LANDFILLS IN THE VICINITY OF AUSTIN, TEXAS

Prepared for

THE CITY OF AUSTIN
Austin, Texas

Prepared by

Underground Resource Management, Inc.
Austin, Texas

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EXECUTIVE SUMMARY

The following conclusions are based on the findings of this report:

- The information reviewed for this project indicates that landfills owned and/or operated by the City of Austin do not contain significant amounts of chemical or industrial wastes. The landfills will probably not cause any major environmental health hazard.
- Several military, institutional, and industrial landfills contain documented hazardous wastes. These sites are regulated by existing state or federal solid waste management programs.
- Four private sites have a high potential to contain hazardous chemical wastes. The City of Austin is not responsible for investigation or remedial work at private waste sites. Because of the potential impact on the Austin environemnt, however, we recommend a meeting of representatives from the City of Austin and the Texas Department of Health (TDH) to discuss additional investigations of these private sites.
- To assure proper maintenance of closed waste sites, we recommend an annual inspection and supplemental report on the 20 of the 29 landfills presented in individual sections of this report. We also recommend water quality laboratory analyses where a surface expression of landfill leachate or a monitor well can be sampled.

During this study of closed landfill and dump sites by Underground Resource Management, Inc. (URM) for the City of Austin, 66 sites were identified. These sites range in significance from large landfills or those with known hazardous contents to small recreational area trash dumps. This report is complete in the sense that every landfill site identified during the project by URM is described or listed, even if the site has no apparent environmental impact. It is almost certain, however, that there are small waste disposal sites in and around Austin which remain undocumented. Even though stricter legislation and tighter controls by the City, the Texas Department of Health (TDH), and the Texas Department of Water Resources (TDWR) will prevent most of the past practices which are described in this report, illegal dumping may continue, and new illegal dump sites will probably be used.

In researching locations in and around Austin which are potentially contaminated with hazardous waste materials, a few sites which were not closed landfills were discovered. These sites were used for land disposal of liquid wastes and wastewater, or were where pipes and underground storage tanks had leaked. As a result, areas around Austin have been contaminated with acids, caustics, solvents, and heavy metals. Soils and ground water in Austin may contain concentrations of these or other constituents which are not attributable to landfills. Those waste sites which are not landfills are not included in this report.

All of the landfills and dump sites in this report can be categorized as one of the following: those owned and/or operated by the City of Austin, privately owned and/or operated sites, Travis County sites, and illegal disposal sites. The responsibility and jurisdiction of the City and, therefore, the recommendations in this report, depend upon whether the landfill was operated by the City or by another operator.

Of the City of Austin landfills, only Steiner Landfill was documented to contain any industrial waste. The quantities of industrial or chemical wastes in Steiner are small. The geology below this site is the Taylor Formation, in which groundwater movement is limited. The waste in Steiner is not likely to migrate from the site. A groundwater monitoring program has been proposed by the City for Steiner Landfill to verify that the wastes will not contaminate a water supply. Water samples from three other landfills operated by the City of Austin were collected during the project. Monitor wells were installed at Mabel Davis and at Butler (Zilker Park) Landfills. Surface water samples were collected at Mabel Davis and Brinkley-Anderson.

The four ground and water surface-water samples were analyzed by URM's laboratory for 139 constituents which have been identified by the U. S. Environmental Protection Agency (USEPA) as priority groundwater pollutants. This list includes several pesticides and toxic organic chemicals. None of the four water samples from Austin landfills contained any of these priority pollutants in detectable quantities. USEPA has also defined concentrations for eight heavy metals as a criteria for toxic waste. The concentrations of these eight heavy metals in the water samples are well below these levels defined by USEPA for hazardous waste. Although some water samples do not meet the standards for drinking water (see Appendix D), they apparently will not significantly degrade the water.

Of the privately owned sites in and around Austin, several sites are being monitored by existing groundwater programs under the jurisdiction of the Texas Department of Health (TDH) or the Texas Department of Water Resources (TDWR). These sites are Austin (Longhorn) Community Disposal, Sunset Farms, the Texaco Chemical Company landfills, and the University of Texas Balcones Research Center. Bergstrom Air Force Base also has a waste disposal site evaluation program conducted by the U. S. Air Force. No recommendations are made in this report for those private sites with monitoring programs in operation. Of the remaining private sites, four have a higher potential for environmental impact than the remainder of the sites because of undocumented reports of chemical wastes or drums in the waste. These sites are the M. E. Ruby landfill in northwestern Travis County, Hog Hill (Handy's Dump), the Whisenhunt site, and the Wingfield disposal site on US 183. Jurisdiction for these privately operated sites belongs to the TDH and/or the TDWR. It is recommended that the City of Austin coordinate actions with TDH and TDWR to implement a program which would determine whether these sites are impacting the Austin environment.

The remaining solid waste disposal sites in and around Austin are less likely to contribute to groundwater or surface-water contamination. As a minimum landfill control program, however, URM recommends that additional waste disposal sites be added to the list in this report as they are discovered. Each of the sites should be visited annually with these objectives:

- Inspection of the cover for subsidence and erosion;
- Inspection of the perimeter for leachate seepage;
- Collection of water samples for laboratory analysis; and
- Observation of illegal dumping, if it occurs.

The results of the annual field inspections should be reported in writing as a continuing supplement to this report. This report and supplemental reports should be used by City of Austin staff and the Austin Planning Department to protect the landfill cover, to prevent methane migration and collection in or below existing or proposed construction, and to minimize foundation failures from inadequately compacted waste, as well as to protect the ground and surface-water quality in the Austin environment.

INTRODUCTION

The primary purposes of the investigation of closed sanitary landfills by Underground Resource Management, Inc. (URM) for the City of Austin have been:

- To identify and locate closed landfill and dump sites in and around the city;
- To estimate the probable landfill contents and potential for hazardous contents in each site;
- To evaluate the potential for groundwater contamination and/or health hazards associated with each site; and
- To recommend groundwater monitoring or remedial cleanup, where necessary.

The area of study is shown on Figure 1. This is the second report presented to the City of Austin by URM for the Austin Closed Landfill Study. The first report was "Site-Specific Recommendations for the City of Austin Closed Sanitary Landfill Study", presented in January, 1984. In the first report, preliminary background information was presented, and recommendations were made for monitor well installations and sampling at Mabel Davis Park, Winn-Cook Park, the Butler Landfill in Zilker Park, and the Sprinkle Site. A recommendation was also made to sample leachate discharges to Little Walnut Creek from the Brinkley-Anderson landfill site.

This second report by URM discusses the history of waste disposal in Austin, typical landfill waste contents, regulatory aspects of waste disposal in Austin, and geologic factors affecting the potential for waste migration. Monitor well completion diagrams and results of laboratory analysis of the groundwater samples are also presented.

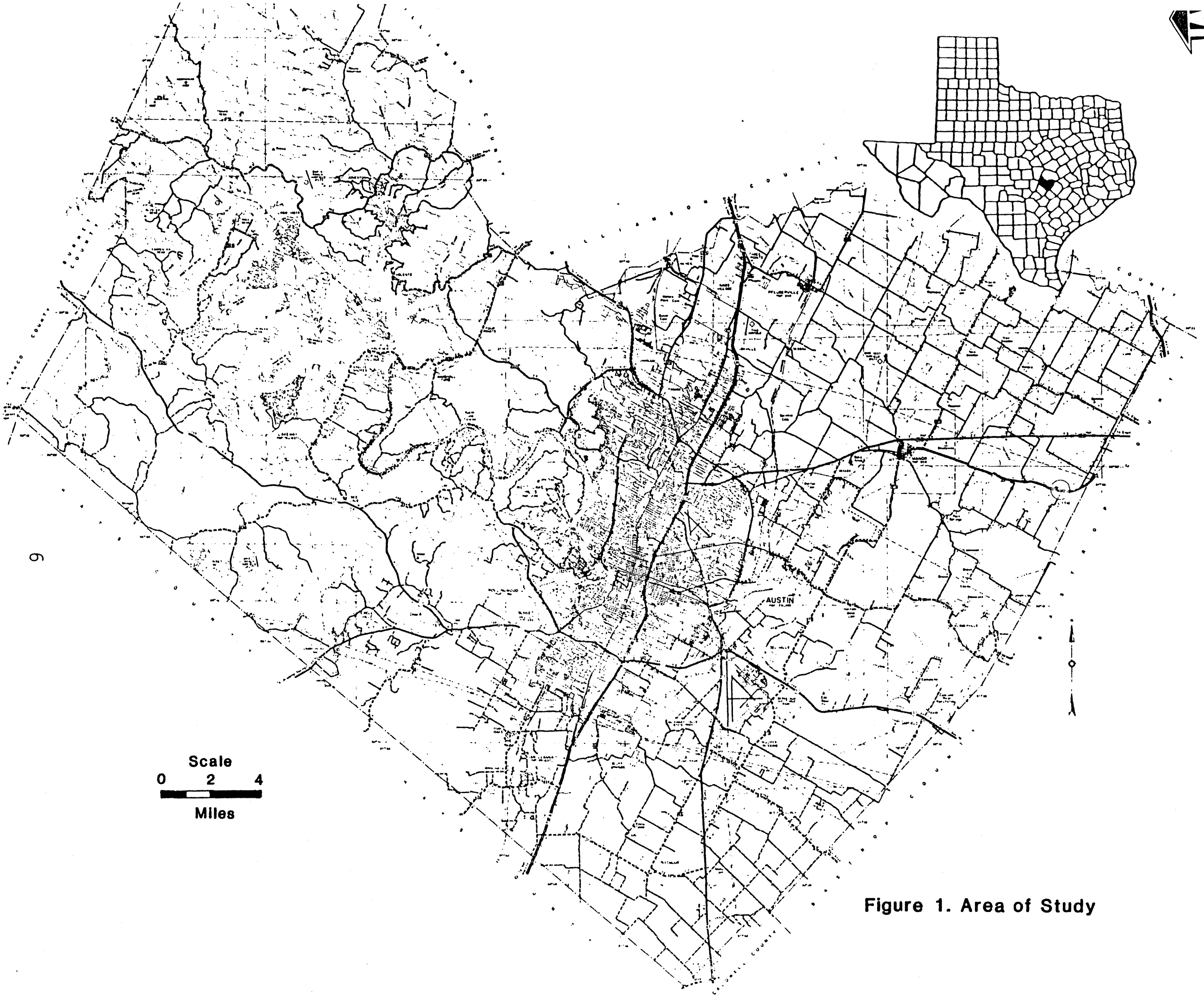


Figure 1. Area of Study

During this project, a total of 66 waste sites in or around Austin were identified by URM. Several of the historical sites were identified by long-time sanitarians or residents of Austin, and the sites may now be unrecognizable as a dump or covered by buildings. Other sites were referenced in newspaper articles with inadequate information to pinpoint their locations. Of the 66 sites, 29 were inspected in the field by a URM geologist. These 29 sites are discussed in individual sections of Appendix A. A summary evaluation of these sites is presented in Table 1. The most significant landfills in and around Austin are included in these 29 sites. Sites which are not necessarily significant and probably present no serious environmental problems are also included in the individual discussions if a URM geologist visited the site. The remaining sites are listed in Appendix B with the information obtained for each site during this project.

All of the disposal sites discovered during this project are discussed either in Appendix A or B, including those which were only used for short times, or those which are small and probably represent nominal environmental impact beyond the aesthetic impact of the waste. This report probably does not include, however, all such small sites which may exist in and around Austin.

History of Waste Disposal in Austin

A chronology of the waste sites in and around Austin for which operating dates are known is shown in Figure 2. The oldest dump site identified in this project operated in the 1200 block of South Congress Avenue from 1927 to 1929. At that time, only small amounts of trash were generated by city residents because garbage was often fed to hogs, and household trash was generally burned. When the City did begin organized trash collection, the volume collected was small and the service was not billed directly to the user. Funds came from general

TABLE 1

Site Evaluation of Major Austin Area Landfills

Site Name	Geologic Suitability of the Site	Potential for Significant Hazardous Waste Contents	Sensitivity of Local Land Use	Recommendations
1. Airport Dump	Medium - upper Colorado River terrace deposits underlain by Taylor Clay	Low - used by the City for a short period	Low - unused land near the airport	Annual site visit
✓ 2. Balcones Research Center	Poor - past contamination of water wells by magnesium, located on Austin Group	Confirmed - known radioactive contents	Low - University Research Facility	Existing ground-water program regulated by TDH
3. Bergstrom Air Force Base	Medium - terrace deposits of the Colorado River and Onion Creek	Confirmed - low level radioactive waste, possibly pesticides, waste paints, thinners, strippers	Low - U. S. Air Force Base	U. S. Air Force program exists
✓ 4. Bluff Springs/Knuckols Crossing	Medium - Colorado River terrace deposits underlain by Taylor Clay	Low - used by City for brush, tree trimming	Medium - open land	Annual site visit
✓ 5. Brinkley-Anderson	Poor - located adjacent to perennial stream channel, underlain by Dessau limestone of Austin Group	Medium - site closed (1968) before toxic chemicals were commonly disposed	Medium - unused area adjacent to industrial park	Regrading, water sample collection
✓ 6. Butler	Poor - on the gravel terraces adjacent to Town Lake underlain by Edwards Formation	Medium - site closed (1968) before toxic chemicals were commonly disposed	High - located in Zilker Park	Ground-water monitoring
✓ 7. Grove	Poor - located in quarry pit in Lower Colorado River terraces	Low - small site used for municipal waste only	Medium - open land	Annual site visit
✓ 8. Highway 71, Precinct 3	Poor - leachate outflow observed, on the Glen Rose Formation	Medium - used for private and municipal refuse until October, 1976	Medium - remote area used to graze cattle	Annual site visit
✓ 9. Hog Hill/Handy's Dump	Medium - site located in a drainage on Taylor Clay and a small part on Upper Colorado River terrace deposits	High - drums and glue were observed on the site	Medium - located beside a dead end street near the City Vehicle Services facility	Coordinate action with TDH

TABLE 1 (Cont'd)

Site Evaluation of Major Austin Area Landfills

Site Name	Geologic Suitability of the Site	Potential for Significant Hazardous Waste Contents	Sensitivity of Local Land Use	Recommendations
✓10. Industrial Waste Materials Management	Excellent - deep Taylor Clay with low permeability	Confirmed - known drums of waste in the site	Low - land owned and operated by a commercial disposer	Existing Ground-water monitoring program regulated by TDWR
Precinct 2? 11. Jonestown, Precinct 4 ← 2 - as per back individuals	Poor - placed in a limestown quarry pit in the Fredericksburg group of the Edwards	Medium - used by country and private haulers from 1969 to 1980, site gate was attended	Medium - unused land but in an area of rapid expansion	Annual site visit
12. (Longhorn) Austin Community Disposal	Excellent - deep Taylor Clay with low permeability	Confirmed - this site accepts only non-hazardous waste but it includes the area used by Industrial Waste Materials Management	Low - an operating landfill	Ground-water monitoring program exists
✓ on borderline 13. Mabel Davis	Poor - formerly a sand and gravel pit	Low - municipal waste until 1961, pesticide wastes were removed.	High - park	Ground water monitoring
6 ✓14. McGuire	Poor - formerly a sand and gravel pit	Low - municipal waste until 1961	Low - open land	Annual site visit
✓15. M. E. Ruby	Poor - formerly a limestone quarry in the Edwards Formation	High - drums of toxic waste were found adjacent to the fill area	Medium - unused area adjacent to an industrial park and housing development	Coordinate action with TDH
✓16. Montopolis Bridge	Poor - lower Colorado River terraces, adjacent to river	Medium - illegal dumping by private individuals	High - mobile home park	No action
✓17. Moses Guerrero	Poor - formerly a gravel pit through which water percolates quickly, near Cottonmouth Creek	Low - mostly brush, dirt, building debris, small amounts of domestic waste	Medium - open land with some low density housing	Annual site visit
✓18. Old 2[illegible] P[illegible]cinct [illegible]	Excellen[illegible] - deep	High - Municipal, priva[illegible]	Medium - a Flea arket operates on he site	Annual site visit

TABLE 1 (Cont'd)

Site Evaluation of Major Austin Area Landfills

Site Name	Geologic Suitability of the Site	Potential for Significant Hazardous Waste Contents	of	se	Recommendations
✓ 19. Sprinkle	Medium - located on the Austin chalk Formation	Medium - municipal waste until 1973	Mec ura grc	lt- l	Annual site visit
✓ 20. Steiner	Good - located principally on the Taylor Group	High - used by Jefferson Chemical to dispose of drums of chemical wastes	Low lar		Existing program by City of Austin
✓ 21. St. Stephen's	Medium - on Glen Rose limestone west of Austin	Low - only used for school waste	Hig sch	te	No action
22. Sunset Farms Sanitary	Excellent - deep Taylor clays with low permeability	Low - no hazardous industrial or radioactive materials accepted	Low lar	ing	Ground-water monitoring program exists
✓ 23. Texaco Chemical	Poor - landfill in Austin chalk with shallow ground water	Confirmed - used as a laboratory waste disposal site	Mediu is on trial round entia	11 d- ent	Existing program regulated by TDWR
24. Turner	Medium - located in a sand and gravel quarry on a ridge top	Low - site operated by the land owner for municip and private trash from 1955 - 1957	Mediu	nt	Annual site visit
25. Webberville-Govalle	Medium - located on Lower Colorado River Terrace deposits	Medium - illegal dumps used through the presen		nt	Surface water sampling, remove waste piles and prevent further dumping (coordinate with TDH)
✓ 26. Whisenhunt	Medium - formerly a pit in the Colorado River floodplain	High - 50 5-gal. cans of solvent from an engraving company, domestic waste		ield	Coordinate action with TDH
✓ 27. Wingfield	Poor - gravel pit crosses stream draining to Carson . Fluviatile ce Deposits ie Taylor Clay	High - photos show 55-gal drums with unidentified contents		ial	Coordinate action with TDH

Winn-Cook /
Wild Basin ?) - individual write-ups ~~are~~ not in this table

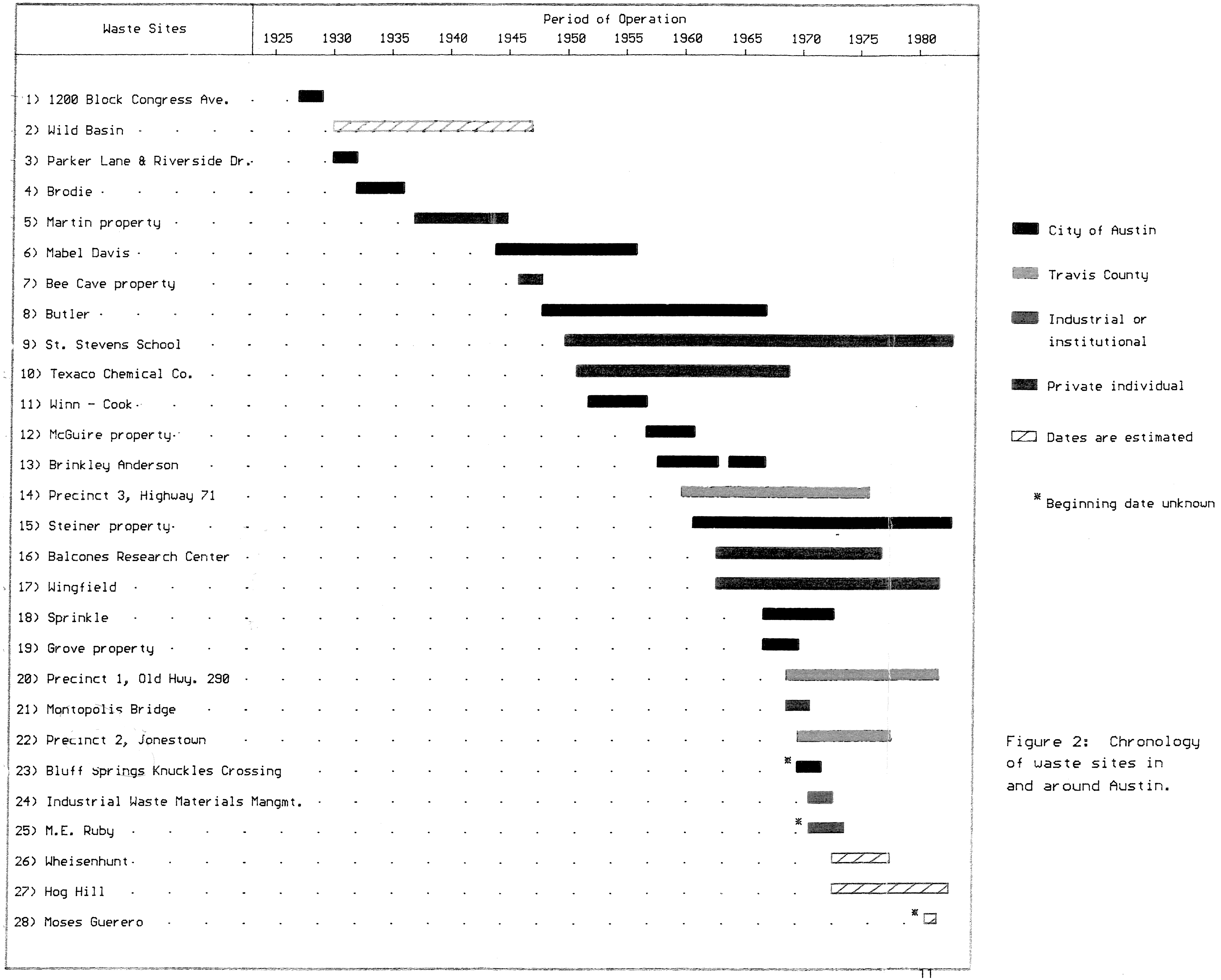


Figure 2: Chronology of waste sites in and around Austin.

city taxes.

A change in waste collection came in the 1960's, however, which was initiated by the growing number of businesses and large apartment complexes. Private haulers with large metal trash bins began to service these complexes and businesses. At the same time, the City of Austin began to assess a trash collection fee to the user on utility bills, and more businesses and individuals began using alternative private waste services. These private waste services paid a fee to use county or municipal landfills, or used private land for dumping. As a result of more waste and waste collectors, there was a greater task of controlling disposal. During the same time, the types and volumes of chemical and industrial waste were increasing.

Landfill Contents

The contents of Austin area landfills have been estimated for this report from information in government agency files, conversations with local sanitarians and trash haulers, data on typical municipal refuse contents, and a review of the history of industry and commerce in Austin. A list of sources used for this report is presented in Table 2 General information on the contents of landfills is presented below. Available information on the specific contents of a landfill is also presented in the individual landfill section.

Typically the composition of municipal refuse is:

Paper - 48%
Garbage - 16%
Leaves and grass - 9%
Wood - 2%
Synthetic materials - 2%
Cloth - 1%
Glass - 6%
Metals - 8%
Ashes, stone, dirt - 8%

TABLE 2

Information Sources

- Clipping files at the Austin American-Statesman with articles pertaining to Austin area landfills.

- Records at the Austin Historical Center with landfill information.

- Mr. John Young, Texas Department of Water Resources Enforcement and Fields Operations District 14, Austin, personal conversation.

- The Agricultural Stabilization and Conservation County Committee. Aerial photographs of Travis County at 1 inch = 600 feet for 1964 and 1973. Older photos at the same scale from the Austin Historical Center.

- File records at the Texas Department of Health including correspondence files and solid waste permit files.

- Landfill files at the Austin Travis County Health Department.

- Files at the Texas Department of Water Resources.

- Chamber of Commerce: Directory of Austin Area Manufacturers, 1932, 1950, 1961-62, 1970, and 1983.

- Former and current employees of the Austin Travis County Health Department, including Mr. Frank Redding, Mr. Lawrence Jones, Mr. Don Kolberg, and Mr. Ervin Coonrod.

- Interviews with representatives of Texaco Chemical Company, the U. T. Balcones Research Center, and Bergstrom Air Force Base.

- URM field visits to 29 sites.

- Seepage survey of the south shore of Town Lake adjacent to the closed Butler Landfill on November 11, 1983, during a period when the lake level was 3 feet below normal pool.

- Telephone interviews with local waste haulers.

- Telephone interviews with Mr. Chester Faulk, City of Austin Electrical Department.

- Rod Kimbro, Texas Department of Water Resources, telephone interview.

- Field trip by Mark Shipper of URM with Mr. Andrew Covar of the City of Austin to the disposal site near Wild Basin.

TABLE 3

Possible Contents of Austin Area Landfills

Material	Potential Sources
Paper and fiber products	Residential, commercial
Plastic, styrofoam	Residential, commercial
Metal cans, scrap	Residential, commercial
Old appliances	Residential
Tires	Residential, commerical
Leaves, grass, yard trimmings	Residential, commercial, City of Austin, University of Texas
Clearing brush	Construction contractors
Putrescible garbage	Residential, agricultural, groceries, restaurants
Construction debris, lumber, masonry, plumbing, fixtures	Construction contractors
Rock, dirt, sand, gravel	Construction contractors
Asbestos	Construction contractors, industry, commercial
Pesticides	Residential, commercial, pesticide companies, Bergstrom Air Force Base
Metal-contaminated sludge	Petroleum industry, metal-finishing industry
Acids or bases	Computer industry
Photographic developer, photo resist stripper	Newspaper, printers, individuals
Paint-thinners	Computer industry, paint manufacturers
Dyes	Computer industry, paint manufacturers
Halogenated and nonhalogenated solvents	Computer industry, paint manufacturers, equipment manufacturers
Laboratory wastes	University of Texas, plastic projects, scientific laboratories, Texas Department of Health Laboratories, Hospitals
Organic chemicals	Computer industry, chemical industry, laboratories
Xylene, xylol	Scientific and computer equipment manufacturers
Pharmaceuticals	Hospitals, residences, medical laboratories
PCB-contaminated material	City electric companies, Bergstrom Air Force Base, University of Texas
Cyanide electroplating bath sludges	Metals finishing, plating industry, scientific equipment manufacturers
Urethane and solvents	Computer industry
Low-level radioactive materials	University of Texas, Bergstrom Air Force Base

This analysis is based on United States Public Health Service data for wet garbage. An analysis of municipal refuse collected by the City of San Antonio showed a similar composition, and these numbers are believed to represent a fair approximation of the composition of Austin waste.

The potential environmental impacts of typical municipal wastes as described above are surface subsidence methane gas generation, and increased concentrations of biochemical oxygen demand, dissolved iron, lead, zinc, magnesium, and nitrogen in leachate generated from a landfill. These constituents can have a negative effect on the ground and surface-water quality.

Another serious environmental concern, however, is hazardous chemical or industrial wastes which are disposed of in a landfill. Even where they are found in relatively small quantities, compared to the total volume of the landfill, they may represent a potential health hazard if they are leached from the landfill to surface or groundwater. Table 2 is a list of the possible contents of Austin landfills including toxic and hazardous materials, and their possible sources.

There are several documented cases of chemical and industrial materials which have been disposed of in closed or existing landfills in and around Austin. These cases are discussed in the individual reports on the Balcones Research Center, Bergstrom Air Force Base, Industrial Waste Materials Management, Mabel Davis, Old 290, Steiner, and Texaco Chemical Company landfills. In addition to these documented reports of hazardous wastes, there are undocumented observations of drums or barrels adjacent to, or in Hog Hill, M. E. Ruby, Whisenhunt, and Wingfield disposal sites. These four sites also have a potential for containing some quantities of hazardous materials.

It is most likely, however, that nearly all of the recent municipal waste disposal sites in Austin have at least small quantities of hazardous chemicals. These chemicals have been generated by industries, businesses, and individuals who have had either no alternative disposal options or no regulatory incentives to bury the waste any place other than the local public or private landfills. Austin is, and has historically been, the home of many businesses which are listed as small quantity hazardous waste generators. These include printers, machine shops, hospitals, furniture strippers, metal platers, computer companies, paint companies, laboratories, and scientific instrument manufacturers. Much of the waste which has been produced by these small generators is buried in Austin landfills.

Chemical wastes generated by Austin commerce and industry may arrive at the landfill in several forms. Specific wastes may be transported by the business directly to the landfill. Since the businesses are generally required to pay a fee at the landfill entrance, there is some informal screening of the waste contents. Files of the Texas Department of Health contain records of inquiries by gate-keepers as to the suitability of waste brought for disposal. Small amounts of chemical waste may also be containerized and disposed of with the regular office and home trash. These items are likely to go unnoticed. A third method of transport of chemicals to sanitary landfills is in septic cleaning tank trucks. These trucks are permitted to pump grit trap wastes, if their waste contains a minimum percentage of solids, into pits at the landfills. If there is a lack of careful monitoring, these trucks may also pump sludges from tanks other than residential septic tanks, and dispose of the material at the landfill.

In addition to the wastes generated locally, hazardous wastes have been imported to landfills in Austin from industries on the Texas Gulf

Coast. Mr. Jack Arsenault and Herb Skinner operated the Industrial Waste Materials Management site for imported waste. Arsenault, or another person, also disposed of drums which were later discovered near the M. E. Ruby Quarry on Highway 183 North, and on a tract of land known as Martin Hill, on F.M. 1325. This was strictly illegal disposal on the part of the person who had contracts to collect waste, but had no place to dispose of it. The drums found near the M. E. Ruby quarry and on Martin Hill were subsequently inventoried by personnel from the Texas Department of Water Resources, and the state initiated disposal in a licensed hazardous waste disposal facility near Robstown, Texas. As far as was determined in that investigation, there were no similar drum sites in Travis County, although there is a possibility that some exist that were never found. During the same time period, 1971-1974, the state and federal governments were developing more restrictive regulations for the disposal of industrial or hazardous waste. Many industries, recognizing the more restrictive regulations which would follow, attempted to rid themselves of stored and accumulated waste on their own properties. Discussions with officials from other municipalities who owned or operated sanitary landfills indicated that they were aware of the potential for loads of industrial wastes out of the Houston, Galveston, Corpus Christi, Texas City, and Port Arthur areas, which are probably disposed of within their sanitary landfills. It is possible that some of these barrels of waste were disposed of in landfills around Austin.

