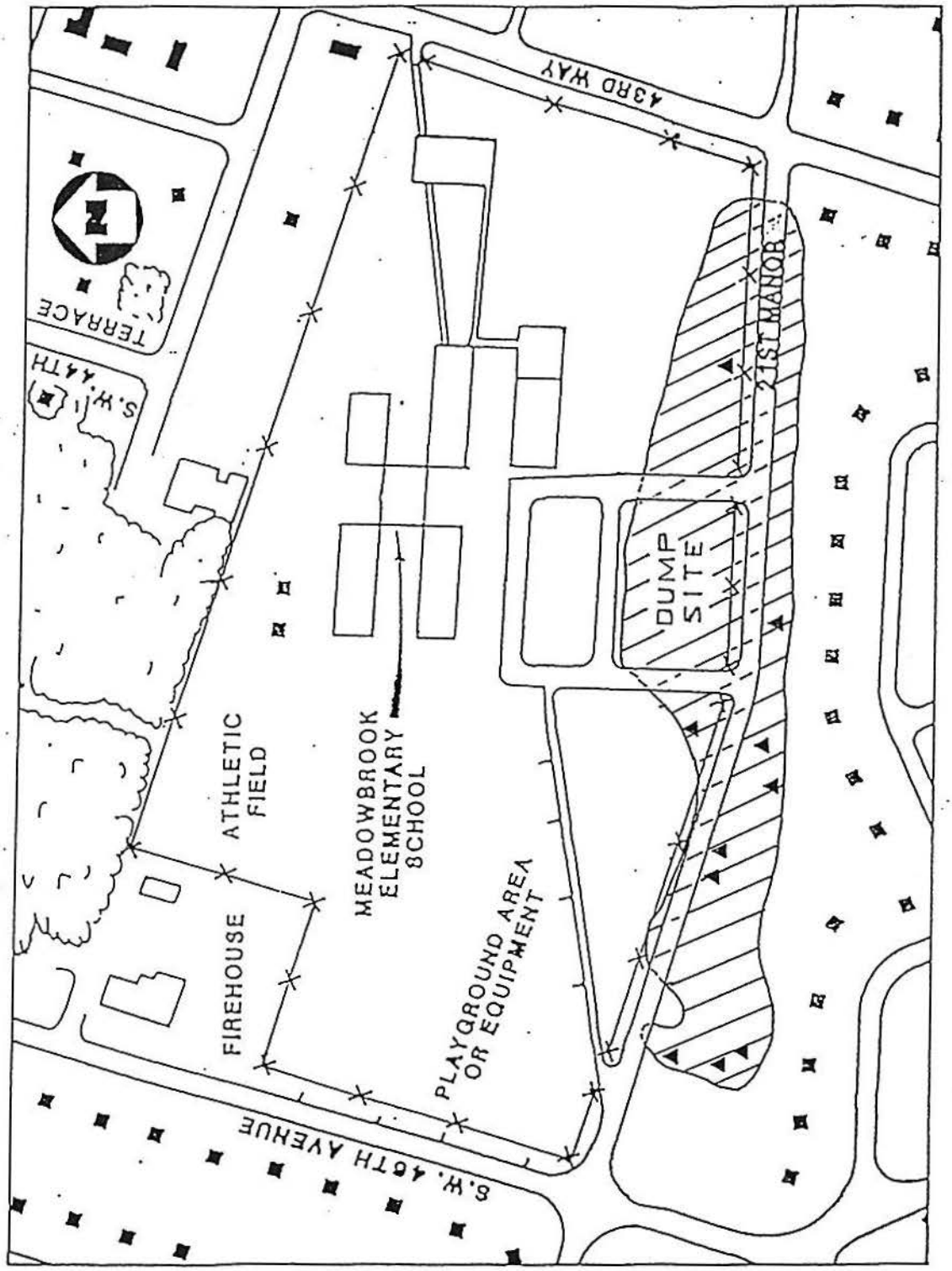


Figure 5. Locations of On-Site Subsurface Soil Samples



▲ Location of Subsurface