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From: Florida Department of Health and Rehabilitative Services,  
Toxicology and Hazard Assessment

Subject: Health Consultation: Record of Decision, Davie Landfill Superfund Site  
Davie, Florida

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#### Background and Statement of Issues

The U.S. Environmental Protection Agency (EPA) follows a multi-step process to clean up hazardous waste sites identified on its Superfund list. During this process, EPA usually conducts a remedial investigation (RI) to characterize the type and extent of site-related contamination, and a feasibility study (FS) to identify different site cleanup alternatives. Eventually, EPA publishes its selected cleanup plan in a draft Record of Decision (ROD). The draft ROD, as well as other EPA documents, is made available to government agencies and private citizens for comment. The Agency for Toxic Substances and Disease Control (ATSDR), or a delegated state health agency, is responsible for reviewing the draft ROD and commenting on the public health aspects of the proposed cleanup plan. Under a cooperative agreement with ATSDR, the Florida Department of Health and Rehabilitative Services (FHRS) is using this Health Consultation to comment on the second ROD for the Davie Landfill Superfund Site in Davie, Florida. The purpose of this document is to assess the public health implications of EPA's proposed cleanup plan and to address the outstanding concerns and recommendations raised in FHRS's 1991 Public Health Assessment for this site.

The Davie Landfill Superfund Site is at 4001 S.W. 142nd Avenue in Davie, Broward County, Florida, approximately seven miles west of Fort Lauderdale. The site occupies approximately 210 acres, and includes a closed 48-acre sanitary landfill, a closed 68-acre trash landfill, a remediated 8-acre sludge lagoon, and three borrow pits now known as Lakes 1, 2, and 3. The site overlies and is open to the Biscayne aquifer, an EPA-designated sole-source drinking water supply for southeastern Florida. In addition, the site lies between two major drainage canals: the North New River Canal, approximately 3.5 miles north of the

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site, and the South New River Canal (C-11), approximately 0.25 miles south of the site. Regional ground water flow is generally from the northwest to the southeast, but flow direction varies depending on the season, the elevation of water in the C-11 Canal, and the amount of back-pumping of the C-11 Canal after periods of high rainfall. A dairy farm borders the site along the western, southern, and most of the eastern boundaries. A Boy Scout camp borders the site's northern boundary. Residential areas are along the site's northeastern boundary and across Orange Drive to the south (Figure 1).

Davie Landfill began operating in 1964, with the start-up of the county's incinerator and the acceptance of trash, construction and demolition debris, and ash from the incinerator in the unlined trash landfill. In November 1971, site operators created a sludge lagoon in an unlined natural depression to hold grease trap pumpage, septic tank sludge, and treated municipal sludge. Over the years, the county built and raised dikes around this lagoon to hold increasing amounts of sludge. In June 1975, the garbage incinerator closed because it exceeded federal particulate matter emissions standards. Subsequently, the county opened the plastic- and clay-lined sanitary landfill for garbage disposal. Between 1975 and 1980, waste disposal in the sludge lagoon rose from an estimated 2,500 tons per month to 7,100 tons per month. On several occasions, leakage resulted in discharge to an adjacent borrow pit. Concern about these leakages and the impact of the sludge lagoon on ground water led EPA to designate Davie Landfill a hazardous waste site under CERCLA (the Comprehensive Environmental Response, Compensation, and Liability Act; also known as Superfund), and Broward County to cease sludge disposal in the lagoon in November 1981. EPA placed the site on the Superfund list in September 1983 because of concerns about the sludge lagoon. The trash and sanitary (garbage) landfills closed on December 31, 1987.

EPA first sampled the sludge lagoon in August 1982 and found high levels of total cyanides and total sulfides, strongly suggesting industries had improperly disposed plating wastes in septic tanks. EPA resampled the lagoon in 1983 and 1985, and found reduced concentrations of both contaminants. Still, the 1985 samples indicated the contaminant concentrations reaching the groundwater were at levels of public health concern (FHRS 1991). In September 1985, EPA issued a ROD regarding remediation of the sludge lagoon. In 1989, EPA performed the remedial actions necessary for sludge lagoon cleanup, including stabilization of the sludge, relocation of the stabilized sludge to the lined Cell No. 14 of the sanitary landfill, and placement of a low-permeability cap on Cell No. 14 (Figure 2). The ROD addressed source control and indicated EPA would make a decision on additional actions needed to clean up contaminated ground water after further assessment of ground water monitoring data.

