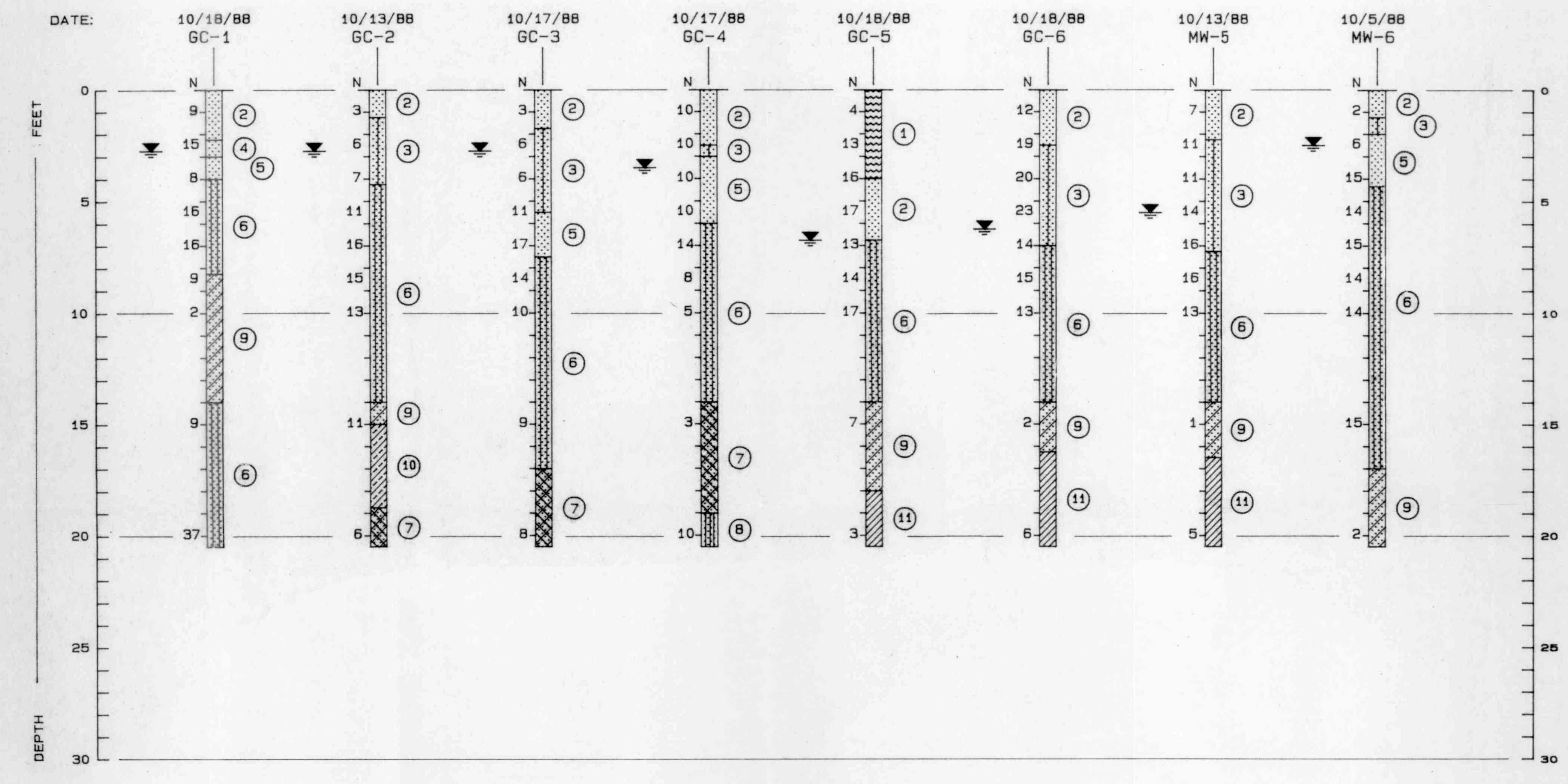
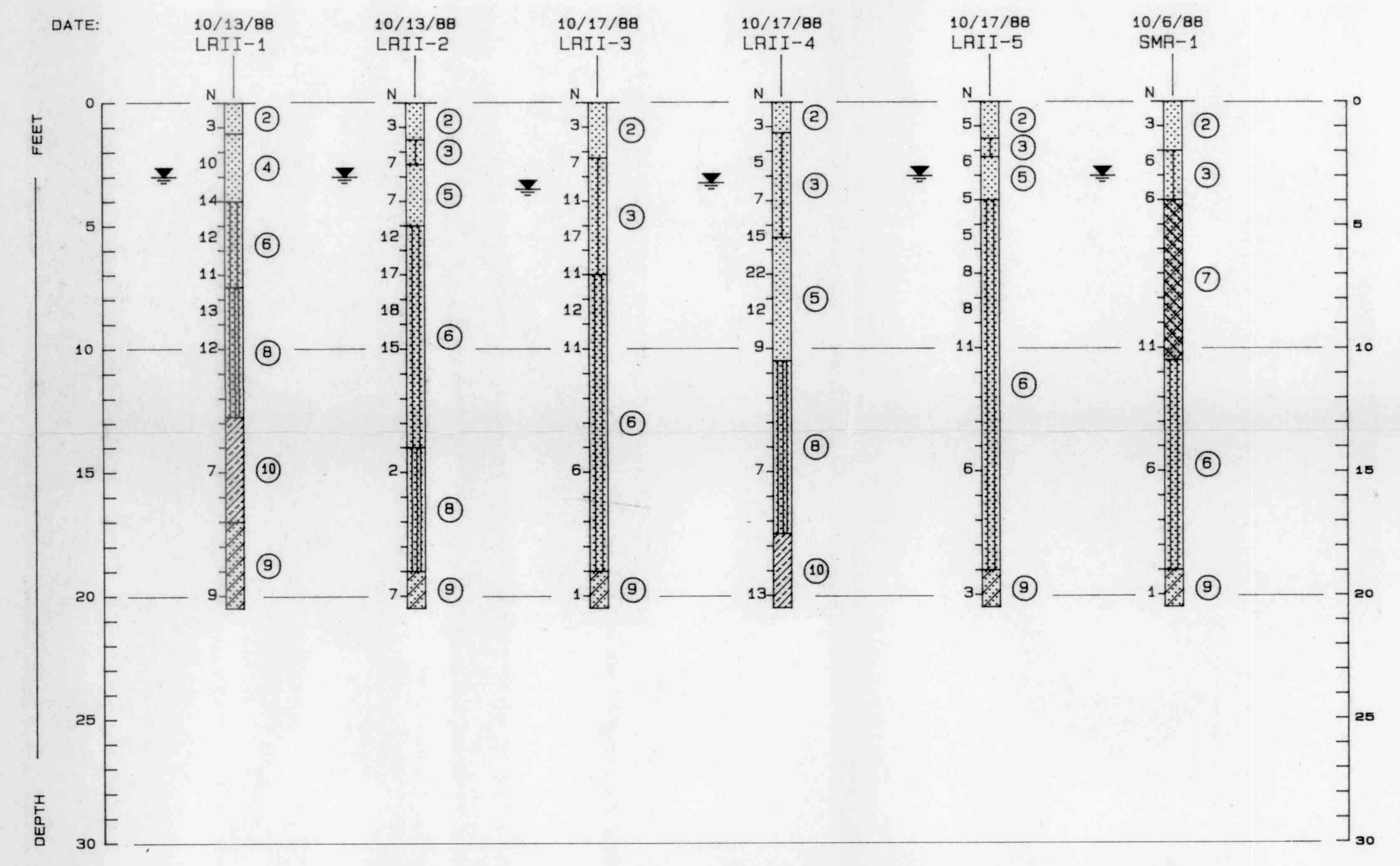
LIST OF MAJOR SECTIONS

1565214 (1)

SOIL BORING PROFILES





LEGEND

1 BROWN FINE SAND (FILL) (SP)
2 GRAY FINE SAND (SP)
3 BROWN TO DARK BROWN SLIGHTLY SILTY TO SILTY FINE SAND (SP-SM, SM)
4 YELLOWISH BROWN FINE SAND (SP)
5 BROWN TO DARK GRAY FINE SAND (SP)
6 LIGHT GRAY TO DARK GRAY FINE SAND TO SILTY FINE SAND (SP, SP-SM, SM)
7 DARK GRAY CLAYEY FINE SAND (SC)
8 GRAY FINE SAND TO SILTY FINE SAND WITH PHOSPHATE (SP, SP-SM, SM)
9 GRAY CLAYEY FINE SAND WITH PHOSPHATE (SC)
10 GRAY SANDY CLAY WITH PHOSPHATE AND ROCK FRAGMENTS (CL)
11 GREENISH GRAY CLAY WITH PHOSPHATE, ROCK FRAGMENTS, SAND AND CONSOLIDATED CLAY LENSES (CH)
12 GRAY CHERT

MW, SMR GC, LRII — SURFICIAL AQUIFER MONITOR WELL LOCATION TEST HOLES

SA — SECONDARY ARTESIAN AQUIFER MONITOR WELL LOCATION TEST HOLES

N — STANDARD PENETRATION RESISTANCE IN BLOWS PER FOOT

LOSS OF DRILLING FLUID

SP, SP-SM, SM, SC, CH — UNIFIED SOIL CLASSIFICATION SYSTEM

GROUNDWATER LEVEL MEASURED ON DATE DRILLED

ENGINEERING CLASSIFICATION

I COHESIONLESS SOILS

DESCRIPTION	BLOW COUNT "N"
VERY LOOSE	0 TO 4
LOOSE	4 TO 10
MEDIUM DENSE	10 TO 30
DENSE	30 TO 50
VERY DENSE	50

II COHESIVE SOILS

DESCRIPTION	UNCONFINED COMPRESSIVE STRENGTH, QU, TSF	BLOW COUNT "N"
VERY SOFT	1/4	0 TO 2
SOFT	1/4 TO 1/2	2 TO 4
MEDIUM STIFF	1/2 TO 1	4 TO 8
STIFF	1 TO 2	8 TO 15
VERY STIFF	2 TO 4	15 TO 30
HARD	4	30

WHILE THE BORINGS ARE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT THEIR RESPECTIVE LOCATIONS AND FOR THEIR RESPECTIVE VERTICAL REACHES, LOCAL VARIATIONS CHARACTERISTIC OF THE SUBSURFACE MATERIALS OF THE REGION ARE ANTICIPATED AND MAY BE ENCOUNTERED. THE BORING LOGS AND RELATED INFORMATION ARE BASED ON THE DRILLER'S LOGS AND VISUAL EXAMINATION OF SELECTED SAMPLES IN THE LABORATORY. THE DELINEATION BETWEEN SOIL TYPES SHOWN ON THE LOGS IS APPROXIMATE AND THE DESCRIPTION REPRESENTS OUR INTERPRETATION OF SUBSURFACE CONDITIONS AT THE DESIGNATED BORING LOCATIONS ON THE PARTICULAR DATE DRILLED.

GROUNDWATER ELEVATIONS SHOWN ON THE BORING LOGS REPRESENT GROUNDWATER SURFACES ENCOUNTERED ON THE DATES SHOWN. FLUCTUATIONS IN WATER TABLE LEVELS SHOULD BE ANTICIPATED THROUGHOUT THE YEAR. ABSENCE OF WATER SURFACE DATA ON CERTAIN BORINGS IMPLIES THAT NO GROUNDWATER DATA IS AVAILABLE, BUT DOES NOT NECESSARILY MEAN THAT GROUNDWATER WILL NOT BE ENCOUNTERED AT THESE LOCATIONS OR WITHIN THE VERTICAL REACHES OF THESE BORINGS IN THE FUTURE.

SOIL BORING PROFILES

Ardaman & Associates, Inc.
Consulting Engineers in Soils, Hydrogeology, Foundations, and Materials Testing

WELL COMPLETION REPORT
LENA ROAD LANDFILL
MANATEE COUNTY, FLORIDA

DRAWN BY: R.B.E. | CHECKED BY: HAD | DATE: 2/13/89
FILE NO. 86-115 | APPROVED BY: H.G. Stangland

FIGURE 2

SECTION 1

BEST AVAILABLE COPY

DER Form #
Form Title
Effective Date
DER Application No. (Filled in by DER)

Florida Department of Environmental Regulation

Twin Towers Office Bldg. • 2600 Blair Stone Road • Tallahassee, Florida 32399-2400

APPLICATION FOR PERMIT TO CONSTRUCT ☐ OPERATE ☒

D.E.R.

MAR 31 1992

SOUTHWEST DISTRICT TAMPA

A SOLID WASTE RESOURCE RECOVERY AND MANAGEMENT FACILITY

GENERAL REQUIREMENTS

Solid Waste Resource Recovery and Management Facilities shall be permitted pursuant to Section 403.707 Florida Statutes, and in accordance with Florida Administrative Code Rule 17-7. A minimum of six copies of the application shall be submitted to the Department District Office having jurisdiction over the facility. Complete appropriate sections for the type of facility for which application is made. Entries should be typed or printed in ink. All blanks should be filled in or marked not applicable. The application shall include all information, drawings, and reports necessary to evaluate the facility. Information required to support the application is listed on the attached pages of this form.

Facility Type: Existing X Proposed ___

Sanitary Landfill:
- X Class I,
- __ Class II,
- __ Class III: Trash/yard Trash
- __ Class III: Yard Trash Composting

Volume Reduction:
- __ Composting
- __ Shredder
- X Incinerator/Trench Burner
- __ Resource Recovery: __ Energy __ Materials

Sludge Landspreading:
- __ Grade I
- __ Grade II
- __ Grade III
- __ Septage/Food Service

FACILITY NAME: Lena Road Landfill / 4041C02025 (DER ID Number)

FACILITY LOCATION (main entrance): 3333 Lena Road, Bradenton, Florida 34203

S 6 (section), T 35S (township), R 19E (range) /Latitude 27 ° 28 ' 00 " Longitude 82 ° 27 ' 00 "

Applicant Name (operating authority): Manatee County Public Works

Street Address & P. O. Box: 4501 66th St. W., Bradenton (City) Manatee (County) 34210 (Zip)

Contact Person: Richard A. Wilford, Director (Name) (813) 792-8811 (Phone Number)

Authorized Agent/Consultant: Solid Waste Division (Name) (813) 792-8811 (Phone Number)

Contact Person: Gus DiFonzo, Manager (Name) 4501 66th St. W. (Street) (P. O. Box) (813) 792-8811 (Phone Number)

Bradenton (City) Manatee (County) FL (State) 34210 (Zip)

Landowner (if different than applicant): N/A

Address of Landowner: N/A (Street, P. O. Box) (City) (State) (Zip)

Cities, Towns and Areas to be Served: Manatee County, Florida

Current and Projected Population to Served: 220,500 / (2011) 291,900

Acres within Waste Site Boundary: 313 Acres within Property Boundary: 1,200±

Protecting Florida and Your Quality of Life

Volume of Solid Waste to be received: 1100 cu. yds/day tons/day gallons/day

Date Site Ready to Received Solid Waste: Currently receiving waste Estimated Life of Facility 32 years

Estimated Cost of Construction, Total: $ N/A Estimated cost of Closing: $ 19,829,213

Anticipated Construction Starting and Completion Dates
From: N/A To: N/A

REQUIRED ATTACHEMENTS FOR CONSTRUCTION/OPERATION PERMIT FOR A RESOURCE RECOVERY AND MANAGEMENT FACILITY

GENERAL
Permit application and supporting information shall include the following (17-7.030(2), F.A.C.):

	Completeness Check
1. A letter of transmittal to the Department; (17-7.030(3)(a) F.A.C.)	X
2. A table of contents listing the main sections of the application: (17-7.030(3)(b), F.A.C.)	X
3. The permit fee specified in Florida Aministrative Code Rule 17-4.05 in check or money order payable to the Department: (17-7.030(3)(c), F.A.C.)	X
4. Six copies, at minimum, of the completed application form, all supporting data, and reports; (17-7.030(2), F.A.C.)	X
5. Engineer seal; (17-7.030(2)(d), F.A.C.)	X
6. Engineer's letter of appointment if applicable; (17-7.030(3)(e), F.A.C)	
7. Copy of any lease agreement, transfer of property agreement with right of entry for long-term care, or any other agreement between operator and property owner by which the closing and long-term care of the facility may be affected; (17-7.030(3)(h)	
8. Proof of publication of notice of application for the proposed activity in a newspaper of general circulation; (17-7.03(4), F.A.C)	

SPECIFICATION ATTACHMENT ITEMS

The following information items must be included in the application or an explanation given if they are not applicable.

Construction Permits:

A. Landfills - Submit items 1, 2, 3, 4, 5, 6, 7, 8, 10.
B. Volume Reduction - Submit items 1, 2, 3, 4, 5, 6, 7, 9, 10.
C. Sludge Landspreading - Submit items 2, 3, 4, 5, 6, 8, 10.

Operation Permits:

A. Landfills - All the items above.
B. Volume Reduction - All the items above.
C. Sludge Landspreading - All the items above.

NOTE: For facilities that have been satisfactorily constructed in accordance with their construction permit the information required for A, B, and C type facilities does not have to be resubmitted for an operation permit if the information has not changed during the construction period.

1. A foundation analysis (17-7.050(2)(b), F.A.C.) Exhibit "A" — Exhibit "A"

2. Evidence that the facility is in conformance with local zoning (17-7.050(2)(c)4, F.A.C) — Exhibit "C"

3. Facility Design (17-7.050(3), F.A.C.:

NOTE: All maps, plan sheets, drawings, isometrics, cross-sections, or aerial photographs shall be legible; be signed and sealed by the registered professional engineer responsible for their preparation; be of appripriate scale to show clearly all required datails; be numbered, referenced to narrative, titled, have a legend of symbols used, contain horizontal and vertical scales (where applicable), and specify drafting or origination dates; and use uniform scales as much as possible, contain a north arrow, and use NGVD for all elevations.

Completeness Check

a. A map or aerial photograph of the area, no more than 1 year old, showing land use and zoning within 1 mile of the facility. (17-7.050(3)(a), F.A.C.) Sht. 2 & 3

b. Plot Plan (17-7.050(3)(b), F.A.C.) X

NOTE: The plot plan on a scale not greater than 200 feet to the inch showing the following:

(1) Dimensions and Legal Description of the site — Sht. 1

(2) Location and depth (NGVD) of soil borings — Sht. 3

(3) Plan for trenching or disposal areas — Sht. 6 & 7

(4) Fencing or other measures to restrict access — Sht. 3

(5) Cross sections showing both original and propsed fill elevations — Sht. 8 & 9

(6) Location, depth, and construction details of monitoring wells — Sht. 3 & Table 1

c. Topographic Maps (17-7.050(3)(c), F.A.C.) X

NOTE: The topographic maps, which may be combined with the plot plan (item 4b), on a scale not greater than 200 feet to the inch showing the following:

(1) Five foot contour intervals — Sht. 4 & 5

(2) Proposed fill areas — Sht. 6 & 7

(3) Borrow areas — ___

(4) Access roads — Sht. 3

(5) Grades required for proper drainage — Sht. 4 & 5

(6) Typical cross sections of disposal site including lifts, borrow areas and drainage controls — Sht. 8 & 9

(7) Special drainage devices — ___

(8) Fencing — Sht. 3

(9) Equipment facilities — Sht. 3

(10) Other pertinent information based on intended use of facility — N/A

d. Report (17-7.050(3)(d), F.A.C.)

(1) Estimated population and area served by the proposed site with basis for the estimate — X

(2) Anticipated type, annual quantity, and source of solid waste — X

(3) Anticipated life of site — X

(4) Source and characteristics of cover material — X

e. Ground Water Monitoring Plan (17-7.050(3)(e), F.A.C.)

(1) Plan and hydrogeological survey, including foundation analysis, in accordance with 17-4.245(6), 17-7.030, and 17-7.050 F.A.C.; or — Exhibit "A"

(2) A copy of a Department letter of approval of a previously submitted plan, if applicable. — Exhibit "D"

	Completeness Check
4. Landfill Performance and Design Standards (17-7.050(4), F.A.C.)	
a. Liner performance (17-7.050(4)(a)(b), F.A.C.)	X
(1) Material type (soil, synthetic, other)	X
(2) Adequate base support	X
(3) Planned installation adequate to cover all surrounding earth	N/A
(4) Equivalency to design standards	N/A
b. Liner quality control plan (17-7.050(4)(c), F.A.C.)	X
(1) Specifications	N/A
(2) Construction/installation methods	N/A
(3) Sampling and testing	Exhibit "A"
(4) Manufacturer's specifications and recommendations	N/A
c. Leachate control and removal system performance (17-7.050(4)(e), F.A.C.)	X
(1) Construction materials	X
(2) Strength and thickness	X
(3) Measures to prevent clogging	X
(4) Central collection point for treatment and disposal	X
(5) Leachate depth not to exceed one foot	X
(6) Equivalency to design standards	X
d. Surface water management system performance (17-7.050(4)(g), F.A.C)	X
(1) Prevention of surface water flow onto waste-filled areas	X
(2) Stormwater run-off controls; retention, detention ponds	X
(3) Equivalency to design standards	X
(4) Water management district approval	X
e. Gas control system performance (17-7.050(4)(i), F.A.C.)	X
(1) Prevention of methane migration	X
(2) Prevention of damage to vegetation	X
(3) Prevention of objectionable odors off site	X
(4) Equivalency to design standards	X
5. Operations Plan (17-7.050(5)(b),(c)(d) & (e), F.A.C.)	X
a. Designation of responsible person(s)	X
b. Contingency operations	X
c. Controlling the type of waste received at the site:	X

	Completeness Check
d. Weighing or measuring incoming waste	X
e. Vehicle traffic control and unloading	X
f. Method and sequence of filling waste	X
g. Waste compaction and application of cover	X
h. Operations of gas, leachate, and storm water controls	X
i. Ground water monitoring	X
j. All weather access roads	X
k. Effective barrier	X
l. Signs indicating name of operating authority, traffic flow, hours of operation, and charges for disposal (if any)	X
m. Dust control methods	X
n. Litter control devices	X
o. Fire protection and fire fighting facilities	X
p. Attendant	X
q. Communication facilities	X
r. Adequate in-service and reserve equipment	X
s. Safety devices on equipment to shield and protect operators	X
6. Water Quality Standards (17-7.050(5)(g) & (h), F.A.C.)	Exhibit "B"
Describe how surface runoff and leachate will be handled to meet water quality standards of Florida Administrative Code Rules 17-3 and 17-4.	X
7. Closure (17-7.070(2), F.A.C.) a. Closure plan (17-7.073, F.A.C.)	X
(1) Design	Same as Previously Designed
(2) Final use	X
(3) Closure operations	X
(4) Post-closure (17-7.075, F.A.C.)	X
(5) Financial responsibility(17-7.071, F.A.C.)	X
b. Closure plan schedule (17-7.071, F.A.C)	X
8. Solid Waste Disposal Facility Data Form	X
9. Solid Waste-Volume Reduction and Resource Recovery Facility Data Form	
10. Certification by Applicant and Engineer or Public Officer	

SOLID WASTE DISPOSAL FACILITY DATA FORM

Date Form Completed: 11/1/91

Permit No.: S041-118353 Issue Date: 12/14/87 Expires: 6/1/92

DER ACTION: ___ Add ___ Delete ___ Change ___ Deactivate Site X Reissue

1. DER IDENTIFICATION NUMBER
4041C10011

2. SITE NAME
Lena Road Landfill

3. COUNTY
Manatee

4. FACILITY ADDRESS (Road, cross road, street)
3333 Lena Road, Bradenton, FL 34203

4a. Facility Phone Number: 813/748-5543

4b. Facility Site Supervisor Bud Bell

5a. 27 ° 28 ' 00 " Latitude 82 ° 27 ' 00 " Longitude

5b. 6 Township 35S Range 19E Section

6. Operating Authority Name
Manatee County Public Works

7. Phone Number 813- 792-8811

8. Operating Authority Address
4501 66th St. W.
Bradenton, FL 34210

9. Owner of Site Property (if different from operator)
N/A

10. Phone Number of Owner

11. Address of Owner
N/A

12. Facility Type -
X Class I, Sanitary Landfill
___ Class II, Sanitary Landfill
___ Class III, Trash/Yard Trash
___ Class III Yard trash comp.

Sludge Landspreading:
___ Grade I
___ Grade II
___ Grade III
___ Septage

Type
___ Other Facility

13. Month Year Begun
May, 1973

14. Disposal Area
313 Acres

15. Population Served
220,500

16. Expected Useful Lifetime
32 Years

17. Weighing Scales
X Yes ___ No

18. Security to Prevent Unauthorized Used
X Yes ___ No

19. Depth of Water Table
+3.0' below existing Ft. (NGVD)
grade at high water

20. Quantity of Waste/Day
1100 tons or Yd³

21. Charge
$ 18.00 yd/ton

22. Surrounding Land Use Zoning
___ Residential ___ None X Agricultural ___ Commercial ___ Industrial ___ Other

23. Types of Waste Received
x Residential
x Commercial
___ Incinerator Residue
___ Pathological/Infectious
x Agricultural
___ Septic Tank
___ Industrial
___ Water/Air Treat Sludge
x Yard Trash/Trash
___ Sewage Sludge
___ Industrial Sludge
___ Hospital
x Other: House Hold Chemical Storage

24. Number of Monitoring Wells 44

25. Number of Surface Monitoring Points 6

26. Gas Control / Recovery
x Yes ___ No / ___ Yes x No

27. Salvaging Permitted
___ Yes x No

28. Attendant
x Yes ___ No

29. Leachate Control Method - Liner Type: X Natural X Emplaced Clay __ Synthetic __ None __ Other Slurry Wall			
Collection Mehtod: __ Well Point __ Perimeter Ditch __ None X Under Site Drains __ Other ____			
Treatment Method: __ Oxidation __ Recirculated __ Chemical X Advanced __ None __ Other ____			
30. Leachate Discharge __ Yes X No		Class of Receiving Water III	
31. Site Located in __ Floodplain __ Wetlands X Other: Flat Woods			
32. Surface Runoff Collected X Yes __ No	Type of Runoff Treatment Evaporation/Transpiration	Class of Receiving Waters III	
33. Property Recoreded as a Solid waste Disposal Site in County Land Records X Yes __ No			
34. Days of Operation 6 weeks	Days of Cover 6 days/week	Hours of Operation 7am-5pm	
35. Name, Title and Phone Number of Person Completing Form Greg F. Yekaitis, Solid Waste Technical Coordinator, (813) 792-8811			

NOTE: All blanks must be filled or marked as not applicable.

SOLID WASTE VOLUME REDUCTION AND RESOURCE RECOVERY FACILITY DATA FORM

Permit No.: AC41-99004 Issue Date: 12/14/87 Expires: 6/1/92

Facility No. (DER Identification): 4041C10011

DER ACTION: ☐ Add ☐ Delete ☐ Change ☐ Deactivate Site ☒ Other Reissue

1. County: Manatee County	2. Site Name: Lena Road Landfill
3. Date Form Completed: 2/26/92	4. Facility Address: 3333 Lena Road, Bradenton, FL 34203
4a. Facility Phone No.: (813) 748-5543	4b. Facility Site Supervisor: Bud Bell
5a. Latitude: 27° 28' 00"; Longitude: 82° 27' 00"	5b. Township: 6; Range: 35; Section: 19
6. Operating Authority Name: Manatee County Public Works	8. Operating Authority Address: 4501 66th St. W. Bradenton, FL 34210
7. Phone Number: (813) 792-8811	
9. Owner of Site Property (if different from Operator)	11. Address of Owner
10. Phone Number of Owner	

12. Facility Type (check one or more)
☐ Incinerator Only ☐ Biomass Gas Production ☐ Pyrolysis ☒ Other: YARD WASTE SHREDDER
☐ Sludge Concentration ☐ Baler (compactor) ☐ Composting Plant
☐ Transfer Station ☐ Waterwall Incinerator ☐ Shredder (pulverizer)

13. Month/Year Begun: April 1986	14. Disposal Area: N/A Acres	15. Population Served: 220,500
16. Expected Useful Lifetime: Years	17. Weighing Scales: ☒ Yes ☐ No	18. Waste Processed Per Operational Day: 99 tons/gal/yd Max.
19. Charge/ $18.00/ton	20. Days Operated: S M T W T F S	21. Hours/Day Operated: 8

22. Maximum Processing Rate 99 tons/day

23. Material Recovered, Tons/Week N/A
_____ Paper _____ Glass Other:
_____ Ferrous Metals _____ Non-Ferrous Metals
_____ Aluminum _____ Plastics

24. Energy Recovery, in units shown N/A
_____ High Pressure Steam-lb/hr _____ Chilled Water-gal/hr _____ Gas-ft^3/hr
_____ Low Pressure Steam-lb/hr _____ Oil-gal/hr _____ Gas-BTU/hr
_____ Electricity-kw/hr _____ Oil-BTU/hr Other:

25. Process Water Recycled ☐ Yes ☒ No	Treatment Method Used N/A
Discharged to: ☐ Surface Waters ☐ Underground N/A	Class Receiving Water N/A
26. Final Residue is 1-6 % of waste intake	Residue is disposed of at (Site Name) Lena Road Landfill

27. Supplementary Fuel Used N/A

Type N/A Quantity Used/Hour N/A

28. Estimated Operating Costs Material — Energy Revenue $ N/A | Total Cost/Ton $ N/A | Net Cost/Ton $ N/A

29. Number of Staff	30. State Pollution Control Bond Financing Amount $ N/A	31. Estimated Amount of Tax Exemptions that will be Requested $ N/A

32. Name and Title of Person Completing Form
Greg Yekaitis, Solid Waste Technical Coordinator (813) 792-8811

Note: All blanks must be filled or marked as not applicable.

CERTIFICATION BY APPLICANT AND ENGINEER OR PUBLIC OFFICER

A. Applicant

The undersigned applicant or authorized representative of Manatee County is aware that statements made in this form and attached information are an application for a Solid Waste Resource Recovery and Management Facility Operating Permit from the Florida Department of Environmental Regulation and certifies that the information in this application is true, correct and complete to the best of his knowledge and belief. Further, the undersigned agrees to comply with the provisions of Chapter 403, Florida Statutes, and all rules and regulations of the Department. It is understood that the Permit is not transferable, and, the Department will be notified prior to the sale or legal transfer of the permitted facility.

Signature of Applicant or Agent

Richard A. Wilford, Director

Name and Title

Date: ____________________

Attach letter of authorization if agent is not a governmental official, owner, or corporate officer.

B. Professional Engineer Registered in Florida or Public Officer as Required in Section 403.707 and 403.7075, Florida Statutes

This is to certify that the engineering features of this resource reocvery and management facility have been designed/examined by me and found to conform to engineering principals applicable to such facilities. In my professional judgement, this facility, when properly maintained and operated, will comply with all applicable statutes of the State of Florida and rules of the Department. It is agreed that the undersigned will provide the applicant with a set of instructions of proper maintenance and operation of the facility.

Signature

Robert T. Hall, P.E. County Utility Engineer

Name and title (please type)

27417

Florida Registration Number (please affix seal)

315 75th St. W.

Mailing Address

Bradenton, FL 34209

City, State, Zip Code

(813) 792-8811

Telephone Number

Date: ____________________

REGISTERED ENGINEER STATE OF FLORIDA CERT. NO. 27417 ROBERT T. HALL

Construction Cost Estimate: Construction is Complete

Permit Number: SO 41-118353

Issue Date: 12/14/87

Review Date: 3/2/92

Expiration Date: 6/1/92

SECTION 2

Florida Department of Environmental Regulation
Twin Towers Office Bldg. • 2600 Blair Stone Road • Tallahassee, Florida 32399-2400

DER Form # 17-701.900(1)
Form Title Notif. of Intent to Use a Gen. Perm. for a Const. and Demolition Debris S. W. Mngt. Facility
Effective Date August 1, 1989
DER Application No. ______ (Filled in by DER)

D.E.R.
MAR 3 1 1992
SOUTHWEST DISTRICT TAMPA

Notification of Intent to Use a General Permit for a Construction and Demolition Debris Solid Waste Management Facility

ID Number (Internal Use Only) ______
Application Date ______

GENERAL REQUIREMENT: Disposal facilities for construction and demolition debris are permitted in accordance with Florida Administrative Code Rule 17-701.061(4). The permit applicant, by completing, signing and sending this notice to the Department of Environmental Regulation, agrees to the conditions for a construction and demolition debris disposal facility and is hereby granted a permit by rule provided Rule conditions are fulfilled. Send two copies of this notice, by certified mail, to the District Office of the Department in which the facility is located. Complete all entries by typing or printing in ink.

1. Applicant Name: Manatee County
2. Facility Name (if different): Lena Road Landfill
3. Mailing Address: 4501 66th St. W., Bradenton, FL 34210
4. Street Address: 3333 Lena Road
   City Bradenton County Manatee Zip 34203
5. Phone Number: (813) 792-8811
6. Facility Location (main entrance): 3333 Lena Road
   Section 6, Township 35-S, Range 19-E
   Latitude 27 ° 28 ' 00 " Longitude 82 ° 27 ' 00 "
7. Property Owner's Name (if different from applicant): ______
8. Mailing Address: ______
9. Street Address: ______
   City ______ County ______ Zip ______
10. Phone Number: (____) ______
11. If the property owner is different from applicant, include evidence of authorization to use property as a construction and demolition debris disposal facility (e.g., contract, lease, or signed letter).
12. Acres Within Property Boundary: 1,200±
13. Acres Used for Waste Disposal: 313
14. Planned Active Life of the Facility: 32 Years years

DER Form # 17-701.900(1)
Form Title Notif. of Intent to Use a Gen. Perm. for a Const. and Demolition Debris S. W. Mmgt. Facility
Effective Date August 1, 1989
DER Application No. ______ (Filled in by DER)

15. General Description of Operations: Construction and demolition debris is all brought to one area of the landfill where the various materials are segregrated into its components. Wood products are shredded and concrete and asphalt products are stockpiled for future use as road base material.

I, Richard A. Wilford hereby certify that I will operate, close and maintain this facility in accordance with applicable rules of the Florida Administrative Code and agree that Department personnel may enter onto the property to inspect the facility during normal business hours.

Applicant Signature

SECTION 3

DER Form # 17-711.900(2)
Form Title Waste Tire General Permit Notification
Effective Date February 22, 1989
DER Application No ____________ (Filled in by DER)

Florida Department of Environmental Regulation
Twin Towers Office Bldg. ● 2600 Blair Stone Road ● Tallahassee, Florida 32399-2400

Waste Tire General Permit Notification

Pursuant to Rule 17-711.801, Florida Administrative Code, the owners or operators of a qualifying waste tire collection center or small processing facility or mobile shredding, chopping, or cutting equipment shall submit the following information on this form to the Department.

D.E.R.

MAR 3 1 1992

SOUTHWEST DISTRICT TAMPA

1. Type and status of operation (check as many as apply):
   Existing [X] Proposed [ ]
   [X] Waste tire collection center [X] Mobile shredding, chopping, or cutting equipment
   [ ] Small processing facility [ ] Other
2. Waste tire collection centers and small processing facilities must complete the following facility information:
   a. Facility name: ____________
   b. Facility location:
      Street address (main entrance) 3333 Lena Road
      City Bradenton, County Manatee, Zip 34203
      Section 6, Township 35-S, Range 19-E
      Latitude 27°28'00", Longitude 82°27'00"
   c. Name of property owner: Manatee County Public Works Dept.
   d. Address of property owner: 4601 66th St. W.
      City Bradenton State FL Zip 34210
   e. Telephone number of property owner: (813) 792-8811
3. Name of operator: Bud Bell
4. Address of operator: 3333 Lena Road
   City Bradenton State FL Zip 34203
5. Telephone number of operator: (813) 748-5543
6. Describe the general operation of the facility or equipment (attach additional sheets, if necessary):
   See Attached Exhibit "E".
7. Describe how the waste tire storage and handling requirements of Rule 17-711.540, F.A.C. will be met (attach additional sheets, if necessary):
   See Attached Exhibit "E".

Northwest District 160 Governmental Center Pensacola, Florida 32501-5794 904-436-8300
Northeast District 3426 Bills Rd Jacksonville, Florida 32207 904-798-4200
Central District 3319 Maguire Blvd. Suite 232 Orlando, Florida 32803-3767 305-894-7555
Southwest District 4520 Oak Fair Blvd Tampa, Florida 33610-7347 813-623-5561
South District 2269 Bay St Fort Myers, Florida 33901-2896 813-332-2667
Southeast District 1900 S. Congress Ave., Suite A West Palm Beach, Florida 33406 305-964-9668

DER Form #	17-711.900(2)
Form Title	Waste Tire General Permit Notification
Effective Date	February 22, 1989
DER Application No.	(Filled in by DER)

. Date of beginning operation: 12/20/89

. Quantities of waste tires, expressed in tons (assume there are 100 tires per ton or 10 tires per cubic yard):

Received per month: 150 tons

Stored on site: 150 tons

Processed per month: 150 tons

). Describe how and where the waste tires, processed tires, and residuals from processing will be disposed:

See Exhibit "E".

1. List mobile shredding, chopping, and cutting equipment processing locations during preceeding three months (Photocopies of Form 17-711.900(3) for each processing site may be attached in lieu of listing each site). Attach additional sheets, if necessary:

Name of facility or site: Lena Road Landfill

Site Location (main entrance)

Street address: 3333 Lena Road

City Bradenton County Manatee Zip 34203

Latitude 27°28'00", Longitude 82°27'00"

Site property owner: Manatee County Public Works Dept.

Property owner address: 4501 66th St. W., Bradenton, FL 34210

Property owner phone number: (813) 792-8811

2. Required attachments:

a. Letter of notification to fire protection authority Exhibit "F"

b. General permit fee of $25.00. (Rule 17-4, F.A.C.)

3. Certification:

To the best of my knowledge and belief, I certify the information provided in this notification is true, accurate, and correct.

Richard A. Wilford
Name of Authorized Agent

Richard Wilford
Signature of Authorized Agent

3/31/92
Date

Mobile Equipment Operators mail completed form to:
Florida Department of Environmental Regulation
Solid Waste Section
Attention: Tires
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Collection Centers and Small Processing Facilities
mail completed form to
the appropriate district office
listed on page 1.

WASTE TIRE GENERAL PERMIT CHECKLIST

PROJECT NAME: Lena Road Landfill Waste Tire Facility

DATE RECEIVED: ____________________

30 DAY DEADLINE: ____________________

The following information is needed in support of Waste Tire Collection Center and Small Processing Facility General permits (Rule 17-711 FAC).

( ) 1. Submission of completed general permit application on Form 17-711.900(2). (FAC 17-711.801(2))

( ) 2. Description of the general operation of the facility or equipment, including quantities of waste tires received, accumulated or processed per month (FAC 17-711.801(2)(b)).

( ) 3. Description of arrangements made to acquire fire protection services for the facility (FAC 17-711.801(2)(c)).

( ) 4. Description of how and where the waste tires, processed tires, and residuals from processing will be disposed of (FAC 17-711.801(2)(e)).

( ) 5. Description of how the waste tire storage and handling requirements of Rule 17-711.540, FAC, will be met, to include the following:

(a) Assurance that a waste tire site shall not be constructed, maintained or operated in or within 200 feet of a water body, or in any wetland, transitional wetland or isolated wetlands, except as provided in FAC 17-711.540(2)(a). An aerial photograph depicting the project site and the location of waste tire piles should be sufficient.

(b) Description of waste tire pile or processed tire pile dimensions, not to exceed: (1) width: 50 feet; (2) area: 10,000 square feet; and (3) height: 15 feet (FAC 17-711.540(2)(b)). Existing and proposed waste tire piles and dimensions should be shown on a site plan sheet.

(c) Assurance of 50 foot wide fire lane placed around the perimeter of each waste tire pile (FAC 17-711.540(2)(c)). This should be shown on a site plan sheet.

(d) Explanation of how the owner or operator shall control mosquitos, rodents and public access to the site (FAC 17-711.540(2)(d), (e), & (g)-(i)).

___

(e) Explanation of communications equipment, fire safety survey results, and efforts to control potentially flammable vegetation on waste tire site (FAC 17-711.540(2)(f), (k)-(m)). A letter from the local fire department should indicate that they are satisfied with the proposed project.

___

(f) Submission of an emergency preparedness manual containing the following elements:

1. A list of names and numbers of persons to be contacted in the event of a fire, flood or other emergency.

___

2. A list of the emergency response equipment at the site, its location, and how it should be used in the event of a fire or other emergency.

___

3. A description of the procedures that should be followed in the event of a fire, including procedures to contain and dispose of the oily material generated by the combustion of large numbers of tires. (FAC 17-711.540(2)(j) and 17-711.540(2)(n)).

___

(g) Discussion of monthly record keeping to approximate quantity of waste tires and processed tires received at the site, stored at the site, and shipped from the site (FAC 17-711.540(2)(p)).

___

( ) 6. (Small Processing Facilities Only) Discussion of how any residuals from waste tire processing will be managed so as to be contained on site, and be controlled and disposed of in a permitted solid waste management facility or properly recycled (FAC 17-711.540(5)).

___

( ) 7. (Mobile Shredding, Chopping, or Cutting Equipment Owners/ Operators Only) Acknowledgement that reports (on Form Number 17-711.900(2)) will be submitted to the Department every three months, describing each site at which the chopper, cutter, or shredder has operated (FAC 17-711.801(3)).

___

SECTION 4

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

TWIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32301-8241

BOB GRAHAM
GOVERNOR

VICTORIA J. TSCHINKEL
SECRETARY

APPLICATION FOR PERMIT TO CLOSE
A SOLID WASTE RESOURCE RECOVERY AND MANAGEMENT FACILITY

GENERAL REQUIREMENTS

D.E.R.

MAR 3 1 1992

SOUTHWEST DISTRICT TAMPA

Solid Waste Resource Recovery and Management Facilities must be permitted pursuant to Section 403.707, Florida Statutes. Separate permit applications for each type of facility, six copies each, should be submitted to the District office of the Department of Environmental Regulation. Complete appropriate sections of the application for the type of facility involved.

Applicant has the responsibility to provide copies of the application to appropriate city, county and/or regional pollution control agencies, established pursuant to Section 403.182, Florida Statutes. Applicant shall also submit the application through appropriate local planning agencies. Comments from any the these agencies shall be forwarded with the application to the Department.

The permit application shall include all information necessary to evaluate the proposed closure plan to insure the landfill will pose no significant threat to public health or the environment. All entries should be typed or printed in ink. If additional space is needed, separate, properly identified sheets of paper may be attached. All blanks shall be filled or marked as not applicable.

Facility Type:

Sanitary Landfill:
- [X] Class I, more than 50 cy or 20 tons waste/day
- [ ] Class II, less than 50 cy or 20 tons waste/day
- [ ] Class III:
  - [ ] trash/yard trash

Volume Reduction:
- [ ] Composting
- [ ] Transfer Station
- [ ] Shredder
- [X] Incinerator/Trench Burner
- [ ] Resource Recovery: __Energy __Materials

Sludge Landspreading:
- [ ] Grade II

FACILITY NAME: Lena Road Landfill / 4041C02025 (ID number)

FACILITY LOCATION (main entrance): ____

S 6 (section), T 35S (township), R 19E (range) / Latitude 27° 28' 00" Longitude 82° 27' 00"

Applicant Name (operating authority): Manatee County Public Works

Street Address (include P. O. Box): 4501 66th St. W, Bradenton (city), Manatee (county) 34210 (zip)

Contact Person: Gus DiFonzo (Name) (813) 792-8811 (phone number)

Authorized Agent/Consultant: ____ (Name) ____ (phone number)

Mailing Address: ____

____ (city) ____ (county) ____ (zip)

Contact Person: Greg Yekaitis (name) (813) 792-8811 (phone nubmer)

Landowner (if different than applicant): ____

Address of Landowner: ____ (street, P. O. Box) ____ (city) ____ (state) ____ (zip)

REQUIRED ATTACHEMENTS FOR CLOSURE OF A RESOURCE RECOVERY AND MANAGEMENT FACILITY

LANDFILL:

Permit applications and supporting information shall include the following (17-7.030(2), F.A.C.):

	Completeness Check
1. A letter of transmittal to the Department; (17-7.030(3)(a), F.A.C.)	
2. A table of contents listing the main sections of the application: (17-7.030(3)(a), F.A.C.)	X
3. The permit fee specified in Florida Aministrative Code Rule 17-4.05 in check or money order payable to the Department: (17-7.030(3)(c), F.A.C.)	X
4. Six copies, at minimum, of the completed application form, all supporting data, and reports; (17-7.030(2), F.A.C.)	X
5. Engineer certification; (17-7.030(3)(g), and 17-7.073(8), F.A.C.)	X
6. Engineer's letter of appointment if applicable; (17-7.030(3)(e), F.A.C.	
7. Closure plan as required in Florida Administrative Code Rule 17-7.073. A copy of a Department letter of approval of the landfill groundwater monitoring plan, or a copy of the letter of transmittal of the groundwater monitoring plan to the Department may be included in the closure plan in lieu of the groundwater monitoring plan document.	
8. Copy of any lease agreement, transfer of property agreement with right of entry for long-term care, or any other agreement between operator and property owner by which the closing and long-term care of the facility may be affected; (17-7.030(3)(h) and 17-7.075(3)(4), F.A.C.)	N/A

ATTACHMENT ITEMS

The following information items must be included in the application or an explanation given if they are not applicable.

CLOSURE PLAN REQUIREMENTS (17-7.073), F.A.C.)

1. General Landfill Information Report (17-7.073(1), Florida Administrative Code)

a. Identification of the landfill(17-7.073(1)(a), F.A.C.)	X
b. Name, address, and phone number of primary contact person. (17-7.073(1)(b), F.A.C.)	X
c. Name of persons or consultants preparing closure plan (17-7.073(1)(c), F.A.C.)	X
d. Name of landfill property owners and landfill operator (17-7.073(1)(d), F.A.C.)	X
e. Locations of main entrance or operators office of the landfill by: township, range, and section and latitude and longitude. (17-7.073(1)(e), F.A.C.)	X
f. Total acreage: of waste disposal area and landfill property (17-7.073(1)(f), F.A.C.)	X
g. Legal Description of landfill property (17-7.073(1)(g), F.A.C.)	See Sheet 1
h. History of landfill construction and operations (17-7.073(1)(h), F.A.C.)	X
i. Identity of types of waste disposal of in completed landfill (17-7.073(1)(i), F.A.C.)	X

2. Area Information Report
(17-7.073(2), F.A.C.)

	Completeness Check
a. Topogrpahy (17-7.073(2)(a), F.A.C.)	See Drawings
b. Hydrology (17-7.073(2)(b), F.A.C.)	See Exhibits A & G
c. Geology (17-7.073(2)(c), F.A.C.)	See Exhibits A & G
d. Hydrogeology (17-7.073(2)(d), F.A.C.)	See Exhibits A & G
e. Ground and surface water quality (17-7.073(2)(e), F.A.C.)	See Exhibit B
f. Land use information (17-7.073(2)(f), F.A.C.)	X
3. Groundwater Monitoring Plan Containing Site Specific Information (17-7.073(3) and 17-4.245(6)(d), F.A.C.)	See Exhibit B
4. Gas Migration Investigation (17-7.073(4), F.A.C.)	X
5. Assessment of the Effectiveness of Existing Landfill Design and Operation (17-7.073(5), F.A.C.)	
a. Effectiveness and results of groundwater investigation (17-7.073(5)(a), F.A.C.)	See Exhibit B
b. Effects of surface water runoff, drainage patterns and existing storm water controls (17-7.073(5)(b), F.A.C.)	X
c. Extent and effects of methane gas migration(17-7.073(5)(c), F.A.C.)	X
d. Type and condition of existing cover and effectiveness as leachate control mechanism. (17-7.073(5)(d), F.A.C.)	X
e. Nature and characteristics of wastes disposed of at the landfill. (17-7.073(5)(e), F.A.C.)	X
6. Closure Design Plan (17-7.073(6), F.A.C.)	
a. Phasing of site closing. (17-7.073(6)(a), F.A.C)	X
b. Existing topography and proposed final grades. (17-7.073(6)(b), F.A.C.)	See Sheets 6 & 7
c. Final cover installation plans. (17-7.073(6)(c), F.A.C.)	X
d. Proposed method of leachate control. (17-7.073(6)(c), F.A.C.)	X
e. Compliance with groundwater protection requirements of 17-4.245 and 17-4.246, F.A.C. (17-7.073(6)(e), F.A.C.)	See Exhibit B
f. Proposed method of gas and odor control. (17-7.073(6)(f), F.A.C.)	X
g. Proposed method of stormwater control. (17-7.073(6)(g), F.A.C.)	X
h. Proposed method of access control. (17-7.073(6)(h), F.A.C.)	X
i. Proposed final use of landfill property. (17-7.073(6)(i), F.A.C.)	X

7. Closure Operation Plan
(17-7.073(7), F.A.C.)

	Completeness Check
a. Describe actions which will be taken to close the landfill. (17-7.073(7)(a), F.A.C.)	X
b. Time schedule for completion of closure and long term care. (17-7.073(7)(b), F.A.C.)	X
c. Proposed method of demonstrating financial responsibility for long term monitoring and maintenance. (17-7.073(7)(d), and 17-7.077(2)(i), F.A.C.)	X
d. Equipment and personnel needs to complete closure. (17-7.073(7)(e), F.A.C.)	X

REQUIREMENTS FOR LONG TERM CARE (17-7.075, F.A.C.)

1. Establish Long Term Care Period From Date of Closing. (17-7.075(1) and 17-7.074(5), F.A.C.)	X
2. Acquire Right of Access Agreement Between Operator and Property Owner for Closing and Long-Term Care. (17-7.075(3) and 17-7.077(2)(h), F.A.C.)	N/A

REQUIREMENTS FOR PROOF OF FINANCIAL RESPONSIBILITY (17-7.076, F.A.C)

1. Closure Cost Estimates (17-7.076(1), F.A.C.)	Exhibit "H"

SECTION 5

TABLE OF CONTENTS

BACKGROUND INFORMATION

The Lena Road Landfill Stage I Operating Permit Number SO 41-118353 was issued by the Department of Environmental Regulations on 12-14-87 and expires on 6-1-92. Also, Construction Permit Number SC 41-095658 for Lena Road Landfill Stage II was issued on 12-10-87 and expires on 6-1-92. The Construction Permit Number SC 41-095667 was issued for Lena Road Landfill Stage III on 7-27-86. A modification was made to the Operating Permit for Stage I to replace the expired permit for Stage III. The latest permit information is attached as Exhibit "D". Prior to expiration of the construction permit for Stage II SC41-095658, and after Certification of Completion of the construction on Stage II, refuse was placed into this area.

As previously agreed upon by your Department, we are requesting one operating permit for Stages I, II and III and that the permit be referred to as the Lena Road Landfill Operating Permit.

One of the design features which is common throughout the landfill is that fill is intended to be placed to form a pyramid shape with a gently sloped plateau top to maintain a drainage pattern. Fill is placed in ten foot lifts. The maximum slope on the lifts is three feet horizontally, for one foot vertically. The top of the plateau will have a maximum elevation of 137 feet above mean sea level. The top of the plateau will have a minimum 3-1/2% slope from the center to the outside edges.

LINER FEATURES & LEACHATE COLLECTION

Although the previous three stages are each of different configuration and vary in elevation, the design concept for the construction of each remain the same. Underlying the entire Lena Road Landfill is a naturally occurring impermeable clay and/or sand clay layer lying 9-25 feet below the ground. (See Exhibits "A" & "G" for permeability.)

This layer effectively limits downward percolation of leachate. An impervious slurry wall which surrounds the entire landfill is keyed into this existing clay layer. All leachate is collected in the leachate collection system and transported to the Southeast Waste Water Treatment Plant for treatment. Leachate levels are maintained one foot below the natural water table within the slurry wall in order to prevent leachate migration into ground water. Thus, lateral movement of leachate is continually controlled.

STORMWATER CONTROL

Stormwater runoff is transferred through downdrains and sheet flows to perimeter ditches for treatment. This elongated detention/treatment lake varies in width from a few feet to a few hundred feet and depth from one foot to twenty feet, depending upon location. The stormwater is never in contact with solid waste. Eventually stormwater is discharged through underdrain filters in four locations at the site with weir structures designed for emergency overflows. All facilities for storm treatment have been constructed and approved by E.P.A., F.D.E.R. and S.W.F.W.M.D. See Exhibit "D" for approvals.

Stormwater Management, water quality and groundwater monitoring are addressed in the Ardaman & Associates Inc., **Lena Road Landfill Responses to the FDER Letter on Revised Groundwater Monitoring Plan, Exhibit "B".**

METHANE GAS CONTROL

Methane gas migration is prevented by the slurry wall. The impervious slurry surrounding the landfill acts as a barrier preventing gas migration. The gas is collected in the upper portion of the leachate collection pipes. This is accomplished by producing a negative pressure in the system by utilizing a positive displacement air blower. The gas is filtered in a charcoal sand filtration unit before being vented to the atmosphere.

LANDFILL OPERATIONS

The Lena Road Landfill operates under the direction of Richard A. Wilford, Director of Manatee County Public Works Department. The operations are supervised by Gus DiFonzo, Solid Waste Division Manager. The certified site supervisor is Bud Bell, Landfill Superintendent.

There is only one access road to the Lena Road Landfill. Vehicles entering the landfill must be weighed in, after which trucks are directed to the working face of the landfill for unloading where all solid waste is spread in layers approximately two feet thick and compacted to one foot thick before the next layer is applied. Solid waste is formed into lifts and at the end of each working day is covered with at least 6" of cover.

In order to assure that no hazardous, chemical, flammable or infectious waste enter the landfill, visual inspection is made at the scale entering the Landfill and also during unloading. Random load checks are also made to further prevent hazardous substances from entering the Landfill. Suspicious loads are rejected or held subject to the approval of the County and/or State environmental authorities.

Manatee County is currently handling 343,200 tons per year of residential and commercial solid waste. Considering projected population growth in Manatee County, the anticipated life of this existing solid waste disposal site is another 32 years.

Since the beginning of operations in 1973, there has never been a problem with the adequacy of equipment in service or the availability of rental equipment. See equipment list.

Equipment Maintenance:

One full time mechanic and fuel island.

Staff:

1 Landfill Operations Supervisor
2 Staff Supervisors/Chief Equipment Operators
1 Office Assistant
2 Scale Attendants
2 Enforcement Personnel
10 Equipment Operators
1 Landfill Attendants

Equipment:

3 4X4 Pickup Trucks
1 2X2 Pickup Truck
1 Sedan
2 Compactors
2 Scrappers
4 Doziers
1 Water Wagon
2 Mowers
1 Grader
1 Dragline

FILL SCHEDULE

In May 1992, commercial and residential solid waste disposal operations will begin in the northeast corner of what is now referred to as Stage II of the Lena Road Landfill. Solid waste will be placed in an 8' deep trench and covered.

In June 1992, Landfill operations will be moved to the southwest corner of what is now referred to as Stage III. There solid waste will be placed in 10' lifts.

In July of 1992, Landfill operations again will be moved to the northeast corner of Stage II. 8' Deep trenches approximately 250' X 100' will be filled on a monthly basis. Operations will move in an east to west direction along the north boundary of Stage II then will be moved southerly to move west to east. This back and forth filling pattern of trenches will continue through June of 1995.

In July of 1995, operations will again be moved to the western boundary of Stage III. 10' Lifts will be filled moving along the western boundary from south to north, then easterly from north to south through January 1996.

In February of 1996, the lifts placed in Stage III will be decreased to 5' thick. The lifts will continue moving monthly in a northerly or southerly direction through September of 1996. When commercial and residential solid waste fill operations will move to Stage I.

In October 1996, solid waste will be placed in the center of Stage I between two hall roads. Solid waste disposal operations will move in a northerly direction through January 1997 when operations will be moved to Stage II.

In February 1997, trench filling will begin where they left off in June of 1995. Commercial and residential solid waste disposal will continue to be placed in trenches moving in an east and west direction through July of 1998. No further projections have been made for fill areas beyond July of 1998.

Construction and demolition debris will be placed in 10' lifts along the eastern side of Stage I. Disposal operations will begin in June of 1992 in the southeastern portion of Stage I and move along the east side in a northerly direction until June of 1997. Although plans for construction and demolition debris have not been solidified beyond June 1997, it is thought a second 10' lift of construction and demolition debris will be placed on top of the first and in the same manner as the first. (See Sheet 10 of drawings for graphic representation of fill and closure schedule.)

EFFECTIVE BARRIER

The Lena Road Landfill is attended during operational hours and access is prohibited during non-operational hours. Heavily wooded areas, fencing and an access gate act as an effective barrier against unauthorized access.

CONTINGENCY PLAN

The contingency plan for the Lena Road Landfill is as follows:

1. The landfill will be open its regular working hours: 8:00 AM to 5:00 PM., Monday thru Saturday, unless otherwise instructed by the Director.

2. All landfill employees will be on 24-hour alert call. Scheduling will be to accommodate each employee.

3. If the regular working face area is unobtainable due to flooding, an emergency dumping area will be provided.

4. Emergency first aid kits will be checked and replenished with necessary supplies. All manual emergency equipment, flashlights, candles, walkie-talkie radios, etc., will be on hand.

5. In the event of scale/computer failure, all vehicles will be charged by the yardage rate of $8.10 per yard.

6. Two and Four wheel drive vehicles with radios will be available. One will be assigned to Erwin (Bud) Bell - call number 705. This vehicle will remain at the landfill. The other vehicle will be assigned to Greg Yekaitis, call number 702, and will be at his disposal at all times.

The following is a list of emergency telephone numbers:

Manatee County Public Works Department

NAME	HOME PHONE #	BEEPER #
Richard Wilford	(813)792-2818	(813)795-9079
Charles Hunsicker	(813)726-0894	(813)798-4968
Dan Gray	(813)792-3576	(813)794-4456
Gus DiFonzo	(813)746-5848	(813)795-9027
Greg Yekaitis	(813)722-6519	(813)794-4457
Ervin "Bud" Bell	(813)322-1710	(813)794-4446
Gary Steeley	(813)758-0716	(813)794-4135
Steve Tucker	(813)322-2524	(813)795-9004

Fire Department Braden River	**(813)746-7666**
Sheriff's Department	**(813)747-3011 (Haz-Mat)**
Emergency Services	**911**

POPULATION

The 1990 census estimated permanent population in Manatee County is 209,000. Over the last 5 years, Manatee County has grown at an average rate of about 3 percent per year. By the year 2010, the population is expected to reach approximately 273,100.

The population projections for Manatee County and the incorporated cities within the County are shown in Table 2. The projections for the County are based upon the medium growth projections published by the University of Florida, College of Business Administration. The population figures and projections for the Cities of Bradenton and Palmetto were obtained from the respective Planning Departments in each city. The projection for the total County is depicted in Table 2.

Manatee County has a large seasonal population variation over the winter months. The Manatee County Planning Department's average seasonal population increases are shown below:

MONTH	POPULATION INCREASE
December	10,000
January	20,000
February	30,000
March	40,000
April	25,000
May	15,000

Seasonal and permanent populations were normalized to an average annual population for the purposes of this study. The adjusted total population for the County is shown in Table 2. Those figures represent about a 6.8 percent increase over the permanent population.

Data was insufficient to estimate seasonal variation distribution throughout the various subunits of the County. Also, the magnitude of the variation is not significant. It was assumed that the relationship between the percentage increase in the seasonal population and the size of the permanent population would remain constant over the study period.

FIRE PROTECTION

Fire protection services are provided by the Braden River Fire Department. Appropriate communication equipment is readily available to contact the fire department. On site fire hydrants and a variety of equipment including, but not limited to, dozers, scrapers, front end loaders and a 5,000 gallon water tanker are available to aid in fire containment and fighting operations.

LANDFILL CLOSURE

At the end of operations at the landfill, Bud Bell (3333 Lena Road, Bradenton, FL 34203, 813-748-5543), will be assigned to supervise the closure procedure. Access to the site shall be restricted and an informational sign will be posted. The informational sign will inform the public that the landfill is closed, of the penalty for dumping at the site, of the location and operation hours, of an alternate approved solid waste collection site and the name of the operating agency.

Manatee County Public Works Dept. has designed a closure plan. At closure, in order to prevent the production of leachate and methane gas, a 40 mil. impervious synthetic membrane will cover the landfill. This membrane is to be installed on one foot of intermediate cover. It is believed that the membrane will eliminate percolation of water. Reducing the volume of water filtering through the solid waste will reduce the amount of leachate produced. It will also reduce decomposition, which will in turn, reduce methane gas production and settlement. The membrane will be covered with 18" of common fill and 6" of topsoil. This layer will be sodded with grass. (See Sheet 10 of Drawings.)

Upon completion, Manatee County Public Works Dept., the property owners of Lena Road Landfill, will properly close and maintain the site. This includes erosion control, maintenance of grass cover, prevention of ponding and prevention of continued solid waste disposal. Also ground water monitoring and leachate collection and treatment will continue until the site stabilizes. The closed site shall be publicly recorded in the County Property records. It is intended that long term land use be a golf course.

BIBLIOGRAPHY

Ardaman & Associates, Inc., March 3, 1983. Geotechnical and Hydrogeological Investigation Lena Road Landfill.

Ardaman & Associates, Inc., August 29, 1985. Compilation of Hydrogeological and Groundwater Data for Lena Road Landfill Stage III Area.

Ardaman & Associates, Inc., March 28, 1990. Lena Road Landfill Responses to FDER Letter on Revised Groundwater Monitoring Plan.

Briley, Wild & Associates Inc., March 1983. Lena Road Landfill, Design Criteria, Survey Data, Hydrology.

Camp, Dresser & McKee, July 1986. Manatee County Solid Waste Management Plan for the Board of County Commissioners of Manatee County.