A limited survey was made by telephone of facilities in Austin which generate etiologic, or disease-carrying, waste. Of these facilities, two hospitals, Seton and Holy Cross, use incinerators which are part of their physical plant to dispose of all potentially pathogenic waste. Brackenridge Hospital waste in the same category is transported to an incinerator in Pflugerville. Austin Pathological Services Laboratory was also contacted and they either autoclave or incinerate all of their pathogenic waste. Doctor's offices typically autoclave wastes which might be pathogenic or send them to a laboratory.

Another potential source of hazardous waste in Austin is PCB-contaminated oil. PCB was routinely used as a fire retardant in transformer and capacitor oil before 1977. The City of Austin sold used transformers and capacitors with residual PCB oil as scrap metal. Since 1977, the City of Austin's PCB waste has been burned, according to EPA regulations, in an incinerator in Eldorado, Arkansas. All of the capacitors, and most of the transformers, have now been modified to use non-PCB oil. Texas Electrical Co-op has also used PCB oil in transformers and capacitors for 30 years. The Co-op now sends all PCB-contaminated oil to Kansas City, but prior to 1977 it was sold for fuel oil or road oiling. Some PCB-contaminated oil or metal may be disposed in Austin landfills.

Regulatory Aspects of Waste Disposal in Austin

Municipal waste disposal in the City of Austin and in Travis County is regulated by the Texas Department of Health (TDH) under the authority of these Texas laws:

- The Solid Waste Disposal Act (1969),
- Texas Health and Sanitation Laws (1945),
- The County Solid Waste Control Act (1971), and
- The Litter Abatement Act (1981).

Additional authority was given to TDH to regulate municipal hazardous waste under the Federal Resource Conservation and Recovery Act (RCRA), enacted in 1976. Within the authority of these laws, TDH has developed Departmental Municipal Solid Waste Management Guidelines.

When the Texas Department of Health began its regulatory program in 1969, all existing landfill operations were permitted under a grandfather clause. Guidelines were issued to cover basic problems of disease vectors, adequate cover, site drainage, burning, and washout. The Municipal Solid Waste Rules, Standards, and Regulations were updated in 1970 to regulate open burning and fire protection, to confine unloading to the smallest possible area, to prevent windblown waste, and to provide a separate area for heavy or bulky items.

It was not until the mid-1970's that the environmental impacts of landfills on air quality and surface and ground water were considered. By 1976, all public and private municipal waste disposal sites were required to operate by permit. Trash burning was no longer allowed. As part of their permit application process, landfill operators were required to submit information on the depth to ground water below the site, and distance to surface water. The Texas Department of Health began to exercise stricter control on the compaction and daily cover requirements.

Since the mid-1970's the state landfill records have generally included information on the owner and operator, the general class of wastes received, the type of operation, and inspection reports. For this report to the City of Austin, these records have been useful to establish the times of operation, the general character of the waste, and whether the landfill was operated within TDH guidelines. The information is not adequate, however, to establish definitively either the contents of the waste site or the potential for leachate migration.

Geologic Factors Affecting Landfills

Geologic factors which affect the suitability of a location for a landfill site are the permeability of the underlying formation, the depth and quality of groundwater, the effectiveness of intervening layers as barriers to leachate migration, and the surface topography. Landfills in Travis County are located on or in these formations: recent alluvial deposits of the Colorado River and its tributaries, upper Colorado River terrace deposits, the Austin, the Taylor and Navarro Groups, the Edwards Formation, and the Glen Rose.

Many of the landfills are located in sand and gravel quarry pits along the Colorado River and its tributaries. The original quarries were excavated for alluvial material deposited by the river system. The alluvium is typically underlain by the relatively impermeable Taylor or Navarro Groups. These quarry pits were selected as landfill sites because they were an available hole, and they could be filled to reclaim otherwise unusable land. The disadvantages of these sites are that the alluvium is relatively permeable to landfill leachate. Since these landfills are often located near rivers or streams, the leachate may migrate to the river and, during high water conditions in the river or stream, groundwater may rise and mix directly with the waste. Where the waste is located above the high water table level, leachate may migrate vertically until the groundwater, or a less permeable layer, is encountered. A well-graded and compacted cover on these landfills is important to minimize infiltration and leachate generation.

Four sites identified in this study are located in the Austin Chalk Formation. These sites are the Balcones Research Center Landfill, Brinkley-Anderson, Texaco Chemical Company landfill, and the Sprinkle site. The Austin Chalk consists of light gray chalk, limy marl, and chalky limestone with small amounts of bentonite, glauconite, and pyrite nodules. The formation yields small quantities of water from cracks and faults in the outcrop area. This groundwater is typically under water table conditions and subject to contamination. The coefficient of transmissibility in the Austin chalk ranges from 2 to 200 gpd. ft., based on the reported results of the Texaco Landfill monitor wells. Landfills located in this formation could produce leachate which may in turn migrate into these shallow groundwaters.

Of the formations which outcrop in Travis County, the Navarro and Taylor Groups are the most ideally suited for landfill locations. These groups are massive beds of shale and marl with clayey chalk, and are as thick as 1,200 feet in Travis County. Although in some locations the Navarro and Taylor may yield very small amounts of fresh to moderately saline water, their low permeability is generally an effective limit to leachate migration.

Two landfills, the M. E. Ruby and the Jonestown County Landfills in northwestern Travis County, are located in the Edwards and Fredericksburg Formations. These formations are important groundwater aquifers in Travis County along the Balcones Fault Zone. Water in the Edwards Aquifer flows through faults, joints, and underground solution channels, which can be cavernous. Although in the Balcones Fault Zone the aquifer usually occurs under artesian conditions west of the fault zone and below the waste sites, the aquifer is not completely saturated, and water table conditions prevail. Water leaching from these landfills would have the potential to contaminate local groundwater.

Landfills in the outcrop of the Glen Rose Formation were identified south of the Colorado River and west of the Mount Bonnell Fault. The Glen Rose Formation consists of an upper member and a lower member. The upper member is alternating beds of limestone, dolomite, shale, and marl, with some anhydrite and gypsum. The upper and lower members are separated by the fossiliferous Corbula Martinae Bed. This formation contains small to moderate amounts of groundwater in fractures and joints. Where the groundwater encounters a bed of less permeable marl in its downward migration, the water may move laterally to a surface seep. This situation apparently occurred at the Highway 71 County Landfill, and resulted in a seep of water with landfill leachate into a drainage below the site.

Site Evaluation Criteria

The URM evaluation of the potential for significant hazardous chemical and industrial wastes in the landfill was based on these factors:

- Records of hazardous wastes in landfill files;
- Documented, photographed, and undocumented observations of hazardous waste at a site;
- Documented and undocumented reports of drums or other containers likely to contain chemical waste;
- Disposal site users;
- Period of landfill operation relative to the time during the 1970's when large inventories of hazardous wastes were disposed; and
- The opportunities for illicit dumping based on landfill fences, maintenance personnel, and security.

At several sites, one of the first three factors provides definitive information that a landfill was used to dispose of potentially hazardous wastes. In the absence of reported hazardous wastes, however, it is extremely difficult to make a responsible determination that a site is "safe" or "clean". On many sites, the only available information consists of the operator and the dates of operation. This information provides some clues from typical waste disposal practices during the period of operation. Generally, sites which were used only for municipal waste, sites which were closed before 1965 and were fenced, sites with a site operator, or those which were operated for a short time are judged to have a low potential for significant hazardous waste contents. The Mabel Davis site, however, is an example of a site which, based on these criteria, would be rated as a low potential. Illegal dumping apparently occurred after the site was closed, however, and significant amounts of pesticide were later accidently uncovered. Rainfall runoff over the site dissolved the exposed pesticide and contaminated the stream below the site.

Every waste disposal site in Travis County potentially contains some hazardous wastes. At many sites, like St. Stephen's School, the amount of wastes is probably very small. The objective of the URM evaluation is to identify those sites where the potential for significant groundwater contamination is high, and where additional groundwater monitoring may be warranted. All waste sites, however, should be handled with an awareness of the possibility that the site may contain hazardous materials.

SITE SPECIFIC INVESTIGATIONS

Monitor Well Installation

During this study, 66 closed landfill sites or dumping areas were identified. Of those, 13 were reportedly used by the City. After a preliminary review of the sites, which included site visits, file searches, and interviews with retired City Sanitation Department workers, four sites were selected for field investigation. One criteria for selection was that the sites be representative of the other landfills used by the City, since only a limited number of wells could be drilled. Selection was also based on the present use of the closed landfills and their potential for environmental impact. The sites recommended were Zilker Park, Mabel Davis Park, Winn-Cook Elementary School, and the Smith property (Sprinkle Cut-off Road).

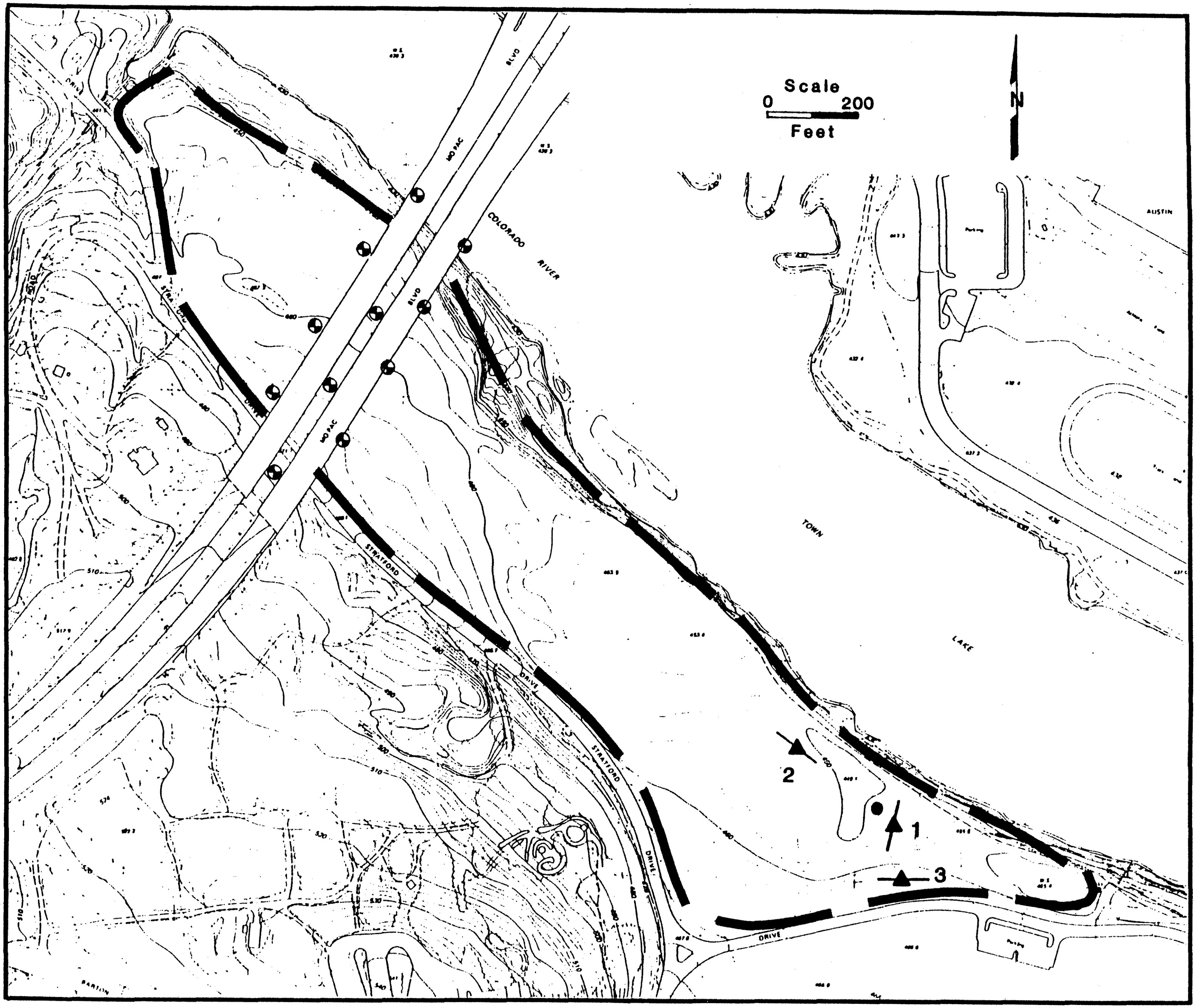
Monitor wells were drilled at Zilker Park and Mabel Davis Park. Wells were also planned for Winn-Cook and the Smith property, but were not drilled because access to the property was not authorized by the landowner. After the two monitor wells were installed, they were bailed dry on three different occasions. As they recovered after each bailing, groundwater stored within the fill material entered the well. This process ensured that when the groundwater sample was taken, it would be from the fill material. In addition to the well samples, a surface water sample was collected from the perennial stream that crosses the fill material at Mabel Davis Park, and a sample was collected from a seep along Little Walnut Creek, adjacent to the closed Brinkley-Anderson landfill.

The monitor wells were drilled using an 8-inch hollow-stem auger. With this drilling method, water is not added to circulate the cuttings to the surface. Instead, the hole is drilled dry, and the cuttings are carried to the surface by the fluted edge of the auger. Samples were taken at 5-foot intervals through the hollow-stem auger as drilling progressed with either a Shelby push-tube or a split-spoon sampler. The wells were cased with 2-inch (inside diameter) Schedule 80 PVC pipe. A 10-foot length section of 0.01 gauge well screen was set opposite the water-bearing zone. The screen was wrapped with filter cloth material (Mirafi®) to prevent fine mud and silt from entering the well. The well was gravel packed with number 2 filter sand, opposite the screened interval. Granular bentonite, a low permeability expansive clay, was used to seal the annulus from the top of the gravel pack to the surface.

Water samples were collected from the wells with a bailer. The wells were bailed a few days prior to sampling. This was necessary due to the slow recovery of the wells after bailing, which took from tens of minutes to a few days to return to static water level. Each well had its own bailer so that the wells were not cross-contaminated during sampling. The well casings are covered by a steel pipe with a locking cap.

Zilker Park Well

The well at Zilker Park is completed in fill material, and is located near the southeast end of the landfill (Figure 3). It was drilled February 21, 1984. During drilling, old rags, paper, plastic, and a light bulb were brought up with the cuttings, so it is fairly certain that the well is located on fill material. The bottom of the fill was at 19 feet. Sand and gravel were penetrated from 19 feet to the total depth of 26 feet. The Edwards Limestone underlies the landfill, but was not reached, although it is probably within a few feet of the total depth. During drilling, as the borehole was advanced, water was encountered at a depth of about 9 feet. Below that depth, the fill material became a spongy, muddy slurry created by the mixing action of



⊕ Approximate Locations of Texas Highway Department Soil Borings

▬ ▬ Approximate Fill Boundary

● Monitor Well Location

—▲— Resistivity Sounding Station

Fig. 3. Location of Monitor Well, Butler Landfill

the augers. Consequently, when the gravel pack was added to fill the annulus around the well screen, it settled slowly due to the viscosity of the borehole liquid. As a result, the permeability of the gravel pack is low, probably similar to the permeability of the fill material. After bailing, the well takes several hours to recover. The well construction figure is in Appendix C. Water level data is included on the well construction diagram. Results of the groundwater analyses are presented in Appendix D are are discussed in a separate section of this report.

Zilker Park Resistivity Soundings

Three resistivity soundings were made at Zilker Park on July 3, 1984. The electrical resistivity method provides a method for shallow subsurface characterization by means of electrical measurements taken on the surface. Electrical current is forced to flow through two electrodes (which are driven into the ground) and passes through earth material. The resulting drop in voltage is measured across two other electrodes. The amount of voltage drop is related to the conductive properties of the soil and/or underlying rock units, and also to the degree of saturation of the sediments and to the water quality.

Resistivity soundings are used to determine variations of subsurface conditions with depth. Increasing the electrode spacing between successive measurements yields information from increasing depths.

Locations of the three resistivity soundings are shown on Figure 3. The Wenner Configuration of Electrode spacing was used. Sounding No. 1 was made 30 feet east of the monitor well, ZP1, which was installed during this study. The plots of the Barnes' layer method and Moore's cumulative methods are included in Appendix E. The electrode spacing roughly correlates to depth. The Moore plot of Sounding 1 shows a sharp slope break at an electrode spacing of about 12 feet, and probably indicates the top of the saturated zone. The Barnes' plot shows a zone of low resistivity extending from an electrode spacing 12 to 30 feet, and this may correspond to the layer of saturated fill material. That interpretation does not totally agree with what was found at the nearby monitor well, where drilling samples indicated the bottom of the fill to be at about 19 feet below land surface. Beyond an electrode spacing of 33 feet, the Barne's plot indicates a zone of high resistivity which may correspond to the top of the underlying Edwards Limestone.

The results of Soundings 2 and 3 show similar patterns. Interpretation of resistivity data for depth determinations requires some skill and experience, and an accuracy within 10 to 20 percent is often all that can be expected (Bison Instruments Instruction Manual, 1975). Actual soil boring and monitor well installation, although more costly, provides reliable subsurface information as well as providing a monitoring point for groundwater sampling.

Mabel Davis Park Well

At Mabel Davis Park, fill material is located in two converging valleys. The valleys are drained by perennial streams which have average flows of 5 to 10 gpm. The streams cross the surface of the fill material and join below the filled areas. The well at Mabel Davis is located on fill material near the toe of the northwest waste body (Figure 4). At the well, fill material extends from the surface to a depth of 10 feet. Underlying the fill is the Taylor Clay, which is a shaley, yellow-gray, fossiliferous clay. The hole was advanced through the fill and an additional 5 feet into the clay to a total depth of 15 feet. Well construction is similar to that described for the Zilker Park well. The well screen is set from 5 to 15 feet below the land surface. Static water level is 5.7 feet below the land surface. Well construction is

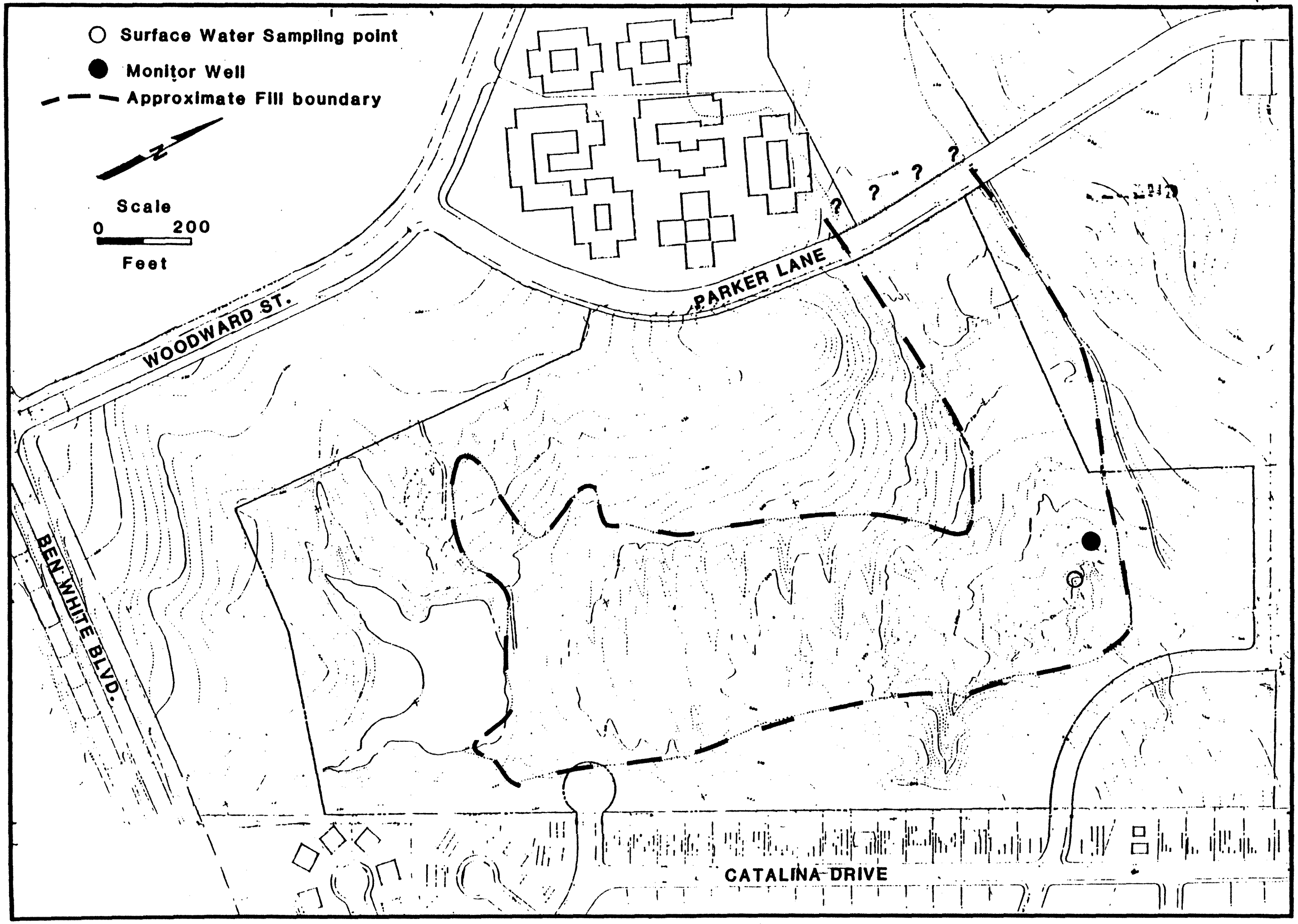


Figure 4. Mable Davis Monitor Well and Surface Water Sampling Locations.

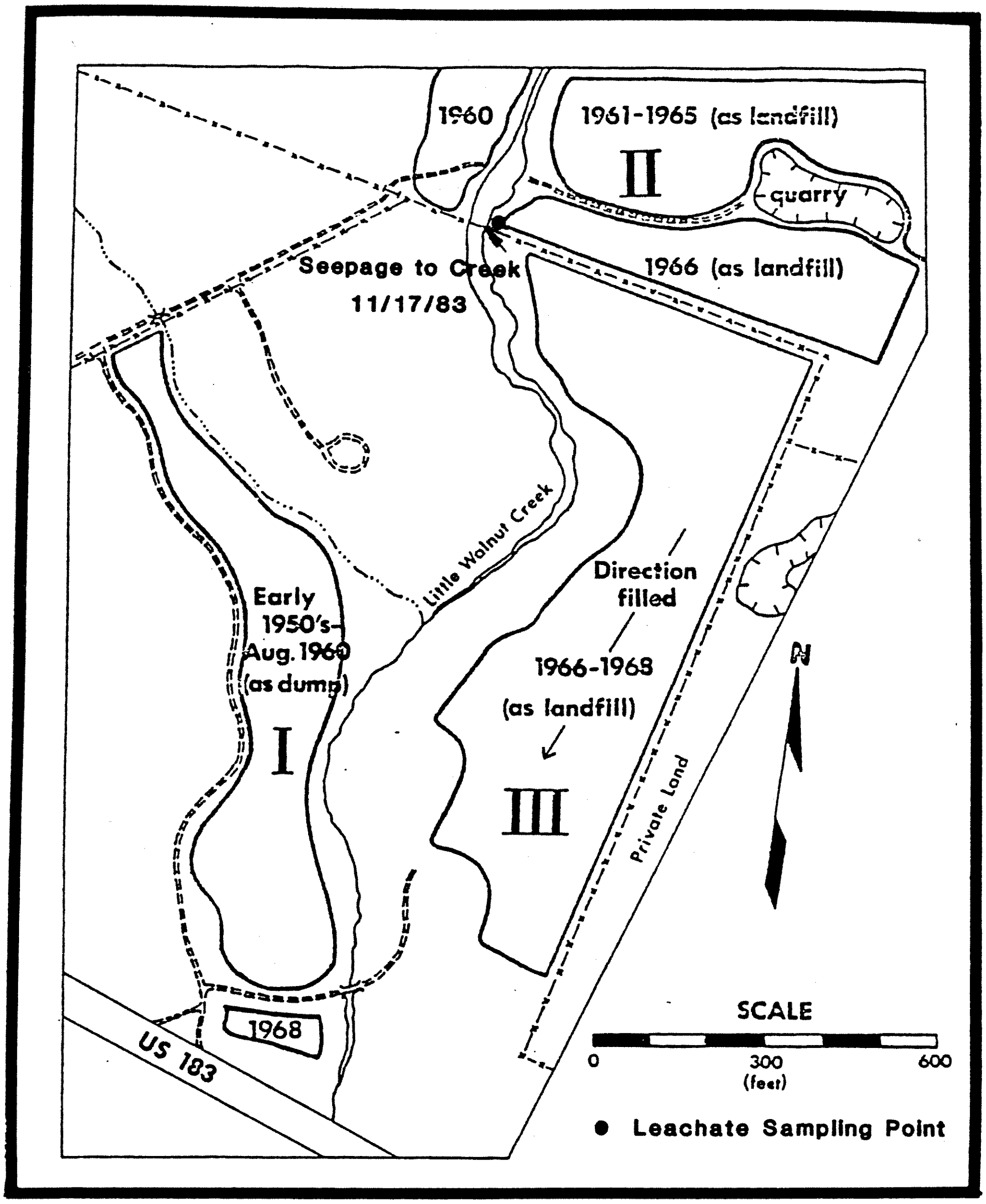
diagrammed in Appendix C.

The borehole remained open after the well was set, making it possible to get a clean, uniform gravel pack opposite the length of the screen. Despite this, the well takes several minutes to recover after it has been bailed dry, due to the relatively low permeability of the fill material and the Taylor Clay. A groundwater sample was collected from the well and the results of the analyses will be described in a later section of this report. A stream sample was also collected. It was taken from below the junction of the two creeks where the concrete hiking trail crosses the creek (Figure 4).

Brinkley-Anderson Seep Sample

A seep sample was collected on June 1, 1984 after a period of several weeks without rain, near the east bank of Little Walnut Creek. The sample was taken at a point about 1,700 feet upstream of the Rt. 183 bridge (straight-line distance). The seep drains a part of the landfill that was used between 1961 and 1965. The seep issues from the bottom of the refuse material at the contact with the underlying bedrock. At the time of the sampling, the discharge of the seep was much less than a gallon per minute. The leachate was collected from a small pool located about 10 feet away from the creek. Flow was not entering the creek because it was evaporating as it crossed the bedrock ledge separating the pool from the creek. The water in the pool was brown colored and had a slight odor.

Seeps were observed entering the creek from the opposite (west) bank about 50 feet downstream of where the east bank seep sample was collected. They were flowing approximately 1 gallon per minute and were draining material that was emplaced in 1960. The seeps were clear, but dense orange, filamentous algae was observed at the point of discharge,



After: Tom Clarke, U. T. Masters Thesis, 1972.

Figure 5. Location of Leachate Sampling Point, Brinkley–Anderson

indicating an abundance of iron. These seeps were not sampled.

Laboratory Analyses of Water Samples

Water samples were collected from the monitor wells installed at Zilker and Mabel Davis Park. In addition, samples were collected from the surface stream draining Mable Davis Park, and a bank-side seep at Brinkley. Sampling is described in more detail in the monitor well installation and site sampling section of this report. The four samples were analyzed at the URM laboratory for the standard groundwater constituents and the 139 EPA Priority Pollutants which are listed on the laboratory reports in Appendix D. Priority pollutants, which include several pesticides and organic chemicals, were analyzed using a Hewlett-Packard Gas Chromatograph/Mass Spectrometer, and interpreted by matching peaks on the computer library.

None of the priority pollutants were detected in the four water samples. The EP Toxic heavy metals, arsenic, cadmium, chromium, and mercury were not found in any samples at the detection limit. Samples from the monitor wells at Mabel Davis and Zilker Park show very low concentrations of lead, 0.07 mg/L, which is well below the EP toxic criteria of 5 mg/L for lead. The pH of all samples ranged from 7.1 to 8.1.

The water sample from the surface seep at Brinkley-Anderson showed a nitrate concentration of 76 mg/L. This concentration exceeds the Primary Drinking Water Standard of 10 mg/L of nitrate. Even though the concentration is high, the total nutrient loading to the stream is apparently low because of the slow seepage rate. Little Walnut Creek, which is below the landfarm, does not exhibit the biological growth or algae blooms which are characteristic of nutrient overloading.

In general, the results of the laboratory analyses of the samples from monitor wells at Zilker Park and Mabel Davis Park, and the surface seep at Brinkley-Anderson indicate that hazardous materials are not present in the leachate at the sampling location. There is no indication that leachate from the sampled locations will severly contaminate ground or surface water. Although the total dissolved solids are fairly high in the Zilker Park well and the Brinkley-Anderson surface seep, this leachate will be diluted by the receiving surface water bodies. Metals and toxic organic chemicals, which might be of concern even at low concentrations, were not detected in the samples.

Although the laboratory analyses of these samples indicate little pollution potential from the leachate, the samples are representative of only one portion of the landfill. It is possible that parts of the landfill away from the points sampled contain hazardous constituents which were not detected in the sample.

A factor which affects the quality of the leachate is the age of these landfills. Metals and organic material are dissolved as rain water and/or groundwater infiltrate the fill material. Typically, highest concentrations occur when the fill is freshly placed. After 3 to 5 years have passed, the concentration of leached material in the wastewater will have dropped significantly. The amount and rate of rain water infiltration and/or groundwater through-flow influences the rate at which degradation occurs. Since the wastes at Brinkley-Anderson, Butler, and Mabel Davis landfills were placed between 1944 and 1968, many of the leachable constituents have probably been removed. Landfills which have been closed more recently probably have higher concentrations of leached constituents in th leachate.

