

Public Health Assessment for

*MUNISPORT LANDFILL
NORTH MIAMI, DADE COUNTY, FLORIDA
CERCLIS NO. FLD084535442
JANUARY 28, 1993*

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



PUBLIC HEALTH ASSESSMENT

MUNISPORT LANDFILL

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CERCLIS NO. FLD084535442

Prepared by:

The Florida Department of Health and Rehabilitative Services
Under a 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 Munisport Landfill site is an inactive landfill in, and owned by, the City of North Miami, Florida. This site is in an urban area adjacent to the Oleta River Recreational Area, a state mangrove preserve, and Biscayne Bay. Soil, sediments, surface water, and ground water are contaminated. We selected ammonia, benzene, di(2-ethylhexyl)phthalate, cadmium, carbon disulfide, chloromethane, coliform bacteria, dieldrin, lead, methylene chloride, pentachlorophenol, polychlorinated biphenyls (PCBs), styrene, vanadium, and zinc as contaminants of concern.

Approximately 1,500 people live in Highland Village mobile home park southwest of the site. These residents are concerned they have been exposed to contaminated dust and stormwater run-off and children trespassing on the site have been exposed to contaminated soil and water. Accidentally ingesting contaminated soil and surface water, and breathing contaminated smoke are completed human exposure pathways. Children who swam in the landfill lakes risked bacterial and viral infections. Air sampling was too late to determine the health risk from breathing contaminated smoke from the 1990 landfill fire. Although it is unlikely that this site is the source, eating polychlorinated biphenyl (PCB) contaminated fish and oysters from Biscayne Bay over a lifetime may affect the immune system and result in a "low" increased risk of cancer.

Based on the available data, we categorize the Munisport Landfill site as an indeterminate public health hazard. Data are either not available or inadequate for all environmental media to which humans may be exposed. Except for coliform bacteria, the available environmental data do not indicate that humans are being or have been exposed to levels of toxic chemicals that would be expected to cause adverse health effects. This conclusion is based on the limited data currently available and may change once the surface soil and landfill material have been adequately characterized. The data are inadequate to determine if there has been an increased rate of cancer in the Highland Village mobile home park.

Additional surface soil samples, fill material samples, and up-to-date lake water samples are necessary to adequately characterize the extent of contamination. Public access to this site should be restricted and warning signs posted as required by Florida law. Dust generated during any remediation, construction, or development that removes vegetation or uncovers landfill material should be controlled and nearby residential air monitored for site related contaminants. The appropriate agency should investigate the extent of PCB contamination in Biscayne Bay fish and oysters.

The Florida Department of Health and Rehabilitative Services (HRS), in cooperation with the Agency for Toxic Substances and Disease Registry, will work with other agencies to ensure these recommendations are followed. Florida HRS will inform the

community about health risks from exposure to site-related contaminants and apply for funding for a disease symptom and prevalence study.

The Florida Department of Environmental Regulation will sample stormwater run-off in Highland Village and will monitor closure of the landfill portion of the site. The Environmental Protection Agency will monitor design and performance of the ground water cleanup and will require air monitoring where appropriate.

BACKGROUND

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

A. Site Description and History

The Munisport Landfill site is an inactive landfill in the City of North Miami, Dade County, Florida (Figure 1, Appendix A). The site is about 2,000 feet northwest of Biscayne Bay. It is bordered on the north by N.E. 151st St., on the east by Florida International University, on the south by N.E. 135th St., and on the west by Biscayne Blvd. (Figure 2, Appendix A). This 291 acre site can be divided into 4 areas: a 170-acre landfill, 15 acres of uplands, 93 acres of altered wetlands, and 13 acres adjacent to Biscayne Bay that are separated from the rest of the site by the State of Florida mangrove preserve (Figure 3, Appendix A).

In 1970, the City of North Miami purchased 350 acres of land on Biscayne Bay. In 1972, the City of North Miami leased 291 acres of this land to Munisport, Inc. to develop a recreational facility. Starting in 1974, Munisport operated a landfill to fill in low-lying areas of this site. Munisport ceased landfill operations in 1980 and in 1981, the Florida Department of Environmental Regulation (DER) revoked their operating permit. In 1983 the Environmental Protection Agency (EPA) added this site to the Superfund National Priorities List (NPL). In 1985, ATSDR visited the site and issued a health assessment. ATSDR concluded that existing data were inadequate to assess the public health threat and recommended EPA conduct a remedial investigation (1). EPA conducted a remedial investigation and found that leachate from this landfill (primarily ammonia) threatens the environmental health of Biscayne Bay, but does not threaten human health. In January 1989, Dade County Public Health Unit personnel removed a small pile of hospital waste from the landfill. In a 1990 Record of Decision (ROD), EPA consulted with ATSDR and concluded that the site did not pose a threat to human health (31,32). In this ROD, EPA outlined plans to intercept and treat the contaminated ground water and to relinquish control of the landfill portion of the site to the state. For about 6 weeks in March and April 1990, an

underground fire burned at this landfill. Nearby residents reported that thick black smoke from this fire burned their eyes and throats and forced them to stay indoors. EPA was unable to mobilize an air sampling team until the fire subsided.

As a result of landfill operations, the original site topography has been altered. Eight borrow pits were excavated to provide cover for material deposited in the landfill. These borrow pits are now filled with water and together cover an area of about 16 acres. The land surface in the northern part of the site is gently rolling. The land surface in the southern part of the site is mostly flat. A 30 foot high mound of soil exists in the middle of the landfill.

There has been no remediation at this site since landfill operations ceased in 1980. Most of the site is heavily vegetated. There are no buildings or other structures on the site. Site access is poorly restricted and there are few warning signs. The City of North Miami is the current site owner. The City of North Miami is designing a system to extract and treat ammonia contaminated ground water. The City of North Miami is closing the landfill portion of the site pursuant to Florida law. There are plans to build an amphitheater and a racetrack on the landfill portion of the site.

This public health assessment has been prepared at the request of EPA and as part of a program to update health assessments of the first 951 sites on the Superfund National Priorities List.

B. Site Visit

Mr. Randy Merchant and Mr. Bruce Tuovila, Florida HRS, visited the site on December 11 and 12, 1991. They observed that most of the site was heavily vegetated. A fence along the southern and western site boundaries had numerous access points. There were some warning signs along the site boundary but they were too few to meet the requirement of Florida DER Rule 17-736 and Florida Statutes 403.704 and 403.7255. They observed the nearest residence in Highland Village is about three feet from the site boundary. Heavily worn paths indicated that people frequently trespass across this site. They saw three 10-12 year old boys riding bicycles and carrying fishing poles along the southeast site boundary. They also saw one teen-age boy walking across the site.

Mr. Merchant and Mr. Tuovila attended an EPA sponsored public meeting on December 11, 1991 and noted community health concerns. They attended the Munisport Landfill Technical Advisory Committee meeting on December 12. They also reviewed the Munisport Landfill files at the Dade County Public Health Unit, Environmental Health Section. No environmental samples were collected by Mr. Merchant or Mr. Tuovila.

C. Demographics, Land Use, and Natural Resource Use

Demographics

The City of North Miami which is south and west of the site has approximately 50,000 people. The City of North Miami Beach, northwest of the site, has a population of approximately 36,000. In 1992 there were approximately 1,500 people living in Highland Village mobile home park immediately southwest of the site (2). The nearest residence in Highland Village is about three feet from the landfill boundary. The north campus of Florida International University, located immediately east of the site, has an enrollment of approximately 6,000 students, about 600 of whom reside in on-campus dormitories (3). Approximately 830 students, ages 5 to 12, attend Natural Bridge Elementary School about 0.5 mile east of the site. These students are from neighborhoods west of Biscayne Boulevard and from Highland Village (4).

The racial makeup of Highland Village is predominately white; the economic status is low to middle income. Some residents are French-Canadian and only reside in Highland Village during the winter months.

Land Use

The land use around the site is mostly recreational, residential, and light commercial (Figure 4, Appendix A). There is little or no agriculture or hunting in this area. North of the site is a municipal sports stadium and a wastewater treatment plant. East of the site is Florida International University and the Oleta River Recreational Area. Swimming, boating, and fishing are popular activities at Oleta River Recreational Area. Southeast of the site is a State mangrove preserve and Biscayne Bay. Highland Village mobile home park is south and southwest of the site. Although the site is within the City of North Miami, Highland Village is in the City of North Miami Beach. South of Highland Village is a marina on a canal connected to Biscayne Bay. West of the site, along Biscayne Boulevard (U.S Highway 1), are light commercial developments: an abandoned drive-in theater, a U.S. Post Office, and a KOA campground.

Two facilities near this site, Sparkletts Water Systems Aquavend and Magnum Marine Corporation, reported releases of chemicals from 1987 to 1989 under the EPA Toxic Chemical Release Inventory program. The Dade County Department of Environmental Resources Management (DERM) reports three sites within 0.5 mile of the site that have leaking underground petroleum storage tanks. We will discuss environmental contamination from these sources in the Environmental Contamination and Other Hazards section. We are unaware of any other hazardous waste sites within 0.5 mile of this site.

Natural Resource Use

The Biscayne Aquifer which underlies the Munisport Landfill site is the sole source of drinking water for this part of the state. The ground water in the vicinity of this site, however, is not potable because of high salinity from saltwater intrusion. Although there have been reports of private well use in this area as late as 1985, most homes and businesses are supplied with municipal water from wells further inland.

There are numerous surface water bodies on and around this site. Eight lakes exist on the site as the result of past excavations. The Oleta River north of the site and Arch Creek/Southern Canal south of the site drain into Biscayne Bay. The Oleta River Recreational Area and Biscayne Bay are used for recreational swimming, skiing, and fishing. Although Biscayne Bay is closed for commercial oyster harvesting, individuals collect oysters for their own consumption.

The Munisport Landfill site is located next to a State mangrove preserve and Biscayne Bay. The State mangrove preserve is important as a source of food for the aquatic food chain. This preserve is part of the Biscayne Bay Aquatic Preserve established to maintain the biological integrity of the entire system. This preserve provides detritus, a food source for many small aquatic organisms such as invertebrates, various shellfish, and forage fish. These organisms in turn are food for larger predatory fish in Biscayne Bay, the Gulf of Mexico, and the Atlantic Ocean. This area, along with other wetlands, serves as a breeding and nursery ground for many of the fish species found in Biscayne Bay and the Atlantic Ocean. Other important functions of these wetlands include bird and other wildlife habitat, water quality improvement, flood protection, and shoreline erosion control.

D. Health Outcome Data

Guided by community health concerns, Florida HRS epidemiologists reviewed the Florida Cancer Data System (FCDS). FCDS is Florida's statewide cancer registry. It covers all newly diagnosed cases of cancer (except for some forms of skin cancer) reported since 1981. The FCDS is a program of Florida HRS and is operated by the University of Miami School of Medicine. Florida HRS epidemiologist analyzed the FCDS for all cancers reported through 1987, the latest year for which data were available. They searched the 33181 zip code which includes neighborhoods around the Munisport Landfill. ZIP codes are the smallest geographical unit searchable in the FCDS. We discuss the results of this review in the Public Health Implications, Health Outcome Data Evaluation section.

COMMUNITY HEALTH CONCERNS

About 10 to 20 residents of Highland Village mobile home park, which borders the southwest corner of the landfill, have expressed health concerns. We compiled these concerns from the December 1991 public meeting, telephone conversations with community leaders, community newsletters, newspaper articles, and EPA reports. We address these health concerns in the Public Health Implications, Community Health Concerns Evaluation section.

Air Exposure Health Concerns

1. Highland Village residents are concerned that until the landfill closed and heavy vegetation covered the site, they were exposed to contaminated dust including asbestos. They are concerned that rashes, respiratory illnesses, and infections they suffered in the 1970's and 1980's were caused by exposure to this dust. They are concerned that they will suffer health effects from exposure to contaminated dust resulting from future remediation and/or construction on the landfill.

2. Highland Village residents are concerned that toxic smoke from the March/April 1990 landfill fire aggravated existing respiratory conditions and may result in other long-term health effects. They are concerned that the April 10-11, 1990 EPA air monitoring was too late to measure the maximum concentrations of toxic chemicals generated by this fire.

3. Highland Village residents are concerned that they may suffer adverse health effects from continuous exposure to gases such as methane, benzene, and styrene emitted from the landfill. They are concerned because the ambient air quality of their neighborhood has not been monitored.

Skin Exposure Health Concerns

4. Highland Village residents are concerned that they may suffer health effects from skin contact with contaminated stormwater runoff from the landfill that floods their neighborhood. They are concerned that the proposed remediation will increase the frequency of flooding of their neighborhood.

5. Highland Village residents are concerned that their children swam in the on-site lakes and may suffer health effects from exposure to toxic chemicals.

6. Highland Village residents are concerned that their children have suffered increased rates of eye irritation and infection from swimming at the Oleta State Recreation Area and in the lagoon

adjacent to Florida International University.

7. The manager of a youth facility northeast of the site is concerned that their children developed serious skin infections after being cut or scratched.

Other Health Concerns

8. Highland Village residents are concerned that they may have been exposed to radiation from radioactive hospital waste disposed of in the landfill.

9. Highland Village residents are concerned that their children and other trespassers on the landfill may have suffered higher rates of infection from exposure to hospital waste.

10. Highland Village residents are concerned that they may suffer health effects from contact with snakes, scorpions, and spiders, that live in the dense undergrowth along the southern boundary of the landfill.

11. Highland Village residents are concerned that people who eat landcrabs from the tidal areas near the landfill may be exposed to toxic chemicals.

12. Highland Village residents are concerned that there have been an inordinately high number of cancers in their neighborhood during the past 10 years. They are concerned these cancers are caused by exposure to toxic chemicals from the landfill.

13. One Highland Village resident has experienced intermittent swelling of the face, hands, and feet. This resident is concerned the swelling is caused by exposure to site contaminants.

We address these health concerns in the Public Health Implications, Community Health Concerns Evaluation section.

ENVIRONMENTAL CONTAMINATION AND OTHER HAZARDS

In this section, we review the environmental data. We judge the adequacy of the sampling, select contaminants of concern, and list the maximum concentration and frequency of detection of these contaminants. We then compare the maximum concentration found to background levels and to standard comparison values. We discuss on-site contamination first and off-site contamination second.

We reviewed the environmental sampling data collected at this site since 1975 and selected the following contaminants of concern:

ammonia	chloromethane	polychlorinated
benzene	coliform bacteria	biphenyls (PCBs)
di(2-ethylhexyl) phthalate	dieldrin	styrene
cadmium	lead	vanadium
carbon disulfide	methylene chloride	zinc
	pentachlorophenol	

We selected these contaminants based on the following factors:

1. Concentrations of contaminants on and off the 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 carcinogenic and noncarcinogenic endpoints.
4. Community health concerns.

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 also report that contaminant in all other media. We evaluate these contaminants in subsequent sections and determine whether exposure has public health significance.

In addition to the contaminants of concern listed above, the following chemicals were detected in the ground water at concentrations above selection guidelines:

arsenic	chlordan	molybdenum
barium	chromium	nickel
beta-BHC	manganese	strontium

We eliminated these chemicals from further consideration, however, because ground water is not a likely past, current, or future human exposure pathway. See the Pathways Analyses section for details. Appendix B contains a list of 28 chemicals found in various media at this site that lack sufficient toxicological data to determine their public health significance.

To identify industrial facilities that could contribute to the contamination near the Munisport Landfill site, we searched the 1987, 1988, and 1989 EPA Toxic Chemical Release Inventory (TRI) data base. EPA developed TRI from the chemical release information

(air, water, and soil) provided by certain industries. Two industrial facilities in the Munisport Landfill area (33181 zip code) reported releases. Only the Magnum Marine Corporation marina, 14100 Biscayne Boulevard, reported releases of site-related contaminants of concern. Magnum Marine Corporation reported non-point air releases of 2,600 pounds of styrene in 1988 and 12,000 pounds in 1989.

Four facilities within 0.5 mile of the site have requested reimbursement from the Florida DER for cleanup of leaking underground petroleum storage tanks. Dade County DERM reports ground water at three of these facilities is, or has been, contaminated with petroleum products: Dade County Water and Sewer Authority, 2575 N.E. 151st St.; Phillips 66, 14200 Biscayne Blvd.; and Florida International University, 3000 N.E. 145th St. No ground water contamination has been discovered at Rinker Materials, 2001 N.E. 146th St.

In this assessment, the contamination that exists on the site will be discussed first, separately from the contamination that occurs off the site. "On site" is defined as the area within the Munisport Landfill property boundary (Figure 3, Appendix A). This includes all land within the dike, whether or not it was used for the landfill. "On-site" also includes the small section of land between N.E. 135th St. and Biscayne Bay but excludes the State of Florida Mangrove Preserve. This definition of "on-site" is consistent with past site descriptions.

In the following subsections we discuss contamination by media: landfill leachate, soil, surface water, sediments, ground water, air, and biota. Summary tables for the contaminants of concern in each medium are located in Appendix C. These summary tables list the maximum concentrations found, frequency of detection, and background and comparison values.

A. On-site Contamination

We compiled data in this subsection from City of North Miami, Dade County Department of Environmental Resource Management (DERM), Florida Department of Environmental Regulation (DER), and Environmental Protection Agency (EPA) investigations.

On-Site Landfill Leachate

In 1980, EPA collected one grab sample from a leachate outbreak near the north end of the northwest lake (5). Because the leachate outbreaks were sporadic, EPA was unable to collect additional samples. Leachate is the liquid that has passed through landfill material and usually contains dissolved chemicals and suspended solids. EPA found elevated levels of some metals and volatile organic chemicals in the leachate. Of the metals, only the

concentration of lead was above its comparison value (Table 1, Appendix C). EPA did not analyze the leachate for extractable chemicals, pesticides, or polychlorinated biphenyls (PCBs). Without additional samples, we do not know if this sample is representative of the landfill leachate.

On-Site Soil

In 1984, EPA collected two soil samples from the landfill along the north lake and inside the dike near the southeast lake (Figure 3, Appendix A) (6). In 1988, EPA collected 23 more on-site soil samples and 2 off-site background samples (7). Figures 5-7 (Appendix A) show the locations of these soil samples, and Table 2 (Appendix C) reports the contaminants of concern and their maximum concentrations. We considered soil samples BK-1 (Biscayne Blvd. near the drive-in theater) and BK-2 (Biscayne Blvd. at N.E. 151st St.) as representative of background soil quality.

Although volatile organic chemicals, such as benzene were not detected, a few on-site soil samples contained di(2-ethylhexyl)phthalate, dieldrin, pentachlorophenol, and PCBs. Lead was found in most (18 of 25) soil samples taken on the site. Lead concentrations ranged from "not detected" to 87 milligrams per kilogram (mg/kg). Although the on-site soil lead concentrations were less than the background samples (110 and 180 mg/kg), the background samples are not representative of Florida soils. The lead concentration of most Florida soils is less than 10 mg/kg (8). The two background samples were collected along Biscayne Boulevard, a heavily traveled road likely to have high soil lead levels from deposition of leaded automobile exhaust.

Because the number of soil/fill samples is limited, we cannot determine the extent of contamination in the landfill portion of the site. Cover soil sampling on the landfill portion of the site (10 cover soil samples from 170 acres; 1 sample every 17 acres) is inadequate to fully characterize the extent of contamination. The fill material has not been sampled. Additional chemicals may be discovered and the concentrations of chemicals previously detected in the cover soil may be higher. As stated in the 1988 EPA remedial investigation report, "...limited soil sampling was conducted at the Munisport Landfill Site. There was no attempt to thoroughly characterize the soils in the landfill..." This report goes on to explain that no samples were taken from the fill material itself, only the cover soil, 0-1 foot deep (7). Thorough soil/fill sampling is especially important because of reports of hazardous waste disposal at this site. Nearby residents report the landfill operated 24 hours per day with little supervision. In 1976 Dade County DERM discovered 12 drums of liquid chemicals on the site. Recently a truck driver reported delivering drums and buckets of waste solvents to this site from a nearby boat manufacturing facility. The lack of thorough soil/fill sampling on the landfill portion of this site is a significant data gap.

Fifty surface soil samples (0 to 3 inches deep) and sixty fill material samples (5 to 10 feet deep) from the landfill portion of this site will be necessary to fully characterize the extent of contamination. This is based on an average one sample for every three acres of landfill ($170 \text{ acres}/3 = 57$; minus 10 surface samples already collected = 47). The surface soil samples (0 to 3 inches deep) are necessary to identify the contaminants to which humans may be exposed if the vegetation is removed. Fill material samples (5 to 10 feet deep) are necessary to identify the contaminants to which humans may be exposed if the landfill material is uncovered.