Soil Samples

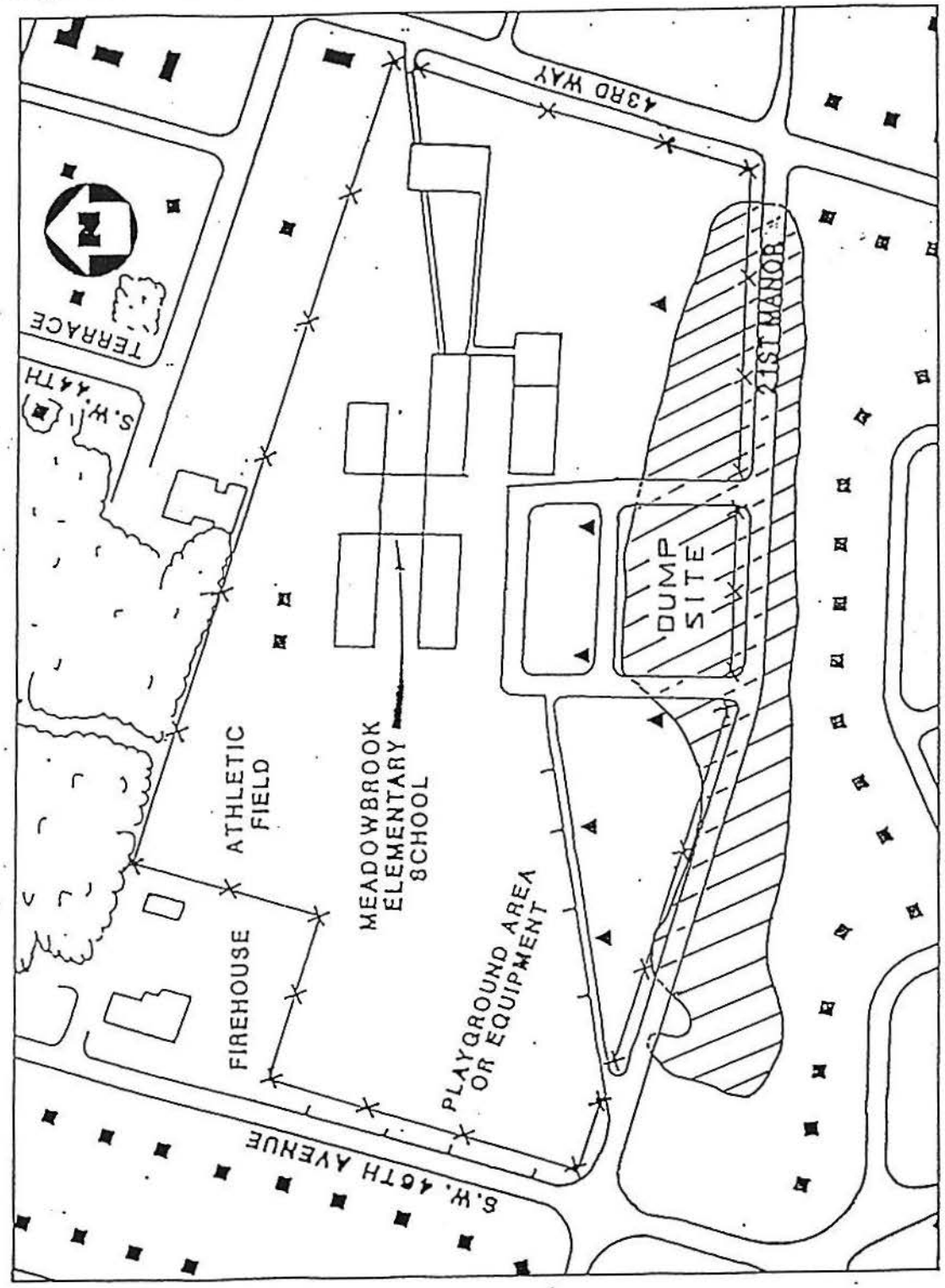
Figure 6. Locations of On-Site Shallow Groundwater Samples