Government agencies have monitored ground water at the landfill since 1976. Sampling shows a plume moving generally south and southeast in the direction of regional ground water flow. In addition, some contaminants have been found in the monitor wells in the

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northwestern portion of the site. Officials believe the southern plume contains leachate from the trash and garbage landfills as well as the sludge lagoon. The ground water also contains contaminants not detected in the sludge. Samples collected prior to 1987 only analyzed for inorganic contaminants and total organics. This limitation masked detection of the off-site movement of vinyl chloride and precluded evaluation of historical ground water monitoring information on this and other organic compounds. In 1988, the Broward County Public Health Unit (CPHU) sampled private wells in the residential area south of the site and found high levels of vinyl chloride. Broward County provided affected homes with bottled water immediately and with municipal water service later. Most residents continue to use these private wells for irrigation. Broward County's 1988 Contamination Assessment Plan (CAP), a part of their modified landfill closure permit, set a course of action to determine the source of contamination and plume movement. Broward County and the Town of Davie have agreed to convert this landfill site to a 209-acre park after satisfying the State's landfill closure requirements, as well as all other applicable state and federal regulations concerning the site (FHRS 1991, CDM 1993). The current site permit has expired. Broward County has not applied for permit renewal with the State, reportedly because they are waiting for EPA to finalize the remediation plan (Lurix, pers. comm.).

In 1992, EPA and Broward County entered into an Administrative Order by Consent for the completion of CERCLA's Remedial Investigation/Feasibility Study (RI/FS) process. In January 1994, EPA finalized the RI report identifying remaining contamination sources at the site and their potential threat to human health and the environment. In April 1994, EPA finalized the FS report outlining ground water cleanup alternatives at the site (EPA 1994). In June 1994, EPA sent a copy of the second ROD, describing the selected ground water cleanup plan, to FHRS for comment.

In order to evaluate the second ROD, we reviewed 12 documents produced by different government agencies since 1991. We chose this cut-off date because FHRS's 1991 public health assessment for the site evaluated earlier data and documents. The documents we included in our review contained environmental or public health data related to the second ROD or to concerns raised in the public health assessment. Beginning with the 1991 public health assessment, we summarize the relevant points in each of these documents below.

FHRS finalized the public health assessment for this site on August 26, 1991. In that assessment, FHRS concludes Davie Landfill is a public health hazard because of probable human exposure to vinyl chloride and other contaminants in the past, and potential exposure to these contaminants in the future if the site is not remediated. In addition, the FHRS public health assessment identifies several human exposure pathways, including soil and air exposures, that cannot be evaluated because of a lack of appropriate environmental sampling data. Finally, the FHRS public health assessment makes eight recommendations for protecting public health from potential future exposures. Four of the recommendations

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address the need for contaminant plume delineation and environmental monitoring in the future (FHRS 1991).

The October 1993 RI report characterizes the environmental and ecological resources on and around the site. During the study, investigators performed a well survey to determine private water well use within a three-mile radius of the site. The environmental samples taken during this investigation address some of the data deficiencies cited in FHRS's public health assessment. The environmental media sampled include ground water from nearby private wells and both on- and off-site monitor wells; surface water and sediment from on- and off-site lakes, ponds, and ditches; and soil from the area around the sanitary landfill, along with one off-site background sample. The analytical results show low levels of VOCs (volatile organic compounds), semi-volatile compounds, pesticides, and inorganics in all media. Of the contaminants found in ground water, vinyl chloride, sodium, antimony, and lead exceed state or federal primary drinking water MCLs (maximum contaminant levels) at some locations. Some measurements for aluminum, iron, manganese, and pH exceed secondary drinking water MCLs. Of the contaminants found in surface water, beryllium, iron, nitrogen (as  $\text{NH}_4$ ), and turbidity exceed their respective MCLs. The RI report also includes an ecological characterization of major on-site habitats, vegetation types, and animal species. The report concludes cleanup of the sludge lagoon was effective in reducing and eliminating contamination at this site (CDM 1993).