On-Site Surface Water

Between 1975 and 1982, Florida DER and Dade County DERM analyzed 36 water samples from the eight on-site lakes. They also analyzed water samples from inside the dike and the culverts (9). In 1984, EPA analyzed 12 water samples from the on-site lakes (6). In 1988, EPA again sampled the water from the on-site lakes. They also took four water samples from inside the dike and two at the culverts (7). Figures 8 and 9 (Appendix A) show the locations of these surface water samples, and Table 3 (Appendix C) reports the contaminants of concern and maximum concentrations. Analyses detected ammonia and coliform bacteria in most water samples, carbon disulfide and zinc in some, and other contaminants of concern in few or none. The bacteriological quality of the on-site lakes has not been tested since 1982. There is no on-site background surface water with which to compare these concentrations. For this public health assessment, these samples adequately characterize the on-site surface water quality. Up-to-date sampling is needed, however, to determine current bacterial contamination in the on-site lakes.

On-Site Sediments

In 1984, EPA analyzed 12 sediment samples from the on-site lakes (6). In 1988, EPA analyzed four additional sediment samples from these lakes and two from the culverts (7). Figures 8 and 9 (Appendix A) show the locations of these sediment samples and Table 4 (Appendix C) reports the contaminants of concern and maximum concentrations. Analyses detected ammonia, vanadium, and zinc in most sediment samples; lead and polychlorinated biphenyls (PCBs) were detected in only a few. Other contaminants of concern were not detected. There are no on-site background sediments with which to compare these concentrations. For this public health assessment, these samples adequately characterize on-site sediment quality.

On-Site Ground Water

From 1975 to 1980, Florida DER and Dade County DERM analyzed ground water from six on-site monitor wells (Figure 10, Appendix A) (9). In 1984, EPA analyzed ground water from these wells and one new

well (5). In 1987, the City of North Miami and the Florida DER analyzed the ammonia concentrations in ground water from five new on-site monitor wells (Figure 11, Appendix A) (10). In 1988, EPA analyzed ground water from 17 new on-site monitor wells (Figure 12, Appendix A) (7). We compiled analytical results for the contaminants of concern in Table 5 (Appendix C). Analyses detected ammonia in most ground water samples; coliform bacteria, lead, vanadium, and zinc in some; and other contaminants of concern in few or none. For this public health assessment, these samples adequately characterize on-site ground water quality.

We used ground water analyses from monitor wells #TW-1 (near the Biscayne Blvd. site entrance) and #MW-11A+B (about 1,000 feet west of the Biscayne Blvd. site entrance) as representative of background ground water quality.

On-Site Air

On April 10 and 11, 1990, EPA collected eight on-site air samples using Summa canisters and carbon tubes (11). This sampling was in response to complaints from nearby residents of smoke from a fire at the landfill. A fire started in the landfill material early in March 1990 and diminished by early April. Samples were taken directly from smoking vents in the landfill and also downwind (west) of the fire (Figure 13, Appendix A). The results (Table 6, Appendix C) show high concentrations of benzene in the smoke from the fire. Concentrations of benzene in the downwind sample were 100 times lower. EPA did not analyze the air samples for metals, bacteria, particulates, or extractable chemicals. EPA did not sample the background air quality for comparison.

Since EPA was unable to take air samples at the peak of the fire, these results are not representative of maximum air contaminant concentrations.

B. Off-site Contamination

"Off site" is defined as the area outside the Munisport landfill property boundary (Figure 3, Appendix A). We compiled data in this subsection from City of North Miami, Dade County Department of Environmental Resource Management (DERM), Florida Department of Environmental Regulation (DER), and Environmental Protection Agency (EPA) investigations. These agencies collected ground water, surface water, sediment, and biota (fish and oysters) from the adjacent mangrove preserve, Biscayne Bay, and Oleta River.

Off-Site Surface Soil

No off-site soil samples have been collected. We do not believe off-site surface soil sampling is necessary since there have been no reports or evidence of off-site disposal. Also, there have been

no reports or evidence of significant transport of site contaminants to off-site surface soils. Stormwater run-off from the site has been mostly through the mangrove preserve where EPA has collected sediment samples.

Off-Site Surface Water

Between 1975 and 1982, Florida DER and Dade County DERM analyzed surface water samples from an off-site canal (9). In 1988, EPA analyzed four water samples from outside the dike, five from the canal south of the site, three from Biscayne Bay near the site, eight from the Oleta River, and one from the lagoon east of the site (7). In 1989, EPA analyzed five water samples from the mangrove preserve southeast of the site (12). Figures 9 and 14 (Appendix A) show the locations of these surface water samples and Table 7 (Appendix C) reports the contaminants of concern and maximum concentrations. Although impacted by nearby discharges, we used surface water samples #OR-6 (Oleta River north of North Miami Beach Boulevard), DC-1 (Dania Creek culvert), BP-1 (Black Point Creek), and BC (Biscayne Creek) as representative of off-site background surface water quality.

Analyses detected vanadium and coliform bacteria in most surface water samples, ammonia and carbon disulfide in some, and other contaminants of concern in few or none. The concentration of vanadium in the background sample was slightly greater than the maximum concentration in any other off-site samples. For this public health assessment, these samples adequately characterize off-site surface water quality.

Off-Site Sediments

In 1984, EPA analyzed one sediment grab sample from the mangrove preserve southeast of the site (6). In 1988, EPA analyzed four sediment grab samples from the mangrove preserve and five from the Oleta River (7). In 1989, EPA analyzed six additional sediment grab samples from the mangrove preserve (9). Figures 9 and 14 (Appendix A) show the locations of these samples, and Table 8 (Appendix C) reports the contaminants of concern and maximum concentrations. Analyses detected ammonia, vanadium, and zinc in most samples; lead in some; and other contaminants of concern in few or none. For this public health assessment, these samples adequately characterize off-site sediment quality.

We used sediment sample #OR-6 (Oleta River north of North Miami Beach Boulevard) and the six regional sediment samples from the 1989 EPA Water Quality and Toxic Assessment Study (12) as representative of background sediment quality.

Off-Site Ground Water

From 1975 to 1980, Florida DER and Dade County DERM analyzed ground

water from six off-site monitor wells (9). In 1984, EPA analyzed ground water from three new wells (6). In 1988, EPA analyzed ground water from 10 new off-site monitor wells (7). Figures 10 and 12 (Appendix A) show the locations of these wells. We compiled analytical results for the contaminants of concern in Table 9 (Appendix C). Analyses detected ammonia in all ground water samples, lead and zinc in some, and other contaminants of concern in few or none. For this public health assessment, these samples adequately characterize off-site ground water quality.

We used ground water analyses from monitor wells #TW-1 (near the Biscayne Blvd. site entrance) and #MW-11A+B (about 1,000 feet west of the Biscayne Blvd. site entrance) as representative of background ground water quality.

Off-Site Biota

In 1987 the U.S. Fish and Wildlife Service collected eight fish and oyster samples from the State mangrove preserve and Biscayne Bay near the site. For comparison, they also collected six fish and oyster samples from areas of Biscayne Bay distant from the site. EPA analyzed these samples for metals, pesticides, and polychlorinated biphenyls (PCBs) (7). Figures 15-18 (Appendix A) show the sampling locations and Table 10 (Appendix C) summarizes the maximum concentrations of the contaminants of concern. Analyses identified zinc and PCBs in both fish and oysters near the site and at background locations away from the site. From the pattern of fish and oyster contamination, it does not appear that this site is the source of PCBs in Biscayne Bay. Additional samples are necessary to determine the extent of PCB contamination of fish, oyster, and other aquatic life in Biscayne Bay and the resulting threat to public health.

Off-Site Air

There are no air quality data for Highland Village mobile home park or other neighborhoods near the site. There are no air quality data on dust when the landfill was in operation. Since on-site air monitoring occurred after the 1990 landfill fire had subsided, we cannot determine the maximum off-site air concentrations. The site is now heavily vegetated, and off-site migration of contaminated dust is unlikely. Any future remediation, construction, or development that removes vegetation or uncovers the landfill material, however, may generate contaminated dust.

C. Quality Assurance and Quality Control

EPA confirmed that their analytical data underwent a formal quality assurance and quality control validation. We could not review this data review summary since it has already been archived. We assumed

that estimated data (J) and presumptive data (N) were valid. This assumption errs on the side of public health by assuming that a contaminant exists when actually it may not exist. Florida DER and Dade County DERM did not perform formal data reviews on the samples they collected. We assume these data are valid, however, since environmental samples were collected and analyzed by state 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.

D. Physical and Other Hazards

A 30-foot high mound of soil exists in the middle of the landfill. Although it is covered with vegetation, a 10-foot cliff where the soil has eroded could be a physical hazard to children who play on it. Dense undergrowth along the southwest site boundary next to the Highlands Village mobile home park harbors snakes, scorpions, and spiders that may threaten the health of these residents. These animals are not related to site contamination but are native to this area and thrive in the dense undergrowth.

As described in the previous section, prior to 1982 Florida DER and Dade County DERM found high levels of coliform bacteria in the on-site lakes. Children swimming in these lakes were at risk of infections such as hepatitis, meningitis, and gastroenteritis. The bacteriological quality of these lakes, however, has not been tested since 1982.

PATHWAYS ANALYSES

To determine whether nearby residents are exposed to contaminants migrating from the site, we evaluate 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.

We categorize exposure pathways 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: exposure could have occurred, could be occurring, or could occur in the future. An exposure pathway is eliminated if at least one of the five elements is missing and will never be present.

Table 11 (Appendix C) identifies the completed exposure pathways and Table 12 (Appendix C) identifies the potential exposure pathways. Only those pathways that are important and relevant to this site are discussed in detail.

A. Completed Exposure Pathways

Soil Pathway

Contaminated landfill soil/fill is a source, medium, and point of exposure for past, present, and future exposures (Table 11, Appendix C). There is ample evidence to support residents' assertions that children play and ride bicycles/motorbikes on the site. These children (number unknown) are the receptor population exposed to contaminated surface soil via skin contact and incidental ingestion.

Surface Water Pathway

Contaminated surface water in the on-site lakes is a medium and point of exposure for past, current, and future exposures (Table 11, Appendix C). Surface water contamination most likely originated in the landfill contents and leached into the adjacent lakes. Residents report that children (number unknown) swim in these lakes. Exposure occurs during swimming via skin absorption and incidental ingestion of the water.

Fish and Oyster Pathway

Ingestion of fish and oysters from Biscayne Bay is a past, current, and future exposure pathway (Table 11, Appendix C). The concentrations of PCBs in the fish and oysters collected near the site were similar to the concentrations collected from other distant areas of Biscayne Bay. This pattern suggests this site is not the source of PCBs in Biscayne Bay. Given its close proximity to a large urban area, there are many possible sources of the polychlorinated biphenyls (PCBs) found in the fish and oysters of Biscayne Bay. PCBs are adsorbed to particulate matter and carried from upland areas to the bay suspended in surface water or stormwater run-off. Fish and oysters then accumulate PCBs from particulates in the water. People who eat these contaminated fish and oysters are exposed via ingestion. Sport and subsistence fishing occurs in Biscayne Bay. Although, Biscayne Bay is closed to commercial oyster harvesting, the Dade County Public Health Unit reports unregulated private oyster harvesting and consumption. The number of people who eat fish and oysters from Biscayne Bay is unknown.

Air Pathway

Inhalation of contaminated dust is a past and future air exposure pathway (Table 11, Appendix C). Contaminated soils and fill material are sources of contaminated dust. Contaminated dust, generated by heavy machinery during landfill operations and by dirt bikes after the landfill closed, may have been carried by winds to the Highlands Village mobile home park. Approximately 1,500 residents of Highland Village mobile home park may have been exposed by inhalation. We cannot evaluate this pathway, however, since airborne dust was not tested. Currently, generation of dust from the landfill is unlikely due to the heavy vegetative cover. Future exposure is possible if the vegetation is cleared and the site is remediated or developed.

Inhalation of contaminated smoke is a past and future air exposure pathway (Table 11, Appendix C). The landfill material that caught fire in 1990 was the source of airborne contamination. The residents of Highland Village mobile home park (approximately 1,500) reported inhalation exposure to heavy black smoke. We cannot fully evaluate this pathway, however, since EPA was unable to mobilize an air sampling team in time to collect air samples before the fire subsided. Future exposure is possible if the landfill burns again.

B. Potential Exposure Pathways

Stormwater Run-off Pathway

Skin contact with contaminated stormwater run-off is a potential past and future exposure pathway for approximately 500 (one-third of the total) residents of Highland Village (Table 12, Appendix C). Occasionally, heavy rains cause the southeast landfill lake to overflow and flood the eastern third of Highland Village. On average, these rains may occur once every 2-3 years and leave standing water for 2 to 3 days. We can only classify this exposure as potential since the stormwater run-off has not been sampled.

Landfill Leachate Pathway

Skin contact with the leachate from the landfill was a potential past exposure pathway for an unknown number of site trespassers (Table 12, Appendix C). Before the landfill closed, EPA found leachate flowing from the landfill material into one of the on-site lakes. We can only classify this exposure as potential since we do not know if site trespassers came in contact with this leachate.

Soil Pathway

Incidental ingestion and skin contact with contaminated soil is a potential pathway for future site workers (Table 12, Appendix C). Contaminated soil would be the source, medium, and point of exposure. Incidental ingestion and skin contact would be the routes of exposure and remedial workers would be the exposed population. This is a potential pathway, however, since exposure may or may not occur.

Soil Gas Pathway

Inhalation of gases from the landfill is a future potential pathway for residents of Highland Village mobile home park (Table 12, Appendix C). If significant areas of the landfill adjacent to the Highland Village mobile home park are paved, landfill gases that currently migrate upward and dissipate may migrate latterly into Highland Village. Landfill material would be the source, air the medium, and houses in Highland Village the point of exposure. Inhalation would be the route of exposure and the residents of Highland Village the potentially exposed population. We categorize this pathway as future potential since exposure may or may not occur in the future.

C. Eliminated Pathways

Past, present, or future human exposure to the contaminated ground water at this site is unlikely. In Dade County, ground water near Biscayne Bay is not potable due to saltwater intrusion. Before Munisport began landfill operations in 1974, drinking water and irrigation wells near the Bay were abandoned due to saltwater intrusion. Although there have been reports of private well use in this area as late as 1985, most homes and businesses are supplied with municipal water from wells further inland. Currently there are no plans to use ground water in this area. It is unlikely that contamination from this site will migrate inland since regional ground water flow is toward Biscayne Bay. Since human exposure to the contaminated ground water is unlikely, we will not discuss it in the remainder of this assessment.

Past, present, or future human exposure to the contaminated sediments is also unlikely since they remain covered with water and unavailable for skin absorption or incidental ingestion.

PUBLIC HEALTH IMPLICATIONS

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

Soil Pathway

Incidental ingestion and skin contact with contaminated soil is a potential pathway for future site workers (Table 12, Appendix C). Contaminated soil would be the source, medium, and point of exposure. Incidental ingestion and skin contact would be the routes of exposure and remedial workers would be the exposed population. This is a potential pathway, however, since exposure may or may not occur.

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Past, present, or future human exposure to the contaminated ground water at this site is unlikely. In Dade County, ground water near Biscayne Bay is not potable due to saltwater intrusion. Before Munisport began landfill operations in 1974, drinking water and irrigation wells near the Bay were abandoned due to saltwater intrusion. Although there have been reports of private well use in this area as late as 1985, most homes and businesses are supplied with municipal water from wells further inland. Currently there are no plans to use ground water in this area. It is unlikely that contamination from this site will migrate inland since regional ground water flow is toward Biscayne Bay. Since human exposure to the contaminated ground water is unlikely, we will not discuss it in the remainder of this assessment.

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PUBLIC HEALTH IMPLICATIONS

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percentile daily intake averaged over three days for consumers of fin fish) multiplied by 50% (an estimate of the percentage of a individual's total fish consumption that comes from Biscayne Bay).

Ammonia

Trespassers on the site may have been exposed to ammonia via incidental ingestion of the soil. They may also have been exposed to ammonia via incidental ingestion of the surface water when swimming in the on-site lakes. These exposures, however, are unlikely to cause adverse health effects.

The estimated daily dose of ammonia from incidental ingestion of contaminated soil is less than the ATSDR intermediate Minimal Risk Level (MRL) (14). A chronic MRL is not available for comparison. Ammonia has not been identified as causing cancer. Therefore, for exposures of less than a year, incidental ingestion of ammonia contaminated soil at this site is unlikely to cause adverse health effects. Adverse health effects from exposure to ammonia from these soils via skin absorption is also unlikely since skin absorption is insignificant compared to ingestion.

The estimated daily dose of ammonia from incidental ingestion of contaminated water (during swimming) is less than the ATSDR intermediate Minimal Risk Level (MRL) (14). A chronic MRL is not available for comparison. Ammonia has not been identified as causing cancer. Therefore, for exposures of less than a year, incidental ingestion of ammonia contaminated surface water when swimming in the on-site lakes is unlikely to cause adverse health effects. Adverse health effects from exposure to ammonia from this water via skin absorption are also unlikely since skin absorption is insignificant compared to ingestion.

Even though children 1 to 6 years old are unlikely to swim in these lakes and children 6 to 18 years old are less likely to ingest soil, a combination of the estimated doses for both of the above routes of exposure would not exceed the MRL. That is, children exposed to ammonia at this site by both incidental ingestion of contaminated soil and ingestion of contaminated water during swimming, are unlikely to suffer ill health effects.

Although EPA did not analyze any biota samples for ammonia, ammonia does not bioaccumulate in fish and oysters. EPA did not analyze the air samples for ammonia. Although EPA did not analyze the landfill leachate sample for ammonia and has not analyzed any stormwater samples, we consider skin absorption from these two sources insignificant.

Benzene

Although EPA measured benzene in the smoke coming from the landfill, we cannot evaluate the public health threat for two

reasons. First, EPA was unable to mobilize an air sampling team before the fire subsided. The benzene concentrations at the peak of the fire may have been higher. Second, EPA collected the air samples at the landfill, not in the nearby residential neighborhoods where human exposure occurred. We do not know how much the benzene in the smoke was diluted before it reached these residents. In 1990 and 1991 memos, ATSDR concluded that the measured benzene concentrations were unlikely to have caused health effects in nearby residents. ATSDR failed, however, to address the fact that these measurements were taken weeks after the fire subsided.

The maximum benzene concentration measured in the smoke directly from the landfill exceeds the draft ATSDR acute Minimal Risk Level (15). Short-term (1-14 days) inhalation of benzene at this concentration could result in damage to the immune system. Long-term (> 1 year) inhalation of benzene at this concentration could result in a "moderate" increased risk of cancer. Although EPA did not detect benzene in the downwind air samples, we do not know the maximum residential benzene concentrations and therefore cannot evaluate the public health threat.

Benzene was not detected in the landfill leachate sample or any soil or surface water samples. Although EPA did not analyze any biota samples for benzene, benzene does not bioaccumulate in fish and oysters. Although stormwater run-off has not been sampled, it is unlikely to contain benzene since it was not detected in any surface water samples.

Cadmium

Trespassers on the site may have been exposed to cadmium via incidental ingestion of contaminated surface water when swimming in the on-site lakes. This exposure, however, is unlikely to cause adverse health effects.

The estimated daily dose of cadmium from incidental ingestion of water (during swimming) is less than the draft ATSDR chronic Minimal Risk Level (MRL) (16). Thus, incidental ingestion of surface water when swimming in the on-site lakes is unlikely to cause adverse health effects. Adverse health effects from exposure to cadmium in this water via skin absorption are also unlikely since skin absorption is insignificant compared to ingestion.

EPA did not detect cadmium in the surface soil, the landfill leachate sample, or the fish and oysters tested. EPA did not test the air samples for cadmium.

Carbon Disulfide

Trespassers on the site may have been exposed to carbon disulfide via incidental ingestion of contaminated surface water when

swimming in the on-site lakes. This exposure, however, is unlikely to cause adverse health effects.

The estimated daily dose of carbon disulfide from incidental ingestion (during swimming) is less than the EPA Reference Dose (RfD) (17). Skin absorption of carbon disulfide is likely but the rate is unknown. Carbon disulfide has not been identified as causing cancer. Therefore, incidental ingestion of carbon disulfide contaminated surface water when swimming in the on-site lakes is unlikely to cause adverse health effects.