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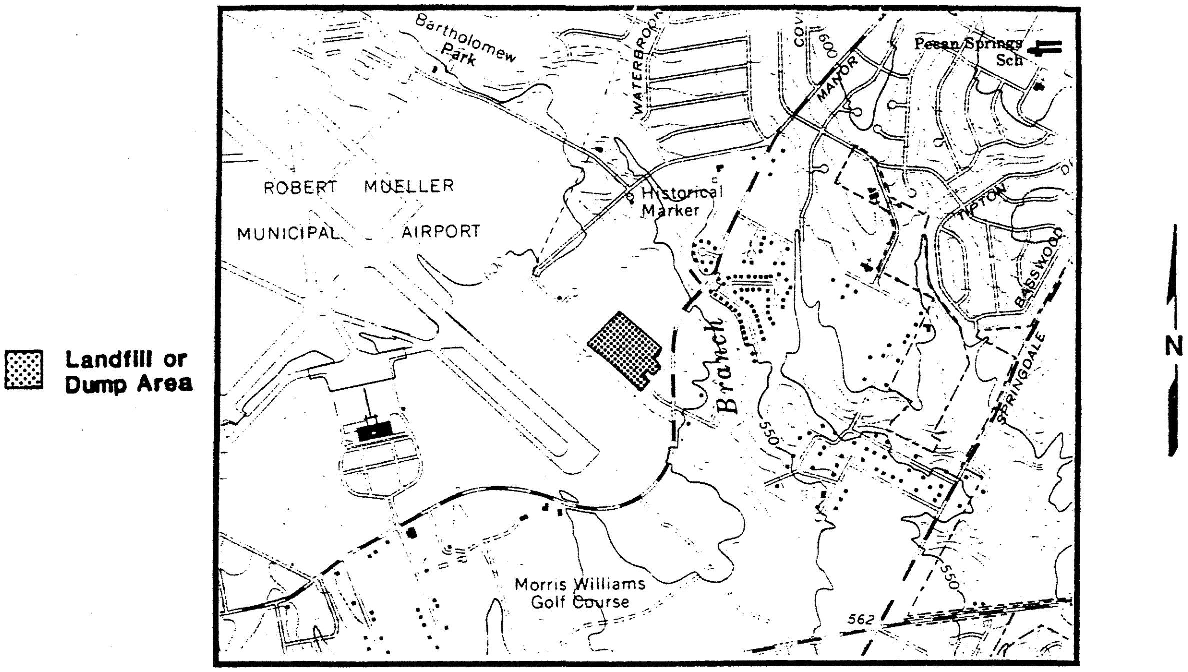
Appendix A
Individual Site Reports

APPENDIX A

TABLE OF CONTENTS

AIRPORT DUMP



Base taken from U.S.G.S. Austin East, Tx. Topographic Quadrangle.

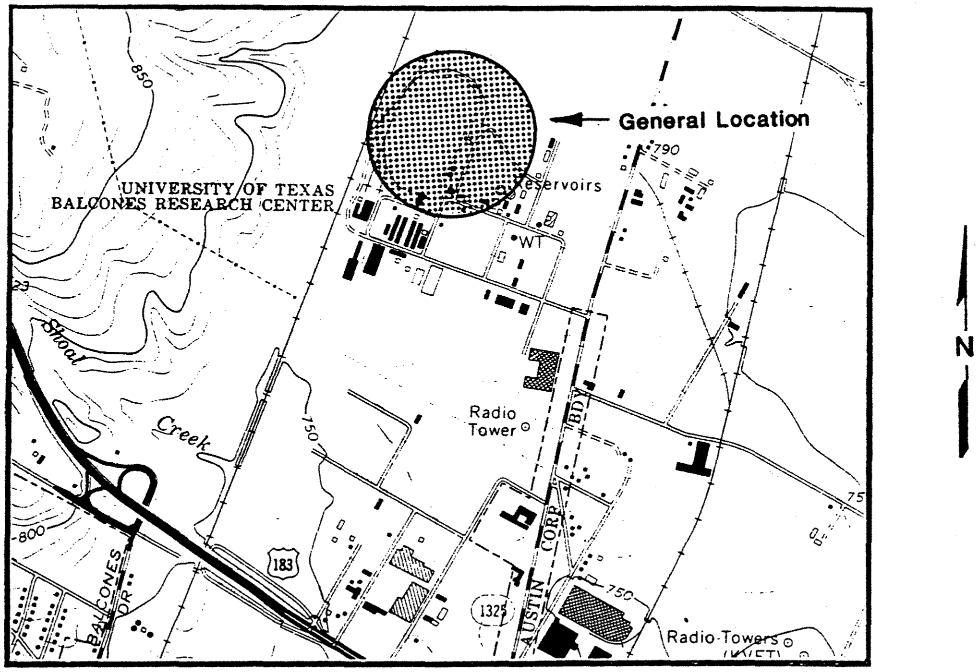
Little is known about this site, which is adjacent to the municipal airport, and has been used by the City of Austin for approximately 6 months. The site was apparently closed before completion of the airport. The location of the site was estimated based on irregular lineations of surface topography shown on the 1966 aerial photographs. The total area of disposal, estimated from the photograph, was approximately 7 acres. No information has been obtained from which to determine either the volume of waste, or the degree of compaction. Since the site is small and was used only for a short period of time, and only by the City of Austin, the site has a low potential of containing significant hazardous wastes other than those materials commonly disposed with municipal refuse.

The geological formation in the area of the site is Upper Colorado

River Terrace deposits underlain by the Taylor Clay. Leachate from the disposal site would migrate easily through the Terrace Deposits, and from there it would probably move along the upper surface of the Taylor Clay.

Because of the low potential for hazardous contents at this disposal site, the only action recommended at this time is an annual site visit.

BALCONES RESEARCH CENTER



Base taken from U.S.G.S. Pflugerville West, Tx. Topographic Quadrangle.

Scale

0 2000 4000

Feet

Three waste disposal sites have been identified on the property of the University of Texas' Balcones Research Center. Information on these disposal sites has been acquired from Mr. Bill Bryant, the U. T. Radiation Safety Officer, from the files of the Texas Department of Health and from a report on the site by TDWR (1978).

Of the three sites, one which is currently used is a slit trench site where plastic bags, containing the wastes of a colony of research monkeys, are buried. The second site is 200 feet by 200 feet and was used from 1963 to August, 1977 to dispose of low-level radioactive waste, including paper towels, gloves, aprons, and broken glassware.

Radioactive isotopes which contaminate these wastes are tritium, carbon 14, sodium 22, cobalt 60, nickle 63, technecium 99, cesium 137, thallium 204, lead 210, and some miscellaneous isotopes. The total activity is estimated to be 1,905 millicuries decayed to 1983. These wastes were placed in 55-gallon drums or pasteboard boxes, and buried in ditches 2 feet wide by 8 to 10 feet deep, with 10 feet of separation between ditches. There is a minimum of 4 feet of soil cover over the waste. The total volume of buried waste is estimated to be 20,000 to 40,000 cubic feet. The disposal area is fenced and marked. Since this site was closed in 1977, radioactive wastes generated by the Balcones Research Center have been disposed of by Isotechs of Houston.

The third disposal area is an acid neutralization pit within old lime slurry pits originally created by the magnesium processing plant which operated at the Research Center site during World War II. The lime slurry pits are 4 to 5 acres and 20 to 30 feet deep. They contain approximately 110,000 cubic yards of a white semi-solid, consisting primarily of calcium, magnesium, chloride, and sulfate. This nonplastic sludge has a reported permeability of 4 x 10^{-4} cm/sec. The Balcones Research Center uses about 1/4 of an acre of these lime slurry pits to dispose of liquid chemical wastes. The wastes are first neutralized by placing some of the lime slurry into the container, then the container contents are poured into the slurry pit. Some chemical wastes are also shipped to the hazardous waste site in Robstown, Texas.

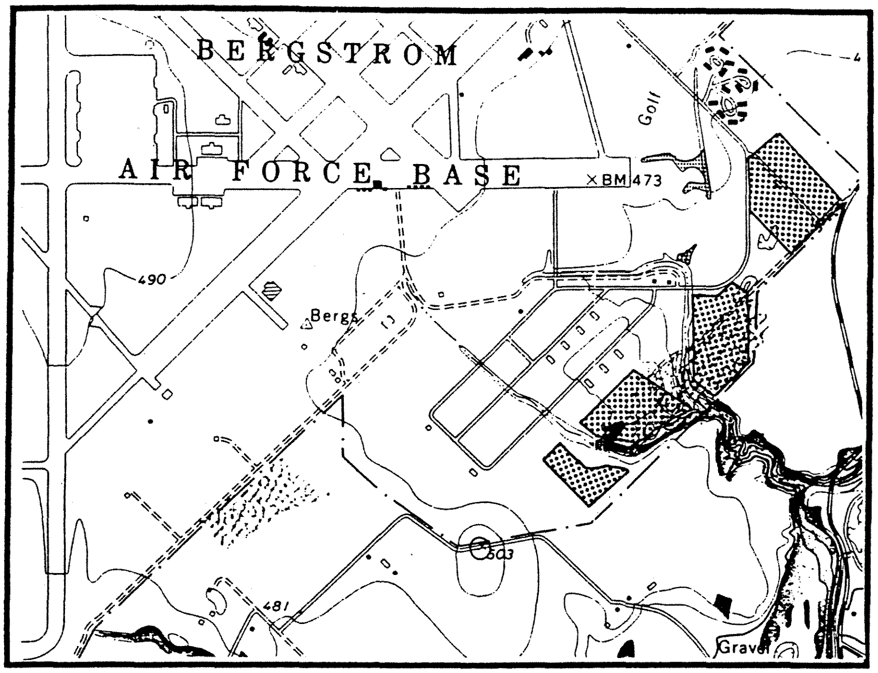
Nine wells were installed to monitor groundwater below the slurry pits from August, 1976, to August, 1977. The results of chemical analyses on samples from these wells showed that leachate was apparently migrating into the groundwater, indicated by increasing total dissolved solids.

The Research Center waste disposal sites are located on the Austin Group, which consists of chalk, marly limestone, and limestone. The monitor well boring logs show an upper layer of silt and clay, underlain by a weathered, tan limestone, and then an unweathered, gray limestone. The upper layer of clay generally extends from 2 to 6 feet below the surface, and the top of the gray, unweathered limestone is encountered between 12 and 30 feet in the borings.

Groundwater movement below the Balcones Research Center may be influenced by the Balcones Fault zone. A major fault displacement with the down-thrown side toward the east is located 500 feet west of the site, and topographically down-slope from the waste disposal area. This fault may provide an avenue for leachate to migrate into lower groundwater levels. Although a potential groundwater contamination may exist from the Balcones Research Center, mitigation of that problem is not within the direct responsibility of the City of Austin. A monitoring program regulated by the Texas Department exists so no action within this study is recommended.

BERGSTROM AIR FORCE BASE

▨ **Landfill or Dump Area**



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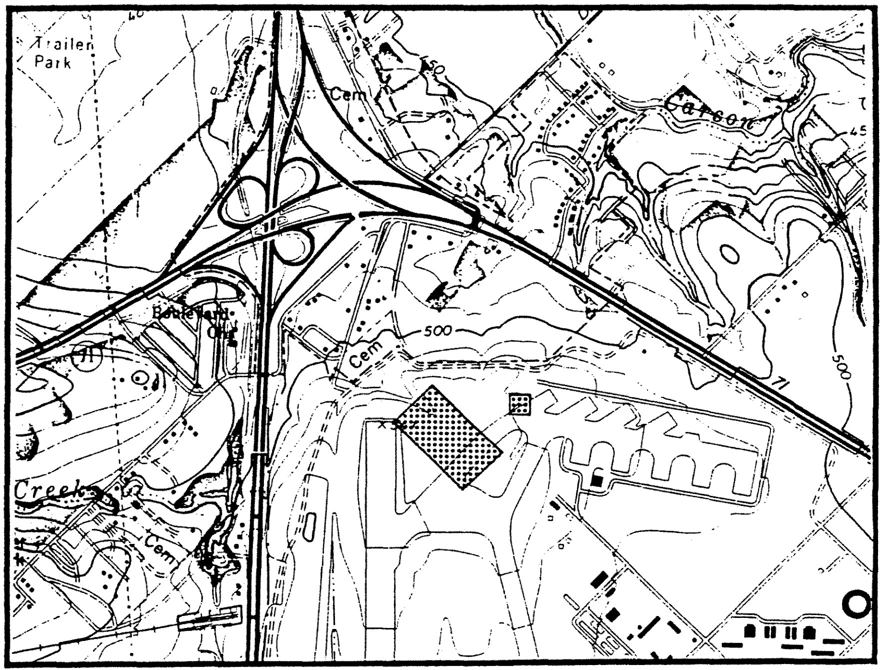
Base taken from U.S.G.S. Montopolis, Tx. Topographic Quadrangle.

Scale

0 2000 4000

Feet

▨ **Landfill or Dump Area**



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Base taken from U.S.G.S. Montopolis, Tx. Topographic Quadrangle.

Seven landfills and a radioactive waste disposal site have been operated on Bergstrom Air Force Base. These disposal sites were inventoried and evaluated by CH2M Hill as part of the Department of Defense Installation Restoration Program. Refer to the report "Installation Restoration Program Records Search for Bergstrom Air Force Base, Texas" (CH2M Hill, 1983) to obtain additional information.

Industrial operations on the base, which include the corrosion control, flight, and aerospace equipment maintenance, laboratories, and photographic processing facilities, generate hazardous waste oils, contaminated fuels, spent solvents, and cleaners. From 1943 to 1972, these wastes were burned on the base. Since 1972, spent non-halogenated solvents, waste oils, and recovered aviation fuels have been stored in three 25,000-gallon underground storage tanks until they were either sold for recovery or removed by a contractor.

The seven Air Force Base landfills were operated from 1943 to 1980 to dispose of domestic waste, construction rubble, and possibly rinsed pesticide containers, paint cans, waste paints, thinners, strippers, oil, and solvents. Wastes were generally placed in these landfills in trenches, burned, and covered. In the early 1970's, seven 55-gallon drums of DDT were found in Landfill Number 6. One of these drums was corroded and leaking and was buried on the site. The remaining six drums were given to the City of Austin for disposal. Our investigation of city files found no record of the final disposal of these drums. Since 1980, off-base contract disposers have been used instead of these landfills.

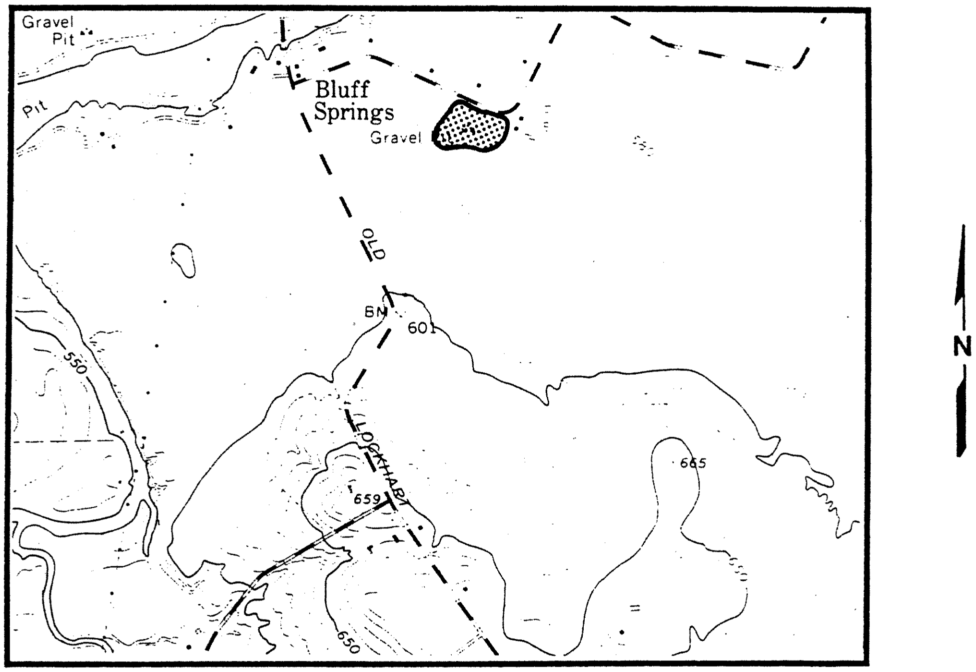
The low-level radioactive materials disposal site consists of two 18-inch diameter, and one 12-inch diameter cast iron pipe. All three pipes extend vertically, approximately 20 feet into the ground and are covered with a 4-inch concrete slab. A radiological survey of the site revealed no activity above background levels.

The geology immediately underlying the air force base is Terrace deposits of the Colorado River and Onion Creek consisting of sand, silt, clay, and gravel. A 10 gpm well on the air force base golf course produces water from a depth of 150 feet in these terrace deposits. The water quality is reportedly poor. Below the Colorado River terrace deposits are approximately 700 feet of the Taylor Formation. This formation consists of montmorillonitic clay and marly clay. The Edwards and Trinity Aquifers underlie the Taylor Clay. The groundwater in both the Edwards and upper Trinity below the air force base is saline. These aquifers are confined and effectively isolated by the overlying clay layers.

No URM field investigation was made of the Bergstrom landfills. Responsibility for these sites belongs to the Department of Defense.

BLUFF SPRINGS/NUCKOLS CROSSING

▨ **Landfill or Dump Area**



Base taken from U.S.G.S. Oak Hill, Tx. Topographic Quadrangle.

Scale

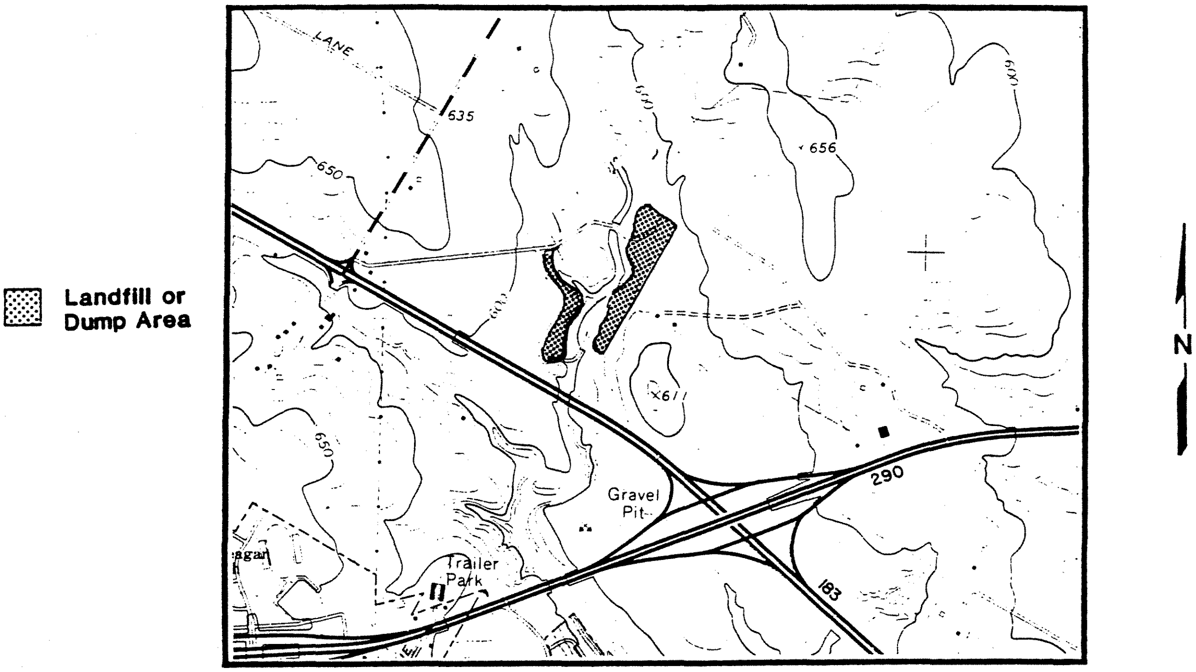
0 2000 4000

Feet

The Bluff Springs Landfill was operated by the Austin Parks and Recreation Department to receive brush, tree trimmings, and vegetative material. It received no municipal or industrial wastes. The area of the landfill was 2-1/2 acres, and it received 5 to 7 four-cubic-yard truckloads of material daily. The site was closed in the fall of 1972.

The landfill is located in a 20-foot deep gravel pit, two miles from Williamson Creek. The surface geology at this location is high terrace deposits of the Colorado River, underlain by Taylor Clay. The surrounding topography is flat. Since this site is unlikely to have received any potentially hazardous materials, the only action recommended is an annual site visit.

BRINKLEY-ANDERSON



Base taken from U.S.G.S. Austin East, Tx. Topographic Quadrangle.

Scale

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Feet

The Brinkley-Anderson site is located on the east and west banks of Little Walnut Creek. The east bank of the creek was used as a County dump from the 1950's to 1968. The west bank was operated by the City of Austin from 1958 to 1967 for municipal solid waste. The site is located west of the intersection of Highways 183 and 290, along Walnut Creek. Information on the site was collected from field inspection, city and county files, and from Clark's master's thesis on this site (1972).

During operation of the Brinkley-Anderson landfills, gravel and marl were apparently removed to the underlying Dessau limestone, and the excavated trenches were filled with municipal solid waste in 30 to 50-foot lifts. As was common practice during this period, the waste was inadequately covered and compacted. Subsequent to the site closure, irregular subsidence has formed surface depressions which collect water which then infiltrates through the waste. Some of the infiltrated water is expressed as leachate at the contact between the Dessau limestone and the waste. An unfilled limestone quarry adjacent to the pit may also contribute water which is leaching through the landfill.

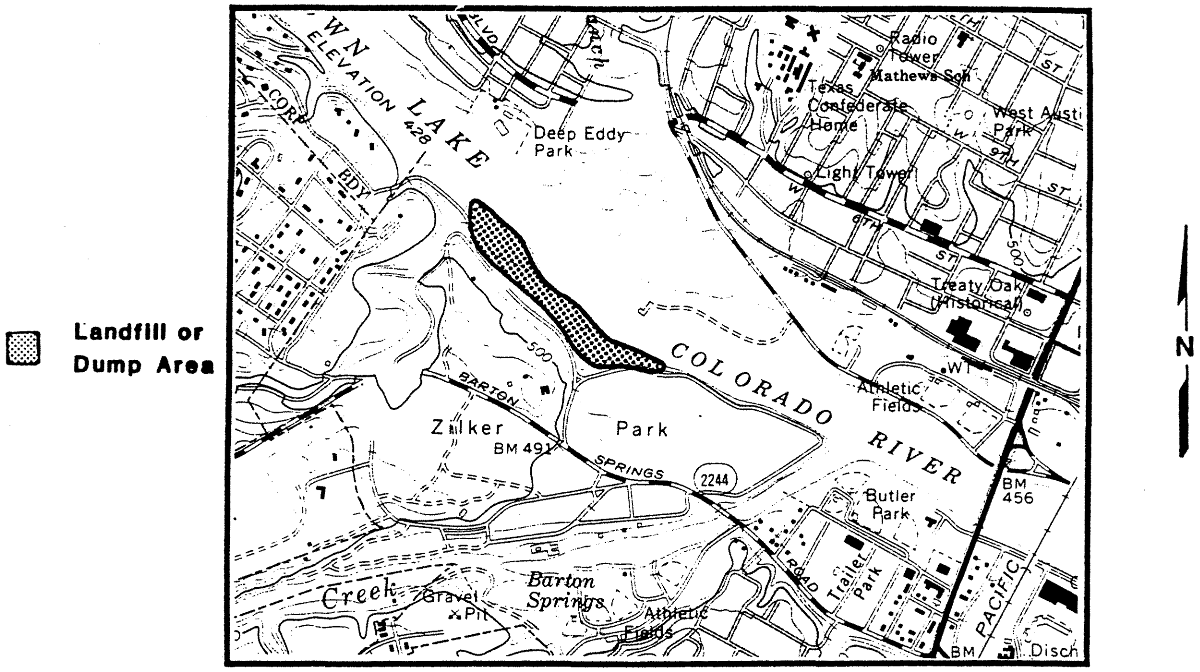
Nine laboratory analyses of leachate and Walnut Creek water were conducted by Clark in 1972. These tests showed relatively higher levels of sulfate, phosphate, copper, zinc, chromium, nickel, cobalt, lead, arsenic, selenium, mercury, manganese, and titanium in leachate samples compared to samples from Walnut Creek. These constituents are typically higher in landfill leachate. The higher concentrations observed in the leachate, however, were quickly diluted downstream. Laboratory techniques have improved dramatically since 1972, and the water quality analyses conducted now will certainly produce more accurate results.

The site was field inspected by URM on November 17, 1983. Little Walnut Creek was walked to the northern edge of the landfill site. Seepage to the creek was noticed at only one location adjacent to the northern section of the fill. Water emerged from the contact between the debris and underlying limestone on the east bank, about 1,700 feet upstream from the Highway 183 bridge. The flow rate was about 1/3 gpm and was clear. Most of the landfill close to Highway 183 has been graded level, but the northeast section of the site shows distinct subsidence on the scale of 4 to 5 feet.

In a second field visit on June 1 to collect a leachate sample for laboratory analysis, part of the site had been regraded, and construction had begun on a building complex. Regrading and covering the site may reduce infiltration into the landfill. There are two serious potential problems, however, with building sites on top of municipal waste.

One problem can be differential subsidence and structure failure. The other potential problem is methane gas migration into buildings above waste sites. Methane often moves into buildings along plumbing pipes and can create both a health and an explosive hazard. Both the problem of subsidence and of methane generation are potentially more severe above sites with deep waste lifts, as in Brinkley-Anderson. Removing the waste below the buildings and placing properly compacted fill before construction would resolve the problems of differential subsidence and probably eliminate the potential for methane collection below the buildings. We recommend annual sampling and analysis of seeps from the landfill into Little Walnut Creek.

BUTLER LANDFILL



Base taken from U.S.G.S. Austin West,Tx. Topographic Quadrangle.

Scale

0 2000 4000

Feet

The Butler landfill was operated by the City of Austin from 1948 to 1967. It was operated exclusively for municipal waste, but it was an uncontrolled site and may contain some waste from other sources. The landfill is located on the south shore of Town Lake and extends from a small creek west of MoPac highway east about 2,500 feet into Zilker Park. The average width is 500 feet. Based on average dimensions of 2,500 feet by 500 feet by 20 feet deep, the site would contain approximately 100,000 cubic yards of refuse.

Aerial photographs on file at the Agricultural Stabilization and Conservation Committee in Austin indicate that the eastern end of the dump was filled last. Differential settlement has occurred since the closure of the dump and the surface, especially in the eastern part, contains several closed depressions, a few of which are several feet deep. Some depressions contain water year-round, and a pipe has been placed to allow these to drain to Town Lake. Other depressions contain water only after a rain. The area is now part of Zilker Park and the dump site is grass-covered and mowed periodically.

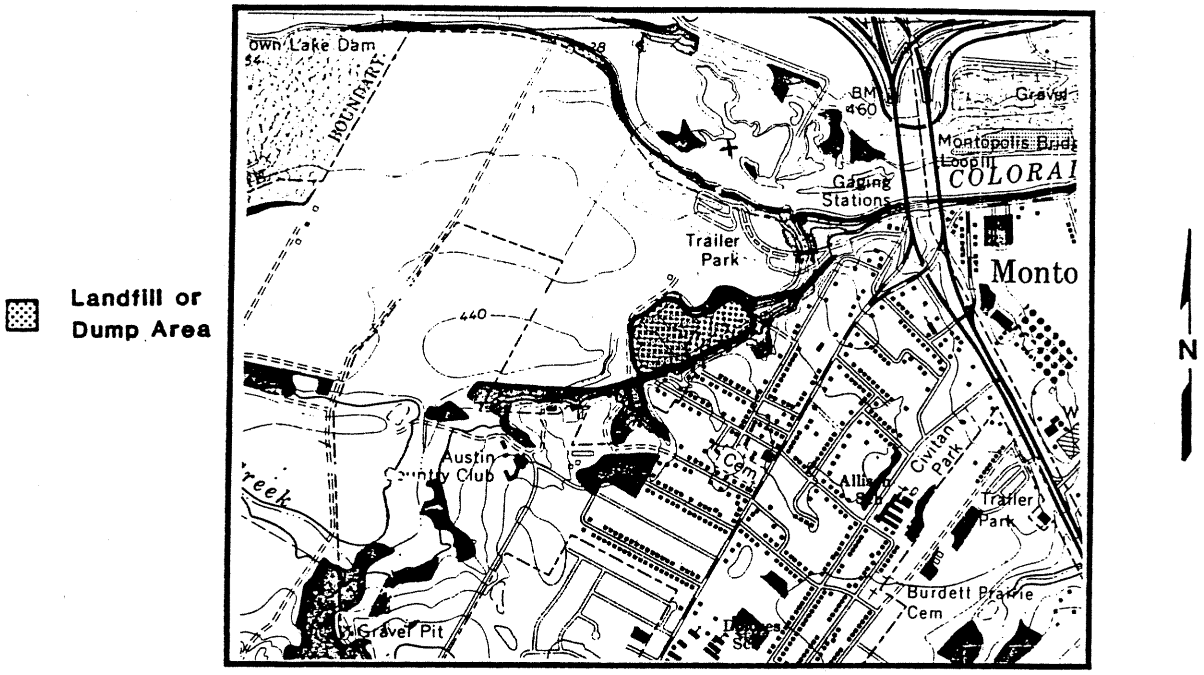
The municipal waste disposed at Butler was used to fill an old gravel pit that had been mined for sand and gravel from low terrace deposits of the Colorado River. The terrace deposits are underlain by the Edwards Limestone in all areas of the landfill. The site is adjacent to, and parallels about 1/2 mile of the south shore of Town Lake in the vicinity of the Mopac bridge.