SECTION 6

TABLE 1

TABLE 1

Boring No.	Depth	Boring No.	Depth
TH 1-3	31 ft.	TH 19	21 ft.
TH 1A-3	21 ft.	TH 20	40 ft.
TH 2-3	31 ft.	TH 21	50 ft.
TH 3-3	41 ft.	TH 22	40 ft.
TH 4-3	31 ft.	TH 23	30 ft.
TH 5-3	31 ft.	TH 24	30 ft.
TH 6-3	31 ft.	TH 25	30 ft.
TH 7-3	31 ft.	TH 26	25 ft.
TH 8-3	31 ft.	TH 27	30 ft.
TH 1	15 ft.	TH 28	30 ft.
TH 2	15 ft.	TH 29	30 ft.
TH 3	15 ft.	TH 30	35 ft.
TH 4	16 ft.	TH 31	35 ft.
TH 5	15 ft.	TH 32	45 ft.
TH 6	75 ft.	TH 33	50 ft.
TH 7	20 ft.	TH 34	50 ft.
TH 8	16 ft.	TH 35	30 ft.
TH 9	20 ft.	TH 36	30 ft.
TH 10	15 ft.	TH 37	30 ft.
TH 11	15 ft.	TH 38	45 ft.
TH 12	18 ft.	TH 39	40 ft.
TH 13	25 ft.	TH 40	55 ft.
TH 14	25 ft.	TH 41	30 ft.
TH 15	20 ft.	TH 42	25 ft.
TH 16	21 ft.		
TH 17	60 ft.		
TH 18	60 ft.		

TABLE 2

TABLE 2
POPULATION PROJECTIONS FOR MANATEE COUNTY SUBAREAS
1980-2010

	Year						
	1980	1985	1990	1995	2000	2005	2010
Incorporated Communities							
- Beach Communities[1]	9,615	9,900	10,300	10,800	11,200	11,500	13,800
- Bradenton	30,170	40,000	51,500	54,200	56,900	59,900	62,900
- Palmetto	8,637	9,000	9,900	10,900	12,100	13,400	14,800
Unincorporated County							
- County, North	9,966	11,700	12,900	13,800	15,500	16,400	17,200
- County, South	76,029	84,500	90,100	102,700	113,000	120,700	133,500
- County, East	14,025	16,900	20,300	24,500	28,900	33,400	30,900
Total Permanent Population	148,442	172,000	195,000	216,900	237,600	255,300	273,100
ADJUSTED SEASONAL TOTAL	158,500	183,700	208,200	231,600	253,700	273,700	291,600

[1] Beach communities include the cities of Anna Maria, Bradenton Beach, Holmes Beach, and Longboat Key (Manatee portion).

SECTION 7

EXHIBIT INDEX

NAME	AUTHOR	EXHIBIT
Geotechnical and Hydrological Investigation, Lena Rd. Landfill	Ardaman & Associates	"A"
Lena Rd. Landfill Response to FDER, Letter on Revised Ground-water Monitoring Plan	Ardaman & Associates	"B"
Proof of Zoning Compliance	Manatee County Planning, Permitting & Inspections	"C"
Permit Approvals	DER	"D"
Waste Tire Storage Facilities Operations	MCPWD	"E"
Waste Tire Fire Inspection	Braden River Fire Dept.	"F"
Compilation of Hydrogeological and Groundwater Data for Lena Rd. Landfill Stage III Area	Ardaman & Associates	"G"
Closure Estimate		"H"

EXHIBIT "A"

GEOTECHNICAL AND
HYDROGEOLOGICAL INVESTIGATION
LENA ROAD LANDFILL

BRILEY, WILD & ASSOCIATES, INC.
MANATEE COUNTY, FLORIDA

Ardaman & Associates, Inc.

OFFICES

Orlando, 8008 S. Orange Avenue, P.O. Box 13003, Orlando, Florida 32809, Phone (305) 855-3860
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Bradenton, 209 A 6th Avenue East, P.O. Box 1335, Bradenton, Florida 33508, Phone (813) 748-3971
Cocoa, 1300 N. Cocoa Blvd., P.O. Box 3557, Cocoa, Florida 32922, Phone (305) 632-2503
Fort Myers, 2508 Rockfill Road, Fort Myers, Florida 33901, Phone (813) 337-1288
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Panama City Beach, 8801 C West Alternate Highway 98, Panama City Beach, Florida 32407, Phone (904) 234-7822
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Tallahassee, 3175 West Tharpe Street, Tallahassee, Florida 32303, Phone (904) 576-6131

Ardaman & Associates, Inc.

Consultants in Soils, Hydrogeology, Foundations and Materials Testing

March 3, 1983
File Number 82-7047

Briley, Wild and Associates, Inc.
5000 U.S. Highway 1, North
Ormond Beach, Florida 32074

Attention: Mr. John Cumming, P.E.

Subject: Geotechnical and Hydrogeological Investigation at the Existing and Proposed Expansion for the Lena Road Landfill, Manatee County, Florida

Gentlemen:

As requested by Mr. John Cumming and authorized by Manatee County, we are pleased to submit herein the geotechnical and hydrogeological investigation at the above mentioned site as per Florida Department of Environmental Regulation Guidelines. This report contains the results of our field investigation, laboratory testing, and engineering analyses and recommendations. We would appreciate the opportunity to discuss this report with your project team, including Mr. Rock Payne, at your earliest convenience once you have read the report.

We appreciate the opportunity to serve you on this project. Please do not hesitate to contact us if you have questions on the report or if we can be of further assistance to you on this project.

Very truly yours,
ARDAMAN & ASSOCIATES, INC.

Herbert G. Stangland

Herbert G. Stangland, Jr., P.E.
Senior Water Resources Engineer

John E. Garlanger
HGS

John E. Garlanger, Ph.D., P.E.
Principal
Florida Registration No. 19782

HGS:ed
Enclosures
cc: S. Davidson (w/encl.)

8008 S. Orange Avenue, P.O. Box 13003, Orlando, Florida (305) 855-3860
Offices in: Bartow, Bradenton, Cocoa, Fort Lauderdale, Fort Myers, Miami, Naples, Panama City Beach, Riviera Beach, Sarasota, Tallahassee

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Chapter 1

INTRODUCTION

The following report contains the results of our geotechnical and hydrogeologic field investigation, laboratory testing and engineering analyses/recommendations for the Lena Road landfill in Manatee County, Florida.

1.1 Location

The existing landfill is located in Section 6, Township 35 South, Range 19 East in Manatee County, Florida. The proposed 200-acre landfill expansion area is located north of and adjacent to the existing landfill in Section 6, T35S, R19E and Section 31, T34S, R19E. A location plan is presented in Figure 1.1.

1.2 Purpose and Scope

The purpose of the investigation was to:

- Document existing leachate plume, if any, adjacent to the existing landfill.
- Project leachate plume movement under various future landfill heights.
- Analyze potential leachate collection and/or leachate management systems at the existing landfill.
- Evaluate and analyze geotechnical elements of a golf course on the landfill. As a part of this element a plan is presented to install settlement platforms to quantitatively evaluate settlements in the existing landfill.
- Review published and unpublished reports, including those in our files, relating to the geology, hydrogeology and surficial soil conditions at the site.
- Collect and examine well logs drilled in the vicinity of the site to obtain a generalized profile of the stratigraphy.
- Plan a field program and visit the site to stake out boring locations and to record observations relating to surficial soil conditions, topographic features and surface drainage features.
- Conduct a field investigation program consisting of forty-two (42) Standard Penetration Test (SPT) borings carried at least into the uppermost confining layer, approximately 25.0 feet deep. Two (2) of the borings were carried to a depth of 60 feet and one (1) to a depth of 70 feet. Soil sampling was at 2.5 foot intervals for the first 10.0 feet, and at 5.0 foot intervals thereafter. All deep borings were grouted after completion.

- Install fourteen (14) shallow observation wells within the surficial aquifer to monitor water level, to use for water quality sampling, and to use for *in situ* permeability tests. Conductivity, chlorides, iron, chemical oxygen demand, nitrate, color, temperature, and pH values were determined from the groundwater taken from each observation well. Selected well waters also had analyses performed for arsenic, barium, cadmium, chromium, lead, mercury, and silver.

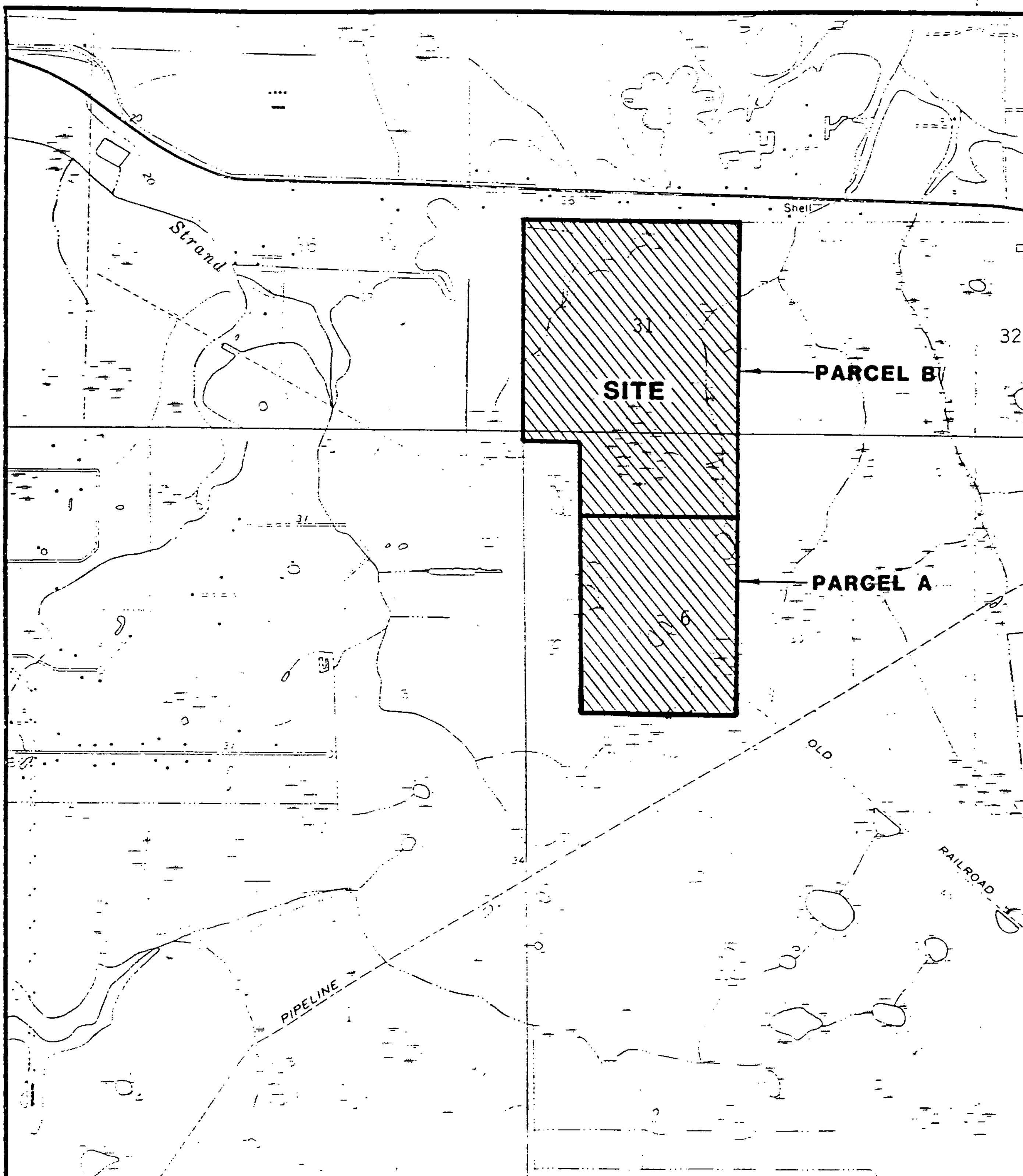
- Obtain nine (9) undisturbed samples of clay layers or other pertinent strata for permeability testing.

- Perform a laboratory testing program consisting of visual classification and index testing of the soil samples obtained from the test borings and permeability testing of samples of recompacted clayey borrow soils. These samples were tested at the *in situ* moisture content and compacted with the Standard Proctor compactive effort. One (1) of the clayey borrow soils was tested at varying moisture contents to determine the effect on density and permeability.

- Perform a well inventory for wells located within one quarter mile of the site. Inventory will rely on available data from the Southwest Florida Water Management District and from the Manatee County Health Department.

- Develop a fracture trace map and evaluate the potential for sinkhole development.

- Prepare this report documenting our field and laboratory testing and presenting the results of our hydrogeological investigation. The report discusses location, geology, hydrology, water supply, borrow material, design recommendations, and impact assessment analyses for the entire site as per Florida Department of Environmental Regulation guidelines.



SITE LOCATION MAP

TOWNSHIP 35S, RANGE 19E
TOWNSHIP 34S, RANGE 19E

FROM USGS QUAD MAP: LORRAINE, 1944

Ardaman & Associates, Inc.
Consulting Engineers in Soil Mechanics, Foundations, and Material Testing

HYDROGEOLOGICAL INVESTIGATION
LENA ROAD LANDFILL
MANATEE COUNTY, FLORIDA

DRAWN BY: H.A.D.	CHECKED BY:	DATE: 12/21/82
FILE NO. 82-7047	APPROVED BY: Staneland	

Chapter 2

SITE CONDITIONS

2.1 Topography and Geology

The landfill site lies within the Terraced Coastal lowlands, a subdivision of the Coastal Plain Province. The topography is largely controlled by a series of marine terraces formed during Pleistocene time, when the sea stood above its present level. This rise and fall of sea level was attributed to the advance and retreat of the continental ice sheets. When the sea was relatively stationary for long periods, shorelines and marine terraces were developed. The site lies on the Talbot Terrace as indicated by Peek (1958). Elevations on this terrace range between 25 and 42 feet NGVD while "natural" elevations on site average 35 feet NGVD.

The Eocene age or younger deposits in descending order include: Pleistocene and recent deposits, Bone Valley Formation, Hawthorn Formation, Tampa Limestone, Suwannee Limestone, Ocala Group Limestones, and Avon Park Limestone.

Pleistocene and younger deposits range from 10 to 15 feet thick on-site. These deposits consist of gray and light brown fine sands and slightly silty to silty fine sands.

The Bone Valley and Hawthorn Formations underlie the Pleistocene and younger sediments. These deposits, as encountered in our borings, generally consist of coarse to medium sand and phosphate, gray and green clayey sand and clay with traces of phosphate, and gray silt. Our test borings did not encounter the bottom of these deposits. Scott, et al., 1981 report that the top of the Hawthorn Formation is 0 feet NGVD at the site. Scott et al., 1981 report a thickness of the Hawthorn at the site of about 300 feet.

Scott, et al., 1981 report that the top of the Tampa Limestone is 300 feet below sea level or approximately 335 feet below land surface. The Tampa Formation of Miocene Age is between 125 and 235 feet thick according to Peek (1958). The Tampa Limestone according to Scott, et al., 1981, is the first nonphosphatic (less than one percent phosphorus), light colored limestone. Quartz sand is common within these carbonates and clay seams are also present. In the study area, this Formation yields large quantities of water and its top is considered the top of the Floridan Aquifer.

The Oligocene (Suwannee Formation) and Eocene age limestones beneath the Tampa Formation have a total thickness of between 2,600 and 2,800 feet. The upper 1,000 feet of these limestones is the Floridan Aquifer (Peek, 1958). The upper part of the Suwannee is generally creamy-white to tan soft to hard granular porous limestone, with some crystalline and dolomitic limestone. Peek, 1958, reports that the top of the Suwannee Formation is 450 feet below sea level or almost 500 feet below land surface.

2.2 Soils

General site conditions before landfill operations began are shown in Figure 2.1 as per the 1952 aerial photographs for the Manatee County Soil Survey. The United States Department of Agriculture, Soil Conservation Service, Soil Survey of Manatee County, Florida (1958), indicates that the predominant surficial soil, excluding areas of shallow ponds, is Leon-Immokalee fine sands, nearly level phase. Surface drainage is classified as slow to very slow and internal drainage as very slow. Leon-Immokalee fine sands are clean sands with a hardpan layer.

2.3 Aquifer Systems

The surficial, secondary artesian, and Floridan aquifers are the aquifer systems in this area.

A surficial unconfined aquifer system is found in the beds of sand and slightly silty to silty sand found on site at depths between the surface and 10 to 15 feet. This zone is recharged directly by local rainfall. Water levels encountered in this system for the most part range between 2.5-4.0 feet below ground surface. These levels can fluctuate widely with variations in rainfall and evapotranspiration. Localized drawdown of the water table can be seen near the approximately 10-foot deep ditch located on the west side of the site. Movement of the shallow groundwater is very limited due to the lack of topographic relief but some radial movement away from the landfill occurs. Vertical movement of water downward is restricted due to the presence of clays and clayey sands found between depths of 10 to 15 feet. In fact, recharge through the confining beds to the Floridan Aquifer has been estimated at less than 2 inches/year by Stewart (1980). Wells for domestic supply are from the deeper artesian aquifers and not from this surficial aquifer.

At a depth of approximately 335 feet below land surface is found the Tampa Formation which is recognized as the top of the Floridan Aquifer. Probably most of the water in the Floridan in the area comes from rainfall that infiltrates into the aquifer in the recharge area of Polk County. The most used zones for wells in the area are in the Tampa and Oligocene age Suwannee Limestone although the deeper formations may yield large quantities of water; however, the concentrations of total dissolved solids increase with depth.

The Hawthorn Formation, beneath surficial sands and overlying the Tampa Limestone consists predominantly of clay and marl, which serves as a confining bed for the water in the Floridan Aquifer. Thin beds of sand, shell and limestone within the Formation, which are generally separated by relatively thick beds of clay, are the source of many domestic and small irrigation supplies. These thin pervious beds comprise the secondary aquifer. Seaburn and Robertson, 1980, report that the top of the first dolostone unit in the Hawthorn Formation is approximately 100 feet below mean sea level, several miles west of the landfill.

Data from a Southwest Florida Water Management District (SWFWMD) observation well near Verna, 11 miles southeast of the site, shows the potentiometric surface to range between a May low of 31.4 feet NGVD (average for the period of record) and a September high of 41.1 feet NGVD (average for the period of record). Coupled with an average water-table elevation of 37 feet NGVD at the site, head differences between the Surficial and Floridan aquifers can range between 5.6 feet downwards and 4.1 feet upwards. These data indicate that the potential exists for Floridan Aquifer waters to move upwards toward the surficial aquifer during the rainy season and to move downward toward the Floridan Aquifer during the dry season.

The direction of groundwater movement in the artesian aquifers is east to west. According to the SWFWMD potentiometric surface map of the Floridan Aquifer for May 1982 the surface was 6 feet NGVD and the hydraulic gradient flat. During September 1981 the surface was approximately 18 feet NGVD with hydraulic gradient of one foot per mile toward the west. During extremely low water level conditions the potentiometric surface probably will be below sea level with a hydraulic gradient to the north as evidenced by the May 1981 potentiometric surface map. Our experience in the area is that the secondary artesian aquifer direction of groundwater movement is the same as the direction of the groundwater movement in the Floridan Aquifer.

Peek (1958) conducted a pumping test at a Floridan Aquifer well located five miles east of Terra Ceia and approximately 10 miles northwest of the landfill. His calculations indicated a transmissivity of 100,000 gallons/day/foot and a storage coefficient of 0.00014 in the Floridan Aquifer.

2.4 Evaluation of Sinkhole Potential

While the mechanics of how cavities form and what causes a sinkhole are generally understood, the evaluation of a specific area for possible future sinkholes is not yet an exact science. Present tools utilized for such evaluations include local experience, review of geologic history, assessment of regional surficial and bedrock geology, review of hydrogeologic information, and the review of aerial photographs, topographic maps and infrared photographs.

The conditions which must be present for a sinkhole to occur are: (1) cavities or caverns in the limestone through which water is flowing; (2) a connection between these openings in the limestone and the overburden material through which the soil particles in the overburden can pass; and (3) water flowing down into the limestone from the overburden. The latter factor appears to be particularly important. Most sinkholes occur just after the dry season when the water level in the limestone aquifers reaches its low for the year especially where pumping from wells has further lowered the potentiometric surface and rainfall has begun to raise the groundwater level in the surficial aquifer.

The first step in evaluating the sinkhole potential of any area is the determination of past experience. Sinkhole prone areas can be readily identified and areas with the least potential will be conspicuous by the relative absence of sinkhole activity. The location of recent sinkholes which have occurred in Hillsborough, Polk, Manatee, and Hardee Counties are shown in Figure 2.2. The data presented has been collected from a variety of sources including Mr. William Casey of the Polk County Civil Defense Office, the Southwest Florida Water Management

District and previous investigations by Ardaman & Associates, Inc. It is significant to note that there are no reports of sinkholes in Manatee County, in extreme south Hillsborough County or in Hardee County, west of the Peace River.

Because solutioning is most active along fractures in the limestone, it is desirable when studying the sinkhole potential of a site to ascertain the location of these features. When the limestone surface is buried under overlying sediment, it is not possible to map these features. However, they can sometimes be inferred from linear surface features, e.g., stream segments, alignment of sinkholes, etc. These linear surface features are called lineaments. Figure 2.3 presents a lineament map of the study area discerned from aerial photographs and from U.S.G.S. quadrangle topographic maps.

The presence of linear surface features is only one of the factors which must be considered in determining the potential for sinkhole activity. Some other factors include thickness of clay beds above the limestone layers, relationship between elevations of water table and potentiometric surface in artesian aquifers, groundwater pumping, etc.

The downward recharge of groundwater, which is responsible for the erosion of overburden into the limestone cavities, cannot be significant in this area due to the relatively minor difference in water levels between the surficial aquifer and the artesian Floridan Aquifer. It should also be noted that the clayey and partially indurated soils within the Hawthorn Formation are relatively impervious, thick, consolidated sediments which are resistant to erosion.

The sinkhole classification of the region presented by the Florida Geological Survey as shown in Figure 2.4, suggests the site lies within an area of least probable sinkhole development.

In summary, the geologic, hydrologic and geotechnical evidence available to date suggests that the type of conditions favorable for the development of sinkhole formations does not exist in the vicinity of this site. Although cavernous limestone may be present, it is very deep and is overlain by thick deposits of relatively impermeable sediments. Furthermore, no evidence of sinkholes has been observed or recorded in the area of this investigation, nor do any of the aerial photographs indicate recent sinkhole activity. There is no potential for sinkhole development in this area.

2.5 Landfill

All of the existing landfill area has been filled, except for approximately 25-acres at the southwest portion of the site. The original cells are approximately 100 feet wide, 300 feet long and extend approximately 8 feet below the original surface elevation. Presently, filling operations are taking place along the northern part of the site. The surface of the landfill areas within this part of the site are presently approximately 14 feet above the original surface grade (approximately 50 feet NGVD).

A ditch with a 10-foot bottom width runs around most of the perimeter of the site. This ditch is not present for about 900 feet near the northwestern corner of the site. The perimeter ditch has no positive outlet. An earth plug separates the perimeter ditch and a drainage ditch on the west side of the site. This drainage ditch runs along the southern edge of a gun range, and into Cypress Strand, a tributary to the Manatee River.

As outlined by Briley, Wild & Associates, Inc., the proposed development approach being considered would require enlarging the existing landfill (Parcel A) to include that portion of the proposed expansion (Parcel B) within Section 6, T35S, R19E. The second stage of development would include the balance of Parcel B, which is within Section 31, T34S, R19E.

The general design approach to the first stage of the landfill (Parcel A) is to develop an elevated plateau over the existing fill area at elevations of 50 to 70 feet (NGVD) having a gentle downward slope of about 1% from east to west. The east, south and west edges of this plateau will have a more pronounced downward slope of 30% to leachate drainage ditches near these respective borders of the property. The northern face of the plateau will step down more gradually (approximate slope = 10%) to the natural existing grade and to drainage ponds which will result from excavation operations for needed cover material.

The plateau area of Parcel A will have a confining berm which in combination with the grading pattern will direct the surface storm drainage from this area to the mid-point of the western boundary of the existing landfill. An elevated water conveyance facility will be provided to direct the surface drainage, or stormwater runoff, over the leachate ditch, from the plateau level to the existing canal which runs westward from the existing landfill. In this way the surface runoff portion of stormwater falling on the landfill will be separated from the water which seeps into the landfill and becomes leachate. The leachate seepage will be collected by the leachate ditches and pumped to aeration ponds for treatment while the uncontaminated runoff will be directed to the natural water courses in its historic pattern.

The leachate ditches will be excavated to approximately one foot below the lowest anticipated groundwater level. Water levels in the leachate ditches will be maintained at a level below the natural, adjacent groundwater level. Therefore, seepage from both the landfill and from nearby adjacent lands will move into the leachate ditch to prevent migration of leachate offsite. The water level in the ditches will be controlled by monitoring the groundwater level on the side of the ditch opposite the landfill.

As mentioned earlier, the northern face of the Parcel A landfill plateau will slope gently down to the natural grade of the land. At the foot of this slope, about 300 feet north of the existing landfill, an impermeable, subsurface "slurry wall" will be built along an east-west line. The slurry wall will extend down to the clay layer to provide an effective seal against the northerly migration of leachate. A perforated drain pipe will be buried immediately south of the slurry wall to drain groundwater to the east and west leachate ditches. Thus, the landfill will be enclosed by leachate drainage ditches on three sides, east, south, and west, and by a slurry wall and buried drain on the north.

During most of the first stage (Parcel A) landfill operation, the leachate collected in the drainage ditches will be pumped to a reservoir in the unused portion in the southwest corner of the landfill. Sprays will be used to provide aeration treatment and to accelerate evaporation. As the first stage approaches final completion, the southwest reservoir area will be filled in and landfilled to the design elevation. The permanent drainage ponds to the north (in the southern portion of Parcel B) which were created to obtain cover material for the landfills will receive the leachate.

A second pond system just north of the "slurry wall" will be used to collect and store surface runoff in the immediate area and the water will provide irrigation water for the future golf course.

The design Stage II operations covering that portion of Parcel B within Section 31, Township 34 South, Range 19 East, is programmed to start upon completion of the Stage I operations.

During the Stage I operation, excess cover material will be stockpiled along a 200-foot buffer strip within the southern area of Parcel B.

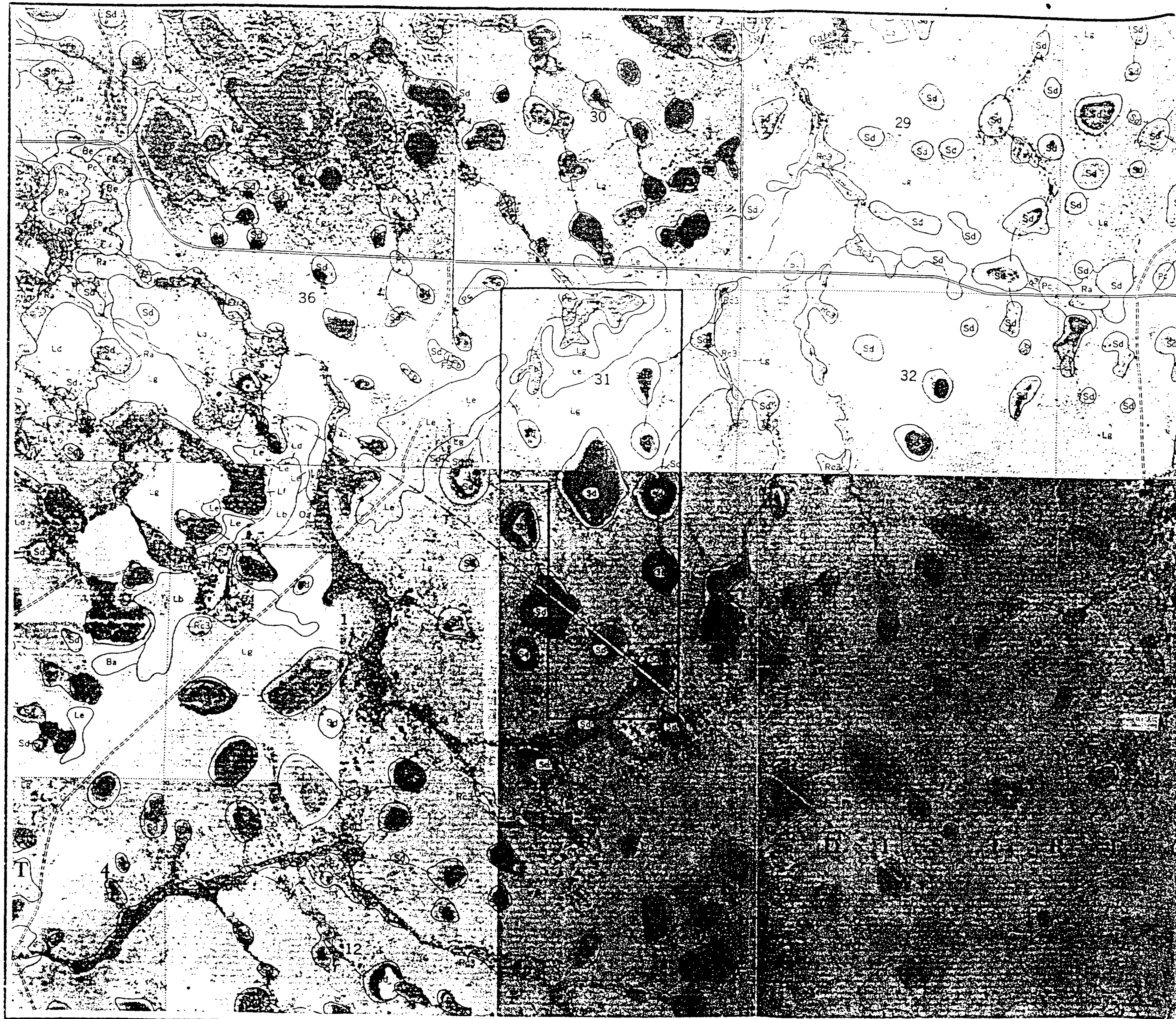
During the Stage II operation (Parcel B), refuse will be deposited in the area north of this 200-foot buffer for a distance of approximately 2100 feet north to within 200 feet of the east and west boundaries. The main top surface area of the plateau resulting from this landfilling will slope downward to the north at approximately 1% grade. The east, south and west edges of the plateau will have more definite slopes of approximately 30%, while the north edge slope will average 10%.

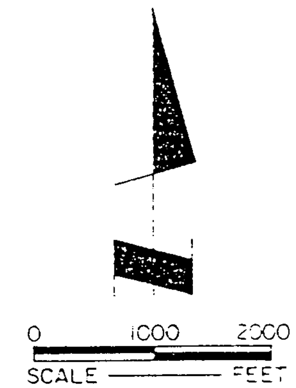
Leachate ditches similar to those described in the Stage I design will be dug along the east and west borders of the Parcel B fill and across 800 feet of the western portion of the south border. Leachate which accumulates in those ditches will be pumped into the leachate pond in the northern part of the Stage I development. Surface drainage from the east, south and west edges of the landfill plateau will also be directed to the leachate pond either by way of the ditches and pumps, or directly from the fill slope in the case of the greater part of the southern edge. This pond will be surrounded with a slurry wall.

At the foot of the north slope from the landfill (Parcel B), a slurry wall of similar design to the one described for Stage I will be constructed. A submerged, perforated drain just south of the slurry wall will direct any leachate accumulation to the east and west leachate ditches.

A stormwater retention pond will be located between the slurry wall and the northern boundary of the property. This pond will have been excavated to develop the balance of the cover material needed for landfilling.

Water from this stormwater retention pond will be used to irrigate the future golf course. Overflow from the retention ponds will follow an existing water course to the north.





SOILS LEGEND

Be	Bracenton fine sand
Fa	Fresh water marsh (unclassified soils)
Fb	Fresh water swamp (unclassified soils)
Ia	Immokalee-Leon fine sands
Ld	Leon fine sand, heavy substratum phase
Le	Leon fine sand, light-colored surface phase
Lf	Leon-Immokalee fine sands, gently sloping phases
Lg	Leon-Immokalee fine sands, nearly level phases
Oa	Ona fine sand
Pa	Parkwood fine sand
Pc	Plummer fine sand
Ra	Ruskin fine sand
Rc	Rutlege fine sand, nearly level phase
Sd	Shallow ponds with grass

VEGETATION LEGEND

3	Prairie

SURFICIAL SOILS

Ardaman & Associates, Inc.
Consulting Engineers in Soil Mechanics, Foundations, and Material Testing

HYDROGEOLOGICAL INVESTIGATION
LENA ROAD LANDFILL
MANATEE COUNTY, FLORIDA

DRAWN BY: R.J.F	CHECKED BY:	DATE: 2/24/83
FILE NO. 82-7C47	APPROVED BY: [signature]	

FIGURE 2.1

K&E 19 1153 12-81 MC3315e

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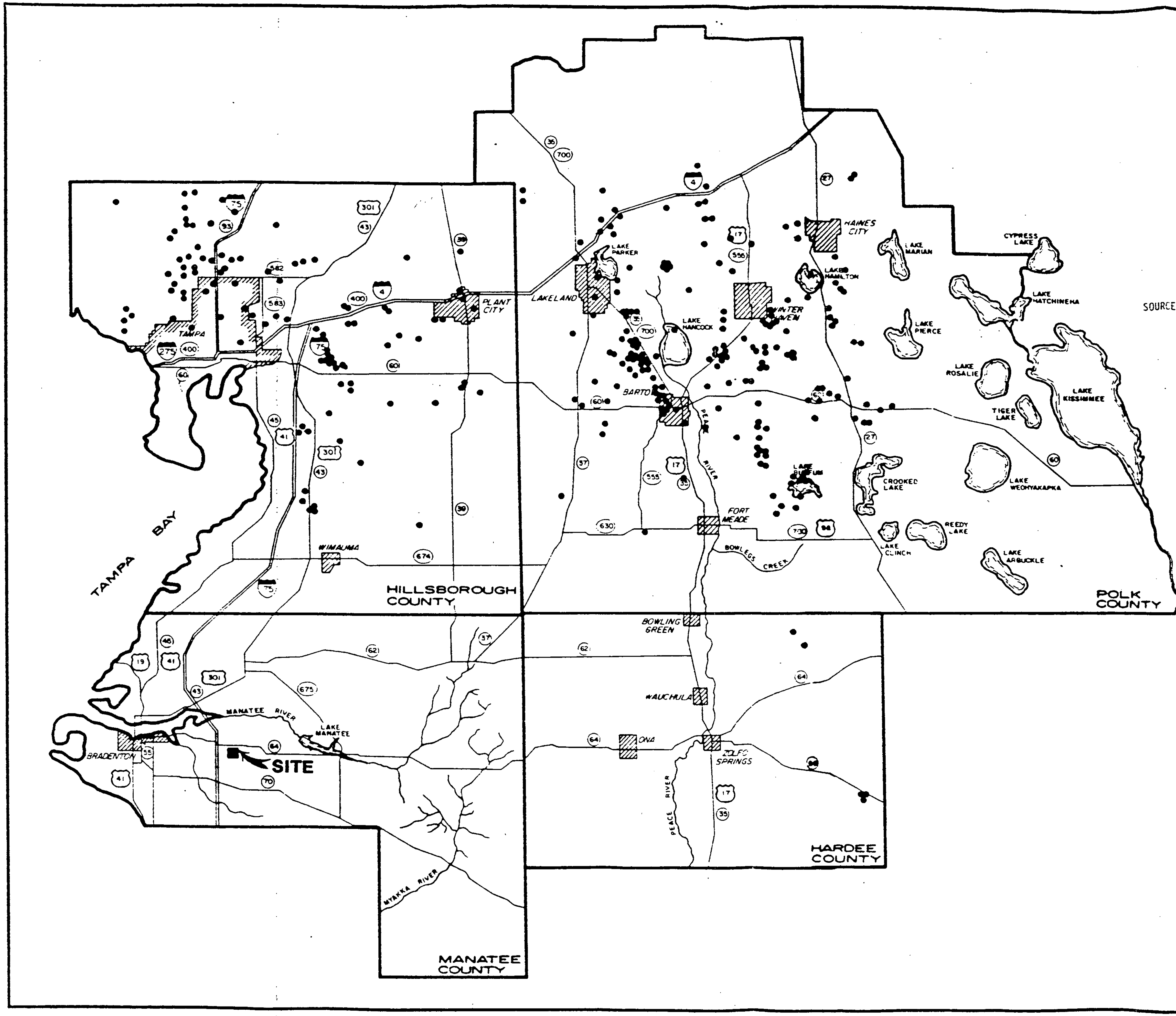

SCALE 0 1 2 3 4 5 6 7 8 9 10 MILES

REPORTED SINKHOLES AS OF MARCH 1982

SOURCES: (1) MR. WILLIAM CASEY, DEPUTY DIRECTOR OF PUBLIC SAFETY CIVIL DEFENCE AGENCY, POLK COUNTY, FLORIDA

(2) SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

(3) PREVIOUS ARDAMAN & ASSOC. SINKHOLE INVESTIGATIONS

Ardaman & Associates,
Consulting Engineers in Soil Mech
Foundations, and Material Testi

HYDROGEOLOGICAL INVESTIGATIO
LENA ROAD LANDFILL
MANATEE COUNTY, FLORIDA

DRAWN BY: H.A.D.	CHECKED BY:	DATE: 3/
FILE NO. 82-7047	APPROVED BY:	

FIGURE 2.2

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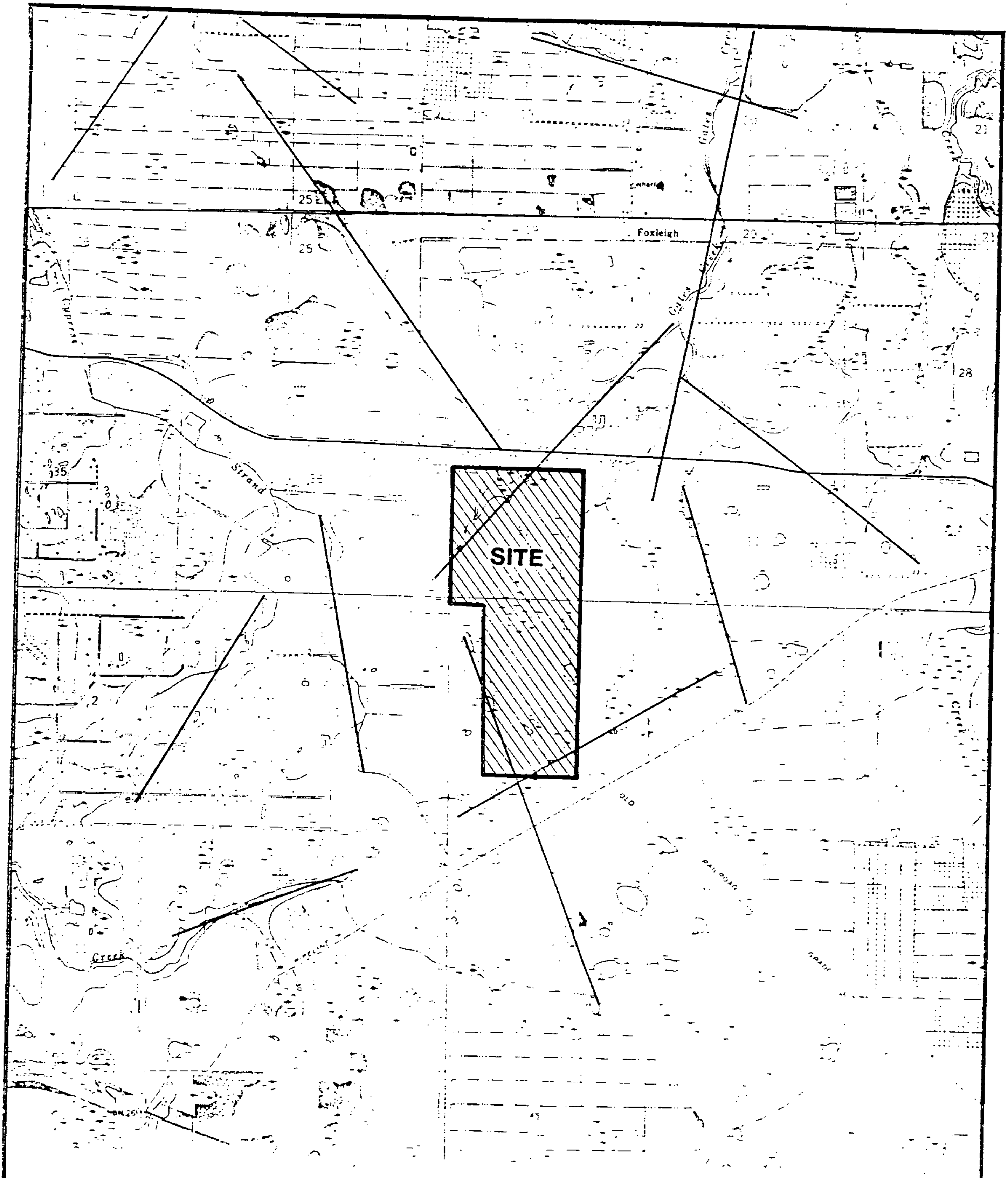
K&E 19 1153 12-80 MC1983



LINEAMENTS IN THE SITE VICINITY

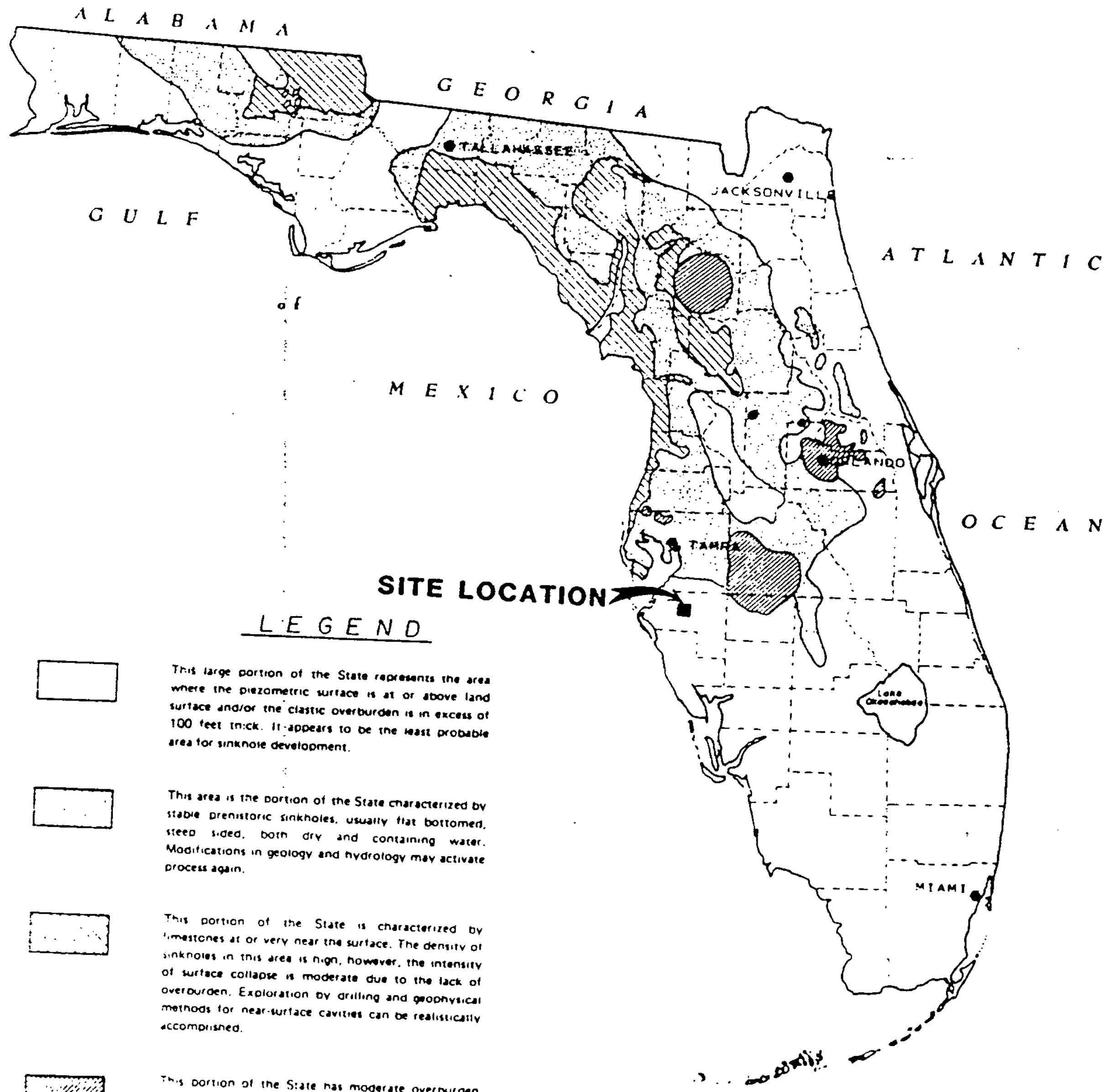
FROM USGS QUAD MAPS: LORRAINE, 1973
PARRISH, 1973

Ardaman & Associates, Inc.
Consulting Engineers in Soil Mechanics, Foundations, and Material Testing

HYDROGEOLOGICAL INVESTIGATION
LENA ROAD LANDFILL
MANATEE COUNTY, FLORIDA

DRAWN BY: H.A.D.	CHECKED BY:	DATE: 3/2/83
FILE NO.	APPROVED BY:	

K&E 19 1153 12-80 MC1983



LEGEND

This large portion of the State represents the area where the piezometric surface is at or above land surface and/or the clastic overburden is in excess of 100 feet thick. It appears to be the least probable area for sinkhole development.

This area is the portion of the State characterized by stable prehistoric sinkholes, usually flat bottomed, steep sided, both dry and containing water. Modifications in geology and hydrology may activate process again.

This portion of the State is characterized by limestones at or very near the surface. The density of sinkholes in this area is high, however, the intensity of surface collapse is moderate due to the lack of overburden. Exploration by drilling and geophysical methods for near-surface cavities can be realistically accomplished.

This portion of the State has moderate overburden overlying cavernous limestones and appreciable water use. These areas have histories of steep-walled, wider sinkhole collapse but require more detailed study. A thick overburden or high water table present within these areas lessen the probability of sinks occurring.

MOST PROBABLE SINKHOLE REGIONS IN FLORIDA

SOURCE: VERNON (1972), S.P. 16

Ardaman & Associates, Inc.
Consulting Engineers in Soil Mechanics, Foundations, and Material Testing

HYDROGEOLOGICAL INVESTIGATION
LENA ROAD LANDFILL
MANATEE COUNTY, FLORIDA

DRAWN BY: H A D	CHECKED BY:	DATE:
FILE NO. 82-2047	APPROVED BY:	

Chapter 3

FIELD INVESTIGATION AND RESULTS

3.1 Field Investigation

The field investigation consisted of 42 Standard Penetration Test (SPT) borings and 15 piezometer installations. The locations of the test borings and piezometers are shown in Figure 3.1. The test borings were conducted utilizing the SPT method (ASTM D-1586) as summarized in Appendix A.1. The piezometers consisted of a five-foot length of two-inch diameter slotted PVC pipe connected to a solid PVC pipe riser with the top extending about three feet above the ground surface. The annular space around the slotted pipe and the 4-inch diameter open hole was filled with silica sand to just below the water table, a 6-inch thick bentonite seal was installed on top of the sand, and the remaining annular space was backfilled to the ground surface with bentonite-cement grout.

The piezometers were used as both water quality sampling points to detect the existence of a leachate plume, document background water quality and for measurement of *in situ* permeabilities. Prior to the permeability tests, each well was developed to clear the slotted section of any fine soil material. After water quality sampling was performed, each piezometer was then filled to the top with clear water and the subsequent drop of the water level in the pipe was recorded at selected time intervals.

As part of the drilling program, nine undisturbed samples of the sand and clay layers were recovered for use in laboratory determination of permeability and chemical testing.

A direct current resistivity survey was performed along the north, east and west sides of the existing landfill site and is further discussed elsewhere in this report. The south side of the site was not surveyed because of wet areas in the southeast corner and the fact that until the last few months no refuse had been placed near this edge of the property.

3.2 Test Boring Results

The results of the SPT borings are illustrated on the subsurface profile in Figures 3.2 through 3.7. Included on the profile for each test boring are the SPT "N" values. The soil stratification is based on an examination of recovered soil samples and interpretation of field boring logs by a geotechnical engineer. The stratification lines represent the approximate boundaries between soil types of significantly differing engineering properties although the actual transition may be gradual. In some cases, variations in properties not considered pertinent to our engineering evaluations have been omitted for clarity.

3.3 Groundwater Levels

The groundwater level at the time of our testing between October 12, and November 9, 1982 was approximately two feet below ground surface. The water levels for each test hole is shown adjacent to the subsurface profiles on Figures 3.2 through 3.7. It should be noted that this level does not necessarily represent extreme water-level conditions. The groundwater levels noted are perhaps slightly below what could be considered "high" water-table conditions. The "high" water table is judged to be one to three feet below land surface.

3.4 *In Situ* Permeability Tests

The results of the *in situ* falling head permeability tests performed in the piezometers are noted at the appropriate depth adjacent to the piezometer profiles in Figures 3.2 through 3.7. The test results are expressed as coefficients of permeability. The measured *in situ* permeabilities ranged from 3.5×10^{-5} cm/sec to 4.7×10^{-3} cm/sec (0.1 to 13.3 feet per day).

3.5 Surface Resistivity Results

Direct current (DC) resistivity methods involve the measurement of the resistivity of geologic units by introducing a direct current into the ground through two electrodes. The voltage (potential) difference is measured between the two current electrodes and a second pair of electrodes (potential electrodes). From the current and potential measurements, the apparent resistivity may be calculated. Apparent resistivity is a measure of a material's resistance to the flow of electricity through it. When the electrodes are placed closely together, most of the introduced current will flow in the near-surface layers. As the electrode spacings are increased, more current moves through the deeper layers. Thus, the change in apparent (measured) resistivity with increasing electrode spacings yields information about the variation of resistivity with depth.

Both changes in geology and water quality can be inferred from the data gathered during a DC resistivity survey. Typically, silicate and carbonate minerals have very high resistivities and clay units have very low resistivities. In general, the higher the porosity, the lower the resistivity. The quality of interstitial waters has a strong influence on the variation of resistivities in saturated geologic units. When ground waters have a very low dissolved solids content, most of the electrical current flows along the surfaces of the soil or rock particles. In this situation, apparent resistivity will be a measure of porosity. As dissolved solids content increases, current flow through the interstitial fluid increases, yielding a lower apparent resistivity.

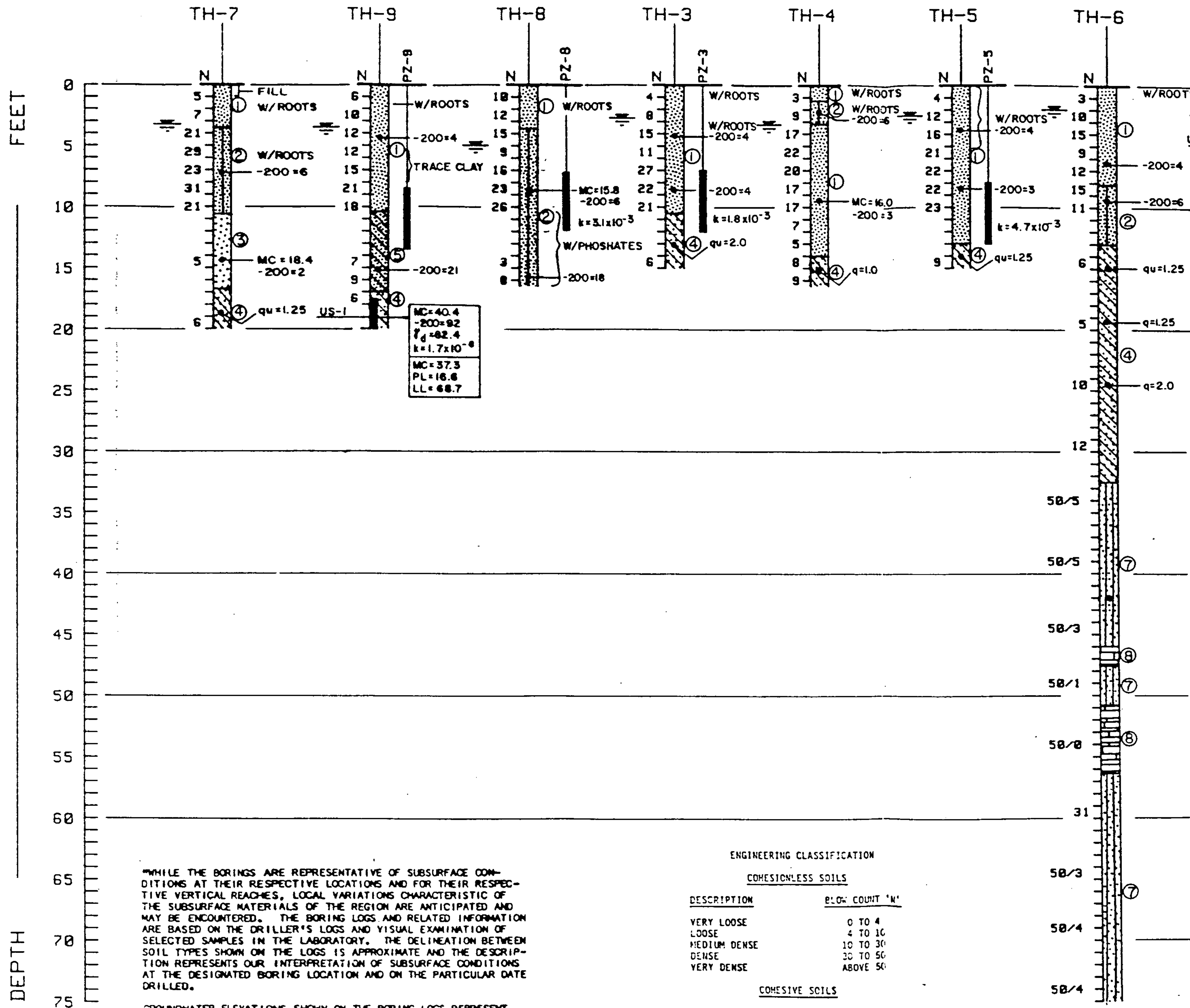
Resistivity soundings were taken along the north, east and west sides of the existing landfill site and were made within a strip 100 feet outside the perimeter ditch. Our resistivity investigation was limited to the near-surface soils with Wenner electrode spacings of 5, 10, and 20 feet. These short spacings permit determinations of depth to the water table and near-surface water quality characteristics. By comparison of the resistivity data and hydrogeologic information from test borings, it was possible to make a qualitative analysis of the groundwater characteristics. Coupled with water quality of the groundwater an indication of leachate plume(s), if any, can be determined with these techniques.

Apparent resistivity values for a spacing of 20 feet was used in this interpretative analysis. The apparent resistivity values ranged between 49 and 800 ohm-feet for this spacing. Values less than 200 ohm-feet were judged to represent groundwater contamination. The resistivity values imply that the highest quality water (e.g., low total dissolved solids) is found along the east side of the existing landfill site. Values were 110 to 538 ohm-feet. Along the west side apparent resistivity values were 100 to 200 ohm-feet. These resistivity values imply some signs of possible contamination. Resistivity values imply the worst water quality to occur between TH-14 and TH-15 along the north wall. Quality appears to improve towards the east and west ends of this north property boundary. Minimum values of 49 to 51 ohm-feet were recorded in the vicinity of TH-14 and TH-15, respectively.

The above data implies that a pollutant plume probably has exited the site along parts of the north property boundary. Water quality has deteriorated to a degree in localized areas along the west and east boundaries. The east boundary infers the best water quality except for the 110 ohm-feet reading just south of TH-11.

3.6 Well Inventory

Figure 3.1 shows the location of wells inventoried for this study. Except for the 2-inch diameter piezometers installed as part of this investigation no wells are located in Section 31. At the existing landfill area a well is located at the weigh station in the northwest corner of Section 6. Five wells were identified between State Road 64 and the proposed landfill area. Well A is reported as 6-inch diameter, 495 feet deep with 61 feet of casing. Well B is reported as 10-inch diameter, 600 feet deep and an unknown casing length. Well A is used for dairy irrigation, while Well B is not in use. All homes along State Road 64 are connected to the county water system. No information is available on other wells.



"WHILE THE BORINGS ARE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT THEIR RESPECTIVE LOCATIONS AND FOR THEIR RESPECTIVE VERTICAL REACHES, LOCAL VARIATIONS CHARACTERISTIC OF THE SUBSURFACE MATERIALS OF THE REGION ARE ANTICIPATED AND MAY BE ENCOUNTERED. THE BORING LOGS AND RELATED INFORMATION ARE BASED ON THE DRILLER'S LOGS AND VISUAL EXAMINATION OF SELECTED SAMPLES IN THE LABORATORY. THE DELINEATION BETWEEN SOIL TYPES SHOWN ON THE LOGS IS APPROXIMATE AND THE DESCRIPTION REPRESENTS OUR INTERPRETATION OF SUBSURFACE CONDITIONS AT THE DESIGNATED BORING LOCATION AND ON THE PARTICULAR DATE DRILLED.

GROUNDWATER ELEVATIONS SHOWN ON THE BORING LOGS REPRESENT GROUNDWATER SURFACES ENCOUNTERED ON THE DATES SHOWN. FLUCTUATIONS IN WATER TABLE LEVELS SHOULD BE ANTICIPATED THROUGHOUT THE YEAR. ABSENCE OF WATER SURFACE DATA ON CERTAIN BORINGS IMPLIES THAT NO GROUNDWATER DATA IS AVAILABLE, BUT DOES NOT NECESSARILY MEAN THAT GROUNDWATER WILL NOT BE ENCOUNTERED AT THESE LOCATIONS OR WITHIN THE VERTICAL REACHES OF THESE BORINGS."

ENGINEERING CLASSIFICATION

COHESIONLESS SOILS

DESCRIPTION	BLOW COUNT 'N'
VERY LOOSE	0 TO 4
LOOSE	4 TO 10
MEDIUM DENSE	10 TO 30
DENSE	30 TO 50
VERY DENSE	ABOVE 50

COHESIVE SOILS

DESCRIPTION	UNCONFINED COMPRESSIVE STRENGTH, TSF	BLOW COUNT 'N'
VERY SOFT	BELOW .25	0 TO 2
SOFT	.25 TO .50	2 TO 4
MEDIUM STIFF	.50 TO 1.0	4 TO 8
STIFF	1 TO 2	8 TO 15
VERY STIFF	2 TO 4	15 TO 30
HARD	ABOVE 4	ABOVE 30

LEGEND

- ① LIGHT GRAY TO GRAY AND LIGHT BROWN TO YELLOWISH BROWN FINE SAND.
- ② GRAY OR LIGHT BROWN TO YELLOWISH BROWN SLIGHTLY SILTY TO SILTY FINE SAND.
- ③ GRAY AND BROWN MEDIUM TO FINE SAND TO SLIGHTLY SILTY FINE SAND WITH PHOSPHATES.
- ④ GRAY AND GREEN OR BROWN TO LIGHT YELLOWISH BROWN CLAY AND SANDY CLAY WITH OCCASIONAL TRACES OF PHOSPHATES AND SEAMS OF FINE SAND.
- ⑤ GRAY AND GREEN SLIGHTLY CLAYEY TO CLAYEY FINE SAND WITH OCCASIONAL TRACES OF PHOSPHATES, SHELL OR CEMENTED SAND.
- ⑥ LIGHT REDDISH BROWN TO REDDISH BROWN SLIGHTLY SILTY TO SILTY FINE SAND WITH TRACES OF ROOTS (HARDPAN TYPE).
- ⑦ GRAY SANDY SILT AND SILT WITH OCCASIONAL TRACES OF CLAY AND PHOSPHATES.
- ⑧ SOLID ROCK

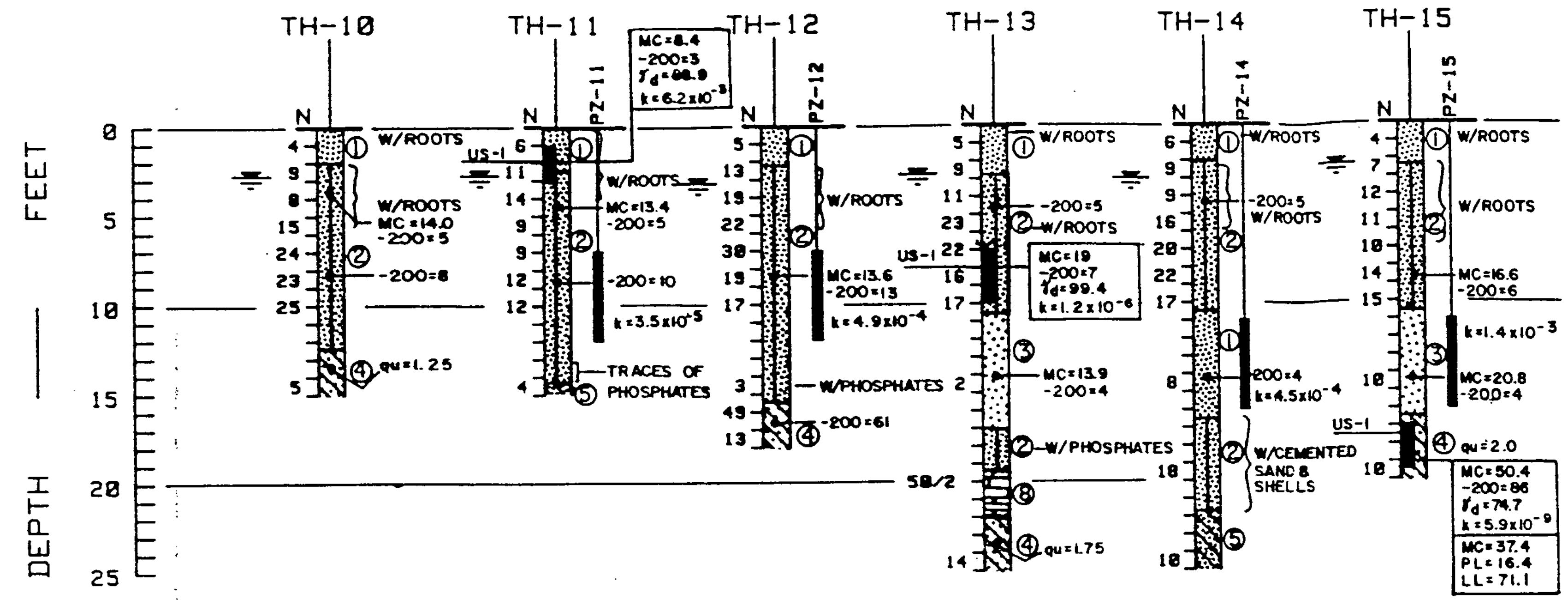
PZ	PIEZOMETER
≚	GROUND WATER LEVEL DATES DRILLED: 10-12-82 THROUGH 10-21-82
N	STANDARD PENETRATION RESISTANCE IN BLOWS PER FOOT.
US-1	UNDISTURBED SAMPLE
50/3	50 BLOWS FOR 3 INCHES OF PENETRATION INTO THE SOIL.
MC	MOISTURE CONTENT IN PERCENT
-200	PERCENT PASSING THE NO. 200 SIEVE.
q_u	UNCONFINED COMPRESSIVE STRENGTH IN tsf
γ_d	IN-SITU DRY DENSITY IN lb/ft^3
PL	PLASTIC LIMIT IN PERCENT
LL	LIQUID LIMIT IN PERCENT
k	COEFFICIENT OF PERMEABILITY IN cm/sec

Ardaman & Associates, Inc.
Consulting Engineers in Soil Mechanics, Foundations, and Material Testing

HYDROGEOLOGICAL INVESTIGATION
LENA ROAD LANDFILL
MANATEE COUNTY, FLORIDA

DRAWN BY: R.J.F.	CHECKED BY:	DATE: 11/3/82
FILE NO. 82-7047	APPROVED BY:	

FIGURE 3.2



LEGEND

1. LIGHT GRAY TO GRAY AND LIGHT BROWN TO YELLOWISH BROWN FINE SAND.
2. GRAY OR LIGHT BROWN TO YELLOWISH BROWN SLIGHTLY SILTY TO SILTY FINE SAND.
3. GRAY AND BROWN MEDIUM TO FINE SAND TO SLIGHTLY SILTY FINE SAND WITH PHOSPHATES.
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7. GRAY SANDY SILT AND SILT WITH OCCASIONAL TRACES OF CLAY AND PHOSPHATES.
8. SOLID ROCK

PZ PIEZOMETER

GROUND WATER LEVEL DATES DRILLED: 10-12-82 THROUGH 10-21-82

N STANDARD PENETRATION RESISTANCE IN BLOWS PER FOOT.