EPA did not detect carbon disulfide in the soil. The fish and oysters were not tested for carbon disulfide but carbon disulfide is not known to bioaccumulate. EPA did not test the landfill leachate sample or the air samples for carbon disulfide.

Chloromethane

Trespassers on the site may have been exposed to chloromethane via incidental ingestion of contaminated surface water when swimming in the on-site lakes. This exposure, however, is unlikely to cause adverse health effects.

Although there is no evidence of chloromethane causing cancer in humans, EPA has classified chloromethane as a possible human carcinogen based on limited evidence in animal testing. The concentrations at this site are so low, however, that the risk of cancer from incidental ingestion of the surface water is insignificant. Skin absorption of chloromethane is likely but the rate is unknown. Therefore, incidental ingestion of chloromethane contaminated surface water when swimming in the on-site lakes is unlikely to cause adverse health effects.

EPA detected chloromethane in one air sample but the concentration was below the ATSDR chronic inhalation Minimal Risk Level (MRL) and is unlikely to cause any adverse health effect (18). EPA did not detect chloromethane in the soil. The fish and oysters were not tested for chloromethane but chloromethane is not known to bioaccumulate. EPA did not test the landfill leachate sample for chloromethane.

Coliform Bacteria

In the past, children and other trespassers on the site may have been exposed to coliform bacteria via incidental ingestion of contaminated water when swimming in the on-site lakes. This exposure may have caused adverse health effects. We can not determine the current health threat from swimming in these lakes because they have not been tested for coliform bacteria since 1982.

There are no standards to compare an estimate of the dose of coliform bacteria that children swimming in the on-site lakes may

have been exposed to. The maximum concentration of total coliform bacteria measured by Florida DER and Dade County DERM in the on-site lakes prior to 1982, however, was 5,400 times the state drinking water standard and 5.4 times the state surface water standard (19). Although not considered Superfund hazardous waste, coliform bacteria are indicators of fecal contamination. Florida DER and Dade County DERM also measured elevated concentrations of fecal coliform and fecal streptococcus bacteria in these lakes. Thus children swimming in the on-site lakes may have been exposed to disease causing bacteria or viruses. As a result of this exposure, these children were at a higher risk of infections such as hepatitis, meningitis, and gastroenteritis.

Dieldrin

Trespassers on the site may have been exposed to dieldrin via incidental ingestion of the contaminated soil. People eating fish and oysters from Biscayne Bay may also have been exposed to dieldrin. The combined exposure to soil, fish, and oyster, however, are unlikely to cause adverse health effects.

The estimated daily doses of dieldrin from ingestion of contaminated fish and oysters and incidental ingestion of contaminated soil are less than the EPA oral Reference Dose (RfD) (20). Although there is no evidence of dieldrin causing cancer in humans, EPA has classified dieldrin as a probable human carcinogen based on limited evidence in animal testing. The fish, oyster, and soil concentrations are so low, however, that the risk of cancer is insignificant. Therefore, incidental ingestion of dieldrin contaminated soil and ingestion of dieldrin contaminated fish and oysters and at this site is unlikely to cause adverse health effects. Adverse health effects from exposure to dieldrin from these soils via skin absorption is also unlikely since skin absorption is insignificant compared to ingestion.

EPA did not detect dieldrin in any surface water samples.

Di(2-ethylhexyl)phthalate

Trespassers on the site may have been exposed to di(2-ethylhexyl)phthalate via incidental ingestion of the contaminated soil. The maximum soil concentrations, however, are unlikely to cause adverse health effects.

The estimated daily dose of di(2-ethylhexyl)phthalate from incidental ingestion is less than the estimated chronic Minimal Risk Level (MRL) (21). Di(2-ethylhexyl)phthalate has been identified as causing cancer in laboratory animals. The soil concentrations are so low, however, that the risk of cancer from incidental ingestion is insignificant. Therefore, incidental ingestion of di(2-ethylhexyl)phthalate contaminated soil at this site is unlikely to cause adverse health effects. Adverse health

effects from exposure to di(2-ethylhexyl)phthalate from these soils via skin absorption is also unlikely since skin absorption is insignificant compared to ingestion.

EPA did not detect di(2-ethylhexyl)phthalate in any surface water samples. EPA did not analyze the landfill leachate sample, the air samples, or the fish and oyster samples for di(2-ethylhexyl)-phthalate.

Lead

Trespassers on the site may have been exposed to lead via incidental ingestion of contaminated surface soil and incidental ingestion of contaminated surface water when swimming in the on-site lakes. Although ATSDR and EPA have no lead exposure guidelines (MRLs or RfDs) for comparison (22), we estimate the combined exposure to on-site soil and surface water are unlikely to cause adverse health effects. EPA did not detect lead in the fish or oysters.

The Centers for Disease Control of the U.S. Public Health Service estimates that blood lead levels generally rise 3-7 micrograms per deciliter ($\mu\text{g}/\text{dL}$) for every 1,000 milligram per kilogram (mg/kg) increase in soil lead concentration (23). Thus the maximum soil lead concentration on the site, 87 mg/kg , is unlikely to increase the blood lead level of children trespassing on this site past the 10 $\mu\text{g}/\text{dL}$ definition of lead poisoning. Although the maximum concentration of lead in the on-site lakes (0.063 mg/L) is four times greater than the Florida drinking water standard (0.015 mg/L), we estimate the annual volume of water ingested during swimming in these lakes is 100 times less than the annual volume of water ingested from drinking water sources. Therefore, we estimate the dose of lead from incidental ingestion during swimming in these lakes is about 25 times less than the dose from drinking water at the Florida standard.

Methylene Chloride

Although EPA measured methylene chloride in the smoke coming from the landfill, we cannot evaluate the public health threat for two reasons. First, EPA was unable to mobilize an air sampling team until the fire subsided. The methylene chloride concentrations at the peak of the fire may have been higher. Second, EPA collected the air samples at the landfill, not in the nearby residential neighborhoods where human exposure occurred. We do not know how much the methylene chloride in the smoke was diluted before it reached these residents. In 1990 and 1991 memos, ATSDR concluded that the measured methylene chloride concentrations were unlikely to have caused health effects in nearby residents. ATSDR failed, however, to address the fact that these measurements were taken weeks after the fire subsided.

The concentration of methylene chloride measured in the smoke directly from the landfill fire is less than the draft ATSDR acute and intermediate Minimal Risk Levels (MRLs) (24). A chronic MRL is unavailable. Although there is no evidence of methylene chloride causing cancer in humans, EPA has classified it as a probable human carcinogen based on limited evidence in animal testing. The risk of cancer from exposure to the maximum methylene chloride concentration measured, however, is insignificant.

EPA did not detect methylene chloride in the landfill leachate sample nor in any soil or surface water samples. Although EPA did not analyze any biota samples for methylene chloride, it does not bioaccumulate in fish and oysters.

Pentachlorophenol

Trespassers on the site may have been exposed to pentachlorophenol via incidental ingestion of the contaminated soil. The maximum soil concentrations, however, are unlikely to cause adverse health effects.

The estimated daily dose of pentachlorophenol from ingestion of contaminated soil is less than the intermediate ATSDR Minimal Risk Level (MRL) (25). A chronic MRL is not available. Although there is no evidence of pentachlorophenol causing cancer in humans, EPA has classified pentachlorophenol as a possible human carcinogen based on limited evidence in animal tests. The soil concentrations are so low, however, that the risk of cancer from incidental ingestion is insignificant. Therefore, incidental ingestion of pentachlorophenol contaminated soil at this site is unlikely to cause adverse health effects. Adverse health effects from exposure to pentachlorophenol from these soils via skin absorption is also unlikely since skin absorption is insignificant compared to ingestion.

EPA did not detect pentachlorophenol in any surface water samples. EPA did not analyze the landfill leachate sample, the air samples, or the fish and oyster samples for pentachlorophenol.

Polychlorinated Biphenyls (PCBs)

People eating fish and oysters from Biscayne Bay may have been exposed to polychlorinated biphenyls (PCBs). Long-term ingestion of fish and oysters at the maximum PCB concentration found may affect the immune system and result in a "low" increased risk of cancer. The pattern of fish and oyster contamination, however, suggest that this site is not the source of PCBs in Biscayne Bay. Trespassers on the site may have also been exposed to PCBs via incidental ingestion of the contaminated soil. The maximum soil concentrations, however, are unlikely to cause adverse health effects.

The estimated daily dose of PCBs from eating contaminated fish and oysters from Biscayne Bay exceeds the draft ATSDR chronic MRL (26). In contrast, the maximum fish and oyster PCB concentrations are less than the U.S. Food and Drug Administration (FDA) tolerance level of 2 mg/kg for fish and shellfish (27). FDA tolerance levels are maximum allowable levels of poisonous substances in human food and animal feed. Based on the ATSDR chronic MRL, we conclude that lifetime consumption of fish and oysters from Biscayne Bay at the maximum PCB concentrations would result in a "low" increased risk of cancer.

The estimated daily dose of PCBs from incidental ingestion of contaminated soil is less than the draft ATSDR chronic Minimal Risk Level (MRL) (26). Although there is no evidence of PCBs causing cancer in humans, EPA has classified PCBs as probable human carcinogens based on limited evidence in animal tests. The soil concentrations are so low, however, that the risk of cancer from incidental ingestion is insignificant. Therefore, incidental ingestion of PCB contaminated soil at this site is unlikely to cause adverse health effects. Adverse health effects from exposure to PCBs in these soils via skin absorption is also unlikely since skin absorption is insignificant compared to ingestion.

EPA did not detect PCBs in any surface water samples. EPA did not analyze the landfill leachate sample or the air samples for PCBs.

Styrene

Although EPA measured styrene in the smoke coming from the landfill, we cannot evaluate the public health threat for two reasons. First, EPA was unable to mobilize an air sampling team until the fire subsided. The styrene concentrations at the peak of the fire may have been higher. Second, EPA collected the air samples at the landfill, not in the nearby residential neighborhoods where human exposure occurred. We do not know how much styrene in the smoke was diluted before it reached these residents. In 1990 and 1991 memos, ATSDR concluded that the measured styrene concentrations were unlikely to have caused health effects in nearby residents. ATSDR failed, however, to address the fact that these measurements were taken weeks after the fire subsided.

The maximum styrene concentrations measured in the undiluted smoke directly from the landfill exceeds the draft ATSDR chronic Minimal Risk Level (28). Long-term inhalation (> 1 year) of styrene at this concentration could result in damage to the blood system and a "moderate" increased risk of cancer. Although EPA did not detect styrene in the downwind air samples, we do not know the maximum residential styrene concentrations and therefore cannot evaluate the public health threat.

Styrene was not detected in any soil or surface water samples.

Although EPA did not analyze any biota samples for styrene, it does not bioaccumulate in fish and oysters. EPA did not analyze the landfill leachate sample for styrene.

Vanadium

Trespassers on the site may have been exposed to vanadium via incidental ingestion of contaminated water when swimming in the on-site lakes. People eating fish and oysters from Biscayne Bay may also have been exposed to vanadium. The combined exposures from the surface water and fish and oyster, however, are unlikely to cause 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) (29). A chronic MRL is unavailable. Vanadium has not been identified as causing cancer. Therefore, incidental ingestion of vanadium contaminated surface water when swimming in the on-site lakes is unlikely to cause adverse health effects. Adverse health effects from exposure to vanadium via skin absorption is also unlikely since vanadium is not well absorbed across the skin.

The estimated maximum dose of vanadium from ingestion of contaminated fish and oysters is less than the draft ATSDR intermediate Minimal Risk Level (MRL) (28). A chronic MRL is unavailable. There is no evidence of vanadium causing cancer. Therefore, the maximum vanadium concentration in fish or oysters tested is unlikely to cause any adverse health effects.

EPA did not detect vanadium in the surface soil or the landfill leachate samples. EPA did not test the air samples for vanadium.

Zinc

Trespassers on the site may have been exposed to zinc via incidental ingestion of the contaminated soil and incidental ingestion of contaminated water when swimming in the on-site lakes. People eating fish and oysters from Biscayne Bay may also have been exposed to zinc. The combined exposures from soil, surface water, and fish and oyster, however, are unlikely to cause adverse health effects.

The estimated daily dose of zinc from incidental ingestion of contaminated soils is less than the estimated ATSDR chronic Minimal Risk Level (MRL) (30). Zinc has not been shown to cause cancer. Therefore, incidental ingestion of zinc contaminated soil at this site is unlikely to cause adverse health effects. Adverse health effects from exposure to zinc in these soils via skin absorption is also unlikely since zinc is not well absorbed across the skin.

The estimated daily dose of zinc from incidental ingestion of water

(during swimming) is less than the estimated ATSDR chronic Minimal Risk Level (MRL) (30). Zinc has not been identified as causing cancer. Therefore, incidental ingestion of zinc contaminated water when swimming in the on-site lakes is unlikely to cause adverse health effects. Adverse health effects from exposure to zinc from this water via skin absorption is also unlikely since zinc is not well absorbed across the skin.

The estimated daily dose of zinc from eating contaminated fish and oysters is less than the estimated ATSDR chronic Minimal Risk Level (MRL) (30). There is no evidence of zinc causing cancer. Therefore, the maximum zinc concentration in fish or oysters tested is unlikely to cause any adverse health effects.

We believe it is unlikely that skin contact with the landfill leachate resulted in significant exposure to zinc since zinc is not well absorbed. EPA did not test the air samples for zinc.

B. Health Outcome Data Evaluation

Guided by community concerns of increased cancer incidence in the population living near the site, Florida HRS epidemiologists reviewed the Florida Cancer Data System (FCDS). See the Background, Health Outcome Data section of this report for a description of the FCDS. Florida HRS epidemiologists found no significant excess of all cancers in the 33181 zip code, which includes the site and surrounding neighborhoods. There are, however, limitations with FCDS and environmental epidemiology investigations.

1. Analyzing cancer rates for the entire 33181 ZIP code, which includes people who live more than a mile from the site, decreases our ability to detect excess cancers among the people who live next to the site. The larger population in this ZIP code could mask any increased cancer incidence in the Highland Village mobile home park. Unfortunately, ZIP codes are the smallest geographical unit in FCDS. Approximately 1,500 people live in Highland Village next to the site and 12,000 people live in the 33181 ZIP code. It is not possible to analyze FCDS cancer rates for just Highland Village.

2. In environmental epidemiology, exposure assessment is difficult. As with most Superfund sites, we do not have direct measures of exposure at this site. We do not know to which chemicals, to how much of each chemical, and for how long people were actually exposed. In our analysis of the cancer rates, we used the distance from the place of residence to site as an estimate of exposure. Although distance from the place of residence to the site is a poor estimate of exposure, at this site, it is the best estimate we have.

3. The high background incidence of cancer makes small increases hard to detect. The background frequency of cancer in the United States is approximately 25%. Increase in the cancer rate near this site would have to be significant to be detected.

In general, failure to establish a link between the site and the health of nearby residents may be more indicative of the limitations of the existing data and epidemiological methods than the lack of an effect. Based on the available data and epidemiological methods, we can not determine if the Munisport Landfill has caused an increase in the incidence of cancer among residents of the Highland Village mobile home park.

C. Community Health Concerns Evaluation

We address community health concern as follows:

Air Exposure Health Concerns

1. Highland Village residents are concerned that until the landfill closed and heavy vegetation covered the site, they were exposed to contaminated dust including asbestos. They are concerned that rashes, respiratory illnesses, and infections they suffered in the 1970's and 1980's were caused by exposure to this dust. They are concerned that they will suffer health effects from exposure to contaminated dust resulting from future remediation and/or construction on the landfill.

Since there was no air quality monitoring before heavy vegetation covered the site, we do not know if nearby residents were exposed to contaminated dust or asbestos. Thus, we cannot determine if the reported rashes, respiratory illnesses, and infections were caused by exposure to contaminated dust from the landfill. Since the site is now covered with heavy vegetation, exposure to contaminated dust is unlikely. During any future remediation, construction, or development that removes vegetation or uncovers landfill material dust should be controlled and the air on site and in Highland Village should be monitored for contamination, including asbestos.

2. Highland Village residents are concerned that toxic smoke from the March/April 1990 landfill fire aggravated existing respiratory conditions and may result in other long-term health effects. They are concerned that the April 10-11, 1990 EPA air monitoring was too late to measure the maximum concentrations of toxic chemicals generated by this fire.

Suspended particulates in the smoke from the March/April 1990 fire may have aggravated existing respiratory conditions. Any kind of suspended particulates, including those in smoke, are difficult for people with respiratory conditions to tolerate.

We cannot evaluate the public health threat from inhalation of toxic chemicals from this fire since we do not know the maximum concentrations nearby residents were exposed to. We cannot estimate maximum residential exposure concentrations from air samples taken at the landfill after the fire had subsided. Chemical concentrations at the landfill during the peak intensity of the fire may have been higher. Chemical concentrations at nearby residences, however, may have been lower due to dilution. Without peak residential measurements, we cannot estimate exposure or predict health effects.

3. Highland Village residents are concerned that they may suffer adverse health effects from continuous exposure to gases such as methane, benzene, and styrene emitted from the landfill. They are concerned because the ambient air quality of their neighborhood has not been monitored.

Decaying garbage in landfills produces methane. Methane is a non-toxic gas which rises to the top of the landfill and disperses in the air. Concentrations of methane are not likely to accumulate to dangerous levels except under buildings or other enclosed spaces where it can be an explosion hazard. Benzene and styrene were measured in the smoke from the landfill fire. It is highly unlikely, however, that under current conditions concentrations of benzene, styrene, or other gases from the landfill could accumulate to toxic concentrations in the air above the landfill or in the surrounding neighborhoods. Air monitoring in an suburban area such as North Miami is likely to measure gases from other sources such as gas stations, manufacturing facilities, and automobile exhaust. Therefore, under current conditions, air monitoring for these gases is not warranted.

Skin Exposure Health Concerns

4. Highland Village residents are concerned that they may suffer health effects from skin contact with contaminated stormwater that runs off the landfill and floods their neighborhood. They are concerned that the proposed remediation will increase the frequency of flooding of their neighborhood.

Skin contact with the water in the on-site lakes is not likely to cause adverse health effects. Of the contaminants of concern that readily cross the skin, the concentrations are too low to cause health effects. The stormwater run-off from these lakes, however, has not been tested and may be different

due to suspended particulates. Florida DER plans to analyze the stormwater run-off next time it floods Highland Village. Until the stormwater run-off is analyzed, we can not determine its health threat.

EPA, Florida DER, and the City of North Miami plan to further characterize the local hydrology and develop a plan to control stormwater runoff and flooding in Highland Village.

5. Highland Village residents are concerned that their children swam in the on-site lakes and may suffer health effects from exposure to toxic chemicals.

Although not a Superfund hazardous waste, the coliform bacteria in the on-site lakes are indicative of fecal contamination. In the past, children swimming in these lakes may have been exposed to disease causing bacteria or viruses via incidental ingestion of the contaminated water and may have suffered a higher rate of infection and illness such as hepatitis, meningitis, and gastroenteritis. It is not possible to determine the current health threat from swimming in these lakes because they have not been tested for coliform bacteria since 1982. It is unlikely that children will suffer health effects from exposure to the chemicals found in these lakes since the concentrations were low.

6. Highland Village residents are concerned that their children have suffered increased rates of eye irritation and infection from swimming at the Oleta State Recreation Area and in the lagoon adjacent to Florida International University.

We cannot evaluate the possibility of infections from swimming in these two bodies of water since they have not been tested for bacteria or viruses. It is unlikely, however, that this site is the source of bacterial contamination of nearby surface water. Bacterial transport via stormwater run-off is unlikely since stormwater run-off from this site is infrequent. Similarly, bacterial transport via ground water is restricted by the filtering effect of the aquifer material.

7. The manager of a youth facility northeast of the site is concerned that their children developed serious skin infections after being cut or scratched.

Although we can not determine the source of these infections, it is possible they were the result of swimming in the on-site lakes, especially if the levels of bacterial contamination had not changed since 1982.

Other Health Concerns

8. Highland Village residents are concerned that they may have been exposed to radiation from radioactive hospital waste disposed of in the landfill.

In January 1989, Dade County Public Health Unit personnel removed a small pile of hospital waste from the landfill. Some of it may have been radioactive. Most of the radioactive isotopes used in hospitals and doctor's offices, however, have short half-lives (days or weeks). Florida HRS requires hospitals and doctors to hold radioactive waste for 10 half-lives. After 10 half-lives, the remaining radioactivity is insignificant. If radioactive waste from hospitals or doctor's offices was ever buried at this landfill, it is unlikely that it posed a health threat. Most of these isotopes are short lived and the radiation is too weak to penetrate even a thin layer of soil.