The Mopac bridge was constructed in the early 1970's across Town Lake. Many of the bridge support pillars are located within the area of the old landfill. At that time, soil borings were made to find the depth to the bedrock. These boring logs indicate that the thickness of the landfill materials ranges from 20 to 30 feet. In some holes, the landfill material rests directly upon the Edwards Limestone. In the majority of borings, however, the waste body was underlain by 5 to 10 feet of gravel, sand, or clay which, in turn, rest upon the Edwards. The elevation of the Edwards/gravel contact under Mopac bridge is 5 to 10 feet below the pool elevation of Town Lake. Therefore, one could expect that the deeper sections of the landfill would be saturated, or at a minimum, the sand and gravel that underlie the fill would be saturated.

During the week of November 6 to 11, the water level of Town Lake was lowered three feet for work on Longhorn Dam. This provided an opportunity to walk the shoreline adjacent to the landfill. Under these conditions, seepage to the river would be easy to see as it crossed the muddy fringe created by the lowering of the lake. The shoreline was walked November 11, but no seepage was observed either at the shoreline or at any point along the base of the tree-covered slope that drops off to the lake.

A monitor well was installed at this landfill in February, 1984. Water quality samples were collected in May. A resistivity survey was also conducted at this site. The results of the analysis of the water samples show no concentrations of any constituent which would be defined by the USEPA as hazardous. The laboratory results are presented in Appendix B. Annual sampling of the monitor well and analysis of the water for those constituents tested for this report is recommended.

GROVE



Base taken from U.S.G.S. Montopolis, Tx. Topographic Quadrangle.

Scale

0 2000 4000

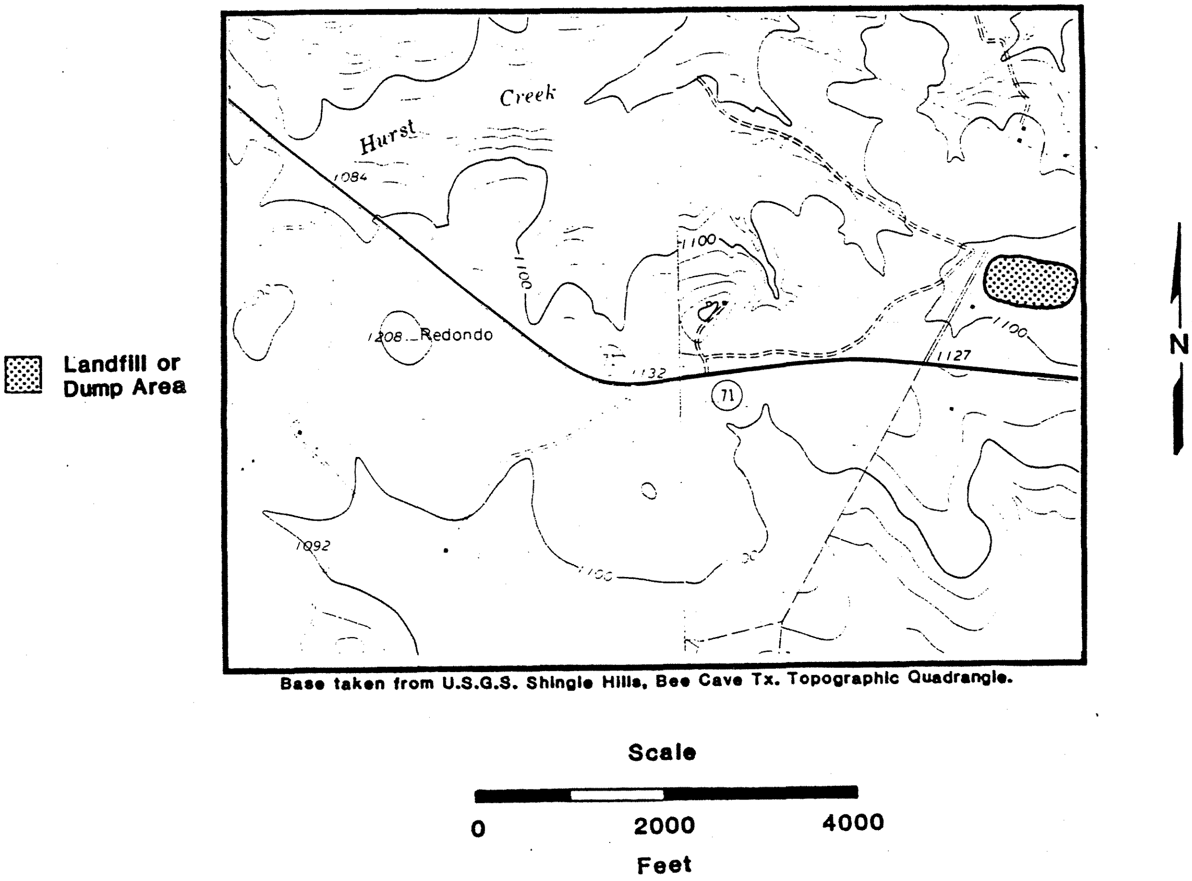
Feet

The Grove landfill is located south of the Colorado River and west of Highway 183. The landfill was operated from 1967 to 1970 by the City of Austin and received municipal solid waste. The total area of the fill is about 3.6 acres.

The geologic formation below the fill is lower Colorado River terrace deposits. Wastes were placed in an existing sand and gravel quarry pit. Some potential exists for migration of leachate through the terrace deposits.

On a field investigation by Underground Resource Management, Inc., building debris, stone, concrete, and boards were observed. The surface of the fill was grass-covered and hummocky. A pond about 2 to 3 feet deep showed no visible evidence of poor water quality, and no seeps or indication of leachate were seen on the steep edge of the fill, above the pond. An annual visit is recommended for this site.

HIGHWAY 71, PRECINCT 3



Base taken from U.S.G.S. Shingle Hills, Bee Cave Tx. Topographic Quadrangle.

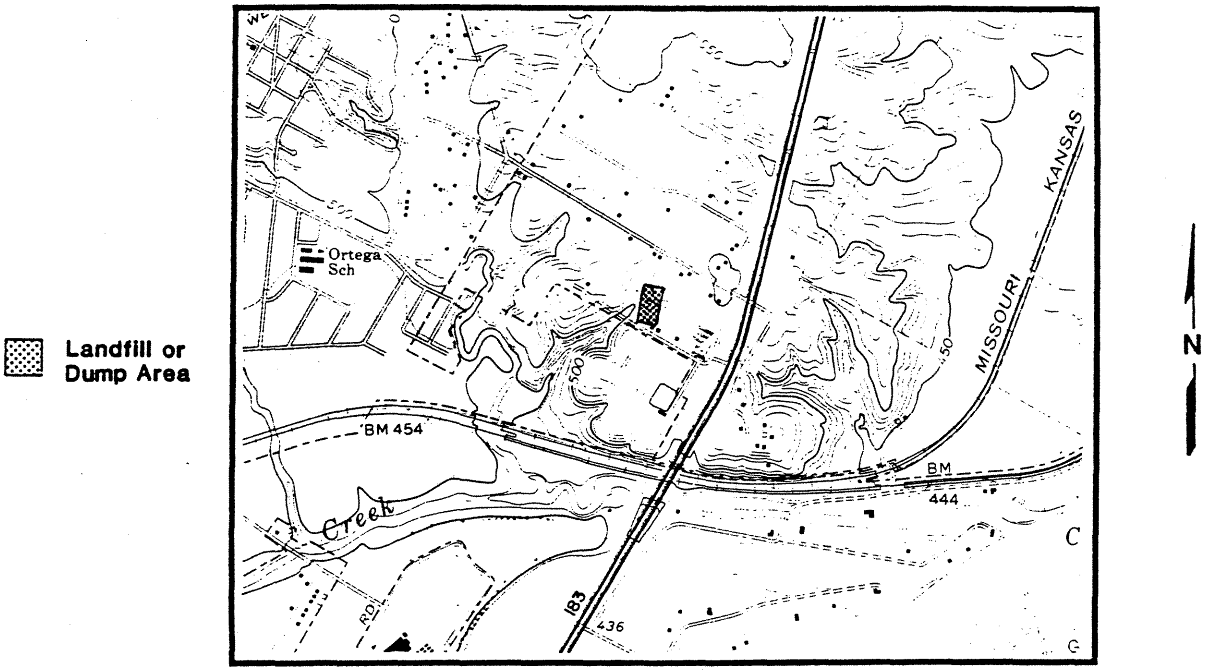
The landfill on Highway 71 was operated by Travis County, Precinct 3, from 1963 to October, 1976, on land which was leased by the County from Mr. W. Gumbles. The total area of the landfill was about 19 acres, and the site was used by individuals and private trash collectors servicing Bee Caves, Oak Hill, Rollingwood, West Lake Hills, and Lakeview. An estimated 1,300 tons per year were received in 1970. A site operator, hired by the County, supervised incoming waste and collected fees.

The waste material fills a drainage valley which was initially about 50 feet wide. The original sides of the valley were expanded as material was excavated for road construction and then filled with waste. The underlying geologic formation is the Glen Rose of Cretaceous Age.

This formation consists of about 700 feet of interbedded, hard and soft limestone, dolomite, and marl. Subsurface water in the Glen Rose moves through cracks and fissures, and laterally on top of the less permeable beds of marl. Leachate from this landfill was observed entering the drainage below the landfill during several County and State Health Department inspections from 1972 to 1974.

Although the landfill has been closed for almost 8 years, it is likely that leachate continues to migrate from this site. During a field visit by URM in November, 1983, the surface was observed to contain several closed depressions, some with water. The surface cover was silty soil with limestone. Gullying and surface erosion were not observed. The weather before the field inspection was dry, and no seeps or surface expressions of the leachate were observed. A field inspection for leachate is recommended, however, after a rainy period. In the 8 years since closure, compaction of the waste has produced depressions which collect water over the waste trenches. Regrading the surface to fill the depressions would allow rain and runoff to drain more quickly from the site. An annual site visit is recommended.

HOG HILL/HANDY'S DUMP



Base taken from U.S.G.S. Austin East, Tx. Topographic Quadrangle.

Scale

0 2000 4000

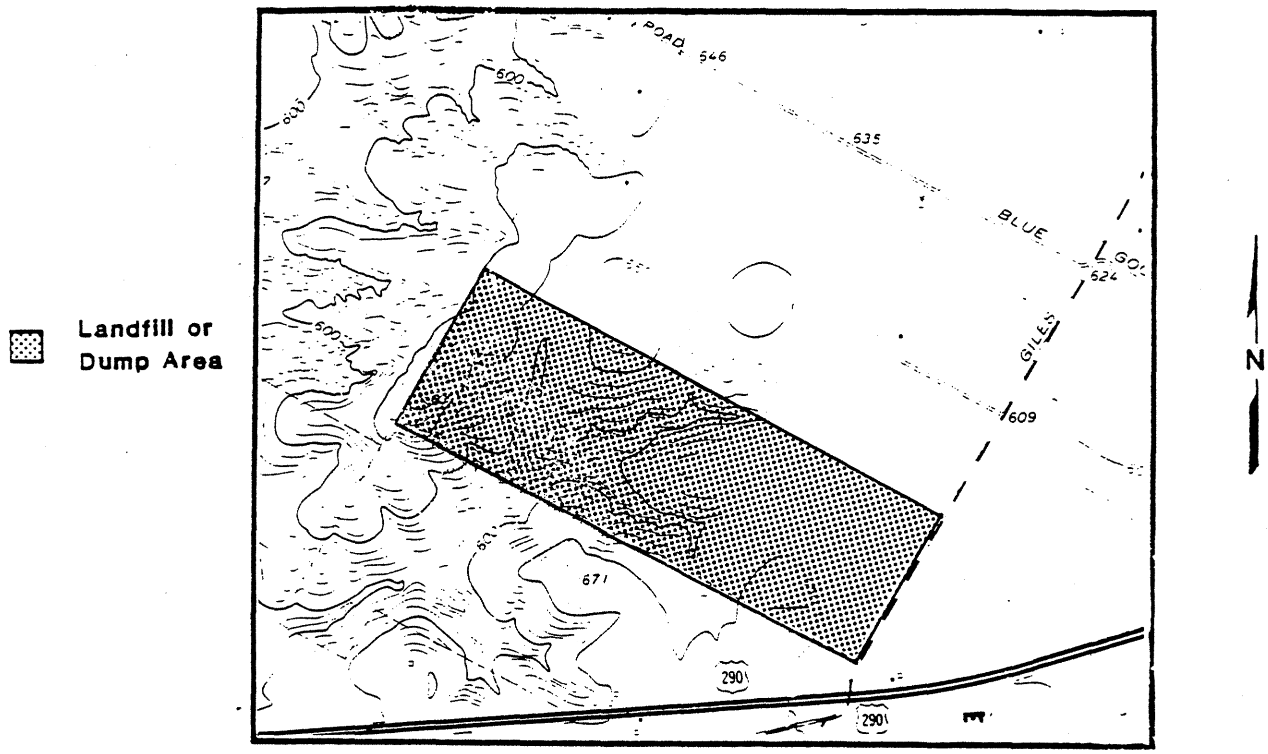
Feet

Hog Hill, also known as Handy's, is an illegal dump site on Hudson Creek. The site has been used since 1973 through the late 1970's. Illegal dumping of trash and junk still occurs in the Hog Hill area despite agency actions to close it. The site is potentially of concern because drums of glue and chemicals have been reported, and the site is fairly large and has been completely uncontrolled.

The field investigation by URM in November, 1984, revealed a dry creek bed adjacent to the site with no evidence of leachate. Only construction debris and clean fill were observed. Geology below the site consists of the Taylor Formation and the Upper Colorado River Terrace deposits. Leachate from the waste would probably migrate laterally and discharge into the surface water of the Creek.

Because drums of glue and unidentified chemicals have been reported at this site, the City should consider coordinating with the Texas Department of Health to determine whether additional action is necessary. A groundwater monitor well could be installed and the water quality of the creek and any seeps might be analyzed. An annual site visit is also recommended.

INDUSTRIAL WASTE MATERIALS MANAGEMENT SITE



Base taken from U.S.G.S. Manor, Austin East, Tx. Topographic Quadrangle.

Scale

0 2000 4000

Feet

The Industrial Waste Materials Management site was purchased and is now operated as a landfill for Class I solid wastes by Longhorn Waste Disposal Company. This landfill was permitted by the Texas Water Quality Board prior to the site being closed in 1972. The Longhorn Waste Disposal Facility is discussed in a separate section, and this section focuses on earlier disposal at the same location.

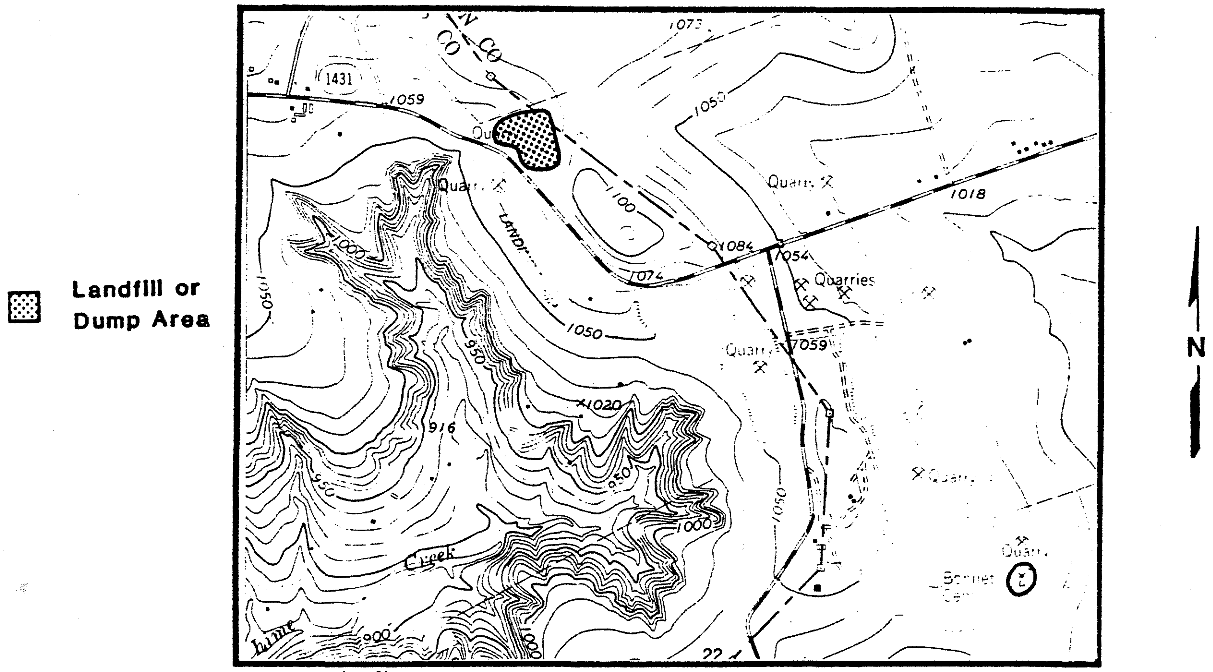
Industrial Waste Materials Management (IWMM) applied for a permit on February 14, 1972, to dispose of spent acids, caustics, solvents, hydrocarbons, and contaminated process waste. The site had been in operation by a private business since May, 1971. IWMM had contracts with industries in Houston and Galveston to dispose of industrial wastes. These materials were imported to Austin in 55-gallon drums by

18-wheel flatbed trucks and buried at this site. One photograph of the operation shows rows of drums stacked two high, and approximately one to two feet below the natural grade. Because of possible groundwater contamination, the site was ordered closed on May 4, 1972 until the Texas Water Quality Board (TWQB) made a final ruling on the site. In June, 1972 the TWQB required final closure of the industrial portion of the landfill. A complete list of the estimated 21,000 barrels of industrial waste, which had been disposed of at that time, does not exist.

Taylor Clay of Cretaceous Age outcrops at the land surface of the disposal site. The Taylor Formation is approximately 400 feet thick in this area and consists of clay and shale. Leachate from the closed landfill was observed along the south side of the site in February, 1973, presumably flowing through root zones in the Taylor Clay. A keyway was cut around part of the site and refilled with compacted clay. An investigation by the TWQB in 1977, which included three borings in the site, concluded that no subsurface migration of waste is expected to occur based on laboratory tests of the permeability of the Taylor Clay, with results of 1 x 10^{-7} cm/sec.

Since the site is encompassed by a private landfill with an existing groundwater monitoring program, no action by the City of Austin is recommended.

JONESTOWN PRECINCT 2



Base taken from U.S.G.S. Leander, Tx. Topographic Quadrangle.

Scale

0 2000 4000

Feet

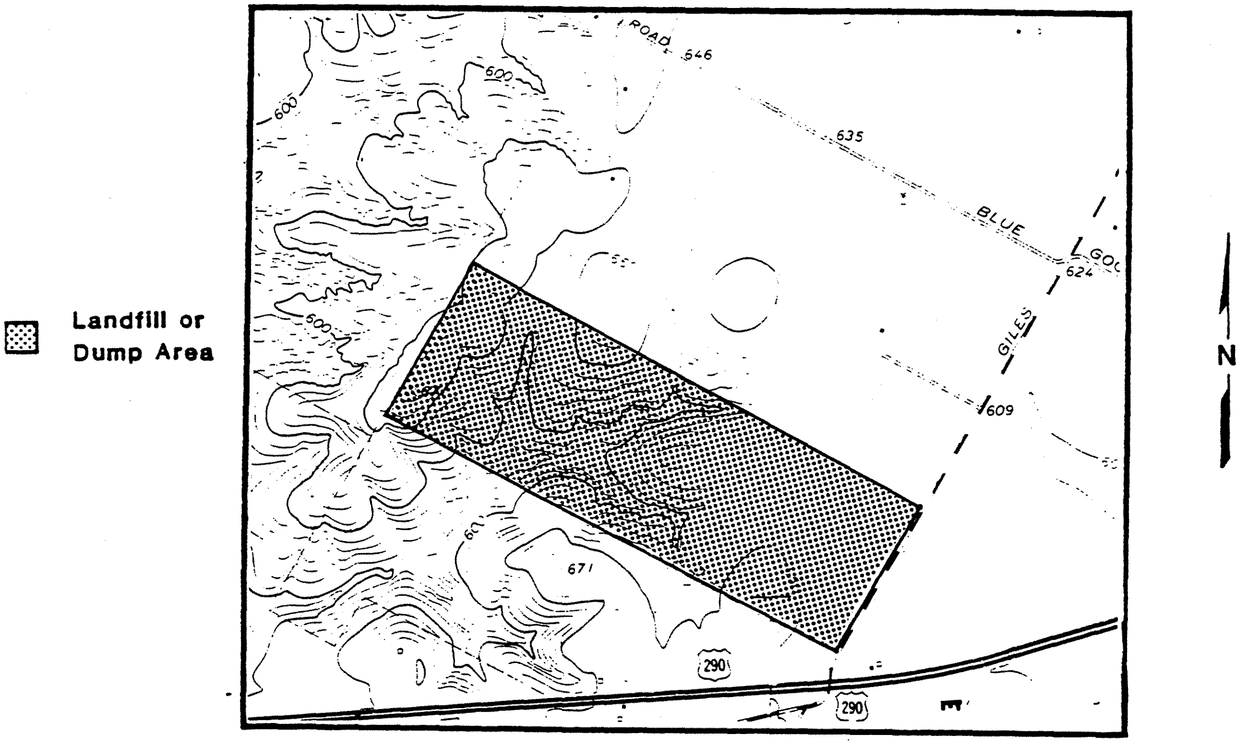
The Jonestown landfill is located 2.4 miles west from Highway 183 on FM 1431. The site was operated by Travis County, Precinct 2, from 1969 to 1980, and received municipal and private waste. Land for the site was leased from Mr. C. E. Durham. Specific users identified in 1970 were Universal Disposal Company, Cen-Tex Disposal Company, Texas Highway Department, Austin State Hospital, and a private contractor providing service to Jonestown. The County provided an attendant to supervise the site during operation.

This landfill was placed in a limestone quarry pit which was excavated into the Fredericksburg group of the Edwards Formation. The maximum depth of excavation was 30 feet. Inspection reports for the later stages of the operation indicate that the landfill was well run, cover was applied daily, and wastes were not placed into ponded water. However, during 1972 to 1973, insufficient cover was imported, and waste was frequently placed in standing water.

The final closure of the site appeared to be good during the URM field inspection. No standing water or water vegetation were observed. The surface of the dump site is gently undulating due to differential settling, and there is some cracking of the soil surface. The original quarry pit was not completely filled, and a 10-foot quarry wall is visible on the southwest side. Adjacent land to the north was used for grazing but apparently the site itself is unused.

An annual visit to inspect the cover is recommended for this site.

(LONGHORN) AUSTIN COMMUNITY DISPOSAL



Base taken from U.S.G.S. Manor, Austin East, Tx. Topographic Quadrangle.

Scale

0 2000 4000

Feet

A private waste disposal landfill has been operating at this location since 1977. A total of 216 acres for the landfill is permitted by the Texas Department of Health as a Type I facility for typical municipal waste. The following types of wastes are NOT accepted at the site: hazardous, special, Class I industrial, or radioactive.

Operation of the site includes both trench and area-fill methods. Trenches are excavated 40 to 50 feet deep and are filled by 10-foot deep lifts to the surface. The area-fill method is used on top of the trenches to place additional waste. Cover material consists of on-site clays which are generally classified as CH and have a high plasticity. Methane gas generated by the decomposing waste is vented through a rock-filled trench, and perforated PVC pipe extends to the surface from each trench cell.

The area surrounding the landfill remains sparcely populated, although Austin subdivisions are growing in that direction. Adjacent land is used primarily to graze cattle and/or other present and past landfill operations. Several commerical businesses are located within one mile of the site along Highway 290.

Three un-named drainages cross the site, and the general direction of the topographic slope is to the southwest. The gently rolling hills on the site are typical of the contours of the Blackland Prairies.

The geology underlying the landfill was described in a March, 1981 report by URM. That description, presented below, has been supported by subsequent electrical resistivity surveys and soil borings at the site.

The proposed landfill site is located on the outcrop of the Taylor Group of the Cretaceous Gulf Series. The Taylor Group is 700 to 850 feet thick in the Austin Area, and approximately the lower one-half of the group is present at the site. The dominant lithology is montmorillonitic claystone, with a variable calcium carbonate content which partially serves to distinguish the component formations in the field. These formations are, in depositional order: Sprinkle, Pecan Gap, and Bergstrom. The Sprinkle and Bergstrom Formations are greenish-gray to brownish-gray, unctuous (waxy or greasy to the touch), montmorillonitic claystone (Young, 1965). The Pecan Gap Formation is essentially a zone in the Taylor Group that contains 1) a high percentage of calcium carbonate compared to the rest of the Taylor interval, and 2) characteristic fossils listed by Plummer (1949) and Cushman (1946).

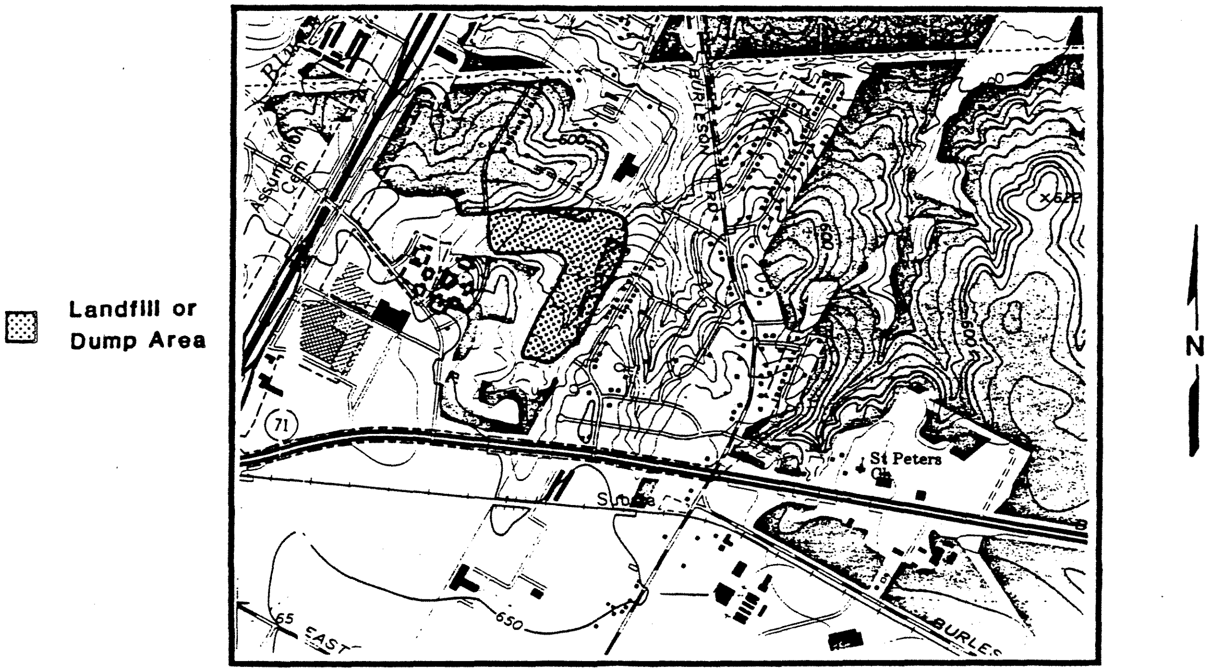
The Taylor Group weathers into a thick, clayey, highly expansive soil typical of the Blackland Prairie. In the "cut in wet-weather" pit on the existing site, the upper two feet of soil (probably Heiden series) was a dark gray to black clay with desiccation cracks, roots, and filled root holes. The lower three feet of the soil profile was a brownish-gray clay with many caliche nodules up to 1 inch in diameter, and root holes filled with darker clay. Scattered pieces of gravel were dispersed in the soil profile as deep as the deepest caliche nodules at 5 feet. These soils develop deep dry-weather cracks and may undergo a slow churning action typical of highly active, "self-mulching" soils. The soils "turn over" because pieces of dried clay topsoil fall into the shrinkage cracks in dry weather. When the soil profile is rewetted by rainfall, a given volume of swelling soil must make room for these added fragments by heaving and shearing soils, and are probably caused by this shearing action.

Six monitor wells were installed in 1982 to sample groundwater below the landfill. The wells were drilled into the top of the Taylor Shale, 20 to 50 feet below ground surface. Samples were collected and analyzed quarterly. The results of the groundwater monitoring program indicate that water in the Taylor Shale has a high concentration of total dissolved solids ranging from about 3,000 to 13,000 mg/L. This finding supports similar findings on samples from other wells in the Taylor Shale. Although two of the wells in the middle of the waste site show higher concentrations of total dissolved solids, which can be attributed to leachate from the landfill, samples from wells on the perimeter of the landfill do not show groundwater contamination. The effects of the landfill leachate appear to be limited to shallow groundwater immediately below the site.

The site occupied by the landfill includes the disposal areas used by Industrial Waste Materials Management until 1972, which has been discussed in a separate section. Part of the work by the existing operation has been to monitor and properly manage the older landfill.

The present operation of the site appears to be well managed, and excludes the disposal of hazardous materials. It probably will not present an environmental hazard.

MABEL DAVIS



Base taken from U.S.G.S. Montopolis, Tx. Topographic Quadrangle.

Scale

0 2000 4000

Feet

The landfill at Mabel Davis Park, originally known as the Saint Edwards landfill, was operated by the City of Austin from 1944 to 1955. The landfill was placed in two areas along converging drainages, as shown in Figure 4. Although there was some trenching, most of the waste was placed in gravel quarry pits. The thickness of the fill, based on 18 borings made prior to the development of Mable Davis Park, ranges from 10 to 15 feet. These borings also indicate a shallow ground-water table a few feet below the surface.