The December 1993 Baseline Risk Assessment report uses data from the RI to estimate present and future potential health risks if the site were to become a residential area. The report considers on-site workers who are closing the landfill, and youth trespassers (7-16 years old) as present-day potentially exposed populations. The potential exposure routes for these persons are skin contact with and incidental ingestion of contaminants in surface water, sediment, and soil. The report does not evaluate ground water exposure in the present-day scenario. The toxicity analysis indicates the increased risk of cancer or noncancer illness is negligible for both present-day populations. Future potentially exposed populations include residents who may be exposed through incidental ingestion of and skin contact with soil, sediment, and surface water, and through ingestion and noningestion exposure to ground water. The toxicity analysis for future residents suggests there might be a total increased cancer risk of 3 in 10,000 for future residents. This potential increased cancer risk could arise from exposure to arsenic (1 in 10,000), vinyl chloride (1 in 10,000), beryllium (4 in 100,000), chloroform (4 in 1,000,000), and 1,4-dichlorobenzene (1 in 1,000,000) in the ground water. In addition, the toxicity analysis for future residents suggests there might be an increased risk of noncancer illness in a young child (1-6 years old) from ingestion of antimony (Hazard Quotient, HQ = 2) and arsenic (HQ = 1) in ground water. An adult resident might also have an increased risk of noncancer illnesses from the combined exposure to antimony, arsenic, and manganese in ground water (combined HQ = 2) (Weston 1993). These risk totals assume the contaminants interact in an additive

manner.

Based on the RI and the Baseline Risk Assessment report, the April 1994 Final Feasibility Study concludes ground water is the only medium of concern at the site. The FS establishes ground water cleanup goals by choosing the smallest value from state or federal drinking water standards. After comparing the cleanup goals with ground water data presented in the RI, the FS concludes antimony is the most likely site-related problem, but can not define the boundaries of an antimony plume because of this element's sporadic occurrence in the ground water. The FS subsequently presents three cleanup alternatives: no action (#1); EPA oversight of existing engineering, institutional, or regulatory controls (#2); and ground water extraction and treatment with discharge to surface waters (#3). The former two alternatives rely on natural decreases of ground water contaminant levels over time, and the FS states such attenuation has occurred. The latter alternative requires surface and ground water monitoring to ensure their effectiveness (CDM 1994).

In a March 29, 1994 memorandum, EPA's project manager for the Davie Landfill site states the agency does not need to require deed restrictions for land and ground water use at the site because these restrictions have already been accomplished through FDEP's (Florida Department of Environmental Protection's) permit with Broward County (EPA 1994a).

FDEP's April 18, 1994 letter to EPA contains the department's comments on the draft proposed plan for the site. By the letter's date, the ground water monitoring plan had not been accepted from the county, the closure permit for the landfill had not been approved, and the original landfill permit had expired. Without these institutional controls in place, FDEP would not concur with EPA's proposed plan. The letter also states the landfill closure is expected to eliminate the source of ground water contamination, and the present contamination is expected to attenuate over time. Furthermore, FDEP disagrees with EPA's proposed monitoring of residential wells and placing affected homes on public water without also trying to meet ground water remediation goals. The letter states the department still wants the remediation goals met and will use monitoring to ensure existing contamination is decreasing; if attenuation does not occur, some form of active remediation might be required (FDEP 1994a).

In a May 5, 1994 memorandum, EPA's project manager for the Davie Landfill site states EPA does not have the statutory authority to oversee existing engineering, institutional, or regulatory controls at the site. Consequently, EPA does not plan to oversee activities associated with the site's landfill closure permit regulated by FDEP, including the 20 year ground water monitoring after site closure, the zoning of the site for park or recreational use, or the provision of public potable water and sewer to park facilities; residential well monitoring by the Broward CPHU; or provision of public water to contaminated wells with funds from Florida's Water Quality Assurance Trust Fund. The memo subsequently explains

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how EPA will modify alternative #2, now called ground water monitoring (EPA 1994b).

In the June 1994 draft ROD, EPA summarizes the three alternatives, presented in the FS, for cleaning up vinyl chloride and antimony contamination in ground water. In this ROD, EPA selects alternative #2 for the proposed cleanup action. Under alternative #2, EPA predicts vinyl chloride contamination will naturally decrease to remediation goals or an asymptotic value within sixteen years. This 16-year time period is 4 more years than the predicted 12-year time period to reach the same goals through ground water treatment (alternative #3). EPA concludes antimony attenuation cannot be predicted (EPA 1994c). The ROD does not present a cleanup plan if an asymptotic value for vinyl chloride is reached that is above the cleanup goal of 1  $\mu\text{g}/\text{l}$  (micrograms per liter or 1/1,000,000 of a liter; the value 1  $\mu\text{g}/\text{l}$  is equivalent to Florida's drinking water MCL for vinyl chloride). In addition, the ROD does not present the specific ground water monitoring requirements for implementing the selected alternative.