9. Highland Village residents are concerned that their children and other trespassers on the landfill may have suffered higher rates of infection from exposure to hospital waste.

In January 1989, Dade County Public Health Unit personnel removed a small pile of hospital waste from the landfill. They concluded that this waste was old, dried out, and not a health threat.

10. Highland Village residents are concerned that they may suffer health effects from contact with snakes, scorpions, and spiders that live in the dense undergrowth along the southern landfill boundary.

Highland Village residents may suffer adverse health effects from contact with snakes, scorpions, and spiders that live in the dense undergrowth along the southern landfill boundary. We recommend that the appropriate local, state, or federal agency clear and maintain a buffer free of dense undergrowth (15 feet minimum) along the southwest site boundary where it borders the Highlands Village mobile home park. We also recommend that Highland Village residents clear their property of dense undergrowth and debris.

11. Highland Village residents are concerned that people who eat landcrabs from the tidal areas near the landfill may be exposed to toxic chemicals.

During the two to three weeks of the year when they are abundant, landcrabs are eaten by only a few people. Until these crabs are tested we cannot evaluate possible health effects from their consumption. Since the exposure period is short and the exposed population limited, we do not recommend

the landcrabs be tested at this time. If soil/fill testing identifies high levels of contaminants likely to accumulate in landcrabs, we will recommend the appropriate local, state, or federal agency test these crabs for contamination.

12. Highland Village residents are concerned that there have been an inordinately high number of cancers in their neighborhood during the past 10 years. They are concerned these cancers are caused by exposure to toxic chemical from the landfill.

Florida HRS epidemiologists evaluated cancer incidence in this area. The available data and environmental epidemiology methods are too limited, however, to determine if the landfill has caused an increase in the incidence of cancer among residents of the Highland Village.

13. One Highland Village resident has experienced intermittent swelling of the face, hands, and feet. This resident is concerned the swelling is caused by exposure to site contaminants.

Since the surface soil and fill material at this site have not been adequately characterized, it is not possible to rule out site contaminants as the cause. The association of health effects with environmental exposure to chemicals, however, is an inexact science. The swelling could also be an allergic reaction to home and yard pesticide exposure, insect bites, plant pollen, or indoor air molds and spores.

CONCLUSIONS

Based on the available data, we categorize the Munisport Landfill site as an indeterminate public health hazard. Data are either not available or inadequate for all environmental media to which humans may be exposed. Except for coliform bacteria, the available environmental data do not indicate that humans are being or have been exposed to levels of toxic chemicals that would be expected to cause adverse health effects. This conclusion is based on the limited data currently available and may change once the surface soil and landfill material have been adequately characterized. The data are inadequate to determine if there has been an increased rate of cancer in the Highland Village mobile home park.

1. Children and adults frequently trespass across this site. Warning signs exist, but they are too few to meet the requirements of Florida DER Rule 17-736 and Florida Statutes 403.704 and 403.7255. The 10-foot cliff in the mound of soil on the landfill may be a physical hazard to children trespassing on the site.

2. Dense undergrowth along the southwest site boundary next to the Highlands Village mobile home park harbors snakes, scorpions, and spiders that may threaten the health of these residents. Dense undergrowth and debris in Highland Village may also harbor snakes, scorpions, and spiders.

3. Past activities at this site may have exposed nearby residents to contaminated dust. We cannot confirm this exposure or evaluate the health risk since no air samples were collected before landfill operations ceased in 1980 and vegetation covered the site. On-site air quality was only tested during the 1990 landfill fire. This testing was too late, however, to measure the maximum contaminant concentrations and was not located in the nearby neighborhoods where exposure occurred. Currently, exposure to contaminated dust is unlikely since the site is covered with vegetation. Any future remediation, construction, or development at this site that removes vegetation or uncovers landfill material, however, may expose nearby residents to contaminated dust.

4. Sampling on the landfill portion of the site (10 samples from 170 acres; 1 every 17 acres) is inadequate to fully characterize the extent of soil contamination. Additional chemicals may be discovered and the concentrations of previously discovered chemicals may be higher. Fifty additional surface soil samples (0 to 3 inches deep) and sixty additional fill samples (5 to 10 feet deep) will be necessary to fully characterize the extent of soil/fill contamination on the landfill portion of the site.

5. Long-term (> 1 year) consumption of PCB contaminated oysters and fish from Biscayne Bay may affect the immune system and result in a "low" increased risk of cancer. The pattern of fish and oyster

contamination suggests that this site is not the source of PCBs in Biscayne Bay. The number of fish and oyster samples collected was too few, however, to characterize the extent of contamination throughout Biscayne Bay.

6. After unusually heavy rains, the southeast lake on the landfill overflows and floods the Highland Village mobile home park. Although skin contact with the water in the on-site lakes is not likely to cause adverse health effects, the stormwater run-off from these lakes has not been tested and may be different due to suspended particulates. Until this stormwater is analyzed, we cannot determine its public health threat.

7. Nearby residents report that children swim in the on-site lakes. Although coliform bacteria are not Superfund hazardous waste, children who swam in the on-site lakes 10 years ago may have been exposed to disease causing bacteria associated with fecal material. As a result of this exposure, these children were at a higher risk of infections such as hepatitis, meningitis, and gastroenteritis. It is not possible to determine the current health threat from swimming in these lakes because they have not been tested for bacterial contamination since 1982.

8. If significant areas of the landfill adjacent to the Highland Village mobile home park are paved, landfill gases that currently migrate upward and dissipate may migrate latterly into Highland Village.

9. Twenty-eight chemicals found in various media at this site lack sufficient toxicological data to determine their public health significance.

10. If radioactive medical waste was disposed of at this landfill, it is unlikely that it was a health threat. Most of the radioactive isotopes used in hospitals and doctor's offices have short half-lives (days or weeks) and the radiation they emit is too weak to penetrate even a thin layer of soil. Florida HRS requires hospitals and doctors to hold this waste until the remaining radioactivity is insignificant.

RECOMMENDATIONS

Cease/Reduce Exposure Recommendations

1. Restrict public access to the site. Post additional hazardous waste warning signs to meet the requirements of Florida DER Rule 17-736 and Florida Statutes 403.704 and 403.7255. Eliminate the 10-foot cliff in the mound of soil in the middle of the landfill. The appropriate local, state, or federal agency should restrict site access to prevent human exposure to contaminated soil via incidental ingestion or to contaminated lake water via incidental ingestion during swimming.

2. Clear and maintain a buffer free of dense undergrowth (15 feet minimum) along the southwest site boundary bordering the Highlands Village mobile home park. The appropriate local, state, or federal agency should clear and maintain a buffer free of dense undergrowth that harbors snakes, scorpions, and spiders. Residents should also clear their property of dense undergrowth or debris.

3. Control dust generation and monitor the air quality on site and in the Highland Village mobile home park. To insure that nearby residents are not exposed to contaminated dust or asbestos, the appropriate local, state, or federal agency should control dust generation during any site remediation, construction, or development that removes vegetation or uncovers landfill material. The appropriate local, state, or federal agency should also monitor the air quality on site and in nearby neighborhoods during any landfill fires or any site remediation, construction, or development that removes vegetation or uncovers landfill material. The air should be sampled for dust (particulates) and analyzed for heavy metals, asbestos, and other site-related contaminants.

Site Characterization Recommendations

4. Collect 50 surface soil samples (0 to 3 inches deep) and 60 fill samples (5 to 10 feet deep) from the 170 acre landfill portion of the site. The number of samples is based on an average of one sample for every 3 acres; ten surface soil samples have already been collected and analyzed. Analyze these samples for the chemicals analyzed in the remedial investigation, plus asbestos. The appropriate local, state, or federal agency should collect and analyze these samples.

5. Investigate PCB contamination in Biscayne Bay fish, oysters, and other aquatic species eaten by humans. The appropriate local, state, or federal agency should investigate the extent of PCB contamination in Biscayne Bay fish, oysters, and other aquatic species eaten by humans.

6. Test the quality of stormwater run-off from this site. The

appropriate local, state, or federal agency should analyze the stormwater run-off quality in Highland Village the next time heavy rains cause the southeast lake to overflow.

7. Test the bacteriological quality of the on-site lakes. Although coliform bacteria are not a Superfund hazardous waste, the appropriate local, state, or federal agency should measure the current levels of bacterial contamination in the on-site lakes.

8. Monitor soil gases along the southeast boundary of the site if significant areas of the landfill are paved. If significant areas of the landfill adjacent to the Highland Village mobile home park are paved, the appropriate local, state, or federal agency should monitor the soil gases along the southwest corner of the landfill.

ATSDR Health Activities Recommendation Panel (HARP) Recommendations

The information in this public health assessment has been evaluated by the ATSDR Health Activities Recommendation Panel (HARP) for follow-up health activities. HARP determined the following actions are needed: community education to inform the community about health risks from exposure to site-related contaminants; community education to inform the community about the relationships between exposure and risk, and between dose and response; a disease symptom and prevalence study to define and validate site-related health complaints; and research to derive a minimal risk level for lead and fill toxicological data gaps for dibenzofuran, tetrahydrofuran and alkyl benzene sulfonamides. After consulting with EPA, and state and local environmental agencies, ATSDR will determine if additional follow-up health actions are needed.

PUBLIC HEALTH ACTIONS

The Public Health Action Plan for the Munisport Landfill site contains a description of actions to be taken by ATSDR, Florida HRS, and other governmental agencies subsequent to the completion of this assessment. The purpose of this plan is to ensure that this assessment not only identifies public health hazards, but provides a plan of action designed to mitigate hazardous substances in the environment. ATSDR and Florida HRS are committed to ensuring this plan is implemented.

A. ATSDR, Division of Toxicology, will develop a chronic oral Minimal Risk Level for lead.

B. ATSDR, Division of Toxicology, will consider developing Toxicological Profiles for the 28 chemicals listed in Appendix B.

C. Florida HRS, Toxicology and Hazard Assessment and the Dade County Public Health Unit, Environmental Health will warn residents of Highland Village of the dangers of trespassing on this site, including incidental ingestion of the soil and incidental ingestion of water from swimming in the lakes.

D. Florida HRS will apply for funding to perform a disease and symptom prevalence study.

E. Florida HRS, Toxicology and Hazard Assessment will coordinate with the appropriate environmental agencies to develop plans to implement the cease/reduce exposure and site characterization recommendations contained in this public health assessment.

F. The Dade County Public Health Unit will test the bacteriological quality of the eight on-site lakes.

G. The Southeast District Office of the Florida DER will sample the stormwater run-off from the site the next time it floods the Highland Village mobile home park. Since the nearest Florida DER office is in West Palm Beach about 60 miles north of the site, they must rely on residents or local officials to notify them when flood conditions exist in Highland Village.

H. The Florida DER will address the closure of the landfill portion of the site under the landfill closure requirements in Chapter 17-701, Florida Administrative Code.

I. EPA will continue to monitor the design and implementation of the ground water remediation.

J. EPA will continue to monitor state closure of the landfill portion of the site to insure that it is compatible with the ground water remediation.

K. EPA will require additional air monitoring where appropriate.

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

The Florida Department of Health and Rehabilitative Services prepared this public health assessment under a cooperative agreement with the Agency for Toxic Substances and Disease Registry. It complies with approved methodology and procedures existing when the assessment was started.



Technical Project Officer, SPS, RPB, DHAC

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



Director, DHAC, ATSDR

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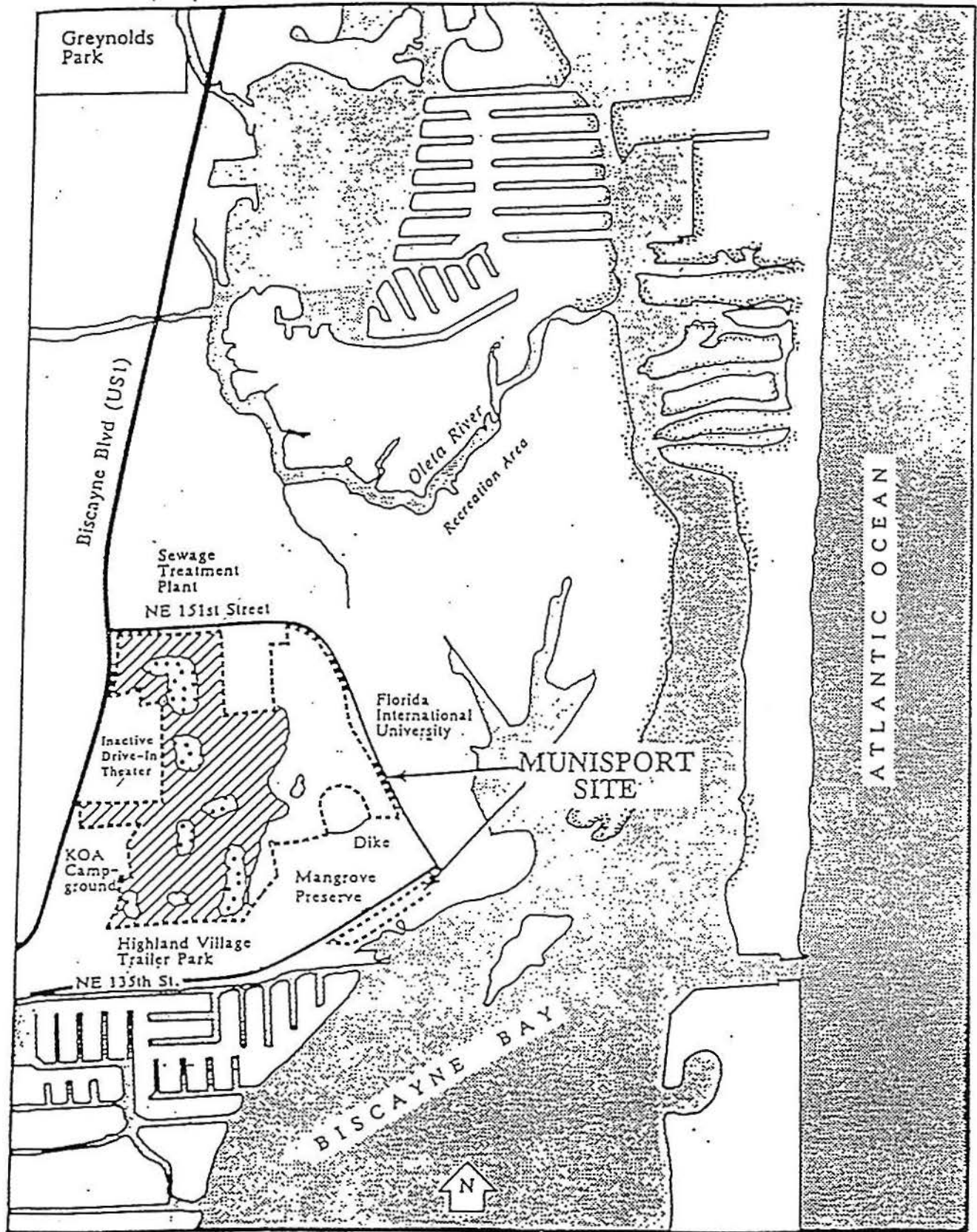
APPENDIX A: SITE MAPS AND SAMPLING LOCATIONS

MAP OF FLORIDA

SHOWING COUNTY OF INTEREST



Figure 2
 SITE VICINITY MAP
 MUNISPORT LANDFILL SITE
 North Miami, Florida



LEGEND





	On-site manmade lakes		Site boundaries
	Other surface water		Landfill area

Figure not drawn to scale

- NW = NORTHWEST LAKE
- N = NORTH LAKE
- E = EAST LAKE
- WC = WEST CENTRAL LAKE
- EC = EAST CENTRAL LAKE
- SW = SOUTHWEST LAKE
- SC = SOUTH CENTRAL LAKE
- SE = SOUTHEAST LAKE
- SITE BOUNDARY
- - - MEAN HIGH WATER LINE

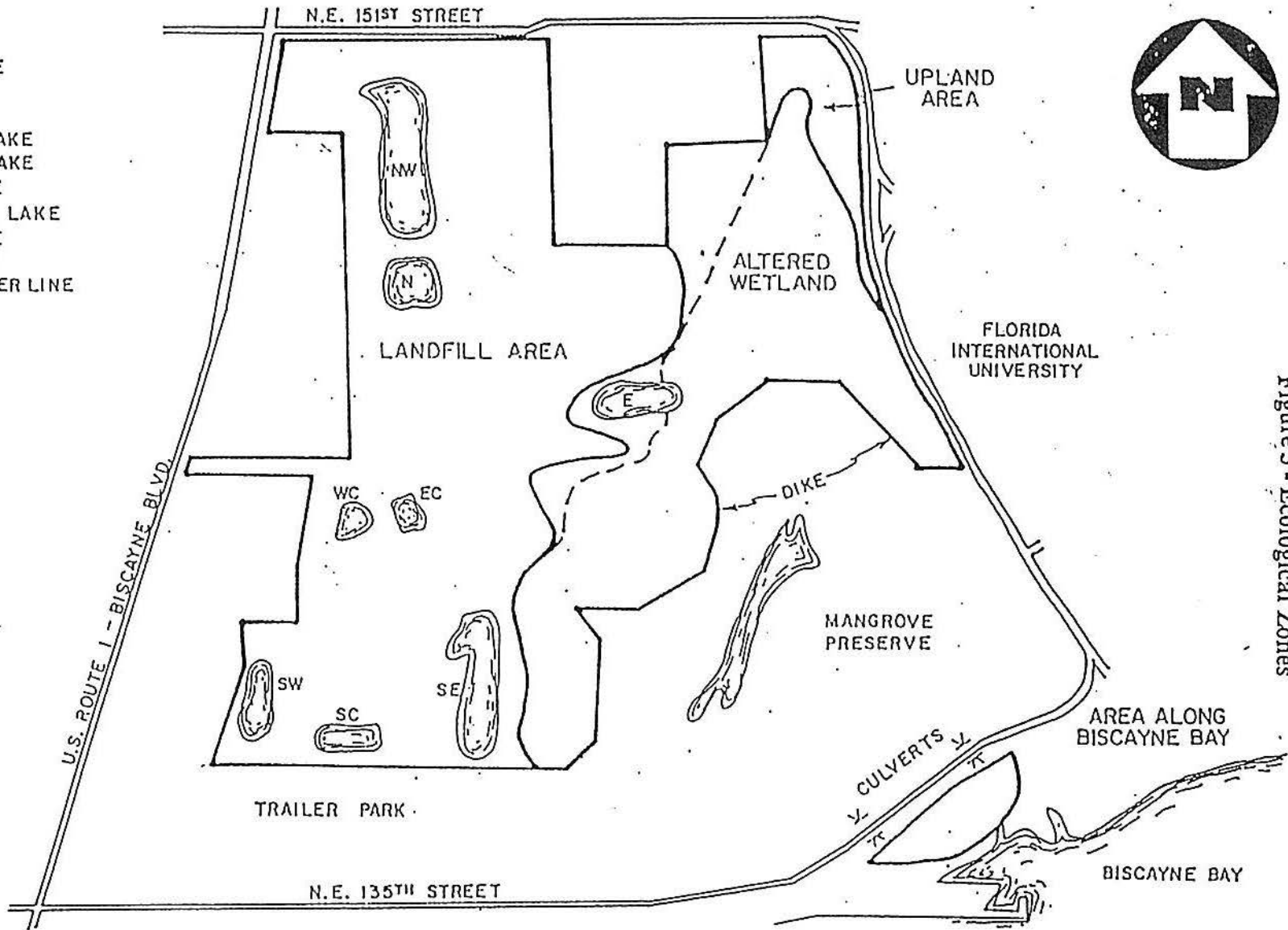
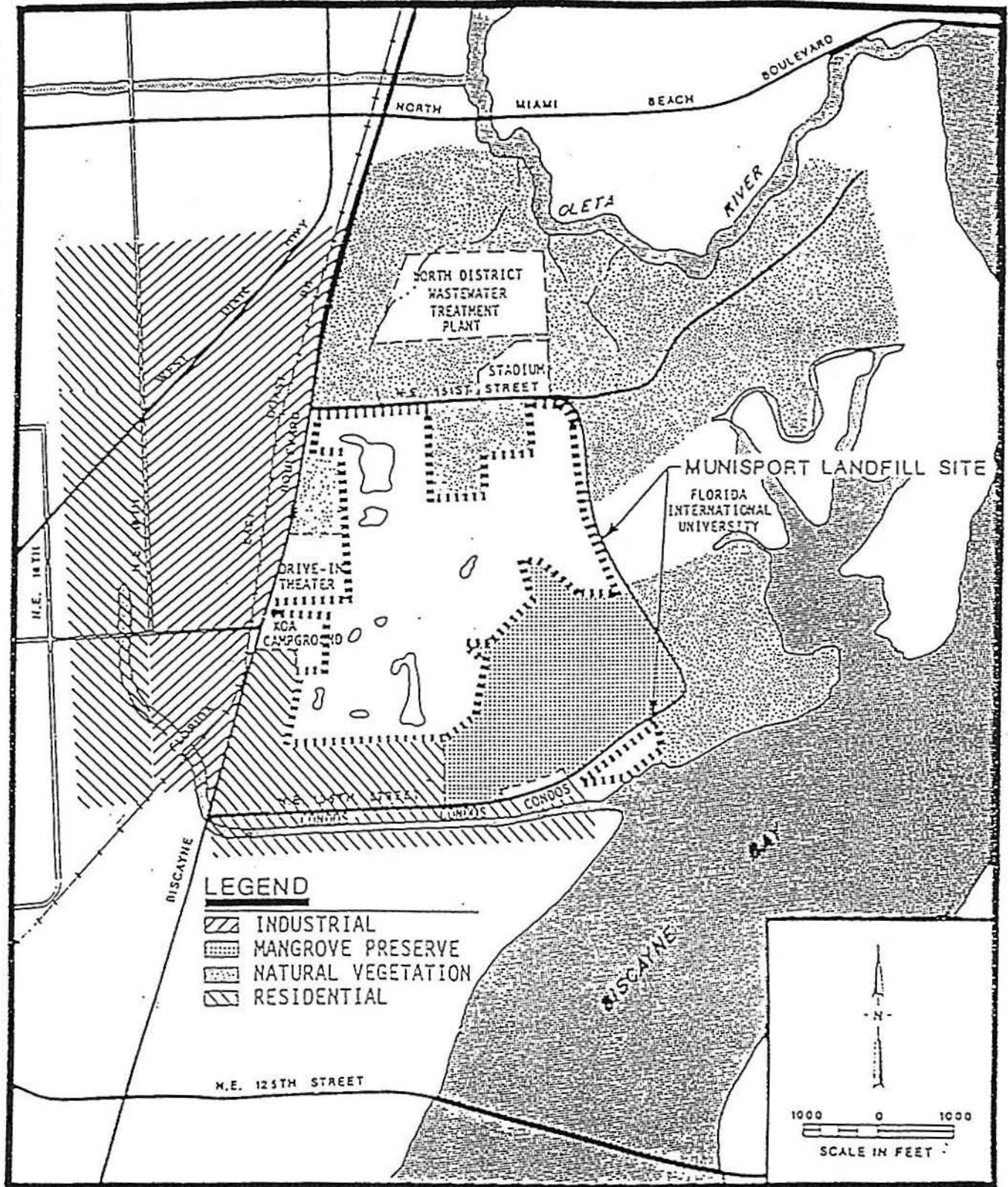