US-1 UNDISTURBED SAMPLE

50/3 50 BLOWS FOR 3 INCHES OF PENETRATION INTO THE SOIL.

MC MOISTURE CONTENT IN PERCENT

-200 PERCENT PASSING THE NO. 200 SIEVE.

q_u UNCONFINED COMPRESSIVE STRENGTH IN tsf

γ_d IN-SITU DRY DENSITY IN lb/ft^3

PL PLASTIC LIMIT IN PERCENT

LL LIQUID LIMIT IN PERCENT

k COEFFICIENT OF PERMEABILITY IN cm/sec

"WHILE THE BORINGS ARE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT THEIR RESPECTIVE LOCATIONS AND FOR THEIR RESPECTIVE VERTICAL REACHES, LOCAL VARIATIONS CHARACTERISTIC OF THE SUBSURFACE MATERIALS OF THE REGION ARE ANTICIPATED AND MAY BE ENCOUNTERED. THE BORING LOGS AND RELATED INFORMATION ARE BASED ON THE DRILLER'S LOGS AND VISUAL EXAMINATION OF SELECTED SAMPLES IN THE LABORATORY. THE DELINEATION BETWEEN SOIL TYPES SHOWN ON THE LOGS IS APPROXIMATE AND THE DESCRIPTION REPRESENTS OUR INTERPRETATION OF SUBSURFACE CONDITIONS AT THE DESIGNATED BORING LOCATION AND ON THE PARTICULAR DATE DRILLED.

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ENGINEERING CLASSIFICATION

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VERY LOOSE	0 TO 4
LOOSE	4 TO 10
MEDIUM DENSE	10 TO 30
DENSE	30 TO 50
VERY DENSE	ABOVE 50

COHESIVE SOILS

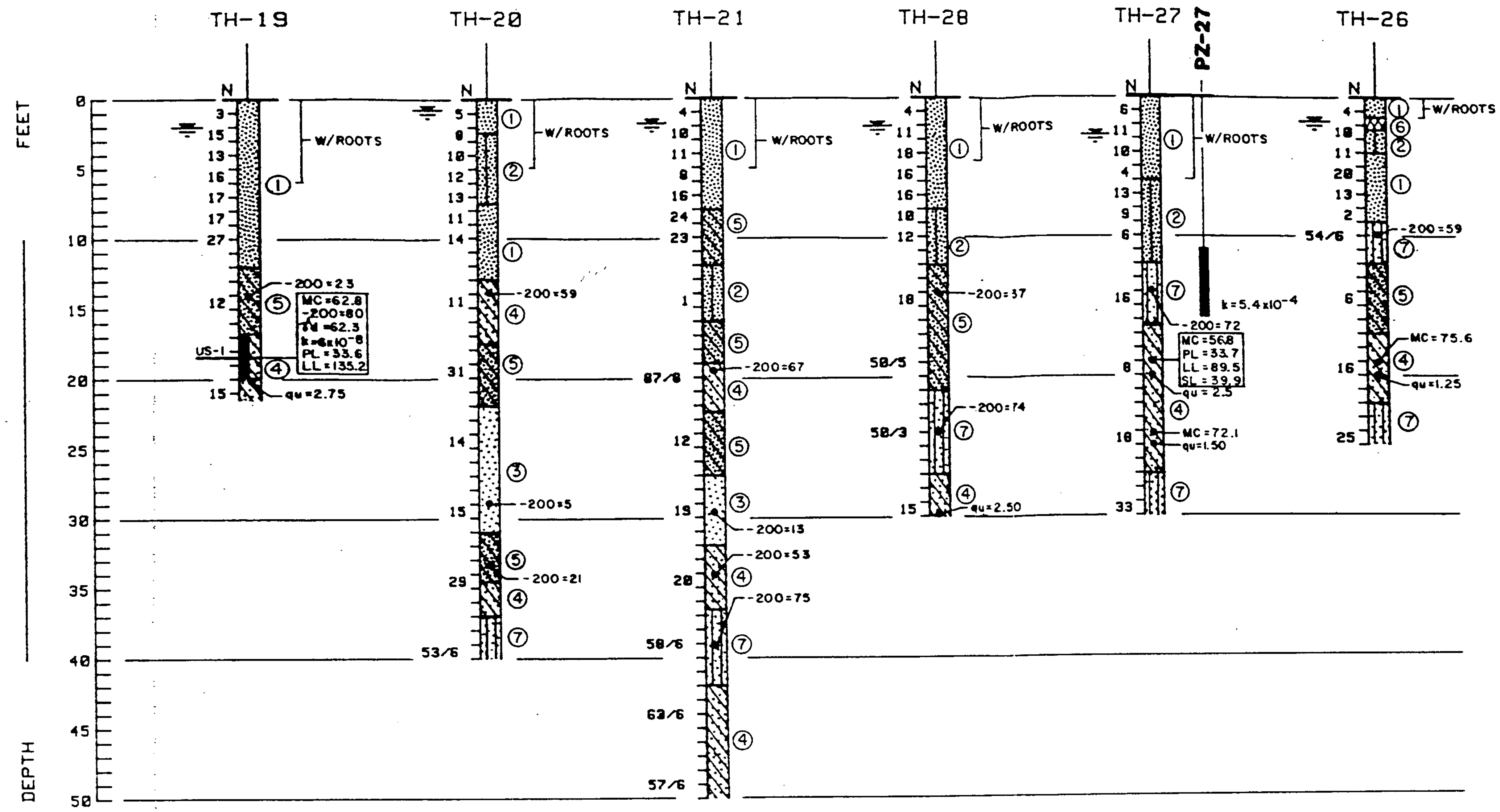
DESCRIPTION	UNCONFINED COMPRESSIVE STRENGTH, TSF	BLOW COUNT 'N'
VERY SOFT	BELOW .25	0 TO 2
SOFT	.25 TO .50	2 TO 4
MEDIUM STIFF	.50 TO 1.0	4 TO 8
STIFF	1 TO 2	8 TO 15
VERY STIFF	2 TO 4	15 TO 30
HARD	ABOVE 4	ABOVE 30

Ardaman & Associates, Inc.
Consulting Engineers in Soil Mechanics, Foundations, and Material Testing

HYDROGEOLOGICAL INVESTIGATION
LENA ROAD LANDFILL
MANATEE COUNTY, FLORIDA

DRAWN BY: R.J.F.	CHECKED BY: JF	DATE: 11/3/82
FILE NO. 82-7047	APPROVED BY: [signature]	

FIGURE 3.3



LEGEND

1. LIGHT GRAY TO GRAY AND LIGHT BROWN TO YELLOWISH BROWN FINE SAND
2. GRAY OR LIGHT BROWN TO YELLOWISH BROWN SLIGHTLY SILTY TO SILTY FINE SAND
3. GRAY AND BROWN MEDIUM TO FINE SAND TO SLIGHTLY SILTY FINE SAND WITH PHOSPHATES
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ENGINEERING CLASSIFICATION

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LOOSE	4 TO 10
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DENSE	30 TO 50
VERY DENSE	ABOVE 50

COHESIVE SOILS

DESCRIPTION	UNCONFINED COMPRESSIVE STRENGTH, TSF	BLOW COUNT 'N'
VERY SOFT	BELOW .25	0 TO 2
SOFT	.25 TO .50	2 TO 4
MEDIUM STIFF	.50 TO 1.0	4 TO 8
STIFF	1 TO 2	8 TO 15
VERY STIFF	2 TO 4	15 TO 30
HARD	ABOVE 4	ABOVE 30

"WHILE THE BORINGS ARE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT THEIR RESPECTIVE LOCATIONS AND FOR THEIR RESPECTIVE VERTICAL REACHES, LOCAL VARIATIONS CHARACTERISTIC OF THE SUBSURFACE MATERIALS OF THE REGION ARE ANTICIPATED AND MAY BE ENCOUNTERED. THE BORING LOGS AND RELATED INFORMATION ARE BASED ON THE DRILLER'S LOGS AND VISUAL EXAMINATION OF SELECTED SAMPLES IN THE LABORATORY. THE DELINEATION BETWEEN SOIL TYPES SHOWN ON THE LOGS IS APPROXIMATE AND THE DESCRIPTION REPRESENTS OUR INTERPRETATION OF SUBSURFACE CONDITIONS AT THE DESIGNATED BORING LOCATION AND ON THE PARTICULAR DATE DRILLED.

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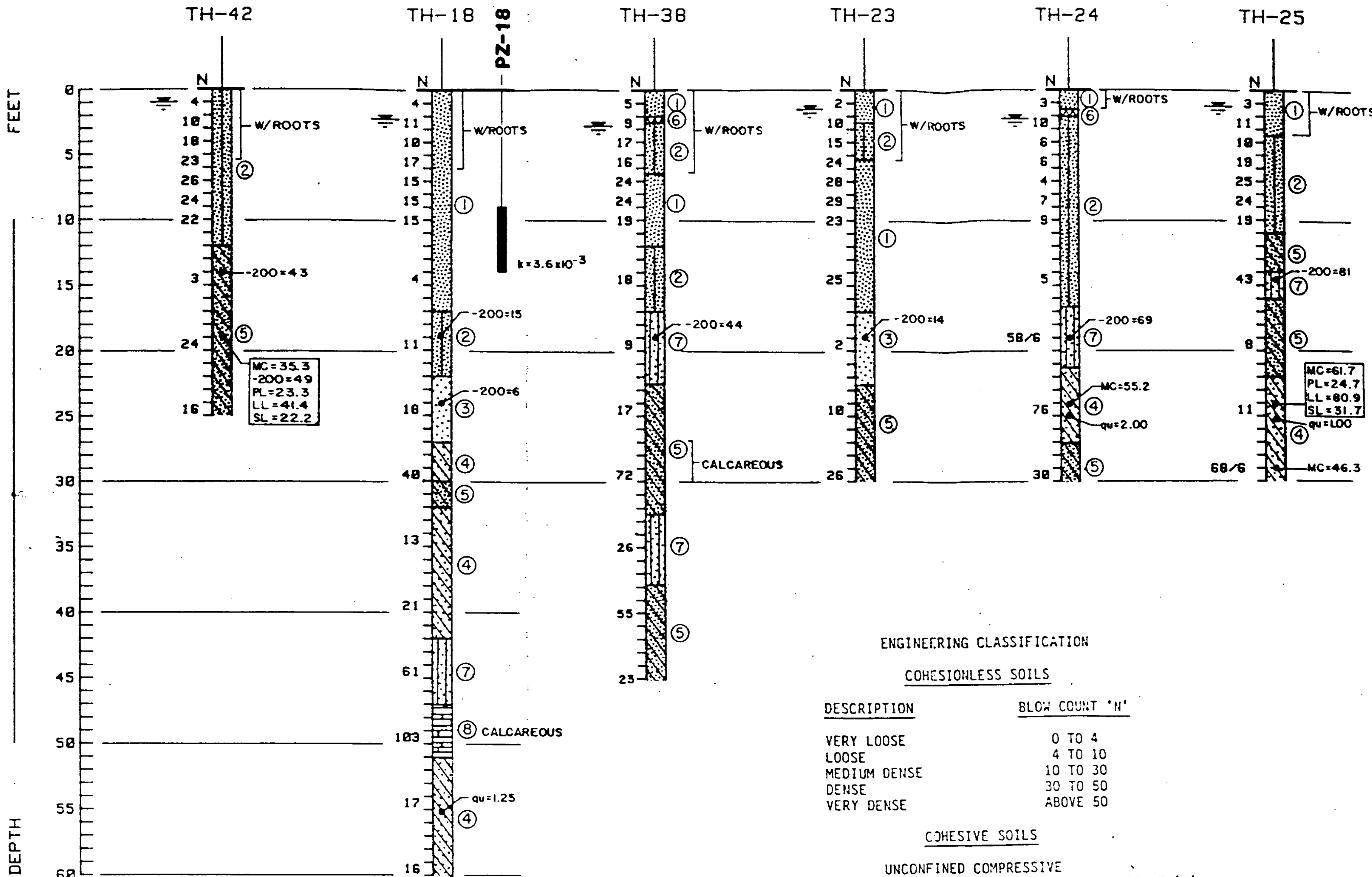
FIGURE 3.4



LEGEND

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8. SOLID ROCK

PZ	PIEZOMETER
	GROUND WATER LEVEL DATES DRILLED: 10/21/82 THROUGH 11/9/82
N	STANDARD PENETRATION RESISTANCE IN BLOWS PER FOOT
US-1	UNDISTURBED SAMPLE
50/3	50 BLOWS FOR 3 INCHES OF PENETRATION INTO THE SOIL
MC	MOISTURE CONTENT IN PERCENT
-200	PERCENT PASSING THE NO. 200 SIEVE
qu	UNCONFINED COMPRESSIVE STRENGTH IN tsf
γ_d	IN-SITU DRY DENSITY IN lb/ft^3
PL	PLASTIC LIMIT IN PERCENT
LL	LIQUID LIMIT IN PERCENT
SL	SHRINKAGE LIMIT IN PERCENT
k	COEFFICIENT OF PERMEABILITY IN cm/sec

ENGINEERING CLASSIFICATION

COHESIONLESS SOILS

DESCRIPTION	BLOW COUNT 'N'
VERY LOOSE	0 TO 4
LOOSE	4 TO 10
MEDIUM DENSE	10 TO 30
DENSE	30 TO 50
VERY DENSE	ABOVE 50

COHESIVE SOILS

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DRAWN BY: RJF	CHECKED BY:	DATE: 1/21/83
FILE NO. 82-7847	APPROVED BY: H.E. Stangland	

FIGURE 3.5

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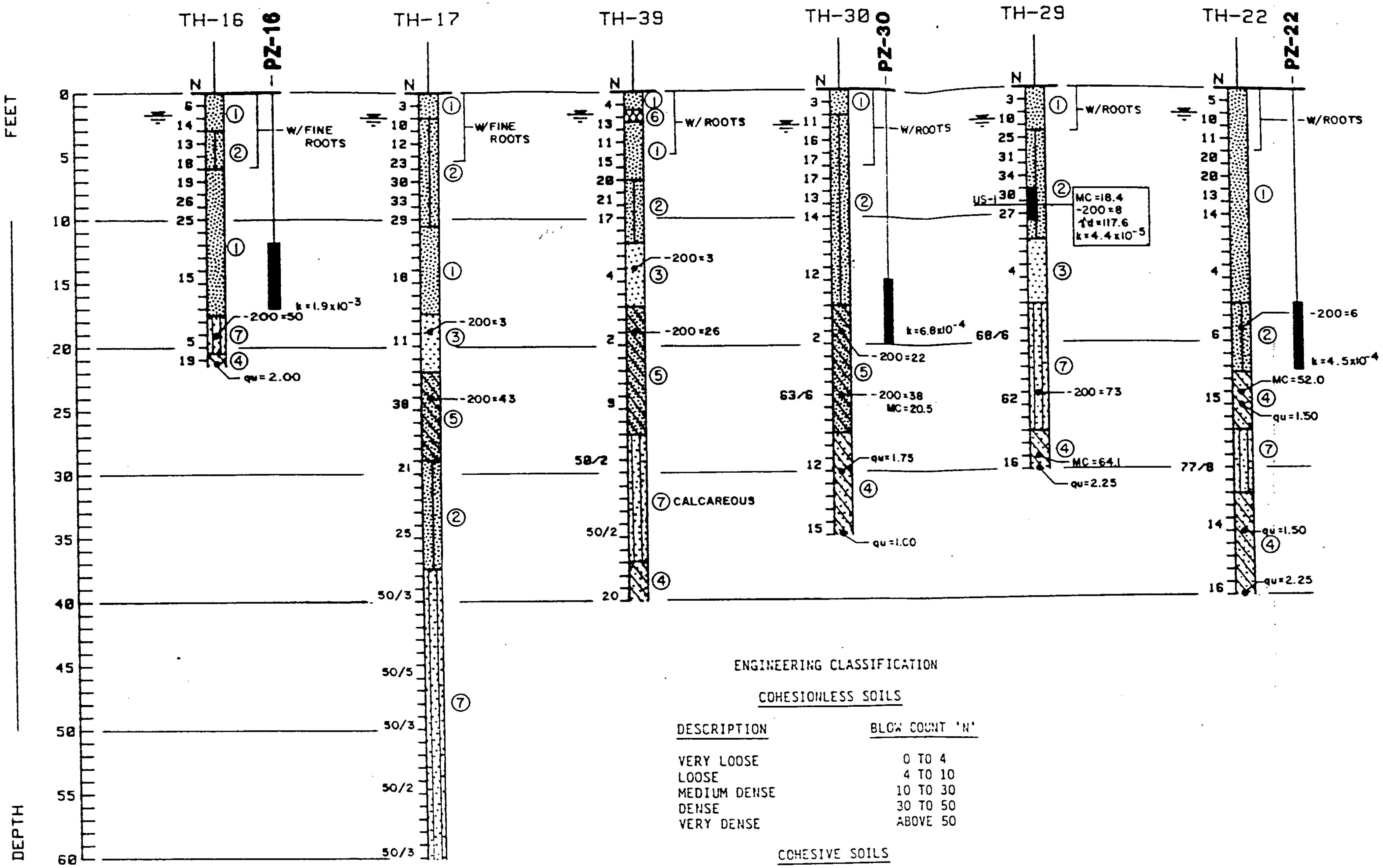

LEGEND

(1)	LIGHT GRAY TO GRAY AND LIGHT BROWN TO YELLOWISH BROWN FINE SAND
(2)	GRAY OR LIGHT BROWN TO YELLOWISH BROWN SLIGHTLY SILTY TO SILTY FINE SAND
(3)	GRAY AND BROWN MEDIUM TO FINE SAND TO SLIGHTLY SILTY FINE SAND WITH PHOSPHATES
(4)	GRAY AND GREEN OR BROWN TO LIGHT YELLOWISH BROWN CLAY AND SANDY CLAY WITH OCCASIONAL TRACES OF PHOSPHATES AND SEAMS OF FINE SAND
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PL	PLASTIC LIMIT IN PERCENT
LL	LIQUID LIMIT IN PERCENT
SL	SHRINKAGE LIMIT IN PERCENT
k	COEFFICIENT OF PERMEABILITY IN cm/sec

ENGINEERING CLASSIFICATION

COHESIONLESS SOILS

DESCRIPTION	BLOW COUNT 'N'
VERY LOOSE	0 TO 4
LOOSE	4 TO 10
MEDIUM DENSE	10 TO 30
DENSE	30 TO 50
VERY DENSE	ABOVE 50

COHESIVE SOILS

DESCRIPTION	UNCONFINED COMPRESSIVE STRENGTH, TSF	BLOW COUNT 'N'
VERY SOFT	BELOW .25	0 TO 2
SOFT	.25 TO .50	2 TO 4
MEDIUM STIFF	.50 TO 1.0	4 TO 8
STIFF	1 TO 2	8 TO 15
VERY STIFF	2 TO 4	15 TO 30
HARD	ABOVE 4	ABOVE 30

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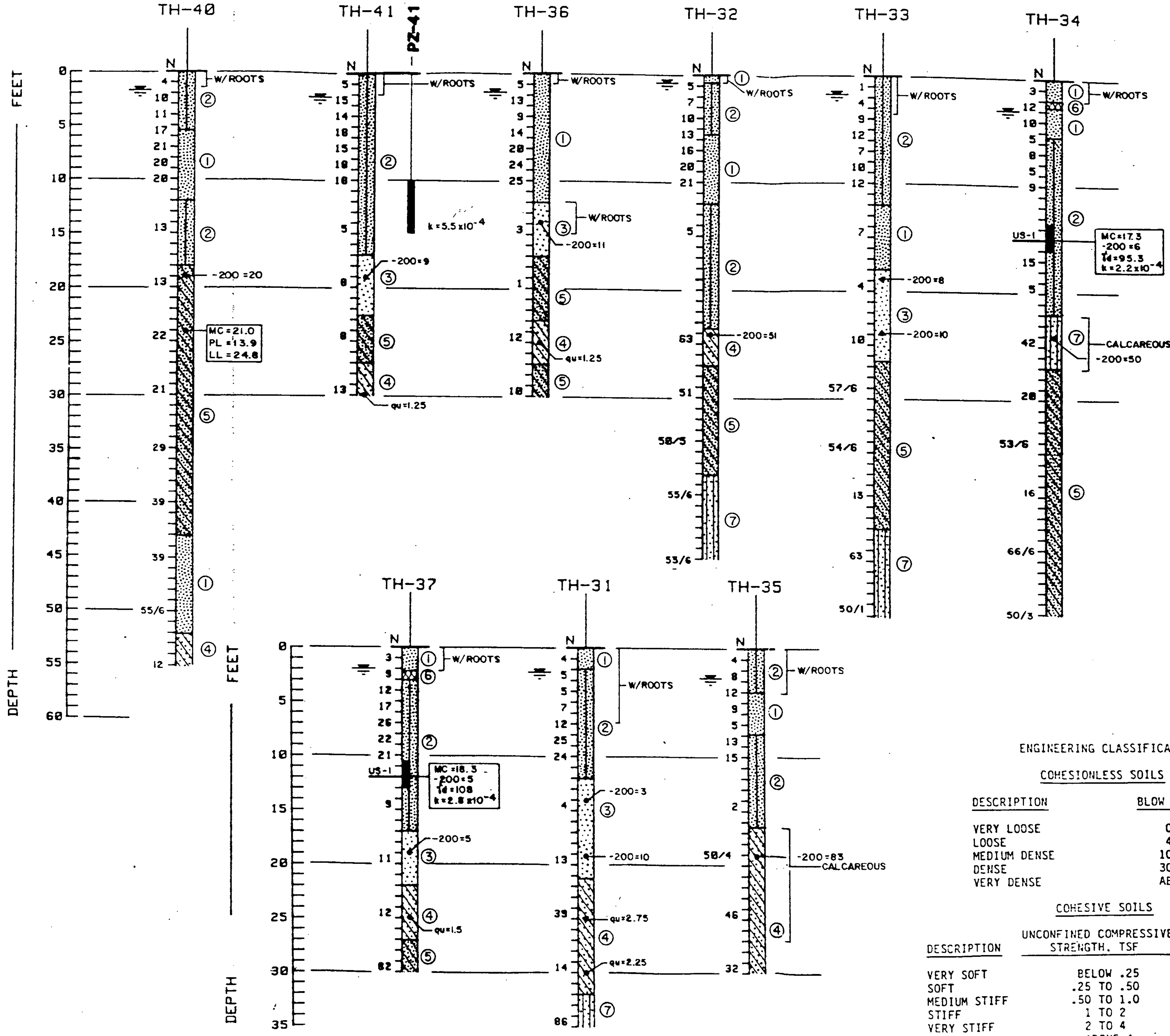
FIGURE 3.6



LEGEND

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③	GRAY AND BROWN MEDIUM TO FINE SAND TO SLIGHTLY SILTY FINE SAND WITH PHOSPHATES
④	GRAY AND GREEN OR BROWN TO LIGHT YELLOWISH BROWN CLAY AND SANDY CLAY WITH OCCASIONAL TRACES OF PHOSPHATES AND SEAMS OF FINE SAND
⑤	GRAY AND GREEN SLIGHTLY CLAYEY TO CLAYEY FINE SAND WITH OCCASIONAL TRACES OF PHOSPHATES, SHELL OR CEMENTED SAND
⑥	LIGHT REDDISH BROWN TO REDDISH BROWN SLIGHTLY SILTY TO SILTY FINE SAND WITH TRACES OF ROOTS (HARDPAN TYPE)
⑦	GRAY SANDY SILT AND SILT WITH OCCASIONAL TRACES OF CLAY AND PHOSPHATES
⑧	SOLID ROCK
PZ	PIEZOMETER
▼	GROUND WATER LEVEL DATES DRILLED: 10/21/82 THROUGH 11/9/82
N	STANDARD PENETRATION RESISTANCE IN BLOWS PER FOOT
US-1	UNDISTURBED SAMPLE
50/3	50 BLOWS FOR 3 INCHES OF PENETRATION INTO THE SOIL
MC	MOISTURE CONTENT IN PERCENT
-200	PERCENT PASSING THE NO. 200 SIEVE
qu	UNCONFINED COMPRESSIVE STRENGTH IN tsf
γ_d	IN-SITU DRY DENSITY IN lb/ft^3
PL	PLASTIC LIMIT IN PERCENT
LL	LIQUID LIMIT IN PERCENT
SL	SHRINKAGE LIMIT IN PERCENT
k	COEFFICIENT OF PERMEABILITY IN cm/sec

ENGINEERING CLASSIFICATION

COHESIONLESS SOILS

DESCRIPTION	BLOW COUNT 'N'
VERY LOOSE	0 TO 4
LOOSE	4 TO 10
MEDIUM DENSE	10 TO 30
DENSE	30 TO 50
VERY DENSE	ABOVE 50

COHESIVE SOILS

DESCRIPTION	UNCONFINED COMPRESSIVE STRENGTH, TSF	BLOW COUNT 'N'
VERY SOFT	BELOW .25	0 TO 2
SOFT	.25 TO .50	2 TO 4
MEDIUM STIFF	.50 TO 1.0	4 TO 8
STIFF	1 TO 2	8 TO 15
VERY STIFF	2 TO 4	15 TO 30
HARD	ABOVE 4	ABOVE 30

"WHILE THE BORINGS ARE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT THEIR RESPECTIVE LOCATIONS AND FOR THEIR RESPECTIVE VERTICAL REACHES, LOCAL VARIATIONS CHARACTERISTIC OF THE SUBSURFACE MATERIALS OF THE REGION ARE ANTICIPATED AND MAY BE ENCOUNTERED. THE BORING LOGS AND RELATED INFORMATION ARE BASED ON THE DRILLER'S LOGS AND VISUAL EXAMINATION OF SELECTED SAMPLES IN THE LABORATORY. THE DELINEATION BETWEEN SOIL TYPES SHOWN ON THE LOGS IS APPROXIMATE AND THE DESCRIPTION REPRESENTS OUR INTERPRETATION OF SUBSURFACE CONDITIONS AT THE DESIGNATED BORING LOCATION AND ON THE PARTICULAR DATE DRILLED.

GROUNDWATER ELEVATIONS SHOWN ON THE BORING LOGS REPRESENT GROUNDWATER SURFACES ENCOUNTERED ON THE DATES SHOWN. FLUCTUATIONS IN WATER TABLE LEVELS SHOULD BE ANTICIPATED THROUGHOUT THE YEAR. ABSENCE OF WATER SURFACE DATA ON CERTAIN BORINGS IMPLIES THAT NO GROUNDWATER DATA IS AVAILABLE, BUT DOES NOT NECESSARILY MEAN THAT GROUNDWATER WILL NOT BE ENCOUNTERED AT THESE LOCATIONS OR WITHIN THE VERTICAL REACHES OF THESE BORINGS."

Ardaman & Associates, Inc.
Consulting Engineers in Soil Mechanics, Foundations, and Material Testing

HYDROGEOLOGICAL INVESTIGATION
LENA ROAD LANDFILL
MANATEE COUNTY, FLORIDA

DRAWN BY: RJF	CHECKED BY:	DATE: 1/21/83
FILE NO. 82-7047	APPROVED BY: J.G. Stansland	

FIGURE 3.7

Chapter 4

LABORATORY TESTING RESULTS

4.1 Classification

In addition to visual classification of the recovered samples, Atterberg limits, grain size analyses, natural moisture contents and percent fines determinations were performed on representative samples of the soil types encountered in our drilling program. The grain size distribution curves are presented in Appendix A.2. The percent passing the No. 200 sieve (percent fines) for each analysis (either complete gradation or percent fines determination) as well as the natural moisture content are noted on Figures 3.2 through 3.7 adjacent to the sample's location in the soil profile.

One objective of the laboratory testing program was to determine the suitability of the clayey onsite soils for use as an "impermeable" top liner for final cover. The top liner would limit formation of leachate through lack of infiltration/percolation and also be acceptable for supporting the high quality grass cover necessary for a golf course. Samples of the clayey soils (Stratum Numbers 4 and 5) were tested to establish their suitability as an impermeable top liner.

Atterberg limits were determined on various soil samples of Strata 4 and 5 using ASTM Nos. D-423, D-424 methodology. The Atterberg limits are used in the Unified Soil Classification System as described in ASTM D-2487. Test results are presented on Figures 3.2 through 3.7 adjacent to the sample tested. Table 4.1 summarizes the Atterberg limits data.

According to the Unified Soil Classification System Stratum 4 is classified as a highly plastic, inorganic clay or sandy clay (i.e., CH). Typical characteristics of this type material when compacted are presented in Table 4.2. Stratum 5 is classified as a clayey sand (i.e., SC). Typical characteristics for compacted clayey materials are presented in Table 4.2.

4.2 Compaction Tests

Standard Proctor tests were performed on composite remolded samples of Strata 4 and 5 according to ASTM D-698. The results of these tests are presented in Figures 4.1 and 4.2. The maximum dry unit weight at optimum water content was 79.5 and 105.5 pounds per cubic foot (PCF) for Stratum 4 and 5, respectively. The optimum water content was 21.8 percent and 16.9 percent for Stratum 4 and 5, respectively.

For each compactive effort there is a unique water content-dry unit weight relationship. For each unique relationship the maximum density occurs at a unique optimum water content. For example, the maximum density value using the Standard Proctor compactive effort on Stratum 5 soil was achieved at an optimum water content of 16.9 percent. However, if the modified compactive effort had been used, the maximum density value would have been achieved at an optimum water content less than this value. Wet of the optimum water content the relationship reduces to a common curve, i.e., wet of optimum water content different compactive efforts yield a density which is dependent only on the water content.

Samples of Stratum 5 soil were compacted at water contents at and below optimum to determine the relationship between the coefficient of permeability, water content and compactive effort. One sample was compacted just dry of optimum at a water content of 15 percent while a second sample was compacted wet of optimum at a water content of 21.8 percent. Permeability of the sample compacted dry of optimum was 1.6×10^{-7} cm/sec and the sample compacted wet of optimum was 1.2×10^{-8} cm/sec. The test results indicate that the permeability value is lower when the sample is compacted wet of optimum than when it is compacted dry of the optimum water content for a given compactive effort.

4.3 Permeability Tests

Permeability tests were conducted on eight undisturbed samples, five from the surficial aquifer (sands) and three from the first clay layer (clays). Falling head tests performed on the fine sand samples resulted in permeability values ranging between 6.2×10^{-3} cm/sec and 1.2×10^{-6} cm/sec. Constant head tests were performed on the clay under a back pressure to ensure specimen saturation. These tests produced values between 6×10^{-8} cm/sec to 5.9×10^{-9} cm/sec. All eight permeability values are noted on Figures 3.2 through 3.7 adjacent to the sample's location. The laboratory test results are also summarized in Table 4.3.

4.4 Water Quality Monitoring

CW-1, CW-2, and CW-3 are county monitor wells as part of their current monitoring program under their existing FDER permit. These wells were installed by others prior to the start of this hydrogeological investigation. Data were collected August 30 and September 1, 1982 from wells CW-1, 2 and 3 which had galvanized steel well points. These data indicated high levels of iron and zinc. Subsequent analyses of water collected November 15, 1982 (Table 4.4) from newly installed PVC wells at the same locations resulted in a significant drop in zinc verifying its originating with the galvanized screen. Iron levels dropped somewhat to levels judged to be naturally occurring background values. Concentrations above the maximum contaminant levels (MCL) were noted for iron, lead and chromium in all three wells. Well CW-2 water and well CW-1 water was at the MCL and above the MCL for mercury, respectively. Well CW-3 water was above the MCL for chloride and in well CW-1 water was above the MCL for nitrate.

On November 15, 1982 the following wells were sampled to document water quality conditions along the perimeter of the landfill: MW-1, -2, -3, -4, -5, -6, -7 and -8. The data are presented in Table 4.4. Wells MW-2, 5 and 8 had waters that exceeded the MCL for chromium and lead and were at the MCL for mercury. Wells MW-7 and 8 had waters that exceeded the MCL for chloride and MW-2 and -3 had waters that appear to be above the estimated background levels for total dissolved solids and chlorides. These data support the resistivity results that indicate: 1) a leachate plume (high chlorides, chromium, lead, mercury) has exited the existing site between TH-14 and TH-15; 2) deteriorated water quality exists at MW-2 and -3 along the west side of the site; and 3) the best quality water is found along the east side.

In January, 1983 water samples were taken from four wells in the area of the future landfill, TH-16, 22, 27 and 41, to document background water quality and determine nature of leachate plume. Results are presented in Table 4.4 and the data indicate that three of the four wells have background water quality. TH-41 water shows "high" values of nitrate and chloride and exceeds the MCL for chromium. Plume movement appears to be to the northeast in the direction of TH-41.

4.5 Cation Exchange Capacity

Two cation exchange capacities were performed on composite samples of the first clay layer and the fine sand which comprises the surficial aquifer. The cation exchange capacities ranged from 1.1 to 16.2 meq/100 grams for slightly silty to silty fine sand and clay, respectively.

Table 4.1

ATTERBERG LIMIT RESULTS

Sample	Stratum	Natural Moisture Content	Percent Fines (-200)	Liquid Limit	Plastic Limit	Plasticity Index	Shrinkage Limit
TH-9	4	37.3	92	68.97	16.6	52.1	-
TH-15	4	37.4	86	71.1	16.4	54.7	-
TH-19	4	62.8	80	135.2	33.6	101.6	-
TH-25	4	61.7	-	80.9	24.7	56.2	31.7
TH-27	4	56.8	-	89.5	33.7	55.8	39.9
TH-40	5	21.0	-	24.8	13.9	10.9	-
TH-42	5	35.3	49	41.4	23.3	18.1	22.2

All values are in percentages.

Table 4.2

TYPICAL PROPERTIES OF COMPACTED MATERIALS

Group Symbol	Soil Type	Range of Maximum Dry Unit Weight, pcf	Range of Optimum Moisture, Percent	Typical Value of Compression, Percent of Original Height: At 1.4 tsf (20 psi)	At 3.6 tsf (50 psi)	Typical Strength Characteristics: Cohesion (as compacted) psf	Cohesion (saturated) psf	(Effective Stress Envelope) degrees	Tan	Typical Coefficient of Permeability ft/min.	Range of CBR Values	Range of Subgrade Modulus k lb/cu.in.
GW	Well graded clean gravels, gravel-sand mixtures	125-135	11-8	0.3	0.6	0	0	38	0.79	5×10^{-2}	40-80	300-500
GP	Poorly graded clean gravels, gravel-sand mix	115-125	14-11	0.4	0.9	0	0	37	0.74	10^{-1}	30-60	250-400
GM	Silty gravels, poorly graded gravel-sand silt	120-135	12-8	0.5	1.1	...	...	34	0.67	10^{-6}	20-60	100-400
GC	Clayey gravels, poorly graded gravel-sand-clay	115-130	14-9	0.7	1.6	...	...	31	0.60	10^{-7}	20-40	100-300
SW	Well graded clean sands, gravelly sands	110-130	16-9	0.6	1.2	0	0	38	0.79	10^{-3}	20-40	200-300
SP	Poorly graded clean sands, sand-gravel mix	100-120	21-12	0.8	1.4	0	0	37	0.74	10^{-3}	10-40	200-300
SM	Silty sands, poorly graded sand-silt mix	110-125	16-11	0.8	1.6	1050	420	34	0.67	5×10^{-5}	10-40	100-300
SM-SC	Sand-silt clay mix with slightly plastic fines	110-130	15-11	0.8	1.4	1050	300	33	0.66	2×10^{-6}	-	
SC	Clayey sands, poorly graded sand-clay mix	105-125	19-11	1.1	2.2	1550	230	31	0.60	5×10^{-7}	5-20	100-300
ML	Inorganic silts and clayey silts	95-120	24-12	0.9	1.7	1400	190	32	0.62	10^{-5}	15 or less	100-200
ML-CL	Mixture of inorganic silt and clay	100-120	22-12	1.0	2.2	1350	460	32	0.62	5×10^{-7}	-	
CL	Inorganic clays of low to medium plasticity	95-120	24-12	1.3	2.5	1800	270	28	0.54	10^{-7}	15 or less	50-200
OL	Organic silts and silt-clays, low plasticity	80-100	33-21	...	...	...	...	...	...	...	5 or less	50-100
MH	Inorganic clayey silts, elastic silts	70-95	40-24	2.0	3.8	1500	420	25	0.47	5×10^{-7}	10 or less	50-100
CH	Inorganic clays of high plasticity	75-105	36-19	2.6	3.9	2150	230	19	0.35	10^{-7}	15 or less	50-150
OH	Organic clays and silty clays...	65-100	45-21	...	...	...	...	...	...	...	5 or less	25-100

Notes:

1. All properties are for condition of "standard Proctor" maximum density, except values of k and CBR which are for "modified Proctor" maximum density.
2. Typical strength characteristics are for effective strength envelopes and are obtained from USBR data.
3. Compression values are for vertical loading with complete lateral confinement.
4. ( ) indicates that typical property is greater than the value shown. (...) indicates insufficient data available for an estimate.

Source: NAVFAC, 1971

Table 4.3

SUMMARY OF PERMEABILITY TESTS

Test No.	Test Hole	Depth (feet)	Classification Unified	Classification % Minus 200 Sieve	Type of Test	Specimen Type	Dry Density (PCF)	Coeff. of Permeability (cm/sec)	Void Ratio Assumed Gs=2.65
1	TH-11	1.0-3.0	SP	3	F	U	98.7	6.2×10^{-3}	0.68
2	TH-29	8.0-10.5	SP-SM	8	F	U	106.6	4.4×10^{-5}	0.55
3	TH-34	13.5-16.0	SP-SM	6	F	U	108.5	2.2×10^{-4}	0.52
4	TH-37	10.5-13.0	SP-SM	5	F	U	107.9	2.8×10^{-4}	0.53
5	TH-9	17.5-19.5	CH	92	C	U	78.1	1.7×10^{-8}	1.12
6	TH-13	7.5-10.0	SP-SM	7	C	U	106.9	1.2×10^{-6}	0.55
7	TH-15	17.5-19.5	CH	86	C	U	77.2	5.9×10^{-9}	1.14
8	TH-19	17.0-20.0	CH	80	C	U	59.8	6.0×10^{-8}	1.76
9	TH-42	15.0-20.0	SC	44	C	R	105.8	1.2×10^{-8}	0.56
10	TH-42	15.0-20.0	SC	43	C	R	110.0	1.6×10^{-7}	0.50

Table 4.4

WATER QUALITY TEST RESULTS

Parameter (units) Sampling Date:	CW-1 (82-955) 11-15-82	CW-2 (82-956) 11-15-82	CW-3 (82-957) 11-15-82	MW-2 (82-959) 11-15-82	MW-5 (82-962) 11-15-82	MW-8 (82-965) 11-15-82
Conductivity (umhos)	313	434	1,400	652	240	4,270
Nitrate (mg N/L)	175	2.0	0.3	-	-	-
Iron (mg Fe/L)	4.5	5.5	29	17	5.5	27
Ammonia (mg N/L)	<0.3	<0.3	<0.3	-	-	-
pH (units)	8.90	8.70	8.70	7.95	8.20	8.85
Chloride (mg Cl/L)	49	35	315	116	38	400
Sulfate (mg SO_4/L)	20*	110*	21*	-	-	-
Chemical Oxygen Demand (mg/L)	124	119	230	-	-	-
Biological Oxygen Demand (mg/L)	8.2	26	21	-	-	-
Cadmium (mg Cd/L)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Chromium (mg Cr/L)	0.06	0.09	0.11	0.08	0.13	0.08
Copper (mg Cu/L)	<0.05	0.06	0.07	-	-	-
Mercury (mg Hg/L)	0.003	0.002	<0.002	0.002	0.002	0.002
Lead (mg Pb/L)	0.17	0.15	0.17	0.16	0.16	0.16
Zinc (mg Zn/L)	2.6	3.3	2.4	-	-	-
Color (Pt.Co. Units)	120*	30*	50*	50*	120*	250*
Arsenic (mg As/L)	-	-	-	0.010	<0.010	<0.010
Barium (mg Ba/L)	-	-	-	0.15	0.07	0.18
Silver (mg Ag/L)	-	-	-	<0.05	<0.05	<0.05

*Note: All color results on filtered samples (0.45 u) due to interferences in test from particulates.

Table 4.4 (cont'd)

WATER QUALITY TEST RESULTS

Parameter (units) Sampling Date:	MW-1 (82-958) 11-15-82	MW-3 (82-960) 11-15-82	MW-4 (82-961) 11-15-82	MW-6 (83-963) 11-15-82	MW-7 (82-964) 11-15-82
Conductivity (umhos)	204	696	239	402	5,130
Chlorides mg (Cl/L)	33	107	35	32	567
Iron (mg Fe/L)	6.1	8.8	4.9	24	22
Color (Pt.Co. Units)	100*	40*	40*	600*	250*
pH (units)	8.45	6.90	7.70	8.20	8.80

*Note: All color results on filtered samples (0.45 u) due to interferences in test from particulates.

Table 4.4 (cont'd)

WATER QUALITY TEST RESULTS

Parameter (units) / Sampling Date:	TW-16 (83-060) 1/83	TW-22 (83-061) 1/83	TW-27 (83-062) 1/83	TW-41 (83-063) 1/83
Conductivity (umhos)	339	400	487	579
Nitrate (mg N/L)	1.0	2.8	1.5	9.8
Iron (mg Fe/L)	8.8	0.40	6.9	13.8
pH (units)	6.50	10.80	6.80	7.10
Chloride (mg Cl/L)	32	22	50	82
Color (Pt.Co. units)	25*	20*	20*	100*
Arsenic (mg As/L)	<0.01	<0.01	<0.01	<0.01
Barium (mg Ba/L)	<0.20	<0.20	<0.20	0.20
Cadmium (mg Cd/L)	<0.01	<0.01	<0.01	<0.01
Chromium (mg Cr/L	<0.05	<0.05	<0.05	0.20
Lead (mg Pb/L)	<0.05	<0.05	<0.05	<0.05
Mercury (mg Hg/L	<0.002	<0.002	<0.002	<0.002
Silver (mg Ag/L)	<0.05	<0.05	<0.05	<0.05

*Note: All color results on filtered samples (0.45 u) due to interferences in test from particulates.

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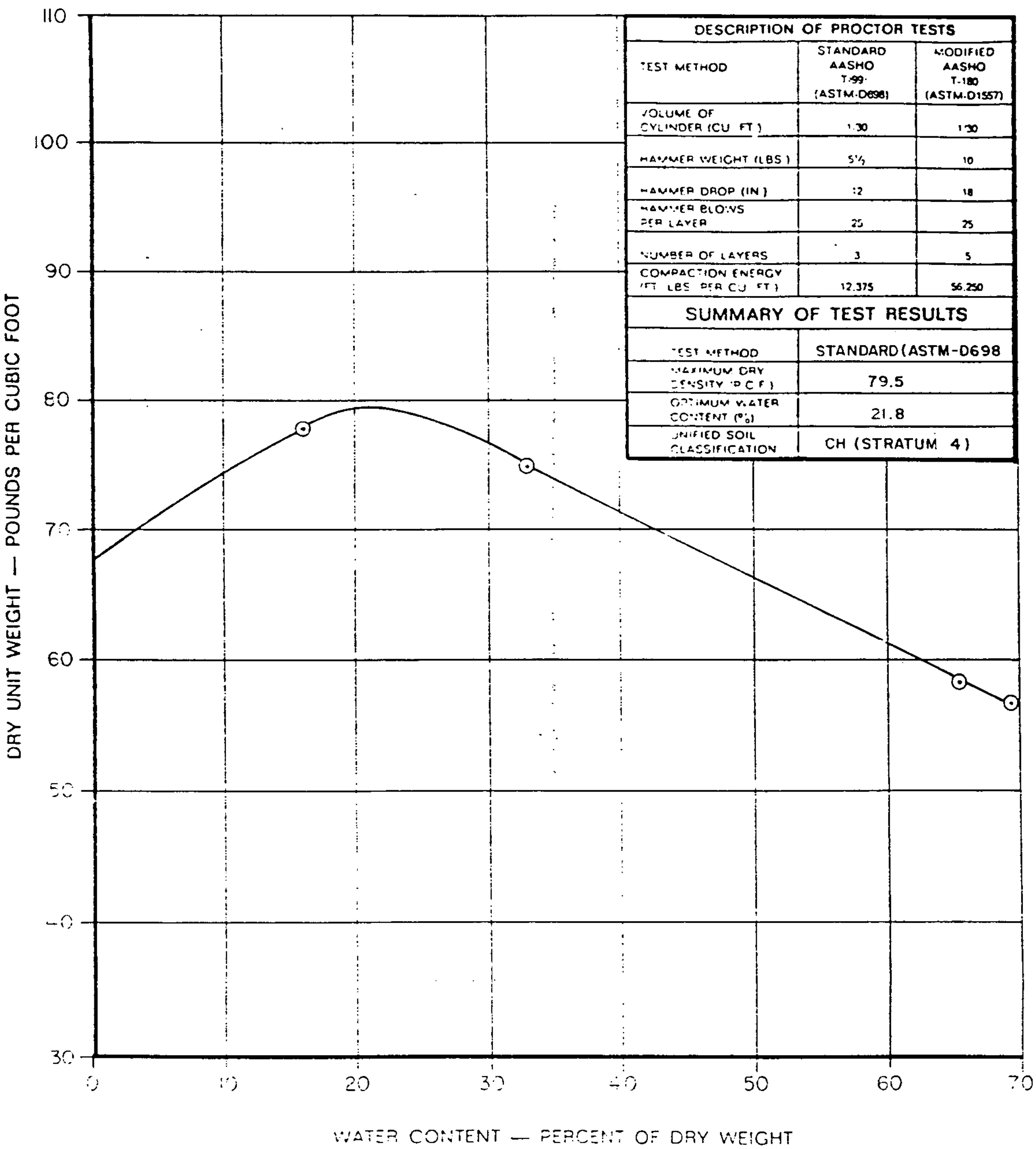

DESCRIPTION OF PROCTOR TESTS		
TEST METHOD	STANDARD AASHO T-99 (ASTM-D698)	MODIFIED AASHO T-180 (ASTM-D1557)
VOLUME OF CYLINDER (CU FT)	1/30	1/30
HAMMER WEIGHT (LBS)	5½	10
HAMMER DROP (IN)	12	18
HAMMER BLOWS PER LAYER	25	25
NUMBER OF LAYERS	3	5
COMPACTION ENERGY (FT LBS PER CU FT)	12,375	56,250

SUMMARY OF TEST RESULTS	
TEST METHOD	STANDARD (ASTM-D698
MAXIMUM DRY DENSITY (P C F)	79.5
OPTIMUM WATER CONTENT (%)	21.8
UNIFIED SOIL CLASSIFICATION	CH (STRATUM 4)

MOISTURE-DENSITY RELATIONSHIP

Ardaman & Associates, Inc.
Consulting Engineers in Soil Mechanics, Foundations, and Material Testing

HYDROGEOLOGICAL INVESTIGATION
LENA ROAD LANDFILL
MANATEE COUNTY, FLORIDA

DRAWN BY: H	CHECKED BY:	DATE: 2/28/83
FILE NO. 92-7047	APPROVED BY:	

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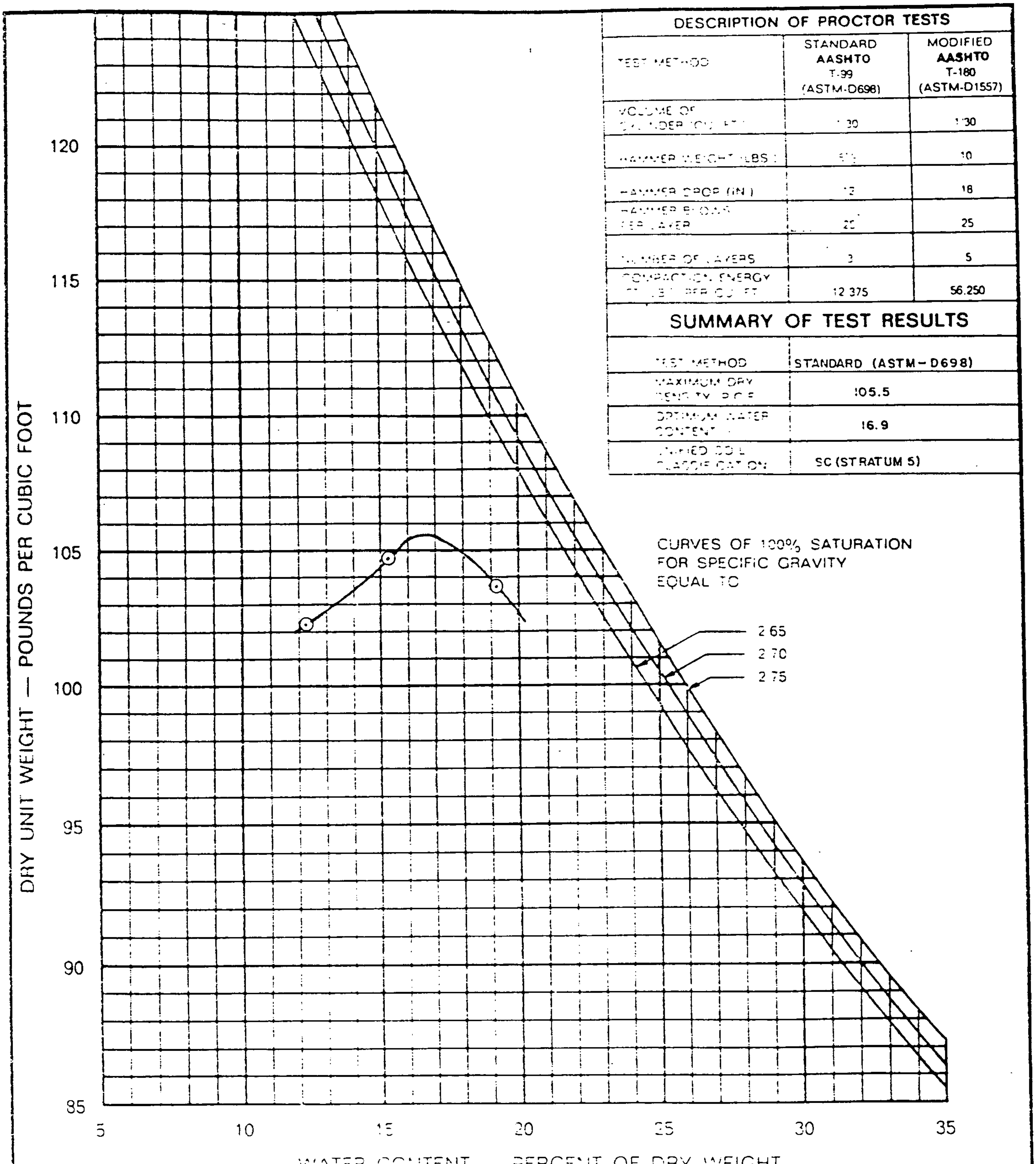
DESCRIPTION OF PROCTOR TESTS		
TEST METHOD	STANDARD **AASHTO** T-99 (ASTM-D698)	MODIFIED **AASHTO** T-180 (ASTM-D1557)
VOLUME OF CYLINDER (CU. FT.)	1/30	1/30
HAMMER WEIGHT (LBS.)	5½	10
HAMMER DROP (IN.)	12	18
HAMMER BLOWS PER LAYER	25	25
NUMBER OF LAYERS	3	5
COMPACTION ENERGY (FT. LBS.) PER CU. FT.	12 375	56.250

SUMMARY OF TEST RESULTS	
TEST METHOD	STANDARD (ASTM-D698)
MAXIMUM DRY DENSITY, P.C.F.	105.5
OPTIMUM WATER CONTENT, %	16.9
UNIFIED SOIL CLASSIFICATION	SC (STRATUM 5)



SOIL DESCRIPTION:

☐ NATURAL GROUND

MOISTURE - DENSITY RELATIONSHIP

HYDROGEOLOGICAL INVESTIGATION
LENA ROAD LANDFILL
MANATEE COUNTY, FLORIDA

Ardaman & Associates, Inc.
CONSULTING ENGINEERS IN
SOIL SCIENCES AND MATERIALS TESTING

File No. 2-7047

FIGURE 4.2

Chapter 5

ANALYSES

5.1 Leachate Collection System

The proposed design concept to control and collect leachate at the subject site is to deepen the existing perimeter ditch system to 10 to 15 feet below the land surface around the east, west and south perimeter of the site and to install a slurry wall and underdrain system along the northern perimeter of the site. This would place the bottom of the collection ditch always below the lowest anticipated groundwater level. The maximum "dry season" water table depth in this area is anticipated not to exceed 4 to 5 feet lower than the depths recorded during our field investigation program. Near the west ditch the "maximum" water-table depth could approach 10 feet. Maintenance of the ditch water level below the natural water table would be necessary to intercept any leachate and prevent leachate from moving beyond the ditch. The water in the ditch would be pumped back onto the site for recycling and/or treatment as needed. The existing county equipment could excavate this ditch system. In order for this system to be effective, the eight monitoring wells already installed around the existing landfill would have to be monitored carefully and regularly to make sure that the ditch water level is maintained approximately one foot below the natural groundwater level. A similar system of monitoring wells would also have to be installed around the proposed expansion landfill area for utilization of this design system.

The amount of leachate which must be collected and the height of the groundwater mound beneath the landfill are a function of the steady state percolation through the landfill at the end of development and the transmissivity of the surficial aquifer. The following table presents the predicted range in height of the groundwater mound at the center of the landfill and the leachate which must be collected for a fill of 30 feet above existing natural land surface (i.e., above 35 feet NGVD) for different values of the steady state percolation and for a permeability range for the surficial aquifer of 1 to 10 feet per day.

Steady State Percolation (in/year)	Elevation of Groundwater Mound at Center of Landfill (ft NGVD)	Leachate to be Collected (gpm)
	Ditch	Ditch
0.4	31-39	10
2.0	35-53	75
4.0	38-65	90

The actual rate of percolation through the landfill will depend on the amount of runoff from the completed landfill, which is a function of the permeability of the top cover and the final topography of the reclaimed landfill. During construction and early years of a cell life, most of the percolation would be absorbed by the refuse. After close out of the landfill, placement of a relatively impervious top cover over the fill will limit the amount of leachate produced by minimizing downward percolation through the landfill.

5.2 Water Balance

The water balance for a landfill includes rainfall, evapotranspiration, runoff and percolation. To minimize percolation and thus limit the formation of leachate, runoff from the landfill must be encouraged. A cell initially will absorb most of the rainfall infiltrating the cells. The amount of runoff from a completed landfill is a function of the permeability of the top cover and the final topography of the reclaimed landfill. Evapotranspiration can range from less than 40 inches per year under natural conditions to over 60 inches per year for a high quality irrigated turf grass. The annual rainfall rate is approximately 56 inches.

Two water balance calculations were performed utilizing the method described in EPA, 1975. The first calculation was based on a non-irrigated grass cover and produced no infiltration/percolation each year.

The second water balance calculation was based on an irrigated turf grass. Using potential evapotranspiration for the grass (McCloud, 1970), the necessary irrigation amounts were generated to replenish soil moisture each month. Table 5.1 shows this water balance calculation. Percolate was 0.48 inches per year occurring in January and February during months when no irrigation was needed.

5.3 Top Cover Considerations

The following geotechnical factors must be considered in designing the top cover for a sanitary landfill:

- Availability of borrow materials
- Permeability of borrow materials
- Workability of borrow materials
- Type of cover crop and root development

A golf course is being considered for the subject site after close-out, the top cover must be capable of supporting a high quality grass cover and the water balance must include year-round irrigation. As shown in the preceding section, irrigation water will result in minimal percolation if it is applied only as required. However, proper management of the irrigation system is essential if long-term collection/treatment of leachate is to be avoided. Furthermore, the rate and amount of decomposition of the organic portions of the refuse is directly related to the available moisture which fuels the process. Therefore, excess irrigation could also lead to large differential settlements of the golf course elements.

Soil texture, soil thickness, and water table location are properties of soils important in achieving a high quality grass cover. A clayey sand is the preferred soil texture because it has a relatively high available moisture and nutrient holding capacity and because it does not soften excessively if saturated.

Roots for turf grass penetrate 1 to 2 feet into the ground; therefore, it is desirable to have at least two feet of soil depth for root development. Shallow root systems are not desirable for a high quality grass.

The proposed borrow material for the top liner is a clayey fine sand of low to medium plasticity. It also has a low to medium shrink/swell potential (Peck, Hanson & Thornburn, 1974). Although the shrinkage limit for this soil may vary over a wide range depending on fines composition, it is generally expected to be close to or less than the compaction optimum moisture content. To prevent shrinkage cracks from developing in the top liner, it must be compacted at or below the shrinkage limit or it must be protected against surface desiccation by burying it below a layer of soil with no crack potential. The top layer must also provide a suitable root zone for the grass cover. Since in this project it is desirable to compact the top liner material at a moisture content wet of optimum in order to achieve the lowest permeability, a surface layer with no crack potential would be the alternative for negating the potentially damaging effects of surface desiccation. Therefore, the proposed design should include a surface cover of the more sandy top soils (minus 200 less than 20%) twelve (12) inches thick over the "impermeable" clayey sand blanket. The "impermeable" blanket should be a minimum thickness of 18 inches.

Based on the available subsoil data it is estimated that a total of 500,000 cubic yards of clayey fine sand (Stratum 5), are suitable for use as a relatively impervious top liner material. This amount is enough to provide a 1.0-foot thick relatively impervious top liner for the refuse to be contained in Parcels A and B. All of the required borrow should be available in the areas which have been designated for construction of leachate or retention ponds. Additional material, if required, may be obtained by mixing the highly plastic clay material (Strata 4) with the sandy near surface soils to obtain a workable material. In its natural state, Stratum 4 is not suitable as a construction material due to its highly plastic condition.

The borrow material should have a percent fines (i.e., percent by weight passing the U.S. No. 200 standard sieve) content of at least 20 percent by dry weight so that the desired after compaction permeability is obtained. Figure 5.1 presents the relationship between percent fines and permeability which was determined for the site soils and from our experience with similar *in situ* soils in Manatee County. Strict quality control of the top liner with respect to density, compaction, moisture content, gradation and plasticity of the material is essential to satisfactory performance of the top liner blanket. Testing indicated that the clayey sand materials are in a natural state which will enable them to be worked easily if reasonable care and judgement is used during the excavation and compaction operations.

The remolded compacted clayey fine sand soil (Stratum 5) has a measured permeability ranging between 10^{-5} and 10^{-8} cm/sec depending upon the compaction moisture content and the fines content. Compaction wet of optimum results in lower permeabilities for a given fines content than compaction dry of optimum. The borrow material should be placed in thin, (8-inch thick, loose) lifts and compacted with a sheepsfoot roller or loaded scraper pans to 95 percent of the standard Proctor dry density.

In-place densities of the rolled fill sould be frequently checked during construction. In addition, the gradation and plasticity of the borrow material should be checked on a regular basis and representative samples selected for permeability testing. Single point Standard Proctor compaction tests on material with a moisture content equal to or less than optimum should also be performed frequently to document the maximum dry density of the borrow material.

The extent of available and suitable cover material should be more accurately defined. This could be accomplished relatively inexpensively with a grid of auger borings spaced 300 feet on centers. These auger borings averaging 30 feet deep, combined with existing data would provide sufficient detail to accurately estimate available borrow. At present, it is expected that suitable clayey fine sand borrow (Stratum 5) will be located approximately between 20 to 40 feet below existing ground surface as indicated by the results of our test borings. Dewatering to lower the water table may be necessary to facilitate excavation operations. The use of the dragline method of excavation would most likely be the most efficient and cost effective method for obtaining the clayey materials. Another factor to be considered is the stockpiling of the sandy overburden soils which must be removed to reach the clayey stratum.

5.4 Bottom Liner

Forty-one of the 42 test borings conducted at this site, encountered clay, silt or very clayey sand which can be defined as impermeable. The only boring not encountering an impervious stratum was TH-8 which was a shallow boring only 16 feet deep. All of the deep borings, i.e., ±60 feet, encountered thick dense strata of fine grained (i.e., clay and silt) impervious soils. These strata represent the upper units of the confining Hawthorn Formation which separates the surficial aquifer from the artesian aquifer systems. This confining bed has good continuity in this area and will effectively prevent downward percolation of leachate.