After the site was closed by the City, some illegal dumping probably occurred. Acock Agricultural Chemicals Company apparently disposed of bags of unused pesticides when they closed their Austin pesticide reformulation business in the late 1950's. In April, 1979, the Austin

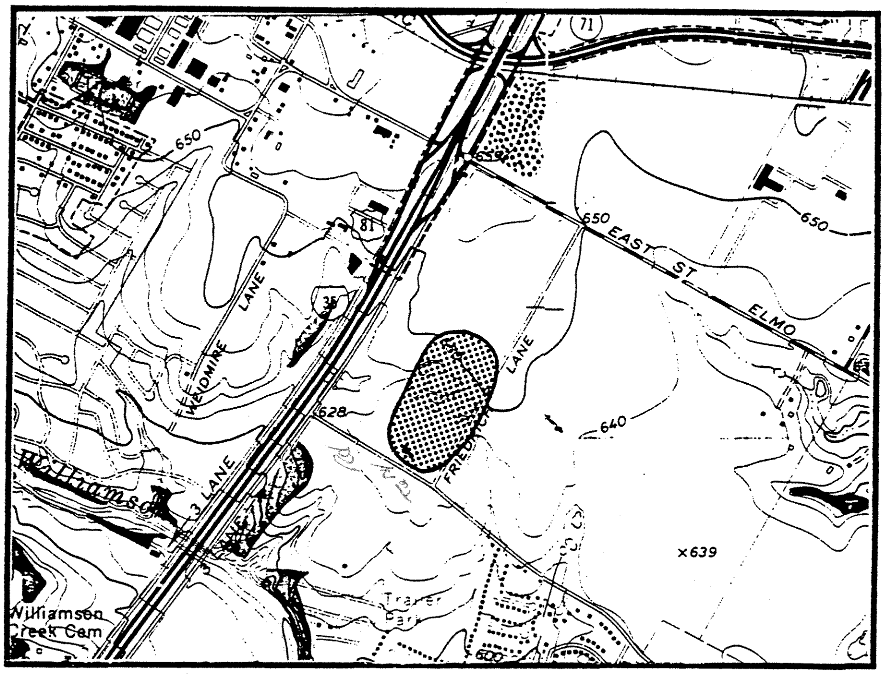
Parks and Recreation Department began excavation in the park to build a baseball field. A fish kill in a pond downstream from the excavation site alerted the Parks Department and the Austin-Travis County Health Department of a potential chemical contamination problem. Water and soil tests revealed significant concentrations of Toxaphene, DDT, Lindane, and BHC. The City of Austin excavated pockets of the pesticide wastes and surrounding soil, loaded the material into polyethylene-lined and covered trucks, and transported the material to Texas Ecologists, Inc., in Robstown, Texas. Clean fill was compacted into the excavation site and spread over surrounding areas. Subsequent soil testing again found elevated pesticide levels, and approximately 2,500 cubic yards of contaminated soil was excavated and placed in a pit at the Steiner landfill, which was prepared to receive that waste. The disposal pit was inspected by the Texas Department of Health and determined to be suitable to contain the waste.

The Mabel Davis site is located on high terrace deposits of the Colorado River underlain by Taylor Clay. There is a pond located upstream from one area of the waste which fills a valley channel. The stream from the pond was flowing at 10 to 15 gpm during the URM site visit. Ridges, coinciding with the trash bodies, were observed parallel to the dam of the pond, and the area below is swampy. Algae on the bottom of the stream is red and fibrous, indicating a possible high iron content in the water. At one location, glass, cans, and tires were observed where the stream has cut 5 to 6 feet into the bank.

As discussed in an earlier section of this report, a monitor well was installed at this site by URM in February. Ground and surface-water samples were collected and analyzed. The laboratory results (in Appendix C) show no constituents in concentrations which would be defined as hazardous by the USEPA. However, based on the past history and the potential for exposure of children playing in the park, we recommend annual sampling of the surface and groundwater at this site.

MCGUIRE

▨ **Landfill or Dump Area**



Base taken from U.S.G.S. Montopolis, Oak Hill, Tx. Topographic Quadrangle.

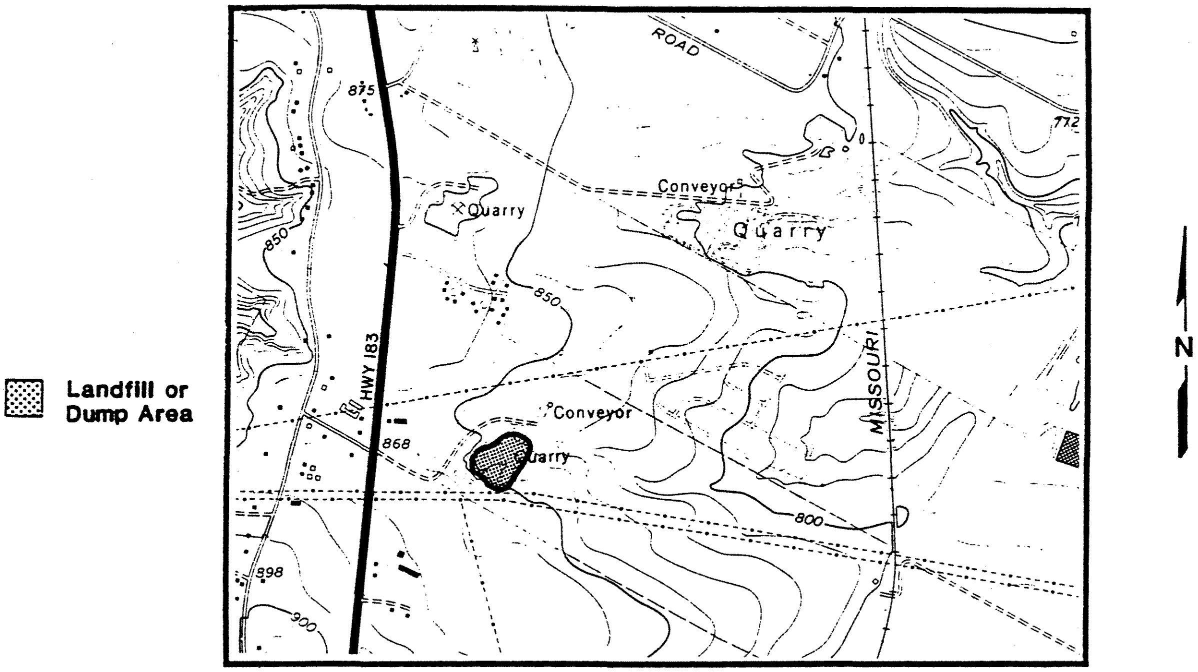
Scale

0 2000 4000

Feet

The McGuire Landfill was operated by the city from 1954 to 1961. The site is estimated to cover about 13 acres, from interpretation of a 1966 aerial photograph. This area was formerly a sand and gravel quarry. During a field visit by URM, undulating ridges were observed which probably indicate bodies of waste. The ridges were oriented north to south, spaced 50 to 80 feet apart, and were 6 to 10 feet high. During the visit, there was no evidence of trash at the surface or of standing water. Because of the age of the operations at the McGuire site, it is unlikely to contain large quantities of hazardous waste. An annual visit to inspect the site cover is recommended.

M. E. RUBY



Base taken from U.S.G.S. Pflugerville West, Tx. Topographic Quadrangle.

Scale

0 2000 4000

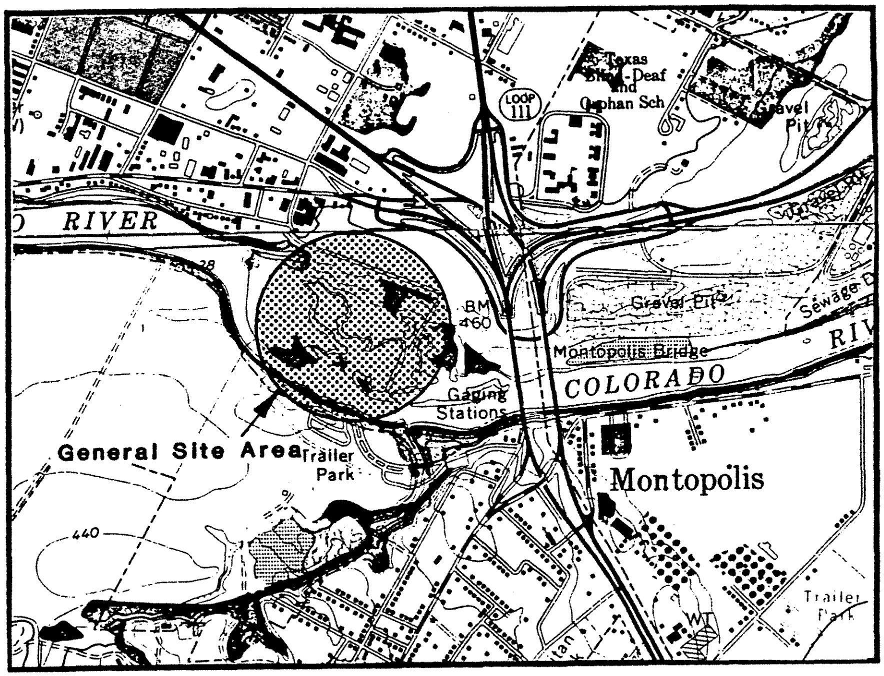
Feet

The M. E. Ruby landfill was a disposal operation run by the private owner to fill part of a large limestone quarry pit. The landfill was operating for an undetermined length of time by 1972 when the Austin-Travis County Health Department received complaints and investigated the site. Several operational problems were reported by the inspectors, including trash which had burned for more than a month, waste disposed into standing water in the pit bottom, no soil cover, and discharges from the pit onto an area which drained into Walnut Creek. No equipment was available at the site to spread, compact, or cover the waste. M. E. Ruby collected fees for the disposal of construction debris, tires, brush, paper, and small amounts of domestic garbage. Possible hazardous materials which were received included paints, petroleum-based materials, and vinyl acrylic. Several waste drums containing hazardous materials were also found beside the road adjacent to the pit, although there is no evidence that additional drums are buried in the pit. These drums were removed by the TDWR and shipped to a Class I disposal site. The site was closed by the Texas Department of Health in January, 1974.

The geologic formation below and around the quarry is the Edwards Limestone. The estimated area filled with waste is 4.6 acres. The depth of the fill is unknown. In a site inspection by URM, piles of debris, including lumber and block, were observed covering much of the property. Boggy conditions and water-filled depressions cover much of the property. Water-loving vegetation was not observed, however, and it is likely that the depressions on top of the filled area are dry during long periods of the year. A small drainage crossed the surface of the fill at the time of the field visit and discharged 3 to 5 gpm into a quarry pond on the southeast side of the filled area.

There is a high potential for hazardous waste contents, and migration of leachate which might contain high concentrations of total dissolved solids, heavy metals, and organic chemicals at this site. Our recommendation is that the City of Austin coordinate with the Texas Department of Health to determine what additional action can be taken to determine whether this site represents an environmental hazard.

MONTOPOLIS BRIDGE



Base taken from U.S.G.S. Montopolis, Tx. Topographic Quadrangle.

Scale

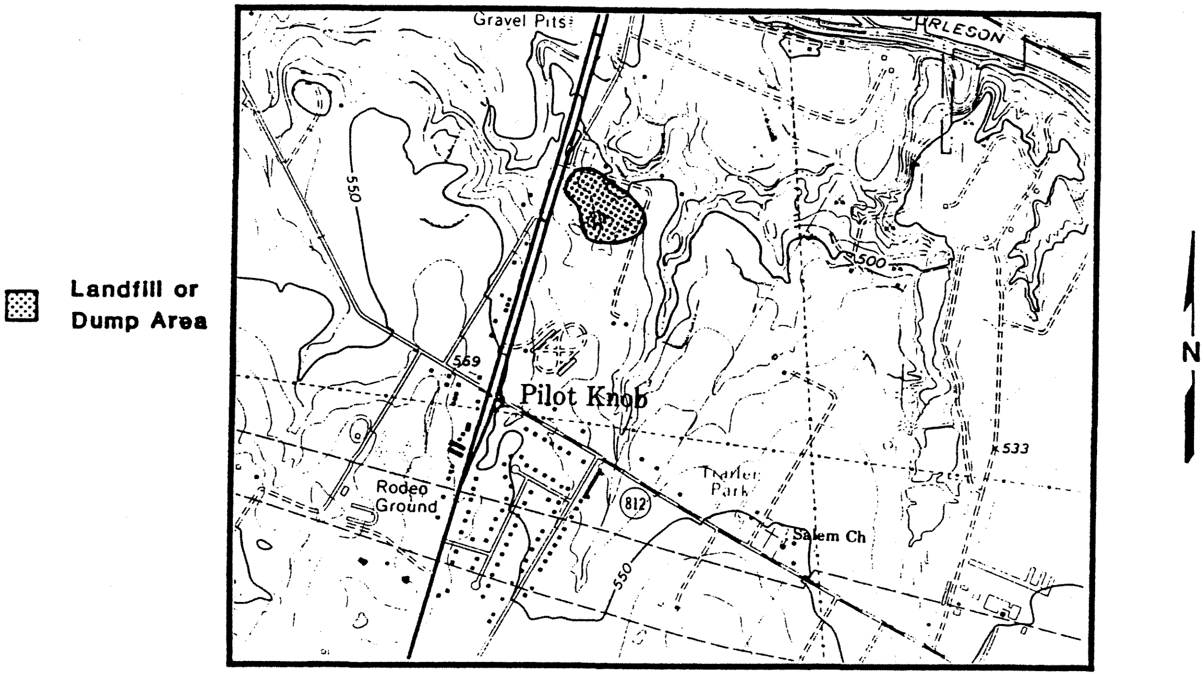
0 2000 4000

Feet

The Montopolis Bridge site is a low area along the Colorado River which was used for illegal dumping by individuals and some commercial businesses without the permission of the owner. Clothing, tires, appliances, and building materials are some of the items which were observed there. The total area was probably less than 16 acres. The total thickness of piled material was about 6 feet. The dumping was stopped and the wastes were removed by the owners (Centex Corporation of Reno, Nevada) in December, 1970.

The disposal site is located on alluvium along the Colorado River. Any waste leachate would be easily transported through the alluvium and into the river water. Because the site has been cleaned, and the waste removed, there is probably little opportunity for contamination from this site.

MOSES GUERRERO



Base taken from U.S.G.S. Montopolis, Tx. Topographic Quadrangle.

Scale

0 2000 4000

Feet

Moses Guerrero operated an unpermitted dump site to fill a quarry on his land until the end of 1982. The primary purpose of the operation was to raise the grade and reclaim the land. To achieve that purpose, little domestic wastes were received. Substantial quantities of brush, wood, stumps, wood chips, metal, soil, rock, and concrete were received. The site was reported by the Texas Department of Health to be clean and well organized. Wastes were compacted, and daily cover was applied on the surface of the working area.

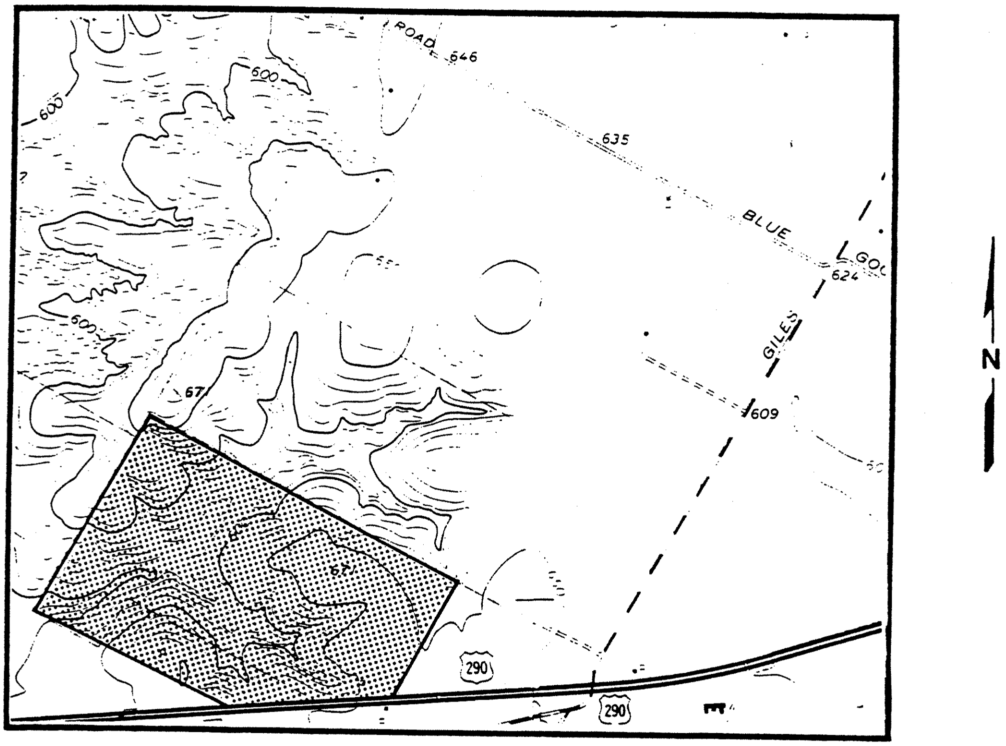
The landfill is located on tributary terrace deposits of Onion Creek which are underlain by Taylor Clay. The operator of the site reported that infiltration of rainwater into the bottom of the pit was rapid. There is a likelihood that leachate from the site is hydraulically connected to the water in Cottonmouth Creek, which flows into Onion Creek. The total area was estimated from aerial photographs of the quarry to be 4.2 acres. The photographs also indicated that the quarry was wedge-shaped, with a 15 to 20-foot escarpment along the southwest edge, tapering to a natural grade at the road along the north side.

During the URM field visit, clean top soil was observed in piles, apparently to be spread. A 150-foot long trench was cut 20 feet deep through stratified gravel and sand. No standing water was observed in the trench. A seep, possibly related to the landfill, was observed on the north side of Hillmore Road.

Although some potential exists for leachate moving from this site, it was apparently well operated for land reclamation and contains only brush, building debris, and clean fill. An annual visit to inspect the cover is recommended for this site.

OLD 290 LANDFILL

▨ **Landfill or Dump Area**



Base taken from U.S.G.S. Manor, Austin East, Tx. Topographic Quadrangle.

Scale

0 2000 4000

Feet

The Old 290 landfill was operated by Travis County from 1968 to May 23, 1982, on land which was leased from Mr. Joe Robertson. During its operation, the landfill received wastes from Travis County residents, the City of Austin, disposal contractors serving Westlake Hills, Manor and Pflugerville, as well as several other private disposal companies, builders, state agencies, and the University of Texas. The landfill was operated for the county by a private contractor. On October 10, 1977, the facility was permitted by the Texas Department of Health as a Type I facility.

Wastes at the landfill were disposed in drainages and ravines. Daily cover was generally applied, but the wastes were not always properly compacted according to an inspection report by the Texas

Department of Water Resources (TDWR) in 1973. Toward the end of the operational period, trenches were used for waste disposal.

Generally, wastes were domestic garbage, trash, building debris and industrial wastes. Grease trap wastes and sand filter sludges were accepted at times during the operation. Records also exist of three occasions when industries in the Austin area requested permission to dispose of process wastes or hazardous wastes. On February 8, 1978, a septic tank cleaner truck requested permission to dump a tank of hydrocarbon solvent from Galvon. The request was denied and the Galvon waste was referred to the City or Longhorn waste sites. In August, 1976, Texas Instruments requested authorization to dispose of the filter cake sludge from its waste treatment system. The sludge included salts and chemicals which decomposed to hazardous fumes when heated, or were carcinogenic or toxic. Authorization was denied because of the poor operating history of the site. In April, 1980, Tracor requested permission to dispose of one 55-gallon drum per day of materials contaminated with about 2.5% diamino-diphenylmethane - a toxic chemical. About 90% of the remaining waste was paper and cellulose products. Permission to dispose of the material was granted to Tracor. These reports indicate that there is certainly at least small quantities of containerized waste in the landfill, and that there is potentially larger quantities of industrial waste for which permission for disposal was not requested.

Since the site was closed, the land has been leased by Mr. Robertson to Austin Country, and a flea market has been constructed. The foundations, sewer system, and drainage for the permanent buildings of the flea market resulted in removal of some of the cover and excavation of wastes. Since the flea market began operating, odors have been reported. Gas tests by the Texas Department of Health measured methane concentrations of 30% to 38% in the decomposing solid waste, and 0 to 5%

venting through cracks to the surface. The odors were reported as hydrogen sulfide gas from the landfill. The Texas Department of Health recommended either a venting system or additional cover.

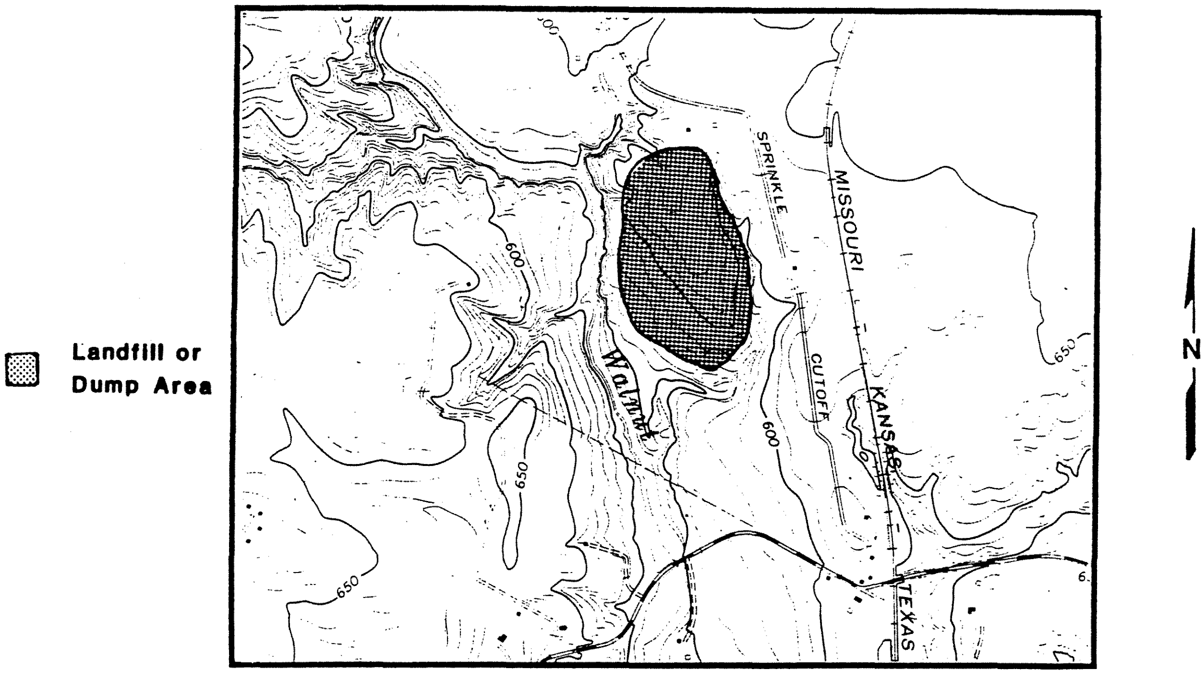
Geologically, the Old 290 landfill is located on an outcrop of the Navarro and Taylor Group. The clay extends to a depth of approximately 400 feet below the site. Six borings on the adjacent Longhorn disposal site provide laboratory data on the formation characteristics between 601 and 539 feet mean sea level. Samples from these borings were clay, CH in the Unified Soil Classification System, with liquid limits of 65 to 57, plasticity indices of 47 to 38, and coefficients of permeability in the range from 5 x 10^{-8} to 1.2 x 10^{-8} cm/sec. These characteristics indicate a soil which is well suited for a waste disposal site because of low permeabilities.

The landfill is located near two tributaries of Walnut Creek, and a potential problem exists of leachate migrating laterally to the surface water. Leachate has been reported at the site by the Texas Department of Water Resources, and the Austin-Travis County Health Department inspectors from 1970 through May, 1982. Some of the leachate running into the creek was reported to be rust colored. Analyses of samples collected on January 27, 1982, however, reportedly detected no pesticide residue, no priority organic compounds, and no toxic metals. High iron, magnesium, and "salt" were detected. Actual analytical results were not recorded in the file.

During a URM field visit on November 23, 1983, the appearance of the landfill was good. The wastes were completely covered and only slight erosion of the cover was observed. Vegetation was not yet established. After a 0.5-inch rain the previous night, the creek water was slightly murky, but there were no odors or foaming, and there were frogs, which indicate conditions which are not severly toxic. At one point near the southeast corner of the site, a 0.5 gpm seep into a swampy area with cattails was observed. The water was clear, with a sheen, and the soil showed an orange tint, and was discharging from the older part of the site on the west side of the creek. During the site visit it was noted that much of the debris on the west side of the creek was not covered.

To summarize, the potential for hazardous materials within the wastes deposited in the 290 landfill is high. This potential results from both the known drums containing diamino-diphenylmethane, and from the probability that hazardous wastes from several other sources found their way into the landfill over the life of the site. Because of the low permeability of the Taylor Clay around this site, however, the potential for groundwater contamination is low. The site should be checked annually for erosion and leachate flowing into the surface water.

SPRINKLE



Base taken from U.S.G.S. Austin East, Tx. Topographic Quadrangle.

Scale

0 2000 4000

Feet

The Sprinkle landfill is located north of Cameron Road and west of Sprinkle Cut-off Road. The landfill was operated from November, 1967 to November, 1973 by the City of Austin on land leased from Mr. Wallace Smith. This site was used exclusively by the City for municipal waste. The site was fenced and locked, and a site operator supervised dumping.

The total area of the site is 100 acres. Wastes were buried in trenches generally 15 to 20 feet deep. Daily cover and final cover were regularly applied over the life of the site.

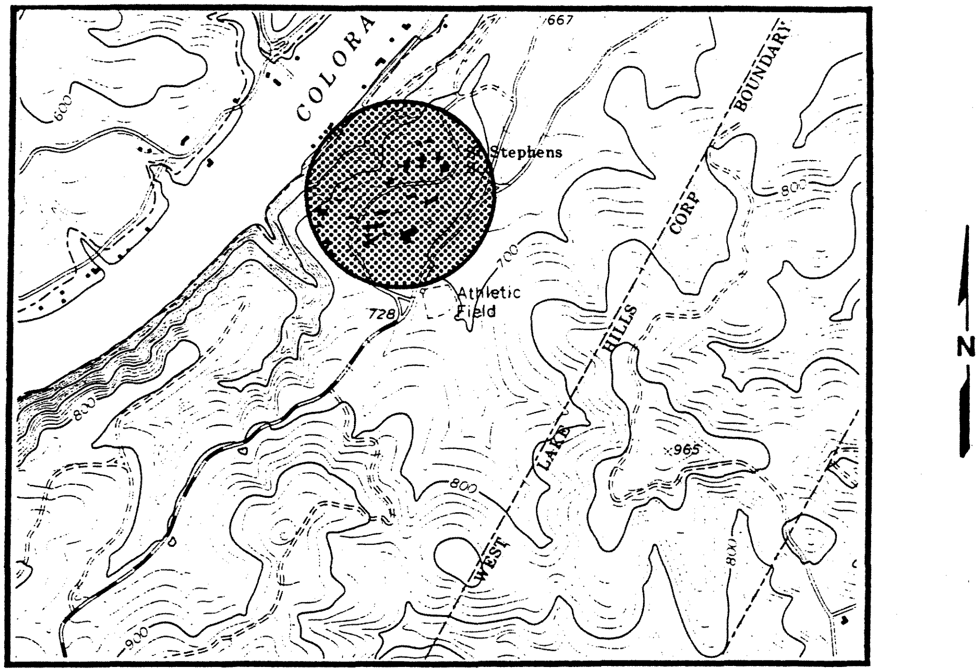
The topography around the site is gently rolling, and the drainage across the site is generally to the south. Walnut Creek is located 30 yards west, and an un-named tributary runs along the east boundary of the landfill. The site is primarily located on an isolated patch of tributary terrace deposits surrounded and underlain by the Austin Group. A major fault along the east side of the site delineates the outcrops of the Austin Group and Taylor Clay. The site, however, is located entirely on chalk and marly limestone of the Austin Group.

The Texas Health Department Solid Waste files contain a description of one soil sample removed from the deepest excavation on the site. The sample was identified as a stiff, tan, very fossiliferous clay with an estimated permeability of 1 x 10^{-6} cm/sec. This description is typical of the marl layers interbedded with limestone in the Austin Group.

During a URM field visit in November, 1983, the perimeter of the site and Walnut Creek were inspected for potential expressions of waste leachate. At one location, about 150 yards west of the site, a few mossy seeps were detected at a bedding plane 4 feet above the creek. None of the observed characteristics of the water indicated poor quality.

Because this site was controlled and used exclusively by the City for municipal wastes, it is not likely to contain industrial hazardous wastes. It is probable that it does contain small amounts of hazardous wastes, normally disposed of by households, like paint-thinners and strippers, and similar wastes from businesses. There is some potential for leachate carrying these chemicals to migrate laterally to the surface water, or vertically to the groundwater. A monitor well for this site was recommended in the first report by URM for this project. Because the site is not owned by the City, however, access to drill was not obtained from the landowner, and the City of Austin decided not to install a monitor well. The City should be aware of a potential for leachate migration from this site. An annual inspection of the cover is recommended.

ST. STEPHEN'S SCHOOL



Base taken from U.S.G.S. Austin West,Tx. Topographic Quadrangle.