Figure 3 - Ecological Zones

A-3

ECOLOGICAL ZONES
MUNISPORT SITE, NORTH MIAMI, FL
 SCALE: 1" = 1000'

Figure 4 - Site Vicinity Land Use



REM II
 LAND USE IN VICINITY OF MUNISPORT LANDFILL
 MUNISPORT LANDFILL SITE
 NORTH MIAMI, FLORIDA

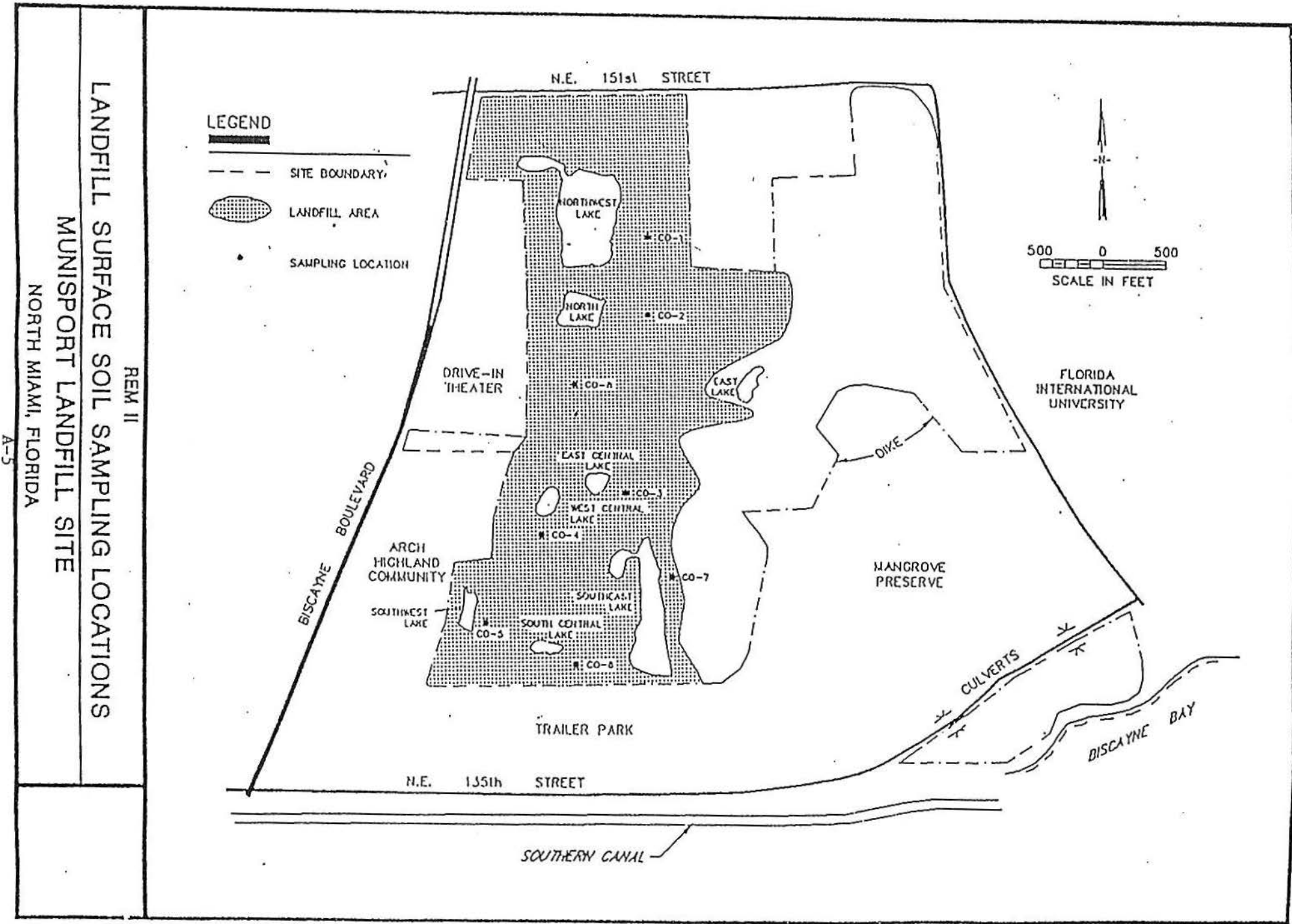


Figure 5 - Soil Sampling Locations

REM II
UNFILLED AREA SOIL SAMPLING LOCATIONS
MUNISPORT LANDFILL SITE
 NORTH MIAMI, FLORIDA

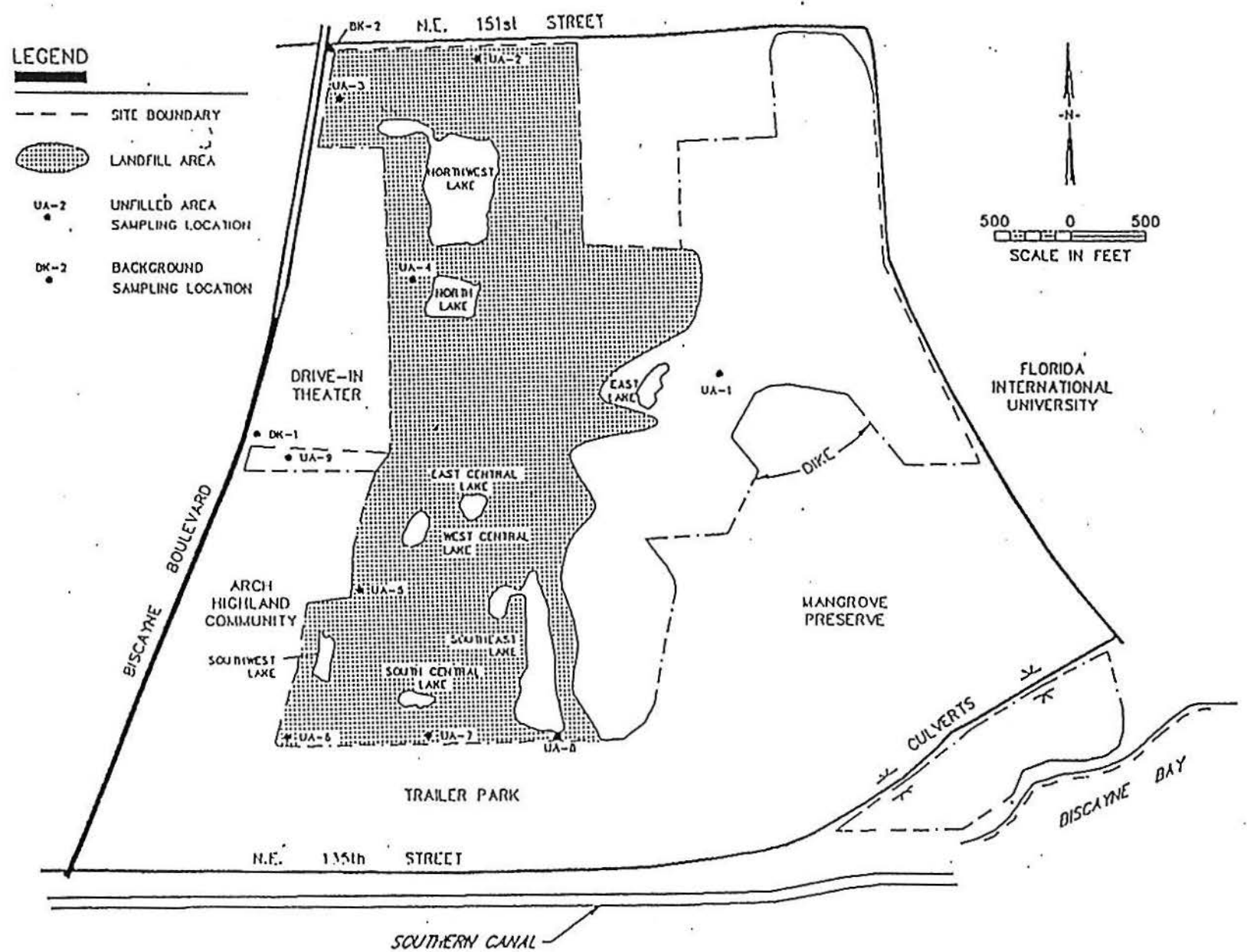


Figure 6 - Soil Sampling Locations

NORTHEAST AREA SOIL SAMPLING LOCATIONS
 MUNISPORT LANDFILL SITE
 NORTH MIAMI, FLORIDA

REM II

A-7

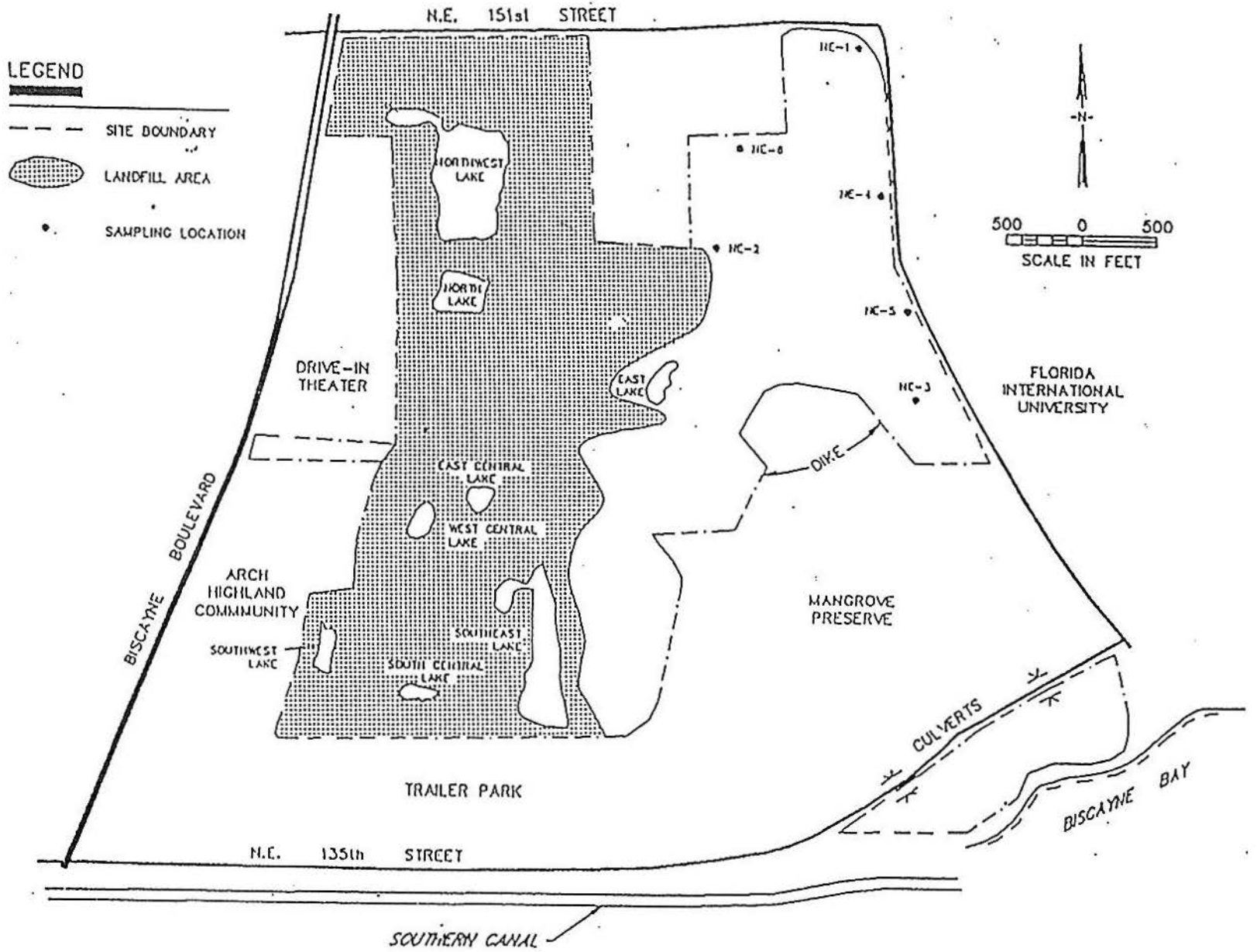
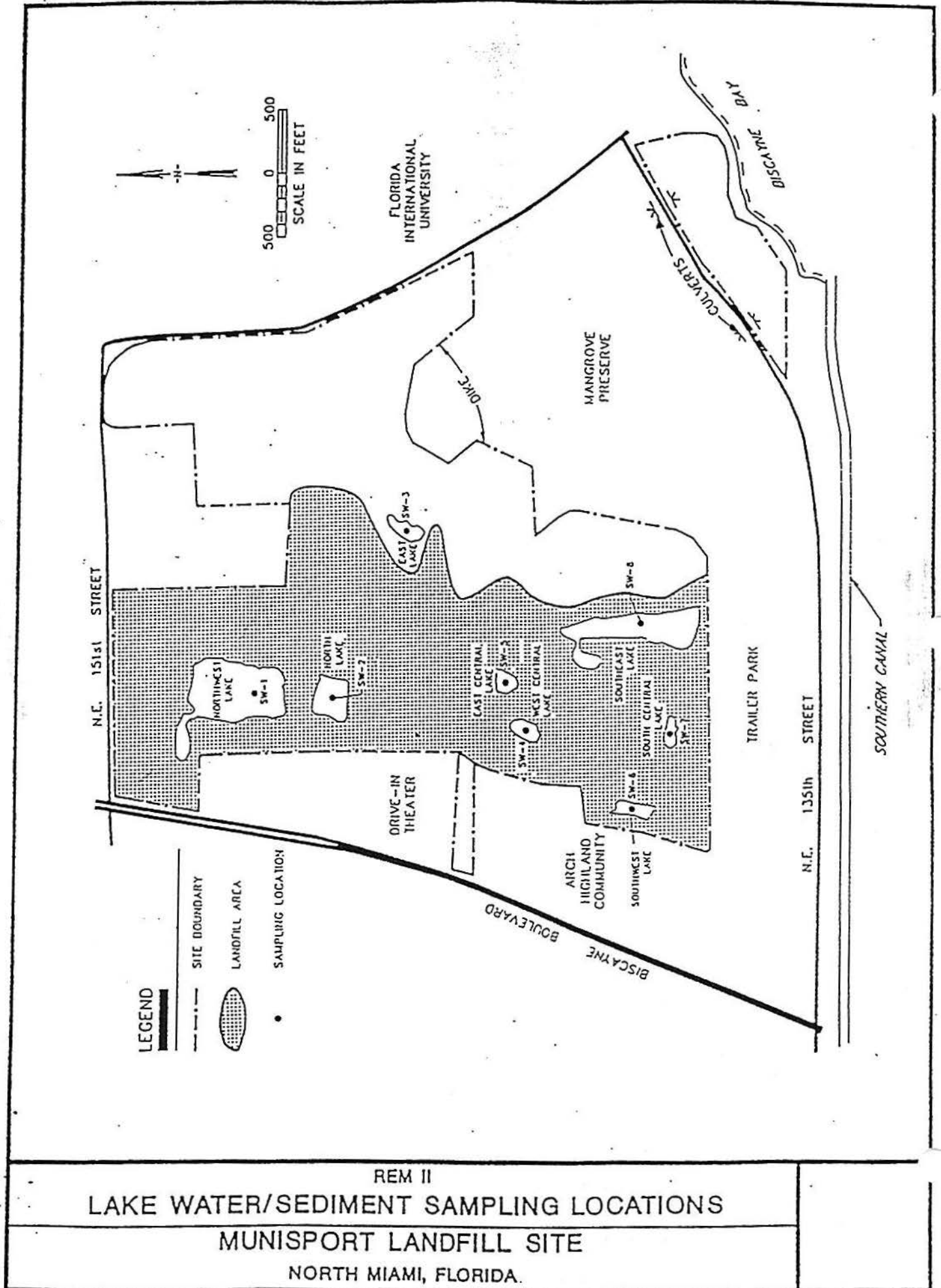


FIGURE 7 - SOIL SAMPLING LOCATIONS

Figure 8 - Surface Water/Sediment Sampling Location



REM II
 LAKE WATER/SEDIMENT SAMPLING LOCATIONS
 MUNISPORT LANDFILL SITE
 NORTH MIAMI, FLORIDA.