5.5 Settlement Considerations

Settlement of sanitary landfills are caused by a number of complex and interrelated mechanisms:

- Mechanical: Distortion, bending, crushing and reorientation of the materials, similar to the consolidation of organic soils.
- Ravelling: The erosion or sifting of fine materials into the voids between large particles.
- Physio-Chemical Change: Corrosion, oxidation and combustion.
- Bio-Chemical Decay: Fermentation and decay, both aerobic and anerobic.
- Interaction: Methane from bio-chemical decay may support combustion, ignited spontaneously from the heat of decay. Organic acids from decay may produce corrosion; volume changes from consolidation may trigger ravelling.

Of these mechanisms, only the first is load related and can be analyzed in terms of the stresses involved. The other mechanisms are related to the environment: air, moisture, and temperature and other local conditions including the percolation of ground water. A waste fill is dynamic, changing with the environment and partially creating its own environment. For example, temperatures 60°F (33C) above ambient are common during biochemical decay. Decay utilizes moisture and the oxygen in the air voids to form carbon dioxide; when the oxygen is depleted, methane is produced which is poisonous and flammable.

Mechanical settlement due to an applied load (i.e., surcharge or structural) or from the consolidation of the fill under the weight of the fill materials themselves, causes the void spaces between and within the solids to be compressed and the settlement corresponds to volume change. This initial primary phase of settlement is normally complete in less than one month.

Settlement produced by ravelling and combustion is erratic and cannot be predicted. When the fill consists of large solids with open spaces between and finer materials adjacent or above, there is sporadic movement of these fines into the open voids. The movement may be induced by water seepage through the fill, by vibration, or by changes induced by chemical or biological decomposition. Movement generally occurs in sudden episodes of varying magnitude following progressive deterioration. Deterioration is related to environmental changes. These include rapid changes in ground water, flooding due to torrential rainfall or broken water pipes, and drying and exposure to air from making excavations in the soil cover or the fill.

Chemical and biological decomposition is accompanied by the production of gas and a substantial reduction in solid volume. The rate of settlement due to physico-chemical and bio-chemical decay is high if the organic content subject to decay is large and the environment is favorable: (warm, moist, with fluctuating water table that pumps fresh air into the fill). The rate is low for more inert materials and in unfavorable environments. "Venting" of the landfill is necessary to relieve any gases which may develop.

The ultimate settlement of a landfill is related to the initial void ratio and the environmental conditions favorable to deterioration, decay, ravelling and combustion. By using typical properties for the refuse condition, long-term secondary compression of the landfill has been estimated. The following table presents the results of our settlement analyses for various conditions and surcharge options:

Surcharge Loading	3 Feet	5 Feet	10 Feet
Initial Settlement at end of 1 month	0.76-2.78 ft.	1.16-4.26 ft.	1.95-7.14 ft.
Settlement during construction of Golf Course at end of 1 year	1.14-3.61 ft.	1.09-3.57 ft.	0.99-3.49 ft.

Settlement during life of Golf Course at end of 30 years	2.69-8.55 ft.	2.58-8.45 ft.	2.35-8.26 ft.

From the settlement analyses it is evident that the size of the surcharge does not have a significant effect on the amount of long-term (i.e., > 1 month) secondary compression. The initial primary settlement should not pose a problem since it will be essentially "built out" of the landfill (i.e., within one month) during construction of the top liner/cover. However, success of the project may hinge on the magnitude of the potentially damaging secondary compression. For this reason a field test implementation of a settlement plate observation program is necessary in order to establish more accurately the limits for design. The settlement analyses are based on a maximum possible thickness of refuse equal to 45 feet and an initial density of 1000 pounds per cubic yard (lb/c.y.). Implementation of the settlement plate program would enable us to evaluate and refine our settlement predictions in relation to the actual conditions affecting settlement in the field. Settlement of waste fills can be minimized by compaction; but in order to be effective the fill should be compacted in lifts not exceeding 6 to 8 feet in thickness. Chemical control of decomposition is possible but very costly.

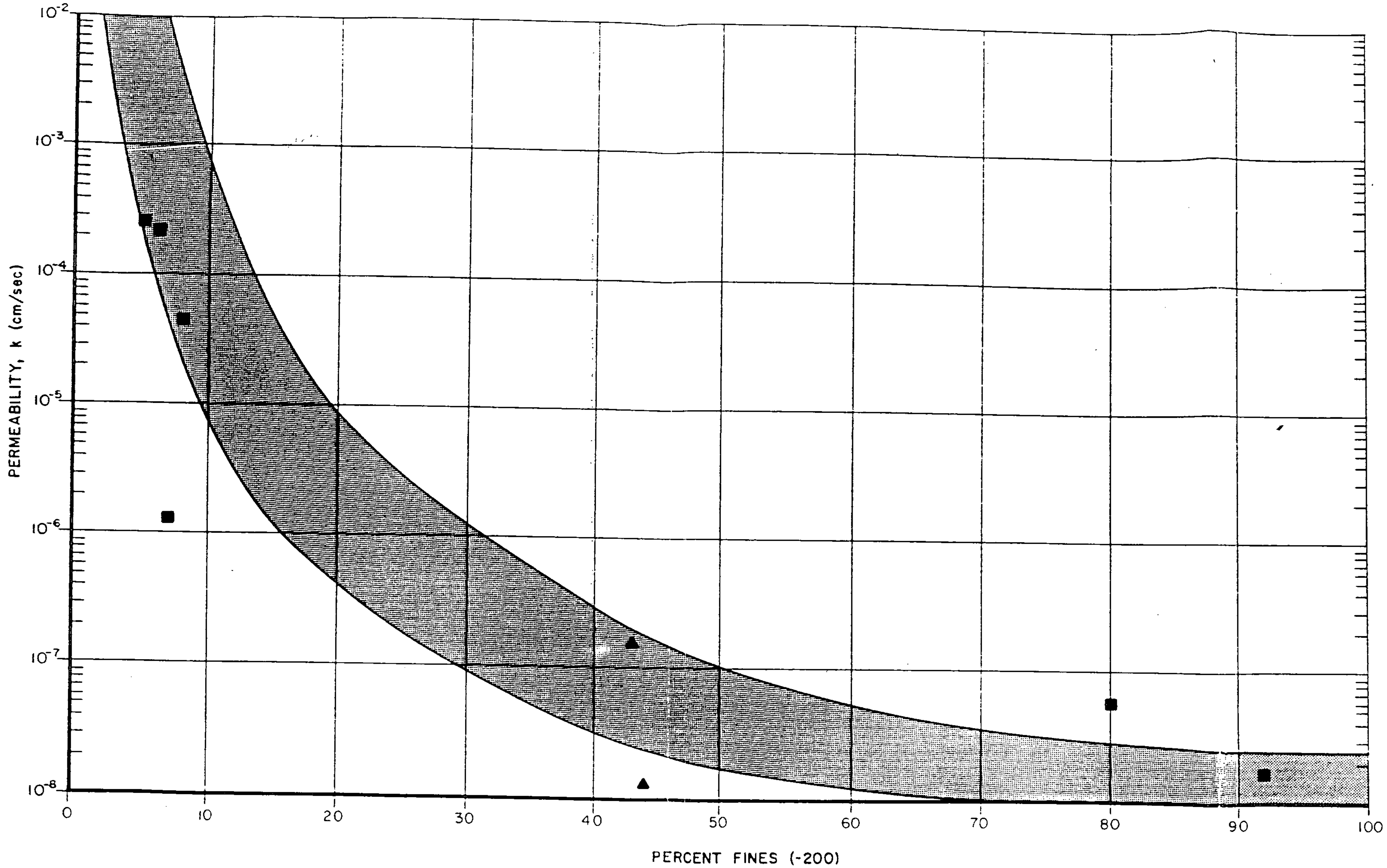
The most practical acceptable alternative for controlling settlement of the refuse fill is to control the amount of available moisture for decomposition by construction of an "impervious" liner on top of the refuse. This approach will not only reduce the amount of settlement over the years but will also eliminate the problem of leachate contamination of the surrounding environment.

Table 5.1

WATER BALANCE WITH GOLF COURSE IRRIGATION

	J	F	M	A	M	J	J	A	S	O	N	D	Year
PET	1.86	1.68	2.79	4.20	6.82	9.00	9.92	9.92	8.40	5.27	2.70	1.66	64.42
P	2.68	2.87	3.65	2.43	2.60	7.63	8.94	9.55	8.68	3.24	1.91	2.17	56.35
RO Coef.	.275	.275	.275	.25	.25	.30	.30	.30	.30	.275	.275	.275	
RO	.74	.79	1.00	.61	.65	2.29	2.68	2.86	2.60	.89	.52	.60	16.23
I (P-RO)	1.94	2.08	2.65	1.82	1.95	5.34	6.26	6.69	6.08	2.35	1.39	1.57	40.12
I-PET	+.08	+.040	-0.14	-2.38	-4.87	-3.66	-3.66	-3.23	-2.32	-2.92	-1.31	-0.29	
Irrigation	0	0	+.14	2.38	4.87	3.66	3.66	3.23	2.32	2.92	1.31	0.29	+24.78
Σneg (I-PET)	0	0	0	0	0	0	0	0	0	0	0	0	
Soil Moist. Storage	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	
ΔStorage	0	0	0	0	0	0	0	0	0	0	0	0	
ACT ET	1.86	1.68	2.79	4.20	6.82	9.00	9.92	9.92	8.40	5.27	2.70	1.86	64.42
Percolation	0.08	0.40	0	0	0	0	0	0	0	0	0	0	0.48

PET - Potential Evapotranspiration
P - Precipitation
RO - Runoff
I - Infiltration
ACT ET - Actual Evapotranspiration



LEGEND

▲ REMOLDED SAMPLES (STRATUM 5)

■ UNDISTURBED SAMPLES

BAND REPRESENTS ARDAMAN & ASSOCIATES, INC., EXPERIENCE CURVE FROM SOILS IN MANATEE COUNTY

COEFFICIENT OF PERMEABILITY VS. PERCENT FINES

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HYDROGEOLOGICAL INVESTIGATION
LENA ROAD LANDFILL
MANATEE COUNTY, FLORIDA

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FIGURE 5.1

Chapter 6

CONCLUSIONS AND RECOMMENDATIONS

A "deep" perimeter ditch concept is recommended for the leachate collection/ containment system for the subject site. The ditch water and/or leachate will be recycled or treated within the project site. This concept calls for a 10- to 12-foot deep trench along the east, south and west sides of the landfill sites. The water level in the ditch must always be maintained lower than the adjacent water table on the off-site side of the ditch. No surface discharge of ditch water should be allowed offsite unless treated sufficiently to meet Class III surface water standards. Rainfall and irrigation water, after a final cover has been placed, should not be allowed to comingle with the ditch water so that this large volume of water can be recycled as irrigation water on the site or discharged from the site with no treatment. The runoff water should not be allowed to become contaminated with leachate; therefore, a dual water management system is recommended after final cover has been installed.

The slurry wall system is recommended between the landfill and stormwater retention ponds and surrounding the leachate ponds. Provision for drainage must be made behind the wall, e.g., an underdrain system, so leachate will not overtop the wall. The slurry wall should tie into the underlying clay layer (Strata 4) and intercept the leachate ditch so that leachate will not escape around the end of the wall.

Differential settlement is a major geotechnical concern for greens, tees, and structures. A settlement plate data program is recommended for defining the design problem. The settlement plate data will give us a much better idea of the expected magnitude of total and differential settlements. One or two test cells utilizing surcharge loads should be an intergal part of the settlement plate investigation. Recommendations for the settlement plate data program have been submitted previously under separate cover.

The final top liner/cover section shall consist of an 18-inch thick compacted layer of clayey fine sand material with a percent fines content (percent by weight passing the U.S. No. 200 sieve) not less than 20 percent, and be classified as an SC or CL soil in accordance with the Unified Soil Classification System (ASTM D-2487-66T). Additionally, a twelve (12) inch thick surface layer of sandy (minus 200 less than 20 percent) overburden soils shall be placed over the impermeable top liner to prevent desiccation damage to the clayey material. Venting of methane and other generated gases is recommended.

The integrity of the cover material against water erosion and differential settlement must be inspected monthly during the first few years. During an unusually heavy rainfall event an immediate inspection should be made. An annual inspection is probably adequate after the first 5 years. The potential for problems to develop are most probable in the first few years because of insufficient vegetative cover and because landfills undergo most of their settlement in these years.

Side slopes below the water level for retention ponds should not be steeper than 1.75 (Horizontal) to 1.0 (Vertical). Slopes above the water line need to be considerably flatter at 3.5 (Horizontal) to 1.0 (Vertical) to prevent erosion and enable proper maintenance.

Leachate type water has been encountered across the ditch along the north boundary from the landfill. Based on a combination of the resistivity and water quality data (i.e., 4000-5000 umhos per cm^2) the worst area is along the middle half of the north boundary primarily between TH-14 and-15. Since this area is going to be part of the new expanded landfill area no remedial action is required at this time. Once the plans for the new site are finalized a review of this recommendation will be necessary.

Leachate type waters are beginning to show up in limited areas and limited distances away from the landfill. A study is recommended to fully document the extent and quality of the leachate plume. The study would also evaluate alternative remedial measures. Until the above mentioned study has been completed and a plan of action has been determined, the eight monitoring wells presently installed at the site, i.e., MW-1, MW-2, etc., the three county wells, and piezometers at TH-16 and TH-41 need to be monitored quarterly.

The following suite of parameters are suggested for this monitoring program:

- Conductivity
- pH
- Chlorides
- Chromium
- Lead

The procedures for sampling are summarized as follows:

- Transport the sample bottles and preservatives as provided by the water analysis laboratory to the site.

- Sterilize the sampling equipment to be used for sample collection.

- Measure *in situ* water level, temperature, pH, and electrical conductivity of pumped water at 1-2 gallon intervals after pumping is initiated. A minimum of two casing volumes should be removed before sampling. A vacuum pump or gas lift method is recommended for sampling.

- Withdraw water sample and place into proper container once measurement values from three consecutive readings are constant. Laboratory instructions (e.g., type of bottle, quantity of sample, and preservative) must be followed carefully and thoroughly.

- Label sample properly and completely.

- Ice samples down and prepare for transportation to water analysis laboratory.

- Complete field note-taking as per water sample log sheet shown in Table 6.1. Document the period of time pump was on prior to collection of sample plus pumping rate at well in gallons per minute.

- Transmit collected samples to water analysis laboratory within 24 hours of sampling. The chain of custody form to be used is shown in Table 6.2.

The analysis and recommendations submitted in this report are based upon the available data obtained at the locations indicated. This report does not reflect any variations which may occur at other locations where field data are not available. The nature and extent of variations between the locations may not become evident until later when more data becomes available.

If variations then appear evident, it will be necessary for a reevaluation of the recommendations of this report to be made after performing on-site observations and noting the characteristics of any variations.

This report has been prepared in accordance with generally accepted geotechnical and hydrogeological engineering practices. In the event any changes occur in the design, nature or location of the landfill system and for final land use for the site we should review the applicability of conclusions and recommendations in this report. We also recommend a general review of final design and specifications by our office in order that hydrogeological recommendations are properly interpreted and implemented in the design specifications.

Table 6.1

WATER SAMPLE LOG SHEET

Project No. ____________________ Sample No. ____________________
Location ____________________ Well No. ____________________
Sampled By ____________________ Date ____________ Time ________
Water Depth ____________________ Field pH ____________
Volume Removed Before Sampling ____________ Field Cond. ____________
Preservative/Handling ____________ Field Temp. ____________
Sampling Comments ____
____
Required Analyses ____
Notes:

Received by ____________________ Lab ____________________
Date ____________________ Time ____________________
Comments ____

Lab Results Rec. & Attached By ____________ Date ____________
Comments on Results:

Comments By ____________________ Date ____________________

Table 6.2

TRANSFER OF CUSTODY SHEET

I, ______________________________ of ______________________________
(Signature) (Company)

hereby transfer the items listed below to

______________________________ of ______________________________
(Name) (Company)

Items Transferred

1.

2.

3.

4.

5.

6.

7.

8.

9.

10.

Receipt of above listed items acknowledged by

______________________ ______________ ______________
(Signature) (Date) (Time)

Chapter 7

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Appendix A.1

SPT BORING PROCEDURES

STANDARD PENETRATION TEST

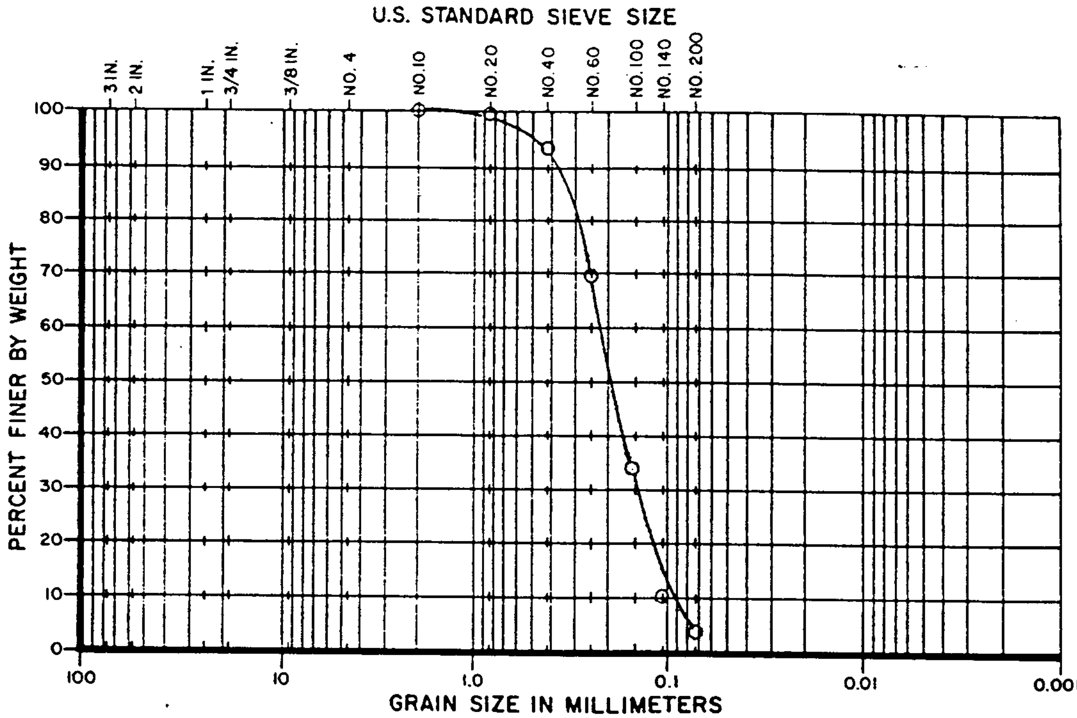
The standard penetration test is a widely accepted method of *in situ* testing of foundation soils (ASTM D-1586). A 2-foot long, 2-inch O.D. split-barrel sampler attached to the end of a string of drilling rods is driven 18 inches into the ground by successive blows of a 140-pound hammer freely dropping 30 inches. The number of blows needed for each 6 inches of penetration is recorded. The sum of the blows required for penetration of the second and third 6-inch increments of penetration constitutes the test result or N-value. After the test, the sampler is extracted from the ground and opened to allow visual examination and classification of the retained soil sample. The N-value has been empirically correlated with various soil properties allowing a conservative estimate of the behavior of soils under load.

The tests are usually performed at 5-foot intervals. However, more frequent or continuous testing is done by our firm through depths where a more accurate definition of the soils is required. The test holes are advanced to the test elevations by rotary drilling with a cutting bit, using circulating fluid to remove the cuttings and hold the fine grains in suspension. The circulating fluid, which is a bentonitic drilling mud, is also used to keep the hole open below the water table by maintaining an excess hydrostatic pressure inside the hole. In some soil deposits, particularly highly pervious ones, NX-size flush-coupled casing must be driven to just above the testing depth to keep the hole open and/or to prevent the loss of circulating fluid.

Representative split-spoon samples from soils at every 5 feet of drilled depth and from every different stratum are brought to our laboratory in air-tight jars for further evaluation and testing, if necessary. Samples not used in testing are stored for at least six months prior to being discarded. After completion of a test boring, the hole is kept open until a steady state groundwater level is recorded. The hole is then sealed, if necessary, and backfilled.

Appendix A.2

SIEVE ANALYSES



GRAVEL		SAND			SILT	CLAY
COARSE	FINE	COARSE	MEDIUM	FINE		

TEST HOLE NO.	SAMPLE NO.	DEPTH	SYMBOL	SAMPLE DESCRIPTION	UNIFIED CLASS.
11	1	1.0-3.0	o	GRAY FINE SAND	SP

GRAIN SIZE DISTRIBUTION

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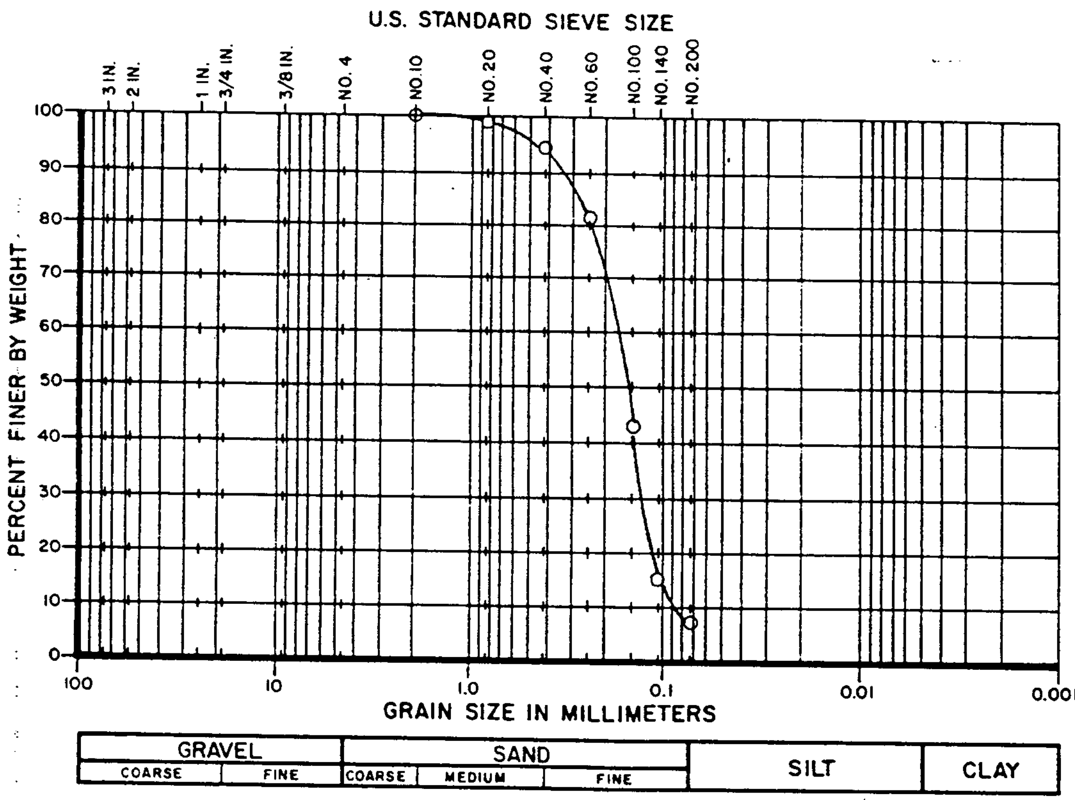

TEST HOLE NO.	SAMPLE NO.	DEPTH	SYMBOL	SAMPLE DESCRIPTION	UNIFIED CLASS.
29	1	8.0-10.5	o	BROWN SLIGHTLY SILTY FINE SAND	SP-SM

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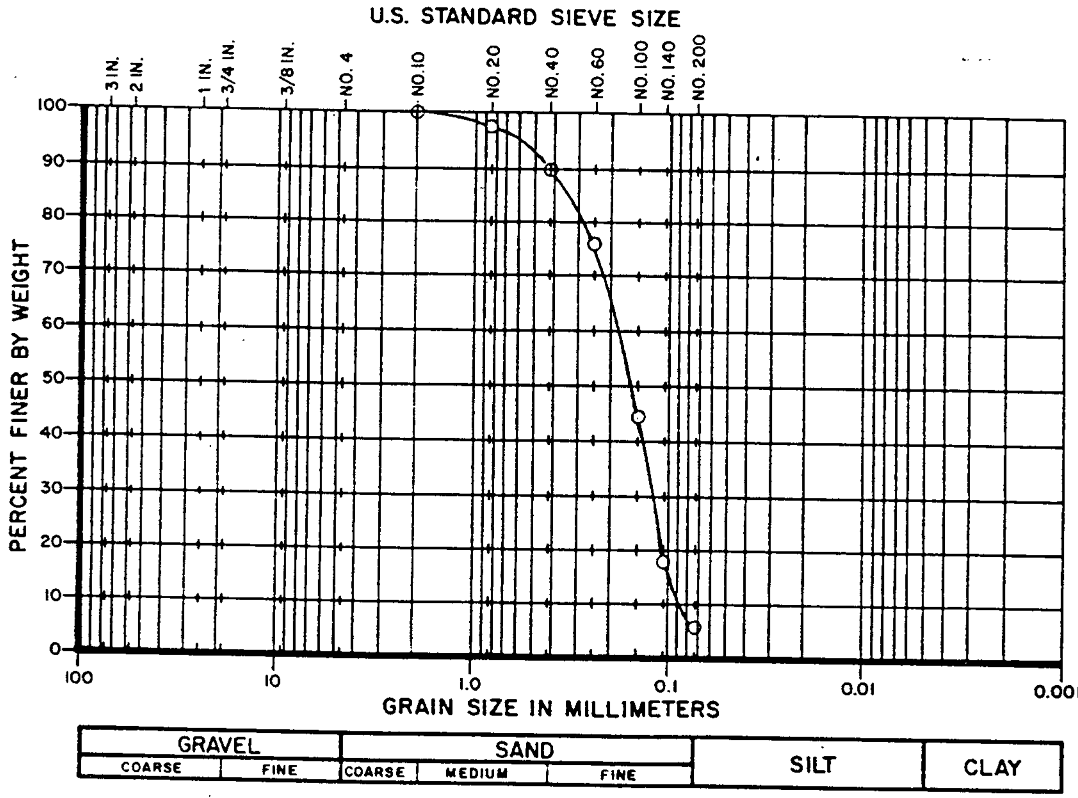

TEST HOLE NO.	SAMPLE NO.	DEPTH	SYMBOL	SAMPLE DESCRIPTION	UNIFIED CLASS.
34	1	13.5-16.0	O	GRAY TO BROWN SLIGHTLY SILTY FINE SAND	SP-SM

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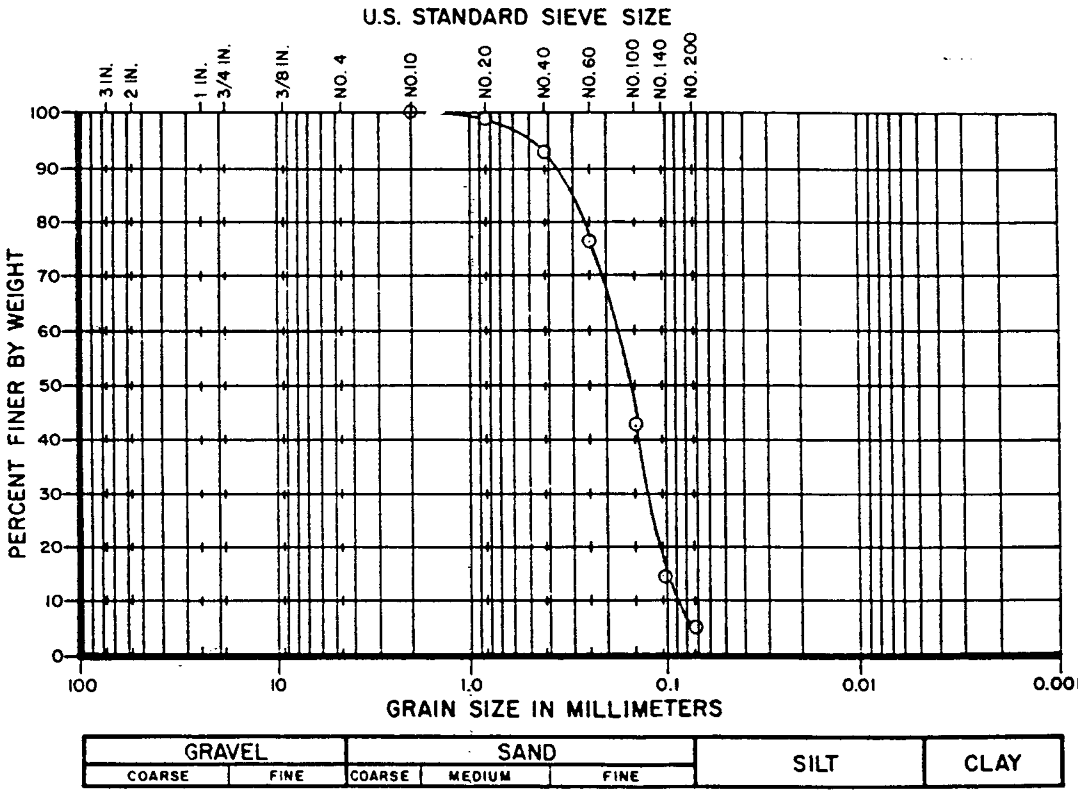

TEST HOLE NO.	SAMPLE NO.	DEPTH	SYMBOL	SAMPLE DESCRIPTION	UNIFIED CLASS.
37	1	10.5-13.0	O	LIGHT GRAY SLIGHTLY SILTY FINE SAND	SP-SM

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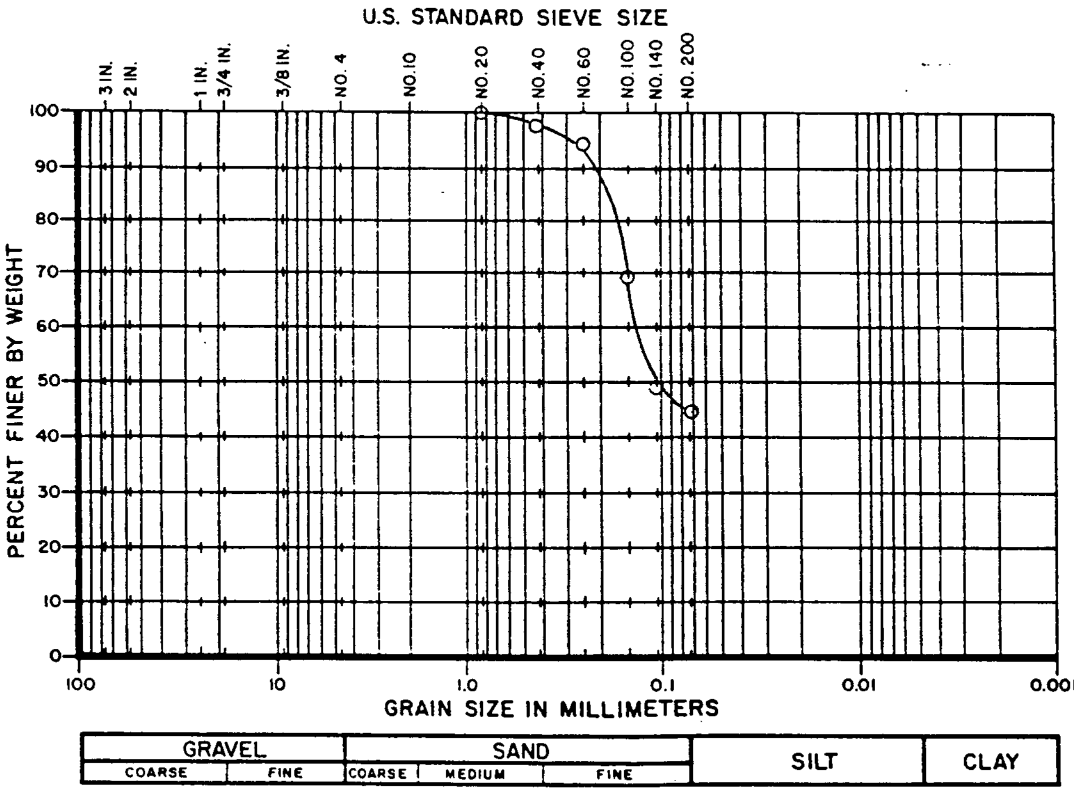

TEST HOLE NO.	SAMPLE NO.	DEPTH	SYMBOL	SAMPLE DESCRIPTION	UNIFIED CLASS.
42	1	15.0-20.0	o	GREENISH-GRAY CLAYEY FINE SAND (STRATUM 5	SC
				REMOLDED SAMPLE)	

GRAIN SIZE DISTRIBUTION

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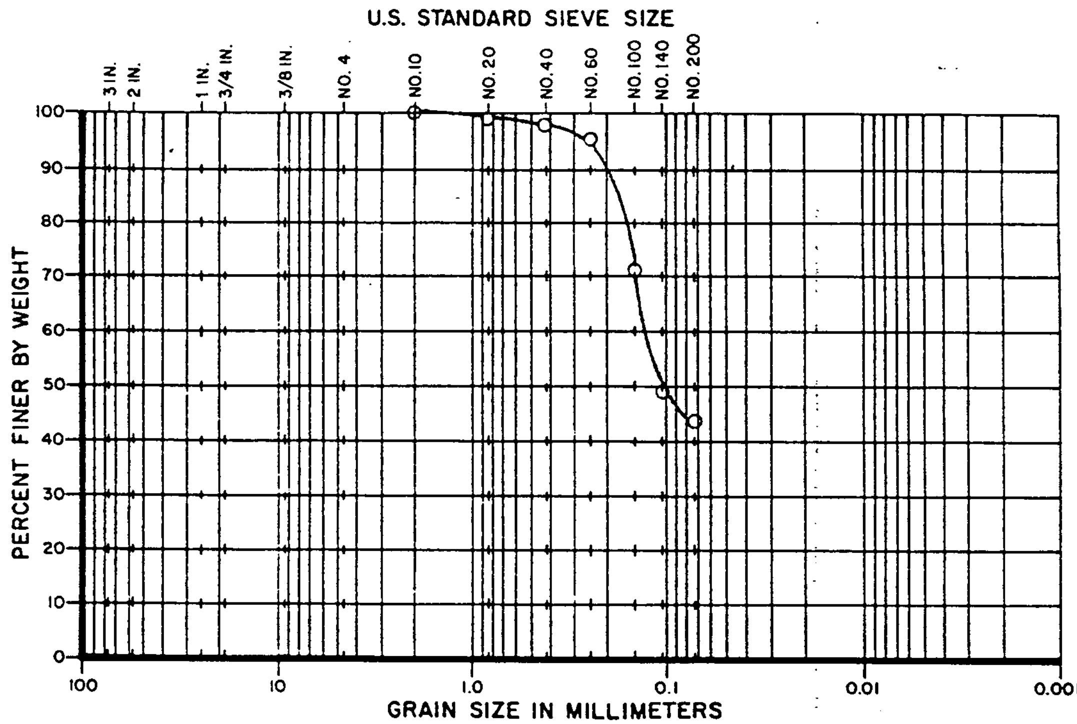

TEST HOLE NO.	SAMPLE NO.	DEPTH	SYMBOL	SAMPLE DESCRIPTION	UNIFIED CLASS.
42	2	15.0-20.0	o	GREEN CLAYEY FINE SAND (STRATUM 5 REMOLDED	SC
				SAMPLE)	

GRAIN SIZE DISTRIBUTION

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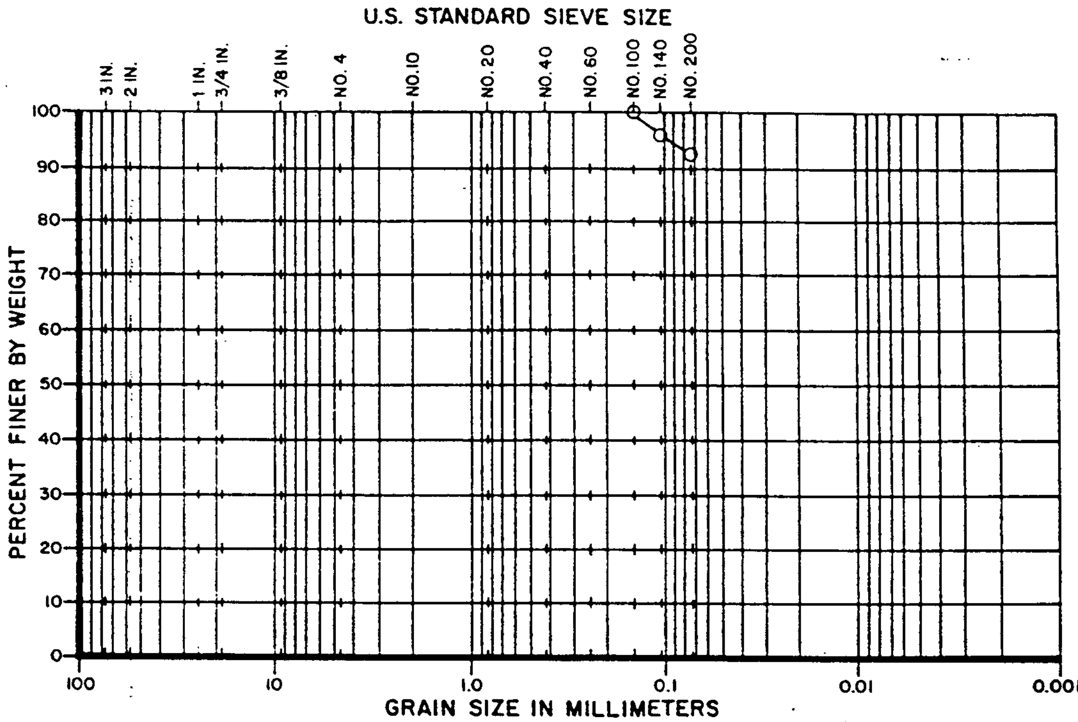

GRAVEL		SAND			SILT	CLAY
COARSE	FINE	COARSE	MEDIUM	FINE		

TEST HOLE NO.	SAMPLE NO.	DEPTH	SYMBOL	SAMPLE DESCRIPTION	UNIFIED CLASS.
9	1	17.5-19.5	o	LIGHT GREENISH-BROWN SANDY CLAY	CH

GRAIN SIZE DISTRIBUTION

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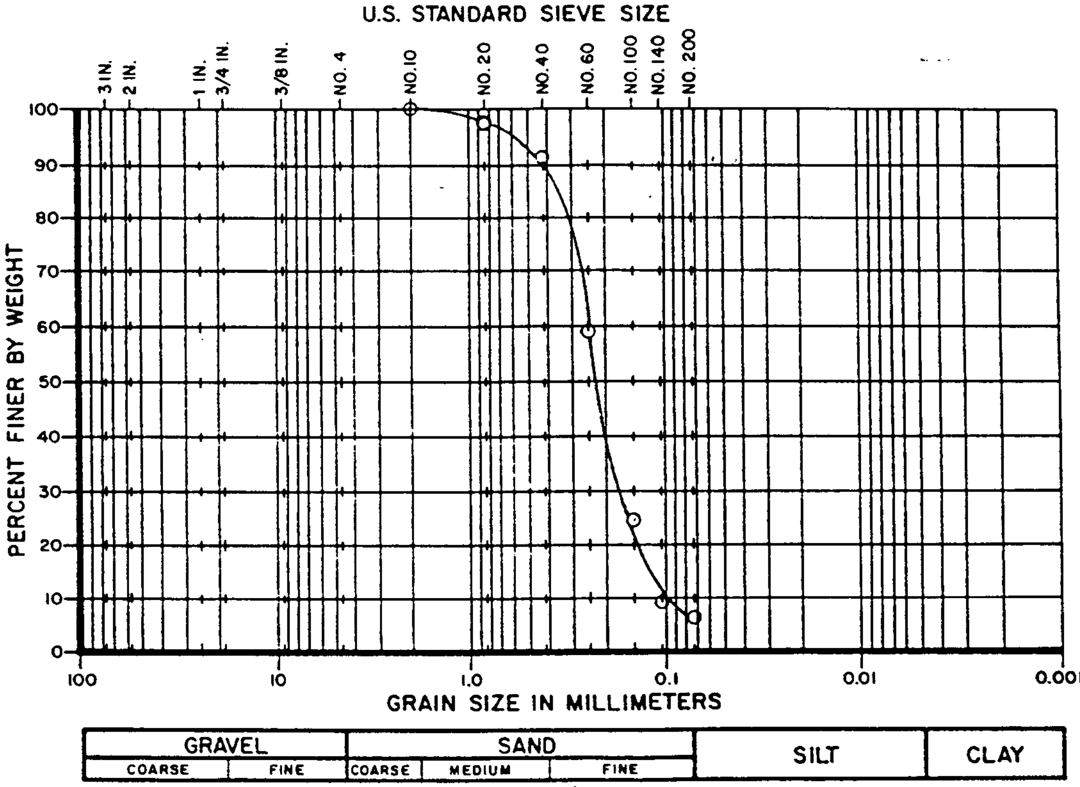
HYDROGEOLOGICAL INVESTIGATION
LENA ROAD LANDFILL
MANATEE COUNTY, FLORIDA

DRAWN BY: KA	CHECKED BY:	DATE: 3/2/83
FILE NO. 82-7047	APPROVED BY:	

FORM NO. 1509 7/80

K&E 19 1153 2-79 MC8964



TEST HOLE NO.	SAMPLE NO.	DEPTH	SYMBOL	SAMPLE DESCRIPTION	UNIFIED CLASS.
13	1	7.5-10.0	o	GRAY TO BROWN FINE SAND	SP-SM

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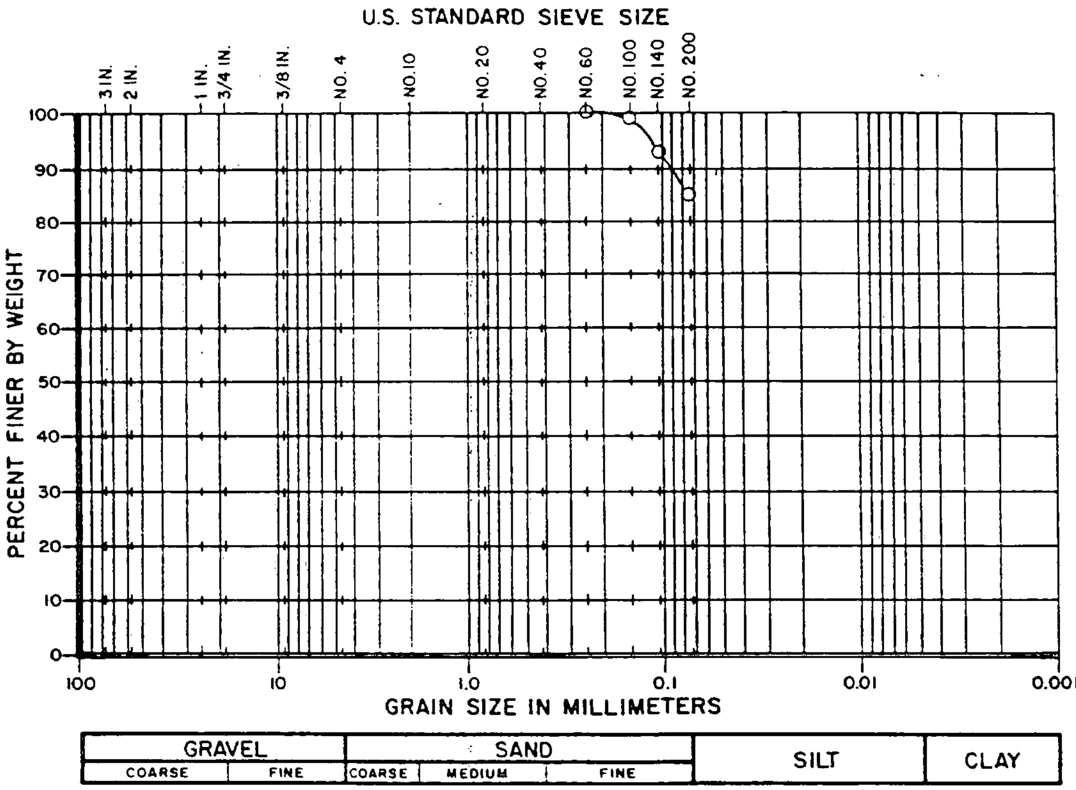

TEST HOLE NO.	SAMPLE NO.	DEPTH	SYMBOL	SAMPLE DESCRIPTION	UNIFIED CLASS.
15	1	17.5-19.5	o	DARK GRAY SANDY CLAY	CH

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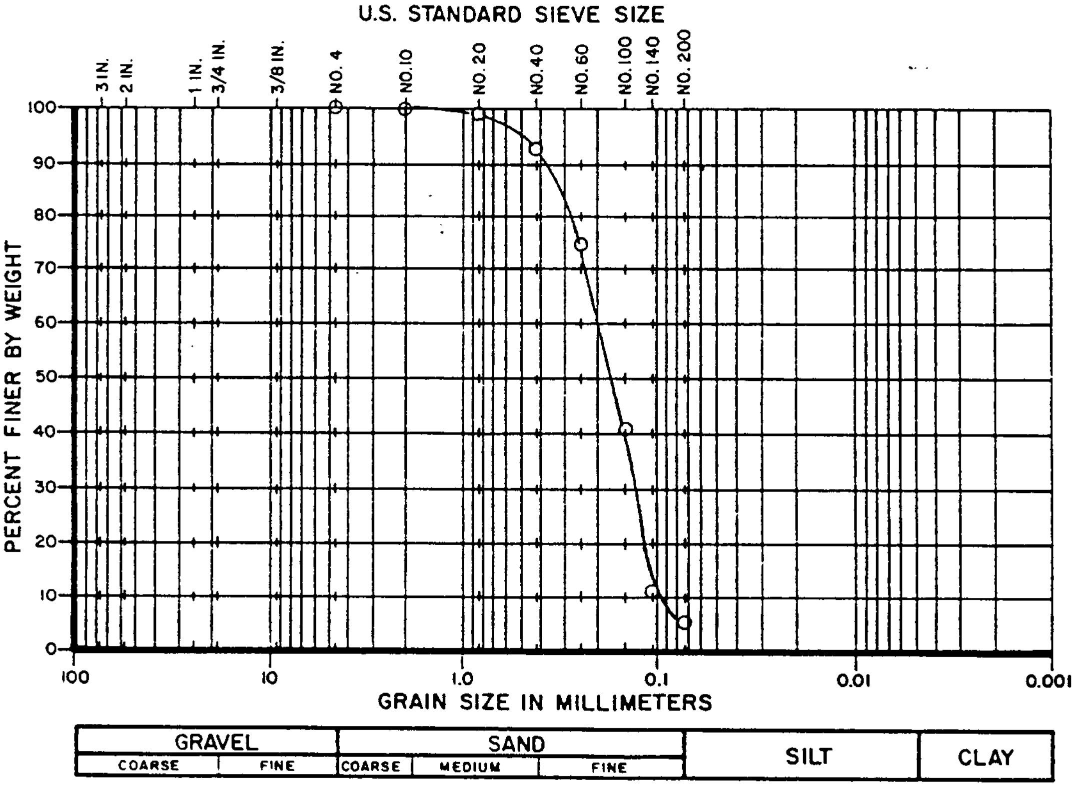

TEST HOLE NO.	SAMPLE NO.	DEPTH	SYMBOL	SAMPLE DESCRIPTION	UNIFIED CLASS.
10	2	2.0-5.75	o	LIGHT YELLOWISH-BROWN SLIGHTLY SILTY FINE SAND	SP-SM

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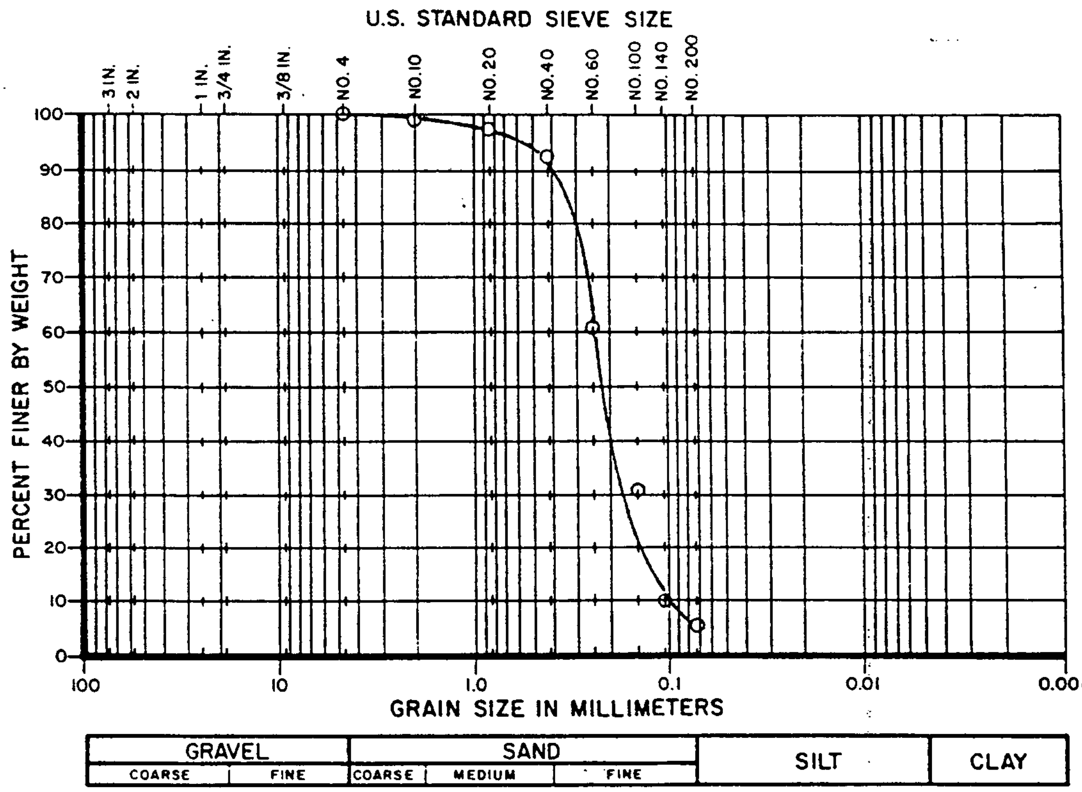

TEST HOLE NO.	SAMPLE NO.	DEPTH	SYMBOL	SAMPLE DESCRIPTION	UNIFIED CLASS.
8	3	7.0-10.5	O	LIGHT YELLOWISH-BROWN SLIGHTLY SILTY FINE SAND	SP-SM

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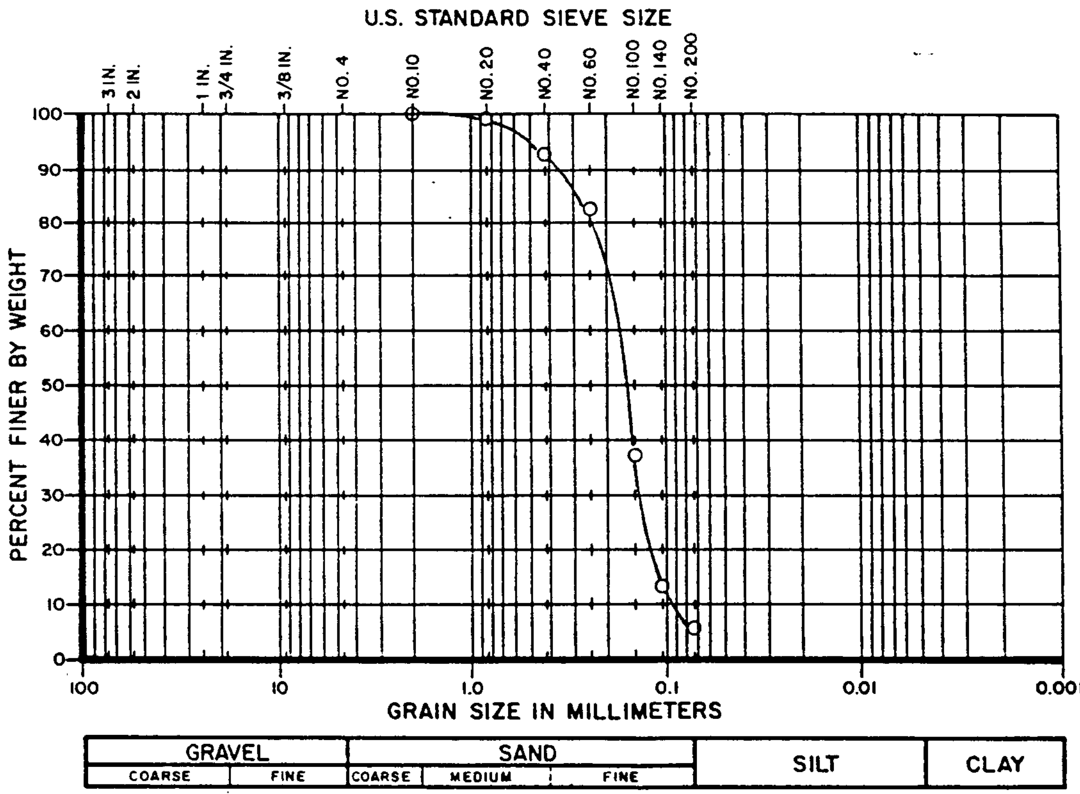

TEST HOLE NO.	SAMPLE NO.	DEPTH	SYMBOL	SAMPLE DESCRIPTION	UNIFIED CLASS.
11	2	2.25-7.0	o	LIGHT BROWN-GRAY SLIGHTLY SILTY FINE SAND	SP-SM

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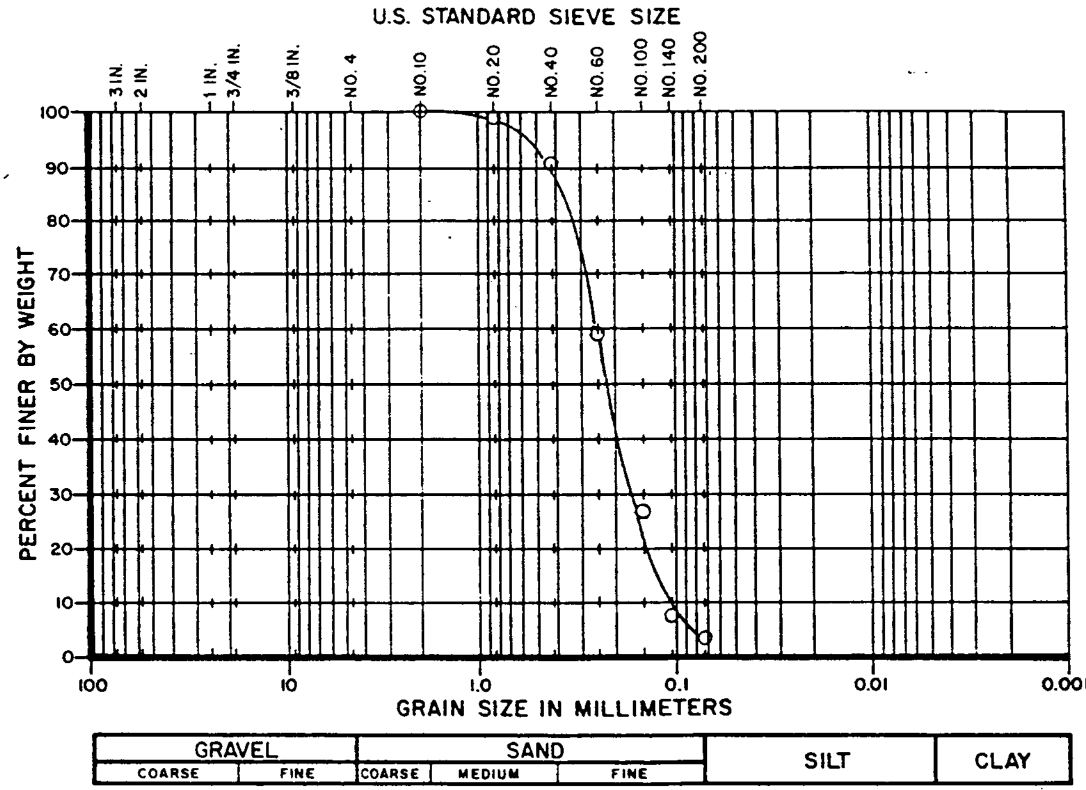

TEST HOLE NO.	SAMPLE NO.	DEPTH	SYMBOL	SAMPLE DESCRIPTION	UNIFIED CLASS.
4	4	8.25-11.0	o	LIGHT GRAYISH-BROWN FINE SAND	SP

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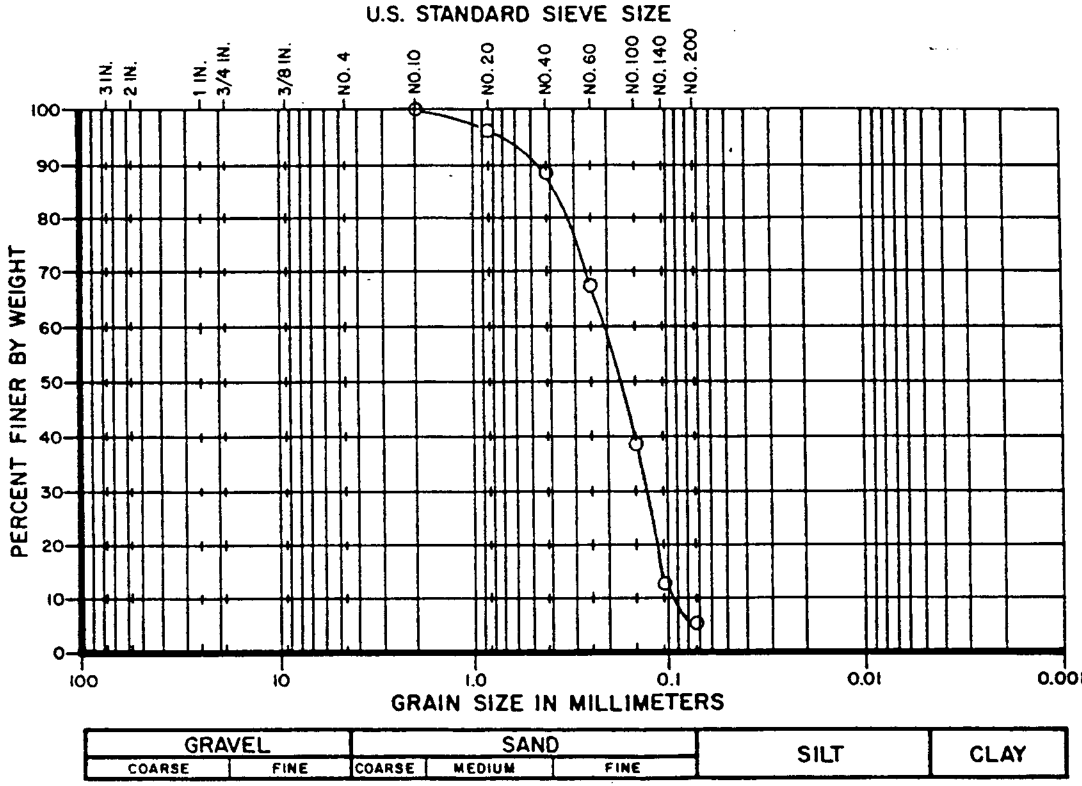

TEST HOLE NO.	SAMPLE NO.	DEPTH	SYMBOL	SAMPLE DESCRIPTION	UNIFIED CLASS.
1	2	3.5-10.5	o	LIGHT YELLOWISH-BROWN SLIGHTLY SILTY FINE SAND	SP-SM

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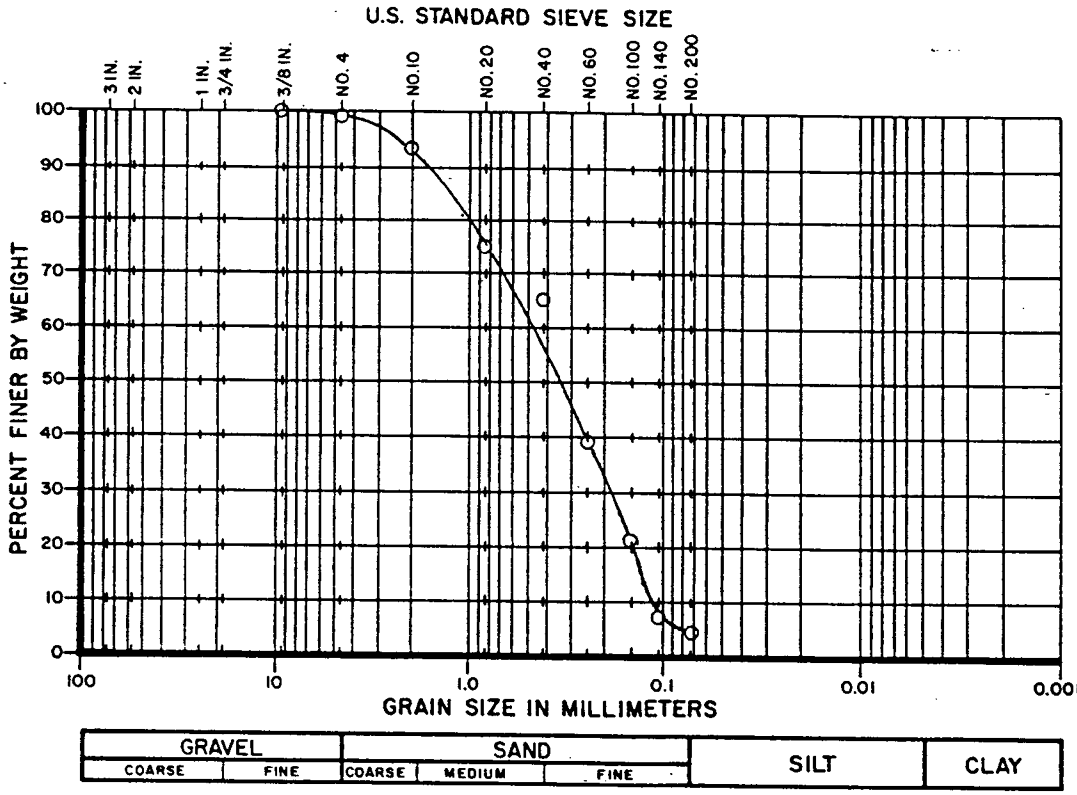
K&E 19 1153 2-79 MC8964●



TEST HOLE NO.	SAMPLE NO.	DEPTH	SYMBOL	SAMPLE DESCRIPTION	UNIFIED CLASS.
13	4	13.5-15.0	o	LIGHT BROWN MEDIUM TO FINE SAND	SP