FDEP's June 1, 1994 letter to EPA points out some technical problems with the FS and presents the department's findings. The discussed topics include: a vinyl chloride detection limit set at 10  $\mu\text{g}/\text{l}$  in the RI, even though Florida's primary drinking water standard is 1  $\mu\text{g}/\text{l}$  and a detection limit of 0.5  $\mu\text{g}/\text{l}$  is possible for this contaminant; detected levels of vinyl chloride, antimony, sodium, iron, aluminum, and manganese exceeding Florida's primary and secondary drinking water standards in several wells; the apparent existence of a vinyl chloride plume south of the site; the lack of analyses for antimony in over half of the 80 wells sampled; an antimony detection limit set at 15  $\mu\text{g}/\text{l}$  when Florida's primary drinking water standard is 6  $\mu\text{g}/\text{l}$ ; the presence of antimony in all 8 sediment samples in which this metal was analyzed for; a question concerning the integrity of background sediment samples at points SD-9 and SD-12; too few surface water and sediment samples taken in C-11 Canal; and invalid sediment sample results in some locations. The document concludes the Davie Landfill Site has harmed the State's natural resources (FDEP 1994b).

Broward County's Office of Integrated Waste Management is submitting quarterly reports to FDEP and EPA containing ground and surface water monitoring results from the site. The latest report (second quarter) shows low level contamination is still present at the site. Some monitor wells, such as MW-24, do not have results published in this report (OIWM 1994a).

Broward County's June 8, 1994 letter to EPA states the Broward County Public Health Unit is responsible for the monitoring of residential (private) wells in the area, and will not be provided by the Office of Integrated Waste Management. The letter also states the County's disagreement with the conclusion that antimony and vinyl chloride are site-related contaminants, and their disagreement with the conservative assumption used in the Baseline Risk Assessment which assumes people will be living on the site and consuming ground

water from beneath the site (OIWM 1994b).

FDEP's July 15, 1994 letter to EPA presents the department's comments on the second ROD. The department's recommendations include connecting all affected residences in a contaminated area to public water rather than waiting for individual private wells to show excessive contamination, and implementing institutional controls used at the site in off-site areas downgradient from the site. The department also states its position that an increased cancer risk greater than 1/1,000,000 is unacceptable, thereby challenging EPA's classification of 1/10,000 - 1/1,000,000 as an acceptable cancer risk range (FDEP 1994c). Following a recent telephone conversation with EPA's project manager for the site, the department intends to send EPA another letter about the ROD, formally documenting the need for EPA to carry out any remedial activities (such as ground water monitoring, public water supply hook-up, etc.) the county fails to perform (Heuler, pers. comm.).

#### Site Visit

On June 21, 1994, FHRS staff performed a windshield survey at the site. Site remediation and conversion into a park was already underway. The fence along the site's eastern boundary (Boy Scout Road) was intact and in good repair; the fence along the other boundaries could not be observed from local roads. Although the gate along Boy Scout Road was initially open when staff arrived at the site, it was closed and locked after a truck left the site. The cap on the eastern side of the north mound was exposed (i.e., lacked a grass cover) in some places (along cells 13 and/or 14). In addition to the residential areas south (Sunshine Ranches) and east (Sunny Lake Farms) of the site, there is an established residential area beginning 0.4 miles north of the site, just north of the Boy Scout Camp property. Furthermore, there is new construction under way approximately 0.2 miles north of the Sunny Lake Farms subdivision, as well as northwest of the site along SW 31st Court.

#### Discussion

The RI's use of detection limits exceeding Florida's primary drinking water standards for antimony and vinyl chloride prevents our drawing any conclusions about the attenuation or elimination of these substances from the environment. Furthermore, the FS's conclusion that ground water contaminant attenuation has occurred cannot be substantiated by the one sample set collected during the RI. To demonstrate attenuation, samples need to be collected at the same sample points over many different time periods to account for ground water concentration changes caused by local rainfall and seasonal variants. Sample analyses need to use detection limits below the MCL for each contaminant. Ground water contaminant attenuation needs to be confirmed sometime in the future, after more sample

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sets are collected and analyzed.