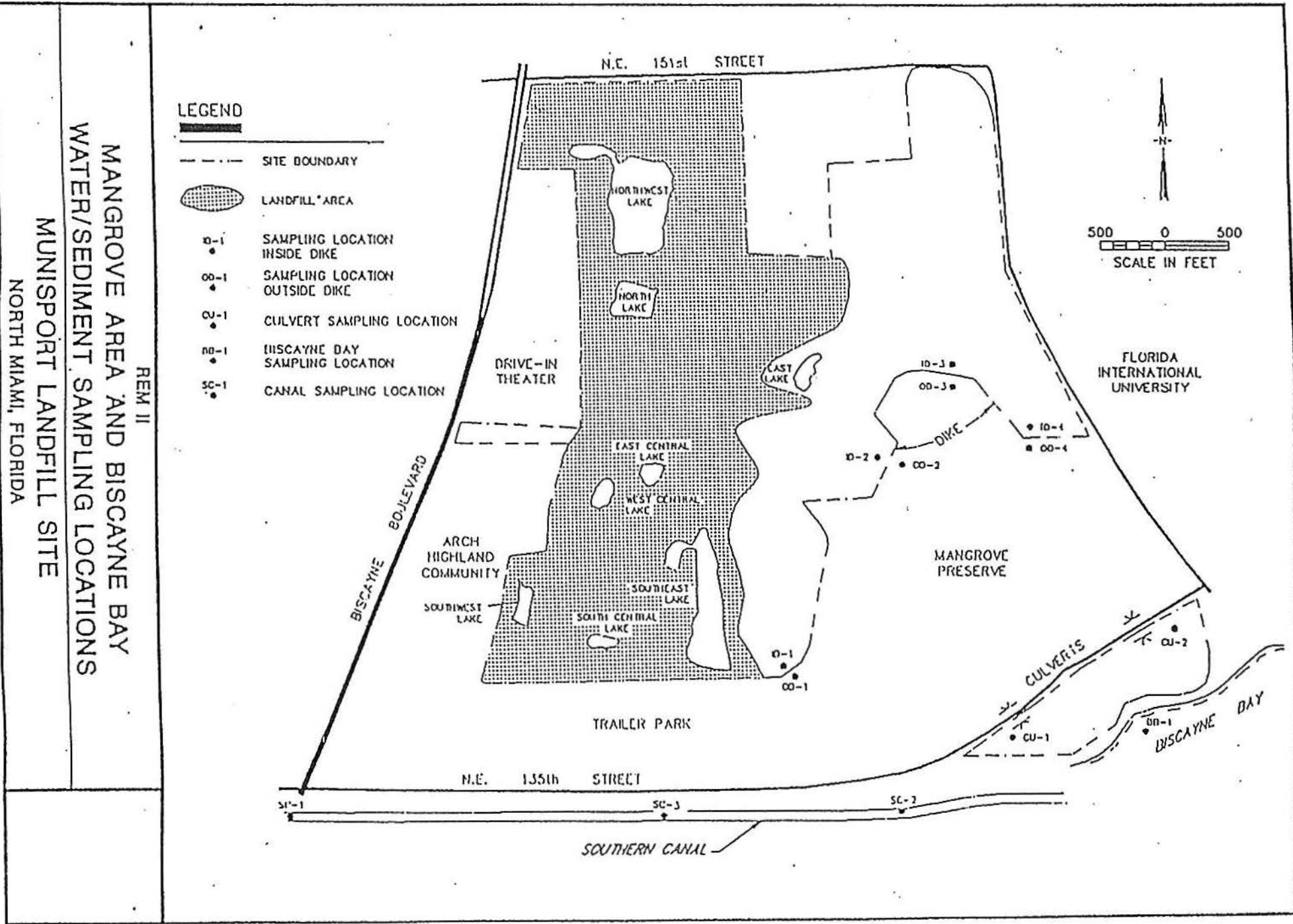


Figure 9 - Surface Water/Sediment Sampling Location

MANGROVE AREA AND BISCAYNE BAY
 WATER/SEDIMENT SAMPLING LOCATIONS

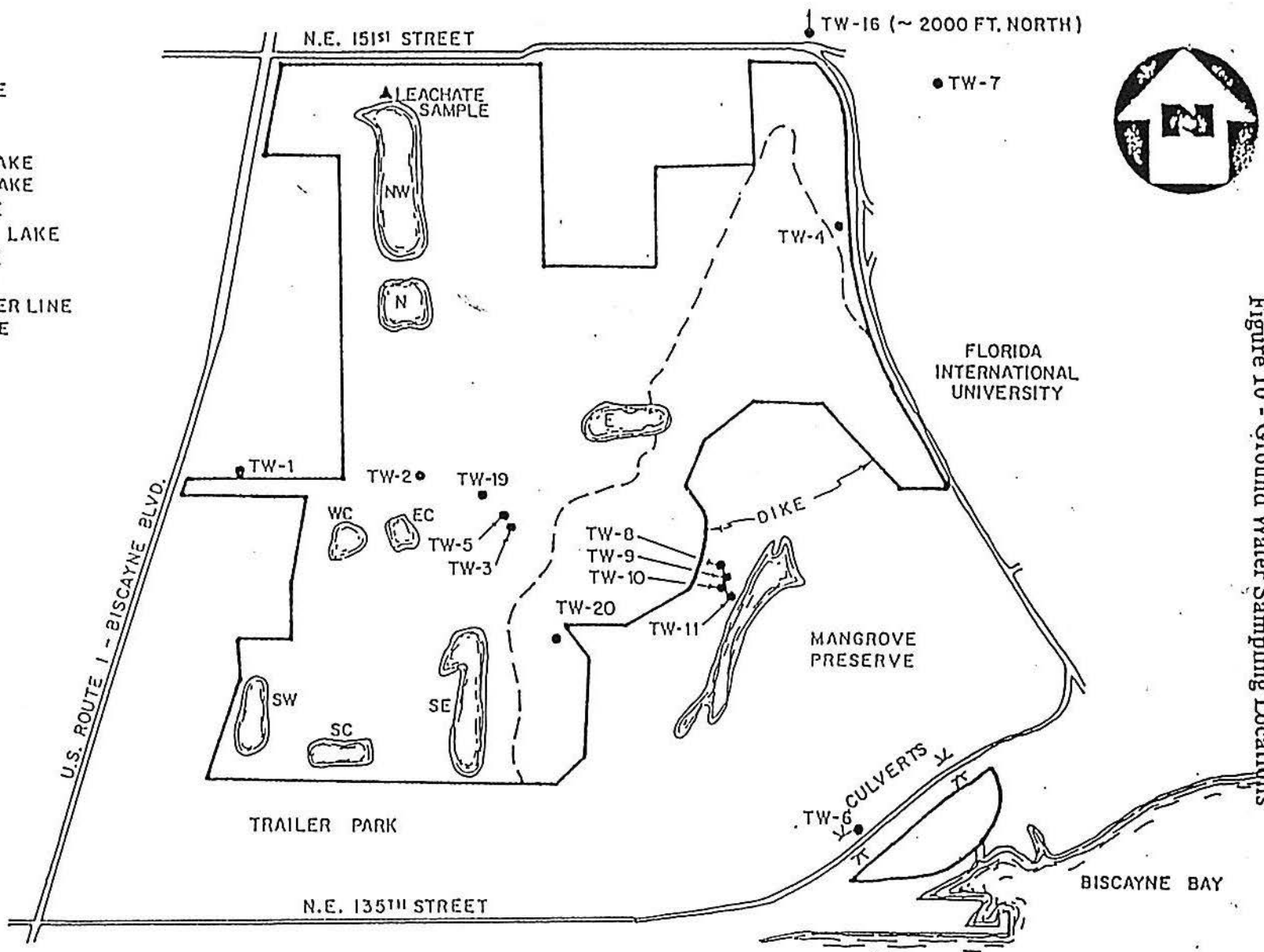
MUNISPORT LANDFILL SITE
 NORTH MIAMI, FLORIDA

LEGEND

- SITE BOUNDARY
- LANDFILL AREA
- SAMPLING LOCATION INSIDE DIKE
- SAMPLING LOCATION OUTSIDE DIKE
- CULVERT SAMPLING LOCATION
- BISCAYNE BAY SAMPLING LOCATION
- CANAL SAMPLING LOCATION

REM II

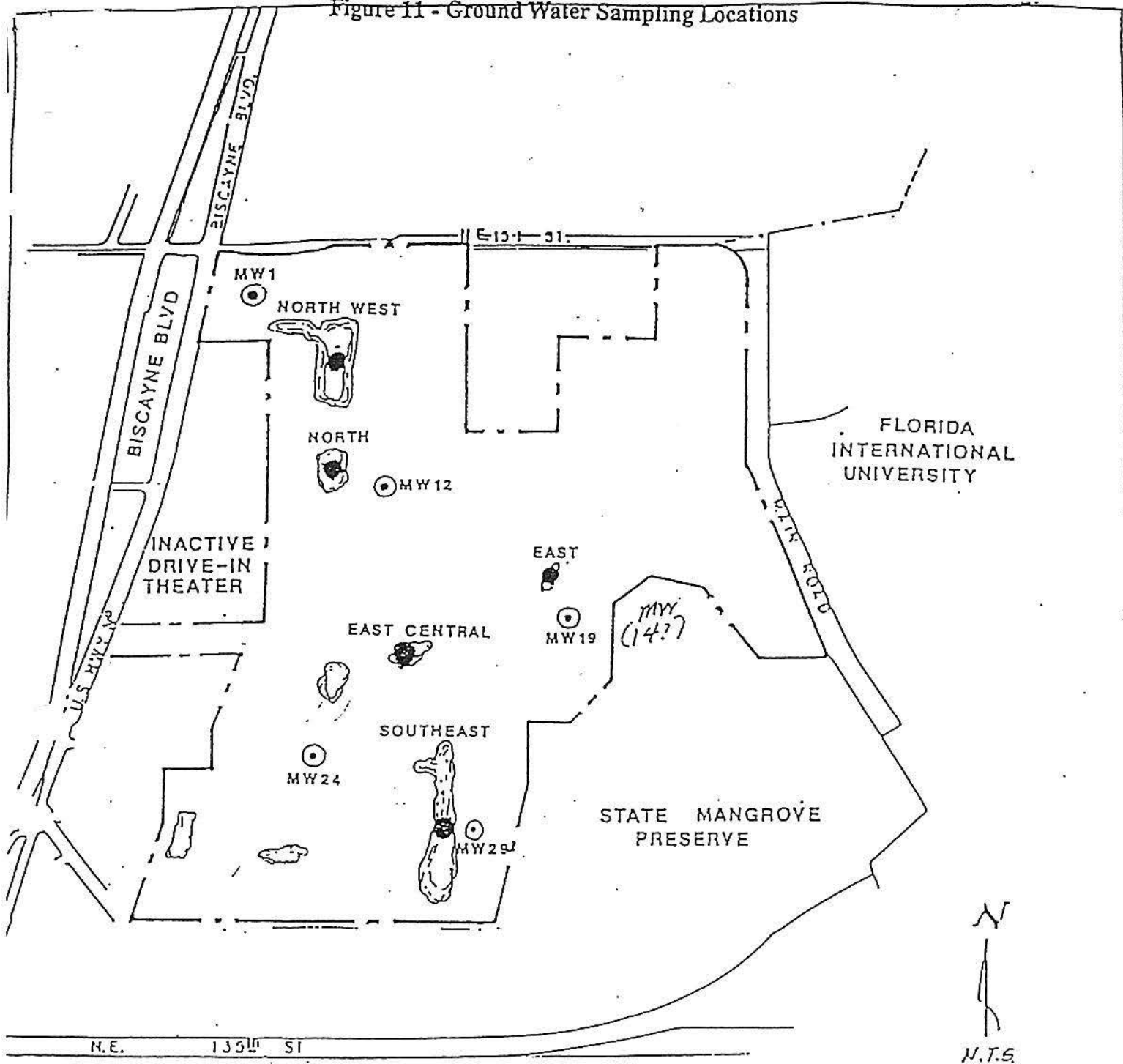
- NW = NORTHWEST LAKE
- N = NORTH LAKE
- E = EAST LAKE
- WC = WEST CENTRAL LAKE
- EC = EAST CENTRAL LAKE
- SW = SOUTHWEST LAKE
- SC = SOUTH CENTRAL LAKE
- SE = SOUTHEAST LAKE
- SITE BOUNDARY
- - - MEAN HIGH WATER LINE
- ▲ = LEACHATE SAMPLE
- = TEST WELL
- TW



LOCATION OF DER GROUNDWATER SAMPLING POINTS
MUNISPORT SITE, NORTH MIAMI, FL
 SCALE: 1" = 1000'

Figure 10 - Ground Water Sampling Locations

Figure 11 - Ground Water Sampling Locations

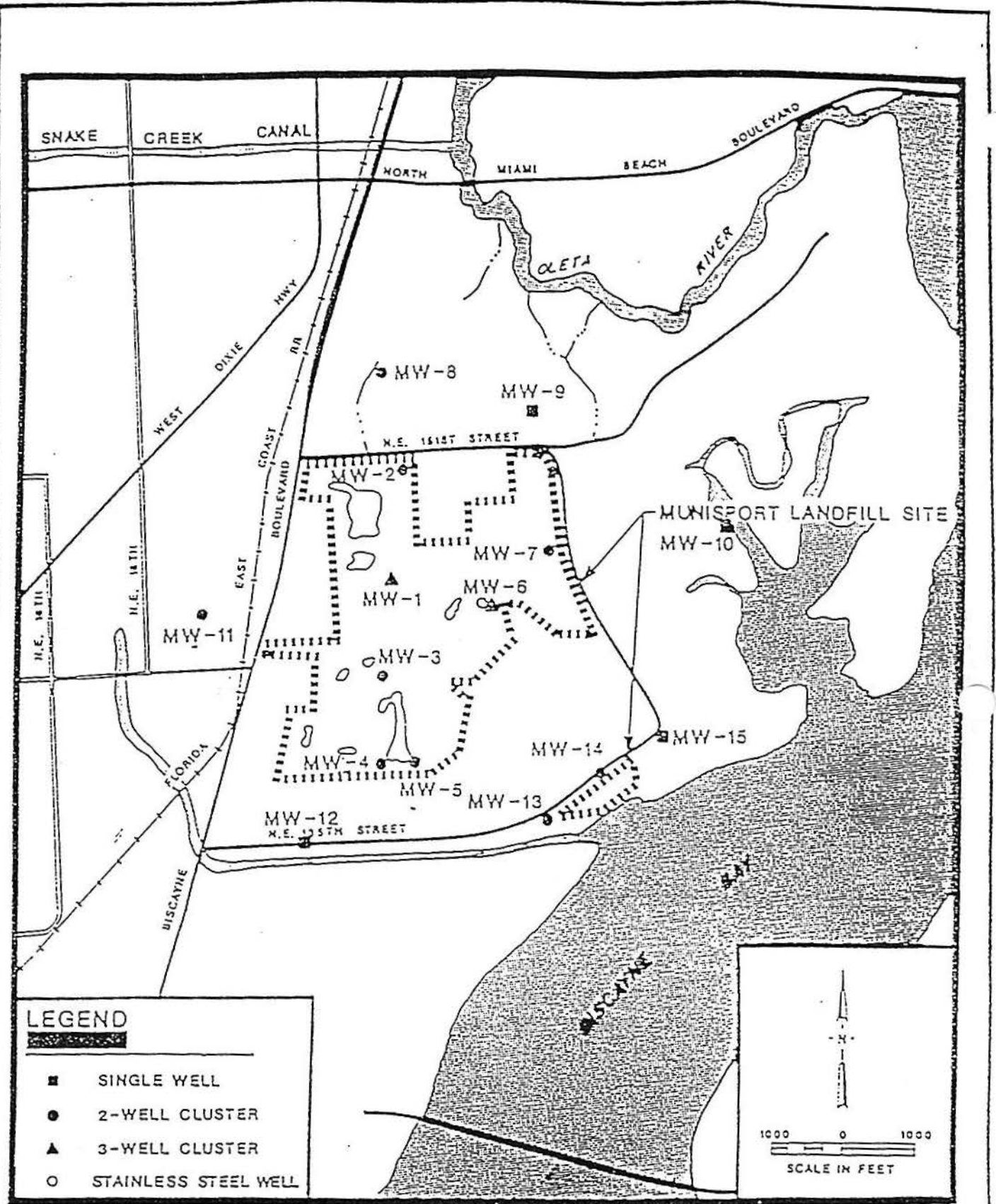


- PROJECT BOUNDARY--LINES
- MW 12 MONITORING WELLS
- APPROXIMATE SAMPLING POINTS (SURFACE WATER)