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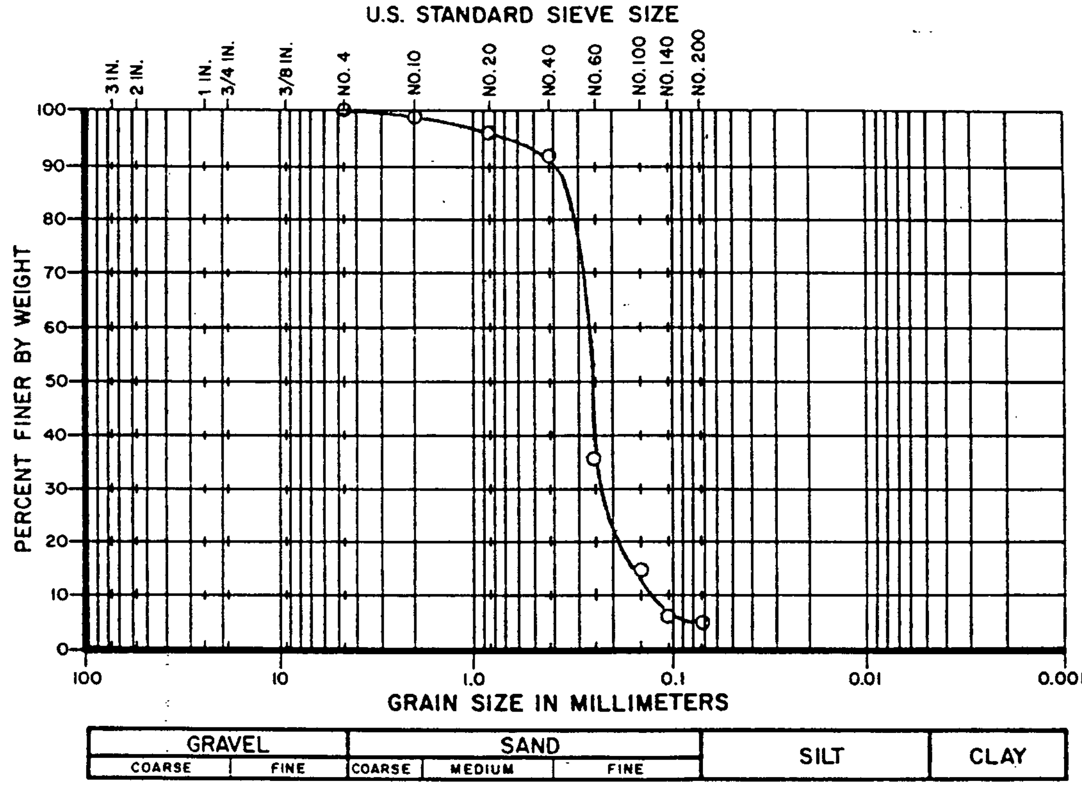

TEST HOLE NO.	SAMPLE NO.	DEPTH	SYMBOL	SAMPLE DESCRIPTION	UNIFIED CLASS.
15	4	13.5-15.0	o	BROWN MEDIUM TO FINE SAND	SP

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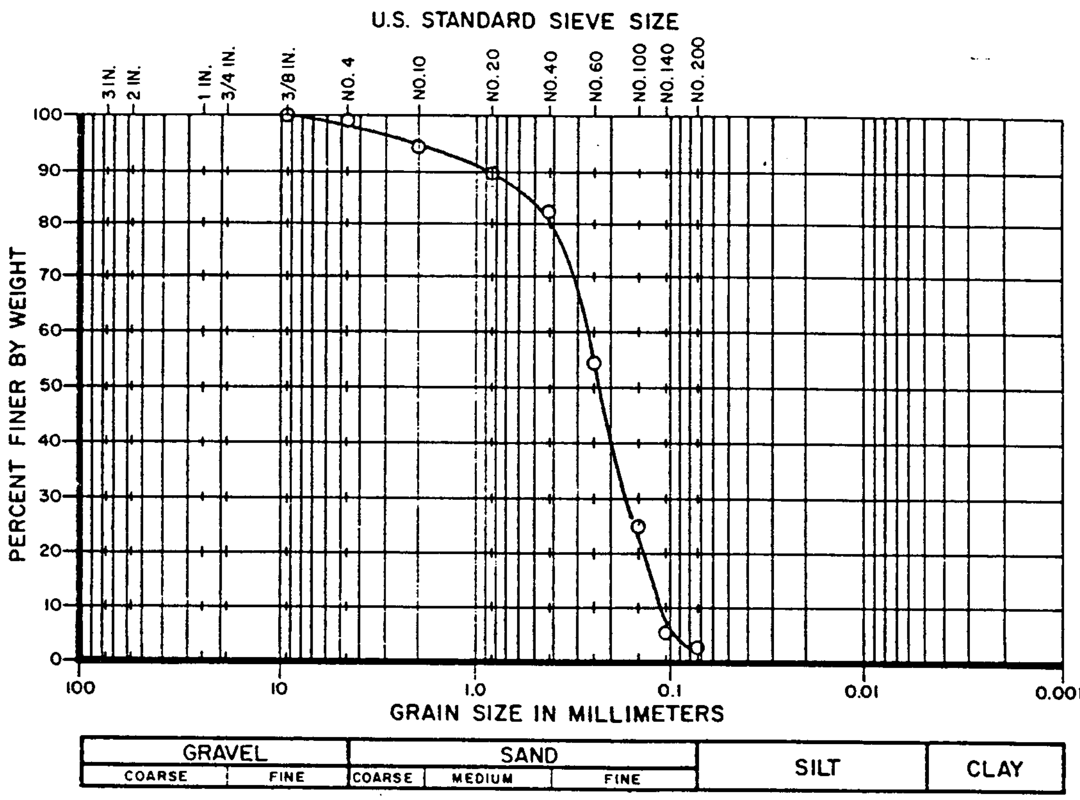

TEST HOLE NO.	SAMPLE NO.	DEPTH	SYMBOL	SAMPLE DESCRIPTION	UNIFIED CLASS.
7	3	13.5-15.0	o	BROWN MEDIUM TO FINE SAND WITH PHOSPHATES	SP

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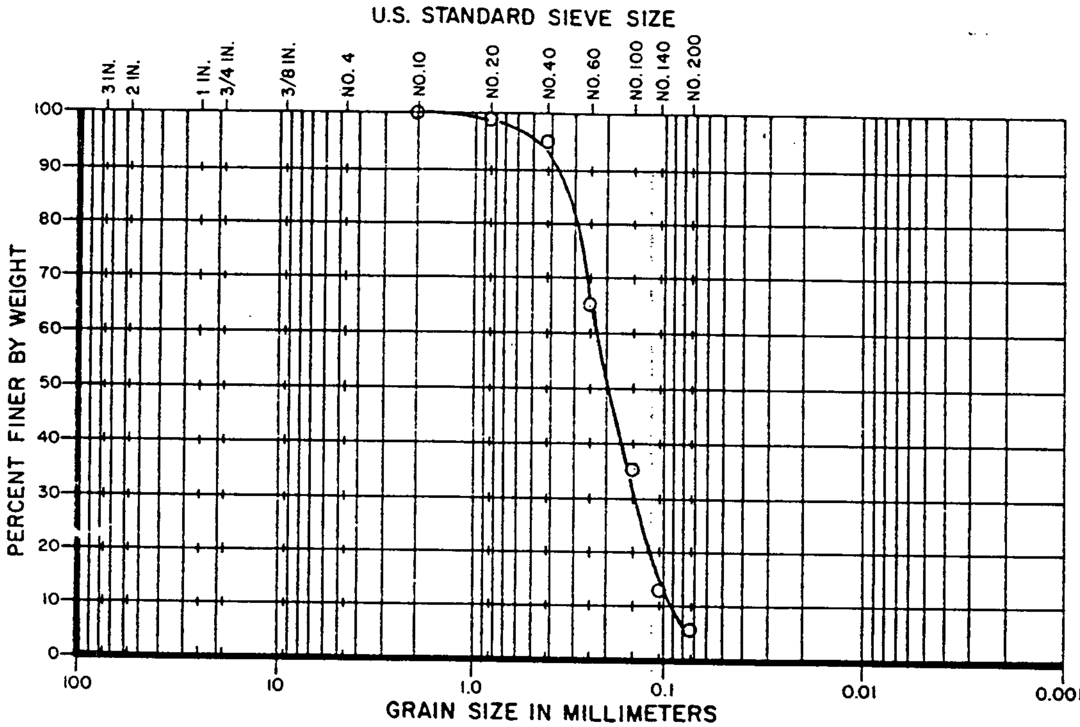

TEST HOLE NO.	SAMPLE NO.	DEPTH	SYMBOL	SAMPLE DESCRIPTION	UNIFIED CLASS.
15	3	7 0-10.5	o	LIGHT BROWN SLIGHTLY SILTY FINE SAND	SP-SM

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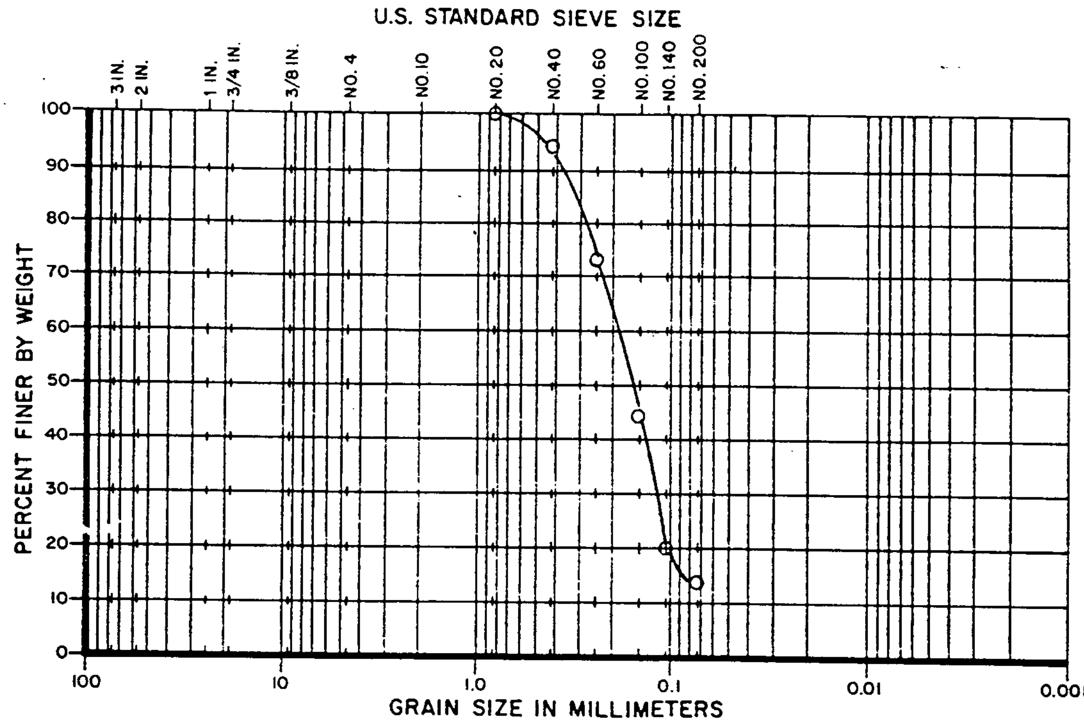

GRAVEL		SAND			SILT	CLAY
COARSE	FINE	COARSE	MEDIUM	FINE		

TEST HOLE NO.	SAMPLE NO.	DEPTH	SYMBOL	SAMPLE DESCRIPTION	UNIFIED CLASS.
12	3	6.25-10.5	o	LIGHT BROWN SILTY FINE SAND	SM

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LENA ROAD LANDFILL
MANATEE COUNTY, FLORIDA

DRAWN BY: KA	CHECKED BY:	DATE: 3/2/83
FILE NO. 82-7047	APPROVED BY:	

FORM NO 1509 7/80

EXHIBIT “B”

Lena Road Landfill Responses to FDER Letter on Revised Groundwater Monitoring Plan

Ardaman & Associates, Inc.

OFFICES

Orlando, 8008 S. Orange Avenue, Orlando, Florida 32859-3003, Phone (407) 855-3860
Bartow, 1987 S. Holland Parkway, Bartow, Florida 33830, Phone (813) 533-0858
Bradenton, 209 A 6th Avenue East, Bradenton, Florida 33508, Phone (813) 748-3971
Cocoa, 1300 N. Cocoa Blvd., Cocoa, Florida 32924, Phone (407) 632-2503
Fort Myers, 2508 Rockfill Road, Fort Myers, Florida 33916, Phone (813) 337-1288
Miami, 2608 W. 84th Street, Hialeah, Florida 33016, Phone (305) 825-2683
Port St. Lucie, 1017 S.E. Holbrook Ct., Port St. Lucie, Florida 34985, Phone (407) 337-1200
Sarasota, 2500 Bee Ridge Road, Sarasota, Florida 34277, Phone (813) 922-3526
Tallahassee, 3175 West Tharpe Street, Tallahassee, Florida 32303, Phone (904) 576-6131
Tampa, 105 N. Faulkenburg Road, Suite D, Brandon, Florida 34299-1506, Phone (813) 654-2336
West Palm Beach, 2511 Westgate Avenue, Suite 10, West Palm Beach, Florida 33409, Phone (407) 687-8200

Ardaman & Associates, Inc.

Consultants in Soils, Hydrogeology,
Foundations and Materials Testing

March 28, 1990
File Number 86-115B

Manatee County Public Works
Solid Waste Department
4501-66th Street, West
Bradenton, FL 34210

Attention: Mr. Daniel Gray

Subject: Lena Road Landfill Responses to FDER Letter on Revised Groundwater Monitoring Plan - Permit Nos. S041-118353, SC41-095658, SC41-095667

Gentlemen:

As requested, Ardaman & Associates, Inc. has reviewed the Florida Department of Environmental Regulation (FDER) letter of February 13, 1990 to Manatee County on the subject project and presents the following responses.

1. <u>Please provide:</u>

a. <u>Data (porosity, horizontal and vertical permeability, direction) of groundwater flow in the surficial aquifer.</u>

Eighteen <u>in situ</u> permeability tests (Ardaman & Associates, Inc. 1983) have been performed on the sands in the surficial aquifer at the site. The hydraulic conductivities ranged from .003 to 17.6 feet per day. The average horizontal hydraulic conductivity of the fine sand to slightly silty fine sand from six tests was 6.5 feet per day while the average vertical hydraulic conductivity from four laboratory permeability tests was 0.4 feet per day. The average horizontal hydraulic conductivity of the slightly silty to silty fine sands from seven tests was 2.4 feet per day while the vertical hydraulic conductivity value from one test was 17.6 feet per day. The vertical hydraulic conductivity can be equal to the horizontal hydraulic conductivity for loose shallow clean sands to as much as about one tenth the horizontal hydraulic conductivity in a deeper dense layer.

The porosity of the fine sand to silty fine sands from the data in the 1983 hydrogeological survey was 0.32 to 0.48 with an average of .43 from five tests.

The groundwater flow direction within the surficial aquifer system is complicated at a landfill site because of the changing dynamics of the system with respect to such man-controlled variables as landfill heights, fill areas, varying compaction, varying types of refuse, varying porosities of refuse, slurry walls, the biochemical reactions with time in the cells, and varying cover permeabilities and placement procedures. In addition to these man-controlled variables, the natural variables such as rainfall, evapotranspiration rates and aquifer transmissivities adjacent to the landfill must also be considered.

. water table map gives a "snap shot" of the groundwater system at an instant of time. With all ıese variables interacting at this site one instantaneous "snap shot" is not considered too ıeaningful.

n the final analysis, the direction and rate of groundwater movement away from the landfill toward he leachate collection system at anytime in the life of the landfill will depend on the groundwater nound with respect to the water level in the leachate collection system. The height of the mound ıt the site is directly related to the infiltration/percolation into the landfill. A low nfiltration/percolation rate supports no mound or at most a low mound. Conversely, a high nfiltration/percolation rate supports a high mound.

Groundwater level contours outside of the landfill and leachate collection system are a subdued reflection of the ground surface contours, i.e., at any time, the depth to the water table below a given ground surface contour is approximately the same along the contour. The groundwater in the surficial aquifer flows toward relief points along natural or artificial channels and depressions in the land surface. The local relief points at this site are toward the intermittent stream north of Stage II and toward the intermittent tributary as part of Cypress Strand west of Stage I south of Stage III and the headwaters of Cypress Strand at the south end of Stage I.

Table 1 summarizes the known recent water level data at the site. Once the piezometers inside the slurry wall are installed and levels run, the groundwater flow directions and hydraulic gradients i e surficial aquifer across the slurry wall can be documented.

b. <u>Background water quality data</u>

The results from several monitor wells indicate background water quality characteristics. Surficial aquifer monitor well water quality data at MW-1, CW-1, CW-2 and CW-5 reflect background characteristics and at least one year of data are provided in the Appendix of the revised groundwater monitoring plan report (Ardaman & Associates, Inc. 1990). In this revised groundwater monitoring plan report we suggested that the SMR-1 well be a background well for the surficial aquifer for the entire three stage project area. This well was installed in October 1988. One year of water quality data are available from this well and are enclosed herein.

Background water quality data for the secondary artesian aquifer wells (SA-1, SA-2, and SA-3) are provided in the Appendix of the Ardaman & Associates, Inc. 1990 report. SMR-2 was identified in this report as the background secondary artesian aquifer well for the three stage project area. This well was installed in November 1988. One year of water quality data from the SMR-2 well are provided herein.

c. <u>Waste disposal (leachate generation) rate</u>

Leachate generation data from the County is provided herein. These data represent inflow to the leachate pond from the two pumping stations within Stage I.

<u>Comments on the toxicity of the leachate</u>

Water chemistry data on the leachate are provided herein from the County.

e. Anticipated leachate volumes

The order of magnitude volumes presented in the enclosed tables from the County are anticipated in the future subject to refinements when hydraulic gradients across the slurry wall are monitored regularly and maintained at levels in accordance with the permit conditions. As Stage II is developed Stage I will be closed so significant additional acreages are not anticipated for infiltration to the leachate collection system. At this time anticipated leachate volumes cannot be accurately predicted.

f. An inventory of supply wells within 2000 feet

The well inventory has been provided in two Ardaman & Associates, Inc. transmittals. Figure 1 shows the location of wells inventoried in Ardaman & Associates, Inc. 1983. Except for the monitoring wells on-site, no other wells are located in Section 31. At the existing landfill area a well is located at the weigh station in the northwest corner of Section G. Five wells were identified between State Road 64 and the landfill area. Well A is reported as 6-inch diameter, 495 feet deep with 61 feet of casing. Well B is reported as 10-inch diameter, 600 feet deep and an unknown casing length. Well A is used for dairy water, while Well B is not in use. All homes along State Road 64 are connected to the County water system.

May 1983 an expanded well inventory was performed to encompass a one-mile radius from the landfill. The expanded inventory includes the listing of all wells permitted through the Manatee County Health Department from 1965 to May 1983. Table 3.1 summarizes the known characteristics of these inventoried wells. Most of the wells are not located more precisely than the section number. Figure 3.8 shows the precise location of the only wells precisely located at this time from the Health Department records.

g. Information on surface water flow (water quality)

The 1988 CDM report contains information on the surface water at the site. This report is enclosed. Three discharge points control surface water outflow from the site at this time. A north weir in the vicinity of TH-14 discharges north and east from Stage I. A south weir discharges to the Cypress Strand at the south end of Stage I and a west weir discharges to a tributary of the Cypress Strand at the west edge of Stage I and south of Stage III. The 1989 water quality (pH) and flow data from these three weirs are enclosed herein.

Please do not hesitate to contact us if you have questions or when we can be of further assistance.

Very truly yours,
ARDAMAN & ASSOCIATES, INC.

Herbert G. Stangland

Herbert G. Stangland, Jr., P.E.
Senior Water Resources Engineer
Florida Registration No. 16713

John E. Garlanger

HGS

John E. Garlanger, Ph.D., P.E.
Principal

HGS/JEG/js

HSmcpwsw.res

Enclosures

Table 1

1989 WELL WATER LEVEL DATA

Location	Elevation TOC (ft, NGVD)	Date	Depth to Water from TOC (ft)	Water Level Elevation (ft, NGVD)
Artesian Aquifer Wells				
SA-1		03-20-89	21.02	
		04-24-89	26.00	
		08-07-89	18.25	
		12-12-89	17.60	
SA-3		03-16-89	24.25	
		04-24-89	27.00	
		08-07-89	22.58	
		12-12-89	47.75	
SA-4	31.28	03-09-89	22.00	9.28
		04-25-89	25.00	6.28
		08-08-89	19.08	12.20
		12-13-89	18.58	12.70
SA-5	37.92	03-06-89	26.16	11.76
		04-26-89	29.50	8.42
		08-08-89	23.58	14.34
		12-12-89	21.80	16.12
SA-6	36.04	03-06-89	23.50	12.54
		04-26-89	25.08	10.96
		08-09-89	25.00	11.04
		12-14-89	21.50	14.54
SA-7	33.27	03-06-89	23.12	10.15
		05-01-89	28.50	4.77
		08-09-89	28.17	5.10
		12-14-89	21.33	11.94
SA-8	34.48	03-08-89	24.30	10.18
		05-01-89	28.25	6.23
		08-09-89	24.75	9.73
		12-14-89	21.79	12.69
SMR-2	36.10	03-16-89	20.63	15.47
		04-27-89	24.88	11.22
		08-10-89	24.30	11.80
		12-18-89	35.00	1.10

Table 1
(continued)

1989 WELL WATER LEVEL DATA

Location	Elevation TOC (ft, NGVD)	Date	Depth to Water from TOC (ft)	Water Level Elevation (ft, NGVD)
Surficial Aquifer Wells				
SMR-1	36.48	03-16-89	6.58	29.90
		04-27-89	7.92	28.56
		08-10-89	5.40	31.08
		12-18-89	5.58	30.90
MW-1	38.93	03-09-89	6.08	32.85
		04-27-89	6.71	32.22
		08-10-89	2.58	36.35
		12-11-89	8.75	30.18
MW-2	39.77	03-07-89	9.08	30.69
		04-25-89	9.29	30.48
		08-11-89	9.75	30.02
		12-11-89	8.82	30.95
MW-3		03-07-89	7.92	
		04-25-89	9.29	
		08-11-89	7.67	
		12-11-89	7.50	
MW-6 (New)	39.32	03-09-89	6.08	33.24
		04-26-89	7.67	31.65
		08-07-89	6.33	32.99
		12-11-89	5.82	33.50
LRII-1	38.02	03-06-89	4.12	33.90
		04-26-89	5.96	32.06
		08-08-89	5.25	32.77
		12-12-89	5.00	33.02
LRII-2	36.53	03-06-89	6.50	30.03
		04-26-89	8.17	28.36
		08-09-89	6.25	30.28
		12-14-89	5.75	30.78

Table 1
(continued)

1989 WELL WATER LEVEL DATA

Location	Elevation TOC (ft, NGVD)	Date	Depth to Water from TOC (ft)	Water Level Elevation (ft, NGVD)
LRII-3	33.51	03-06-89	6.13	27.38
		05-01-89	7.83	25.68
		08-09-89	5.67	27.84
		12-14-89	6.67	26.84
LRII-4	33.90	03-08-89	5.83	28.07
		05-01-89	7.38	26.52
		08-09-89	5.50	28.40
		12-14-89	6.63	27.27
LRII-5	36.78	03-08-89	6.33	30.45
		04-26-89	7.67	29.11
		08-11-89	5.00	31.78
		12-18-89	8.83	27.95
GC-1	31.36	03-09-89	4.33	27.03
		04-25-89	5.00	26.36
		08-08-89	5.16	26.20
		12-13-89	5.00	26.36
GC-2	38.23	03-20-89	4.83	33.40
		04-24-89	5.63	32.60
		08-07-89	8.08	30.15
		12-12-89	17.33	20.90
GC-3	35.08	03-08-89	4.00	31.08
		04-24-89	5.67	29.41
		08-07-89	7.17	27.91
		12-12-89	4.75	30.33
GC-4	33.98	03-07-89	5.08	28.90
		04-24-89	6.50	27.48
		08-07-89	5.00	28.98
		12-13-89	6.25	27.73
GC-5	36.52	03-07-89	7.50	29.02
		04-25-89	8.00	28.52
		08-08-89	7.50	29.02
		12-13-89	7.83	28.69

Table 1
(continued)

1989 WELL WATER LEVEL DATA

Location	Elevation TOC (ft, NGVD)	Date	Depth to Water from TOC (ft)	Water Level Elevation (ft, NGVD)
GC-6	39.10	03-07-89	8.33	30.77
		04-25-89	8.00	31.10
		08-08-89	7.75	31.35
		12-13-89	8.17	30.93
CW-3		03-20-89	5.88	
		05-01-89	6.42	
		08-08-89	6.50	
		12-18-89	7.83	
CW-4		03-20-89	6.71	
		04-27-89	6.58	
		08-10-89	4.63	
		12-11-89	5.00	
CW-5		03-09-89	6.00	
		04-27-89	7.83	
		08-10-89	3.54	
		12-11-89	4.00	

NOTE: TOC - Top of Casing

Appendix 1

1989 WATER QUALITY DATA

FIRST QUARTER - 1989

LENA ROAD

Manatee County Public Works Department

Solid Waste Division

LANDFILL TONNAGE

6		1987		1988		1989	
	T/D	T/M	T/D	T/M	T/D	T/M	T/D
339	848	20,559	857	22,367	932	23,857	954
408	809	19,967	832	23,512	980	23,058	960
.527	855	24,149	1006	26,639	1110	27,138	1005
.636	860	23,451	977	23,829	993		
.316	847	21,400	892	21,847	910		
,143	839	22,703	946	25,756	1073		
.339	889	24,321	1013	23,838	993		
.673	861	21,717	905	27,844	1160		
1,003	833	22,285	929	25,234	971		
1,452	893	23,449	977	24,070	926		
278	803	22,176	924	24,276	971		
08	892	24,852	1035	24,385	938		
5,522	852*	271,029	941*	293,597	996*		

AVERAGE

T/M = TONS/MONTH

T/D = TONS/DAY

MANATEE COUNTY PUBLIC WORKS

CENTRAL LABORATORY (HRS No. E54139)

PROJECT: LENA ROAD LANDFILL

COLLECTED: March 6-20, 1989

COLLECTED BY: Parker
Martin

FIELD PARAMETERS

LOCATION	DATE	ID No.	pH (S.U.)	COND. (umho/cm)	TEMP. (deg C)	TOTAL DEPTH (ft)	SAMPLE DEPTH (ft)
SA-1	20-Mar-89	200056	7.3	500	23.9	140.0	21.02
SA-3	16-Mar-89	200055	7.3	575	24.41	135.0	24.25
SA-4	09-Mar-89	200052	7.4	605	20.2	160	22
SA-5	06-Mar-89	20049	8.9	600	25.2	166.08	26.16
SA-6	06-Mar-89	20049	11.6	1390	24.4	166.0	23.5
SA-7	06-Mar-89	20049	12.2	4100	24.0	166.0	23.12
SA-8	08-Mar-89	200051	9.4	403	21.8	160	24.3
SA-8 FD	08-Mar-89	200051	9.1	396	21.0	160	24.3
SMR-1	16-Mar-89	200055	6.0	300	22.9	23.42	6.58
SMR-2	16-Mar-89	200055	7.6	700	26.33	165.0	20.63
CW-2	WELL	HAS	BEEN	DESTROYED			
CW-3	20-Mar-89	200056	6.2	2075	24.3	18.25	5.88
CW-4	20-Mar-89	200056	5.5	230	22.9	14.42	6.71
CW-5	09-Mar-89	200052	5.7	212	20.3	14.33	6.00
MW-1	09-Mar-89	200052	5.4	69	21.9	13.17	6.08
MW-2	07-Mar-89	200050	6.2	1400	21.1	21.26	9.08
MW-3	07-Mar-89	200050	5.7	159	20.9	16.75	7.92
MW-6	09-Mar-89	200052	5.7	570	19.9	21.58	6.08
LR II-1	06-Mar-89	20049	6.4	445	20.8	21.50	4.12
LR II-2	06-Mar-89	20049	6.6	260	22.6	22.58	6.5
LR II-3	06-Mar-89	20049	6.0	900	23.0	23.0	6.13
LR II-4	08-Mar-89	200051	6.7	296	20.7	22.42	5.83
LR II-5	08-Mar-89	200051	6.8	404	21.3	23.17	6.33
GC-1	09-Mar-89	200052	6.4	1050	20.3	23.08	4.33
GC-2	20-Mar-89	200056	6.2	610	23.0	18.50	4.83
GC-3	08-Mar-89	200051	6.8	480	20.3	23.08	4.00
GC-4	07-Mar-89	200050	6.2	471	21.8	22.25	5.08
GC-5	07-Mar-89	200050	5.4	271	22.0	21.25	7.50
GC-6	07-Mar-89	200050	6.0	438	21.9	21.30	8.33

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MANATEE COUNTY PUBLIC WORKS

CENTRAL LABORATORY (HRS No. E54139)

PROJECT: LENA ROAD LANDFILL

COLLECTED: March 6-20, 1989 COLLECTED BY: Parker, Martin

LABORATORY PARAMETERS

	DATE	ID No.	pH (S.U.)	COND. (umho/cm)	TURB. (NTU)	NITRITE as N (mg/l)	NITRATE as N (mg/l)	TKN (mg/l)	CHLORIDE (mg/l)	TDS (mg/l)	TRUE COLOR (C.U.)	SULFATE (mg/l)	TOC (mg/l)	BICARBONATE ALKALINITY (mgCaCO3/l)	COD (mg/l)
	20-Mar-89	200056	7.5	531	0.52	< 0.01	0.11	1.0	26.6	326	30	12	10.9	244	8
	16-Mar-89	200055	7.3	620	1.00	< 0.01	< 0.01	1.3	24.0	366	30	26	10.8	287	12
	09-Mar-89	200052	7.6	695	14	< 0.01	0.01	1.2	65.0	426	20	53	7.9	200	8
	06-Mar-89	20049	8.9	568	6.80	< 0.01	0.57	0.8	74.0	336	20	27	5.3	151	11
	06-Mar-89	20049	11.6	1270	6.5	< 0.01	< 0.01	1.3	22.4	550	10	147	6.4	< 1	11
	06-Mar-89	20049	12.2	3900	0.68	< 0.01	< 0.01	1.5	68.8	940	10	6	2.4	< 1	7
	09-Mar-89	200051	9.8	405	30	< 0.01	< 0.01	1.2	54.2	248	< 1	8	2.8	67	5
	16-Mar-89	200055	5.9	282	350	< 0.01	< 0.01	2.0	27.0	212	240	17	21.1	58	25
	16-Mar-89	200055	7.6	689	25	0.01	< 0.01	0.8	101	415	10	8	4.3	200	5
	20-Mar-89	200056	6.5	2270	130	< 0.01	0.05	61.1	307	1130	120	36	57.9	670	73
	20-Mar-89	200056	5.7	227	3.0	< 0.01	< 0.01	0.8	17.0	144	10	54	7.2	17	5
	09-Mar-89	200052	5.7	250	3.5	< 0.01	< 0.01	1.1	20.3	146	10	51	6.4	28	7
	09-Mar-89	200052	5.1	83	8.4	< 0.01	0.01	1.3	8.6	60	60	4	12.5	11	14
	07-Mar-89	200050	6.5	1600	80	0.01	0.03	15.0	253	958	120	16	63.0	409	77
	07-Mar-89	200050	6.5	1610	14	0.02	0.06	2.0	152	1280	80	532	28.4	169	35
	09-Mar-89	200052	5.8	650	13	< 0.01	0.04	2.2	159	510	50	3	15.7	72	16
i-1	06-Mar-89	20049	6.4	466	150	0.01	< 0.01	0.6	29.2	296	50	72	12.1	135	15
I-2	06-Mar-89	20049	6.7	247	34	< 0.01	1.00	< 0.2	5.0	128	20	7	2.7	107	9
I-3	06-Mar-89	20049	5.4	72	22	< 0.01	< 0.01	0.2	11.8	14	5	2	1.0	15	6
I-4	08-Mar-89	200051	6.9	337	34	< 0.01	< 0.01	0.6	7.3	186	40	< 2	2.7	154	5
I-5	08-Mar-89	200051	7.0	452	50	< 0.01	< 0.01	1.7	10.1	284	100	3	11.2	214	11
1	09-Mar-89	200052	6.6	1160	140	< 0.01	0.06	1.8	168	760	100	< 2	19.5	382	22
-2	20-Mar-89	200056	6.5	680	900	0.02	0.03	2.5	90.2	442	200	17	18.0	187	25
-3	08-Mar-89	200051	6.7	521	90	< 0.01	0.01	0.6	29.1	304	60	29	6.4	189	8
-4	07-Mar-89	200050	6.4	552	40	0.01	0.01	0.8	25.8	316	20	87	5.1	138	15
-5	07-Mar-89	200050	6.1	319	14	< 0.01	0.04	1.5	19.7	186	40	30	12.1	90	17
-6	07-Mar-89	200050	6.3	527	38	< 0.01	0.02	2.8	59.7	284	80	55	10.7	100	16
R... FD	06-Mar-89	20049	6.4	500	160	0.01	< 0.01	0.7	27.4	288	50	72	12.0	130	13
iC-6 FD	07-Mar-89	200050	6.3	539	19	< 0.01	0.02	2.9	56.9	292	80	57	10.5	109	17
iA-8 FD	08-Mar-89	200051	9.5	404	5.7	< 0.01	< 0.01	1.2	57.0	288	< 1	7	2.7	43	6
MW-6 FD	09-Mar-89	200052	5.8	680	9.5	< 0.01	0.03	1.8	158	532	50	2	15.4	70	19
SMR-2 FD	16-Mar-89	200055	8.4	663	50	0.01	0.09	1.3	96.4	407	15	8	6.3	189	8

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T REGIONAL TREATMENT
NATEE COUNTY
H ST. WEST
N FL 34210
NDRE RACHMANINOFF

8 WATER SAMPLES Samples Received on 03/21/89

Client Job/PO Number:

CLIENT

Reported Date : 04/04/89

umber: 892932
umber:

Description	Client Id
ROAD LANDFILL	SA-1 UNFILTERED
ROAD LANDFILL	GC-2 UNFILTERED
ROAD LANDFILL	CW-3 UNFILTERED
R..D LANDFILL	CW-4 UNFILTERED
D LANDFILL	SA-1 FILTERED
ROAD LANDFILL	GC-2 FILTERED
ROAD LANDFILL	CW-3 FILTERED
ROAD LANDFILL	CW-4 FILTERED

		SAMPLE NUMBER 0001	0002	0003	0004	0005	0006	0007	0008
	MG/L	< 0.02	0.14	< 0.02	< 0.02	< 0.02	0.03	< 0.02	< 0.02
	MG/L	< 0.01	0.04	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	MG/L	< 0.02	36	27	2.9	0.03	27	26	3.1
	MG/L	< 0.02	0.04	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
ME	MG/L	< 0.005	0.097	0.041	0.007	< 0.005	0.070	0.045	0.008
VAPOR	MG/L	< 0.0002	0.0004	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
	OTN	2	< 1	4	4				
	MG/L	28	29	180	19	28	35	170	20
	MG/L	0.18	0.17	0.46	0.10				
	MG/L	0.006	0.024	< 0.005	< 0.005	< 0.005	0.008	< 0.005	< 0.005

APPROVED BY: MICHAEL C. PRICE
LABORATORY MANAGER

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[illegible]WEST REGIONAL TREATMENT
[illegible] MANATEE COUNTY
[illegible] 66TH ST. WEST
BRADENTON FL 34210
ATTN: ANDRE RACHMANINOFF

[illegible]: 1095 Samples Received on 03/10/87
Client Job/PO Number:
[illegible] By: CLIENT
Reported Date : 04/10/87
[illegible] Number : 097973
[illegible] Number : 87-2873

#	Description	Client Id
1	LENA ROAD LANDFILL	MW 1 UNFILTERED
2	LENA ROAD LANDFILL	MW 6 UNFILTERED
3	LENA ROAD LANDFILL	MW 6 DUP UNFILTERED
4	LENA ROAD LANDFILL	CW 5 UNFILTERED
5	LENA ROAD LANDFILL	SA 4 UNFILTERED
6	LENA ROAD LANDFILL	OC 1 UNFILTERED
7	LENA ROAD LANDFILL	MW 1 FILTERED
8	LENA ROAD LANDFILL	MW 6 FILTERED
9	LENA ROAD LANDFILL	MW 6 DUP FILTERED
10	LENA ROAD LANDFILL	CW 5 FILTERED
11	LENA ROAD LANDFILL	SA 4 FILTERED
12	LENA ROAD LANDFILL	OC 1 FILTERED

PARAMETER		SAMPLE NUMBER 0001	0002	0003	0004	0005	0006	0007	0008
[illegible]MIUM BY FLAME	MG/L	< 0.02	0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.03
[illegible]ER BY FLAME	MG/L	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
[illegible] BY FLAME	MG/L	1.8	22	24	2.9	0.13	23	1.7	24
[illegible]D BY FLAME	MG/L	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.02	< 0.02
[illegible]GANESE BY FLAME	MG/L	0.006	0.011	0.013	< 0.005	< 0.005	0.118	0.005	0.014
[illegible]CURY BY COLD VAPOR	MG/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
[illegible]R	OTN	< 1	< 1	1	1	< 1	16		
[illegible]DIUM BY FLAME	MG/L	7.5	33	34	17	63	54	7.9	32

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umber : 892873

	SAMPLE NUMBER 0001	0002	0003	0004	0005	0006	0007	0008
MG/L	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2		
MG/L	0.005	0.010	0.006	< 0.005	< 0.005	0.007	< 0.005	0.008

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ıce Number: 892873

TER		SAMPLE NUMBER 0009	0010	0011	0012
BY FLAME	MG/L	0.02	< 0.02	< 0.02	< 0.02
FLAME	MG/L	< 0.01	< 0.01	< 0.01	< 0.01
LAME	MG/L	23	2.3	0.08	25
LAME	MG/L	< 0.02	< 0.02	< 0.02	< 0.02
BY FLAME	MG/L	0.013	< 0.005	< 0.005	0.120
COLD VAPOR	MG/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
FLAME	MG/L	33	16	51	120
LAME	MG/L	0.019	0.005	< 0.005	0.006

APPROVED BY: Michael C. Price

MICHAEL C. PRICE
LABORATORY MANAGER

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IWEST REGIONAL TREATMENT
T MANATEE COUNTY
66TH ST. WEST
ENTON FL 34210
I: ANDRE RACHMANINOFF

ion: 8 Samples Received on 03/17/89

Client Job/PO Number:

By: CLIENT

Reported Date : 04/11/89

e Number: 892820
e Number: 89 .920

Description	Client Id
LENA ROAD LANDFILL	SA-3 UNFILTERED
LENA ROAD LANDFILL	SMR-1 UNFILTERED
LENA ROAD LANDFILL	SMR-2 UNFILTERED
LENA ROAD LANDFILL	SMR-2 DUP UNFILTERED
LENA ROAD LANDFILL	SA-3 FILTERED
L , ROAD LANDFILL	SMR-1 FILTERED
LENA ROAD LANDFILL	SMR-2 FILTERED
LENA ROAD LANDFILL	SMR-2 DUP FILTERED

ER		SAMPLE NUMBER 0001	0002	0003	0004	0005	0006	0007	0008
Y FLAME	MG/L	< 0.02	0.03	< 0.02	< 0.02	< 0.02	0.04	< 0.02	< 0.02
FLAME	MG/L	< 0.01	0.01	< 0.01	0.15	< 0.01	< 0.01	< 0.01	0.03
LAME	MG/L	0.05	8.7	0.20	0.56	0.03	7.5	0.02	0.19
LAME	MG/L	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
BY FLAME	MG/L	< 0.005	0.013	< 0.005	0.007	< 0.005	0.017	< 0.005	< 0.005
Y COLD VAPOR	MG/L	< 0.0002	< 0.0002	< 0.0002	0.0002	< 0.0002	< 0.0002	< 0.0002	0.0002
FLAME	MG/L	29	19	63	66	30	20	66	64
ITS	MG/L	< 0.1	0.18	0.10	< 0.1				
LAME	MG/L	0.014	0.007	< 0.005	0.029	0.006	0.006	< 0.005	< 0.005

SAMPLES 1 THROUGH 4 WERE TO HAVE ODOR. THE ODOR
TESTS WERE NOT PERFORMED.

APPROVED BY:
MICHAEL C. PRICE
LABORATORY MANAGER

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SOUTHWEST REGIONAL TREATMENT
PLANT MANATEE COUNTY
5100 66TH ST. WEST
BRADENTON FL 34210
ATTN: ANDRE RACHMANINOFF

ription: 36 Samples Received on 03/09/89

oled By: CLIENT

Client Job/PO Number:

Reported Date : 04/06/89

erence Number: 892872
nvoice Number:

ple	Description	Client Id
01	LENA ROAD LANDFILL	LRII-1 UNFILTERED
02	LENA ROAD LANDFILL	LRII-1FD UNFILTERED
03	LENA ROAD LANDFILL	SA-5 UNFILTERED
04	LENA ROAD LANDFILL	SA-6 UNFILTERED
0:	LENA ROAD LANDFILL	LRII-2 UNFILTERED
06	LENA ROAD LANDFILL	LR-II-3 UNFILTERED
07	LENA ROAD LANDFILL	SA-7 UNFILTERED
08	LENA ROAD LANDFILL	GC-6 UNFILTERED
09	LENA ROAD LANDFILL	GC-5 UNFILTERED
10	LENA ROAD LANDFILL	GC-6FD UNFILTERED
11	LENA ROAD LANDFILL	MW-3 UNFILTERED
12	LENA ROAD LANDFILL	MW-2 UNFILTERED
13	LENA ROAD LANDFILL	GC-4 UNFILTERED
14	LENA ROAD LANDFILL	GC-3 UNFILTERED
15	LENA ROAD LANDFILL	SA-8 UNFILTERED
16	LENA ROAD LANDFILL	LRII-4 UNFILTERED
17	LENA ROAD LANDFILL	LRII-5 UNFILTERED
18	LENA ROAD LANDFILL	SA-8FD UNFILTERED
19	LENA ROAD LANDFILL	LRII-1 FILTERED
020	LENA ROAD LANDFILL	LRII-1FD FILTERED
021	LENA ROAD LANDFILL	SA-5 FILTERED
022	LENA ROAD LANDFILL	SA-6 FILTERED
023	LENA ROAD LANDFILL	LRII-2 FILTERED
024	LENA ROAD LANDFILL	LRII-3 FILTERED
025	LENA ROAD LANDFILL	SA-7 FILTERED
026	LENA ROAD LANDFILL	GC-6 FILTERED
027	LENA ROAD LANDFILL	GC-5 FILTERED
028	LENA ROAD LANDFILL	GC-6FD FILTERED

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HRS #E83079

ence Number: 892872

?	LENA ROAD LANDFILL	MW-3 FILTERED
)	LENA ROAD LANDFILL	MW-2 FILTERED
l	LENA ROAD LANDFILL	GC-4 FILTERED
2	LENA ROAD LANDFILL	GC-3 FILTERED
3	LENA ROAD LANDFILL	SA-8 FILTERED
4	LENA ROAD LANDFILL	LRII-4 FILTERED
5	LENA ROAD LANDFILL	LRII-5 FILTERED
6	LENA ROAD LANDFILL	SA-8FD FILTERED

RAMETER		SAMPLE NUMBER 0001	0002	0003	0004	0005	0006	0007	0008
IUM BY FLAME	MG/L	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
R BY FLAME	MG/L	< 0.01	< 0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.01
BY 'E	MG/L	22	22	0.22	< 0.02	8.0	3.7	0.08	10
BY .LAME	MG/L	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
NESE BY FLAME	MG/L	0.067	0.070	< 0.005	< 0.005	0.024	< 0.005	< 0.005	0.016
JRY BY COLD VAPOR	MG/L	0.0006	0.001	0.001	0.0009	< 0.0002	< 0.0002	< 0.0002	< 0.0002
	OTN	< 1	< 1	< 1	< 1	8	< 1	< 1	16
JM BY FLAME	MG/L	21	22	58	64	3.7	6.9	74	45
ACTANTS	MG/L	< 0.2	0.20	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
BY FLAME	MG/L	0.011	0.010	0.012	0.007	< 0.005	0.006	0.017	0.006

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HRS #E83079

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e Number: 892872

ER		SAMPLE NUMBER 0009	0010	0011	0012	0013	0014	0015	0016
Y FLAME	MG/L	< 0.02	< 0.02	< 0.02	0.02	< 0.02	< 0.02	< 0.02	< 0.02
FLAME	MG/L	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.01
.AME	MG/L	8.0	8.7	52	14	16	8.1	0.08	3.6
LAME	MG/L	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
BY FLAME	MG/L	0.019	0.018	0.059	0.042	0.044	0.041	< 0.005	0.014
Y COLD VAPOR	MG/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	0.0004	< 0.0002	< 0.0002
	DTN	32	< 1	2	16	< 1	8	65	8
/ FLAME	MG/L	11	43	180	140	23	21	43	8.3
NTS	MG/L	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
FLAME	MG/L	< 0.005	0.006	0.006	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005

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HRS #E83079

e Number: 892872

		SAMPLE NUMBER 0017	0018	0019	0020	0021	0022	0023	0024
FLAME	MG/L	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
AME	MG/L	< 0.01	0.01	< 0.01	< 0.01	< 0.01	0.03	< 0.01	0.01
E	MG/L	6.1	0.10	20	21	0.09	0.16	6.2	1.3
E	MG/L	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
FLAME	MG/L	0.025	< 0.005	0.069	0.075	< 0.005	< 0.005	0.020	< 0.005
COLD VAPOR	MG/L	< 0.0002	0.0003	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
	OTN	4	16						
LAME	MG/L	13	45	22	22	59	65	4.5	8.5
;	MG/L	< 0.2	< 0.2						
AME	MG/L	< 0.005	0.008	< 0.005	0.010	0.009	0.018	0.013	0.015

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rinking Water Certification
RS #83160

Environmental Certification
HRS #E83079

ference Number: 892872

PARAMETER		SAMPLE NUMBER 0025	0026	0027	0028	0029	0030	0031	0032
OMIUM BY FLAME	MG/L	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
PER BY FLAME	MG/L	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
IN BY FLAME	MG/L	0.08	7.5	8.0	7.5	54	14	16	6.6
AD BY FLAME	MG/L	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
GANESE BY FLAME	MG/L	< 0.005	0.014	0.015	0.014	0.055	0.043	0.042	0.041
CURY BY COLD VAPOR	MG/L	< 0.0002	0.0006	< 0.0002	0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
IUM BY FLAME	MG/L	75	47	12	48	180	140	24	23
IC BY FLAME	MG/L	0.006	< 0.005	< 0.005	0.005	0.009	0.014	< 0.005	< 0.005

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#83160

.rence Number: 892872

ARAMETER		SAMPLE NUMBER 0033	0034	0035	0036
MIUM BY FLAME	MG/L	< 0.02	< 0.02	< 0.02	< 0.02
ER BY FLAME	MG/L	< 0.01	< 0.01	< 0.01	< 0.01
BY FLAME	MG/L	0.04	3.5	4.6	0.04
B\ FLAME	MG/L	< 0.02	< 0.02	< 0.02	< 0.02
;ANESE BY FLAME	MG/L	< 0.005	0.016	0.034	< 0.005
:URY BY COLD VAPOR	MG/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
IUM BY FLAME	MG/L	45	8.5	14	43
C BY FLAME	MG/L	0.007	0.012	0.032	0.007

APPROVED BY: Michael C Price
MICHAEL C. PRICE
LABORATORY MANAGER

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ing Water Certification
#83160

Environmental Certification
HRS #E83079

)IOCHEMISTRY FOR LENA ROAD LANDFILL

/irolab nple #	Client Sample ID	GROSS ALPHA pCi/L	Radium 226 pCi/L	Radium 228 pCi/l
882302-0001	MW-1 12/5/88	2.8+/-1.5	0.1+/-0.1	6.9+/-1.7
882302-0002	MW-2 12/5/88	5.9+/-5.6	1.3+/-0.1	4.9+/-1.4
882302-0003	CW-2 12/5/88	0.7+/-1.0	2.3+/-0.1	7.7+/-1.6
882302-0004	CW-2 DUPE 12/5/88	2.2+/-1.4	0.8+/-0.1	8.1+/-1.7
882302-0005	CW-3 12/5/88	16.1+/-11.6	2.3+/-0.1	2.1+/-1.4
882303-0006	CW-4 12/5/88	7.6+/-5.5	3.3+/-0.1	1.8+/-1.3
882302-0007	GC-5 12/5/88	1.9+/-2.2	0.6+/-0.1	6.5+/-1.7
882302-0008	GC-6 12/5/88	3.1+/-3.2	2.3+/-0.1	5.6+/-1.8
882302-0009	MW-3 12/5/88	2.2+/-2.5	1.2+/-0.1	0.1+/-1.3
882321-0001	SA-1 12/6/88	3.1+/-3.2	1.0+/-0.1	0.5+/-1.4
882321-0002	SA-3 12/6/88	2.0+/-2.0	0.7+/-0.1	5.0+/-1.4
882321-0003	GC-2 12/6/88	73.0+/-19.3	13+/-0.2	8.5+/-1.7
882321-0004	GC-3 12/6/88	5.2+/-4.0	1.4+/-0.1	3.1+/-1.4
882321-0005	GC-4 12/6/88	6.8+/-4.6	0.9+/-0.1	7.5+/-1.5
88[illegible]-0006	CW-5 12/6/88	1.1+/-1.1	2.0+/-0.1	2.3+/-2.8
882321-0007	CW-5 DUPE 12/6/88	0.3+/-1.7	1.4+/-0.1	15.2+/-2.1
882342-0001	LRII-1 12/7/88	1.5+/-2.7	1.0+/-0.1	12.7+/-3.9
882342-0002	LRII-1 DUPE 12/7/88	2.3+/-2.7	0.8 +/-0.0	6.4+/-2.1
882342-0003	SA-5 12/7/88	0.9+/-3.0	1.2+/-0.1	0.8+/-2.4
882342-0004	SA-6 12/7/88	3.6+/-5.4	4.7+/-0.1	19.2+/-8.4
882342-0005	LRII-2 12/7/88	3.1+/-2.1	1.9+/-0.1	2.6+/-2.0
882342-0006	SA-7 12/7/88	0.0+/-3.6	9.2+/-0.2	3.2+/-3.2
882342-0007	LRII-3 12/7/88	5.8+/-1.8	1.7+/-0.1	0.0+/-6.5
882342-0008	SA-8 12/8/88	11.3+/-6.6	8.9+/-0.2	8.8+/-3.4
882342-0009	SA-8 DUPE 12/8/88	3.1+/-5.0	4.9+/-0.1	6.8+/-3.4
882342-0010	LRII-4 12/8/88	2.7+/-2.6	2.5+/-0.1	3.2+/-2.0
882342-0011	SMR-2 12/8/88	14.8+/-7.2	3.1+/-0.1	0.0+/-1.9
882342-0012	SMR-1 12/8/88	25.8+/-8.0	6.3+/-0.1	0.0+/-2.0
882342-0013	MW-6 12/9/88	6.5+/-5.4	4.7+/-0.1	1.1+/-1.9
882342-0014	MW-6 DUPE 12/9/88	16.9+/-7.8	3.5+/-0.1	2.3+/-2.1
882342-0015	LRII-5 12/9/88	19.3+/-7.3	3.7+/-0.1	4.2+/-2.1
882342-0016	SA-4 12/9/88	1.4+/-3.0	0.9+/-0.0	1.2+/-2.0
882342-0017	GC-1 12/9/88	12.6+/-9.1	3.1+/-0.1	0.0+/-1.8

4th Quarter
Radionuclides

[redacted]	LEACHATE INPUT TO POND G.P.D.	LEACHATE IRRIGATION G.P.D.	LEACHATE TO W.W.T.P. G.P.D.	RAINFALL INCHES	AVERAGE DAILY PH			WEIR DISCHARGE FLOW (MGD)		
					NORTH	SOUTH	WEST	NORTH	SOUTH	WEST
1										
2										
3	58,100	N	187,200		N	N	7.0	N	N	N
4	31,660	O	176,160		O	O	7.0	O	O	O
5	30,560		7,950				7.0			
6	31,920	S			D	D	7.0	D	D	D
7	30,930	P			I	I	7.0	I	I	I
8		R			S	S		S	S	S
9		A			C	C		C	C	C
10	32,035	Y			H	H	7.0	H	H	H
11	32,365				A	A	7.0	A	A	A
12	54,764	I			R	R	7.0	R	R	R
13	31,011	R			G	G	7.0	G	G	G
14	27,340	R			E	E	7.0	E	E	E
15		I								
16	57,320	G					7.0			
17	29,865	A		0.17	N	N	7.0	N	N	N
18	29,080	T			O	O	7.0	O	O	O
19	29,050	I					7.0			
20	33,625	O			D	D	7.0	D	D	D
21	76,671	N		0.02	I	I	7.0	I	I	I
22		*			S	S		S	S	S
23	71,303	*		1.55	C	C	7.0	C	C	C
24	31,660	*			H	H	7.0	H	H	H
25	30,860	*			A	A	7.0	A	A	A
26	31,030				R	R	7.0	R	R	R
27	33,885				G	G	7.0	G	G	G
28	31,465				E	E	7.0	E	E	E
29										
30	63,870						7.0			
31										
TOTAL:	910,369	-0-	371,310	1.74	N/A	N/A	N/A	N/A	N/A	N/A

DATE	LEACHATE INPUT TO POND G.P.D.	LEACHATE IRRIGATION G.P.D.	LEACHATE TO W.W.T.P. G.P.D.	RAINFALL INCHES	AVERAGE DAILY PH NORTH	AVERAGE DAILY PH SOUTH	AVERAGE DAILY PH WEST	WEIR DISCHARGE FLOW (MGD) NORTH	WEIR DISCHARGE FLOW (MGD) SOUTH	WEIR DISCHARGE FLOW (MGD) WEST
1	31,410	*	*	0.0	*	*	7.0	*	*	*
2	28,710	*	*	0.0	*	*	7.0	*	*	*
3	29,630	*	*	0.0	*	*	7.0	*	*	N
4	28,390	N	N	0.0	N	N	7.0	N	N	O
5		O	O		O	O		O	O	
6	62,125			0.0			7.0			
7	30,000	S	D	0.00	D	D	7.0	D	D	D
8	38,280	R	I	0.00	I	I	7.0	I	I	I
9	26,290	A	S	0.0	S	S	7.0	S	S	S
0	48,725	Y	C	0.0	C	C	7.0	C	C	C
1	31,087		H	0.0	H	H	7.0	H	H	H
2		I	A		A	A		A	A	A
3	60,928	R	R	0.0	R	R	7.0	R	R	R
	29,200	R	G	0.0	G	G	7.0	G	G	G
5	26,730	I	E	0.0	E	E	7.0	E	E	E
	30,050	G	*	0.0	*	*	7.0	*	*	*
7	32,160	A	*	0.0	*	*	7.0	*	*	*
	32,590	T	N	0.0	N	N	7.0	N	N	N
		I	O		O	O		O	O	O
	64,685	O		0.0			7.0			
	30,955	N	D	0.0	D	D	7.0	D	D	D
	35,280	*	I	0.0	I	I	7.0	I	I	I
3	27,330	*	S	0.0	S	S	7.0	S	S	S
		*	C		C	C		C	C	C
5		*	H		H	H		H	H	H
6		*	A		A	A		A	A	A
7	121,280	*	R	0.0	R	R	7.0	R	R	R
8	33,060	*	G	0.0	G	G	7.0	G	G	G
9		*	E		E	E		E	E	E
0		*	*		*	*		*	*	*
1		*	*		*	*		*	*	*
TOTAL:	878,895	-0-	-0-	-0-	-NA-	-NA-	-NA-	-NA-	-NA-	-NA-

LEACHATE INPUT TO [illegible]P	LEACHATE IRRIGATION G.P.D.	LEACHATE TO W.W.T.P. G.P.D.	RAINFALL INCHES	AVERAGE DAILY PH NORTH	SOUTH	WEST	WEIR DISCHARGE FLOW (MGD) NORTH	SOUTH	WEST
37,300	-	-	-	-	-	7.1	-	-	-
40,960	-	-	-	-	-	7.1	-	-	-
52,345	-	-	0.65	-	-	7.0	-	-	-
9,321	-	-	-	N	N	7.1	N	N	N
-	-	-	-	O	O	-	O	O	O
20,824	-	595,800	-	-	-	7.0	-	-	-
10,110	N	145,800	TRACE	D	D	7.0	D	D	D
9,420	O	767,400	0.05	I	I	7.0	I	I	I
9,040	-	760,200	-	S	S	7.0	S	S	S
39,745	S	686,600	-	C	C	7.0	C	C	C
39,405	P	-	-	H	H	7.0	H	H	H
-	R	-	-	A	A	-	A	A	A
20,220	A	-	-	R	R	7.0	R	R	R
9,570	Y	91,200	-	G	G	7.0	G	G	G
10,060	-	530,400	-	E	E	7.0	E	E	E
9,650	I	465,600	-	-	-	7.0	-	-	-
9,355	R	451,200	-	N	N	7.1	N	N	N
9,310	R	511,200	-	O	O	7.1	O	O	O
-	I	-	-	-	-	-	-	-	-
20,815	G	879,600	-	D	D	7.0	D	D	D
40,670	A	-	-	I	I	7.0	I	I	I
30,030	T	-	-	S	S	7.0	S	S	S
30,420	I	-	-	C	C	7.0	C	C	C
38,350	O	-	0.45	H	H	7.0	H	H	H
39,007	N	-	0.30	A	A	7.1	A	A	A
-	-	-	-	R	R	-	R	R	R
48,113	-	-	-	G	G	7.0	G	G	G
38,800	-	-	-	E	E	7.0	E	E	E
39,660	-	-	-	-	-	7.0	-	-	-
41,180	-	-	-	-	-	7.0	-	-	-
40,830	-	-	-	-	-	7.0	-	-	-
[illegible]1510	-0-	5,885,000	1.45	-0-	-0-	-0-	-0-	-0-	-0-

COMMENTS: STORMWATER MAINTENANCE REQUIRED PUMPING WATER TO S.E.W.W.T.P.