▲ Location of Shallow Groundwater Samples

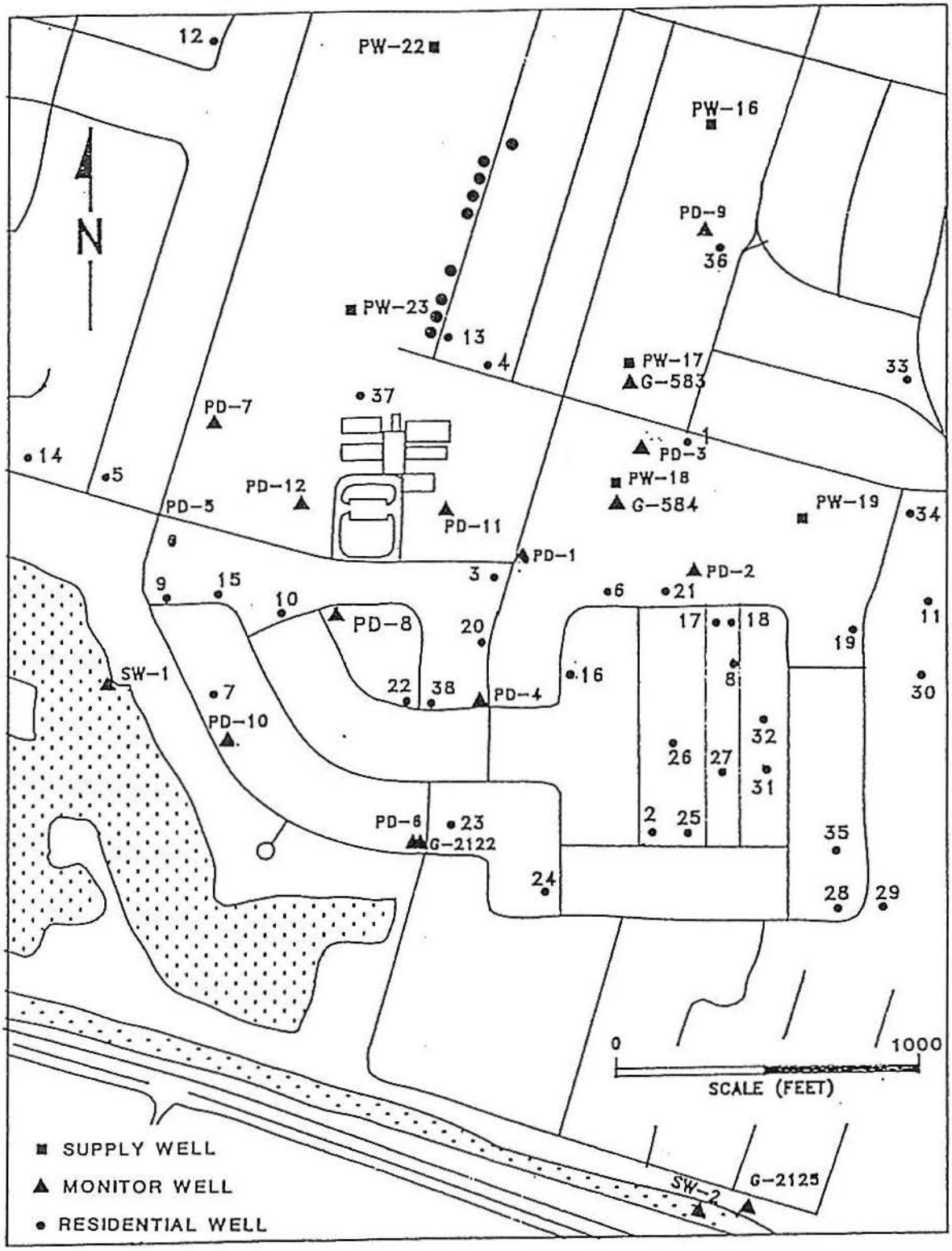
Figure 7. Locations of Contaminated Public and Private Wells

Figure 8. Locations of Off-Site Subsurface Soil Samples



▲ Location of Subsurface Soil Samples

Figure 9. Locations of Off-Site Shallow and Deep Groundwater Samples



APPENDIX B

The following chemicals were detected at this site. Although Toxicological Profiles exist, there is insufficient human health data available upon which to base an assessment of their public health significance.

1,1-Dichloroethane
Aluminum
Benzo(a)anthracene
Benzo(b/k)fluoranthene
Chrysene
Copper
Naphthalene
Zinc

APPENDIX C

The following chemicals were detected at this site. There are no toxicological data available upon which to base an assessment of their public health significance.

Benzopyrene
Bromohexane
Dibenzofuran
Dimethoxyanthracene
Hexadecanoic acid
Hexadecenoic acid
Hexahydrohexamethylindene
Methyethyl Ketone
Methyl(methylethyl)phenanthrene
Methylpentane
Phenylmethylpyridene
Tetramethylphenanthrene