APPROXIMATE SAMPLING LOCATIONS
A-11

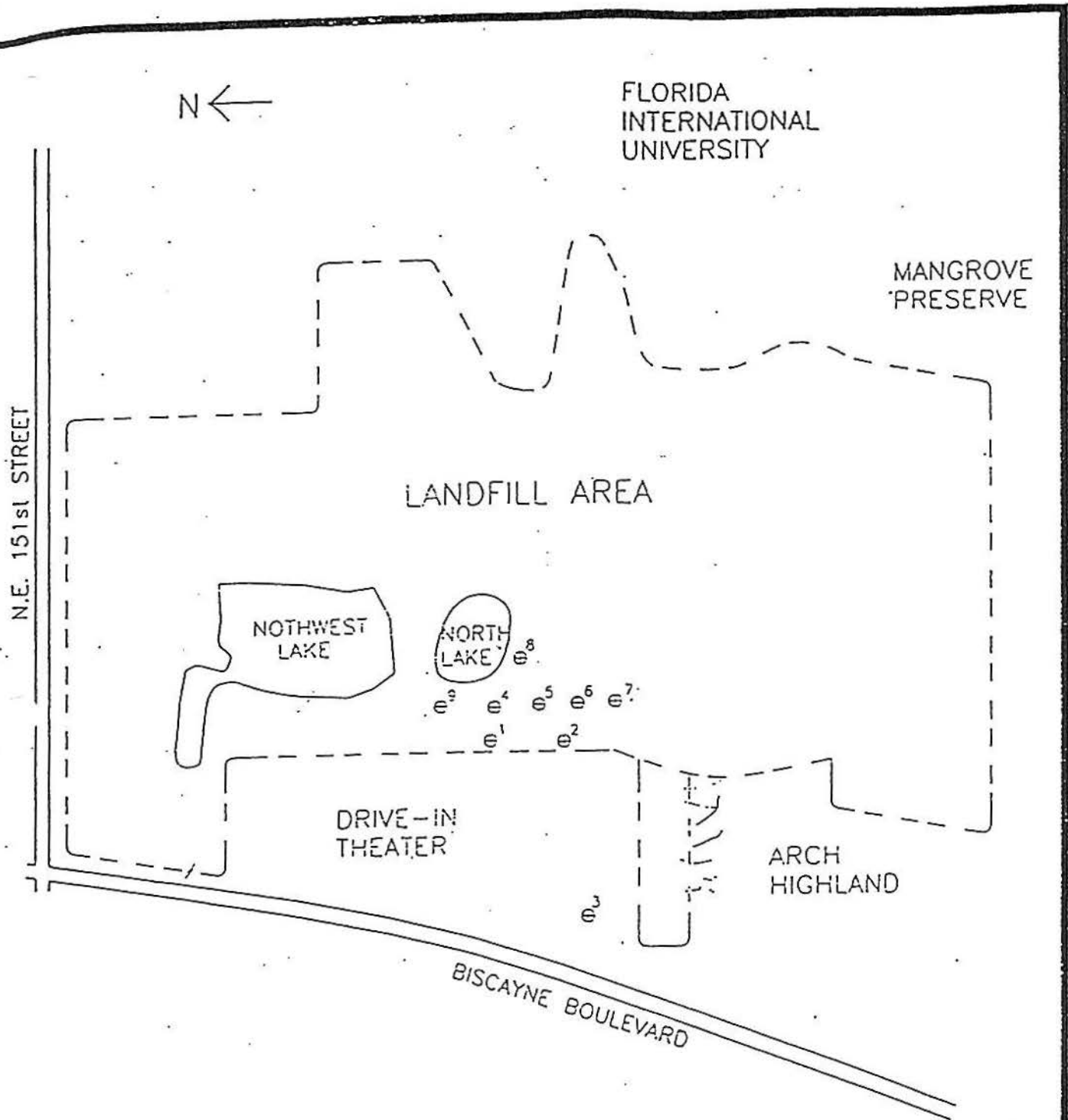
H. J. ROSS ASSOCIATES
ENGINEERS
DIVISION OF RAYMONT ENGINEERING COMPANY

Figure 12 - Ground Water Sampling Locations



REM II
 MONITOR WELL LOCATIONS
 MUNISPORT LANDFILL SITE
 NORTH MIAMI, FLORIDA

Figure 13 - Air Sampling Locations



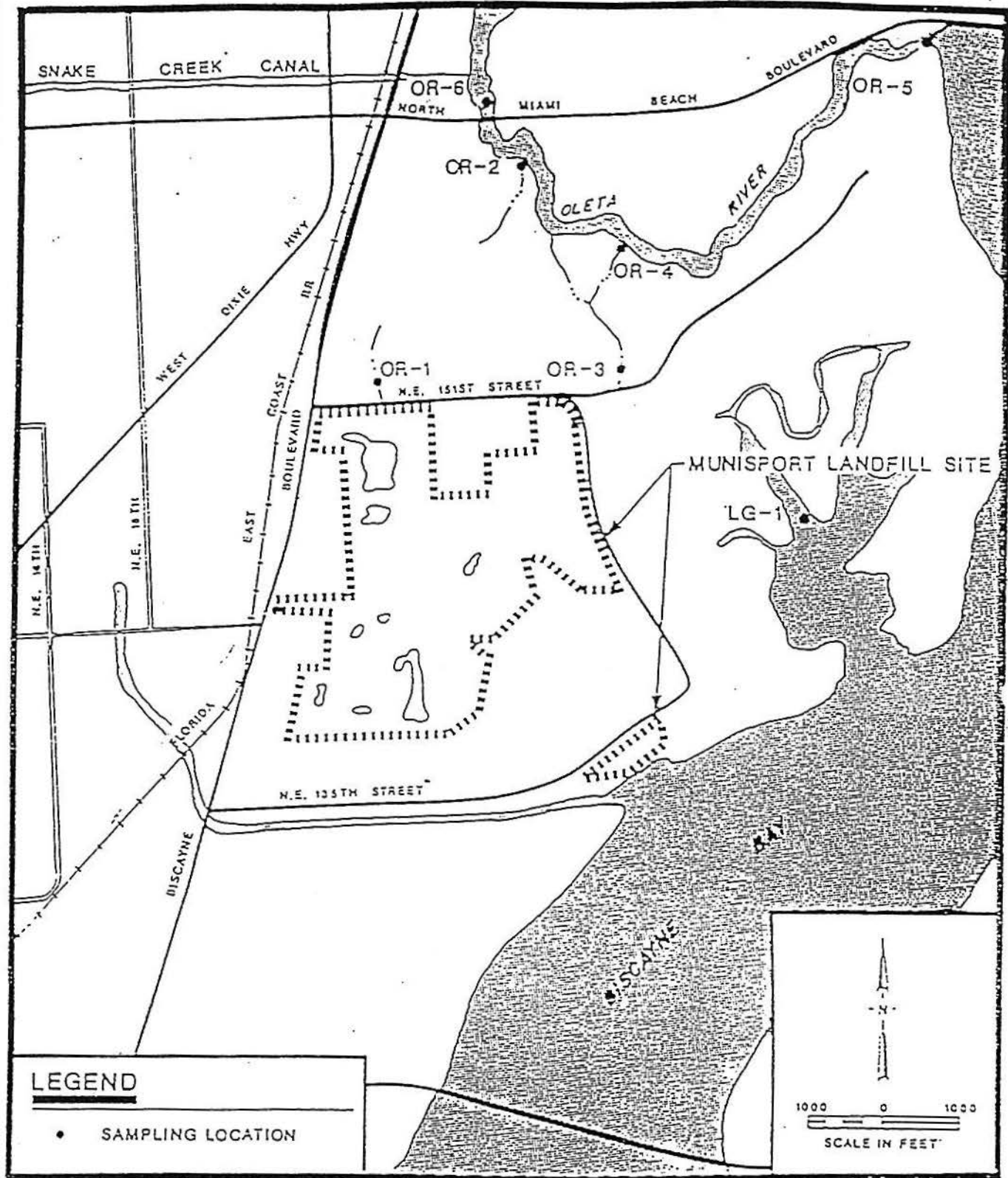
LEGEND

- SITE BOUNDARY
- e SAMPLING LOCATIONS

MUNISPORT LANDFILL
SAMPLING LOCATIONS
NORTH MIAMI, FLORIDA
APRIL, 1990

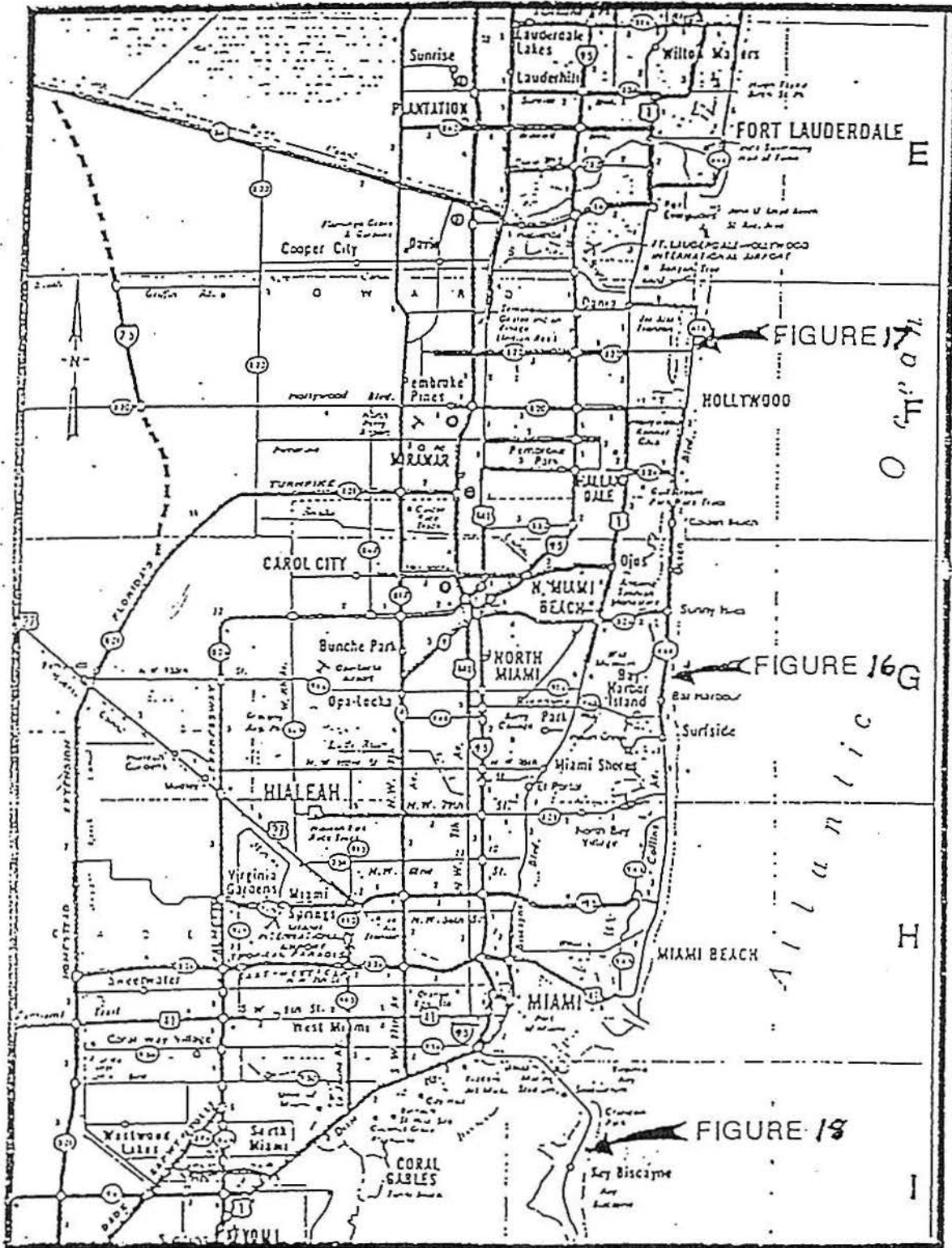
US EPA ENVIRONMENTAL RESPONSE TEAM
RESPONSE ENGINEERING AND ANALYTICAL CONTRACT

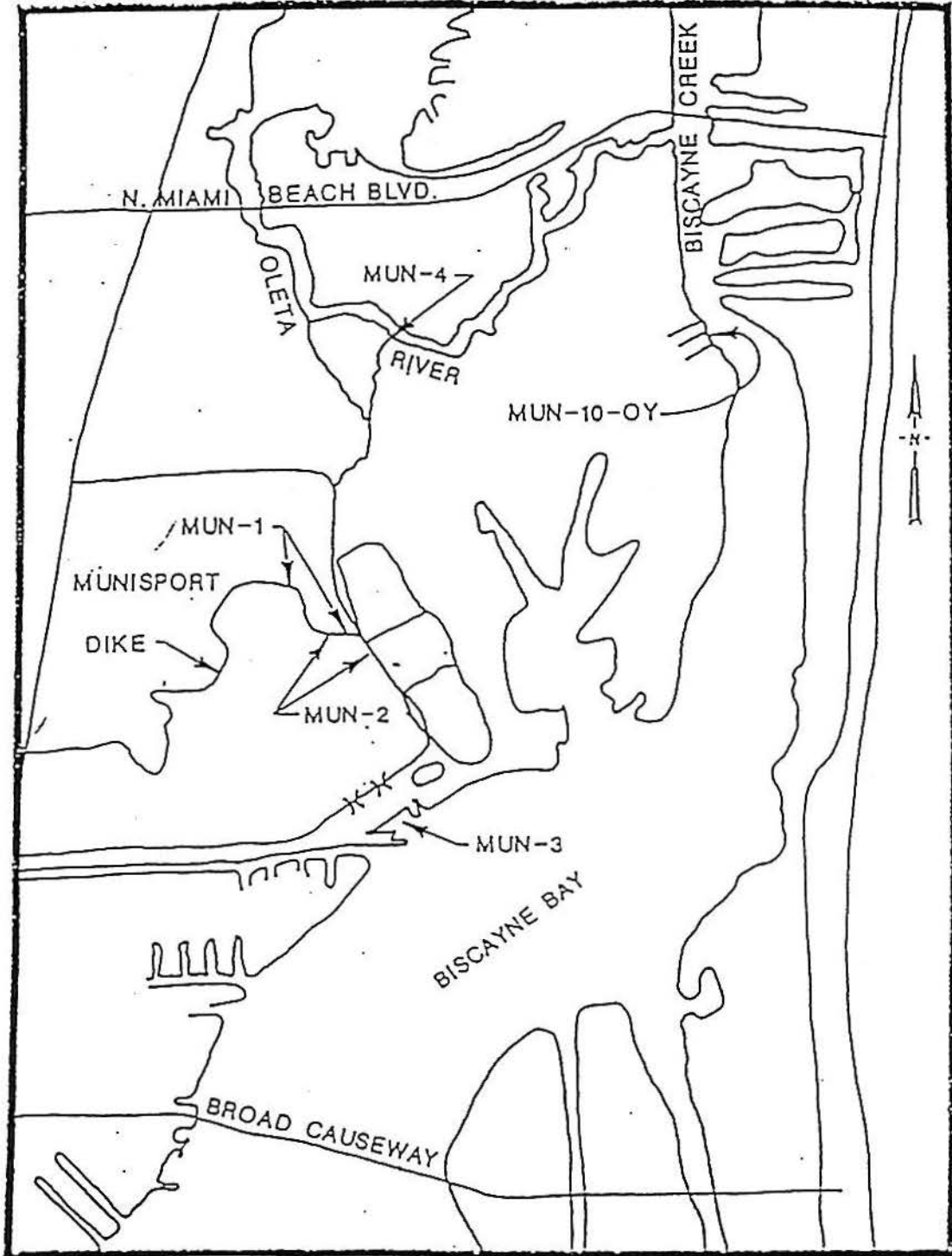
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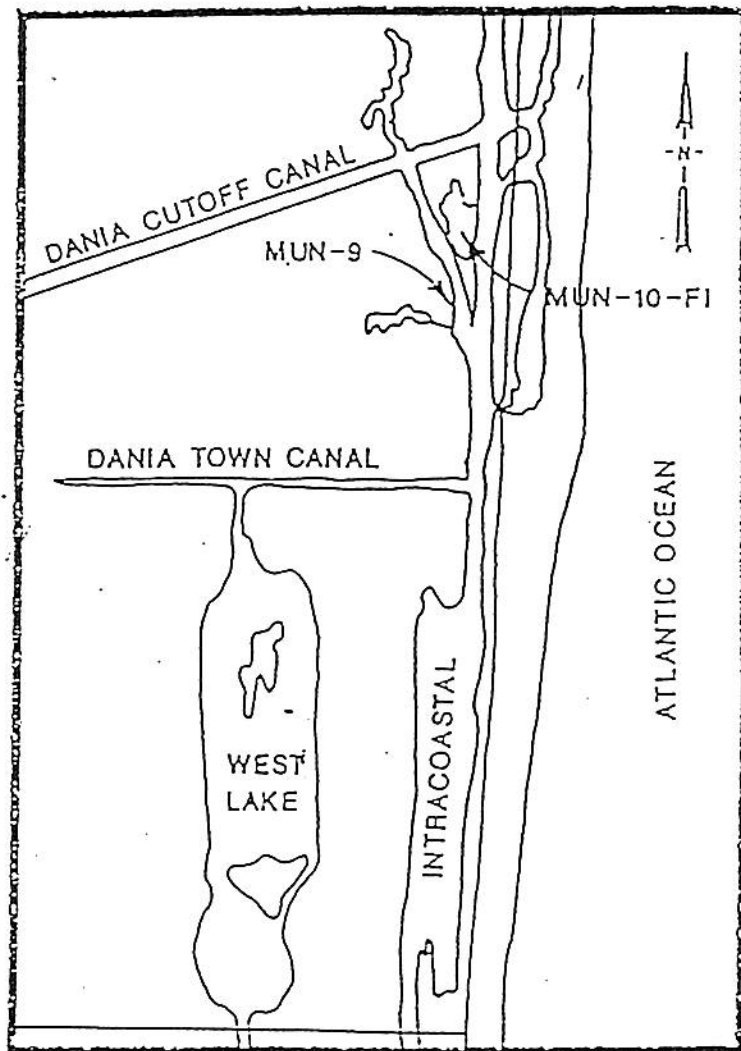


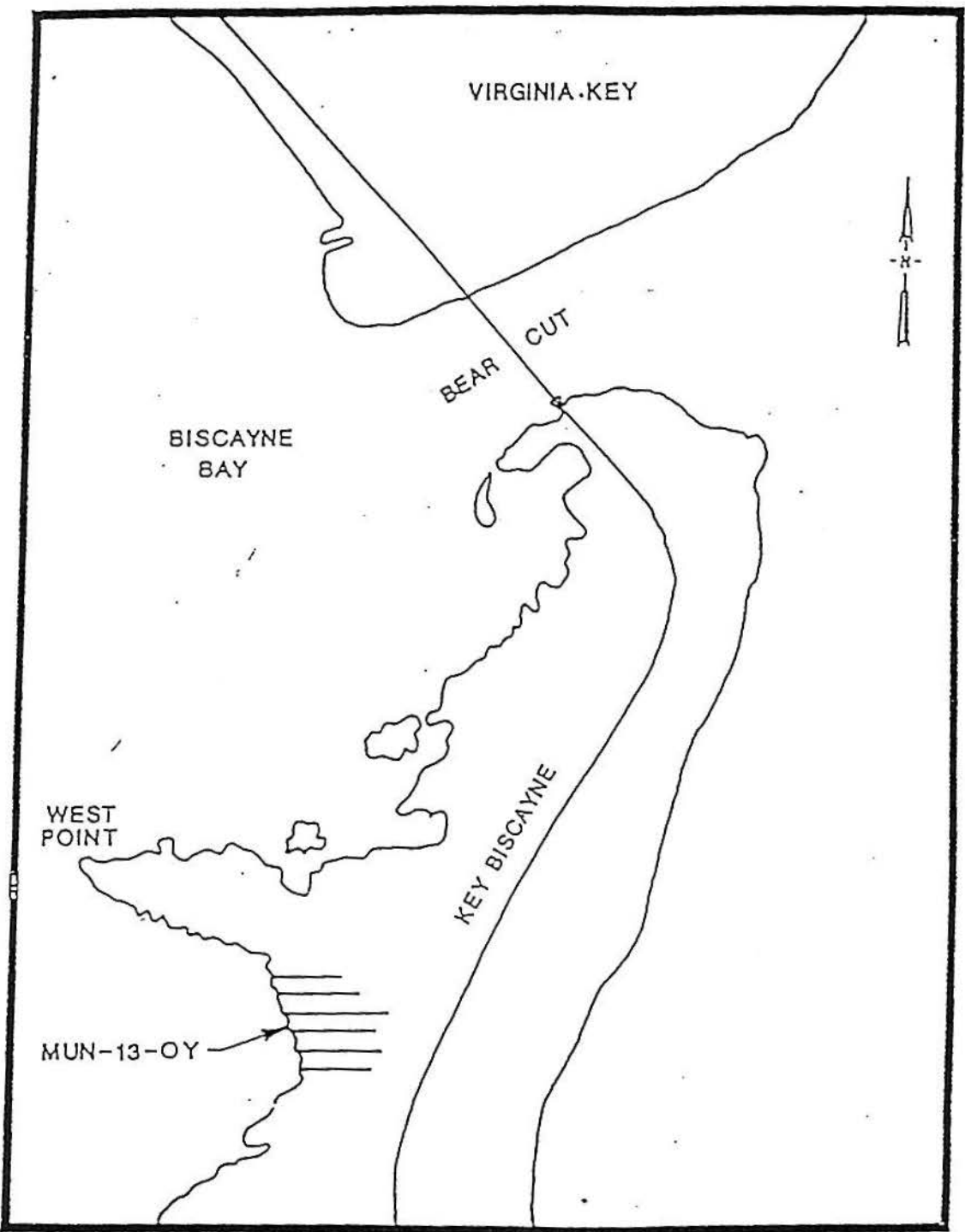
REM II
 OFFSITE SURFACE WATER/SEDIMENT SAMPLING LOCATIONS
 MUNISPORT LANDFILL SITE
 NORTH MIAMI, FLORIDA

Figure 15 - Biota Sampling Locations









APPENDIX B: CONTAMINANTS LACKING SUFFICIENT TOXICOLOGICAL DATA

Contaminants Lacking Sufficient Toxicological Data.

thio bis methane
dimethyl acetate octadienol
trimethyl bicycloheptene
dimethyl disulfide
benzene acetic acid
methyl butanoic acid
dibenzofuran
dibenzothiophene
dodecanoic acid
tridecanoic acid
tetradecanoic acid
pentadecanoic acid
hexadecanoic acid
heptadecanoic acid
tetrahydrofuran
trimethyl bicycloheptanone
benzothiazalone
benzene propanoic acid
propoxy phenol
phosphoric acid
ethoxy phenol
chloromethyl benzeneamine
ethylmethylbenzene sulfonamide
endrin aldehyde
delta BHC
trimethyl benzene sulfonamide
diethyl methyl benzamide
dimethyl ethyl phenol

APPENDIX C: CONTAMINANT CONCENTRATIONS AND EXPOSURE PATHWAY TABLES

Table 1. Maximum Concentrations in On-Site Landfill Leachate

Contaminants of Concern	Maximum Concentration (mg/L)	number * positive ----- total # sampled	Comparison Value	
			(mg/L)	Source
ammonia	NA	---	---	---
benzene	ND	0/1	---	---
di(2-ethyl hexyl) phthalate	NA	---	---	---
cadmium	ND	0/1	---	---
carbon disulfide	NA	---	---	---
chloro-methane	NA	---	---	---
coliform bacteria	NA	---	---	---
dieldrin	NA	---	---	---
lead	0.130	1/1	0.015	FL MCL
methylene chloride	ND	0/1	---	---
pentachloro-phenol	NA	---	---	---
PCBs	NA	---	---	---
styrene	NA	---	---	---
vanadium	ND	0/1	---	---
zinc	0.275	1/1	2	LTHA

* Positive = any detection of the contaminant

NA - not analyzed

ND - not detected

PCBs - polychlorinated biphenyls

mg/L - milligrams per liter

FL MCL - Florida Maximum Contaminant Level

LTHA - EPA Lifetime Health Advisory

Source: 1982 Florida DER and Dade County DERM Summaries of Analytical Results, as quoted in 1984 EPA Remedial Action Master Plan (9).