SECOND QUARTER - 1989

LENA ROAD

Manatee County Public Works Department

Solid Waste Division

LANDFILL TONNAGE

	1986		1987		1988		1989	
	T/M	T/D	T/M	T/D	T/M	T/D	T/M	T/D
JAN	20,339	848	20,559	857	22,367	932	23,857	954
FEB	19,408	809	19,967	832	23,512	980	23,058	960
MAR	20,527	855	24,149	1006	26,639	1110	27,138	1005
APR	20,636	860	23,451	977	23,829	993	24,370	975
MAY	20,316	847	21,400	892	21,847	910	25,646	986
JUN	20,143	839	22,703	946	25,756	1073	28,088	1080
JUL	21,339	889	24,321	1013	23,838	993		
AUG	20,673	861	21,717	905	27,844	1160		
SEP	20,003	833	22,285	929	25,234	971		
OCT	21,452	893	23,449	977	24,070	926		
NOV	19,278	803	22,176	924	24,276	971		
	21,408	892	24,852	1035	24,385	938		
	245,522	852*	271,029	941*	293,597	996*		

* AVERAGE

T/M = TONS/MONTH

T/D = TONS/DAY

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MANATEE COUNTY PUBLIC WORKS

CENTRAL LABORATORY (HRS No. E54139)

PROJECT: LENA ROAD LANDFILL

COLLECTED: April 24 - May 1, 1989 COLLECTED BY: Parker, Elliot

FIELD PARAMETERS

CATION	DATE	ID No.	pH (S.U.)	COND. (umho/cm)	TEMP. (deg C)	TOTAL DEPTH (ft)	SAMPLE DEPTH (ft)
-1	24-Apr-89	20060	7.3	450	24.6	135.0	26.0
-3	24-Apr-89	20060	7.2	600	25.2	130.0	27.0
-4	25-Apr-89	20061	7.8	725	23.5	155	25
-5	26-Apr-89	20063	7.5	620	24.5	160.0	29.5
-	26-Apr-89	20063	7.8	750	23.8	160.0	25.08
-,	01-May-89	20065	8.8	400	26.8	160.0	28.5
-8	01-May-89	20065	8.9	420	25.8	160.0	28.25
MR-1	27-Apr-89	20064	5.9	270	27.5	22.0	7.92
MR-2	27-Apr-89	20064	7.4	700	25.5	157.58	24.88
W-3	01-May-89	20065	6.5	199	23.9	18.17	6.42
W-4	27-Apr-89	20064	6.8	1000	23.0	15.33	6.58
W-5	27-Apr-89	20064	5.5	225	25.0	14.17	7.83
W-1	27-Apr-89	20064	5.2	92	27.0	13.17	6.71
W-2	25-Apr-89	20061	6.4	900	24.5	21.21	9.29
W-3	25-Apr-89	20061	6.3	1225	24.5	16.75	9.29
W-6	26-Apr-89	20063	5.6	600	24.1	21.83	7.67
RII-1	26-Apr-89	20063	6.4	480	22.8	21.25	5.96
RII-2	26-Apr-89	20063	6.2	190	24.8	22.33	8.17
RII-3	01-May-89	20065	5.2	60	24.1	22.92	7.83
RII-4	01-May-89	20065	6.8	265	23.1	22.5	7.38
RII-5	26-Apr-89	20063	5.6	600	24.1	21.83	7.67
C-1	25-Apr-89	20061	6.4	1100	24	23.13	5.0
C-2	24-Apr-89	20060	6.2	690	24.3	18.5	5.63
C-3	24-Apr-89	20060	6.6	510	24.2	23.0	5.67
C	24-Apr-89	20060	6.6	600	25.2	22.33	6.5
C-	25-Apr-89	20061	5.6	295	27.5	21.38	8.0
C-6	25-Apr-89	20061	6.2	470	27	21.25	8.0

M A N A T E E   C O U N T Y   P U B L I C   W O R K S

CENTRAL LABORATORY (HRS No. E54139)

PROJECT: LENA ROAD LANDFILL

COLLECTED: April 24 - May 1, 1989   COLLECTED BY: Parker, Elliott

LABORATORY PARAMETERS

DATE	ID No.	pH (S.U.)	COND. (umho/cm)	TURB. (NTU)	NITRITE as N (mg/l)	NITRATE as N (mg/l)	TKN (mg/l)	CHLORIDE (mg/l)	TDS (mg/l)	TRUE COLOR (C.U.)	SULFATE (mg/l)	TOC (mg/l)	BICARBONATE ALKALINITY (mgCaCO3/l)	COD (mg/l)
-Apr-89	20060	7.0	503	5.0	< 0.01	0.03	0.9	26.7	310	40	3	12.1	241	11
-Apr-89	20060	7.0	565	8.3	< 0.01	< 0.01	0.7	25.0	378	30	26	11.7	300	13
-Apr-89	20061	7.2	710	170	0.03	0.13	1.8	70.1	438	70	65	12.5	231	18
-Apr-89	20063	7.2	694	40	0.01	0.01	0.8	66.6	422	40	40	10.6	214	15
-Ar -9	20063	7.6	839	60	< 0.01	0.01	0.7	67.0	566	30	131	8.3	185	13
-M. /	20065	8.3	443	75	< 0.01	0.03	0.8	62.8	262	10	6	5.3	164	8
-May-89	20065	8.3	458	80	< 0.01	0.02	1.6	62.3	286	10	7	6.8	158	13
-Apr-89	20064	5.9	316	24	< 0.01	< 0.01	0.7	30.6	208	140	28	16.2	64	15
-Apr-89	20064	7.1	736	10	< 0.01	0.03	1.0	89.6	428	20	6	6.2	210	9
-May-89	20065	6.3	2260	120	< 0.01	0.02	63.4	297	1110	80	38	65.3	664	78
7-Apr-89	20064	6.9	1070	15	< 0.01	< 0.01	1.1	108	776	50	162	17.7	290	13
7-Apr-89	20064	5.8	234	2.7	< 0.01	< 0.01	0.8	19.7	154	20	54	7.8	24	8
7-Apr-89	20064	5.6	92	10	< 0.01	0.02	0.6	16.4	86	60	5	12.4	19	11
5-Apr-89	20061	6.3	1510	22	< 0.01	< 0.01	17.9	253	944	500	18	64.8	383	80
5-Apr-89	20061	6.1	1360	3.2	< 0.01	< 0.01	1.8	179	894	800	220	35.0	179	35
6-Apr-89	20063	5.7	672	7.5	< 0.01	0.05	1.1	154	526	100	3	17.3	76	19
26-Apr-89	20063	6.2	520	250	< 0.01	0.07	0.9	28.6	292	140	72	11.0	132	11
26-Apr-89	20063	6.2	197	18	< 0.01	0.01	0.7	9.1	94	50	5	4.1	82	5
01-May-89	20065	6.3	66	1.6	< 0.01	0.03	< 0.2	12.4	22	5	2	2.6	4	7
01-May-89	20065	6.4	304	31	< 0.01	0.02	0.4	11.2	154	60	1	5.1	134	9
26-Apr-89	20063	6.6	445	40	< 0.01	0.02	0.5	13.7	254	120	< 1	12.9	211	12
25-Apr-89	20061	6.3	1210	30	< 0.01	0.04	1.2	201	776	300	2	21.7	386	18
24-Apr-89	20060	6.1	770	300	< 0.01	0.02	1.6	89.8	454	280	15	21.0	200	22
24-Apr-89	20060	6.2	476	70	0.03	< 0.01	0.9	34.3	296	40	33	8.6	191	8
2 -89	20060	6.6	632	190	0.02	< 0.01	0.3	36.9	352	20	73	5.9	185	5
2 -89	20061	5.7	329	9.9	< 0.01	0.03	0.7	29.3	204	100	59	13.6	58	13
25-Apr-89	20061	6.1	551	6.8	< 0.01	0.02	3.3	64.5	320	200	69	12.3	104	10
24-Apr-89	20060	6.1	758	320	0.01	< 0.01	1.7	92.8	478	280	20	21.0	204	23
27-Apr-89	20064	5.9	308	20	< 0.01	< 0.01	0.6	29.7	190	140	28	16.0	62	15

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WEST REGIONAL TREATMENT
T MANATEE COUNTY
[illegible] ST. WEST
[illegible] FL 34210
: ANDRE RACHMANINOFF

ion: 24 WATER SAMPLED Samples Received on 04/27/87

Client Job/PO Number:

By: CLIENT

Reported Date : 05/26/87

e Number: 873220
e Number: 87-3220

Description	Client Id
UNFILTERED	SA-3
UNFILTERED	GC-3
UNFILTERED	SA-1
FILTERED	GC-2
UnFILTERED	GC-2FD
UNFILTERED	GC-4
UNFILTERED	GC-6
UNFILTERED	GC-5
UNFILTERED	GC-1
UNFILTERED	SA-4
UNFILTERED	MW-3
UNFILTERED	MW-2
FILTERED	SA-3
FILTERED	GC-3
FILTERED	SA-1
FILTERED	GC-2
FILTERED	GC-2FD
FILTERED	GC-4
FILTERED	GC-6
FILTERED	GC-5
FILTERED	GC-1
FILTERED	SA-4
FILTERED	MW-3
FILTERED	MW-2

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PARAMETER		SAMPLE NUMBER 0001	0002	0003	0004	0005	0006	0007	0008
MIDm BY FLAME	MG/L	< 0.02	< 0.02	< 0.02	0.11	0.10	< 0.02	< 0.02	< 0.02

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ence Number: 873220

METER		SAMPLE NUMBER 0001	0002	0003	0004	0005	0006	0007	0008
BY FLAME	MG/L	< 0.01	< 0.01	< 0.01	0.01	0.01	< 0.01	0.05	0.03
FLAME	MG/L	< 0.10	7.8	< 0.10	40	49	20	11	14
FLAME	MG/L	< 0.02	< 0.02	< 0.02	0.03	0.03	< 0.02	< 0.02	< 0.02
ESC BY FLAME	MG/L	< 0.005	0.060	0.007	0.096	0.081	0.054	0.103	0.025
BY COLD VAPOR	MG/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
	OTN	< 1	1	< 1	1	< 1	4	8	16
BY FLAME	MG/L	27	20	22	33	33	21	51	15
TANTS	MG/L	0.11	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.17	0.19
Y FLAME	MG/L	0.019	0.006	0.012	0.047	0.026	0.015	0.048	0.026
: 10 VOC'S									
-TRICHLOROETHANE	UG/L	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
ICH ETHENE	UG/L	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
DIB OETHANE (EDB)	UG/L	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
ICHLOROETHANE	UG/L	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
ICHLOROBENZENE	UG/L	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
NE	UG/L	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
N TETRACHLORIDE	UG/L	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
ICHLOROETHENE	UG/L	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
LOROETHENE	UG/L	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
CHLORIDE	UG/L	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1

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METER		SAMPLE NUMBER 0009	0010	0011	0012	0013	0014	0015	0016
M BY FLAME	MG/L	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.05
BY FLAME	MG/L	< 0.01	0.30	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
FLAME	MG/L	26	0.61	33	21	< 0.10	7.9	< 0.10	32
FLAME	MG/L	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
SE BY FLAME	MG/L	0.116	0.027	0.051	0.037	0.006	0.042	< 0.005	0.072
BY COLD VAPOR	MG/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
	CTN	1	< 1	1	8				
BY FLAME	MG/L	54	62	140	140	27	20	22	34
ANTS	MG/L	< 0.1	< 0.1	0.30	0.31				
FLAME	MG/L	0.013	0.035	0.017	0.013	0.048	0.022	0.007	0.053
10 VOC'S									
RI ROETHANE	UG/L	< 1	< 1	< 1	< 1				
CHLOROETHENE	UG/L	< 1	< 1	< 1	< 1				
IBROMOETHANE (EDB)	UG/L	< 0.02	< 0.02	< 0.02	< 0.02				
CHLOROETHANE	UG/L	< 1	< 1	< 1	< 1				
HLOROBENZENE	UG/L	< 1	< 1	< 1	< 1				
	UG/L	1.2	< 1	< 1	< 1				
TETRACHLORIDE	UG/L	< 1	< 1	< 1	< 1				
LOROETHENE	UG/L	< 1	< 1	< 1	< 1				
ROETHENE	UG/L	< 1	< 1	< 1	< 1				
CHLORIDE	UG/L	< 1	< 1	< 1	< 1				

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Number: 893220

		SAMPLE NUMBER 0017	0018	0019	0020	0021	0022	0023	0024
ANE	MG/L	0.05	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
E	MG/L	< 0.01	< 0.01	0.03	< 0.01	< 0.01	0.12	< 0.01	< 0.01
	MG/L	33	18	7.5	11	26	0.18	33	12
	MG/L	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
FLAME	MG/L	0.071	0.048	0.019	0.018	0.117	0.007	0.040	0.039
LD VAPOR	MG/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
ME	MG/L	32	21	50	14	54	64	140	120
.	MG/L	0.017	0.026	0.039	0.032	0.024	0.015	0.015	0.031

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APPROVED BY: Michael C. Price

MICHAEL C. PRICE
LABORATORY MANAGER

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SOUTHWEST REGIONAL TREATMENT
PLANT MANATEE COUNTY
5100 66TH ST. WEST
BRADENTON FL 34210
ATTN: ANDRE RACHMANINOFF

escription: 24 Samples Received on 05/01/87

ampled By: CLIENT Client Job/PO Number:

eference Number: 873233 Reported Date : 05/26/87
Invoice Number: 89-3233

ample	Description	Client Id
0001	LENA ROAD LANDFILL UNFILTERED	MW-1
0002	LENA ROAD LANDFILL UNFILTERED	CW-4
0003	LENA ROAD LANDFILL UNFILTERED	CW-5
0004	LENA ROAD LANDFILL UNFILTERED	SMR-1
0005	LENA ROAD LANDFILL UNFILTERED	SMR-2
0006	LENA ROAD LANDFILL UNFILTERED	SMR-1FD
0007	LENA ROAD LANDFILL UNFILTERED	SA-5
0008	LENA ROAD LANDFILL UNFILTERED	LRII-1
0009	LENA ROAD LANDFILL UNFILTERED	SA-6
0010	LENA ROAD LANDFILL UNFILTERED	LRII-2
0011	LENA ROAD LANDFILL UNFILTERED	LRII-5
0012	LENA ROAD LANDFILL UNFILTERED	MW-6
0013	LENA ROAD LANDFILL FILTERED	MW-1
0014	LENA ROAD LANDFILL FILTERED	CW-4
0015	LENA ROAD LANDFILL FILTERED	CW-5
0016	LENA ROAD LANDFILL FILTERED	SMR-1
0017	LENA ROAD LANDFILL FILTERED	SMR-2
0018	LENA ROAD LANDFILL FILTERED	SMR-1 FD
0019	LENA ROAD LANDFILL FILTERED	SA-5
0020	LENA ROAD LANDFILL FILTERED	LRII-1
0021	LENA ROAD LANDFILL FILTERED	SA-6
0022	LENA ROAD LANDFILL FILTERED	LRII-2
0023	LENA ROAD LANDFILL FILTERED	LRII-3
0024	LENA ROAD LANDFILL FILTERED	MW-6

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SAMPLE NUMBER

PARAMETER		0001	0002	0003	0004	0005	0006	0007	0008
[illegible] BY FLAME	MG/L	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02

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ence Number: 873233 Page: 2

AMETER		SAMPLE NUMBER 0001	0002	0003	0004	0005	0006	0007	0009
BY FLAME	MG/L	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.24	< 0.01
BY FLAME	MG/L	2.6	3.6	3.4	9.9	0.11	10	0.47	24
BY FLAME	MG/L	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
IESE BY FLAME	MG/L	0.007	0.037	0.005	0.020	< 0.005	0.018	0.005	0.066
Y BY COLD VAPOR	MG/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
	CTN	< 1	< 1	2	< 1	< 1	< 1	< 1	< 1
BY FLAME	MG/L	8.1	38	16	22	59	21	54	22
TANTS	MG/L	23	0.14	< 0.10	0.15	0.13	0.18	0.15	0.12
BY FLAME	MG/L	< 0.005	< 0.005	< 0.005	< 0.005	0.009	< 0.005	0.050	0.009
E: USE 10 VOC									
-TRICHLOROETHANE	UG/L	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
IB THANE (EDB)	UG/L	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
ICHLOROETHANE	UG/L	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
IE	UG/L	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
TETRACHLORIDE	UG/L	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
CHLOROETHENE	UG/L	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
LOROETHENE	UG/L	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
CHLORIDE	UG/L	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1

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Reference Number: 893233

PARAMETER		SAMPLE NUMBER 0009	0010	0011	0012	0013	0014	0015	0016
CHROMIUM BY FLAME	MG/L	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
COPPER BY FLAME	MG/L	0.13	< 0.01	< 0.01	< 0.01	< 0.01	0.02	< 0.01	< 0.01
IRON BY FLAME	MG/L	0.40	6.1	5.0	25	2.2	3.0	2.9	9.4
LEAD BY FLAME	MG/L	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
MANGANESE BY FLAME	MG/L	0.007	0.013	0.017	0.009	< 0.005	0.037	< 0.005	0.022
MERCURY BY COLD VAPOR	MG/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
ODOR	OTN	< 1	1	< 1	2				
SODIUM BY FLAME	MG/L	45	3.5	13	33	8.1	38	15	23
SURFACTANTS	MG/L	0.12	< 0.10	0.12	0.16				
ZINC BY FLAME	MG/L	0.113	< 0.005	< 0.005	< 0.005	< 0.005	0.020	< 0.005	< 0.005

OFILE: USE 10 VOC

,1 RICHLOROETHANE	UG/L	< 1	< 1	< 1	< 1
,2 . ROMOETHANE (EDB)	UG/L	< 1	< 1	< 1	< 1
,2-DICHLOROETHANE	UG/L	< 1	< 1	< 1	< 1
ENZENE	UG/L	< 1	< 1	< 1	< 1
ARBON TETRACHLORIDE	UG/L	< 1	< 1	< 1	< 1
ETRACHLOROETHENE	UG/L	< 1	< 1	< 1	< 1
RICHLOROETHENE	UG/L	< 1	< 1	< 1	< 1
INYL CHLORIDE	UG/L	< 1	< 1	< 1	< 1

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OUTHWEST REGIONAL TREATMENT
LANT MANATEE COUNTY
100 66TH ST. WEST
BADENTON FL 34210
TTN: ANDRE RACHMANINOFF

ption: 10 Samples Received on 05/03/89

d By: CLIENT

Client Job/PO Number:

nce Number: 893243

Reported Date : 05/26/89

ice Number: 87-3243

Description	Client Id
LENA ROAD (UNFILTERED)	SA-7
LENA ROAD (UNFILTERED)	LRII-3
LENA ROAD (UNFILTERED)	LRII-4
LENA ROAD (UNFILTERED)	SA-8
A ROAD (UNFILTERED)	CW-3
LENA ROAD (FILTERED)	SA-7
LENA ROAD (FILTERED)	LRII-3
LENA ROAD (FILTERED)	LRII-4
LENA ROAD (FILTERED)	SA-8
LENA ROAD (FILTERED)	CW-3

SAMPLE NUMBER

TER		0001	0002	0003	0004	0005	0006	0007	0008
BY FLAME	MG/L	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
FLAME	MG/L	0.02	< 0.01	< 0.01	0.04	< 0.01	< 0.01	< 0.01	< 0.01
LAME	MG/L	0.19	0.97	4.5	0.25	25	< 0.05	0.89	4.4
LAME	MG/L	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
BY FLAME	MG/L	0.007	< 0.005	0.014	< 0.005	0.039	0.009	< 0.005	0.015
COLD VAPOR	MG/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
	GTN	2	2	2	1	8			
FLAME	MG/L	40	6.2	3.2	41	170	41	6.7	8.4
S	MG/L	0.13	< 0.10	< 0.10	0.14	0.46			
LAME	MG/L	0.069	< 0.005	< 0.005	0.015	< 0.005	< 0.005	< 0.005	< 0.005

Sample #5 (CW-3) was positive for chlorobenzene
at 10.5 ug/l.

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Number: 073243

Page: 2

AMETER		SAMPLE NUMBER 0001	0002	0003	0004	0005	0006	0007	0008
: 10 VOC'S									
RICHLOROETHANE	UG/L	< 1	< 1	< 1	< 1	< 1			
HLOROETHENE	UG/L	< 1	< 1	< 1	< 1	< 1			
IBROMOETHANE (EDB)	UG/L	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02			
HLOROETHANE	UG/L	< 1	< 1	< 1	< 1	< 1			
HLOROBENZENE	UG/L	< 1	< 1	< 1	< 1	< 1			
	UG/L	< 1	< 1	< 1	< 1	11.5			
TETRACHLORIDE	UG/L	< 1	< 1	< 1	< 1	9.9			
LOROETHENE	UG/L	< 1	< 1	< 1	< 1	< 1			
OETHENE	UG/L	< 1	< 1	< 1	< 1	< 1			
LORIDE	UG/L	< 1	< 1	< 1	< 1	< 1			
	UG/L	< 1	< 1	< 1	< 1	< 1			

Sample #5 (CW-3) was positive for chlorobenzene at 10.5 ug/l.

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Reference Number: 893243 | Page: 3

PARAMETER		SAMPLE NUMBER 0009	0010
CHROMIUM BY FLAME	MG/L	< 0.02	< 0.02
COPPER BY FLAME	MG/L	< 0.01	< 0.01
IRON BY FLAME	MG/L	< 0.05	24
LEAD BY FLAME	MG/L	< 0.02	< 0.02
MANGANESE BY FLAME	MG/L	< 0.005	0.040
MERCURY BY COLD VAPOR	MG/L	< 0.0002	< 0.0002
SODIUM BY FLAME	MG/L	41	150
ZINC BY FLAME	MG/L	< 0.005	< 0.005

PROFILE: [illegible]

Sample #5 (CN-3) was positive for chlorobenzene at 10.5 ug/l.

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WASTEWATER TREATMENT

APPROVED BY:
MICHAEL C. PRICE
LABORATORY MANAGER

DATE [redacted]	LEACHATE INPUT TO POND G.P.D.	LEACHATE IRRIGATION G.P.D.	LEACHATE TO W.W.T.P. G.P.D.	RAINFALL INCHES	AVERAGE DAILY PH NORTH	AVERAGE DAILY PH SOUTH	AVERAGE DAILY PH WEST	WEIR DISCHARGE FLOW (MGD) NORTH	WEIR DISCHARGE FLOW (MGD) SOUTH	WEIR DISCHARGE FLOW (MGD) WEST
	37,408	0.0	0.0	0.0	N	N	7.0	N	N	N
	48,352	0.0	0.0	0.0	O	O	7.0	O	O	O
	18,950	0.0	243,120	0.0	T	T	7.0			
	39,520	0.0	0.0	0.02			7.0	D	D	D
	39,185	0.0	86,610	0.0			7.0			
	40,621	0.0	0.0	0.0	A	A	7.0	I	I	I
	48,744	0.0	99,900	0.0	P	P	7.0	S	S	S
	39,180	0.0	79,920	0.0			7.0			
	38,470	0.0	99,900	0.0	P	P	7.0	C	C	C
	39,280	0.0	105,450	0.0			7.0			
	39,265	0.0	209,790	0.0	L	L	7.0	H	H	H
	40,347	0.0	0.0	0.0			7.0			
					I	I		A	A	A
	46,918	0.0	0.0	0.05			7.0			
	40,020	0.0	33,300	2.0	C	C	7.0	R	R	R
	40,250	0.0	0.0	0.0			7.0			
	39,290	0.0	0.0	0.0	A	A	7.0	G	G	G
	41,115	0.0	0.0	0.0			7.0			
					B	B		E	E	E
	48,475	0.0	0.0	0.0			7.0			
	38,126	0.0	0.0	0.0	L	L	7.0	*	*	*
	39,220	0.0	0.0	0.0			7.0			
	42,320	219,600	0.0	0.0	E	E	7.0	*	*	*
	38,116	106,500	0.0	0.0			7.0			
	39,250	0.0	0.0	0.02	*	*	7.0	*	*	*
					*	*		*	*	*
AL:	[redacted]422	326,100	957,990	2.09	NA	NA	NA	NA	NA	NA

DATE: MA 11989	LEACHATE INPUT TO POND G.P.D.	LEACHATE IRRIGATION G.P.D.	LEACHATE TO W.W.T.P. G.P.D.	RAINFALL INCHES	AVERAGE DAILY PH NORTH	AVERAGE DAILY PH SOUTH	AVERAGE DAILY PH WEST	WEIR DISCHARGE FLOW (MGD) NORTH	WEIR DISCHARGE FLOW (MGD) SOUTH	WEIR DISCHARGE FLOW (MGD) WEST
	68,070	71,040	n	0.20	n	n	7.0	n	n	n
	39,116		o	0.70	o	o	7.0	o	o	o
	40,090						7.0			
	44,160		d		d	d	7.0	d	d	d
	50,010		i		i	i	7.0	i	i	i
	65,170		s		s	s	7.0	s	s	s
			c		c	c		c	c	c
			h		h	h		h	h	h
	39,670		a		a	a	7.0	a	a	a
	39,940		r		r	r	7.0	r	r	r
	39,740		g		g	g	7.0	g	g	g
	38,050		e		e	e	7.0	e	e	e
	38,467						7.0			
			t		n	n		n	n	n
	46,228		o		o	o	7.0	o	o	o
	38,620						7.0			
	37,440	75,480	s		d	d	7.0	d	d	d
	37,130		e		i	i	7.1	i	i	i
	36,914		w		s	s	7.0	s	s	s
	28,268		w		c	c	7.0	c	c	c
			t		h	h		h	h	h
	57,278		p		a	a	7.1	a	a	a
	37,230				r	r	7.0	r	r	r
	37,510				g	g	7.0	g	g	g
	37,220	111,000			e	e	7.1	e	e	e
	8,820						7.0			
	56,605	69,930		0.75			7.1			
	16,545			0.10			7.1			
TOTAL:	[illegible],291	327,450	n/a	1.75	n/a	n/a	n/a	n/a	n/a	n/a

[redacted]

LEACHATE INPUT TO POND G.P.D.	LEACHATE IRRIGATION G.P.D.	LEACHATE TO W.W.T.P. G.P.D.	RAINFALL INCHES	AVERAGE DAILY PH NORTH	SOUTH	WEST	WEIR DISCHARGE FLOW (MGD) NORTH	SOUTH	WEST
21,190				N	N	7.0	N	N	N
21,365				O	O	7.1	O	O	O
27,433						7.1			
				D	D		D	D	D
55,982			0.15	I	I	7.1	I	I	I
28,440				S	S	7.1	S	S	S
16,070			0.92	C	C	7.1	C	C	C
16,280				H	H	7.0	H	H	H
26,920				A	A	7.1	A	A	A
25,285				R	R	7.0	R	R	R
				G	G		G	G	G
53,715			0.45	E	E	7.1	E	E	E
27,660						7.0			
21,060			0.12	N	N	7.1	N	N	N
26,550				O	O	7.1	O	O	O
57,080		997,200		D	D	7.1	D	D	D
				I	I		I	I	I
60,170		702,800	1.35	S	S	7.1	S	S	S
106,230		680,100	1.90	C	C	7.1	C	C	C
45,570		400,000	0.20	H	H	7.0	H	H	H
74,700			0.45	A	A	7.1	A	A	A
79,077			0.50	R	R	7.1	R	R	R
				G	G		G	G	G
				E	E		E	E	E
308,993			0.50			7.1			
64,250						7.1			
72,450			0.20			7.1			
61,260			0.50			7.0			
63,150			0.80			7.0			
TOTAL: [illegible].880	N/A	2,780,100	8.04	N/A	N/A	N/A	N/A	N/A	N/A

THIRD QUARTER - 1989

LENA ROAD

Manatee County Public Works Department

Solid Waste Division

LANDFILL TONNAGE

	1986		1987		1988		1989	
	T/M	T/D	T/M	T/D	T/M	T/D	T/M	T/D
AN	20,339	848	20,559	857	22,367	932	23,857	954
EB	19,408	809	19,967	832	23,512	980	23,058	960
AR	20,527	855	24,149	1006	26,639	1110	27,138	1005
PR	20,636	860	23,451	977	23,829	993	24,370	975
AY	20,316	847	21,400	892	21,847	910	25,646	986
UN	20,143	839	22,703	946	25,756	1073	28,088	1080
UL	21,339	889	24,321	1013	23,838	993	25,606	1024
UG	20,673	861	21,717	905	27,844	1160	27,140	1005
EP	20,003	833	22,285	929	25,234	971	24,360	974
CT	21,452	893	23,449	977	24,070	926		
OV	19,278	803	22,176	924	24,276	971		
ſ	21,408	892	24,852	1035	24,385	938		
	245,522	852*	271,029	941*	293,597	996*		

* AVERAGE

T/M = TONS/MONTH

T/D = TONS/DAY

M A N A T E E   C O U N T Y   P U B L I C   W O R K S

CENTRAL LABORATORY (HRS No. E54139)

PROJECT: LENA ROAD LANDFILL

COLLECTED: August 7-11, 1989   COLLECTED BY: Elliott, Parke

FIELD PARAMETERS

LOCATION	DATE	ID No.	pH (S.U.)	COND. (umho/cm)	TEMP. (deg C)	TOTAL DEPTH (ft)	SAMPLE DEPTH (ft)
SA-1	07-Aug-89	20090	7.2	355	23.4		18.25
SA-3	07-Aug-89	20090	7.0	590	24.9		22.58
SA-4	08-Aug-89	20091	7.4	700	24.1		19.08
SA-5	08-Aug-89	20091	7.0	690	24.0		23.58
SA-6	09-Aug-89	20092	8.2	750	24.8	160.0	25.00
S[illegible]	09-Aug-89	20092	9.2	360	23.1	160.0	28.17
S[illegible]	09-Aug-89	20092	9.4	420	24.8	160.0	24.75
SMR-1	10-Aug-89	20093	5.7	243	25.1		5.40
SMR-2	10-Aug-89	20093	6.5	600	24.5		24.30
CW-3	08-Aug-89	20091	6.3	1925	25.9		6.50
CW-4	10-Aug-89	20093	6.5	1075	25.4		4.63
CW-5	10-Aug-89	20093	5.6	265	25.7		3.54
MW-1	10-Aug-89	20093	5.6	125	26.4		2.58
MW-2	11-Aug-89	20094	6.3	1110	25.6	21.25	9.75
MW-3	11-Aug-89	20094	6.3	875	24.4	16.67	7.67
MW-6	07-Aug-89	20090	5.6	485	24.6		6.33
LRII-1	08-Aug-89	20091	6.2	450	25.1		5.25
LRII-2	09-Aug-89	20092	6.8	175	25.8	22.67	6.25
LRII-3	09-Aug-89	20092	5.2	65	25.6	23.00	5.67
LRII-4	09-Aug-89	20092	7.0	295	25.9	22.58	5.50
LRII-5	11-Aug-89	20094	6.6	335	23.9	23.17	5.00
GC-1	08-Aug-89	20091	6.2	1190	26.0		5.16
GC-2	07-Aug-89	20090	6.2	795	24.5		8.08
GC-3	07-Aug-89	20090	6.6	395	24.0		7.17
GC-4	07-Aug-89	20090	5.9	355	24.9		5.00
GC-5	08-Aug-89	20091	5.4	325	27.6		7.50
G[illegible]	08-Aug-89	20091	5.7	465	26.6		7.75

M A N A T E E   C O U N T Y   P U B L I C   W O R K S

CENTRAL LABORATORY (HRS No. E54139)

PROJECT: LENA ROAD LANDFILL

COLLECTED: August 7-11, 1989   COLLECTED BY: Elliott, Parker

LABORATORY PARAMETERS

DATE	ID No.	pH (S.U.)	COND. (umho/cm)	TURB. (NTU)	NITRITE as N (mg/l)	NITRATE as N (mg/l)	TKN (mg/l)	CHLORIDE (mg/l)	TDS (mg/l)	TRUE COLOR (C.U.)	SULFATE (mg/l)	TOC (mg/l)	BICARBONATE ALKALINITY (mgCaCO3/l)
07-Aug-89	20090	6.7	546	40	< 0.01	< 0.01	2.0	22.8	319	10	2	14.9	241
07-Aug-89	20090	6.9	670	14	< 0.01	0.04	1.1	29.8	284	30	26	11.3	293
08-Aug-89	20091	7.3	669	36	< 0.01	0.03	1.0	67.5	472	20	82	13.0	201
08-Aug-89	20091	7.2	790	31	< 0.01	0.01	0.2	66.7	424	20	44	12.8	220
09-Aug-89	20092	6.9	900	45	< 0.01	< 0.01	1.5	54.3	566	5	169	5.1	158
09-Aug-89	20092	8.7	478	110	< 0.01	0.03	1.2	64.9	256	10	7	4.2	107
09 [illegible]-89	20092	8.6	479	75	< 0.01	< 0.01	0.7	59.1	258	10	7	8.2	130
10-Aug-89	20093	5.6	276	4.5	< 0.01	0.01	1.1	30.0	184	30	34	14.4	51
10-Aug-89	20093	6.6	705	3.0	< 0.01	0.03	1.3	108	402	10	5	6.4	195
08-Aug-89	20091	6.2	2540	310	< 0.01	0.04	56.4	358	1120	200	40	67.2	615
10-Aug-89	20093	6.7	1190	16	< 0.01	< 0.01	1.1	145	810	80	183	18.8	283
10-Aug-89	20093	6.2	299	2.7	< 0.01	< 0.01	0.5	22.2	178	20	63	6.6	36
10-Aug-89	20093	5.5	133	3.9	< 0.01	0.01	0.7	22.5	106	20	9	10.0	30
11-Aug-89	20094	6.4	1390	11	< 0.01	< 0.01	13.2	230	820	120	31	49.5	342
11-Aug-89	20094	6.3	988	2.1	< 0.01	< 0.01	1.7	239	604	60	4	37.9	196
07-Aug-89	20090	5.7	603	3.1	< 0.01	0.03	1.1	137	477	40	3	19.9	68
08-Aug-89	20091	6.2	582	190	< 0.01	0.03	1.4	28.3	304	240	86	10.5	116
09-Aug-89	20092	6.3	183	11	< 0.01	< 0.01	0.3	6.9	106	20	5	3.5	8
09-Aug-89	20092	5.2	68	1.3	< 0.01	< 0.01	0.6	12.4	34	5	2	1.6	4
09-Aug-89	20092	6.4	325	50	< 0.01	< 0.01	0.5	10.4	152	30	1	4.6	138
11-Aug-89	20094	6.6	440	10	< 0.01	< 0.01	2.1	12.5	262	40	2	11.1	197
08-Aug-89	20091	6.3	1420	280	< 0.01	0.01	1.1	82.6	769	200	1	21.5	386
07-Aug-89	20090	6.0	872	180	< 0.01	< 0.01	1.6	116	525	200	27	18.4	247
07-Aug-89	20090	6.4	522	40	< 0.01	0.03	2.2	29.9	367	100	25	8.4	133
07-Aug-89	20090	6.5	445	19	< 0.01	< 0.01	1.0	26.8	264	30	84	7.1	85
08-Aug-89	20091	5.4	361	27	< 0.01	0.01	1.9	53.3	232	160	40	14.9	34
08-Aug-89	20091	6.0	616	4.0	< 0.01	< 0.01	3.9	84.0	301	200	81	11.2	45
07-Aug-89	20090	6.2	423	26	< 0.01	< 0.01	1.0	26.2	265	30	86	7.7	85
10-Aug-89	20093	5.5	136	3.8	< 0.01	< 0.01	0.9	24.1	82	20	8	10.5	30

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Drinking Water Certification
HRS #83160

Environmental Certification
HRS #E83079

SOUTHWEST REGIONAL TREATMENT
PLANT MANATEE COUNTY
5100 66TH ST. WEST
BRADENTON FL 34210
ATTN: ANDRE RACHMANINOFF

Description: 18 Samples Received on 08/11/89

Sampled By: CLIENT

Client Job/PO Number:

Reference Number: 894088
Invoice Number: 89-4088

Reported Date : 08/29/89

Sample	Description	Client Id
0001	LENA ROAD LANDFILL	SMR-1
0002	LENA ROAD LANDFILL	SMR-2
0003	LENA ROAD LANDFILL	CW-5
0004	LENA ROAD LANDFILL	CW-4
05	LENA ROAD LANDFILL	MW-1
06	LENA ROAD LANDFILL	MW-1 FD
0007	LENA ROAD LANDFILL UNFITLERED	LRII-5
0008	LENA ROAD LANDFILL UNFILTERED	MW-2
0009	LENA ROAD LANDFILL UNFILTERED	MW-9
0010	LENA ROAD LANDFILL	SMR-1 C
0011	LENA ROAD LANDFILL	SMR-2 C
0012	LENA ROAD LANDFILL	CW-5 C
0013	LENA ROAD LANDFILL	CW-4C
0014	LENA ROAD LANDFILL	MW-1 C
0015	LENA ROAD LANDFILL	MW-1 FD C
0016	LENA ROAD LANDFILL FILTERED	LRII-5
0017	LENA ROAD LANDFILL FILTERED	MW-2
0018	LENA ROAD LANDFILL FILTERED	MW-9

PARAMETER		SAMPLE NUMBER 0001	0002	0003	0004	0005	0006	0007	0008
CHEMICAL OXYGEN DEMAND	MG/L	37	34	32	23	31	30	25	160
CHROMIUM BY FLAME	MG/L	< 0.02	0.04	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02

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HRS #83160

Environmental Certifica
HRS #E6

Reference Number: 894088

PARAMETER		SAMPLE NUMBER 0001	0002	0003	0004	0005	0006	0007	0008
COPPER BY FLAME	MG/L	< 0.01	< 0.01	0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
IRON BY FLAME	MG/L	9.5	2.6	0.16	3.1	2.6	2.8	4.1	7.6
LEAD BY FLAME	MG/L	< 0.02	< 0.02	0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
MANGANESE BY FLAME	MG/L	0.017	0.043	< 0.005	0.009	0.011	0.010	0.019	0.023
MERCURY BY COLD VAPOR	MG/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
ODOR	OTN	< 1	< 1	< 1	1	< 1	< 1	< 1	2
SODIUM BY FLAME	MG/L	22	40	60	16	11	12	13	120
SURFACTANTS	MG/L	0.16	0.10	< 0.10	0.11	0.11	< 0.10	0.12	0.11
ZINC BY FLAME	MG/L	< 0.005	< 0.005	0.010	< 0.005	0.007	0.009	0.008	< 0.005
PROFILE: 10 VOC'S									
1,1,1-TRICHLOROETHANE	UG/L	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,1-DICHLOROETHENE	UG/L	< 1	< 1	< 1	< 1	1	< 1	< 1	< 1
1,2 - DIBROMOETHANE (EDB)	UG/L	< 0.02	< 0.02	< 0.02	< 0.02	0.02	< 0.02	< 0.02	< 0.02
1,2-DICHLOROETHANE	UG/L	< 1	< 1	< 1	< 1	1	< 1	< 1	< 1
1,4-DICHLOROBENZENE	UG/L	< 1	< 1	< 1	< 1	1	< 1	< 1	< 1
BENZENE	UG/L	< 1	< 1	< 1	< 1	1	< 1	< 1	< 1
CARBON TETRACHLORIDE	UG/L	< 1	< 1	< 1	< 1	1	< 1	< 1	< 1
TETRACHLOROETHENE	UG/L	< 1	< 1	< 1	< 1	1	< 1	< 1	< 1
TRICHLOROETHENE	UG/L	< 1	< 1	< 1	< 1	1	< 1	< 1	< 1
VINYL CHLORIDE	UG/L	< 1	< 1	< 1	< 1	1	< 1	< 1	< 1

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Drinking Water Certification
HRS #83160

Environmental Certification
HRS #E63079

Reference Number: 894088

Page:

PARAMETER		SAMPLE NUMBER 0009	0010	0011	0012	0013	0014	0015	0016
CHEMICAL OXYGEN DEMAND	MG/L	94							
CHROMIUM BY FLAME	MG/L	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
COPPER BY FLAME	MG/L	< 0.01	< 0.01	< 0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01
IRON BY FLAME	MG/L	19	9.1	2.4	0.04	3.1	2.6	2.6	3.6
LEAD BY FLAME	MG/L	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
MANGANESE BY FLAME	MG/L	0.025	0.018	0.044	< 0.005	0.010	0.008	0.008	0.019
MERCURY BY COLD VAPOR	MG/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
ODOR	OTN	1							
SODIUM BY FLAME	MG/L	110	22	41	60	17	12	11	13
SURFACTANTS	MG/L	< 0.10							
ZINC BY FLAME	MG/L	0.008	0.006	< 0.005	0.007	< 0.005	< 0.005	< 0.005	< 0.005

PROFILE: 10 VOC'S

1,1,1-TRICHLOROETHANE	UG/L	< 1
1,1-DICHLOROETHENE	UG/L	< 1
1,2 - DIBROMOETHANE (EDB)	UG/L	< 0.02
1,2-DICHLOROETHANE	UG/L	< 1
1,4-DICHLOROBENZENE	UG/L	< 1
BENZENE	UG/L	< 1
CARBON TETRACHLORIDE	UG/L	< 1
TETRACHLOROETHENE	UG/L	< 1
TRICHLOROETHENE	UG/L	< 1
VINYL CHLORIDE	UG/L	< 1

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HRS #83160

Environmental Certification
HRS #E6::79

eference Number: 894088

PARAMETER		SAMPLE NUMBER 0017	0018
:HROMIUM BY FLAME	MG/L	< 0.02	< 0.02
:OPPER BY FLAME	MG/L	< 0.01	< 0.01
IRON BY FLAME	MG/L	7.5	26
.EAD BY FLAME	MG/L	< 0.02	< 0.02
1ANGANESE BY FLAME	MG/L	0.027	0.041
IERCURY BY COLD VAPOR	MG/L	< 0.0002	< 0.0002
;ODIUM BY FLAME	MG/L	120	110
:INC BY FLAME	MG/L	< 0.005	0.015

:OFILE: 10 VOC'S

APPROVED BY: Michael C Price
MICHAEL C. PRICE
LABORATORY MANAGER

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Drinking Water Certification
HRS #83160

Environmental Certification
HRS #E83?79

SOUTHWEST REGIONAL TREATMENT
PLANT MANATEE COUNTY
5100 66TH ST. WEST
BRADENTON FL 34210
ATTN: ANDRE RACHMANINOFF

Description: 12 Samples Received on 08/10/89

Sampled By: CLIENT

Client Job/PO Number:

Reference Number: 894070
Invoice Number: 89-4070

Reported Date : 08/29/89

Sample	Description	Client Id
0001	LENA ROAD LANDFILL UNFILTERED	SA-7
0002	LENA ROAD LANDFILL UNFILTERED	LR II-3
0003	LENA ROAD LANDFILL UNFILTERED	SA-8
0004	LENA ROAD LANDFILL UNFILTERED	LR II-4
0005	LENA ROAD LANDFILL UNFILTERED	SA-6
0006	LENA ROAD LANDFILL UNFILTERED	LR II-2
0007	LENA ROAD LANDFILL FILTERED	SA-7
0008	LENA ROAD LANDFILL FILTERED	LRII-3
0009	LENA ROAD LANDFILL FILTERED	SA-8
0010	LENA ROAD LANDFILL FILTERED	LRII-4
0011	LENA ROAD LANDFILL FILTERED	SA-6
0012	LENA ROAD LANDFILL FILTERED	LRII-2

PARAMETER		SAMPLE NUMBER 0001	0002	0003	0004	0005	0006	0007	0008
CHEMICAL OXYGEN DEMAND	MG/L	20	< 10	16	< 10	37	32		
CHROMIUM BY FLAME	MG/L	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
COPPER BY FLAME	MG/L	< 0.01	< 0.01	< 0.01	< 0.01	0.03	< 0.01	< 0.01	< 0.01
IRON BY FLAME	MG/L	0.23	0.96	0.09	4.3	0.20	5.0	0.06	0.95
LEAD BY FLAME	MG/L	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
MANGANESE BY FLAME	MG/L	< 0.005	< 0.005	< 0.005	0.015	< 0.005	0.010	< 0.005	< 0.005
MERCURY BY COLD VAPOR	MG/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
ODOR	DTN	1	1	1	< 1	1	< 1		

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ing Water Certification
#83160

Environmental Certification
HRS #E83079

rence Number: 894070

AMETER		SAMPLE NUMBER 0001	0002	0003	0004	0005	0006	0007	0008
BY FLAME	MG/L	42	6.2	41	8.4	47	3.4	43	6.6
TANTS	MG/L	< 0.10	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1		
Y FLAME	MG/L	0.009	< 0.005	< 0.005	< 0.005	0.011	< 0.005	0.007	< 0.005
: 10 VOC'S									
RICHLOROETHANE	UG/L	< 1	< 1	< 1	< 1	< 1	< 1		
CHLOROETHENE	UG/L	< 1	< 1	< 1	< 1	< 1	< 1		
IBROMOETHANE (EDB)	UG/L	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02		
CHLOROETHANE	UG/L	< 1	< 1	< 1	< 1	< 1	< 1		
CHLOROBENZENE	UG/L	< 1	< 1	< 1	< 1	< 1	< 1		
E	UG/L	< 1	< 1	< 1	< 1	< 1	< 1		
TET[illegible]CHLORIDE	UG/L	< 1	< 1	< 1	< 1	< 1	< 1		
ILL[illegible]HENE	UG/L	< 1	< 1	< 1	< 1	< 1	< 1		
ROETHENE	UG/L	< 1	< 1	< 1	< 1	< 1	< 1		
CHLORIDE	UG/L	< 1	< 1	< 1	< 1	< 1	< 1		

Envirolab, Inc.
1042 U.S. Highway 1 • P.O. Box 607
Ormond Beach, Florida 32074 • (904) 672-5668

Drinking Water Certification
HRS #83160

Environmental Certification
HRS #E83C 9

eference Number: 894070

PARAMETER		SAMPLE NUMBER 0009	0010	0011	0012
IROMIUM BY FLAME	MG/L	< 0.02	< 0.02	< 0.02	< 0.02
IPPER BY FLAME	MG/L	< 0.01	< 0.01	< 0.01	< 0.01
RON BY FLAME	MG/L	< 0.02	4.0	0.03	4.9
EAD BY FLAME	MG/L	< 0.02	< 0.02	< 0.02	< 0.02
ANGANESE BY FLAME	MG/L	< 0.005	0.015	< 0.005	0.014
ERCURY BY COLD VAPOR	MG/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
IDIUM BY FLAME	MG/L	42	8.6	47	3.5
NC BY FLAME	MG/L	< 0.005	< 0.005	< 0.005	< 0.005

OFILE: 10 VOC'S

APPROVED BY: Michael C Price
MICHAEL C. PRICE
LABORATORY MANAGER

	POND G.P.D.	G.P.D.	G.P.D.	INCHES	DAILY PH NORTH	SOUTH	WEST	WEIR DISCHARGE FLOW (MGD) NORTH	SOUTH	WEST
1										
2										
3	294,550	N		0.15	N	N	7.1	N	N	N
4										
5	106,590	O			O	O	7.1	O	O	O
6	53,840						7.0			
7	74,445	S		2.6	D	D	7.0	D	D	D
8										
9		P			I	I		I	I	I
10	91,825			0.2			7.1			
11	93,740	R			S	S	7.1	S	S	S
12	75,130						7.1			
13	66,860	A		2.0	C	C	7.0	C	C	C
14	67,335		720,000	0.50			7.1			
15	47,885	Y	741,000		H	H	7.1	H	H	H
16			690,000							
17	85,950	I	1,000,000		A	A	7.1	A	A	A
18	31,030		956,000				7.1			
19	48,645	R			R	R	7.0	R	R	R
20	37,800						7.0			
21	73,163	R		0.30	G	G	7.0	G	G	G
22	38,360			3.0			7.0			
23		I			E	E		E	E	E
24										
25	149,400	G		1.8	*	*	7.1	*	*	*
26	42,615	A					7.1			
27	48,525	T					7.1			
28	45,935	I					7.0			
29	43,250	O		TRACE			7.1			
30										
31										
TOTAL:	1,616,873	-0-	4,107,000	10.55+	-NA-	-NA-	-NA-	-NA-	-NA-	-NA-

DATE	LEACHATE INPUT TO POND G.P.D.	LEACHATE IRRIGATION G.P.D.	LEACHATE TO W.W.T.P. G.P.D.	RAINFALL INCHES	AVERAGE DAILY PH NORTH	AVERAGE DAILY PH SOUTH	AVERAGE DAILY PH WEST	WEIR DISCHARGE FLOW (MGD) NORTH	WEIR DISCHARGE FLOW (MGD) SOUTH	WEIR DISCHARGE FLOW (MGD) WEST
1										
2	119945			-0-			7.1			
3	157475			-0-			7.0			
4	150050			-0-			7.1			
5	141625			-0-			7.0			
6										
7	65175			-0-			7.1			
8	32180			-0-			7.0			
9	30140			-0-			7.0			
10	32960			0.75			7.0			
11	35995			0.40			7.0			
12	38425			0.35			7.0			
13										
14	69360			0.25			7.1			
15	35970			-0-			7.1			
16	33820			-0-			7.1			
17	32550			-0-			7.1			
18	86930			-0-			7.1			
19	137130	NO SPRAY IRRIGATION		0.50	NO DISCHARGE	NO DISCHARGE	7.1	NO DISCHARGE	NO DISCHARGE	NO DISCHARGE
20										
21	68267			-0-			7.1			
22	32760			0.20			7.1			
23	33980			-0-			7.0			
24	34670			-0-			7.1			
25	28345			3.0			7.1			
26	57095			0.6			7.1			
27										
28	134390		756,000	1.0			7.1			
29	53120		430,000	-0-			7.1			
30	50520		430,000	-0-			7.1			
31	120300			1.70			7.0			
TOTAL:	1,813,177	-0-	1,616,000	8.75	-NA-	-NA-	-NA-	-0-	-0-	-0-

[illegible]BER 1989

	DATE:	LEACHATE INPUT TO POND G.P.D. STAGE I	STAGE II	STAGE III	LEACHATE IRRIGATION (STAGE I) G.P.D.	LEACHATE TO S.E.W.W.T.P. G.P.D.	RAINFALL INCHES	STAGE I WEIR DISCHARGE FLOW (MGD) NORTH	SOUTH	WEST	AVERAGE DAILY WEIR (pH) NORTH	SOUTH	WEST
1	9/1	60675	NOT OPERATIONAL	MONTHLY ESTIMATE BELOW	NO SPRAY IRRIGATION		-0-	NO DISCHARGE	NO DISCHARGE	NO DISCHARGE	NO DISCHARGE	NO DISCHARGE	7.1
2	9/2												
3	9/3												7.0
4	9/4	190430					.70						7.0
5	9/5	145580					1.80						7.0
6	9/6	70770					.10						7.1
7	9/7	296030					2.00						7.1
8	9/8	93405					0.0						7.0
9	9/9	138685					1.35						
10	9/10												
11	9/11												7.1
12	9/12	61040				250,000	-0-						7.1
13	9/13	57600				250,000	-0-						7.1
14	9/14	55700				250,000	-0-						7.1
15	9/15	59500				250,000	.025						7.1
16	9/16	49405				250,000	.050						
17	9/17					250,000							7.1
18	9/18	103885				250,000	-0-						7.1
19	9/19	56080				250,000	.065						7.0
20	9/20	52590				250,000	-0-						7.1
21	9/21	50620				250,000	-0-						7.1
22	9/22	46560				250,000	-0-						7.0
23	9/23	165000				250,000	4.30						
24	9/24					250,000							7.1
25	9/25	308993				250,000	2.40						7.0
26	9/26	114470					0.22						7.1
27	9/27	70970					-0-						7.1
28	9/28	63420					-0-						7.1
29	9/29	62100					-0-						7.0
30	9/30	53950					.25						
31													
TOTALS:		** 2,998,458		Estimate of 300,000		3,500,000	14.52	-0-	-0-	-0-			

FOURTH QUARTER - 1989

LENA ROAD

Manatee County Public Works Department

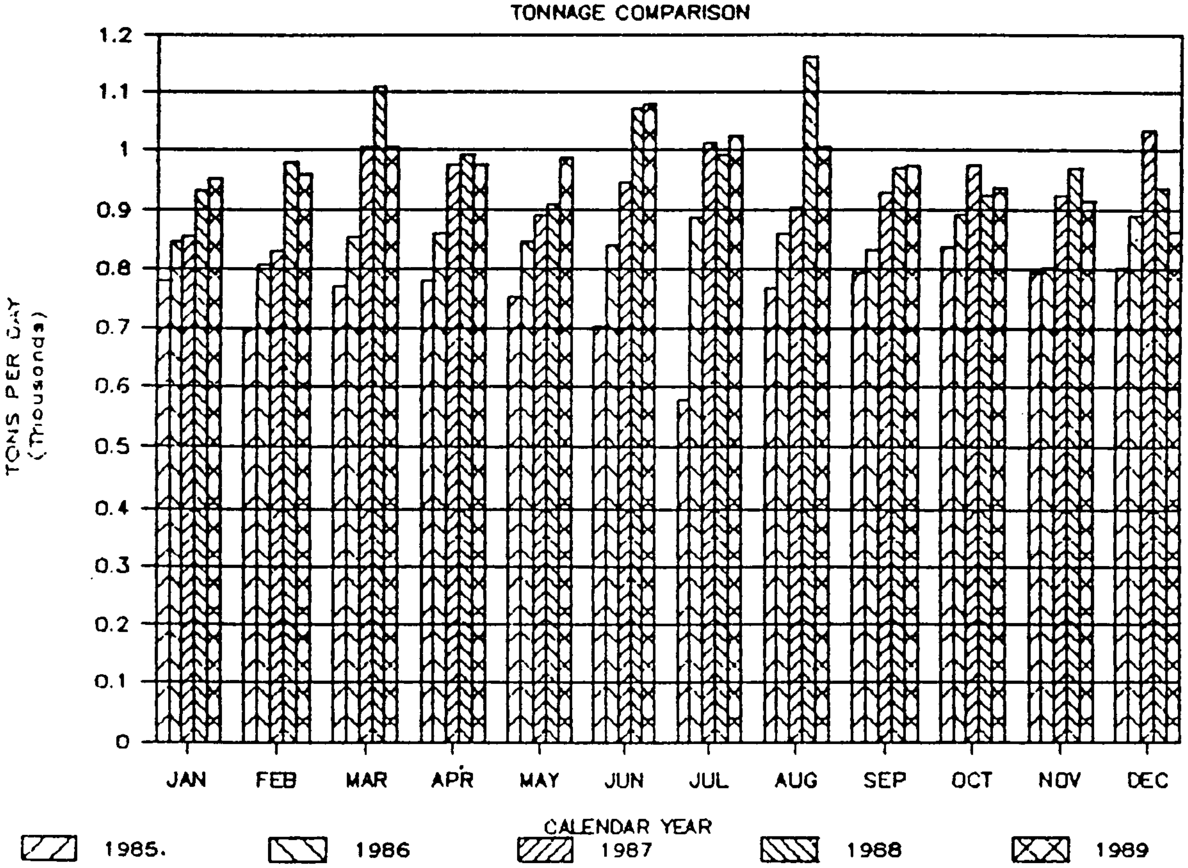
Solid Waste Division

<110m

MANATEE COUNTY PUBLIC WORKS
LENA ROAD LANDFILL FACILITY
TONNAGE COMPARISON: 1985-1989

	1985		1986		1987		1988		1989	
	T/M	T/D	T/M	T/D	T/M	T/D	T/M	T/D	T/M	T/D
JAN	18720	780	20399	848	20559	857	22367	932	23857	954
FEB	16748	698	19408	809	19967	832	23512	980	23058	960
MAR	18496	771	20527	855	24149	1006	26639	1110	27138	1005
APR	18728	780	20636	860	23451	977	23829	993	24370	975
MAY	18048	752	20316	847	21400	892	21847	910	25646	986
JUN	16868	703	20143	839	22703	946	25756	1073	28088	1080
JUL	13862	578	21339	889	24321	1013	23838	993	25606	1024
AUG	18425	768	20673	861	21717	905	27844	1160	27140	1005
SEP	19063	794	20003	833	22285	929	25234	971	24360	974
OCT	20104	838	21452	893	23449	977	24070	926	24325	936
NOV	19080	795	19278	803	22176	924	24276	971	22903	916
DEC	19241	802	21408	892	24852	1035	24385	938	21539	862
TOTAL/AVG	217383	755	245582	852	271029	941	293597	996	298030	973

MANATEE COUNTY LANDFILL
TONNAGE COMPARISON



LENA ROAD LANDFILL MONITORING WELLS

DATE: DECEMBER 11/12/13/14/18 . 1989 COLLECTED BY: V.PARKER & D. ELLIOT

LAB PARAMETER \\\\\\\\\	SA-1	SA-3	SA-4	SA-5	SA-6	SA-7	SA-8	6C-1	6C-2	6C-3	6C-4
CONTROL NUMBER	20126	20126	20127	20126	20128	20128	20128	20127	20126	20126	20127
CHLORIDE (mg/l)	46.3	26.6	64.9	64.9	51.6	57	56.3	148	99.8	28.8	26.3
T.O.C. (mg/l)	10.8	10.2	8.3	8.6	7.7	6.4	4.4	17.8	21.7	8.6	5.5
FECAL COLIFORM (/100ml)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
NITRATE (NO3) AS N (mg/l)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
NITRITE (NO2) AS N (mg/l)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	0.02
pH (STD UNITS)	7.2	7.2	5.5	7.4	7.6	7.8	7.8	6.2	6.2	6.5	6.5
CONDUCTIVITY (umho/cm)	599	581	548	749	940	539	539	1170	823	718	618
TURBIDITY (NTU)	24	3.1	1.4	120	0.87	2.4	1.8	260	360	75	170
T.D.S. (mg/l)	324	368	414	408	588	305	301	682	416		286
D (mg/L)	36.2	38.4	26	26	19.1	17	15.7	43.9	26	25.1	13.2
N (mg/L)	0.9	0.4	1.8	0.6	1.5	1.4	1.3	0.4	0.6	0.2	1.1

FIELD PARAMETER \\\\\\\\\	SA-1	SA-3	SA-4	SA-5	SA-6	SA-7	SA-8	6C-1	6C-2	6C-3	6C-4
FIELD pH (STD UNITS)	7.4	7.3	7.3	7.5	7.6	7.9	7.9	6.4	6.2	6.5	6.5
CONDUCTIVITY (umho)	520	610	650	280	750	410	410	1000	700	420	570
WATER TEMP (deg C)	23.3	22.5	21.7	23.5	22.5	22.5	22.9	20.8	22.3	22.3	21.5
WATER DEPTH (ft.)	128.80	51.40	160.00	150.00	154.00	140.00	159.00	23.00	44.83	23.00	22.58
WELL DEPTH (ft.)	17.60	47.75	19.58	17.33	21.50	21.33	21.79	5.00	17.33	4.75	6.25

LENA ROAD LANDFILL MONITORING WELLS

DATE: DECEMBER 11/12/13/14/18. 1989 COLLECTED BY: V.PARKER & D.ELLIOT

AB PARAMETER \\\\\\\\\	MW-1	MW-2	MW-3	CW-4	CW-5	MW-6	LRII-1	LRII-2	LRII-3	LRII-4	LRII-5
NTROL NUMBER	20125	20125	20125	20125	20125	20125	20126	20128	20128	20128	20129
LORIDE (mg/l)	12.5	111	164	761	184	261	340	102	33	167	
.O.C. (mg/l)	11.8	36.5	31.7	19.8	6.6	17.1	10.6	3.3	2.1	4.0	10.7
CAL COLIFORM (/100ml)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
ITRATE (NO3) AS N (mg/l)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
TRITE (NO2) AS N (mg/l)	0.01	0.13	0.01	0.15	0.01	0.01	0.01	0.01	0.01	0.01	0.01
UNITS)	5.4	6.4	6.1	6.8	5.7	5.6	6.2	6.2	5.1	6.7	6.6
NDUCTIVITY (umho/cm)	98	740	856	1140	345	383	630	178	57	356	389
RBIDITY (NTU)	19	19	22	3.9	20	19	220	30	21	37	32
.D.S. (mg/l)	75	440	490	761	184	261	340	102	33	167	235
(mg/L)	32.8	126	83.3	45.7	18.7	37.5	27.7	13.2	14	13.6	29.4
N (mg/L)	0.8	1.8	1	1.3	0.6	0.9	0.7	1.3	1.6	0.4	0.7

IELD PARAMETER \\\\\\\\\	MW-1	MW-2	MW-3	CW-4	CW-5	MW-5	LRII-1	LRII-2	LRII-3	LRII-4	LRII-5
IELD pH (STD UNITS)	5.5	6.6	6.0	6.8	5.8	5.6	6.4	6.1	5.1	6.8	6.6
DUCTIVITY (umho)	80	495	700	810	250	315	395	155	600	275	610
ER TEMP (deg C)	13.2	22.0	13.2	21.5	21.7	23.2	22.6	22.8	22.9	22.5	23.0
ATER DEPTH (ft.)	13.08	21.25	16.67	15.33	13.00	20.75	21.42	22.80	22.90	22.50	23.00
LL DEPTH (ft.)	8.75	8.82	7.50	5.00	4.00	5.82	5.00	5.75	6.67	6.63	8.83

LENA ROAD LANDFILL MONITORING WELLS

DATE: DECEMBER 11/12/13/14/18 .1989 COLLECTED BY: V.PARKER & D.ELLIOT

AB PARAMETER \\\\\\\\\	6C-5	6C-6	SMR I	SMR II	CW-3
NTROL NUMBER	20127	20127	20129	20129	20129
LORIDE (mg/l)	32.8	87.3	29.4	97	385
T.O.C. (mg/l)	13.5	11.9	14.1	4.2	64.4
CAL COLIFORM (/100ml)	N/A	N/A	N/A	N/A	N/A
NITRATE (NO3) AS N (mg/l)	<0.01	<0.01	<0.01	<0.01	<0.01
TRITE (NO2) AS N (mg/l)	0.01	<0.01	0.03	<0.01	<0.012
(STD UNITS)	6.1	5.4	5.6	7.3	6.4
CONDUCTIVITY (umho/cm)	448	550	297	712	2910
RBIDITY (NTU)	21	33	50	0.55	180
T.D.S. (mg/l)	290	414	176	411	1210
D (mg/L)	38	32.4	35	17.4	199
N (mg/L)	2.1	3.9	0.3	0.7	108

IELD PARAMETER \\\\\\\\\	6C-5	6C-6	SMR I	SMR III	CW-3
ELD pH (STD UNITS)	6.2	5.4	5.1	7.3	6.5
CONDUCTIVITY (umho)	440	41	230	610	2300
TER TEMP (deg C)	24.4	23.9	21.8	21.8	23.3
TER DEPTH (ft.)	21.33	21.41	23.58	160.00	18.17
WELL DEPTH (ft.)	7.83	8.17	5.58	35.00	7.83

DAVIS WATER & WASTE INDUSTRIES, INC.

DAVIS ANALYTICAL LABORATORIES
Florida State HRS Certification #84108
2650 Tallevast Road, P.O. Box 29, Tallevast, FL 34270-0029
(813) 355-2971

CUSTOMER: Manatee County Public Works Department ATTN: Laboratory
ADDRESS: 5100 66th St. West, Bradenton, FL 34210

SAMPLE NAME: Lena Road Landfill Monitoring Wells

SAMPLE TYPE	DATE/TIME COLLECTED		COLLECT BY	RECEIVED
MW 3	12/11/89	09.00	V. PARKER	WK 12/12
MW 2	12/11/89	10.00	V. PARKER	WK 12/12
MW 1	12/11/89	10.50	V. PARKER	WK 12/12

APPROVED BY: Danyn Hen DATE: 12-27-89

LABORATORY ANALYSIS

ANALYSIS (METHOD) I.D.#	MW 3 912199	MW 2 912200	MW 1 912201	
INORGANICS:				
CHROMIUM (EPA 218.1)	< 0.033	< 0.033	< 0.033	(mg/L)
IRON (EPA 236.1)	5.43	6.14	0.620	(mg/L)
LEAD (EPA 239.1)	< 0.041	< 0.041	< 0.041	(mg/L)
SODIUM (EPA 273.1)	122	128	34.6	(mg/L)
COPPER (EPA 220.1)	< 0.011	< 0.011	< 0.011	(mg/L)
MANGANESE (EPA 243.1)	0.024	0.026	< 0.008	(mg/L)
MERCURY (EPA 245.1)	< 0.001	< 0.001	< 0.001	(mg/L)
ZINC (EPA 289.1)	< 0.004	< 0.004	< 0.004	(mg/L)
ODOR (EPA 140.1)	0	2	6	(TON)
MBAS (EPA 425.1)	0.01	0.01	< 0.04	(mg/L)
1,2-DIBROMOETHANE	< 0.02	< 0.02	< 0.02	(ug/L)
1,2-DICHLOROETHANE	< 1.0	< 1.0	< 1.0	(ug/L)
1,4-DICHLOROBENZENE	< 1.0	< 1.0	< 1.0	(ug/L)
BENZENE	< 1.0	< 1.0	< 1.0	(ug/L)
CARBON TETRACHLORIDE	< 1.0	< 1.0	< 1.0	(ug/L)
TETRACHLOROETHENE	< 1.0	< 1.0	< 1.0	(ug/L)
TRICHLOROETHANE	< 1.0	< 1.0	< 1.0	(ug/L)
VINYL CHLORIDE	< 1.0	< 1.0	< 1.0	(ug/L)
1,1,1-TRICHLOROETHANE	< 1.0	< 1.0	< 1.0	(ug/L)
1,1-DICHLOROETHANE	< 1.0	< 1.0	< 1.0	(ug/L)

DAVIS WATER & WASTE INDUSTRIES, INC.