Scale

0 2000 4000

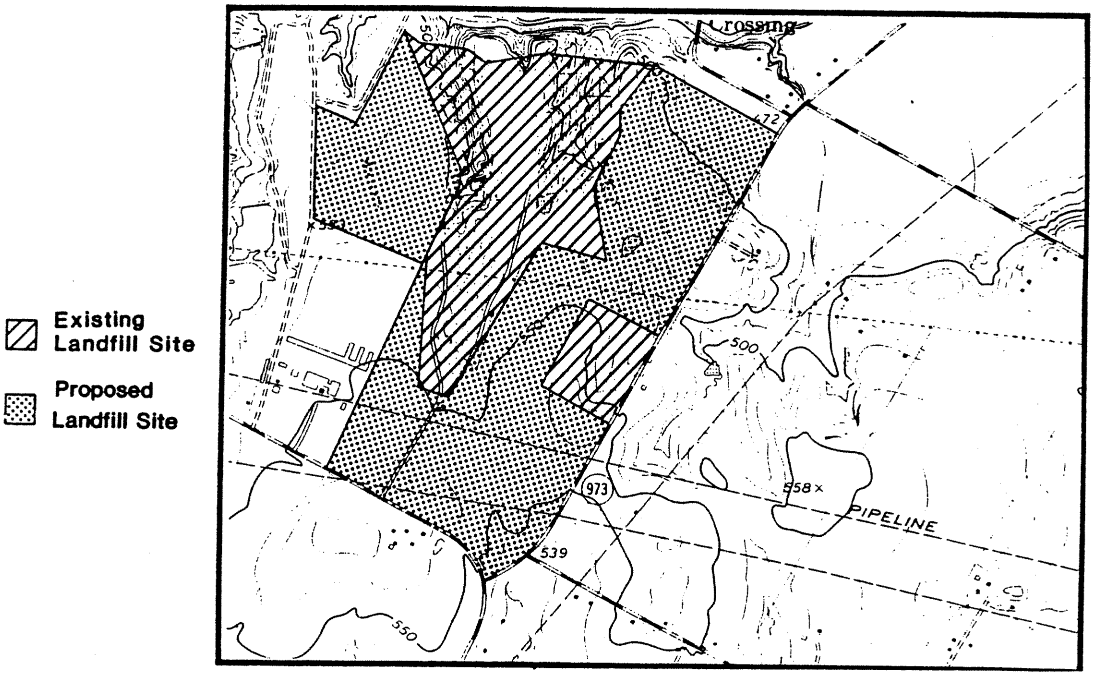
Feet

The St. Stephen's School landfill is a small, 2-acre site used since 1950 to dispose of wastes from the school. The total volume of waste generated by about 200 students and staff is 10 tons per month. The waste is placed in a small pit which is 4 feet deep and covered. At one time refuse in the trench was burned, but this is no longer the practice.

This landfill is located on the Glen Rose Formation, and is comprised of limestone, dolomite, and marl. Surface soils are the Volente series with permeabilities of 0.2 to 0.6 inches per hour.

Since it is very unlikely that this site contains hazardous waste, no action is recommended.

STEINER



Base taken from U.S.G.S. Montopolis, Tx. Topographic Quadrangle.

Scale

0 2000 4000

Feet

The Steiner landfill is located about 1 mile east of Highway 183 on FM 812. The landfill has operated from 1961 through the present on land leased by the City from T. C. Steiner and Charles Bruckmiller. The City has used the site for municipal solid waste disposal as well as allowing businesses and private waste haulers to use the site for a fee.

The largest area of the site, 126.4 acres, was used for general waste and was permitted as a Type I facility by the Texas Department of Health. A smaller area of 16.4 acres was used for the disposal of brush and debris. According to the Solid Waste Survey; Travis County (1970) and personal conversation with Mr. Frank Redding of the City of Austin (retired), Jefferson Chemical Company, now owned by Texaco Chemical Company, regularly disposed of chemical wastes at Steiner. The wastes were contained in 55-gallon drums and buried in trenches dug specifically for this purpose in a separate section of the landfill.

The Steiner landfill also received 2,500 cubic yards of soil from Mabel Davis Park which was contaminated with pesticides in these concentrations:

Toxaphene	723 ± 299	ppm
Lindane	22.7 ± 16.3	
BHC	140 ± 86	
BBHC	8.4 ± 2.7	
DDT	6.4 ± 2.6	

The soil was buried in a pit specifically prepared for this waste in the brush and debris section of the landfill.

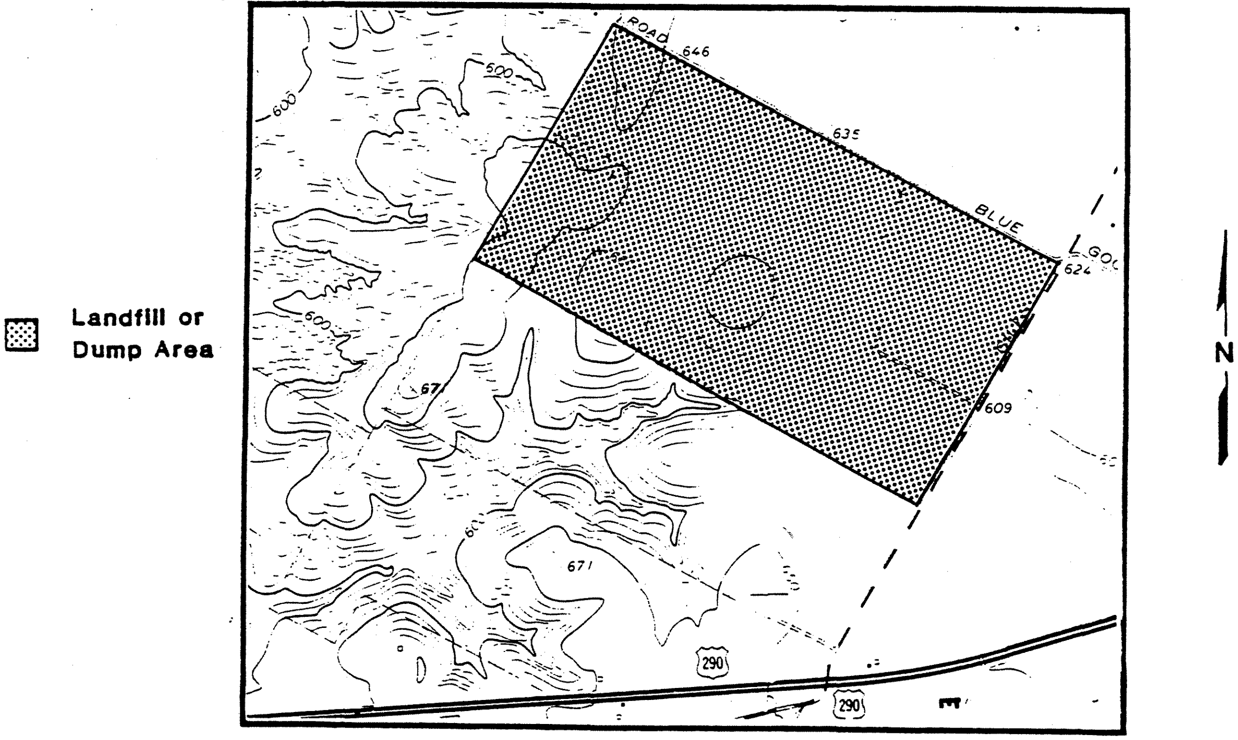
The Steiner landfill is located principally on the Taylor Group, which is a clay, 300 to 500 feet deep. The coefficient of permeability of the clay was measured from 5 x 10^{-7} to 8 x 10^{-9} cm/sec. A small part of the landfill is located on, or in, tertiary terrace deposits of Onion Creek. In 2 borings drilled on the site in 1973, 3-foot gravel beds were logged at depths of 16.4 feet and 12.8 feet. The gravel encountered was well-mixed with fines and clays, but would be expected to exhibit a higher permeability than the clay. Leachate could potentially migrate through these gravel beds.

The City of Austin has applied to the Texas Department of Health for a permit to expand the Steiner Landfill site to 381.8 acres, which will encompass the existing area and expand the site to provide a total of 8,800,000 cubic yards of additional capacity. This capacity has been projected to serve the landfill users for 20 years. Under the conditions of the new permit, Steiner will receive no wastes which would be classified as hazardous.

As part of their permit application, the City of Austin has proposed a groundwater monitoring program. The program includes six monitor wells to be installed and sampled regularly. Four of the wells will be located between the landfill and Onion Creek to detect leachate moving toward the creek. Before filling begins in the expansion area, the monitor wells will be sampled and analyzed to establish the existing groundwater quality. Any changes in groundwater quality will be determined by comparing the quality of future samples to this baseline data.

To supplement the monitor well data, resistivity surveys will be conducted annually for at least two years to determine whether a leachate plume is detectable with this method. The program proposed by the City of Austin is consistent with current technology and no additional recommendations are made for this site.

SUNSET FARMS SANITARY LANDFILL



Base taken from U.S.G.S. Manor, Austin East, Tx. Topographic Quadrangle.

Scale

0 2000 4000

Feet

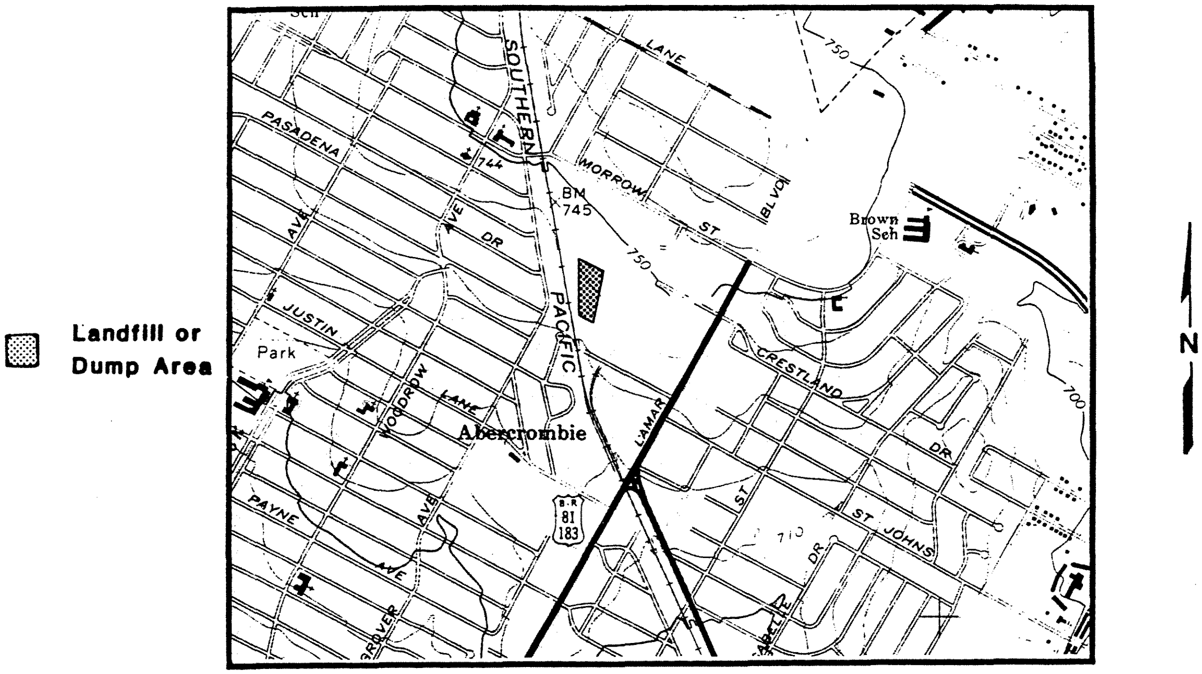
Sunset Farms Sanitary Landfill was permitted by the Texas Department of Health on October 20, 1981 as a Type I municipal landfill. It is owned by Tiger Corporation and operated by Browning-Ferris, Inc. (BFI). The total area of the site is 352.4 acres, which will be used in subsequent stages over the 50-year life expectancy of the landfill, based on a design use rate of 600 tons per day. The landfill method is a combination trench and area fill. Trenches are excavated 10 to 15 feet below grade, and deeper where borings at the trench location indicate no shallow groundwater. When a trench is filled to the natural grade, areal landfilling methods are used to mound waste about 50 feet above the natural grade. An excavated trench is inspected by a geologist for cracking or permeable seams of sand or gravel in the walls. These areas are sealed with a compacted clay liner.

Surface drainage of runoff from the landfill is split between Decker Creek to Decker Lake and Walnut Creek to the Colorado River. Part of the northeastern drainage lies within the 100-year floodplain and is not used for waste disposal. Surrounding land uses include some residences, farming, and animal grazing, and other landfill operations.

The landfill is located on the Taylor Formation. This formation, described elsewhere in this report, consists of marine depositional clays and isolated zones of alluvial clays and gravel. The geology was confirmed in 26 borings at the site, and was presented in the permit application to the Texas Department of Health. Twenty-four of the 26 borings showed shallow, perched groundwater in fractures, joints, and shrinkage cracks. The gradient of this shallow groundwater appears generally to conform to the topography. The laboratory permeability of soil boring cores was on the order of 1 x 10^{-9} cm/sec.

It is unlikely that this site contains significant quantities of hazardous materials. The landfill does not accept hazardous, Class I industrial, or radioactive materials. No drums are accepted unless the top is removed for inspection. A groundwater monitoring program is conducted by BFI.

TEXACO CHEMICAL COMPANY



Base taken from U.S.G.S. Austin East, Tx. Topographic Quadrangle.

Scale

0 2000 4000

Feet

The Texaco Chemical Company landfill was operated on the plant site at 7114 North Lamar, from 1951 to 1969, formerly under the name of Jefferson Chemical Company. As a separate, but related disposal operation, water was also spray irrigated on the laboratory grounds from 1971 to 1976.

The total area of the landfill is 11 acres. Trenches were excavated 8 feet deep, filled with 3 to 5 feet of waste, and then 3 to 4 feet of limestone and topsoil, which was removed from the trench, was placed for cover. The total amount of waste is estimated to be 1,040,000 pounds. These wastes includes urethane polyols, filter cake, alcohols and aldehydes, isocyanates, laboratory wastes, and hydrocarbons.

Six groundwater monitor wells were installed around the landfill in 1971. The water quality of samples from these wells, however, was dominated by the wastewater irrigation operation, and not by leachate from the landfill. After the irrigation program ended, total organic carbon (TOC) was measured at 100 ppm in 1977, 81 ppm in 1978, and an average of 29 ppm from January to April, 1983.

A recovery system of 15 wells was installed by June, 1982 to remove contaminated groundwater from below the landfill. The system pumps groundwater at a rate of 4,000 gpd to equalization tanks, and then discharges the water to the City of Austin wastewater treatment system. Composite samples are analyzed hourly for TOC, and twice weekly for TOC, carbonaceous oxygen demand (COD), and pH. The recovery system produces water from 2.5 feet below the ground surface to the top of the gray limestone at a maximum depth of 35 feet, according to the well design report.

Based on a gas chromatograph-mass spectrometer analysis, the following components were elevated in the composite groundwater sample compared to background water:

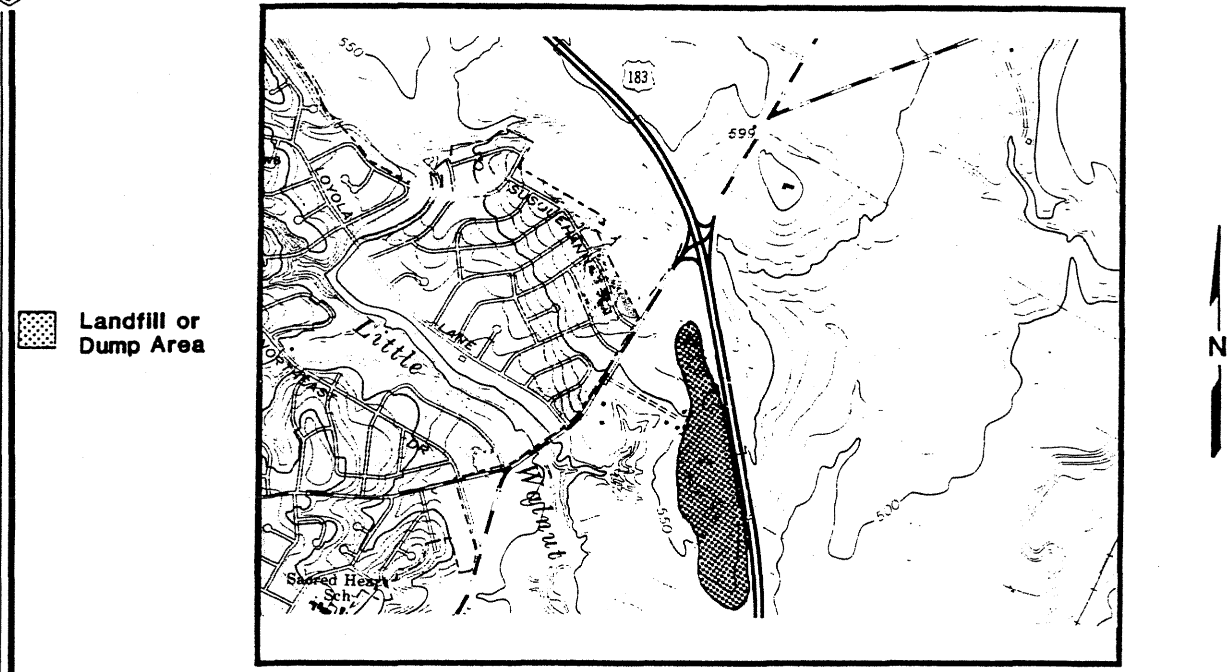
methylene chloride
1,2-dichloroethane
benzene
toluene
chlorobenzene
C_8 aromatics
naphthalene
butylbenzxylphthlate
bis (2-chloroethyl) ether
dimethylphthalate
diethylphthalate

The geologic stratigraphy underlying the Texaco Chemical Company landfill is the Austin Chalk, the Eagle Ford, Buda, Del Rio, Georgetown, Edwards, and Glen Rose, in that order. These formations dip from the Mount Bonnell Fault toward the southeast. The first principal aquifer underlying the site is in the Edwards Formation. The top of the Edwards is 400 feet below the natural grade at Texaco, and the intervening formations of the Eagle Ford and Del Rio are generally impermeable except possibly when they are faulted, fractured, or penetrated by a poorly cased well.

Although it is not a major aquifer, groundwater also occurs under water table conditions in the faults, fractures, and solution channels of the Austin Chalk, which directly underlies the landfill. Several shallow water production wells in the vicinity of the Texaco landfill are completed in this shallow formation. The Texaco recovery well system is designed to produce water from the upper, weathered tan limestone of this formation. The direction of the flow of the groundwater follows the surface topographical slope to the southwest. A transmissibility ranging from 2 to 200 gpd/ft., based on well pump tests, was reported (E_{20} report, 1981) for this upper limestone. The groundwater in this upper layer was also reported to be independent of groundwater in the deeper gray chalk.

Since the site is regulated through the TDWR Industrial Waste Management program, no additional action is recommended to the City of Austin.

TURNER



Base taken from U.S.G.S. Austin East, Tx. Topographic Quadrangle.

Scale

0 2000 4000

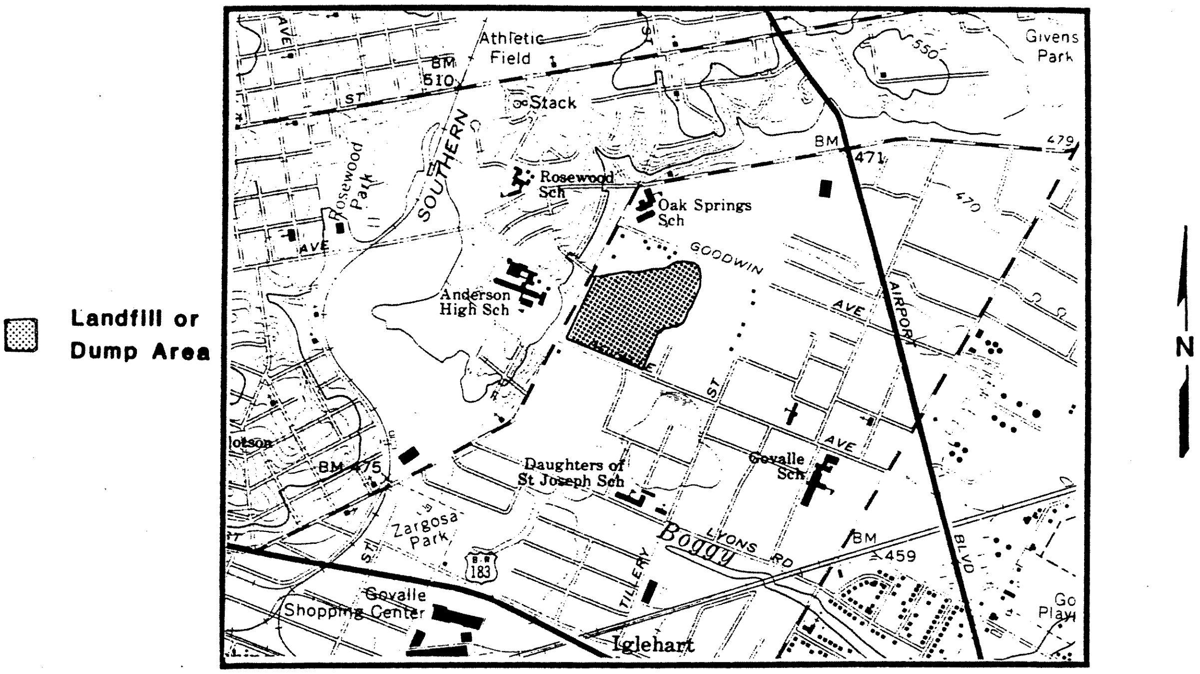
Feet

The Turner site was operated by the landowner from 1955 to 1957. The site received waste from both the City and from private individuals. Some of the trash was burned.

Geologically, the site is located in a quarry pit from which tertiary terrace deposits of sand and gravel were excavated. On a field survey by URM, the landfill apparently occupied a flat ridge top. It was dry, with no evidence of seepage. Concrete block, brick, and scrap sheet metal were observed with clean fill. The surface was hummocky, with no apparent lineations in the hummocks which might indicate the location of trenches.

Because of the dates of operation, it is unlikely that the Turner site was used to dispose of significant amounts of toxic waste. The location of the site (on a ridge top) also limits the amount of rainfall runoff available to percolate into the landfill. An annual field inspection of landfill site is recommended.

WEBBERVILLE - GOVALLE



Base taken from U.S.G.S. Austin East, Tx. Topographic Quadrangle.

Scale

0 2000 4000

Feet

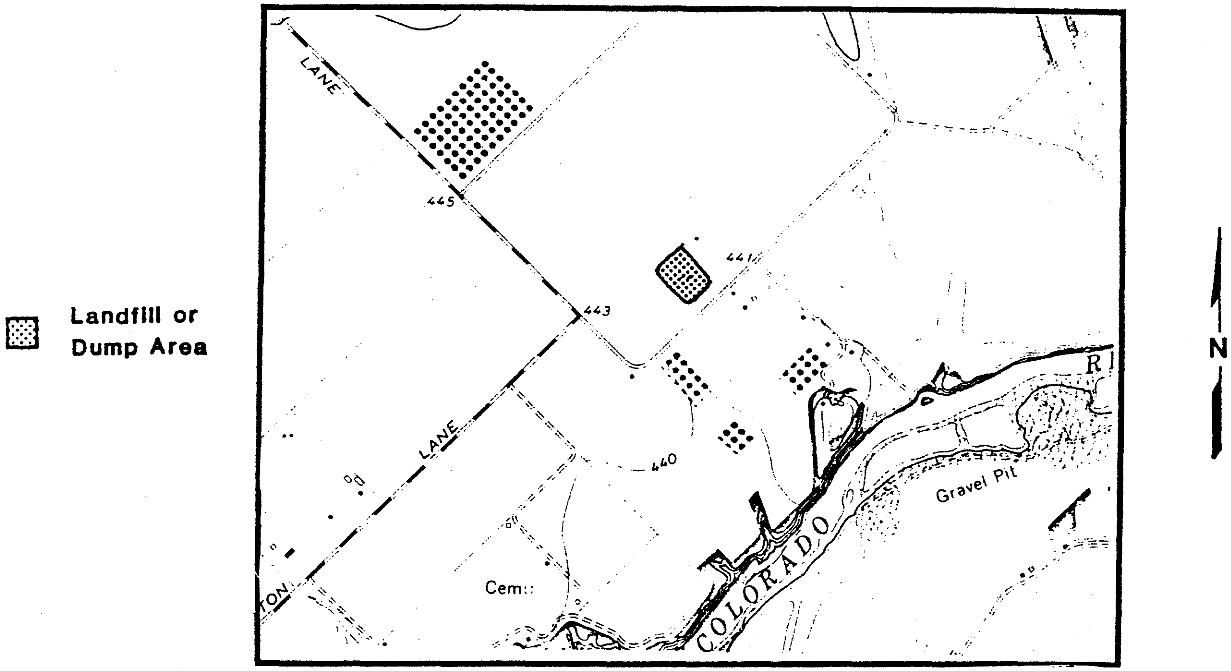
The existence of this site was revealed to URM during a conversation with City of Austin sanitarians. Most of the available information on the site is based on a field visit by URM conducted in November, 1983.

The landfill is located on Lower Colorado River Terrace deposits of sand, silt, clay, and gravel. The west disposal area is bounded on the south side by a small creek which forms a rough border. During the URM field visit, there was no evidence of seepage out of the fill, and the quality of the water seemed, based on appearance and odor, good.

The fill is estimated to be 10 to 15 feet thick. Concrete blocks and brick were observed, but there was no visual evidence of household garbage. The surface area is basically flat with small trees, scrubby vegetation, and some piles of recent dumping.

Future action recommended to the City of Austin would be to collect and analyze the stream quality, and to require the removal of recent waste piles to discourage continued dumping. An annual site visit is also recommended.

WHISENHUNT



Base taken from U.S.G.S. Montopolis, Tx. Topographic Quadrangle.

Scale

0 2000 4000

Feet

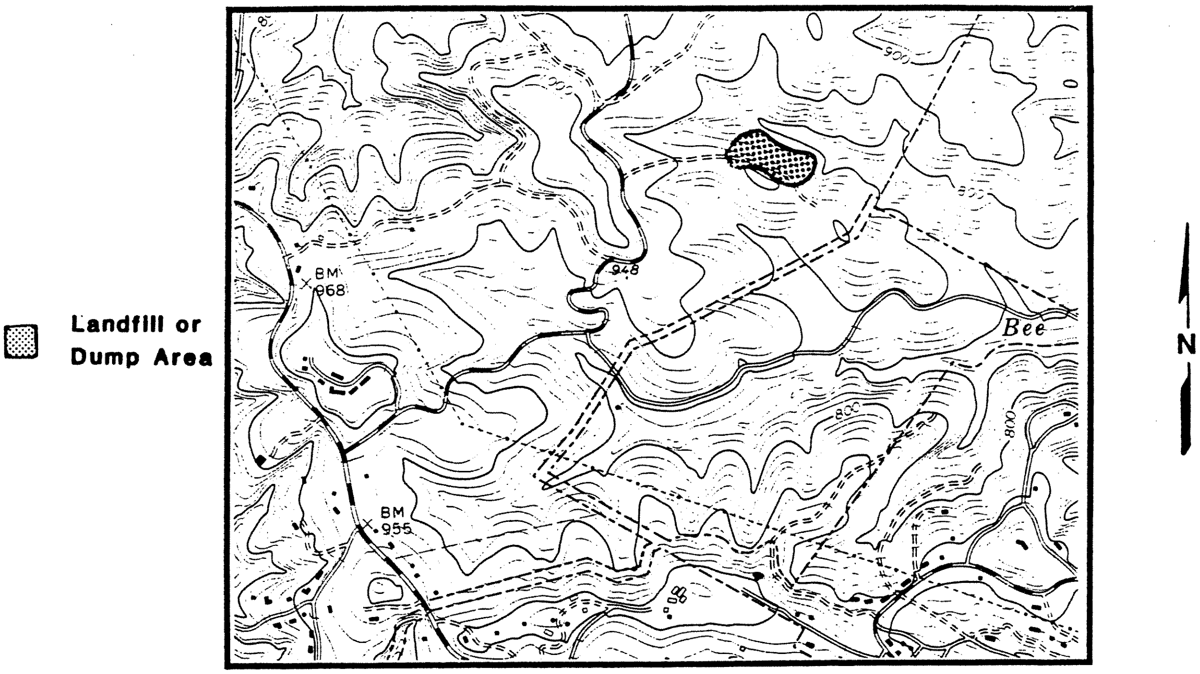
Mr. Otis Whisenhunt operated a private waste disposal site for an undetermined period, encompassing at least the years 1973 to October, 1979, when his permit was cancelled. The site was permitted as a Type V site which was to receive only inert, nonputrescible waste. Since the site is located on fenced land adjacent to Mr. Whisenhunt's residence, it was potentially a well supervised site. Wastes other than inert or nonputrescible wastes were reportedly received, however, including brush, lumber, and possibly some municipal wastes. Fifty 5-gallon cans of solvents from an Austin engraving company were also reportedly accepted at the site.

The Whisenhunt landfill is located in the pit in the Lower Colorado River Terrace Deposits, and in the floodplain of the Colorado River.

The pit has been completely filled, and the surface is a grassed, open field.

Since potentially hazardous wastes were reported at this site, the City of Austin should coordinate with the Texas Department of Health to determine whether an environmental impact exists.

WILD BASIN



Base taken from U.S.G.S. Austin West,Tx. Topographic Quadrangle

Scale

0 2000 4000

Feet

The dumping activities on the Davenport Ranch, which is adjacent to the Wild Basin Wilderness Preserve, took place from the 1930's to 1947. The dumps were operated by Travis County, and were used by the City of Austin and private individuals. Most of the refuse was disposed at the site, burned, and buried. Of these early disposal activities, items which still remain are primarily glass and metal. More recent dumping has also occurred near Wild Basin and on the southeast edge of the earlier site are surface piles containing wood, plastic, tires, bottles, and cans.