The RI and subsequent studies do not completely address the potential health threat to private well users in the area. There are three issues of concern pertaining to private well use, not addressed in the ROD. First, there is a possibility of radial migration of contaminants from the site in directions other than to the south and southeast. FHRS's 1991 Public Health Assessment discusses evidence indicating ground water contamination is present in the northwestern portion of the site (FHRS 1991). Moreover, the RI shows acetone, carbon disulfide, and chlorobenzene present in monitor wells MW-1, MW-3, MW-7 along the site's northern and northwestern boundaries (CDM 1993). In addition, the latest ground water samples show low levels of arsenic, benzene, and other VOCs in these wells (OIWM 1994b). The presence of these contaminants in this area suggests there could be radial movement of contaminants from the site. Although the appearance of these contaminants northwest of the site may not be of current public health concern because there is no receptor population present, this contamination will need assessment at a later date if the site or adjacent farm land is subdivided and potable water wells are installed. Furthermore, during the RI well survey, CDM found that residents living in the Sunny Lake Farms area east of the site use private wells, but CDM did not sample any of these wells for site-related contaminants. Nevertheless, the RI found low levels of cyanide in MW-8, and chloroform and carbon disulfide in MW-24, both east of the site (CDM 1993). The latest ground water sample results found low levels of VOCs present in MW-8; there were no reported results for MW-24 (OIWM 1994a). These results indicate possible contaminant movement eastward from the site, and point to the need for private well monitoring at homes in this area. Second, there are homes using private well water south and southeast of the Sunshine Ranches residential area studied in the RI. Private well sampling in these areas needs to be conducted to ensure acceptable drinking water quality for the residents. At a minimum, water analyses in these wells should include metals, other inorganics, and VOCs. In addition, if significant contaminant levels are found in the monitor wells north of the site or in the noncommunity wells at the Boy Scout Camp, samples should be taken in the residential area immediately north of the camp. Third, EPA does not present a remedy for the situation in which ground water contaminant concentrations reach an asymptotic value that is above Florida's primary drinking water standards. If contaminant concentrations exceeding Florida's primary drinking water standards reach private wells near the site, the affected homes will need clean drinking water delivered to them.

To address water quality concerns of nearby residents, Broward CPHU has been testing private wells at some homes beyond the Sunshine Ranches residential area south of the site for metals and VOCs. Within the past year, they found vinyl chloride in three of the wells tested, and two of these wells had contaminant concentrations exceeding Florida's MCL for this compound. Subsequently, one home had a filter installed to remove this contaminant, and the other home had public water lines extended to it. The third home has vinyl



chloride levels just below the MCL, and Broward CPHU is periodically monitoring the water in this and other area wells. Within the past several weeks, Broward CPHU has sampled two private wells in the Sunny Lake Farms residential area east of the site for metals and VOCs (FHRS 1994a). Neither of the private wells had detectable levels of the individual VOC contaminants analyzed for; however, "other volatiles" were detected. Broward CPHU has not yet received the results of the metal analyses (FHRS 1994b). They will decide if further actions need to be taken after all sample results return from the lab.

In addition to these issues, the 1991 Public Health Assessment documents the lack of available surface water, sediment, and soil data at the time the assessment was written (FHRS 1991). The RI addresses most of these deficiencies through the collection of surface water, sediment, and soil samples. The Baseline Risk Assessment finds present-day or future exposures through these media to be associated with a negligible increased risk of noncancer illnesses, and a potential low increased risk of cancer. The assumptions used to estimate exposure doses are very conservative because they assume people will be living on the site rather than periodically visiting it (Weston 1993). Since the actual contaminant exposures of site visitors likely will be less than the estimates used in the risk assessment, the actual risk of illness is also likely to be smaller than estimated.

The 1991 Public Health Assessment also cites the lack of air monitoring data and suggests inhalation of volatilized vinyl chloride is a potential exposure pathway. Moreover, the health assessment indicates exposure to lead or benzene could occur via ingestion or skin absorption as these contaminants move off site. To address these concerns, we used a computer software called Risk\*Assistant™ (1994) to predict possible airborne concentrations of vinyl chloride and benzene from known ground water concentrations in private wells, and to predict skin absorption doses of VOCs. In our analysis, we used the maximum concentrations found in private wells or in the Sunshine Ranches monitor wells (MW-15, MW-17, MW-18, and MW-19) for these contaminants, and we assumed residents were exposed to these maximum concentrations daily for 30 years. Our exposure analyses did not find any types of illness associated with benzene exposure, or any noncancer illnesses associated with past vinyl chloride exposure. However, modeled and actual data indicate there might be a low increased risk of cancer associated with past vinyl chloride inhalation or ingestion from household water use if actual exposure conditions are similar to those we predicted. This result confirms the need for continued private well testing in the area around the landfill, and the need to include VOC analyses in all private wells samples taken. In addition, the RI found lead concentrations exceeding the MCL in 2 of 20 private wells sampled in the Sunshine Ranches neighborhood, the Boy Scout camp, and the adjacent farm. One of these samples (45 µg/l) greatly exceeded the MCL. The RI suggests these isolated findings of lead may result from contaminated well plumbing (CDM 1993). Although this is possible, these results indicate lead and other metals should be analyzed for in private wells around the site that are used for potable water.