Table 2. Maximum Concentrations in On-Site Soil

Contaminants of Concern	Maximum Concentration (mg/kg)	number * positive ----- total # sampled	Back-ground Concentration (mg/kg)	Comparison Value	
				(mg/kg)	Source
ammonia	13	3/25	ND	none	---
benzene	ND	0/25	ND	---	---
di(2-ethyl hexyl) phthalate	3.2	1/25	ND	0.03	CREG
cadmium	ND	0/25	ND	---	---
carbon disulfide	ND	0/25	ND	---	---
chloro-methane	ND	0/25	ND	---	---
coliform bacteria	NA	---	NA	---	---
dieldrin	0.064	1/25	ND	0.040	CREG
lead	87	18/25	180	none	none
methylene chloride	ND	0/25	ND	---	---
pentachloro-phenol	21	2/25	21	5.8	CREG
PCBs	0.270	3/25	ND	0.090	CREG
styrene	ND	0/25	ND	---	---
vanadium	ND	0/25	ND	---	---
zinc	97	18/25	51	none	---

* Positive = any detection of the contaminant

NA - not analyzed

ND - not detected

PCBs - polychlorinated biphenyls

mg/kg - milligrams per kilogram

CREG - ATSDR Cancer Risk Evaluation Guide

Sources: 1984 EPA Site Investigation (6) and 1988 EPA Remedial Investigation (7)

Table 3. Maximum Concentrations in On-Site Surface Water

Contaminants of Concern	Maximum Concentration (mg/L)	number * positive ----- total # sampled	Back-ground Concentration (mg/L)	Comparison Value	
				(mg/L)	Source
ammonia	63	36/38	none	30	LTHA
benzene	ND	0/33	none	---	---
di(2-ethyl hexyl) phthalate	ND	0/21	none	---	---
cadmium	0.015	6/69	none	0.005	EMEG
carbon disulfide	0.096	14/21	none	1	RfD
chloro-methane	0.011	4/33	none	0.003	LTHA
coliform bacteria	5,400/100 mL	10/10	none	1 per 100 mL	FL MCL
dieldrin	ND	0/21	none	---	---
lead	0.063	3/69	none	0.015	FL MCL
methylene chloride	ND	0/33	none	---	---
pentachloro-phenol	ND	0/33	none	---	---
PCBs	ND	0/33	none	---	---
styrene	ND	0/33	none	---	---
vanadium	0.020	2/33	none	0.020	LTHA
zinc	0.210	19/77	none	2	LTHA

* Positive = any detection of the contaminant

NA - not analyzed, ND - not detected

PCBs - polychlorinated biphenyls

mg/L - milligrams per liter

LTHA - EPA Lifetime Health Advisory

EMEG - ATSDR Environmental Media Evaluation Guide

RfD - EPA Reference Dose

FL MCL - Florida Maximum Contaminant Level

Sources: 1982 Florida DER and Dade County DERM Summaries of Analytical Results, as quoted in 1984 EPA Remedial Action Master Plan (9), 1984 Remedial Action Master Plan (5), and 1988 EPA Remedial Investigation (7).

Table 4. Maximum Concentrations in On-Site Sediments

Contaminants of Concern	Maximum Concentration (mg/kg)	number * positive ----- total # sampled	Back-ground Concentration (mg/kg)	Comparison Value	
				(mg/kg)	Source
ammonia	370	5/6	none	none	---
benzene	ND	0/18	none	---	---
di(2-ethyl hexyl) phthalate	ND	0/18	none	---	---
cadmium	ND	0/18	none	---	---
carbon disulfide	ND	0/18	none	---	---
chloro-methane	ND	0/18	none	---	---
coliform bacteria	NA	---	none	---	---
dieldrin	ND	0/18	none	---	---
lead	80	5/18	none	none	---
methylene chloride	ND	0/18	none	---	---
pentachloro-phenol	ND	0/18	none	---	---
PCBs (1242)	0.90	2/18	none	0.090	CREG
styrene	ND	0/18	none	---	---
vanadium	26	13/18	none	none	---
zinc	430	13/18	none	none	---

* Positive = any detection of the contaminant

NA - not analyzed

ND - not detected

PCBs - polychlorinated biphenyls

mg/kg - milligrams per kilogram

CREG - ATSDR Cancer Risk Evaluation Guide

Sources: 1984 EPA Remedial Action Master Plan (5), 1988 EPA Remedial Investigation (7), and 1989 EPA Water Quality and Toxic Assessment Study of Mangrove Preserve (12).

Table 5. Maximum Concentrations in On-Site Ground Water

Contaminants of Concern	Maximum Concentration (mg/L)	number * positive ----- total # sampled	Back-ground Concentration (mg/L)	Comparison Value	
				(mg/L)	Source
ammonia	561	35/36	0.27	30	LTHA
benzene	0.002	3/20	ND	0.001	CREG
di(2-ethyl hexyl) phthalate	ND	0/20	ND	---	---
cadmium	0.011	1/73	ND	0.005	EMEG
carbon disulfide	ND	0/20	ND	1	Rfd
chloro-methane	0.001	1/20	0.007	0.003	LTHA
coliform bacteria	2,400/100 mL	31/106	7 per 100 mL	1 per 100 mL	FL MCL
dieldrin	0.00008	1/20	ND	0.000002	CREG
lead	0.90	57/127	0.17	0.015	FL MCL
methylene chloride	ND	0/20	ND	---	---
pentachloro-phenol	0.006	2/20	ND	0.0003	CREG
PCBs	ND	0/20	ND	---	---
styrene	ND	0/20	ND	---	---
vanadium	0.054	9/20	0.032	0.020	LTHA
zinc	12	76/114	9.1	2	LTHA

* Positive = any detection of the contaminant

NA - not analyzed

ND - not detected

PCBs - polychlorinated biphenyls

mg/L - milligrams per liter

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: 1984 EPA Remedial Action Master Plan (5), 1987 Ross Report (10), and 1988 EPA Remedial Investigation (7).

Table 6. Maximum Concentrations in On-Site Air

Contaminants of Concern	Maximum Concentration (ppm)	number * positive ----- total # sampled	Back-ground Concentration (ppm)	Comparison Value	
				(ppm)	Source
ammonia	NA	---	NA	---	---
benzene	0.562	8/8	NA	0.00003	CREG
di(2-ethyl hexyl) phthalate	NA	---	NA	---	---
cadmium	NA	---	NA	---	---
carbon disulfide	NA	---	NA	---	---
chloro-methane	0.0006	1/8	NA	0.4	EMEG
coliform bacteria	NA	---	NA	---	---
dieldrin	NA	---	NA	---	---
lead	NA	---	NA	---	---
methylene chloride	0.002	1/8	NA	0.00006	CREG
pentachloro-phenol	NA	---	NA	---	---
PCBs	NA	---	NA	---	---
styrene	0.261	4/8	NA	0.10*	EMEG*
vanadium	NA	---	NA	---	---
zinc	NA	---	NA	---	---

* Positive = any detection of the contaminant

NA - not analyzed

ND - not detected

PCBs - polychlorinated biphenyls

ppm - parts per million

CREG - ATSDR Cancer Risk Evaluation Guide

EMEG - ATSDR Environmental Media Evaluation Guidelines

* - EMEG for styrene: No Observable Adverse Effect Level for humans following long-term inhalation exposure (1ppm) X safety factor of 10.

Source: 1991 EPA Environmental Response Team Report on Air Sampling Performed at the Munisport Landfill (11).

Table 7. Maximum Concentrations in Off-Site Surface Water

Contaminants of Concern	Maximum Concentration (mg/L)	number * positive ----- total # sampled	Back-ground Concentration (mg/L)	Comparison Value	
				(mg/L)	Source
ammonia	11	27/45	0.070	30	LTHA
benzene	ND	0/15	ND	---	---
di(2-ethyl hexyl) phthalate	ND	0/15	ND	---	---
cadmium	ND	0/21	ND	---	---
carbon disulfide	1.9	10/21	0.023	1	RfD
chloro-methane	ND	0/15	ND	---	---
coliform bacteria	190/100 mL	5/5	NA	1 per 100 mL	FL MCL
dieldrin	ND	0/15	ND	---	---
lead	ND	0/22	ND	---	---
methylene chloride	ND	0/15	ND	---	---
pentachloro-phenol	ND	0/15	ND	---	---
PCBs	ND	0/15	ND	---	---
styrene	ND	0/15	ND	---	---
vanadium	0.092	13/15	0.110	0.020	LTHA
zinc	0.150	9/24	ND	2	LTHA

* Positive = any detection of the contaminant

NA - not analyzed

ND - not detected

PCBs - polychlorinated biphenyls

mg/L - milligrams per liter

LTHA - EPA Lifetime Health Advisory

RfD - EPA Reference Dose

FL MCL - Florida Maximum Contaminant Level

Sources: 1982 Florida DER and Dade County DERM Summaries of Analytical Data, quoted in 1984 EPA Remedial Action Master Plan (9), 1984 EPA Remedial Action Master Plan (5), and 1988 EPA Remedial Investigation (7).

Table 8. Maximum Concentrations in Off-Site Sediments

Contaminants of Concern	Maximum Concentration (mg/kg)	number * positive ----- total # sampled	Back-ground Concentration (mg/kg)	Comparison Value	
				(mg/kg)	Source
ammonia	620	9/9	9	none	---
benzene	0.002	1/16	ND	24	CREG
di(2-ethyl hexyl) phthalate	ND	0/16	ND	---	---
cadmium	4.1	1/16	ND	25	EMEG
carbon disulfide	0.003	1/16	ND	5,000	RfD
chloro-methane	ND	0/16	ND	---	---
coliform bacteria	NA	---	---	---	---
dieldrin	ND	0/16	ND	0.040	CREG
lead	110	6/16	27	none	---
methylene chloride	ND	0/16	ND	---	---
pentachloro-phenol	0.4	1/16	ND	5.8	CREG
PCBs (1260)	0.077	1/16	ND	0.090	CREG
styrene	ND	0/16	ND	---	---
vanadium	23	11/16	36	none	---
zinc	1,600	9/16	33	none	---

* Positive = any detection of the contaminant

NA - not analyzed

ND - not detected

PCBs - polychlorinated biphenyls

mg/kg - milligrams per kilogram

CREG - ATSDR Cancer Risk Evaluation Guide

EMEG - ATSDR Environmental Media Evaluation Guide

RfD - EPA Reference Dose

Sources: 1984 EPA Remedial Action Master Plan (5), 1988 EPA Remedial Investigation (7), and 1989 EPA Water Quality and Toxic Assessment Study (12).

Table 9. Maximum Concentrations in Off-Site Ground Water

Contaminants of Concern	Maximum Concentration (mg/L)	number * positive ----- total # sampled	Back-ground Concentration (mg/L)	Comparison Value	
				(mg/L)	Source
ammonia	78	39/39	0.27	30	LTHA
benzene	ND	0/13	ND	---	---
di(2-ethyl hexyl) phthalate	ND	0/13	ND	---	---
cadmium	ND	0/52	ND	---	---
carbon disulfide	ND	0/13	ND	---	---
chloro-methane	0.008	1/13	0.007	0.003	LTHA
coliform bacteria	1,420/100 mL	1/47	7 per 100 mL	1 per 100 mL	FL MCL
dieldrin	ND	0/13	ND	---	---
lead	0.037	24/61	0.17	0.015	FL MCL
methylene chloride	ND	0/13	ND	---	---
pentachloro-phenol	ND	0/13	ND	---	---
PCBs	ND	0/13	ND	---	---
styrene	ND	0/13	ND	---	---
vanadium	0.029	2/13	0.032	0.020	LTHA
zinc	0.12	19/31	9.1	2	LTHA

* Positive = any detection of the contaminant

NA - not analyzed

ND - not detected

PCBs - polychlorinated biphenyls

mg/L - milligrams per liter

LTHA - EPA Lifetime Health Advisory

FL MCL - Florida Maximum Contaminant Level

Sources: 1982 Florida DER and Dade County DERM Summaries of Analytical Results quoted in the 1984 EPA Remedial Action Master Plan (9), 1984 EPA Remedial Action Master Plan (5), and 1988 EPA Remedial Investigation (7).

Table 10. Maximum Concentrations in Off-Site Biota

Contaminants of Concern	Maximum Concentration (mg/kg)	number * positive ----- total # sampled	Back-ground Concentration (mg/kg)	Comparison Value	
				(mg/kg)	Source
ammonia	NA	---	---	---	---
benzene	NA	---	---	---	---
di(2-ethyl hexyl) phthalate	NA	---	---	---	---
cadmium	ND	0/8	ND	---	---
carbon disulfide	NA	---	NA	---	---
chloro-methane	NA	---	NA	---	---
coliform bacteria	NA	---	NA	---	---
dieldrin	0.024	1/8	ND	none	---
lead	ND	0/8	ND	---	---
methylene chloride	NA	---	NA	---	---
pentachloro-phenol	NA	---	NA	---	---
PCBs (1254)	0.44	5/8	0.091	none	---
styrene	NA	---	NA	---	---
vanadium	0.21	1/8	ND	none	---
zinc	1,400	8/8	3,100	none	---

* Positive = any detection of the contaminant

NA - not analyzed

ND - not detected

PCBs - polychlorinated biphenyls

mg/kg - milligrams per kilogram

Source: 1988 EPA Remedial Investigation (7).

Table 11. Completed Exposure Pathways

PATHWAY NAME	EXPOSURE PATHWAY ELEMENTS					TIME
	SOURCE	ENVIRONMENTAL MEDIA	POINT OF EXPOSURE	ROUTE OF EXPOSURE	EXPOSED POPULATION	
Surface Soil	Munisport Landfill	Surface Soil	On the Landfill	Ingestion and Skin Contact	Children trespassing on site	Past Present Future
Surface Water	Munisport Landfill	Surface Water	Landfill lakes	Ingestion and Skin Contact	Children swimming in on-site lakes	Past Present Future
Fish and Oyster *	Munisport Landfill	Fish and Oysters	Residence	Ingestion	Biscayne Bay Fish and Oyster Eaters	Past Present Future
Ambient Air	Munisport Landfill	Air	Nearby Residences	Inhalation	Highland Village Residents	Past and Future

* It is unlikely that this site is the source of PCB contamination of Biscayne Bay.

Table 12. Potential Exposure Pathways

PATHWAY NAME	EXPOSURE PATHWAY ELEMENTS					TIME
	SOURCE	ENVIRONMENTAL MEDIA	POINT OF EXPOSURE	ROUTE OF EXPOSURE	EXPOSED POPULATION	
Stormwater Run-off	Munisport Landfill	Stormwater	Highland Village	Skin Contact	Highland Village Residents	Past and Future
Landfill Leachate	Munisport Landfill	Leachate	On the Landfill	Skin Contact	Children Trespassing on the Site	Past
Surface Soil	Munisport Landfill	Surface Soil	On the Landfill	Ingestion and Skin Contact	On-site Workers	Future
Soil Gases	Munisport Landfill	Air	Highland Village	Inhalation	Highland Village Residents	Future

APPENDIX D: SUMMARY OF PUBLIC COMMENT ON THE DRAFT PUBLIC
HEALTH ASSESSMENT AND FLORIDA HRS RESPONSE

Summary of Public Comment on the Draft Public Health Assessment
and Florida HRS Response

In August 1992, Florida HRS mailed a one page "fact sheet" to 150 people on the EPA Munisport Landfill Superfund mailing list. This fact sheet summarized the findings of the draft public health assessment, announced its availability, and solicited public comments. The EPA mailing list included all residents who had previously attended public meetings, all involved governmental agencies, local television stations, radio stations, and newspapers. We also mailed a copy of the draft health assessment directly to six community leaders. A story regarding the draft assessment appeared in the August 23, 1992 Neighbors edition of the Miami Herald. The Munisport Dump Coalition also summarized the draft assessment in their November newsletter. The deadline for comments on the draft was September 25, 1992. In September, we mailed a second "fact sheet" to everyone on the mailing list. This fact sheet again summarized the draft public health assessment and announced that due to the extensive hurricane damage in Dade County, we were extending the deadline for public comment to October 30, 1992.

We received six sets of comments on the draft public health assessment. Following is a summary of these comments and our responses:

Comment #1

One person pointed out that the March 20, 1992 Consent Decree defined the Superfund site as 30 acres, not 291 acres.

Response:

Florida HRS and ATSDR are not bound by the site definition contained in the Consent Decree. Our definition of the site (Figure 2) includes all potential sources of contamination that may affect public health.

Comment #2

One person felt the draft failed to give adequate attention and credence to the 1987 H.J. Ross Associates Site Investigation Report that showed the landfill consisted of construction debris, yard trash, and household garbage. This person contends this report and the 1988 Remedial Investigation Report demonstrate that Munisport is a typical landfill and not a hazardous waste site.

Response:

H.J. Ross Associates observed material in 38 soil borings and 71 exploratory trenches in the landfill. They failed, however, to collect any samples for chemical analysis. Many of the contaminants of concern at this site are only detectable by chemical analysis. The 1988 EPA Remedial Investigation also failed to collect any samples from the fill material. Therefore, we are unaware of any sampling of the fill material to determine if it contains hazardous chemicals.

In the 1988 Remedial Investigation, EPA did collect and analyze 10 surface soil samples from the landfill cover. These samples, however, were of the cover material, not the fill material. Ten cover soil samples from the 170 acre landfill (1 sample/17 acres) are inadequate to full characterize the extent of contamination in the cover material. These two studies failed to demonstrate this site does not contain hazardous chemicals.

Comment #3

Two people felt the draft public health assessment went beyond available information in asserting that residents' health complaints are unlikely to be site related. They pointed out that association of specific symptoms with exposure to toxic chemical is an inexact art.

Response:

We will explain the difficulty in excluding environmental chemical exposure as a cause of health effects reported by nearby residents.

Comment #4

One person felt the public health assessment should specify which agency should carry out each recommendation.

Response:

Since public health assessments are advisory not regulatory, other agencies are not required to follow our recommendations. Therefore, we have not specified which agency should carry out each recommendation. We will, however, work with all local, state, and federal agencies to ensure that our recommendations are carried out.

Comment #5

One person strongly agreed with our recommendation that the appropriate agency maintain a 15 foot buffer free of vegetation between the site and the Highland Village mobile home park. This person also strongly agreed that during any site remediation, construction, or development the appropriate agency control dust at the site and monitor air quality at the Highland Village mobile home park.

Response:

We will work with the appropriate local, state, or federal agency to ensure that our recommendations are carried out.

Comment #6

One person pointed out that in 1985 the site manager and his family lived in an on-site trailer and depended upon a nearby well for their drinking water. This person asserts during the time the landfill was in operation some residents of the Highland Village mobile home park also depended on wells for their drinking water.

Response:

Although prior to 1974 Dade County moved municipal water supply wells further inland because of saltwater intrusion, some individual may have continued to use shallow wells for drinking water and irrigation. Since there were no analyses of water from these wells, we can not assess the health risk.

Comment #7

One person pointed out that in 1987 the manager of a youth facility northeast of the site complained that several boys developed serious skin infections after being cut or scratched.

Response:

Although we can not determine the source of these infections, it is possible they were the result of swimming in the on-site lakes, especially if the levels of bacterial contamination had not changed since 1982.

Comment #8

One person observed that distance of residence from a hazardous waste site is a poor measure of exposure. This person also observed that the ZIP code used to survey cancer incidence around this site includes a large number of people who do not live close to the site. This person also points out that the failure to establish a link between the site and the health of nearby residents may be more indicative of the limitations of epidemiological methods than the lack of an effect. As a result this person does not feel that one can draw meaningful conclusion regarding the effects of this site on the incidence of cancer.

Response:

We agree that distance of a residence from a hazardous waste site is a poor measure of exposure. Distance from the site, however, is the only readily available measure of exposure we have. We also agree that use of the ZIP code to survey cancer incidence includes a large number of people who do not live close to the site. Unfortunately, ZIP code is the smallest geographical area searchable in the Florida Cancer Data System. This person is also correct that failure to establish a link between a site and the health of nearby residents may be more indicative of the limitations of epidemiological methods than the lack of an effect. We will highlight the limitations of the Florida Cancer Data System and epidemiological investigations in general.

Comment #9

One person stated that the assumptions used to calculate fish and shellfish consumption were not current and underestimate exposure 10 fold. This person also felt the draft relied too heavily on a limited set of fish-tissue samples and failed to consider bioconcentration.

Response:

Historically, a fish ingestion rate of 6.5 grams per day has been used as an average for both fish consumers and non-consumers. We agree that there are more current and appropriate fish ingestion rates. We will use 66 grams of fish and shellfish per day as the ingestion rate for recreational fishers in Biscayne Bay. This rate is based on an estimate by Pao et al. (13) of 132 grams per day (the 95th percentile daily intake averaged over three days for consumers of fin fish) multiplied by 50% (an estimate of the percentage of a individual's total fish consumption that comes from Biscayne Bay).

We also agree that eight fish and oyster tissue samples is a limited number and call for further investigation of the extent of PCB contamination of fish and oysters in Biscayne Bay. Since we relied on direct measurement of PCB concentrations in fish and oysters as opposed to modeling from sediment or water concentrations, the relative contributions of bioaccumulation and/or bioconcentration are irrelevant.

Comment #10

One person suggested that landfill gases that currently migrate upward and dissipate may migrate latterly into Highland Village mobile home park if significant areas of the site are paved. This person suggested that soil gas be monitored.

Response:

We agree that paving significant areas of the landfill could increase the lateral movement of soil gases. We will recommend soil gas monitoring if significant areas of the landfill near the Highland Village mobile home park are paved.