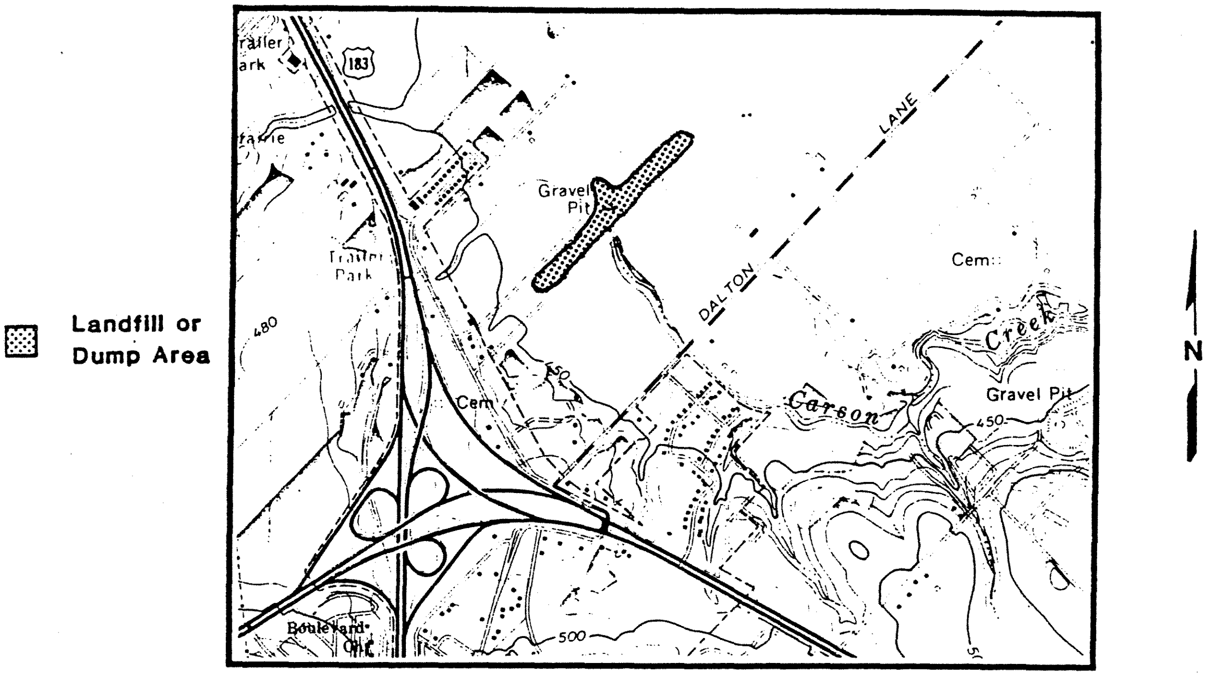
Mr. Andrew Covar, of the City of Austin, has prepared a preliminary report on the Northwest Hill Dump Site. Mr. Covar and Mark Schipper of URM visited the site in November, 1983. Three different dump areas have been identified at the site. One area, a wide bedrock bench, was probably used as a road to bring wastes in. Wastes were dumped over the edge of the ledge and are now visible as an extensive area with a surface cover of glass. In a gully adjacent to the ledge from 860 feet to 820 feet mean sea level is a second area where wastes are deeper, from 2 to 4 feet in the gully along Loop 360, to 5 to 15 feet deep at the other end of the gully. The third area of waste dumping identified by Andrew Covar contains surface piles of more recent deposits estimated to be 1 to 2 feet deep. The total area of dumping is estimated to be 3 to 6 acres.

Because of the age of the waste and the burning of organic material, it is unlikely that leachate would degrade the quality of either surface or ground water. Analyses by the Texas Department of Health for heavy metals and priority pollutants on stream samples below the waste also indicate no water quality contamination. Iron and zinc were measured at maximum concentrations of 0.23 mg/L and 0.04 mg/L, respectively. These two metals are the most probable indicators of contamination from the waste as they are leached from rusting cans. These measured concentrations indicate an insignificant effect of the waste on water quality.

The topography surrounding the site is fairly steep ravines. Much of the soil on the sides of these drainages is eroded, exposing the Glen Rose Formation as benches. Much of the cover has also been eroded and carried into the stream channels.

Since the City of Austin has initiated a program to clean up this site, no additional action is recommended.

WINGFIELD



Base taken from U.S.G.S. Montopolis, Tx. Topographic Quadrangle.

Scale

0 2000 4000

Feet

The Wingfield dump is a privately operated site behind a junk car lot on the Old Bastrop Highway. The wrecking yard business was established in 1963 on 20 acres of land. In 1973, solid waste disposal was initiated on ten acres of that land. During its operation, Tiger Trash and Browning Ferris have reportedly used the site for disposal, as well as smaller private disposers.

Several government agencies have inspected the Wingfield dump during the years of its operation, including the Texas Department of Health, the Austin-Travis County Health Department and the City of Austin. According to information in those files, the total volume of waste in the landfill is estimated to be between 20,400 cubic feet and 40,800 cubic feet, and 10 to 15 feet thick. Until February, 1980, daily cover was not applied to the site. In 1982, the Texas Department of Health reported both domestic and commercial waste on the site, as well as 55-gallon drums. The contents of the drums are unknown. A staff member of the City of Austin recommended to the Texas Department of Water Resources that the Wingfield site be listed on the Imminent Hazardous Waste Survey. The site was reportedly on fire on June 13, 1980.

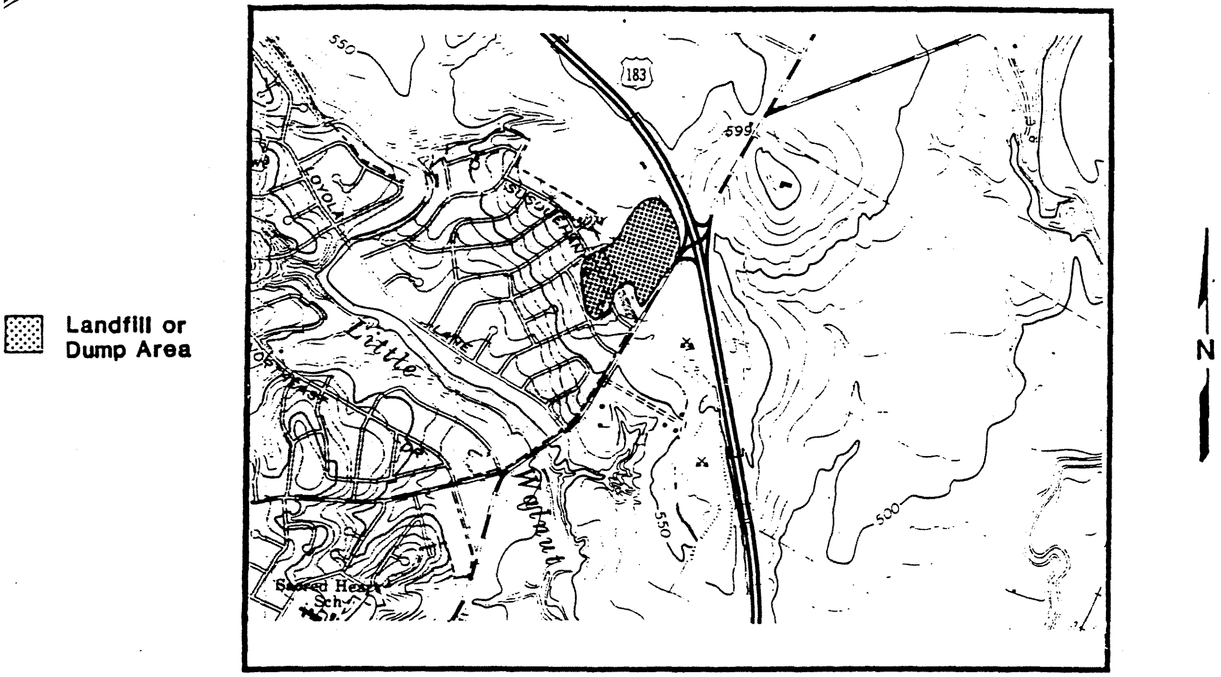
In more recent inspections, the site conditions were reportedly improved. There were no additional reports of hazardous wastes or leachates observed seeping from the landfill. A ground-water sample from a well was analyzed by the Texas Department of Health, and showed no evidence of contamination.

Geologically, the site is located in the Fluviatile Terrace Deposits of the Lower Colorado River. These deposits are interbedded gravel, sand, silt, and clay. They may yield small quantities of potable water to shallow wells. These deposits overlie the Lower Taylor (Ozan) Clay and Marl, which is probably less than 50 feet below the site. Carson Creek crosses the landfill.

During a field visit by URM in November, 1983, the surface of the fill was observed to be roughly graded with no soil cover. Raw refuse is visible at the surface. Dikes have been constructed along the banks of Carson Creek, but are breeched at one location. Water from the upstream drainage of Carson Creek now flows into the gravel pit which is approximately 25 feet lower than the stream drainage channel. Water ponded in the pit is stagnant, but clear.

URM recommends that the City of Austin coordinate with the Texas Department of Health to determine whether this site is an environmental hazard and what additional action will be taken.

WINN-COOK



Base taken from U.S.G.S. Austin East, Tx. Topographic Quadrangle.

Scale

0 2000 4000

Feet

The Winn-Cook landfill was used by the City of Austin for municipal solid waste from 1952 to 1957. Waste was placed into a quarry pit excavated from sands and gravels of the Tertiary Terrace deposits of Walnut Creek. The surface of the landfill is now occupied by part of the Winn-Cook School playground, a section of Sesquehana Road, and an open area overgrown with weeds. Houses and yards have been constructed to the edge of the fill on three sides.

The terrace deposits of Little Walnut Creek probably extend 15 to 20 feet below the surface in the vicinity of the landfill. These deposits are underlain by Taylor Clay, and it is likely that the fill has been placed to the top of, or into, the Taylor Formation. The landfill is located on a ridgetop which slopes toward Little Walnut Creek, about 1,800 feet southwest of the site. Subsidence of the fill is visible in a dip in Susquehanna Road and in long, parallel depressions approximately 20 feet wide. The amount of settlement was estimated to be 1 to 2 feet during the URM field visit in November, 1983.

Because the landfill is located on a ridgetop, rainfall will tend to drain away from the site. Water which does infiltrate would migrate through the terrace deposits and laterally along the contact with the underlying Taylor Clay and Marl. Shallow ground water (less than 30 feet) below the site is unlikely due to the proximity of discharge points along Walnut Creek and Little Walnut Creek, which are more than 100 feet below the site. There may, however, be some pockets of perched water below the landfill.

A monitor well was recommended for this site in the first URM report for the closed landfill project. Due to access problems to the site, the decision was made by the City not to install this well. Because of the dates of operation of the landfill, and because the landfill was operated by the City, this site is unlikely to contain significant quantities of hazardous materials. The residences and the school ground, however, are adjacent to the site, and extra precautions should be taken not to excavate or disturb the buried waste. An annual inspection of the cover is recommended.

APPENDIX B

Additional Sites

APPENDIX B

ADDITIONAL SITES

There are many small sites in Austin which were used to dump discarded brush, vegetation, construction debris, appliances, and other solid waste. Several of these sites never became landfills and were never inspected, monitored, or permitted. The available information on these sites is generally limited to a complaint letter, an agency memo, or a newspaper article reference. There is not adequate information to accurately assess the contents of all of these waste sites, but what is available is presented below.

1. Polk-Shelton Drive, west of Old Lockhart Road
   Owner: L. E. Hunt
   26.5 acres southside of Onion Creek at cattleguard. Closed August 3, 1982 with proper cover and compaction.
   Source: Texas Department of Health (TDH) correspondence file.

2. River City Excavating and Paving
   Owner: Edward Coleman
   3 miles southwest of FM620 and SH183
   Tires, brush, stumps, metal, some burning but mostly inert materials.
   Source: TDH correspondence file, 1982.

3. Stassney Road in Austin City Limits
   Owner: unknown
   Clothing, tires, furniture, building construction and demolition materials, food wastes
   Source: TDH correspondence file, June 11, 1982.

4. Capital Business Park
   Former disposal site now occupied by buildings.
   183 and Bolm Road
   Source: conversation with Bob Kent.

5. Fred Eby property near Lake Austin
   Source: Austin American Statesman, October 2, 1973.

6. Construction site near Tom Wooten Boy Scout Camp
   Trash dumped by campers and picnickers
   Source: Austin American Statesman, October 2, 1973.

7. Buck Steiner County Park Dump
Source: Austin American Statesman, October 2, 1973.

8. Area near Lakeland Park
Source: Austin American Statesman, October 2, 1973.

9. Area near Apache Shores
Source: Austin American Statesman, October 2, 1973.

10. Area where Westlake Drive turns down to Rockcliff
Source: Austin American Statesman, October 2, 1973.

11. Windy Cove
Source: Austin American Statesman, October 2, 1973

12. 1400 Block of South Seventh Street
Refrigerators, rotting trash, roofing shingles
Source: Austin American Statesman, March 22, 1970; quotes from Frank Redding.

13. 600 Block of Pleasant Valley Road
Several acres of trash on west side of the road
Source: Austin American Statesman, March 22, 1970; quotes from Frank Redding.

14. 1100 Block of Delano
Dead dog, trash
Source: Austin American Statesman, March 22, 1970; quotes from Frank Redding.

15. Universal Disposal
7511 N. IH35, Commercial dump
Source: Austin American Statesman, no date.

16. Budder Dale
Close to IH35 near 1st Buda exit; commercial dump
Source: Austin American Statesman, no date (in the 50's).

17. Bull Creek
North of Lake Austin between MoPac and Loop 360, unknown to 1947 reference: City.
Source: Austin American Statesman.

18. Ash dumping sites, early 1950's
West of SH138, north of Town Lake
Source: Austin American Statesman.

19. County landfill
East side of SH183, between Colorado River and US 290
Source: Austin American Statesman.

20. County dump in the 1930's
North of the intersection of Loop 360 and Lamar Boulevard
Source: City of Austin.

21. Illegal dump near Pflugerville
On FM 1825, 2 miles east of IH 36
Complaints received, site inspected by Ervin Coonrod, Austin-Travis County Health Department, May 12, 1983
cover of site completed on May 16, 1983
Source: TDH correspondence files, May 23, 1983.

22. Maha Loop (sic) and U.S. 183, southeast corner of intersection
Citizen complaint of demolition debris and some garbage
Source: TDH correspondence file, September 7, 1982.

23. Zimmerman Lake off Ranch Road 620
Three 55 gallon drums; labels: Senlube JJ-420 lbs.
Senstat 018-420 lbs.
Reported by citizen
Source: TDH correspondence file March 13, 1982.

24. Bradshere - Flournoy site
Permit application No. 90282, closed November 14, 1979
Source: TDH correspondence file, November 14, 1979.

25. Paleface Park
Dumping on LCRA land leased by the County
Site used only in emergencies like the July 4th weekend when the transfer station was overloaded. Site was a gravel mine from 1956-1965. After that it was used as a dump site primarily by Travis County. No date.

26. Jones Cemetery Site
Turn left on Cadillac Drive which is shortly after the Dunlap/Del Valle School on FM 969
Citizen reported many truckloads of trash and garbage
Source: TDH files, June 12, 1978.

27. East of Nixon Lane on FM 969
State agency representatives inspected the site on February 19, 1976. Most of the waste was rock, dirt, concrete foundations, man-made inert materials and brush.
Source: TDH files March 16, 1976.

28. Pansy Trail and Howard Lane
This dump site in north Austin was identified by Bob kent in the field. The site consists of a wedge of fill on about 0.5 acres. The wastes were apparently dumped into a shallow valley of an unnamed drainage channel. The wastes now form a steep bank 12 to 15 feet high with slopes of 1 to 1. The surface of the fill is fairly flat and there is no evidence of differential subsidence or water ponding during rainy weather.

Wastes observed at the site were primarily construction material, asphalt roof, electrical cable, metal strips, and construction stone. Although there is now no evidence of hazardous material at the site, its location near an industrial area, and the lack of control make it a possible candidate of illegal, hazardous dumping.

29. 1200 Block Congress Avenue

30. Parker Lane and Riverside Drive

31. Brodie Dump
Source: Austin - Travis County Health Department

32. Martin property

33. Bee Cave property
Source: Austin - Travis County Health Department

34. Martin Hill
Drums of hazardous waste, presumably disposed of by Mr. Jack Arsenault were discovered. All material was transported to a hazardous waste facility in Robstown, Texas.
Source: Coversation with Bob Kent.

35. Angus Valley Dump
A illegal dump site on vacant property observed by Bob Kent in the mid-1970's. Waste was apparently household trash and the remains of fish cleaning by private individuals.

36. Camp Mabry
A small private dump operated by the camp.

37. Rathgaber

APPENDIX C

Monitor Well Boring Logs and Well Installation Diagrams

Monitor Well Installation

Client: City of Austin Job No.: 83-901 Date Drilled: 2/21/84 Well No.: ZP-1

Site: Old Butler Landfill at Zilker Park Elevation: Pad Top of PVC Casing 2.6 above grade

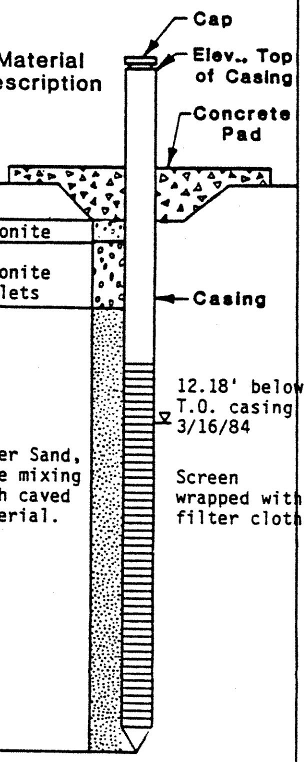
Total Depth: 22 ft. Casing Size & Type: 2 inch ID Schedule 80 PVC Screen Size: 0.010, wrapped with Mirafi cloth

Comments:

Depth	Symbol	Stratigraphy	Sample Description
			Clay, red-brown, sandy and gravelly cover material
5			Sand, brown, fine-grained, silty, slightly clayey cover material
10 15			Refuse, gray to dark gray, loose, saturated, including paper, rags, plastic fragments, mixed with brown, sandy clay
20			Sand, tan, medium-grained, loose
25			Sand and gravel, rounded limestone and quartz pebbles up to ½" diameter.
30 35 40 45 50			

Completion Data

Material Setting	Material Description
	Bentonite
	Bentonite pellets
	Filter Sand, some mixing with caved material.
	Drilled T.D. 26.0



Static Water Level Data

Date	Static Water Level From TOC	Bailing History
3/16/84	12.18	1.95 gal.
5/25/84	14.44	1.56 gal.
5/29/84	15.11	Sampled

Underground Resource Management, Inc.
Austin, Texas

URM-R3d

Monitor Well Installation

Client: City of Austin Job No.: 83-901 Date Drilled: 2/21/84 Well No.: MD-1

Site: Mabel Davis Park Elevation: Pad ______ Top of PVC Casing 2.75' above grade

Total Depth: 15 feet Casing Size & Type: 2 inch I.D. Schedule 80 PVC Screen Size: 0.01 gauge, wrapped with Mirafi cloth

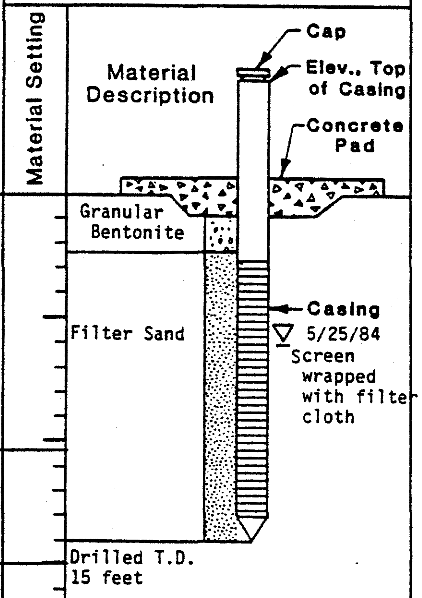
Comments: Located on fill material near toe of Northwest waste body

Depth	Symbol	Stratigraphy	Sample Description
			Refuse and Soil fill Material, mixed., Brown, sandy clay, fill and garbage. During drilling, water trickling into open bore-hole at approximately 5 feet below grade.
5			
10			Clay, shaley, gray-yellow, dry, fossiliferous.
15			
20			
25			
30			
35			
40			
45			
50			

Static Water Level Data

Date	Static Water Level from TOC	Bailing History
3/16/84	7.47'	5.9 gal.
5/25/84	8.48'	5.9 gal.
5/29/84	8.48'	Sampled

Completion Data



Underground Resource Management, Inc.
Austin, Texas

APPENDIX D

Laboratory Analyses Results

The results of the laboratory analyses which follow are blocked into four groups. The first group, conductivity, pH, and total dissolved solids, are standard tests which are used generally to characterize water. Dissolved solids is the parameter used to identify water as fresh (less than 3,000 mg/L) or saline. The second group, alkalinity through sulfates, are inorganic ions which are typically found in all ground water at varying concentrations. Primary drinking water standards (Table D-1) set maximum concentrations for most of these ions.

The next set of constituents, antimony through zinc, are metals. Several of these metals have been defined by the USEPA to be toxic in concentrations higher than the minimum values in Table D-2. Several of the remaining metals, notably zinc, are typically found in landfill leachate. The last group of constituents, acenaphthene through toxaphene, are organic chemicals which comprise the USEPA list of priority pollutants. All of these constituent concentrations are expressed in terms of less than (<) a particular concentration. Results in this form do not indicate that the chemical is present, but that at the minimum concentration which can be detected by sampling and laboratory methods, the chemical is absent.

TABLE D-1

Primary Drinking Water Regulations (1)

Parameter	Maximum Level	
Arsenic	0.05	mg/L
Barium	1.0	mg/L
Cadmium	0.010	mg/L
Chromium	0.05	mg/L
Fluoride	1.4-2.4	mg/L
Lead	0.05	mg/L
Mercury	0.002	mg/L
Nitrogen, Nitrate	10	mg/L
Selenium	0.01	mg/L
Silver	0.05	mg/L
Turbidity	1-5	TU
Coliform, total	<1/100	ml
Endrin	0.0002	mg/L
Lindane	0.004	mg/L
Methoxychlor	0.1	mg/L
THM's	0.100	mg/L
Toxaphene	0.005	mg/L
2,4 D	0.1	mg/L
2,4,5 TP Silvex	0.01	mg/L
Radium 226 + 228	5	pCi/L
Gross Alpha	15	pCi/L
Gross Beta	50	pCi/L
Secondary Regulations		
Chloride	250	mg/L
Color	15	CU
Copper	1	mg/L
Corrosivity	Non-corrosive	
Foaming Agents	0.5	mg/L
Iron	0.3	mg/L
Manganese	0.05	mg/L
Odor	3	T.O.N.
pH	6.5-8.5	Units
Sulfate	250	mg/L
TDS	500	mg/L
Zinc	5	mg/L

(1) Established by the USEPA.

TABLE D-2

Hazardous Waste (1)

A waste is hazardous if it is listed in 40CFR 261.31-261.33, or if it is not excluded, or if it exhibits any one of the following characteristics:

IGNITABILITY: a flash point of less than 140°F (60°C).

CORROSIVITY: a pH of less than 2.0 or greater than 12.5 or corrodes steel at a rate greater than 6.35mm per year at 55°C.

REACTIVITY: unstable, reacts violently with water, is sufficiently cyanide or sulfide bearing to produce toxic gas, or is capable of detonation.

EP TOXICITY: the extract of the sample contains concentrations above the maximum limits listed below:

Parameter	MCL (mg/L)
Arsenic	5.0
Barium	100.0
Cadmium	1.0
Chromium	5.0
Lead	5.0
Mercury	0.2
Selenium	1.0
Silver	5.0
Endrin	0.02
Lindane	0.4
Methoxychlor	10.0
Toxaphene	0.5
2, 4 D	10.0
2, 4, 5 TP Silvex	1.0

(1) As defined by the USEPA.

Client : CITY OF AUSTIN
Facility :

Proj # : 83-901
Lab ID # : 7577

Sample : MABEL DAVIS MONITOR WELL

Date Taken : 5/30/84

Date Received : 5/30/84

Results of Sample Analysis

Conductivity	1800	umhos/cm
pH	7.2	
Solids/Dissolved	1100	mg/l
Alkalinity	280	mg/l
Chloride	87	mg/l
Fluoride	1.3	mg/l
Nitrate-N	0.24	mg/l
Sulfate	460	mg/l
Antimony	<0.1	mg/l
Arsenic	<0.001	mg/l
Beryllium	<0.01	mg/l
Cadmium	<0.01	mg/l
Calcium	190	mg/l
Chromium	<0.05	mg/l
Copper	<0.01	mg/l
Lead	0.07	mg/l
Magnesium	17	mg/l
Mercury	<0.001	mg/l
Nickel	<0.05	mg/l
Potassium	3.2	mg/l
Selenium	<0.001	mg/l
Silver	<0.01	mg/l
Sodium	68	mg/l
Thallium	<0.05	mg/l
Zinc	0.08	mg/l
Acenaphthene	<10	ug/L
Acenaphtylene	<10	ug/L
Anthracene	<10	ug/L

Client : CITY OF AUSTIN
Facility :

Proj # : 83-901
Lab ID # : 7577
(continued)

Benzidine	<10	ug/L
Benzo (a) Anthracene	<10	ug/L
Benzo (a) Pyrene	<10	ug/L
3-4-Benzofluoranthene	<10	ug/L
Benzo (ghi) Perylene	<10	ug/L
Benzo(k)Fluoranthene	<10	ug/L
bis(2-Chloroethoxy) Methane	<10	ug/L
bis(2-Chloroethyl) Ether	<10	ug/L
bis(2-Chloroisopropyl)Ether	<10	ug/L
bis(2-Ethylhexyl) Phthalate	<10	ug/L
4-Bromophenyl Phenyl Ether	<10	ug/L
Butyl Benzyl Phthalate	<10	ug/L
2-Chloronaphthalene	<10	ug/L
4-Chlorophenyl Phenyl Ether	<10	ug/L
Chrysene	<10	ug/L
Dibenzo(a-h) Anthracene	<10	ug/L
1-2-Dichlorobenzene	<10	ug/L
1&3-Dichlorobenzene	<10	ug/L
1-4-Dichlorobenzene	<10	ug/L
3-3'-Dichlorobenzidine	<10	ug/L
Diethyl Phthalate	<10	ug/L
Dimethyl Phthalate	<10	ug/L
Di-N-Butyl Phthalate	<10	ug/L
2-4-Dinitrotoluene	<10	ug/L
2-6-Dinitrotoluene	<10	ug/L
Di-N-Octyl Phthalate	<10	ug/L
1-2-Diphenylhydrazine(Azobenzene	<10	ug/L

Client : CITY OF AUSTIN
Facility :

Proj # : 63-901
Lab ID # : 7577 b
(continued)

Fluoranthene	<10	ug/L
Fluorene	<10	ug/L
Hexachlorobenzene	<10	ug/L
Hexachlorobutadiene	<10	ug/L
Hexachlorocyclopentadiene	<10	ug/L
Hexachloroethane	<10	ug/L
Indeno(1-2-3-cd) Pyrene	<10	ug/L
Isophorone	<10	ug/L
Naphthalene	<10	ug/L
Nitrobenzene	<10	ug/L
N-Nitrosodimethylamine	<10	ug/L
N-Nitrosodi-N-propylamine	<10	ug/L
N-Nitrosodiphenylamine	<10	ug/L
Phenanthrene	<10	ug/L
Pyrene	<10	ug/L
1-2-4-Trichlorobenzene	<10	ug/L
2-Chlorophenol	<10	ug/L
2-4-Dichlorophenol	<10	ug/L
2-4-Dimethylphenol	<10	ug/L
4-6-Dinitro-o-cresol	<10	ug/L
2-4-Dinitrophenol	<10	ug/L
2-Nitrophenol	<10	ug/L
4-Nitrophenol	<10	ug/L
p-Chloro-m-cresol	<10	ug/L
Pentachlorophenol	<10	ug/L
Phenol	<10	ug/L
2-4-6-Trichlorophenol	<10	ug/L
Acrolein	<100	ug/L
Acrylonitrile	<100	ug/L
Benzene	<10	ug/L

Client : CITY OF AUSTIN
Facility :

Proj # : 83-901
Lab ID # : 7577
(continued)

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bis(Chloromethyl) Ether	<10	ug/L
Bromoform	<10	ug/L
Carbon Tetrachloride	<10	ug/L
Chlorobenzene	<10	ug/L
Chlorodibromomethane	<10	ug/L
Chloroethane	<10	ug/L
2-Chloroethylvinyl Ether	<10	ug/L
Chloroform	<10	ug/L
Dichlorobromomethane	<10	ug/L
Dichlorodifluoro- methane	<10	ug/L
1-1-Dichloroethane	<10	ug/L
1-2-Dichloroethane	<10	ug/L
1-1-Dichloroethylene	<10	ug/L
1-2-Dichloropropane	<10	ug/L
1-2-Dichloropropene	<10	ug/L
Ethylbenzene	<10	ug/L
Methyl Bromide	<10	ug/L
Methyl Chloride	<10	ug/L
Methylene Chloride	<10	ug/L
1-1-2-2-Tetrachloro- ethane	<10	ug/L
Tetrachloroethylene	<10	ug/L
Toluene	<10	ug/L
1-2-trans-Dichloro- ethylene	<10	ug/L
1-1-1-Trichloro- ethane	<10	ug/L
1-1-2-Trichloro- ethane	<10	ug/L
Trichloroethylene	<10	ug/L
Trichlorofluoro- methane	<10	ug/L
Vinyl Chloride	<10	ug/L
Aldrin	<10	ug/L
alpha-BHC	<10	ug/L

Client : CITY OF AUSTIN
Facility :

Proj # : 83-901
Lab ID # : 7577
(continued)

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beta-BHC	<10	ug/L
gamma-BHC	<10	ug/L
delta-BHC	<10	ug/L
Chlordane	<10	ug/L
4-4'-DDT	<10	ug/L
4-4'-DDE	<10	ug/L
4-4'-DDD	<10	ug/L
Dieldrin	<10	ug/L
alpha-Endosulfan	<10	ug/L
beta-Endosulfan	<10	ug/L
Endosulfan Sulfate	<10	ug/L
Endrin	<10	ug/L
Endrin Aldehyde	<10	ug/L
Heptachlor	<10	ug/L
Heptachlor Epoxide	<10	ug/L
Arochlor 1016	<10	ug/L
Arochlor 1221	<10	ug/L
Arochlor 1232	<10	ug/L
Arochlor 1242	<10	ug/L
Arochlor 1248	<10	ug/L
Arochlor 1254	<10	ug/L
Arochlor 1260	<10	ug/L
Toxaphene	<10	ug/L