DAVIS ANALYTICAL LABORATORIES
Florida State HRS Certification #84108
2650 Tallevast Road, P.O. Box 29, Tallevast, FL 34270-0029
(813) 355-2971

CUSTOMER: Manatee County Public Works Department ATTN: Laboratory
ADDRESS: 5100 66th St. West, Bradenton, FL 34210

SAMPLE NAME: Lena Road Landfill Monitoring Wells

SAMPLE TYPE	DATE/TIME COLLECTED		COLLECT BY	RECEIVED
MW 4	12/11/89	11.55	V. PARKER	WK 12/12
MW 5	12/11/89	12.30	V. PARKER	WK 12/12
MW 6	12/11/89	13.20	V. PARKER	WK 12/12

APPROVED BY: DATE: 12-27-89

LABORATORY ANALYSIS

ANALYSIS (METHOD) I.D.#	MW 4 912202	MW 5 912203	MW 6 912204	
INORGANICS:				
CHROMIUM (EPA 218.1)	< 0.033	< 0.033	< 0.033	(mg/L)
IRON (EPA 236.1)	25.6	1.59	18.4	(mg/L)
LEAD (EPA 239.1)	< 0.041	< 0.041	< 0.041	(mg/L)
SODIUM (EPA 273.1)	61.7	40.8	47.5	(mg/L)
COPPER (EPA 220.1)	< 0.011	< 0.011	< 0.011	(mg/L)
MANGANESE (EPA 243.1)	0.049	0.012	< 0.008	(mg/L)
MERCURY (EPA 245.1)	< 0.001	< 0.001	< 0.001	(mg/L)
ZINC (EPA 289.1)	< 0.004	< 0.004	< 0.004	(mg/L)
ODOR (EPA 140.1)	0	3	1	(TON)
MBAS (EPA 425.1)	< 0.04	< 0.04	< 0.04	(mg/L)
1,2-DIBROMOETHANE	< 0.02	< 0.02	< 0.02	(ug/L)
1,2-DICHLOROETHANE	< 1.0	< 1.0	< 1.0	(ug/L)
1,4-DICHLOROBENZENE	< 1.0	< 1.0	< 1.0	(ug/L)
BENZENE	< 1.0	< 1.0	< 1.0	(ug/L)
CARBON TETRACHLORIDE	< 1.0	< 1.0	< 1.0	(ug/L)
TETRACHLOROETHENE	< 1.0	< 1.0	< 1.0	(ug/L)
TRICHLOROETHANE	< 1.0	< 1.0	< 1.0	(ug/L)
VINYL CHLORIDE	< 1.0	< 1.0	< 1.0	(ug/L)
1,1,1-TRICHLOROETHANE	< 1.0	< 1.0	< 1.0	(ug/L)
1,1-DICHLOROETHANE	< 1.0	< 1.0	< 1.0	(ug/L)

BEST AVAILABLE COPY

MANATEE COUNTY PUBLIC WORKS DEPARTMENT
CENTRAL LABORATORY (HRS No. E54139)
5100 66th ST. W. BRADENTON FL 34210
(813) 792-8788 SUNCOM: 527-1330

12-11-89

CUSTODY SHEET No.: 20125

ECT: Lena Rd Landfill mw's

SAMPLERS: V Parker

ATION	TIME ON STATION	pH	COND. (umho)	D.O. (mg/l)	TEMP. (deg C)	TOTAL DEPTH (ft)	SAMPLE DEPTH (ft)	A H2SO4 TOC	B HNO3	C Plain	D H2SO4	E Plain	F VOC	G	H	I	J Casing	COMMENTS H. Calibration
#3	0900	6.0	700	–	13.2	16.67	7.5	2	1	2	1	1	2		912199		3.0	(7.0)=6.95 @ 20
#2	1000	6.6	495	–	22.0	21.25	8.82	2	1	2	1	1	2		200		3.0	(7.0)=7.0 @ 16.1
#1	1050	5.5	80	–	23.0	13.08	8.75	2	1	2	1	1	2		201		2.08	(7.0)=7.08 @ 15.8
#4	1155	6.8	810	–	21.5	15.33	5.0	2	1	2	1	1	2		202		3.50	(7.0)=7.0 @ 15
5	1230	5.8	250	–	21.7	13.0	4.0	2	1	2	1	1	2		203		2.82	(7.0)=7.02 @ 16
[illegible]	1325	5.6	315	–	23.2	20.75	5.82	2	1	2	1	1	2		204		3.0	(7.0)=7.0 @ 21

IONAL COMMENTS: Calibration # 520334

CUSTODY TRANSFER INFORMATION

LINQUISHED BY (SIGNATURE):	RELINQUISHED TO (SIGNATURE):	DIVISION / LABORATORY	DATE	TIME	SAMPLE COUNT
[illegible]	[illegible]	Sewage Effluent	12-11-89		24
	[illegible]	Davis Labs	12/12/89		

Logged in 12/12/89 WR 1220

DAVIS ANALYTICAL LABORATORIES
Florida State HRS Certification #84108
2650 Tallevast Road, P.O. Box 29, Tallevast, FL 34270-0029
(813) 355-2971

CUSTOMER: Manatee County Public Works Department ATTN: Laboratory
ADDRESS: 5100 66th St. West, Bradenton, FL 34210

SAMPLE NAME: Lena Road Landfill Monitoring Wells

SAMPLE TYPE	DATE/TIME COLLECTED		COLLECT BY	RECEIVED
SA 3	12/12/89	09.00	DE	DLM 12/13
GC 3	12/12/89	09.00	DE	DLM 12/13
SA 1	12/12/89	10.15	DE	DLM 12/13

APPROVED BY: [signature] DATE: 12-27-89

LABORATORY ANALYSIS

ANALYSIS (METHOD) I.D.#		SA 3 912232	GC 3 912233	SA 1 912234	
INORGANICS:					
CHROMIUM (EPA 218.1)		< 0.033	< 0.033	< 0.033	(mg/L)
IRON (EPA 236.1)		11.4	5.43	1.16	(mg/L)
LEAD (EPA 239.1)		< 0.041	< 0.041	< 0.041	(mg/L)
SODIUM (EPA 273.1)		60.5	47.3	59.5	(mg/L)
COPPER (EPA 220.1)		< 0.011	< 0.011	< 0.011	(mg/L)
MANGANESE (EPA 243.1)		< 0.008	0.040	< 0.008	(mg/L)
MERCURY (EPA 245.1)		< 0.001	< 0.001	< 0.001	(mg/L)
ZINC (EPA 289.1)		< 0.004	< 0.004	< 0.004	(mg/L)
ODOR (EPA 140.1)		0	0	2	(TON)
MBAS (EPA 425.1)		< 0.004	< 0.004	< 0.004	(mg/L)
1,2-DIBROMOETHANE		< 0.02	< 0.02	< 0.02	(ug/L)
1,2-DICHLOROETHANE		< 1.0	< 1.0	< 1.0	(ug/L)
1,4-DICHLOROBENZENE		< 1.0	< 1.0	< 1.0	(ug/L)
BENZENE		< 1.0	< 1.0	< 1.0	(ug/L)
CARBON TETRACHLORIDE		< 1.0	< 1.0	< 1.0	(ug/L)
TETRACHLOROETHENE		< 1.0	< 1.0	< 1.0	(ug/L)
TRICHLOROETHANE		< 1.0	< 1.0	< 1.0	(ug/L)
VINYL CHLORIDE		< 1.0	< 1.0	< 1.0	(ug/L)
1,1,1-TRICHLOROETHANE		< 1.0	< 1.0	< 1.0	(ug/L)
1,1-DICHLOROETHANE		< 1.0	< 1.0	< 1.0	(ug/L)

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Florida State HRS Certification #84108
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(813) 355-2971

CUSTOMER: Manatee County Public Works Department ATTN: Laboratory
ADDRESS: 5100 66th St. West, Bradenton, FL 34210

SAMPLE NAME: Lena Road Landfill Monitoring Wells

SAMPLE TYPE	DATE/TIME COLLECTED		COLLECT BY	RECEIVED
GC 2	12/12/89	10.15	DE	DLM 12/13
SA 5	12/12/89	12.00	DE	DLM 12/13
LR II-1	12/12/89	12.00	DE	DLM 12/13

APPROVED BY: [signature] DATE: 12-27-89

LABORATORY ANALYSIS

ANALYSIS (METHOD) I.D.#	GC 2 912235	SA 5 912236	LR II-1 912237	
INORGANICS:				
CHROMIUM (EPA 218.1)	< 0.033	< 0.033	< 0.033	(mg/L)
IRON (EPA 236.1)	12.6	2.57	15.7	(mg/L)
LEAD (EPA 239.1)	< 0.041	< 0.041	< 0.041	(mg/L)
SODIUM (EPA 273.1)	57.8	82.0	50.8	(mg/L)
COPPER (EPA 220.1)	< 0.011	< 0.011	< 0.011	(mg/L)
MANGANESE (EPA 243.1)	0.078	0.015	0.087	(mg/L)
MERCURY (EPA 245.1)	< 0.001	< 0.001	< 0.001	(mg/L)
ZINC (EPA 289.1)	< 0.004	0.018	< 0.004	(mg/L)
ODOR (EPA 140.1)	2	0	0	(TON)
MBAS (EPA 425.1)	0.004	< 0.004	< 0.004	(mg/L)
1,2-DIBROMOETHANE	< 0.02	< 0.02	< 0.02	(ug/L)
1,2-DICHLOROETHANE	< 1.0	< 1.0	< 1.0	(ug/L)
1,4-DICHLOROBENZENE	< 1.0	< 1.0	< 1.0	(ug/L)
BENZENE	< 1.0	< 1.0	< 1.0	(ug/L)
CARBON TETRACHLORIDE	< 1.0	< 1.0	< 1.0	(ug/L)
TETRACHLOROETHENE	< 1.0	< 1.0	< 1.0	(ug/L)
TRICHLOROETHANE	< 1.0	< 1.0	< 1.0	(ug/L)
VINYL CHLORIDE	< 1.0	< 1.0	< 1.0	(ug/L)
1,1,1-TRICHLOROETHANE	< 1.0	< 1.0	< 1.0	(ug/L)
1,1-DICHLOROETHANE	< 1.0	< 1.0	< 1.0	(ug/L)

BEST AVAILABLE COPY

MANATEE COUNTY PUBLIC WORKS DEPARTMENT
CENTRAL LABORATORY (HRS No. E54139)
5100 66th ST. W. BRADENTON FL 34210
(813) 792-8788 SUNCOM: 527-1330

CUSTODY SHEET No.: 20126

12-12-89

T: Lenkcaneerc Nom Wells

SAMPLERS: D. Elliott

STATION	TIME ON STATION	pH	COND. (umho)	D.O. (mg/l)	TEMP. (deg C)	TOTAL DEPTH (ft)	SAMPLE DEPTH (ft)	A H2SO4 (2)	B HNO3	C H2SO4	D (2)	E	F VOC	G	H	I	J CASING ST.	COMMENTS pH (7.0)=
A 2	0900	7.3	610	~~22.5~~ AC	22.5	51.4	47.75	1	1	1	2	1	2	91	22	32	3.75	7.01 @ 22.0
3		6.5	420	~~22.3~~ AC	22.3	23.0	47.5	1	1	1	2	1	2		2	33	3.08	
1	1015	7.4	520	-	23.3	128.8	17.6	1	1	1	2	1	2		2	34	1.17	
C 2		6.2	700		22.3	4.83	17.33	1	1	1	2	1	2		2	35	3.04	7.03 @ 21.5
5	1200	7.5	380		23.5	150'	21.8	1	1	1	2	1	2		2	36	2.63	
RII-1		6.4	395		22.3	21.42	50'	1	1	1	2	1	2		2	37	30	7.02 @ 23.8

ONAL COMMENTS: Meter Calibration # 520335

CUSTODY TRANSFER INFORMATION

INQUISHED BY (SIGNATURE):	RELINQUISHED TO (SIGNATURE):	DIVISION / LABORATORY	DATE	TIME	SAMPLE COUNT
D. Elliott	M. [illegible]	Central Lab	12-12-89	1415	18
D. Elliott	[illegible]	Davis Labs	12-13-89	10 23	30

DAVIS ANALYTICAL LABORATORIES
Florida State HRS Certification #84108
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(813) 355-2971

CUSTOMER: Manatee County Public Works Department ATTN: Laboratory
ADDRESS: 5100 66th St. West, Bradenton, FL 34210

SAMPLE NAME: Lena Road Landfill Monitoring Wells

SAMPLE TYPE	DATE/TIME COLLECTED		COLLECT BY	RECEIVED
SA 4	12/13/89	09.10	V. PARKER	WK 12/14
GC 1	12/13/89	09.10	V. PARKER	WK 12/14
GC 6	12/13/89	10.30	V. PARKER	WK 12/14

APPROVED BY: [signature] DATE: 12-27-89

LABORATORY ANALYSIS

ANALYSIS (METHOD) I.D.#	SA 4 912238	GC 1 912239	GC 6 912240	
INORGANICS:				
CHROMIUM (EPA 218.1)	< 0.033	< 0.033	< 0.033	(mg/L)
IRON (EPA 236.1)	< 0.065	22.0	7.36	(mg/L)
LEAD (EPA 239.1)	< 0.041	< 0.041	< 0.041	(mg/L)
SODIUM (EPA 273.1)	92.3	70.8	91.7	(mg/L)
COPPER (EPA 220.1)	< 0.011	< 0.011	< 0.011	(mg/L)
MANGANESE (EPA 243.1)	< 0.008	0.129	< 0.008	(mg/L)
MERCURY (EPA 245.1)	< 0.001	< 0.001	< 0.001	(mg/L)
ZINC (EPA 289.1)	< 0.004	0.018	< 0.004	(mg/L)
ODOR (EPA 140.1)	0	7	0	(TON)
MBAS (EPA 425.1)	< 0.004	0.01	< 0.004	(mg/L)
1,2-DIBROMOETHANE	< 0.02	< 0.02	< 0.02	(ug/L)
1,2-DICHLOROETHANE	< 1.0	< 1.0	< 1.0	(ug/L)
1,4-DICHLOROBENZENE	< 1.0	< 1.0	< 1.0	(ug/L)
BENZENE	< 1.0	< 1.0	< 1.0	(ug/L)
CARBON TETRACHLORIDE	< 1.0	< 1.0	< 1.0	(ug/L)
TETRACHLOROETHENE	< 1.0	< 1.0	< 1.0	(ug/L)
TRICHLOROETHANE	< 1.0	< 1.0	< 1.0	(ug/L)
VINYL CHLORIDE	< 1.0	< 1.0	< 1.0	(ug/L)
1,1,1-TRICHLOROETHANE	< 1.0	< 1.0	< 1.0	(ug/L)
1,1-DICHLOROETHANE	< 1.0	< 1.0	< 1.0	(ug/L)

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(813) 355-2971

CUSTOMER: Manatee County Public Works Department ATTN: Laboratory
ADDRESS: 5100 66th St. West, Bradenton, FL 34210

SAMPLE NAME: Lena Road Landfill Monitoring Wells

SAMPLE TYPE	DATE/TIME COLLECTED		COLLECT BY	RECEIVED
GC 6 dup.	12/13/89	10.30	V. PARKER	WK 12/14
GC 5	12/13/89	11.30	V. PARKER	WK 12/14
GC 4	12/13/89	12.45	V. PARKER	WK 12/14

APPROVED BY: Dwayne Hess DATE: 12-27-89

LABORATORY ANALYSIS

ANALYSIS (METHOD) I.D.#	GC 6 dup. 912241	GC 5 912242	GC 4 912243	
INORGANICS:				
CHROMIUM (EPA 218.1)	< 0.033	< 0.033	< 0.033	(mg/L)
IRON (EPA 236.1)	7.36	7.28	19.6	(mg/L)
LEAD (EPA 239.1)	< 0.041	< 0.041	< 0.041	(mg/L)
SODIUM (EPA 273.1)	87.7	41.1	44.5	(mg/L)
COPPER (EPA 220.1)	< 0.011	< 0.011	< 0.011	(mg/L)
MANGANESE (EPA 243.1)	< 0.008	0.021	0.058	(mg/L)
MERCURY (EPA 245.1)	< 0.001	< 0.001	< 0.001	(mg/L)
ZINC (EPA 289.1)	< 0.004	< 0.004	< 0.004	(mg/L)
ODOR (EPA 140.1)	1	0	0	(TON)
MBAS (EPA 425.1)	< 0.004	< 0.004	< 0.004	(mg/L)
1,2-DIBROMOETHANE	< 0.02	< 0.02	< 0.02	(ug/L)
1,2-DICHLOROETHANE	< 1.0	< 1.0	< 1.0	(ug/L)
1,4-DICHLOROBENZENE	< 1.0	< 1.0	< 1.0	(ug/L)
BENZENE	< 1.0	< 1.0	< 1.0	(ug/L)
CARBON TETRACHLORIDE	< 1.0	< 1.0	< 1.0	(ug/L)
TETRACHLOROETHENE	< 1.0	< 1.0	< 1.0	(ug/L)
TRICHLOROETHANE	< 1.0	< 1.0	< 1.0	(ug/L)
VINYL CHLORIDE	< 1.0	< 1.0	< 1.0	(ug/L)
1,1,1-TRICHLOROETHANE	< 1.0	< 1.0	< 1.0	(ug/L)
1,1-DICHLOROETHANE	< 1.0	< 1.0	< 1.0	(ug/L)

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DAVIS ANALYTICAL LABORATORIES
Florida State HRS Certification #84108
2650 Tallevast Road, P.O. Box 29, Tallevast, FL 34270-0029
(813) 355-2971

CUSTOMER: Manatee County Public Works Department ATTN: Laboratory
ADDRESS: 5100 66th St. West, Bradenton, FL 34210

SAMPLE NAME: Lena Road Landfill Monitoring Wells

SAMPLE TYPE	DATE/TIME COLLECTED		COLLECT BY	RECEIVED
LR II-2	12/14/89	09.00	DE	DRH 12/14
SA 6	12/14/89	09.00	DE	DRH 12/14
LR II-3	12/14/89	10.30	DE	DRH 12/14

APPROVED BY: Daryl M Hensen DATE: 12-26-89

LABORATORY ANALYSIS

ANALYSIS (METHOD) I.D.#	LR II-2 912256	SA 6 912257	LR II-3 912258	
INORGANICS:				
CHROMIUM (EPA 218.1)	< 0.033	< 0.033	< 0.033	(mg/L)
IRON (EPA 236.1)	3.79	0.150	0.929	(mg/L)
LEAD (EPA 239.1)	< 0.041	< 0.041	< 0.041	(mg/L)
SODIUM (EPA 273.1)	31.1	73.1	33.5	(mg/L)
COPPER (EPA 220.1)	< 0.011	< 0.011	< 0.011	(mg/L)
MANGANESE (EPA 243.1)	< 0.008	< 0.008	< 0.008	(mg/L)
MERCURY (EPA 245.1)	< 0.001	< 0.001	< 0.001	(mg/L)
ZINC (EPA 289.1)	< 0.004	< 0.004	< 0.004	(mg/L)
ODOR (EPA 140.1)	8	8	7	(TON)
MBAS (EPA 425.1)	< 0.004	< 0.004	< 0.004	(mg/L)
1,2-DIBROMOETHANE	< 0.02	< 0.02	< 0.02	(ug/L)
1,2-DICHLOROETHANE	< 1.0	< 1.0	< 1.0	(ug/L)
1,4-DICHLOROBENZENE	< 1.0	< 1.0	< 1.0	(ug/L)
BENZENE	< 1.0	< 1.0	< 1.0	(ug/L)
CARBON TETRACHLORIDE	< 1.0	< 1.0	< 1.0	(ug/L)
TETRACHLOROETHENE	< 1.0	< 1.0	< 1.0	(ug/L)
TRICHLOROETHANE	< 1.0	< 1.0	< 1.0	(ug/L)
VINYL CHLORIDE	< 1.0	< 1.0	< 1.0	(ug/L)
1,1,1-TRICHLOROETHANE	< 1.0	< 1.0	< 1.0	(ug/L)
1,1-DICHLOROETHANE	< 1.0	< 1.0	< 1.0	(ug/L)

DAVIS ANALYTICAL LABORATORIES
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CUSTOMER: Manatee County Public Works Department ATTN: Laboratory
ADDRESS: 5100 66th St. West, Bradenton, FL 34210

SAMPLE NAME: Lena Road Landfill Monitoring Wells

SAMPLE TYPE	DATE/TIME COLLECTED		COLLECT BY	RECEIVED
SA 7	12/14/89	10.30	DE	DRH 12/14
LR II-4	12/14/89	12.20	DE	DRH 12/14
SA 8	12/14/89	12.20	DE	DRH 12/14

APPROVED BY: Danyl Hense DATE: 12-26-89

LABORATORY ANALYSIS

ANALYSIS (METHOD) I.D.#	LR II-2 912259	SA 6 912260	LR II-3 912261	
INORGANICS:				
CHROMIUM (EPA 218.1)	< 0.033	< 0.033	< 0.033	(mg/L)
IRON (EPA 236.1)	0.201	3.79	0.133	(mg/L)
LEAD (EPA 239.1)	< 0.041	< 0.041	< 0.041	(mg/L)
SODIUM (EPA 273.1)	69.1	36.5	68.8	(mg/L)
COPPER (EPA 220.1)	< 0.011	< 0.011	< 0.011	(mg/L)
MANGANESE (EPA 243.1)	< 0.008	< 0.008	< 0.008	(mg/L)
MERCURY (EPA 245.1)	< 0.001	< 0.001	< 0.001	(mg/L)
ZINC (EPA 289.1)	0.041	< 0.004	0.016	(mg/L)
ODOR (EPA 140.1)	6	5	7	(TON)
MBAS (EPA 425.1)	< 0.004	< 0.004	< 0.004	(mg/L)
1,2-DIBROMOETHANE	< 0.02	< 0.02	< 0.02	(ug/L)
1,2-DICHLOROETHANE	< 1.0	< 1.0	< 1.0	(ug/L)
1,4-DICHLOROBENZENE	< 1.0	< 1.0	< 1.0	(ug/L)
BENZENE	< 1.0	< 1.0	< 1.0	(ug/L)
CARBON TETRACHLORIDE	< 1.0	< 1.0	< 1.0	(ug/L)
TETRACHLOROETHENE	< 1.0	< 1.0	< 1.0	(ug/L)
TRICHLOROETHANE	< 1.0	< 1.0	< 1.0	(ug/L)
VINYL CHLORIDE	< 1.0	< 1.0	< 1.0	(ug/L)
1,1,1-TRICHLOROETHANE	< 1.0	< 1.0	< 1.0	(ug/L)
1,1-DICHLOROETHANE	< 1.0	< 1.0	< 1.0	(ug/L)

DAVIS ANALYTICAL LABORATORIES
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(813) 355-2971

CUSTOMER: Manatee County Public Works Department ATTN: Laboratory
ADDRESS: 5100 66th St. West, Bradenton, FL 34210

SAMPLE NAME: Lena Road Landfill Monitoring Wells

SAMPLE TYPE	DATE/TIME COLLECTED		COLLECT BY	RECEIVED
LR II-5	12/18/89	09.30	VP	DLM 12/19
SMR I	12/18/89	10.30	VP	DLM 12/19
SMR II	12/18/89	10.30	VP	DLM 12/19

APPROVED BY: [signature] DATE: 12-28-89

LABORATORY ANALYSIS

ANALYSIS (METHOD) I.D.#	LR II-5 912310	SMR I 912311	SMR II 912312	
INORGANICS:				
CHROMIUM (EPA 218.1)	< 0.033	< 0.033	< 0.033	(mg/L)
IRON (EPA 236.1)	0.425	1.25	0.073	(mg/L)
LEAD (EPA 239.1)	< 0.045	< 0.045	< 0.045	(mg/L)
SODIUM (EPA 273.1)	74.5	53.1	127	(mg/L)
COPPER (EPA 220.1)	< 0.014	< 0.014	< 0.014	(mg/L)
MANGANESE (EPA 243.1)	< 0.017	< 0.017	< 0.017	(mg/L)
MERCURY (EPA 245.1)	< 0.001	< 0.001	< 0.001	(mg/L)
ZINC (EPA 289.1)	< 0.008	< 0.008	< 0.008	(mg/L)
ODOR (EPA 140.1)	0	0	0	(TON)
MBAS (EPA 425.1)	0.015	0.028	0.023	(mg/L)
1,2-DIBROMOETHANE	< 0.02	< 0.02	< 0.02	(ug/L)
1,2-DICHLOROETHANE	< 1.0	< 1.0	< 1.0	(ug/L)
1,4-DICHLOROBENZENE	< 1.0	< 1.0	< 1.0	(ug/L)
BENZENE	< 1.0	< 1.0	< 1.0	(ug/L)
CARBON TETRACHLORIDE	< 1.0	< 1.0	< 1.0	(ug/L)
TETRACHLOROETHENE	< 1.0	< 1.0	< 1.0	(ug/L)
TRICHLOROETHANE	< 1.0	< 1.0	< 1.0	(ug/L)
VINYL CHLORIDE	< 1.0	< 1.0	< 1.0	(ug/L)
1,1,1-TRICHLOROETHANE	< 1.0	< 1.0	< 1.0	(ug/L)
1,1-DICHLOROETHANE	< 1.0	< 1.0	< 1.0	(ug/L)

DAVIS ANALYTICAL LABORATORIES
Florida State HRS Certification #84108
2650 Tallevast Road, P.O. Box 29, Tallevast, FL 34270-0029
(813) 355-2971

CUSTOMER: Manatee County Public Works Department ATTN: Laboratory
ADDRESS: 5100 66th St. West, Bradenton, FL 34210

SAMPLE NAME: Lena Road Landfill Monitoring Wells

SAMPLE TYPE	DATE/TIME COLLECTED		COLLECT BY	RECEIVED
CW 3	12/18/89	12.00	VP	DLM 12/19
CW 3 dup.	12/18/89	12.03	VP	DLM 12/19

APPROVED BY: Darryl Hens— DATE: 12-28-89

LABORATORY ANALYSIS

ANALYSIS (METHOD) I.D.#	CW 3 912313	CW 3 dup. 912314	
INORGANICS:			
CHROMIUM (EPA 218.1)	< 0.033	< 0.033	(mg/L)
IRON (EPA 236.1)	0.212	0.230	(mg/L)
LEAD (EPA 239.1)	< 0.045	< 0.045	(mg/L)
SODIUM (EPA 273.1)	228	226	(mg/L)
COPPER (EPA 220.1)	< 0.014	< 0.014	(mg/L)
MANGANESE (EPA 243.1)	0.042	0.041	(mg/L)
MERCURY (EPA 245.1)	< 0.001	< 0.001	(mg/L)
ZINC (EPA 289.1)	< 0.008	< 0.008	(mg/L)
ODOR (EPA 140.1)	1	1	(TON)
MBAS (EPA 425.1)	0.065	0.061	(mg/L)
1,2-DIBROMOETHANE	< 0.02	< 0.02	(ug/L)
1,2-DICHLOROETHANE	< 1.0	< 1.0	(ug/L)
1,4-DICHLOROBENZENE	< 1.0	< 1.0	(ug/L)
BENZENE	< 1.0	< 1.0	(ug/L)
CARBON TETRACHLORIDE	< 1.0	< 1.0	(ug/L)
TETRACHLOROETHENE	< 1.0	< 1.0	(ug/L)
TRICHLOROETHANE	< 1.0	< 1.0	(ug/L)
VINYL CHLORIDE	< 1.0	< 1.0	(ug/L)
1,1,1-TRICHLOROETHANE	< 1.0	< 1.0	(ug/L)
1,1-DICHLOROETHANE	< 1.0	< 1.0	(ug/L)

MANATEE COUNTY PUBLIC WORKS DEPARTMENT
CENTRAL LABORATORY (HRS No. E54139)
5100 66th ST. W. BRADENTON FL 34210
(813) 792-8788 SUNCOM: 527-1330

12-13-89

CUSTODY SHEET No.: 20127

Lena Rd Landfill

SAMPLERS: V. Parker

ION	TIME ON STATION	pH	COND. (umho)	D.O. (mg/l)	TEMP. (deg C)	TOTAL DEPTH (ft)	SAMPLE DEPTH (ft)	A TOC H_2SO_4 (2)	B HNO3	C TOC H_2SO_4	D PLAIN (2)	E PLAIN	F VOC	G	H	I	J CASING	COMMENTS PH CALIBR.
1	0910	7.3	650	-	21.7	160.0	18.58	1	1	1	2	1	2	91	22	38	2.92	(7.0)=7.03@23.5
1	0910	6.4	1000	-	20.8	23.0	5.0	1	1	1	2	1	2		23	9	3.29	(7.0)=7.03@23.5
D	1030	5.4	4.1	-	23.9	21.41	8.17	1	1	1	2	1	2		2	40	3.04	(7.0)=7.11@19.2
P	1030	5.4	4.1	-	23.9	21.41	8.17	1	1	1	2	1	2		2	41	3.04	(7.0)=7.11@19.2
5	1130	6.2	440	-	24.4	21.33	7.83	1	1	1	2	1	2		2	42	3.0	(7.0)=7.05@17.1
L'	1-5	3.5	570	-	21.5	22.58	6.25	1	1	1	2	1	2		2	43	3.75	(7.0)=7.06@17.5

NAL COMMENTS: Calibration # 526336

CUSTODY TRANSFER INFORMATION

NQUISHED BY (SIGNATURE):	RELINQUISHED TO (SIGNATURE):	DIVISION / LABORATORY	DATE	TIME	SAMPLE COUNT
[illegible signature]	[illegible signature]	SWRTP Effl.	12/13/89	1430	18
Vincent Parker	David Moore	Davis Labs	12/14/89	9.45	

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MANATEE COUNTY PUBLIC WORKS DEPARTMENT
CENTRAL LABORATORY (HRS No. E54139)
5100 66th ST. W. BRADENTON FL 34210
(813) 792-8788 SUNCOM: 527-1330

DATE: 12-14-89

CUSTODY SHEET No.: 20128

PROJECT: LENA LANDFILL MON. WELLS

SAMPLERS: D. ELLIOTT

LOCATION	TIME ON STATION	pH	COND. (umho)	D.O. (mg/l)	TEMP. (deg C)	TOTAL DEPTH (ft)	SAMPLE DEPTH (ft)	A [illegible] H2SO4	B [illegible] HNO3	C TKN H_2SO_4	D NO3	E [illegible]	F VOC	G	H	I	J [illegible]	COMMENTS pH (7
LR II-2	0900	6.1	155	F	22.8	22.86	5.75	1	1	1	1	1	2		912	256	3.09	6.99
SA 6		7.4	750	–	22.2	154.	21.5	1	1	1	1	1	2		912	257	2.46	
LR II-3	1030	5.1	600		22.9	22.92	6.67	1	1	1	1	1	2		912	258	2.96	7.07
SA 7		7.9	410		22.5	140.	21.33	1	1	1	1	1	2		912	259	2.63	
LR II-4	1220	6.8	275		23.0	22.5	6.63	1	1	1	1	1	2		912	260	2.83	7.07
SA-8		7.9	410		22.9	159.	21.79	1	1	1	1	1	2		912	261	3.08	

ADDITIONAL COMMENTS: METER CALIBRATION # 550337

CUSTODY TRANSFER INFORMATION

RELINQUISHED BY (SIGNATURE):	RELINQUISHED TO (SIGNATURE):	DIVISION / LABORATORY	DATE	TIME	SAMPLE CO
D Elliott	[illegible]	Central	12-14-89	1430	18
D Elliott	[illegible]	[illegible] LAB	12-14-89	1630	24

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MANATEE COUNTY PUBLIC WORKS DEPARTMENT
CENTRAL LABORATORY (HRS No. E54139)
5100 66th ST. W. BRADENTON FL 34210
(813) 792-8788 SUNCOM: 527-1330

CUSTODY SHEET No.: 20129

12-18-89

ECT: Lena Landfill MW.5

SAMPLERS: V. Parker

TION	TIME ON STATION	pH	COND. (umho)	D.O. (mg/l)	TEMP. (deg C)	TOTAL DEPTH (ft)	SAMPLE DEPTH (ft)	A H2SO4	B HNO3	C H_2SO_4	D	E	F (VOC)	G	H	I	J Casing	COMMENTS pH CALIBR.
5	0930	6.6	310	—	16.8	23.0	8.83	1	1	1	1	1	2	912310			3.17	(7.0)=6.96@20
eI	1030	5.1	230	—	20.9	23.58	5.58	1	1	1	1	1	2	912311			3.17	(7.0)=7.01@21.1
eII	1030	7.3	610	—	21.8	160.0	35.0	1	1	1	1	1	2	912312			2.67	(7.0)=7.00@22.
3	1200	6.5	2300	—	23.3	18.17	7.83	1	1	1	1	1	2	912313			8.24	(7.0)=7.13@17.
Dup 3	1200	6.5	2300	—	23.3	18.17	7.83	1	1	1	1	1	2	912314			8.24	(7.0)=7.13@17.7

ONAL COMMENTS: CALIBRATION # 520338

CUSTODY TRANSFER INFORMATION

LINQUISHED BY (SIGNATURE):	RELINQUISHED TO (SIGNATURE):	DIVISION / LABORATORY	DATE	TIME	SAMPLE COUNT
Vera V J Parker	W. [illegible]	C. LAB	12-18-89	1500	15
Vera V J Parker	Dan [illegible]	DAVIS	12/19/89	0907	

	DATE:	LEACHATE INPUT TO POND G.P.D. STAGE I	STAGE II	STAGE III	IRRIGATION (STAGE I) G.P.D.	LEACHATE TO S.E.W.W.T.P. G.P.D.	RAINFALL INCHES	STAGE I WEIR DISCHARGE FLOW (MGD) NORTH	SOUTH	WEST	AVERAGE DAILY WEIR (pH) NORTH	SOUTH	WEST
1			NOT APPLICABLE		NO SPRAY IRRIGATION			NO DISCHARGE	NO DISCHARGE	NO DISCHARGE	NOT APPLICABLE	NOT APPLICABLE	
2	10-2	112,570		138,900		800,000	-0-						7.0
3	10-3	55,200		117,600		400,000	-0-						7.1
4	10-4	53,420		128,500		400,000	-0-						7.1
5	10-5	51,630		141,500		400,000	-0-						7.0
6	10-6	48,270		125,700		700,000	-0-						7.0
7	10-7	52,700		143,800		700,000	-0-						7.0
8													
9	10-9	96,950		115,900		1,400,000	-0-						7.0
10	10-10	46,750		372,060		700,000	0.50						7.0
11	10-11	46,390		236,910		700,000	-0-						7.1
12	10-12	44,310		238,500		700,000	-0-						7.1
13	10-13	44,590		370,710		700,000	-0-						7.1
14	10-14	77,260		369,500		700,000	0.80						7.1
15													
16	10-16	95,780		380,712		700,000	-0-						7.0
17	10-17	44,940		236,880		700,000	-0-						7.0
18	10-18	46,150		149,460		700,000	-0-						7.0
19	10-19	41,030		49,728		700,000	0.55						7.1
20	10-20	39,900		151,800		700,000	-0-						7.0
21	10-21	35,725		117,078		700,000	-0-						7.0
22													
23	10-23	81,215		240,090		1,400,000	-0-						7.1
24	10-24	40,600		-0-		700,000	-0-						7.1
25	10-25	41,640		-0-		700,000	-0-						7.1
26	10-26	39,790		167,640		700,000	-0-						7.1
27													
28	10-28	78,190		190,944		1,400,000	-0-						7.1
29													
30	10-30	83,530		202,176		1,400,000	-0-						7.0
31	10-31	35,770		90,576		700,000	-0-						7.0
TOTALS:		1,434,300	NA	4,476,664	-0-	19,500,000	1.85	-0-	-0-	-0-			
TOTALS:		5,910,964	LEACHATE POND INPUT										

OCTOBER 1989
WATER BALANCE REPORT

MANATEE COUNTY
LENA ROAD LANDFILL FACILITY

[redacted] 1989

	DATE:	LEACHATE INPUT TO POND G.P.D. STAGE I	STAGE II	STAGE III	IRRIGATION (STAGE I) G.P.D.	LEACHATE TO S.E.W.W.T.P. G.P.D.	RAINFALL INCHES	STAGE I WEIR DISCHARGE FLOW (MGD) NORTH	SOUTH	WEST	AVERAGE DAILY WEIR (pH) NORTH	SOUTH	WEST
1	11-1-89	33,340	NOT APPLICABLE	89,700	NO SPRAY IRRIGATION	700,000	0.0	NO DISCHARGE	NO DISCHARGE	NO DISCHARGE	NO DISCHARGE	NO DISCHARGE	7.0
2	11-2-89	39,710		93,600		700,000	0.0						7.0
3													
4	11-4-89	71,255		162,720		1,400,000	0.0						7.0
5													
6	11-6-89	73,280		198,000		1,400,000	0.0						7.0
7	11-7-89	38,665		88,740		700,000	0.0						7.0
8	11-8-89	40,260		90,480		700,000	0.0						7.0
9	11-9-89	35,820		85,860		700,000	0.1						7.1
10													
11	11-11-89	65,700		115,390		1,400,000	0.0						7.1
12													
13	11-13-89	64,370		336,960		1,400,000	0.0						7.1
14	11-14-89	35,660		84,270		-0-	0.0						7.1
15	11-15-89	38,230		82,680		-0-	0.0						7.0
16	11-16-89	36,925		79,560		-0-	0.2						7.0
17													
18	11-18-89	55,855		135,000		-0-	0.0						7.1
19													
20	11-20-89	63,880		152,484		-0-	0.0						7.1
21	11-21-89	37,000		74,880		-0-	0.0						7.1
22	11-22-89	34,140		73,320		-0-	0.0						7.1
23													
24	11-24-89	NR		NR		-0-	0.3						7.1
25	11-25-89	88,525		205,884		-0-	0.0						7.1
26													
27	11-27-89	59,885		130,050		-0-	0.0						7.1
28	11-28-89	30,650		67,500		-0-	0.1						7.0
29	11-29-89	32,200		14,903		-0-	0.0						7.0
30	11-30-89	30,625		35,099		-0-	0.0						7.0
31													
	TOTALS:	[redacted]	-0-	2,397,080	-0-	9,100,000	0.7	-0-	-0-	-0-			

TOTAL LEACHATE INPUT: 3,403,055

	[redacted] 1989 DATE:	LEACHATE INPUT TO POND G.P.D. STAGE I	STAGE II	STAGE III	IRRIGATION (STAGE I) G.P.D.	LEACHATE TO S.E.W.W.T.P. G.P.D.	RAINFALL INCHES	STAGE I WEIR DISCHARGE FLOW (MGD) NORTH	SOUTH	WEST	AVERAGE DAILY WEIR (pH) NORTH	SOUTH	WEST
1	12-1-89	26350	NOT APPLICABLE	61713	NO SPRAY IRRIGATION	-0-	-0-	NO DISCHARGE	NO DISCHARGE	NO DISCHARGE	NO DISCHARGE	NO DISCHARGE	7.0
2	12-2-89	37025		78679		-0-	-0-						7.0
3													
4	12-4-89	123,475		132840		-0-	-0-						7.0
5	12-5-89	31,940		62,160		-0-	-0-						7.0
6	12-6-89	31,330		85,203		-0-	-0-						7.0
7	12-7-89	30,190		59,640		-0-	-0-						7.0
8	12-8-89	27,540		47,712		-0-	-0-						7.0
9	12-9-89	101,655		183,718		-0-	1.6						7.0
10													
11	12-11-89	70,255		151,769		-0-	-0-						7.0
12	12-12-89	37,610		74,349		-0-	-0-						7.0
13	12-13-89	32,980		69,420		-0-	.30						7.0
14	12-14-89	27,200		66,077		-0-	-0-						7.0
15	12-15-89	26,500		55,463		-0-	-0-						7.0
16	12-16-89	41,880		77,490		-0-	.2						7.0
17													
18	12-18-89	63,340		137,430		-0-	.2						7.0
19	12-19-89	32,300		65,950		-0-	-0-						7.0
20	12-20-89	47,530		67,000		-0-	-0-						7.0
21	12-21-89	52,570		76,240		-0-	.30						7.0
22	12-22-89	30,520		64,073		-0-	-0-						7.0
23	12-23-89	144,325		50,898		-0-	1.3						7.0
24													
25													
26	12-26-89	151,315		341,268		-0-	-0-						7.0
27	12-27-89	42,410		93,936		-0-	-0-						7.0
28	12-28-89	41,540		87,811		200,000	-0-						7.0
29						200,000							
30	12-30-89	30,720		165,820		200,000	-0-						7.0
31													
	TOTALS:	1,282,500		2,356,659		600,000	3.9						

TOTAL LEACHATE INPUT: 3,639,159
TOTAL SE PLANT: 600,000

MANATEE COUNTY PUBLIC WORKS
LENA ROAD LANDFILL
WATER BALANCE REPORT

DECEMBER 1991
LENA ROAD

MANATEE COUNTY PUBLIC WORKS
SOLID WASTE DIVISION

MONTHLY WATER BALANCE REPORT FOR THE MONTH OF December, 1991

DAY OF MONTH	LEACHATE INPUT TO POND G.P.D. STAGE I	STAGE II	STAGE III	LEACHATE IRRIGATION (STAGE I) G.P.D.	LEACHATE TO S.E.W.W.T.P. G.P.D.	RAINFALL INCHES	STAGE I WEIR DISCHARGE FLOW(MGD) NORTH	SOUTH	WEST	AVERAGE DAILY WEIR (pH) NORTH	SOUTH	WEST
1												
2	150,000		35,000		242,200	0						
3	30,000		2,000		81,000	0						
4	26,000		2,000		100	0						
5												
6	19,000		1,000		0	0						
7	24,000		2,000		400	0						
8												
9	63,000		4,000		0	0						
10	29,000		15,000		0	0						
11	25,000		4,000		0	0						
12	26,000		4,000		33,500	0						
13												
14												
15												
16	111,000	NOT APPLICABLE	13,000	NOT APPLICABLE	915,100	0	NO DISCHARGE	NO DISCHARGE	NO DISCHARGE	NO DISCHARGE	DRY DITCH	
17												
18	51,000		6,000		540,100	0						
19	20,000		5,000		252,400	0						
20	15,000		3,000		203,900	0						
21												
22												
23												
24	105,000		48,000		1,021,500	0						
25												
26	49,000		10,000		505,000	0						
27												
28												
29												
30	105,000		120,000		1,074,100	0						
31	21,000		30,000		239,900	0						
T O T A L S	869,000		314,000		5,109,200	0						

TOTAL LEACHATE INPUT 1,183,000

GFY:atm
1991

Greg

MANATEE COUNTY PUBLIC WORKS
LENA ROAD LANDFILL FACILITY
TONNAGE COMPARISON: 1985-1991

	1985		1986		1987		1988		1989		1990		1991		1992	
	T/M	T/D	T/M	T/D	T/M	T/D	T/M	T/D	T/M	T/D	T/M	T/D	T/M	T/D	T/M	T/D
JAN	18720	780	20399	848	20559	857	22367	932	23857	954	26931	1036	28134	1082		
FEB	16748	698	19408	809	19967	832	23512	980	23058	960	23303	971	31828	1326		
MAR	18496	771	20527	855	24149	1006	26639	1110	27138	1005	25909	960	28204	1085		
APR	18728	780	20636	860	23451	977	23829	993	24370	975	23935	957	27437	1055		
MAY	18048	752	20316	847	21400	892	21847	910	25646	986	23929	920	27594	1061		
JUN	16868	703	20143	839	22703	946	25756	1073	28088	1080	26334	1013	27720	1109		
JUL	13862	578	21339	889	24321	1013	23838	993	25606	1024	24633	985	25279	972		
AUG	18425	768	20673	861	21717	905	27844	1160	27140	1005	26266	973	26170	969		
SEP	19063	794	20003	833	22285	929	25234	971	24360	974	23298	971	23234	929		
OCT	20104	838	21452	893	23449	977	24070	926	24325	936	32426	1201	25774	955		
NOV	19080	795	19278	803	22176	924	24276	971	22903	916	24770	991	30403	1216		
DEC	19241	802	21408	892	24852	1035	24385	938	21539	862	25590	1024	25472	1019		
TOTAL/AVG	217383	755	245582	852	271029	941	293597	996	298030	973	307323	1000	327249	1065		

LENA ROAD LANDFILL

MATERIAL CLASS REPORT-LANDFILLED, DIVERTED, RECYCLED in TONS

MATERIAL CLASS	DECEMBER 1991			FISCAL 91-92 YEAR TO DATE		
	LANDFILLED	DIVERTED	RECYCLED	LANDFILLED	DIVERTED	RECYCLED
ASH			0			0
CLEAN-UP	165.9			179.3		
CONCRETE		0			11.5	
FLUFF	1104.6			3243		
ILLEGAL	36.1			72.9		
MIXED	23713.4			75081.1		
MULCH			0			553
ROOFING	452		0	463		
SH-TIRES			0			121.8
RAW-TIRES		37.9			119.7	
WH-GOODS			20.7			37.4
WOOD		1043			2870.	
TOTALS	25472	1080.9	20.7	79039.3	3001.	712.2

Appendix 2

LEACHATE TOXICITY DATA

LEACHATE TOXICITY DATA

Manatee County Public Works Department

Solid Waste Division

BEST AVAILABLE COPY

RECEIVED FEB 23 1990

DAVIS ANALYTICAL LABORATORIES
Florida State HRS Certification #84108
2650 Tallevast Road, P.O. Box 29, Tallevast, FL 34270-0029
(813) 355-2971

USTOMER: Manatee County Public Works Department
TTN: Laboratory
DDRESS: 5100 66th St. West, Bradenton, FL 34210

AMPLE NAME(S): Effluent & Leachate Lake

AMPLE TYPE	DATE/TIME COLLECTED	COLLECT BY	RECEIVED
FFLUENT	11/15/89	VP	WY 11/16
EACHATE 1AKE	11/15/89	VP	WY 11/16

PPROVED BY: [signature] DATE: 1-4-90

LABORATORY ANALYSIS

IALYSIS (METHOD) I.D.#	EFFLUENT 911289	LEACHATE 911290		PAGE 1 OF 4
SENIC (EPA 206.3)	< 0.001	< 0.001	(mg/L)	
RT'M (EPA 208.1)	0.300	0.610	(mg/L)	
DI JM (EPA 213.1)	< 0.004	< 0.004	(mg/L)	
LCIUM (EPA 215.1)	65.9	77.3	(mg/L)	
ROMIUM (EPA 218.1)	< 0.033	< 0.033	(mg/L)	
PPER (EPA 220.1)	< 0.010	< 0.010	(mg/L)	
ON (EPA 236.1)	0.073	5.39	(mg/L)	
AD (EPA 239.1)	< 0.050	< 0.050	(mg/L)	
GNESIUM (EPA 242.1)	12.6	18.8	(mg/L)	
NGANESE (EPA 243.1)	0.103	0.126	(mg/L)	
RCURY (EPA 245.1)	< 0.0001	< 0.0001	(mg/L)	
LENIUM (EPA 270.3)	< 0.001	< 0.001	(mg/L)	
LVER (EPA 272.1)	< 0.017	< 0.017	(mg/L)	
DIUM (EPA 273.1)	70.4	68.5	(mg/L)	
NC (EPA 289.1)	0.022	0.022	(mg/L)	
LORIDE (STD 407C)	161	159	(mg/L)	
UORIDE (EPA 340.2)	0.207	0.261	(mg/L)	
TRATE (EPA 353.2)	1.03	0.19	(mg/L)	
LFATE (EPA 375.4)	135	43.3	(mg/L)	
KALINITY (EPA 310.1)	94.5	311	(mg/L)	
LOR (EPA 110.2)	0	30	(units)	
S (EPA 425.1)	0.058	0.123	(mg/L)	
R (EPA 140.1)	7	0	(TON)	
(EPA 150.1)	6.97	7.67	(units)	
(EPA 160.1)	455	475	(mg/L)	
BIDITY (FWPCA 275)	0.649	57.9	(NTU)	
RC VITY (SAT. INDEX)	-1.53	0.27		
DI S (STD 314A)	217	270	(mg/L)	
AL COLIFORM (STD 909A)	0	0	(#/100ml)	
AL COLIFORM (STD 909C)	0	300	(#/100ml)	

BEST AVAILABLE COPY

DAVIS WATER & WASTE INDUSTRIES INC

DAVIS ANALYTICAL LABORATORIES
Florida State HRS Certification #84108
2650 Tallevast Road, P.O. Box 29, Tallevast, FL 34270-0029
(813) 355-2971

STOMER: Manatee County Public Works Department

ALYSIS (METHOD) I.D.#	EFFLUENT 911289	LEACHATE 911290	
D (EPA 405.1)	< 0.1	9.2	(mg/L)
D (EPA 410.1)	53.8	36.5	(mg/L)
NDUCTIVITY (EPA 120.1)	665	883	(umhos)
TAL CYANIDE (EPA 335.2)	0.060	0.320	(mg/L)
L & GREASE (EPA 413.1)	< 0.1	10.2	(mg/L)
UMINUM (EPA 202.1)	< 0.170	0.900	(mg/L)
RYLLIUM (EPA 210.1)	< 0.005	< 0.005	(mg/L)
CKEL (EPA 249.1)	< 0.020	< 0.020	(mg/L)
N (EPA 351.1)	2.60	29.8	(mg/L)
TAL SOLIDS (EPA 160.2/APHA 209A)	416	561	(mg/L)
LATILES - EPA 624 *			
1,1,1-TRICHLOROETHANE	< 1	< 1	(ug/l)
1,1,2,2-TETRACHLOROETHANE	< 1	< 1	(ug/l)
[illegible],2-TRICHLOROETHANE	< 1	< 1	(ug/l)
[illegible]-DICHLOROETHANE	< 1	< 1	(ug/l)
1,1-DICHLOROETHENE	< 1	< 1	(ug/l)
1,2-DICHLOROBENZENE	< 1	< 1	(ug/l)
1,2-DICHLOROETHANE	< 1	< 1	(ug/l)
1,2-DICHLOROPROPANE	< 1	< 1	(ug/l)
1,3-DICHLOROBENZENE	< 1	< 1	(ug/l)
1,4-DICHLOROBENZENE	< 1	< 1	(ug/l)
2-CHLOROETHYLVINYL ETHER	< 1	< 1	(ug/l)
BENZENE	< 1	13	(ug/l)
BROMODICHLOROMETHANE	< 1	< 1	(ug/l)
BROMOFORM	< 1	< 1	(ug/l)
BROMOMETHANE	< 1	< 1	(ug/l)
CARBON TETRACHLORIDE	< 1	< 1	(ug/l)
CHLOROBENZENE	< 1	< 1	(ug/l)
CHLOROETHANE	< 1	< 1	(ug/l)
CHLOROFORM	23	< 1	(ug/l)
CHLOROMETHANE	< 1	< 1	(ug/l)
CIS-1,3-DICHLOROPROPENE	< 1	< 1	(ug/l)
DIBROMOCHLOROMETHANE	< 1	< 1	(ug/l)
ETHYLBENZENE	< 1	< 1	(ug/l)
METHYLENE CHLORIDE	< 1	< 1	(ug/l)
TETRACHLOROETHENE	< 1	< 1	(ug/l)
TOLUENE	< 1	< 1	(ug/l)
TRANS-1,2-DICHLOROETHENE	< 1	< 1	(ug/l)
[illegible]NS-1,3-DICHLOROPROPENE	< 1	< 1	(ug/l)
[illegible]CHLOROETHENE	< 1	< 1	(ug/l)
TRICHLOROFLUOROMETHANE	< 1	< 1	(ug/l)
VINYL CHLORIDE	< 1	< 1	(ug/l)

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DAVIS ANALYTICAL LABORATORIES
Florida State HRS Certification #84108
2650 Tallevast Road, P.O. Box 29, Tallevast, FL 34270-0029
(813) 355-2971

STOMER: Manatee County Public Works Department

ALYSIS (METHOD) I.D.#	EFFLUENT 911289	LEACHATE 911290	
A METHOD 625 *			
1,2,4-TRICHLOROBENZENE	< 1	< 1	(ug/L)
1,2-DICHLOROBENZENE	< 1	< 1	(ug/L)
1,3-DICHLOROBENZENE	< 1	< 1	(ug/L)
1,4-DICHLOROBENZENE	< 1	< 1	(ug/L)
2,4,6-TRICHLOROPHENOL	< 5	< 5	(ug/L)
2,4-DICHLOROPHENOL	< 5	< 5	(ug/L)
2,4-DIMETHYL PHENOL	< 5	< 5	(ug/L)
2,4-DINITROPHENOL	< 5	< 5	(ug/L)
2,4-DINITROTOLLUENE	< 5	< 5	(ug/L)
2,6-DINITROTOLUENE	< 5	< 5	(ug/L)
2-CHLORONAPHTHALENE	< 5	< 5	(ug/L)
2-CHLOROPHENOL	< 5	< 5	(ug/L)
2-METHYL-4,6-DINITROPHENOL	< 5	< 5	(ug/L)
2-NITROPHENOL	< 1	< 1	(ug/L)
3,3'-DICHLOROBENZIDINE	< 10	< 10	(ug/L)
,4'-DDE	< 5	< 5	(ug/L)
, DDT	< 5	< 5	(ug/L)
,4 -DDD	< 5	< 5	(ug/L)
-BROMOPHENYLPHHENYLETHER	< 5	< 5	(ug/L)
-CHLORO-3-METHYLPHENOL	< 1	< 1	(ug/L)
-CHLOROPHENLYPHHENYLETHER	< 5	< 5	(ug/L)
-NITROPHENOL	< 5	< 5	(ug/L)
CENAPHTHENE	< 5	< 5	(ug/L)
CENAPHTHYLENE	< 5	< 5	(ug/L)
LDRIN	< 5	< 5	(ug/L)
NTHRACENE	< 5	< 5	(ug/L)
ENZIDINE	< 10	< 10	(ug/L)
ENZO(A)ANTHRACENE	< 5	< 5	(ug/L)
ENZO(A)PYRENE	< 5	< 5	(ug/L)
ENZO(B)FLUORANTHENE	< 5	< 5	(ug/L)
ENZO(GHI)PERYLENE	< 5	< 5	(ug/L)
ENZO(K)FLUORANTHENE	< 5	< 5	(ug/L)
IS(2-CHLOROETHOXY)METHANE	< 5	< 5	(ug/L)
IS(2-CHLOROETHYL)ETHER	< 5	< 5	(ug/L)
IS(2-CHLOROISOPROPYL)ETHER	< 5	< 5	(ug/L)
IS(2-ETHYLHEXYL)PHTHALATE	< 5	< 5	(ug/L)
JTYL BENZYL PHTHALATE	< 5	< 5	(ug/L)
HLORDANE	< 5	< 5	(ug/L)
HRYSENE	< 5	< 5	(ug/L)
-BHC	< 5	< 5	(ug/L)
-N-BUTYL PHTHALATE	< 5	< 5	(ug/L)
- OCTYL PHTHALATE	< 5	< 5	(ug/L)
BENZO(A,H)ANTHRACENE	< 5	< 5	(ug/L)

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DAVIS WATER & WASTE INDUSTRIES INC

DAVIS ANALYTICAL LABORATORIES

Florida State HRS Certification #84108
2650 Tallevast Road, P.O. Box 29, Tallevast, FL 34270-0029
(813) 355-2971

JSTOMER: Manatee County Public Works Department

IALYSIS (METHOD) I.D.#		EFFLUENT 911289	LEACHATE 911290		PAGE 4 OF 4
'A METHOD 625 *	(CONTINUED)				
DIELDRIN		< 5	< 5	(ug/L)	
DIETHYL PHTHALATE		< 5	< 5	(ug/L)	
DIMETHYL PHTHALATE		< 5	< 5	(ug/L)	
ENDOSULFAN I		< 50	< 50	(ug/L)	
ENDOSULFAN II		< 5	< 5	(ug/L)	
ENDOLSULFAN SULFATE		< 5	< 5	(ug/L)	
ENDRIN		< 0.05	< 0.05	(ug/L)	
ENDRIN ALDEHYDE		< 5	< 5	(ug/L)	
FLUORANTHENE		< 5	< 5	(ug/L)	
FLUORENE		< 5	< 5	(ug/L)	
HEPTACHLOR		< 5	< 5	(ug/L)	
HEPTACHLOR EXPOXIDE		< 5	< 5	(ug/L)	
HEXACHLOROBENZENE		< 5	< 5	(ug/L)	
HEXACHLOROBUTADIENE		< 1	< 1	(ug/L)	
HEXACHLOROCYCLOPENTADIENE		< 5	< 5	(ug/L)	
HEXACHLOROETHANE		< 5	< 5	(ug/L)	
I[illegible]NO(1,2,3-CD)PYRENE		< 5	< 5	(ug/L)	
IS[illegible]HORONE		< 5	< 5	(ug/L)	
N-NITROSODI-N-PROPYLAMINE		< 10	< 10	(ug/L)	
N-NITROSODIMETHYLAMINE		< 10	< 10	(ug/L)	
N-NITROSODIPHENYLAMINE		< 10	< 10	(ug/L)	
NAPHTHALENE		< 1	< 1	(ug/L)	
NITROBENZENE		< 5	< 5	(ug/L)	
PCB 1016		< 5	< 5	(ug/L)	
PCB 1221		< 5	< 5	(ug/L)	
PCB 1232		< 5	< 5	(ug/L)	
PCB 1242		< 5	< 5	(ug/L)	
PCB 1248		< 5	< 5	(ug/L)	
PCB 1254		< 5	< 5	(ug/L)	
PCB 1260		< 5	< 5	(ug/L)	
PENTACHLOROPHENOL		< 5	< 5	(ug/L)	
PHENANTHRENE		< 10	< 10	(ug/L)	
PHENOL		< 5	< 5	(ug/L)	
PYRENE		< 5	< 5	(ug/L)	
TOXAPHENE		< 5	< 5	(ug/L)	
[illegible]-BHC		< 5	< 5	(ug/L)	
MARY ORGANICS *					
[illegible],4,5-TP SILVEX		< 8	< 8	(ug/L)	
[illegible],4-D		< 4	< 4	(ug/L)	
[illegible]NDRIN		< 0.05	< 0.05	(ug/L)	
[illegible]I[illegible]NE		< 0.2	< 0.2	(ug/L)	
[illegible]E[illegible]OXYCHLOR		< 5	< 5	(ug/L)	
[illegible]OXAPHENE		< 5	< 5	(ug/L)	

ANALYSES PERFORMED BY FLORIDA LAB ID #E83079.