There are a few other recommendations made in the 1991 Public Health Assessment that are not addressed in the ROD. These include the prohibition of well installation in the path of the plume, the sampling and evaluation of any ground water extracted from beneath the site for nonpotable uses (such as for toilet flush), and the ventilation of methane gas from under any buildings constructed on the site.

### Conclusions

The interpretation and conclusions in this health consultation are based upon the referenced data and information, and are specific to our review of the second ROD for the Davie Landfill Superfund Site. Additional data could alter the conclusions presented below. When indicated by public health needs, and as resources permit, we will evaluate additional, relevant data or respond to additional requests if received.

1. At the present time, there are too few ground water samples to determine if contaminant attenuation has occurred in the ground water.
2. EPA has not fully addressed the possibility of radial migration of contaminants from the site, or the potential impact of these contaminants on future water use in the area.
3. EPA has not measured ground water contaminant concentrations in private wells still being used for potable water in the areas surrounding the site or the known contaminant plume; however, the Broward CPHU is monitoring some homes east of the site and south of the suspected plume area. Modeled and actual data indicate there might be a low increased risk of cancer associated with past vinyl chloride inhalation or ingestion from household water use if actual exposure conditions are similar to those we predicted. Private well results confirm the need to analyze for metals and VOCs in all private wells sampled.
4. EPA plans to allow the ground water contaminant concentrations to attenuate until the vinyl chloride concentration reaches  $1 \mu\text{g}/\text{l}$  and the antimony concentration reaches  $6 \mu\text{g}/\text{l}$ , or until these contaminants reach their asymptotic values. The predicted attenuation time is 16 years. There are no documented remediation plans for the situation in which the asymptotic value attained exceeds the MCL for either of these contaminants.
5. The Baseline Risk Assessment found the increased risk of cancer or noncancer illness to be negligible for present-day exposures to surface water, sediment, or soil by site workers or youth trespassers. Potential future residents might have a low increased risk of cancer from exposure primarily to vinyl chloride and arsenic in the ground water. In addition, a future resident child could have an increased risk of noncancer illness from ingestion of antimony or arsenic in ground water, and an adult resident could have an increased risk of

noncancer illness from the combined exposure to antimony, arsenic, and manganese in ground water. The exposure estimates for these residential scenarios are likely to be overestimated if the site remains a park and is not later used as a residential area.

6. A few recommendations in the 1991 Public Health Assessment are not addressed in the ROD. These include: prohibition of well installation in the path of the plume, sampling and evaluation of any ground water extracted from beneath the site for nonpotable uses (such as for toilet flush), and ventilation of methane gas from under any buildings constructed on the site.

### Recommendations

The recommendations and advice in this health consultation are based upon the referenced data and information, and are specific to our review of the second ROD for the Davie Landfill Superfund Site. Additional data could alter the recommendations presented below.

1. Continue collecting ground water monitoring samples at periodic intervals. EPA and FDEP should analyze these data to ensure the remedial alternative is working and ground water contaminant concentrations are decreasing over time.
2. Continue collecting and analyzing ground water samples at the monitor wells in all directions around the site. EPA or FDEP should send sample results to the Broward CPHU so that the CPHU can sample private wells in adjacent residential areas if monitor well results exceed state or federal primary drinking water standards. If, in the future, the farm land adjacent to the site is subdivided and potable wells are installed, FDEP should assess potential contamination in the areas of proposed well installation.
3. Continue monitoring private wells in the residential areas near the site. Broward CPHU should continue monitoring private wells at homes east, south, and southeast of the site on a regular basis. At a minimum, these samples should include analyses for metals and inorganics, purgeables, and other identified contaminants of concern. If monitor wells north of the site or noncommunity wells at the Boy Scout camp begin to show significant contamination levels, Broward CPHU should begin monitoring private wells in the residential area north of the site. Broward CPHU should take the necessary steps to provide clean drinking water at homes adversely affected by the site.
4. Notify Broward CPHU if EPA concludes asymptotic values for site-related contaminants have been reached at levels above an MCL. In this situation, Broward CPHU should monitor private wells in the affected residential areas, and ensure clean drinking water is provided to homes with wells contaminated at or above a drinking water MCL.