Client : CITY OF AUSTIN
Facility :

Proj # : 83-901
Lab ID # : 7578

Sample : MABEL DAVIS STREAM

Date Taken : 5/30/84

Date Received : 5/30/84

Results of Sample Analysis

Conductivity	790	umhos/cm
pH	7.6	
Solids/Dissolved	420	mg/l
Alkalinity	220	mg/l
Chloride	76	mg/l
Fluoride	0.34	mg/l
Nitrate-N	0.26	mg/l
Sulfate	30	mg/l
Antimony	<1	mg/l
Arsenic	<0.001	mg/l
Beryllium	<0.01	mg/l
Cadmium	<0.01	mg/l
Calcium	138	mg/l
Chromium	<0.05	mg/l
Copper	<0.01	mg/l
Lead	<0.05	mg/l
Magnesium	10	mg/l
Mercury	<0.001	mg/l
Nickel	<0.05	mg/l
Potassium	6.8	mg/l
Selenium	<0.001	mg/l
Silver	<0.01	mg/l
Sodium	47	mg/l
Thallium	<0.05	mg/l
Zinc	0.04	mg/l
Acenaphthene	<10	ug/L
Acenaphtylene	<10	ug/L
Anthracene	<10	ug/L

Client : CITY OF AUSTIN
Facility :

Proj # : 83-901
Lab ID # : 7578
(continued)

Benzidine	<10	ug/L
Benzo (a) Anthracene	<10	ug/L
Benzo (a) Pyrene	<10	ug/L
3-4-Benzofluoranthene	<10	ug/L
Benzo (ghi) Perylene	<10	ug/L
Benzo(k)Fluoranthene	<10	ug/L
bis(2-Chloroethoxy) Methane	<10	ug/L
bis(2-Chloroethyl) Ether	<10	ug/L
bis(2-Chloroiso-propyl)Ether	<10	ug/L
bis(2-Ethylhexyl) Phthalate	<10	ug/L
4-Bromophenyl Phenyl Ether	<10	ug/L
Butyl Benzyl Phthalate	<10	ug/L
2-Chloronaphthalene	<10	ug/L
4-Chlorophenyl Phenyl Ether	<10	ug/L
Chrysene	<10	ug/L
Dibenzo(a-h) Anthracene	<10	ug/L
1-2-Dichlorobenzene	<10	ug/L
1&3-Dichlorobenzene	<10	ug/L
1-4-Dichlorobenzene	<10	ug/L
3-3'-Dichlorobenzidine	<10	ug/L
Diethyl Phthalate	<10	ug/L
Dimethyl Phthalate	<10	ug/L
Di-N-Butyl Phthalate	<10	ug/L
2-4-Dinitrotoluene	<10	ug/L
2-6-Dinitrotoluene	<10	ug/L
Di-N-Octyl Phthalate	<10	ug/L
1-2-Diphenylhydrazine(Azobenzene	<10	ug/L

Client : CITY OF AUSTIN
Facility :

Proj # : 83-901
Lab ID # : 7578 b
(continued)

Fluoranthene	<10	ug/L
Fluorene	<10	ug/L
Hexachlorobenzene	<10	ug/L
Hexachlorobutadiene	<10	ug/L
Hexachlorocyclopentadiene	<10	ug/L
Hexachloroethane	<10	ug/L
Indeno(1-2-3-cd) Pyrene	<10	ug/L
Isophorone	<10	ug/L
Naphthalene	<10	ug/L
Nitrobenzene	<10	ug/L
N-Nitrosodimethylamine	<10	ug/L
N-Nitrosodi-N-propylamine	<10	ug/L
N-Nitrosodiphenylamine	<10	ug/L
Phenanthrene	<10	ug/L
Pyrene	<10	ug/L
1-2-4-Trichlorobenzene	<10	ug/L

2-Chlorophenol	<10	ug/L
2-4-Dichlorophenol	<10	ug/L
2-4-Dimethylphenol	<10	ug/L
4-6-Dinitro-o-cresol	<10	ug/L
2-4-Dinitrophenol	<10	ug/L
2-Nitrophenol	<10	ug/L
4-Nitrophenol	<10	ug/L
p-Chloro-m-cresol	<10	ug/L
Pentachlorophenol	<10	ug/L
Phenol	<10	ug/L
2-4-6-Trichlorophenol	<10	ug/L

Acrolein	<100	ug/L
Acrylonitrile	<100	ug/L
Benzene	<10	ug/L

Client : CITY OF AUSTIN
Facility :

Proj # 83-901
Lab ID # : 7578
(continued)

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bis(Chloromethyl) Ether	<10	ug/L
Bromoform	<10	ug/L
Carbon Tetrachloride	<10	ug/L
Chlorobenzene	<10	ug/L
Chlorodibromomethane	<10	ug/L
Chloroethane	<10	ug/L
2-Chloroethylvinyl Ether	<10	ug/L
Chloroform	<10	ug/L
Dichlorobromomethane	<10	ug/L
Dichlorodifluoromethane	<10	ug/L
1-1-Dichloroethane	<10	ug/L
1-2-Dichloroethane	<10	ug/L
1-1-Dichloroethylene	<10	ug/L
1-2-Dichloropropane	<10	ug/L
1-2-Dichloropropene	<10	ug/L
Ethylbenzene	<10	ug/L
Methyl Bromide	<10	ug/L
Methyl Chloride	<10	ug/L
Methylene Chloride	<10	ug/L
1-1-2-2-Tetrachloroethane	<10	ug/L
Tetrachloroethylene	<10	ug/L
Toluene	<10	ug/L
1-2-trans-Dichloroethylene	<10	ug/L
1-1-1-Trichloroethane	<10	ug/L
1-1-2-Trichloroethane	<10	ug/L
Trichloroethylene	<10	ug/L
Trichlorofluoromethane	<10	ug/L
Vinyl Chloride	<10	ug/L
Aldrin	<10	ug/L
alpha-BHC	<10	ug/L

Client : CITY OF AUSTIN
Facility :

Proj # : 83-901
Lab ID # : 7578
(continued)

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beta-BHC	<10	ug/L
gamma-BHC	<10	ug/L
delta-BHC	<10	ug/L
Chlordane	<10	ug/L
4-4'-DDT	<10	ug/L
4-4'-DDE	<10	ug/L
4-4'-DDD	<10	ug/L
Dieldrin	<10	ug/L
alpha-Endosulfan	<10	ug/L
beta-Endosulfan	<10	ug/L
Endosulfan Sulfate	<10	ug/L
Endrin	<10	ug/L
Endrin Aldehyde	<10	ug/L
Heptachlor	<10	ug/L
Heptachlor Epoxide	<10	ug/L
Arochlor 1016	<10	ug/L
Arochlor 1221	<10	ug/L
Arochlor 1232		ug/L
Arochlor 1242	<10	ug/L
Arochlor 1248	<10	ug/L
Arochlor 1254	<10	ug/L
Arochlor 1260	<10	ug/L
Toxaphene	<10	ug/L

Client : CITY OF AUSTIN
Facility :

Proj # : 83-901
Lab ID # : 7579

Sample : ZILKER

Date Taken : 5/30/84

Date Received : 5/30/84

Results of Sample Analysis

Conductivity	4300	umhos/cm
pH	7.1	
Solids/Dissolved	2200	mg/l
Alkalinity	1400	mg/l
Chloride	INTERFER	mg/l
Fluoride	0.25	mg/l
Nitrate-N	0.25	mg/l
Sulfate	<2	mg/l
Antimony	<1	mg/l
Arsenic	<0.001	mg/l
Beryllium	<0.01	mg/l
Cadmium	<0.01	mg/l
Calcium	132	mg/l
Chromium	<0.05	mg/l
Copper	<0.01	mg/l
Lead	0.07	mg/l
Magnesium	84	mg/l
Mercury	<0.001	mg/l
Nickel	<0.05	mg/l
Potassium	153	mg/l
Selenium	<0.001	mg/l
Silver	<0.01	mg/l
Sodium	336	mg/l
Thallium	<0.05	mg/l
Zinc	0.32	mg/l
Acenaphthene	<10	ug/L
Acenaphtylene	<10	ug/L
Anthracene	<10	ug/L

Client : CITY OF AUSTIN
Facility :

Proj # : 83-901
Lab ID # : 7579
(continued)

Benzidine	<10	ug/L
Benzo (a) Anthracene	<10	ug/L
Benzo (a) Pyrene	<10	ug/L
3-4-Benzofluoranthene	<10	ug/L
Benzo (ghi) Perylene	<10	ug/L
Benzo(k)Fluoranthene	<10	ug/L
bis(2-Chloroethoxy) Methane	<10	ug/L
bis(2-Chloroethyl) Ether	<10	ug/L
bis(2-Chloroiso-propyl)Ether	<10	ug/L
bis(2-Ethylhexyl) Phthalate	<10	ug/L
4-Bromophenyl Phenyl Ether	<10	ug/L
Butyl Benzyl Phthalate	<10	ug/L
2-Chloronaphthalene	<10	ug/L
4-Chlorophenyl Phenyl Ether	<10	ug/L
Chrysene	<10	ug/L
Dibenzo(a-h) Anthracene	<10	ug/L
1-2-Dichlorobenzene	<10	ug/L
1&3-Dichlorobenzene	<10	ug/L
1-4-Dichlorobenzene	<10	ug/L
3-3'-Dichlorobenzidine	<10	ug/L
Diethyl Phthalate	<10	ug/L
Dimethyl Phthalate	<10	ug/L
Di-N-Butyl Phthalate	<10	ug/L
2-4-Dinitrotoluene	<10	ug/L
2-6-Dinitrotoluene	<10	ug/L
Di-N-Octyl Phthalate	<10	ug/L
1-2-Diphenylhydrazine(Azobenzene	<10	ug/L

Client : CITY OF AUSTIN
Facility :

Proj # : 83-901
Lab ID # : 7579 b
(continued)

Fluoranthene	<10	ug/L
Fluorene	<10	ug/L
Hexachlorobenzene	<10	ug/L
Hexachlorobutadiene	<10	ug/L
Hexachlorocyclopentadiene	<10	ug/L
Hexachloroethane	<10	ug/L
Indeno(1-2-3-cd) Pyrene	<10	ug/L
Isophorone	<10	ug/L
Naphthalene	<10	ug/L
Nitrobenzene	<10	ug/L
N-Nitrosodimethyl amine	<10	ug/L
N-Nitrosodi-N-propylamine	<10	ug/L
N-Nitrosodiphenylamine	<10	ug/L
Phenanthrene	<10	ug/L
Pyrene	<10	ug/L
1-2-4-Trichlorobenzene	<10	ug/L

2-Chlorophenol	<10	ug/L
2-4-Dichlorophenol	<10	ug/L
2-4-Dimethylphenol	<10	ug/L
4-6-Dinitro-o-cresol	<10	ug/L
2-4-Dinitrophenol	<10	ug/L
2-Nitrophenol	<10	ug/L
4-Nitrophenol	<10	ug/L
p-Chloro-m-cresol	<10	ug/L
Pentachlorophenol	<10	ug/L
Phenol	<10	ug/L
2-4-6-Trichlorophenol	<10	ug/L

Acrolein	<100	ug/L
Acrylonitrile	<100	ug/L
Benzene	<10	ug/L

Client : CITY OF AUSTIN
Facility :

Proj # : 83-901
Lab ID # : 7579
(continued)

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bis(Chloromethyl) Ether	<10	ug/L
Bromoform	<10	ug/L
Carbon Tetrachloride	<10	ug/L
Chlorobenzene	<10	ug/L
Chlorodibromomethane	<10	ug/L
Chloroethane	<10	ug/L
2-Chloroethylvinyl Ether	<10	ug/L
Chloroform	<10	ug/L
Dichlorobromomethane	<10	ug/L
Dichlorodifluoromethane	<10	ug/L
1-1-Dichloroethane	<10	ug/L
1-2-Dichloroethane	<10	ug/L
1-1-Dichloroethylene	<10	ug/L
1 2-Dichloropropane	<10	ug/L
1-2-Dichloropropene	<10	ug/L
Ethylbenzene	<10	ug/L
Methyl Bromide	<10	ug/L
Methyl Chloride	<10	ug/L
Methylene Chloride	<10	ug/L
1 1-2-2-Tetrachloroethane	<10	ug/L
Tetrachloroethylene	<10	ug/L
Toluene	<10	ug/L
1-2-trans-Dichloroethylene	<10	ug/L
1-1-1-Trichloroethane	<10	ug/L
1-1-2-Trichloroethane	<10	ug/L
Trichloroethylene	<10	ug/L
Trichlorofluoromethane	<10	ug/L
Vinyl Chloride	<10	ug/L
Aldrin	<10	ug/L
alpha-BHC	<10	ug/L

Client : CITY OF AUSTIN
Facility :

Proj # : 83-901
Lab ID # : 7579
(continued)

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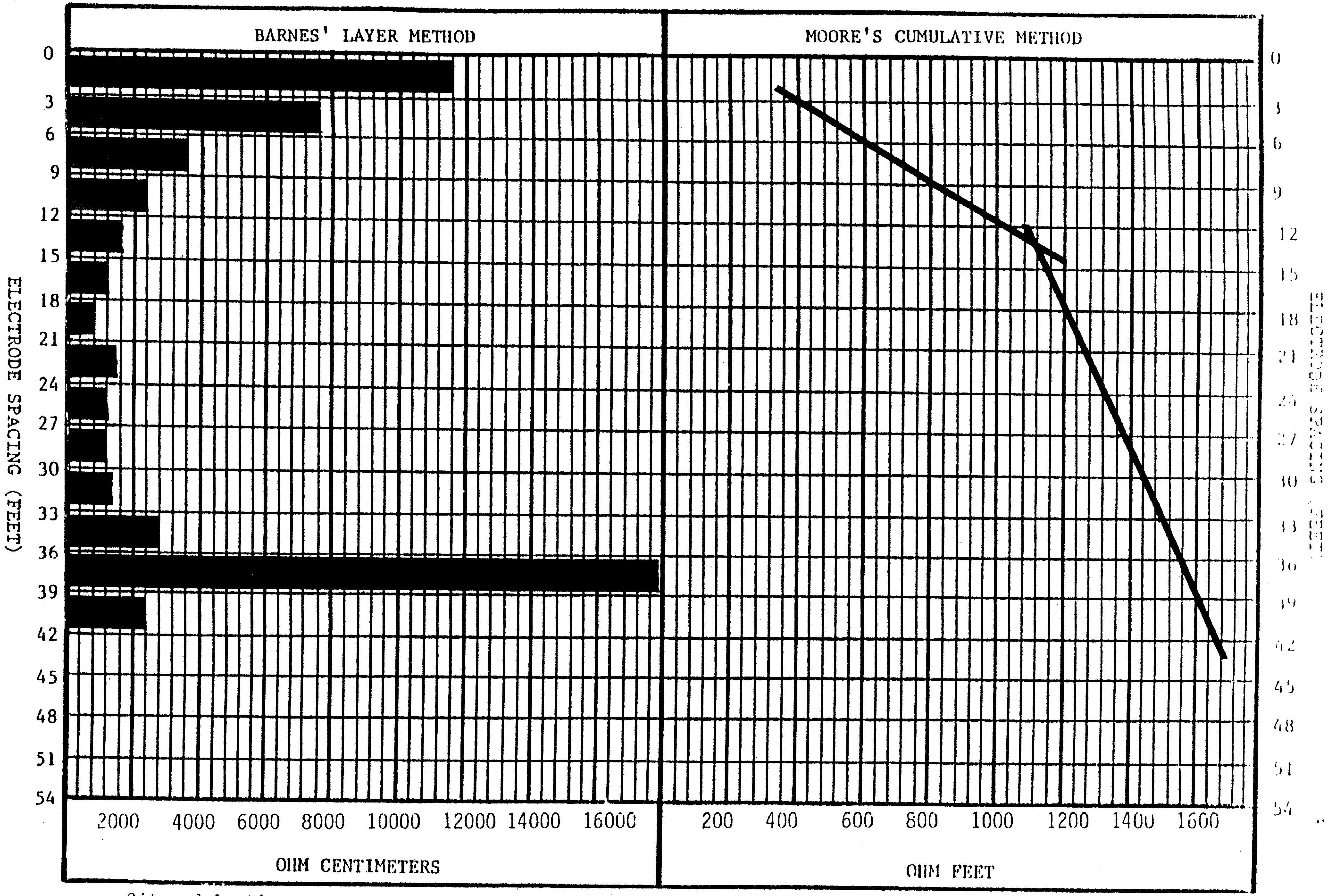
beta-BHC	<10	ug/L
gamma-BHC	<10	ug/L
delta-BHC	<10	ug/L
Chlordane	<10	ug/L
4-4'-DDT	<10	ug/L
4-4'-DDE	<10	ug/L
4-4'-DDD	<10	ug/L
Dieldrin	<10	ug/L
alpha-Endosulfan	<10	ug/L
beta-Endosulfan	<10	ug/L
Endosulfan Sulfate	<10	ug/L
Endrin	<10	ug/L
Endrin Aldehyde	<10	ug/L
Heptachlor	<10	ug/L
Heptachlor Epoxide	<10	ug/L
Arochlor 1016	<10	ug/L
Arochlor 1221	<10	ug/L
Arochlor 1232	<10	ug/L
Arochlor 1242	<10	ug/L
Arochlor 1248	<10	ug/L
Arochlor 1254	<10	ug/L
Arochlor 1260	<10	ug/L
Toxaphene	<10	ug/L

APPENDIX E

Resistivity Soundings 1-3 at Zilker Park (Butler Landfill)

Ground Surface Elevation 451'

Graph For Resistivity Sounding

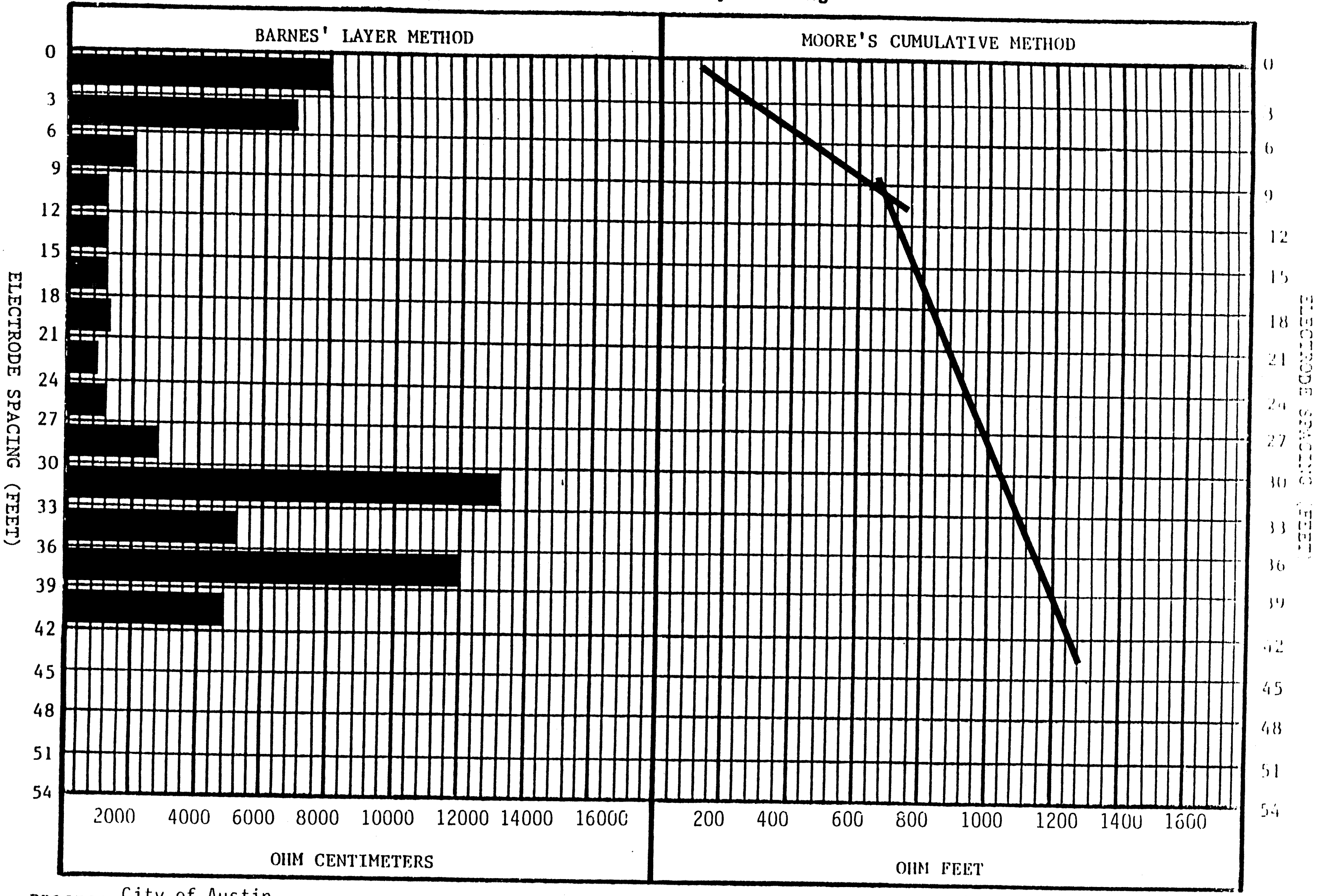


PROJECT City of Austin
Butler Landfill

SOUNDING NO. 1

Ground Surface Elevation 453'

Graph For Resistivity Sounding

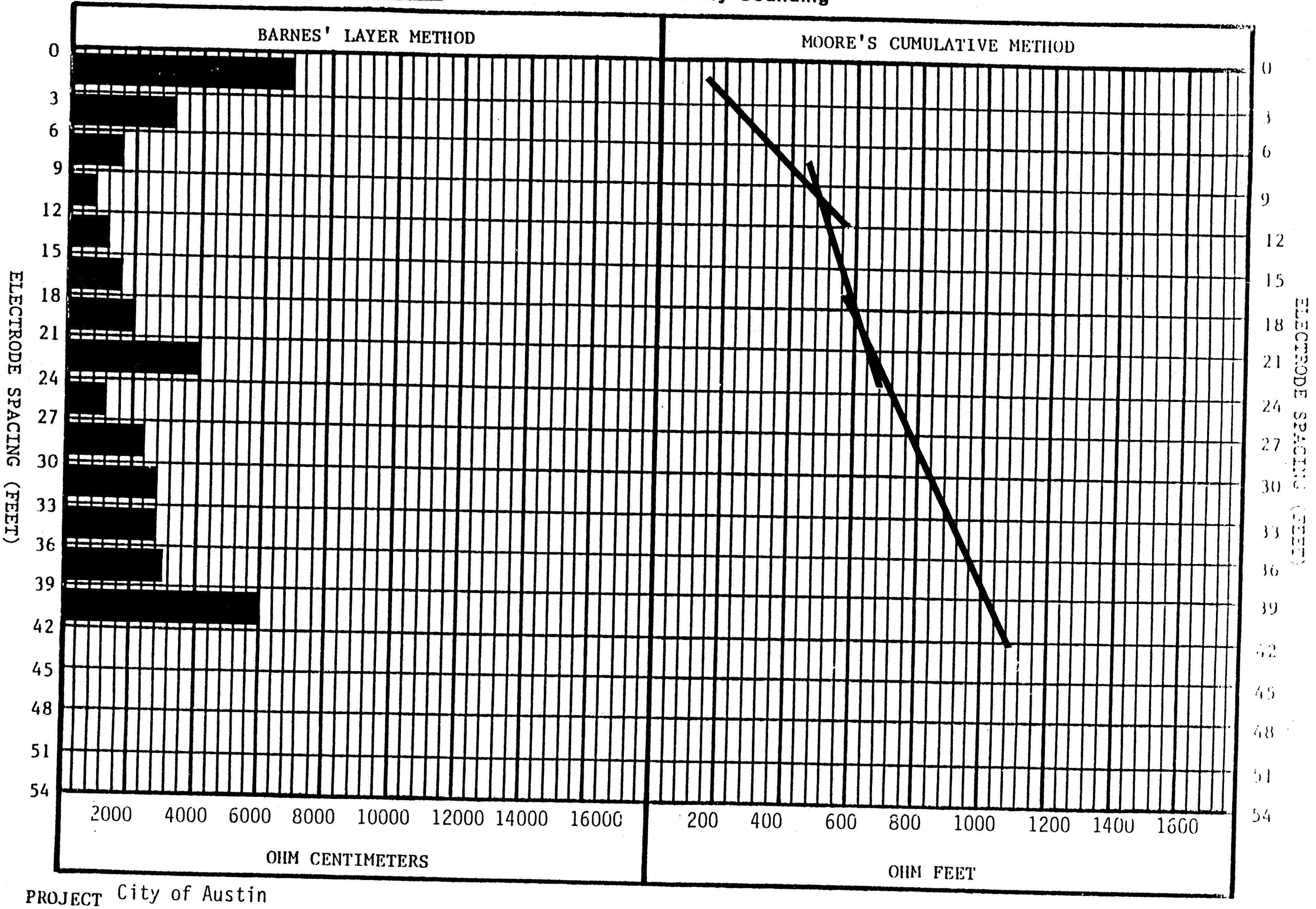


PROJECT City of Austin
Butler Landfill

SOUNDING NO. 2

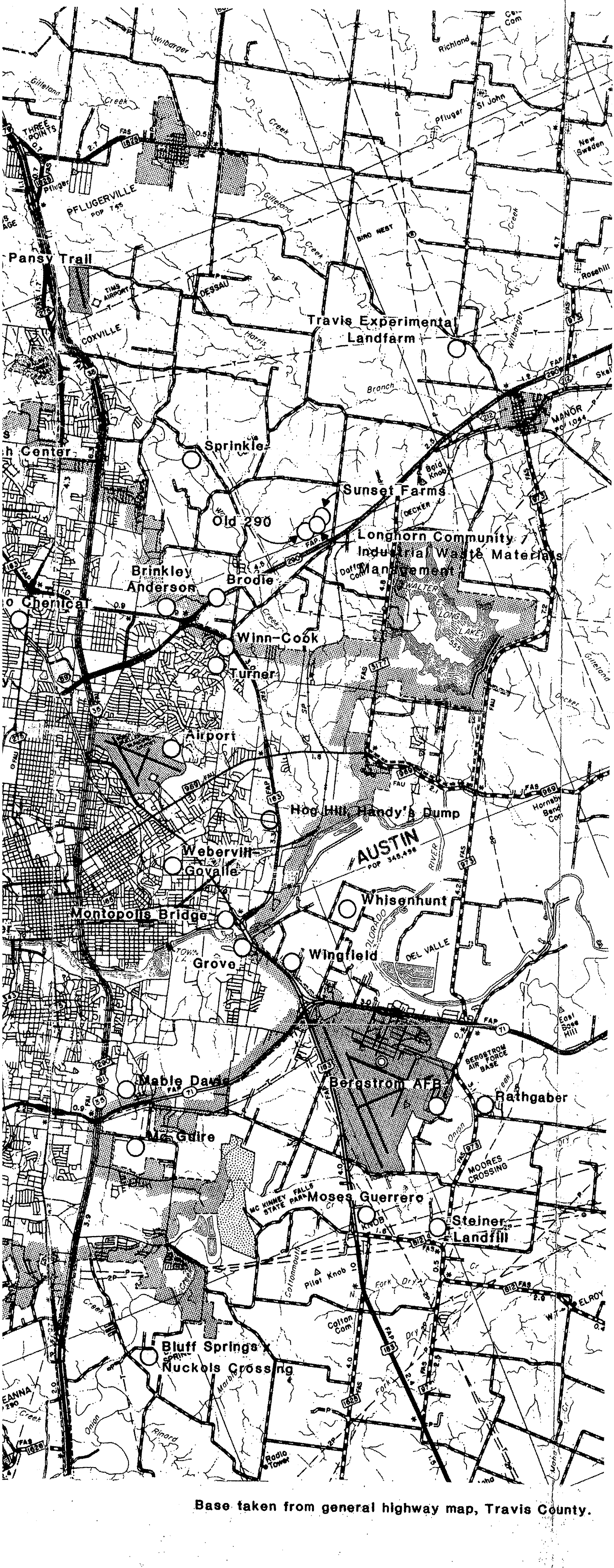
Ground Surface Elevation 464'

Graph For Resistivity Sounding



PROJECT City of Austin
Butler Landfill

SOUNDING NO. 3



Base taken from general highway map, Travis County.

N

Explanation

○ Landfill Location

Scale

0 1 2 3 4

Miles

City of Austin
Austin, Tx.

PLATE 1

LANDFILL LOCATIONS

Date Prepared: June 1984

Prepared by
Underground Resource Management, Inc


HAYS COUNTY
WILLIAMSON COUNTY
Travis County Precinct 3 Landfill
Travis County Precinct 2 Landfill
LAKEWAY
BEE CAVE
CIRCLE VILLE
OAK HILL
ROLLINGWOOD
SUNSET VALLEY
WEST LAKE HILLS
VOLENTE
FOUR POINTS
LA HACIENDA
ALPINE VILLAGE
APACHE SHORES
MANCHACA
SAN LEANNA
PFLUGERVILLE
COXVILLE
KINGS VILLAGE
THREE POINTS
St. Stephens School
Wild Basin
Camp Mabry
Butler
Montopolis Bridge
Texaco Chemical
Balcones Research Center
ME Ruby
Angus
Martin Hill
Pansy Trail
Brinkley Anderson
Mabel Davis
McGuire
Bluff Springs Nuckols