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5. Ensure the land use for the site is restricted to being a public park, rather than a residential area, in the site's landfill closure permit to reduce potential risk of illness from exposure to the site.

6. Prohibit the installation of new wells in the path of the contaminant plume. Provide public water for potable and nonpotable uses on site. Ventilate any future buildings constructed on site to prevent the accumulation of methane gas.

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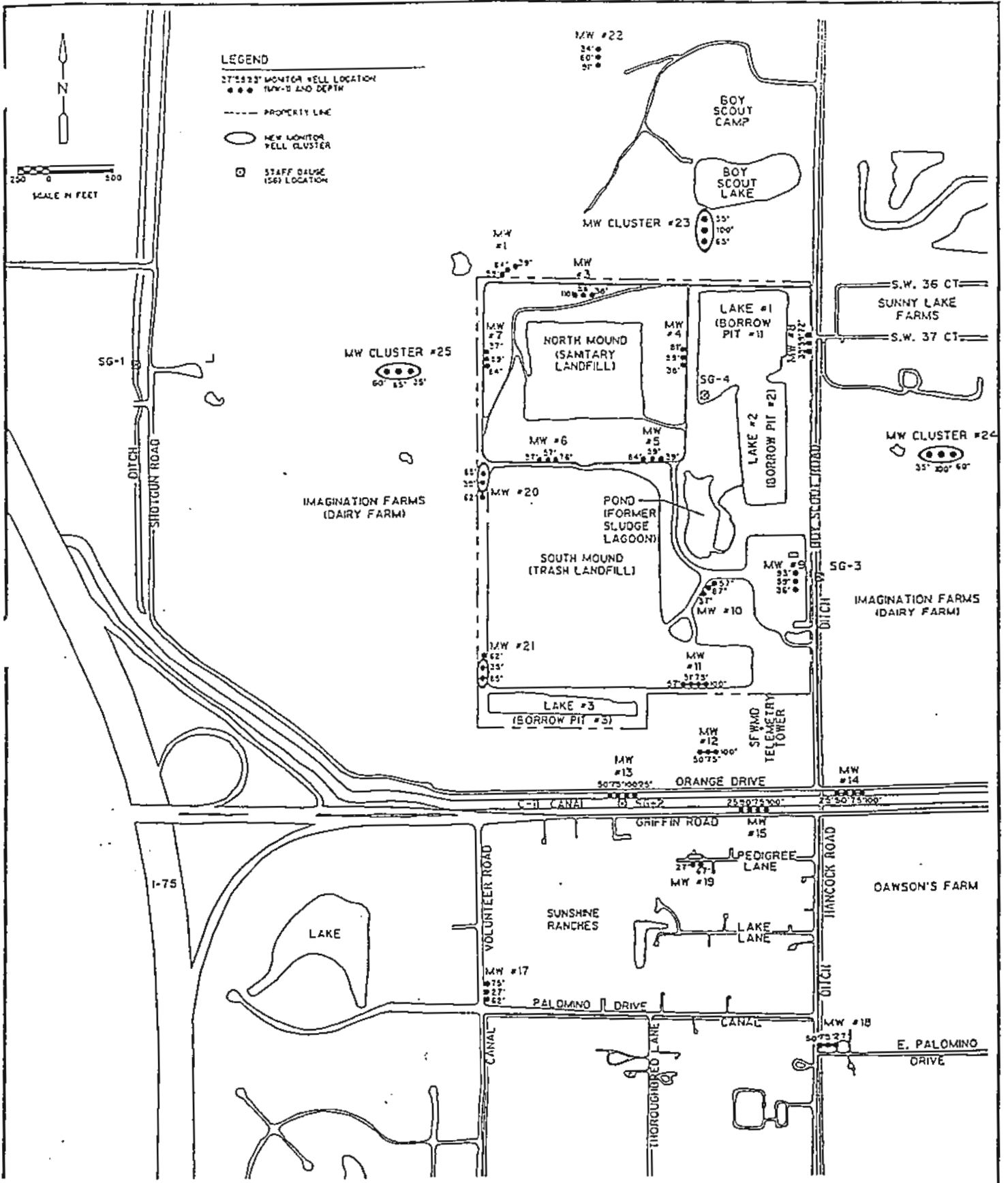
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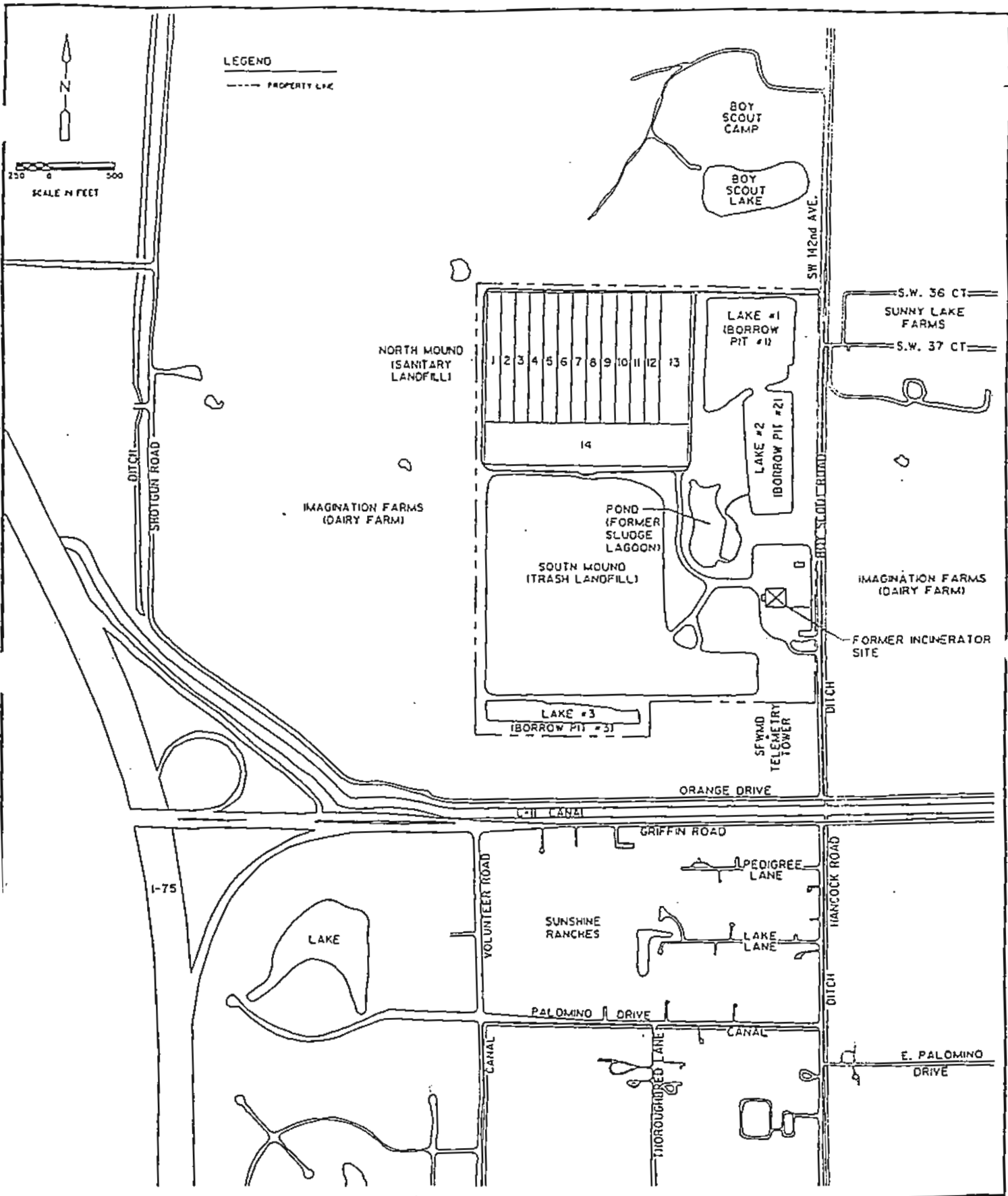
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DAVIE, FLORIDA  
 MONITOR WELL  
 AND STAFF GAUGE LOCATIONS  
 DAVIE LANDFILL

FIGURE 1



FROM  
**CDM** 1994  
 environmental engineers, scientists,  
 planners, & management consultants

DAVIE, FLORIDA  
 APPROXIMATE CELL LOCATIONS - NORTH MOUND  
 DAVIE LANDFILL

Figure 2