Appendix 4

WELL INVENTORY DATA
TABLE 3.1

INVENTORIED WELLS MAP
FIGURE 3.8

Table 3.1

WELL INVENTORY FOR LENA ROAD LANDFILL

No.	Section Location	Name Address	Use	Total Depth	Casing Depth	Casing Diameter
1	S25, T34S, R18E*	Roland Pompey 1918 1st Ave. E.	Domestic	100'	42'	3"
2	S25, T34S, R18E	Tom Emmer Rubonia	-	-	-	4"
3	S25, T34S, R18E	Tom Emmer Rubonia	-	-	-	4"
4	S25, T34S, R18E	Harvey Brock 1833 8th Ave. E.	Irrigation	-	32'	3"
5	S25, T34S, R18E	Leon Esechenko Magnolia Manor	-	90'	37'	3"
6	S25, T34S, R18E	H.B. Brower Lena Road	Household	100'	30'	4"
7	S36, T34S, R18E	Frank Castoral Lena Road	Livestock	365'	42' 63'	4" 3"
8	S36, T34S, R18E	Howard Brower Brower Drive off Lena Road	Domestic	105'	51'	4"
9	S36, T34S, R18E	Hardie		450'	76'	4"
10	S36, T34S, R18E	Schmitt Rt.#64 Lorain Road	-	175'	89'	-

*Section 25, Township 34 South, Range 18 East
Source: Manatee County Health Department Well Records 1965 to May 1983

Table 3.1 (co[illegible]d)

WELL INVENTORY FOR LENA ROAD LANDFILL

No.	Section Location	Name Address	Use	Total Depth	Casing Depth	Casing Diameter
11	S36, T34S, R18E	Schaeffer Lena Road near Brower Drive	Domestic	202'	40'	4"
12	S1, T35S, R18E	Lehman Interprises 9800 Blk. of Cortez Road	Irrigation	100'	80'	4"
13	S1, T35S, R18E	Wiley Jackson P.O. Box 1316	Abandoned	-	-	-
14	S1, T35S, R18E	John Stephens 41st Street E.	Household	175'	84'	3"
15	S1, T35S, R18E	Jim Gay Braden River Ranchetts	Household	150'	50'	-
16	S1, T35S, R18E	MarNav Builders Braden River Ranchetts	Household	160'	42'	3"
17	S1, T35S, R18E	Kenneth M. Watts Lena Road	Water Horses	95'	35'	3"
18	S1, T35S, R18E	I.I. Redins Braden River Ranchetts	-	158'	52'	3"
19	S1, T35S, R18E	Bernard Mitchell 2808 41st Avenue E.	-	167'	37'	3"
20	S1, T35S, R18E	John Sanville	Cattle Watering	126'	50'	3"
21	S1, T35S, R18E	C.T. Adams 2508 Lena Road	Household	239'	84'	3"

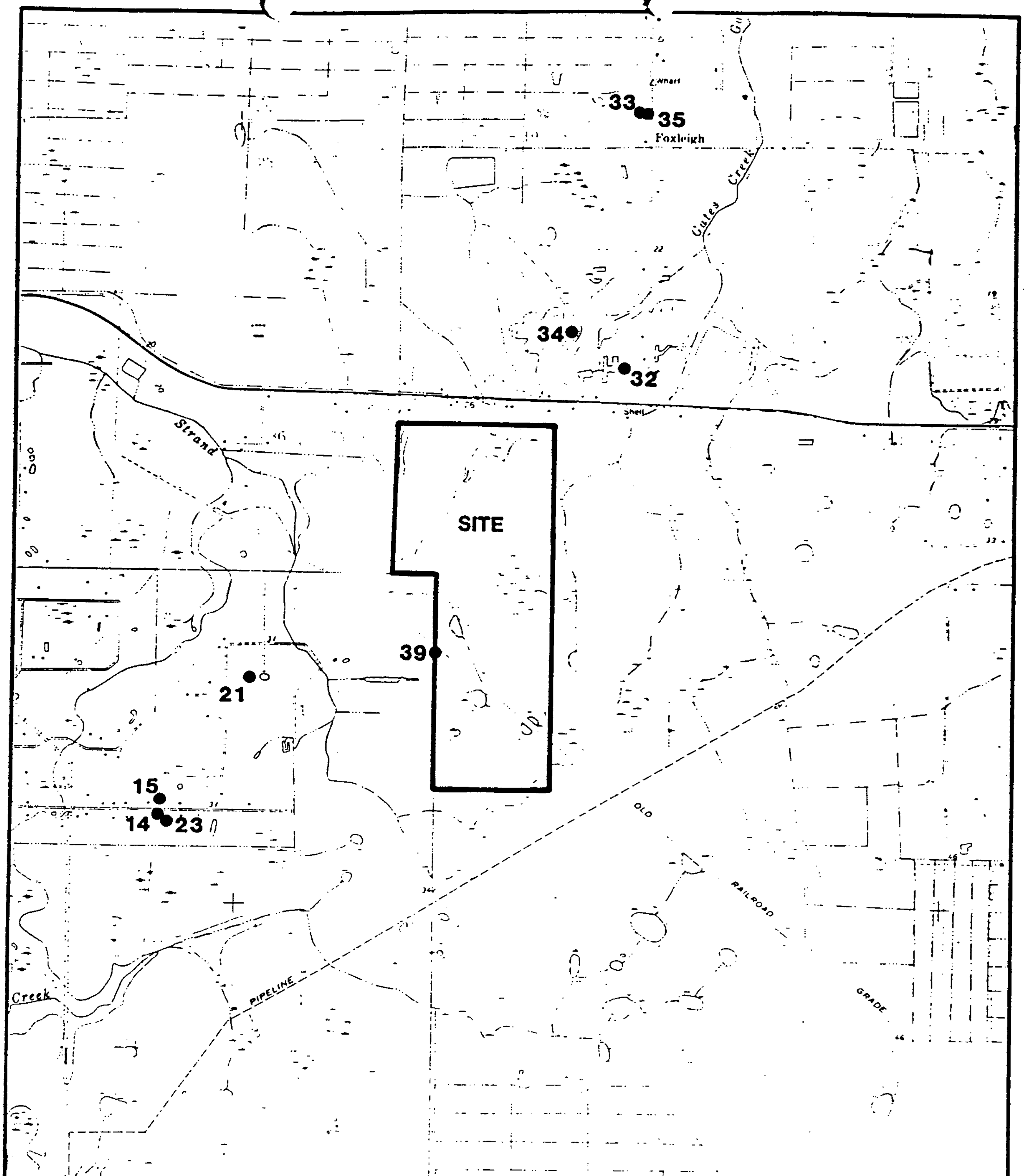
Table 3.1 (cont'd)

WELL INVENTORY FOR LENA ROAD LANDFILL (cont'd)

No.	Section Location	Name Address	Use	Total Depth	Casing Depth	Casing Diameter
22	S1, T35S, R18E	Luther Willis Braden River Ranchetts	Household	140'	62'	3"
23	S1, T35S, R18E	Pete Griffin Braden River Ranchetts	-	135'	44'	3"
24	S12, T35S, R18E	Ray Redell 5007 Coral Blvd.	Domestic Irrigation	-	63'	3"
25	S29, T34S, R19E	Tom & Evelyn Charies Hwy. 64	Irrigation	638'	85'	8"
26	S29, T34S, R19E	Tom & Evelyn Charies Hwy. 64	Irrigation	-	86'	8"
27	S29, T34S, R19E	Tom & Evelyn Charies Hwy. 64	-	658'	84'	8"
28	S29, T34S, R19E	Tom & Evelyn Charies Hwy. 64	-	654'	81'	8"
29	S29, T34S, R19E	Tom & Evelyn Charis Hwy. 64	Irrigation	640'	84'	8"
30	S29, T34S, R19E	Tom & Evelyn Charis Hwy. 64	-	681'	83'	8"
31	S29, T34S, R19E?	Robert Gadbois Upper Man. River Rd.	Domestic	110'	33'	4"
32	S29, T34S, R19E	Joe Warner Upper Man. River Rd.	- -	160'	63'	3"

WELL INVENTORY FOR LENA ROAD LANDFILL

33	S29, T34S, R19E?	Moores Dairy Upper Man. River Rd.	Domestic	310'	63'	4"
34	S30, T34S, R19E	Manatee Dairies Rt.2 Box 3271	Dairy	490'	61'	6"
35	S30, T34S, R19E	R.F. Moore Upper Man. River Rd.	Lawn	88'	40'	4"
36	S32, T34S, R19E	Glen Watkins GWE Dairy Farms 717 1st Street	Stock	450'	98'	8"
37	S32, T34S, R19E	Louise Simmons Rt. 1 Parrish	Irrigation	525'	126'	4"
38	S5, T35S, R19E	Jack Taylor off Pope Road	Irrigation	1056'	102'	10'
39	S6, T35S, R19E	Manatee County Landfill Lena Road	-	160'	46'	3"
40	S7, T35S, R19E	Paul Tedder off SR 70	Irrigation	870'	82	6"
41	S7, T35S, R19E	Paul Tedder off SR 70	Irrigation	880'	80'	6"
42	S7, T35S, R19E	Paul Tedder	Irrigation	860'	83'	6"



INVENTORIED WELLS

0 1000 2000
SCALE—FEET

LEGEND

● WELL LOCATION

14 WELL NUMBER

Ardaman & Associates, Inc.
Consulting Engineers in Soil Mechanics, Foundations, and Material Testing

HYDROGEOLOGICAL INVESTIGATION
LENA ROAD LANDFILL
MANATEE COUNTY, FLORIDA

DRAWN BY: T.S.	CHECKED BY:	DATE: 5/24/83
FILE NO. 82-7047	APPROVED BY:	

Appendix 5

CDM STORMWATER REPORT

LENA ROAD LANDFILL
SURFACE WATER QUALITY INVESTIGATION

Prepared by:

Camp Dresser & McKee Inc.
6221 14th. Street West, Suite 302
Bradenton, Florida 34207

1988

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the WWTP processes. The Manatee County WWTP Division has indicated that the WWTP will be capable of receiving all leachate necessary to be discharged. The possible presence of heavy metals in the leachate as well as other chemical constituents should be analyzed prior to a decision to send the leachate to the wastewater treatment facility. A leachate pretreatment system may be necessary to maintain the chemical quality of the plant effluent and sludges within regulatory requirements. Acceptance of the leachate must also follow the Sewer Use Ordinance 88-01 for pretreatment standards and costs. At this time, this method of treatment is considered as a back-up system to the leachate irrigation system.

A pump located at the southeastern corner of the leachate holding pond transmits leachate to the top of the Stage I area. The leachate is sprayed through a sprinkler system that can be manually controlled by valves and moved as conditions dictate. The County reports that minimal maintenance is required for the sprinkler system. Ponding on the top of the landfill area is likely to have been contaminated by the leachate in the past. The spray irrigation application area's location near the downdrain systems and the berm/road increases the potential for contamination of surface water runoff. Ponding was noted in the berm/road area.

2.6 STORMWATER MANAGEMENT

The existing stormwater management system at the Lena Road Landfill is constructed in conformance with Chapter 17-25 F.A.C. The structural elements of the stormwater water management system include a series of downdrains which feed into a perimeter ditch, a stormwater detention pond and three emergency overflow weirs located on the north, south and western portions of the perimeter ditch. Each emergency overflow weir structure is equipped with a water level recording device. The weir structures are of the rectangular, sharp-crested type and are approximately 10-feet wide.

The western section of the perimeter ditch includes an underdrain system which provides for 1-inch of storage in the stormwater detention pond and corner and moving toward the stormwater detention pond located in the southwest corner. The western underdrained ditch section is isolated from the remainder of the stormwater system by a berm at its north end and by a manual gate at the south end which connects with the stormwater pond.

During a typical dry season the storage provided for compliance with 17-25 F.A.C. (25-year 24-hour storm) in the ditch and stormwater detention pond system is adequate to prevent emergency overflows from the site. During the wet season the perimeter ditch and stormwater detention system water levels rise in response to increased rainfall frequency and natural groundwater fluctuations. Emergency overflows occur from a few to several times a month. Discharge from the western ditch underdrain system is relatively continuous with highest discharges occurring during the wet season. The underdrain system requires cleaning at least two times per year to remove accumulated sediment which clogs the filter sand.

The current operation permit for Stage I of the Lena Road Landfill requires sampling and analysis of stormwater overflows at the three emergency overflows and discharges from the underdrain system. The underdrain system is to be sampled quarterly during or following rainfall events and emergency overflows at the three weirs are to be sampled whenever they occur. Each sample is to be analyzed for the following water quality parameters:

Rainfall (inches)	Total alkalinity
pH	Chloride
Specific Conductance	TSS
TOC	DO
TDS	BOD
TKN	Total Coliform

No specific FDER form is required for water quality data reporting. Water quality must meet Chapter 17-3 and 17-4 standards for Class III waters.

During a typical dry season the storage provided for compliance with 17-25 F.A.C. (25-year 24-hour storm) in the ditch and stormwater detention pond system is adequate to prevent emergency overflows from the site. During the wet season the perimeter ditch and stormwater detention system water levels rise in response to increased rainfall frequency and natural groundwater fluctuations. Emergency overflows occur from a few to several times a month. Discharge from the western ditch underdrain system is relatively continuous with highest discharges occurring during the wet season. The underdrain system requires cleaning at least two times per year to remove accumulated sediment which clogs the filter sand.

The current operation permit for Stage I of the Lena Road Landfill requires sampling and analysis of stormwater overflows at the three emergency overflows and discharges from the underdrain system. The underdrain system is to be sampled quarterly during or following rainfall events and emergency overflows at the three weirs are to be sampled whenever they occur. Each sample is to be analyzed for the following water quality parameters:

Rainfall (inches)	Total alkalinity
pH	Chloride
Specific Conductance	TSS
TOC	DO
TDS	BOD
TKN	Total Coliform

No specific FDER form is required for water quality data reporting. Water quality must meet Chapter 17-3 and 17-4 standards for Class III waters.

3.0 WATER QUALITY

3.1 BACKGROUND AND SITE DESCRIPTION

In accordance with Manatee County's plan of action submitted to the Department of Environmental Regulation (FDER), 14 surface water stations near the Lena Road Landfill were sampled during early 1988. Three samplings were conducted during January and February. During the sampling events there was no direct discharge of landfill stormwater from the emergency overflow weirs. Underdrain seep rates from the stormwater system were unavailable for the sampling episodes, but antecedent rainfall for each of the sampling episodes were as follows:

Sampling Date	Antecedent 72 Hour Rainfall Total
January 26	2.45 inches
February 2	0.00 inches
February 9	0.90 inches

Water quality parameters evaluated included dissolved oxygen (DO), total Kjeldahl nitrogen (TKN), five day biochemical oxygen demand (BOD_5), total suspended solids (TSS), chlorides, alkalinity, pH, conductivity, total coliform, and fecal streptococci. In addition, samples collected February 2 and February 9 were analyzed for fecal coliform. Ammonia nitrogen was measured on samples collected February 2. Tabulated results are included as Attachment A, and summary statistics are included as Attachment B.

Background sample sites and sample sites downstream of the landfill (Figure 3-1) were selected in order to investigate whether surface water quality in downstream stations is different from background. Parameters of particular interest were DO and coliform counts. Sites 5, 11, 12, 13, and 14 were selected as background stations unaffected by the landfill, while stations 6, 7, 8, 9 and 10 are downstream of the landfill. Stations 1 through 4 are located within the boundary of the landfill proper and were not included in

the subsequent evaluations. Site locations were reviewed by FDER prior to sampling. Sampling dates are representative of base-flow conditions from the site as the rainfall was insufficient to cause a discharge through the overflow weirs located at the west, north and south boundaries of the site.

The area drains either into the Braden River by way of Cypress Strand or into the Manatee River via Gates Creek. Regional drainage consists primarily of seasonally isolated wetlands which have been previously interconnected by drainage ditches. The slope of the land in the region is minimal (ca 9 ft/mile) and streamflow is intermittent. The wetlands are shallow depressions on an otherwise flat land surface and tend to act as nutrient and sediment traps with minimal flushing action, especially during the dry season. Much of the surrounding land is used as pasture and the wetlands are frequently used by cattle and indigenous species.

3.2 STATE CRITERIA

Initial review of the data consisted of comparison with State water quality standards (FAC Chapter 17-3). The receiving waters are defined as predominantly fresh water Class III State waters. Water quality results of both the background and downstream stations were compared with appropriate standards. Values outside of State criteria are listed in Table 3-1. The results in Table 3-1 reflect the degree to which background conditions deviate from State criteria.

The background values are typical of wetland chemistries where low pH and DO are common. The average pH of the background stations was 5.6, while the average of the downstream stations was 6.5 indicating that the pH criteria has not been violated as a result of the landfill. In addition, no conductivity measurement exceeded 1,275 umhos/cm. The alkalinity of the background stations is naturally below the Class III criteria. The observed bacteria counts in the background stations are generally the result of high concentrations of native animals which frequent wetland habitats, or cattle which use wetlands as a source of water and shade.

TABLE 3-1

OBSERVATIONS EXCEEDING STATE CRITERIA
CLASS III WATERS

Parameter	Station/Type	Date	Value	FAC 17-3 Criteria
pH				6 < pH > 8.5
	11 Background	01/26/88	3.9	
	13 Background	01/26/88	5.0	
	11 Background	02/02/88	5.6	
	13 Background	02/02/88	4.9	
	11 Background	02/09/88	3.8	
	12 Background	02/09/88	5.9	
	13 Background	02/09/88	4.8	
	6 Downstream	01/26/88	5.8	
	6 Downstream	02/02/88	5.8	
Total Coliform				< 2400 / 100 ml
	5 Background	01/26/88	73000	
	5 Background	02/02/88	80000	
	5 Background	02/09/88	>80000	
	12 Background	02/09/88	10000	
	14 Background	02/09/88	4000	
	6 Downstream	01/26/88	2500	
	8 Downstream	01/26/88	5000	
	9 Downstream	01/26/88	11000	
	10 Downstream	01/26/88	3000	
	8 Downstream	02/02/88	15000	
	9 Downstream	02/02/88	5000	
	6 Downstream	02/09/88	10000	
	8 Downstream	02/09/88	3600	
	9 Downstream	02/09/88	12000	
	10 Downstream	02/09/88	10000	
Fecal Coliform				< 800 / 100 ml
	5 Background	02/02/88	8000	
	5 Background	02/09/88	>60000	
	12 Background	02/09/88	2000	
	14 Background	02/09/88	1100	
	8 Downstream	02/02/88	5000	
	9 Downstream	02/02/88	1600	
	6 Downstream	02/09/88	3400	
	9 Downstream	02/09/88	1900	
	10 Downstream	02/09/88	3000	

TABLE 3-1 (continued)

OBSERVATIONS EXCEEDING STATE CRITERIA
CLASS III WATERS

Parameter	Station/Type	Date	Value	FAC 17-3 Criteria
DO				> 5 mg/l
	12 Background	01/26/88	4.2	
	5 Background	02/02/88	1.0	
	11 Background	02/02/88	4.1	
	12 Background	02/02/88	1.7	
	13 Background	02/02/88	4.8	
	12 Background	02/09/88	3.4	
	13 Background	02/09/88	3.9	
	7 Downstream	01/26/88	4.8	
	6 Downstream	02/02/88	3.2	
	7 Downstream	02/02/88	4.4	
	10 Downstream	02/02/88	3.7	
	6 Downstream	02/09/88	4.8	
	7 Downstream	02/09/88	4.6	
Unionized Ammonia				< 0.02 mg/l NH3
	8 Downstream	02/02/88	0.17	
Alkalinity				> 20 mg/l CaCO3
	5 Background	01/26/88	15.1	
	11 Background	01/26/88	<0.1	
	12 Background	01/26/88	15.5	
	13 Background	01/26/88	0.4	
	14 Background	01/26/88	14.6	
	11 Background	02/02/88	4.6	
	13 Background	01/26/88	0.4	
	14 Background	01/26/88	14.6	
	11 Background	02/02/88	4.6	
	13 Background	02/02/88	<0.1	
	14 Background	02/02/88	11.9	
	11 Background	02/09/88	<0.1	
	12 Background	02/09/88	15.6	
	13 Background	02/09/88	<0.1	
	14 Background	02/09/88	10.7	
	6 Downstream	01/26/88	5.3	
	7 Downstream	01/26/88	6.4	
	10 Downstream	01/26/88	15.5	
	6 Downstream	02/02/88	7.0	
	6 Downstream	02/09/88	9.8	

3.3 STATION COMPARISONS

3.3.1 STATISTICAL FRAMEWORK

In order to objectively determine if a difference exists between the background station results and the results observed downstream, the data were subjected to an analysis of variance (ANOVA). Initially, distribution parameters were calculated for each water quality parameter in order to determine if the observations were evenly and normally distributed around the mean. Except for conductivity and the bacteriological parameters, all station results were normally distributed and were used without transformation. Fecal coliform, fecal streptococci, total coliform and conductivity values were logarithmically transformed prior to evaluation in order to achieve a normal distribution.

For comparative purposes, values that were reported as less than the limits of detection were used as one-half the reported detection limit. Total coliform values reported as 'TNTC' (Too Numerous To Count) were estimated by the laboratory to be greater than 80,000 colonies per 100 ml while the upper counting limit for fecal coliform was estimated by laboratory personnel as 60,000 per 100 ml. The actual values are unknown and may have exceeded these limits. For comparative evaluations, however, 'TNTC' observations were taken as 80,000 and 60,000 per 100 ml respectively for total coliforms and fecal coliforms.

Typically, statistical evaluations of environmental differences are made based on a 95 percent level of assurance. In other words, based on the statistical test, the observer can be 95 percent certain that a difference exists. In the present evaluation, the number of observations was small (3 per station) and a more conservative 99 percent level of assurance was chosen. The net result is that the difference between two stations must be larger, but there is more assurance that the difference exists in order for it to be statistically significant at the 99 percent level. The utility of ANOVA testing is that the results indicate whether the group of stations tested are all members of the same population and whether that group differs significantly from another group.

The ANOVA was used to determine:

- o If there are differences among (intra-group) the background stations,
- o If there are differences among (intra-group) the downstream stations; and
- o If there are significant differences between (inter-group) the background and downstream groups.

A separate ANOVA was run for each parameter and for each group of stations.

3.3.2 INTRA-GROUP RESULTS

The results are summarized in Table 3-2 for the intra-group station combinations evaluated. It should be noted that Table 3-2 is not intended to compare background stations to downstream stations, but rather reports on intra-group differences.

For the parameters of concern (DO, total coliform and fecal coliform), the downstream stations can be considered as a single population as there were no significant (at 99 percent level) differences observed. In addition, no difference was found among the downstream stations for TKN, BOD_5 and TSS. The results for the background stations were similar, although a strong difference was observed among the background stations for total coliform and fecal streptococci. Inspection of the detailed statistical summaries indicated that background Station 5 was significantly different from the other background stations for these two parameters. Station 5 is frequently visited by cattle and it is not surprising that this background station exhibited high bacterial counts.

Overall, the background stations are statistically very similar to one another and the downstream stations are essentially similar to one another. Each type can generally be considered as a group population and station

TABLE 3-2

INTRA-GROUP COMPARISONS WITH NO SIGNIFICANT DIFFERENCE AT 99 PERCENT

Parameter	Among Background Stations	(mean)	Among Downstream Stations	(mean)
DO	X[1]	(4.96 mg/l)	X	(5.83 mg/l)
TKN	X	(3.78 mg/l)	X	(3.04 mg/l)
BOD5	X	(6.11 mg/l)	X	(3.21 mg/l)
TSS	X	(41.6 mg/l)		
CHLORIDE	X	(23.1 mg/l)		
ALKALINITY	X	(12.5 mg/l)		
TOTAL COLIFORM(Ln)[2]			X	(8.27 /0.1L)
FECAL COLIFORM(Ln)	X	(5.91 /0.1L)	X	(6.85 /0.1L)
FECAL SREPTOCOCCI(Ln)			X	(5.31 /0.1L)

Notes:

(1) X = Not significantly different.
(2) (Ln) = Logarithmic transformed.

results combined to form one large population. Therefore, the background group population can be compared with a similar combination of the downstream group population to determine if the two populations are significantly different. The mean TKN concentration of all background stations (3.78 mg/l) can be compared with the mean TKN concentration of all downstream stations (3.04 mg/l) to determine if these two values are significantly different.

3.3.3 INTER-GROUP RESULTS

Background stations were compared as a group to the downstream stations for all parameters except ammonia which was measured only once. The results of the comparisons are given in Table 3-3.

The results indicate that during the flow conditions sampled, there are no significant differences (99 percent level) between the two groups for most of the parameters. Of particular importance is the fact that DO and the bacteriological values were statistically equivalent between the background and downstream groups. However, some parameters did differ significantly. Those parameters are listed in Table 3-4. No Class III violations were observed in the downstream group for the water quality parameters reported in Table 3-4.

Ammonia nitrogen (ammonia) values could not be compared statistically because ammonia was measured only once. Nevertheless, ammonia concentrations at downstream station 8 was high (9.8 mg/l) with respect to the other stations. It is unlikely that this relatively high concentration is associated with the stormwater pond or originated as base-flow through the western ditch stormwater underdrains. The concentration of ammonia in the stormwater pond was an order of magnitude lower than the value observed at Station 8 which eliminates the stormwater pond as the source. Even if the stormwater pond was the source of high ammonia values, a high percentage of the ammonia would be absorbed in the soil as the water passed through the underdrain system and a reduction in ammonia concentration at Station 8 would be expected.

TABLE 3-3

INTER-GROUP COMPARISONS WITH NO SIGNIFICANT DIFFERENCE AT 99 PERCENT

Parameter	Grand Mean	Background Mean	Downstream Mean	ANOVA(2) 'F' Statistic
DO	5.40	4.96	5.83	1.929
TKN	3.41	3.78	3.04	0.342
BOD5	4.66	6.11	3.21	2.495
TSS	26.61	41.61	11.61	1.456
FECAL COLIF.(Ln)(1)	6.38	5.91	6.85	1.497
TOTAL COLIF.(Ln)	7.81	7.35	8.27	4.53
FECAL STREPTOCCI(Ln)	4.98	4.65	5.31	2.160

(1) Logarithmic Transformation.

(2) $$'F' = \frac{\text{Mean Square}_{groups}}{\text{Mean Square}_{errors}} = \frac{\dfrac{\text{Sum Square}_{groups}}{\text{Degrees Freedom}_{groups}}}{\dfrac{\text{Sum Square}_{Total} - \text{Sum Square}_{groups}}{\text{Degrees Freedom}_{error}}}$$

DF_{error} - Degrees Freedom_{error} = Total Number Observations - Number of Stations

Note:

DF_{error} = (3 samplings * 10 stations) - (10 stations) = 20, except for fecal streptococci (DF_{error} = 10). Since two groups (background and downstream) are compared, critical values of 'F' are determined with degrees of freedom for the numerator = 1. At 99% $F_{(1,20)}$ = 8.10 and $F_{(1,10)}$ = 10.04. 'F' ratios in excess of there values indicate that a significant difference exists in comparison.

TABLE 3-4

INTER-GROUP COMPARISONS WITH A SIGNIFICANT DIFFERENCE AT 99 PERCENT

Parameter	Grand Mean	Background Mean	Downstream Mean	ANOVA[2] 'F' Statistic
TDS	185.3	134.2	236.3	118.6
CHLORIDE	34.9	23.1	46.7	60.9
pH	6.07	5.61	6.53	51.7
ALKALINITY	39.5	12.5	66.6	32.8
CONDUCTIVITY(Ln)	5.14	4.81	5.47	48.6

(1) Logarithmic Transformation.

(2) $$'F' = \frac{\text{Mean Square}_{groups}}{\text{Mean Square}_{errors}} = \frac{\dfrac{\text{Sum Square}_{groups}}{\text{Degrees Freedom}_{groups}}}{\dfrac{\text{Sum Square}_{Total} - \text{Sum Square}_{groups}}{\text{Degrees Freedom}_{error}}}$$

DF_{error} - Degrees Freedom_{error} = Total Number Observations - Number of Stations

Note:

DF_{error} = (3 samplings * 10 stations) - (10 stations) = 20, except for fecal streptococci (DF_{error} = 10). Since two groups (background and downstream) are compared, critical values of 'F' are determined with degrees of freedom for the numerator = 1. At 99% $F_{(1,20)} = 8.10$ and $F_{(1,10)} = 10.04$. 'F' ratios in excess of there values indicate that a significant difference exists in comparison.

3.4 STORMWATER POND COMPARISON

As mentioned previously, there were no stormwater discharges at the emergency overflow weirs during the three surface water sampling events. However, because the stormwater discharges have been reported in the past to have concentrations of some constituents which have exceeded water quality standards, a comparison was made between the water quality in the stormwater pond (Station 1) and the average of the background stations. The comparison is shown in Table 3-5.

The stormwater pond appears to be functioning as an effective treatment system. The stormwater pond samples do not exceed the Class III water quality standards. Mean dissolved oxygen in the stormwater pond (6.2 mg/l) was higher than in the background stations (5.0 mg/l). BOD in the stormwater pond was only 1.6 mg/l as compared to 6.1 mg/l in the background stations. Total suspended solids in the stormwater pond were only 8.0 mg/l as compared to 42.0 mg/l in the background stations.

The data in Table 3-5 indicate that stormwater from the Lena Road Landfill will not cause violations of Class III water standards under the climactic conditions of the sampling. Because the pond is effective in treating the stormwater, it is advisable to route all stormwater into the pond prior to discharge. For economics and convenience of monitoring, consideration should be given to consolidating existing weir structures into a single overflow point.

3.5 CONCLUSIONS

Under the flow conditions which existed during the three samplings, the downstream station values were not significantly different from the background stations for most parameters. To a large extent this is due to the water quality (low DO and pH and high bacteria counts) typical of the surrounding wetland systems and the extent of wetland usage by cattle. Of those parameters which were significantly different in the downstream stations, no Class III water quality violations could be directly attributable to the landfill.

TABLE 3-5

STORMWATER POND VERSUS BACKGROUND WATER QUALITY

Parameter	Mean Background	Mean Stormwater Pond
DO (mg/l)	4.96	6.2
TKN (mg/l)	3.78	2.1
TDS (mg/l)	134.2	410.7
BOD_5 (mg/l)	6.11	1.57
TSS (mg/l)	41.6	8.3
Chloride (mg/l)	23.1	131.6
Total ALK (mg/l) $CaCO_3$	12.5	180.7
pH	5.61	7.8
Conductivity (umhos/cm)	122.7	517.3
Total Coliform (per 100 ml)	1,556	2,100
Fecal Coliform (per 100 ml)	369	195
Fecal Strep (per 100 ml)	105	1,703

Despite the lack of any stormwater discharges during the three sampling events, an evaluation of water quality within the stormwater pond indicated no violations of Class III standards. During the sampling period, Lena Road Landfill stormwater was not a potential source of off-site Class III water quality violations. The stormwater quality was comparable to or better than background water quality for DO, BOD, TKN, TSS, and fecal coliforms.

EXHIBIT "C"

pending 3/11

MANATEE COUNTY GOVERNMENT

PLANNING, PERMITTING AND INSPECTIONS DEPARTMENT

M E M O R A N D U M

DATE: February 17, 1992

TO: Gus DiFonzo, Solid Waste Division Manager
Public Works Department

THRU: Richard Wilford, Director
Public Works Department

FROM: Carol Clarke, Acting Director
Panning, Permitting & Inspections Department

SUBJECT: **LENA ROAD LANDFILL**

Please be advised that a Special Exception (SE-262) was granted by the Board of County Commissioners on November 21, 1967 to allow a sanitary landfill in the Agricultural district on a 160 acre parcel described as the NE 1/4 of Section 1, Township 35, Range 18. Attached, for your records, is a copy of the minutes of the Board of County Commissioners meeting in which this Special Exception was approved.

If you have any questions please contact Norm Luppino of my staff at extension 6872.

CBC:BB:jk

cc: Norm Luppino, Principal Planner,
Central Files

File SE-262

NOVEMBER 21, 1967

The Board of County Commissioners of Manatee County, Florida, met in REGULAR SESSION in the Court House in Bradenton, Florida, Tuesday, November 28th, 1967 at 9:00 A. M.

Present were Commissioners Dan P. McClure, Chairman
Nathan J. Taylor, Vice Chairman
Kenneth D. Dierks
Richard P. Briggs
Deputy Clerk Bruce M. Cox
County Attorney Robert Boylston

The meeting was called to order by Chairman McClure.

MINUTES CORRECTED

Motion was made by Mr. Taylor that error of omission in the Minutes of August 15, 1967, be corrected by adding the words "be accepted" to the 2nd paragraph from the bottom of page 584, Minute Book No. 20. Motion was seconded by Mr. Briggs and carried.

Z O N I N G

SE-262 LENA ROAD SITE - SANITARY LANDFILL
160 acres located 1/2 mile south of SR 64 and 1/8 mile ease of Lena Road.

Dr. George Dame referred to the lengthy discussion at the Commissioners' meeting of November 14th after on-the-site inspection of the proposed Lena Road landfill location by a delegation of consultants from the Florida State Board of Health, at which time Mr. Ernest Philen, Engineer in charge of landfill programs, was not prepared to make a statement as to approval or disapproval of the site. Since that time he has conferred with others in the State Health Department and experts in Tallahassee and had advised by telephone that the State Health Department will approve the Lena Road landfill site with a few minor revisions of the operational plan submitted by Mr. Lawrence M. Rhodes.

These revisions would amount to changes in the size and shape of the pits, or cells, and will require 50 feet between the cells and drainage ditches rather than 20 feet, shown in the plan; also, he would like to dredge the creek, cypress strand, northward from the landfill location to highway 64.

It was suggested that if the Board should choose any part of this site that the entire 160 acres be approved as advertised with the understanding the operation would be restricted to the lower 20 acres; that during the two years of operation it will be possible to develop experience which will demonstrate that the remainder of the north 160 acres can be used as a sanitary landfill (including "buffer zone" noted in the operational plan).

Motion was made by Mr. Taylor that the Lena Road site be approved and accepted for a sanitary landfill. Motion was seconded by Mr. Dierks. Voting "Aye", Mr. Taylor, Mr. Dieks and Mr. McClure. Mr. Briggs voted "No". Motion carried.

(It was noted that this was a Special Exception and did not require four-fifths vote of the governing body to override the recommendation of the Planning Commission, which was to deny SE-262 in its entirety.)

EXHIBIT "D"

BEST AVAILABLE COPY

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

SOUTHWEST DISTRICT
4520 OAK FAIR BLVD.
TAMPA, FLORIDA 33610-7347
813-623-5561
Suncom—552-7612

BOB MARTINEZ
GOVERNOR
DALE TWACHTMANN
SECRETARY
DR. RICHARD D. GARRITY
DISTRICT MANAGER

PERMITTEE
Richard A. Wilford
Manatee County Public Utilities
6615 Cortez Road West
Bradenton, FL 33507

PERMIT/CERTIFICATION
GMS ID No: 4041C02025
Permit No: SO41-118353
Date of Issue: 12/14/87
Expiration Date 6/1/92
County: Manatee
Lat/Long: 27°28'
82°27'
Sec/Town/Rge: 6/35S/19E
Project: Lena Road Stage I, Class I Sanitary Landfill

This permit is issued under the provisions of Chapter 403, Florida Statutes, and Florida Administrative Code Rule(s) 17-3, 17-4 and 17-7. The above named permittee is hereby authorized to perform the work or operate the facility shown on the application and approved drawing(s), plans, and other documents, attached hereto or on file with department and made a part hereof and specifically described as follows:

To Operate: A Class I landfill of approximately 150 acres in Manatee County, Florida. The landfill includes a liner comprised of a clay slurry wall tied into the underlying confining clay unit, a leachate collection system, a stormwater management system, and a groundwater and surface water monitoring system.

In Accordance With: The application for an Operating Permit (DER Form 17-1.130(1)) submitted by Briley, Wild and Associates, Inc. on April 1, 1986 and addended information submitted on May 23, 1986.

Location: South of SR 64 on Lena Road, Section 6, Township 35S, Range 19E.

Subject To: Applicable rules of Florida Administrative Code Chapter 17-7, General Conditions 1-15, and Specific Conditions 1-17.

Replaces Permit No.: SC41-67529

RECEIVED DEC 17 1987 MANATEE COUNTY

RECEIVED DEC

Florida Department of Environmental Regulation

Southwest District • 4520 Oak Fair Boulevard • Tampa, Florida 33610-7347

813-623-5561

Lawton Chiles, Governor

Carol M. Browner, Secretary

JAN 1 7 1992

Mr. Richard A. Wilford
Manatee County Government
Public Works Department
Post Office Box 25010
Bradenton, FL 34206

Re: Modification of Conditions - Permit No. SC41-206084
Lena Road Landfill Stage II, Class I Landfill

Dear Mr. Wilford:

The Department hereby extends your permit as follows:

CONDITION	FROM	TO
Expiration Date	January 1, 1992	June 1, 1992

This permit modifies Permit No.: SC41-095658. This letter must be attached to your permit and becomes a part of that permit.

Please note that 60 days prior to June 1, 1992 (no later than April 1, 1992) this office must receive an application for a operational permit for this facility. The new fee required is $10,000 and will expire 5 years after the issue date.

Sincerely,

Richard D. Garrity, Ph.D.
Director of District Management
Southwest District

RDG/rjbb

cc: File - SC41-095658

1-31-92
STAGE I - $10,000
STAGE II - $10,000
TAGE III - $10,000
TIRE SITE - $ 100
$30,100 00

rec: Bob Butera/Tampa DER
Greg Yeluates/SWTC

Recycled Paper

[illegible]

Florida Department of Environmental Regulation
Southwest District • 4520 Oak Fair Boulevard • Tampa, Florida 33610-7347
Lawton Chiles, Governor 813-623-5561 FAX 813-272-2279 Carol M. Browner, Secretary

MAR 19 1991

Mr. Richard A. Wilford
Manatee County Public Works
4501 66th Street West
Bradenton, Florida 34210

Re: Modification of Conditions
Permit No. SO41-118353
Lena Road Stage I, Class I Sanitary Landfill
Manatee County

Dear Mr. Wilford:

We are in receipt of your request for a modification of the permit conditions. The conditions are changed as follows:

CONDITION	FROM	TO
Specific Condition #35.		New, see attached

This letter must be attached to your permit and becomes a part of that permit.

Sincerely,

Richard D. Garrity, Ph.D.
Deputy Assistant Secretary
Southwest District

RDG/egwb
Attachment

35. This permit modification replaces expired Permit Number SC41-095667 and is valid for the following activities at Stage III of the Lena Road Class I Landfill, in accordance with previously submitted and approved information:

- Site Maintenance (mowing, erosion control, etc.)
- Leachate Pumping and Maintenance
- Stormwater Management
- Groundwater Monitoring

In addition, Stage III of the Lena Road Class I Landfill shall comply with all the other conditions contained in this permit and is subject to all applicable requirements of Department rules. This modification does not authorize disposal activities in Stage III or other use of Stage III in the future, except as detailed herein. Proposals for future use of Stage III must be submitted to the Department for review and approval prior to beginning such use.

Gwen - 3-25-91
VIP Please file in DCR Perm. fs.
Please give Gray a copy
Dan

Florida De[...]ironmental Regulation

Southwest Dis[...]oulevard • Tampa, Florida 33610-734[...]

Lawton Chiles, Governor [...] 813-272-2279 Carol M. Browner, Secretary

March 22, 1991

Mr. Richard A. Wilford
Manatee County Public Works
4501 66th Street West
Bradenton, Florida 34210

Re: Certification of Stormwater System for Stage III, Lena Road Class I Landfill
Permit No.: SO41-118353, Manatee County

Dear Mr. Wilford:

On March 20, 1991, the Department of Environmental Regulation inspected the above-referenced stormwater system to ensure its development in accordance with the approved permit. Certification of Construction Completion was received on February 25, 1991.

Present at the March 20, 1991 inspection were Dan Gray, Greg Yekaitis, Mark Ventriglia, Bud Bell, Kim Ford, and Ernest Weeks. The Department determines that the stormwater system for Stage III of the Lena Road Class I Landfill is developed in accordance with the approved permit.

Sincerely,

Ernest G. Weeks

Ernest G. Weeks
Engineer I
Solid Waste Section
Division of Waste Management

EGW/ab

cc: H. Wayne Roberts, P.E., Manatee County
Dan Gray, Manatee County
Kim Ford, P.E., DER Tampa
Steve Morgan, DER Tampa

EXHIBIT "E"

WASTE TIRE STORAGE FACILITY OPERATION

Whole tires are accepted at the Lena Road Landfill Monday through Saturday from 8:00 AM to 5:00 PM. These tires are stored within the landfill's operating area. The area has easy access for fire department inspections and fire fighting operations. The processing (shredding) is performed every 120 days or less in the same general location as storage. Then processed tires are immediately utilized as either daily cover material for the landfill, road base material or are disposed of. Shredded waste tires are sold to licensed permitted tire recycling facilities. Marketing studies are being performed in-house as to available markets for both the County infra-structure and private consensus for asphaltic mixtures, fuel, recreational materials, etc.......

Closure plan schedule of Lena Road Waste Tire Storage-Processing facility is the same as the existing permitted landfill.

In order to address each point of the tire storage concerns outlined in the DER 1989 Waste Tire Rule 17-711.540 Manatee County's Statements are:

1. No indoor storage will occur.

2. a. There are no water bodies, wetlands, transitional wetlands or isolated wetlands within the 200 foot setback requirements. Stormwater and/or floodwaters are diverted from the area by means of a perimeter ditch.

   b. Waste Tire Storage Dimensions

      1. Width: 50 Feet
      2. Area: 2,500 Square Feet
      3. Height: 0 to 10 Feet

   c. Fire lanes for easy access are maintained at all times, as determined by local fire inspectors.

   d. Routine mosquito control measures are implemented.

e. All applicable rules, hours and tipping costs are posted and provided to each customer utilizing the landfill for waste tire processing.

f. Air Curtain Incinerator operations are 1120± feet from proposed waste tire piles. There are no other fires within the confines of the landfill.

g. All roads to and surrounding waste tire storage and processing areas are shelled and maintained at all times. Passability will be strictly maintained.

h. Landfill site access is maintained through security gates and fences.

i. Staff is used to direct and maintain waste tire operations.

j. The storage and processing areas shall be sufficiently bermed to prevent runoff.

k. Fire protection services are provided by the Braden River Fire Department. Contact can be made with them by telephone. A letter concerning the fire safety survey is attached.

l. Appropriate communication equipment is readily available at the landfill site.

m. Maintenance of the storage and processing areas are continual. All potentially flammable underbrush and vegetation has been removed.

n. Emergency procedure manual has been developed and includes at a minimum:

    1. Names and numbers of after hours contacts

    2. Fire Department numbers and procedures, emergency response equipment, and fire hydrant on site locations.
    3. Fire response procedures, including DER notification, etc........

o. All emergencies are promptly reported to the DER and written follow-ups are provided within the required time frames.

p. All appropriate waste summaries are kept at the Landfill site.

3. Storage and process procedures are the same as above.

4. Permitted Landfill - Not Applicable

5. All residuals from waste tire processing are disposed of as described above.

6. Not applicable at this time.

EXHIBIT "F"

BRADEN RIVER
FIRE CONTROL and RESCUE DISTRICT

October 17, 1989

Mr. Dan Gray
Solid Waste Superintendent
Manatee County Public Works
4501 66 Street West
Caller Service 25010
Bradenton, FL 34210

Dear Mr. Gray

I conducted a site inspection of your stock pile of tires at the Manatee County Landfill at Lena Road on October 13. I observed that there were no sources of ignition within 500 feet of the stock pile and no other exposures within in the same area. It is my professional opinion that there is no fire hazard present at this time where the stock pile is currently located.

C. L. Whitehurst III

Captain C. L. Whitehurst III
Operations and Training Officer

cc: Chief/Fire Marshal Sheffield

EXHIBIT "G"

Compilation of Hydrogeological and Groundwater Data for Lena Road Landfill Stage III Area

Ardaman & Associates, Inc.

OFFICES

Orlando, 8008 S. Orange Avenue, P.O. Box 13003, Orlando, Florida 32809, Phone (305) 855-3860
Bartow, 1987 S. Holland Parkway, Bartow, Florida 33830, Phone (813) 533-0858
Bradenton, 209 A 6th Avenue East, P.O. Box 1335, Bradenton, Florida 33508, Phone (813) 748-3971
Cocoa, 1300 N. Cocoa Blvd., P.O. Box 3557, Cocoa, Florida 32922, Phone (305) 632-2503
Fort Myers, 2508 Rockfill Road, Fort Myers, Florida 33901, Phone (813)337-1288
Miami, 7476—7478 N.W. 8th Street, Miami, Florida 33126, Phone (305) 261-1682
Panama City Beach, 8801 C West Alternate Highway 98, Panama City Beach, Florida 32407, Phone (904) 234-7822
Riviera Beach, 6440 Garden Road, P.O. Box 10268, Riviera Beach, Florida 33404, Phone 842-7433
Sarasota, 2500 Bee Ridge Road, P.O. Box 15008, Sarasota, Florida 33579, Phone (813) 922-3526
Tallahassee, 3175 West Tharpe Street, Tallahassee, Florida 32303, Phone (904) 576-6131

Ardaman & Associates, Inc.

Consultants in Soils, Hydrogeology,
Foundations and Materials Testing

August 29, 1985
File Number 82-7047

Briley, Wild & Associates, Inc.
1042 U.S. Highway 1, North
Ormond Beach, FL 32074

Attention: Mr. John Cumming

Subject: Compilation of Hydrogeological and Groundwater Data for Lena Road Landfill - Stage III Area

Gentlemen:

As requested, we have prepared five copies each of the following hydrogeological data and interpretive reports for the Lena Road Landfill - Stage III area (i.e., Gun Club Landfill):

- Groundwater Monitoring Plan for the Gun Club Landfill, Manatee County, Florida; June 25, 1984.

  This report is the original groundwater monitoring plan report for the Gun Club landfill site. In addition to the 44 Lena Road landfill borings, seven additional borings north and south of the Gun Club site document the integrity of the confining beds. A terrain conductivity survey around the Gun Club landfill also was presented in this report. Four surficial aquifer wells were proposed for the monitoring plan.

- Geotechnical Exploration at the Gun Club Landfill, Manatee County, Florida; July 12, 1984.

  This geotechnical design report supplements the June 25, 1984 document by providing data from 8 additional borings and 5 permeability test results for the site. The top of the confining bed was encountered between 9 and 22.5 feet below the surface. The vertical permeabilities of these layers ranged from 4.9×10^{-7} to 4.9×10^{-8} cm/sec. In addition, the recommended leachate containment and collection systems for the Stage III area were presented. A combination of a slurry wall/drain system and a dual ditch system were proposed for the leachate containment/collection system.

- Responses to FDER Letter of Incompleteness, Gun Club Groundwater Monitoring Plan; September 19, 1984.

  The letter report primarily deals with location and number of wells for the Gun Club landfill monitoring program. Water quality data collected from MW-1, MW-3, MW-7, MW-8, CW-1, CW-4 and CW-5 for the period

January 1983 through April 9, 1984 are summarized in this report. Our monitoring philosophy as pertains to the priority pollutant analyses at well(s) is also presented in this report.

- <u>Stage III Lena Road Landfill Design Report; November 1984.</u>

  This engineering report was prepared for FDER and Manatee County by Briley, Wild & Associates, Inc. for subject project.

- <u>Proposal for Additional Deep Monitor Wells at the Lena Road and Gun Club Landfill Sites; December 31, 1984.</u>

  This letter proposal outlines the additional "deep" monitor wells required by FDER to prove that the existing landfills are not the source of contaminants alleged to be entering a private domestic well in the vicinity of the landfill. Four monitoring wells are part of this program. Monitor well SA-1 is north of the Stage I area. Monitoring wells SA-2 and SA-3 are north of the Stage III area and monitoring well SA-4 is west of the Stage III area.

- <u>Letter to FDER showing proposed locations for Intermediate Depth Monitor Wells; January 8, 1985.</u>

  This letter provides FDER the proposed monitoring program as outlined in the December 31, 1984 proposal.

- <u>Letter to Ardaman & Associates, Inc. from FDER on Intermediate Monitor Wells; January 30, 1985.</u>

  This letter states that FDER approves the locations of the intermediate monitor wells.

- <u>Seal Procedures for Intermediate Depth Monitor Wells; February 1, 1985.</u>

  This letter was provided FDER on field procedures to seal intermediate depth monitor wells.

- <u>Response to FDER Questions, Construction Permit Application, Lena Road Landfill, Stage III, Manatee County, Florida; May 8, 1985.</u>

  This letter report discusses Ardaman responses to FDER questions primarily on the slurry wall, the intermediate depth monitoring wells, and the analytical monitoring program for the well monitoring. The letter report references the project design report and project manual for more information on the technical specifications and quality control testing for the construction of the slurry wall. The November 1984 design report is provided herein. Three intermediate depth wells and 7 surficial aquifer wells were proposed as the monitoring wells for the Gun Club Landfill. MW-1 was more acceptable than CW-2 well as the background well. Analyses for metals should be on filtered not unfiltered samples. If unfiltered samples are taken turbidity values should always be taken. The analytical parameter list was discussed.

This document hopefully will serve your present needs as a compilation of groundwater and geotechnical elements of the project. If you need any further assistance, please contact the undersigned.

Very truly yours,
ARDAMAN & ASSOCIATES, INC.

Herbert G. Stangland

Herbert G. Stangland, Jr., P.E.
Senior Water Resources Engineer
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John E. Garlanger

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Principal

HGS:ed

Enclosures

Groundwater Monitoring Plan

Gun Club Landfill

Manatee County, Florida

Ardaman & Associates, Inc.

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Ardaman & Associates, Inc.

Consultants in Soils, Hydrogeology,
Foundations and Materials Testing

June 25, 1984
File Number 84-058

Manatee County
Department of Transportation
Landfill Division
226 6th Avenue East
Bradenton, Florida 33508

Attention: Mr. Rock Payne

Subject: Groundwater Monitoring Plan for the Gun Club Landfill, Manatee County, Florida

Gentlemen:

As requested and authorized by Mr. Rock Payne, we are pleased to present the results of our hydrogeological survey and Groundwater Monitoring Plan for the subject site. The Groundwater Monitoring Plan was developed as per Florida Department of Environmental Regulation guidelines after a review of available literature and other site specific data.

This report has been prepared for the exclusive use of Manatee County for specific application to the subject facility in accordance with generally accepted hydrogeological engineering practice. No other warranty, expressed or implied, is made. It has been a pleasure assisting you on this project. Please do not hesitate to contact us when we can be of further assistance.

Very truly yours,
ARDAMAN & ASSOCIATES, INC.

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SITE LOCATION AND TOPOGRAPHIC SETTING

The Gun Club site is a closed landfill located in Section 1, Township 35 South, Range 18 East, Manatee County, Florida. The site, as shown in Figure 1, is bounded on the north by Lena Road and on the east by the Lena Road Landfill. Cypress Strand borders the west side of the landfilled area and a ditch which flows into Cypress Strand is found along the south side. Figure 2 is a copy of an October 1980 aerial photo of the site provided by Manatee County.

The Gun Club site consists of approximately 80 acres and was in use between 1968 and 1973. It accepted municipal solid waste from franchise contractors. The solid waste was placed below ground in trenches and covered with on-site sandy materials. Manatee County retains ownership of the site as well as the property to the south of the site. Adjacent property north and west of the site is owned by C. T. Adams. Approximately 300 feet of the eastern side of the property is now part of a dedicated right of way.

The landfill site lies within the Terraced Coastal lowlands, a subdivision of the Coastal Plain Province. The topography is largely controlled by a series of marine terraces formed during Pleistocene time, when the sea stood above its present level. This rise and fall of sea level is attributed to the advance and retreat of the continental ice sheets. When the sea was relatively stationary for long periods, shorelines and marine terraces were developed. The site lies on the Talbot Terrace as indicated by Peek (1958). Elevations on this terrace range between 25 and 42 feet NGVD while "natural" elevations on site average 30 feet NGVD.

GEOLOGY

The United States Department of Agriculture, Soil Conservation Service, Soil Survey of Manatee County, Florida (1958), indicates that the predominant natural surficial soil, excluding areas of shallow ponds, is Leon-Immokalee fine sands, nearly level phase. Surface drainage is classified as slow to very slow and internal drainage as very slow. Leon-Immokalee fine sands are clean sands with a shallow hardpan layer.

The geologic sequence in ascending order from Eocene to Holocene age includes: Eocene age Avon Park Limestone and Ocala Group limestones, Oligocene age Suwannee Limestone, Miocene age Tampa Formation and Hawthorn Formation, Pliocene age Bone Valley Formation and surficial soils of Pleistocene and Holocene ages.

Pleistocene and younger deposits range from 10 to 15 feet thick on-site. These deposits consist of gray and light brown fine sands and slightly silty to silty fine sands.

Ardaman (1983) and Ardaman (1982) present results from shallow borings taken around the perimeter of the site. The 1983 report deals with the adjacent Lena Road Landfill. In this report three Standard Penetration Tests (SPT) borings 15 to 20 feet deep were performed along the east side of the Gun Club site. In the

Ardaman 1982 report SPT borings 15 to 20 feet deep were performed south of the Gun Club site. In the Ardaman 1983 report 50-foot deep SPT borings were performed 1000 to 1500 feet north and south of the Gun Club site, respectively. In the Ardaman 1982 report a 30-foot deep SPT boring is along the south boundary of the site and four other SPT borings are 60 to 180 feet south of the south boundary of the site. These data were utilized in the following paragraphs to describe the geology of the site.

The Bone Valley and Hawthorn Formations underlie the Pleistocene and younger sediments. These deposits, as encountered in our borings at the adjacent Lena Road Landfill, generally consist of gray and green clayey sand and sandy clay with traces of phosphate, gray silt and coarse to medium sand and phosphate. Our test borings did not encounter the bottom of these deposits. Scott, et al., 1981 report that the top of the Hawthorn Formation is about 0 feet NGVD at the site. Scott et al., 1981 report a thickness of the Hawthorn at the site of about 300 feet.

Scott, et al., 1981 report that the top of the Tampa Limestone is 300 feet below sea level or approximately 335 feet below land surface. The Tampa Formation of Miocene Age is between 125 and 235 feet thick according to Peek (1958). The Tampa Limestone according to Scott, et al., 1981, is the first nonphosphatic (less than one percent phosphorus), light colored limestone. Quartz sand is common within these carbonates and clay seams are also present. In the study area, this Formation yields large quantities of water and its top is considered the top of the Floridan Aquifer.

The Oligocene (Suwannee Formation) and Eocene age limestones beneath the Tampa Formation have a total thickness of between 2,600 and 2,800 feet at the site. The upper 1,000 feet of these limestones is the Floridan Aquifer (Peek, 1958). The upper part of the Suwannee is generally creamy-white to tan soft to hard granular porous limestone, with some crystalline and dolomitic limestone. Peek, 1958, reports that the top of the Suwannee Formation is 450 feet below sea level or almost 500 feet below land surface.

HYDROGEOLOGY

Aquifers and Confining Beds

The surficial, secondary artesian, and Floridan aquifers are the aquifer systems in this area.

A surficial unconfined aquifer system is found in the beds of sand and slightly silty to silty sand found on site at depths between the surface and 10 to 15 feet. This zone is recharged directly by local rainfall. Water levels encountered in this system for the most part range between 2.5-4.0 feet below ground surface. These levels can fluctuate widely with variations in rainfall and evapotranspiration. Localized drawdown of the water table can be seen near the approximately 10-foot deep ditch located on the east and south sides of the site. Movement of the shallow groundwater is very limited due to the lack of topographic relief but some radial movement away from the landfill occurs. Vertical movement of water downward is restricted due to the presence of clays and clayey sands found at depths of 10 to 15 feet. In fact, recharge through the confining beds to the Floridan Aquifer has been estimated at less than 2 inches/year by Stewart (1980). Wells for domestic supply are from the deeper artesian aquifers and not from this surficial aquifer.

The horizontal permeability of the permeable layers within the surficial aquifer ranges from 0.1 to 13.3 feet per day based on falling head tests performed at the Lena Road Landfill site (Ardaman 1983) and the parcel south of the site (Ardaman 1982). The porosity is estimated at 25 to 45 percent.

The vertical permeability of the first clay layer at the bottom of the surficial aquifer was documented by Ardaman (1983) to range from $6x10^{-8}$ to $5.9x10^{-9}$ cm/sec ($2x10^{-3}$ to $2x10^{-4}$ feet per day).

At a depth of approximately 335 feet below land surface is found the Tampa Formation which is recognized as the top of the Floridan Aquifer. Probably most of the water in the Floridan in the area comes from rainfall that infiltrates into the aquifer in the recharge area of Polk County. The most used zones for wells in the area are in the Tampa and Oligocene age Suwannee Limestone although the deeper formations may yield large quantities of water; however, the concentrations of total dissolved solids increase with depth.

The Hawthorn Formation, beneath surficial sands and overlying the Tampa Limestone consists predominantly of clay and marl, which serves as a confining bed for the water in the Floridan Aquifer. Thin beds of sand, shell and limestone within the Formation, which are generally separated by relatively thick beds of clay, are the source of many domestic and small irrigation supplies. These thin pervious beds comprise the secondary aquifer. Seaburn and Robertson (1980) report that the top of the first dolostone unit in the Hawthorn Formation is approximately 100 feet below mean sea level, several miles west of the landfill.

Data from a Southwest Florida Water Management District (SWFWMD) observation well near Verna, 11 miles southeast of the site, shows the potentiometric surface to range between a May low of 31.4 feet NGVD (average for the period of record) and a September high of 41.1 feet NGVD (average for the period of record). Coupled with an average water-table elevation of 34 feet NGVD at the site, head differences between the surficial and Floridan aquifers can range between 2.6 feet downwards and 7.1 feet upwards. These data indicate that the potential exists for Floridan Aquifer waters to move upwards toward the surficial aquifer during the rainy season and to move downward toward the Floridan Aquifer during the dry season.

The direction of groundwater movement in the artesian aquifers is east to west. According to the SWFWMD potentiometric surface map of the Floridan Aquifer for May 1982 the surface was 6 feet NGVD and the hydraulic gradient flat. During September 1981 the surface was approximately 18 feet NGVD with a hydraulic gradient of one foot per mile toward the west. During extremely low water level conditions the potentiometric surface probably will be below sea level with a hydraulic gradient to the northeast as evidenced by the May 1982 potentiometric surface map.

Peek (1958) conducted a pumping test at a Floridan Aquifer well located five miles east of Terra Ceia and approximately 10 miles northwest of the landfill. His calculations indicated a transmissivity of 100,000 gallons/day/foot and a storage coefficient of 0.00014 in the Floridan Aquifer.

Sinkhole Potential

There are three distinct types of sinkholes which have developed in Florida. The first type is the classical collapse sink, which is generally steep-sided and rocky. It occurs when a cavity can no longer support the weight of the overlying soil and rock. This type of sink generally occurs when the limestone is at or near the surface and solution weathering is still very active. It is unlikely that cavities in ancient rocks at great depth below the surface, which have undergone much more intensive solution weathering in the past, are large enough to cause a deep-seated roof collapse. Any cavity which is large enough to have caused a roof collapse which have done so when it was closer to the surface and the beam action or arching effects of the overlying formation was not as great as it is today.

The second type of sink, which is more common though not as dramatic as the collapse sink, is called a doline or solution sink. There is no physical disturbance of the soluble rock beneath a doline. Subsidence of the overlying soil occurs due to gradual lowering of the rock surface and/or the gradual dissolution or leaching of calcium carbonate from the calcareous soil and rock which exists between the ground surface and the underlying aquifers. (The Florida Geological Survey estimates that this type of subsidence occurs at the rate of one foot every five to six thousand years.) Because the water flows radially to the intersection of vertical joints where the water enters the rock mass, the surface expression of the rock lowering or the leaching of the soluble soil constituents is a shallow depression located over the intersection of the joints. In some cases, the surface depression has the same shape as the original calcareous deposit, as in the case of a shell bed which has dissolved or partially dissolved since deposition.

The third type of sinkhole and probably the most common type of sink occurring in Florida is the erosion sink. Erosion sinks most frequently occur in an environment with the following characteristics:

- Limestones overlain by relatively pervious unconsolidated sediments; e.g., sandy soils.
- Cavity systems present in the limestone.
- A water table higher than the potentiometric surface in the underlying limestone.
- A breach of the limestone into the cavernous zone creating a point of high recharge to the artesian aquifer.

Under these circumstances water moving down into the limestone may take large amounts of sediment into the cavernous system creating a void in the overlying sediment. When the void in the overlying sediment reaches the size where the roof is no longer stable, the overburden suddenly collapses. In many cases the overburden is visible after the collapse, but some sinks of this type have occurred in which even the collapsed overburden disappeared into the cavity system. In other cases the sudden subsidence of the ground surface is only six inches to one foot deep.

Because solutioning is most active along fractures in the limestone, it is desirable when studying the sinkhole potential of a site to ascertain the location of these features. The intersection of two joints is of particular interest. When the limestone surface is buried under overlying sediment, it is not possible to directly map these features. However, they can be inferred from linear surface expressions, e.g., stream segments, alignment of ponded depressions, alignment of similar vegetation and topography, variations in photographic tones, etc.

The region in the vicinity of the site was examined for linear features utilizing the U.S. Geological Survey topographic maps of the area.

For this analysis, stream courses, aligned ponds, and alignments in topography were the most common features utilized as expressions of linear features. These linear features were grouped as first through third order features. Distinguishing aspects of these features were as follows:

First-order features:	major drainage features (I lineaments)
Second-order features:	major tributary features (II lineaments)
Third-order features:	aligned ponds or variations in photographic tones (III lineaments)

Figure 4 presents a lineament map of the area surrounding the site. Several lineaments are evident trending generally northeast-southwest and northwest-southeast.

The presence of linear surface features is only one of the factors which must be considered in determining the potential for sinkhole activity. Some other factors include thickness of clay beds above the limestone layers, relationship between elevations of water table and potentiometric surface in artesian aquifers, groundwater pumping, etc.

The downward recharge of groundwater, which is responsible for the erosion of overburden into the limestone cavities, cannot be significant in this area due to the relatively minor difference in water levels between the surficial aquifer and the artesian Floridan aquifer. It should also be noted that the clayey and partially indurated soils within the Hawthorn Formation are relatively impervious, thick, consolidated sediments which are resistant to erosion.

The sinkhole classification of the region presented by the Florida Geological Survey, as shown in Figure 5, suggests the site lies within the area of least probable sinkhole development. In fact, data collected from the Department of Transportation, the Southwest Florida Water Management District and previous Ardaman & Associates, Inc. studies have shown no reports of sinkholes in Manatee County.

In summary, the geologic, hydrologic and geotechnical evidence available to date suggests that the type of conditions favorable for the development of sinkhole formations does not exist in the vicinity of this site. Although cavernous limestone may be present, it is very deep and is overlain by thick deposits of relatively impermeable sediments. Furthermore, no evidence of sinkholes has been observed or recorded in the area of this investigation, nor do any of the aerial photographs indicate recent sinkhole activity. There is a very low probability for sinkhole development in this area.

Well Inventory

A well inventory was obtained from the files of the Manatee County Health Department for wells permitted between 1965 and May 1983. Table 1 summarizes the known characteristics of the inventoried wells within a 1- to 2-mile radius of the site. The data in the Health Department records generally do not locate each well more precisely than by section number. All homes along State Road 64 are connected to the county water system. Table 2 summarizes the well inventory information for the monitor wells at the adjacent Lena Road Landfill.

Surface Water Quality Measurements

Two surface water samples were obtained in Cypress Strand during the April 10, 1984 field survey. One sample was taken upstream of the landfill and one downstream to detect any quality changes resulting from possible leachate flow into the surface water body. An additional sample was collected from the ditch located on the southern side of the site. Data from the samples is presented in Table 3. Locations of the sampling points are shown on Figure 2. The results seem to indicate influence from a landfill. The data are not conclusive whether the source of the above background water is from the Lena Road or Gun Club sites or both.

Terrain Conductivity Survey

A geophysical exploration consisting of a terrain electromagnetic (EM) conductivity survey was made around the landfill on April 10, 12 and 20, 1984. The purpose of the survey was to document areas of possible surficial aquifer contamination and thereby assist in the placement of monitor wells within or beyond any contaminate plume. The following brief description summarizes the EM method.

The EM method provides a means for shallow subsurface exploration by means of electrical measurements taken at the ground surface. A transmitter coil is energized with an alternating current and a receiver coil is located a short distance away. The time-varying magnetic field arising from the alternating current in the transmitter coil induces very small currents in the earth. These currents generate a secondary magnetic field which is sensed, together with the primary field, by the receiver coil. The ratio of the secondary to the primary magnetic field is proportional to the terrain conductivity. The depth of investigation is determined by the spacing between the coils and the dipole orientation.

In general, the ground conductivity is electrolytic and takes place through the moisture-filled pores and passages in the soil-water-rock matrix. The conductivity is influenced by the following factors:

- soil porosity
- moisture content
- water quality
- temperature and phase state of the porewater
- amount and composition of colloids

The EM survey was conducted using Geonics EM 34-3 equipment. A coil spacing of 10 meters (33 feet) was used. Measurements at each data point were made with both horizontal and vertical dipole orientations, which produce maximum effective exploration depths of approximately 25 and 50 feet, respectively. The survey consisted of eight traverses located around the site perimeter and twelve spot readings. Figures 6 and 7 show the results from the survey.

The terrain conductivity readings ranged from lows of about 20 millimhos/meter (mmhos/m)(horizontal dipole) and about 30 mmhos/m (vertical dipole) to highs of 98 mmhos/m (horizontal dipole) and 100 mmhos/m (vertical dipole). Refuse is reported to be below land surface up to and in places beneath Lena Road. A reading of 150 mmhos/m was also noted south of Lena Road north of the Gun Club site and is judged to reflect cultural interference such as a metal pipe. The conductivity value of 80 mmhos/m (vertical dipole) noted on Traverse C may represent cultural interference because of the rapid drop in conductivity 66 feet to the north.

Only one traverse was made east of the landfill due to the presence of heavy vegetation. Conductivity values adjacent to the landfill indicate near background conditions while Traverse D shows a slight increasing trend toward the east.

South of the site, both dipoles detected an area of high terrain conductivity extending off the property. This area is defined by Traverses E and F which are located south of the drainage ditch which parallels the south property line. Maximum terrain conductivities in this area were 58 mmhos/m with the horizontal dipoles and 100 mmhos/m using the vertical dipoles. Both dipoles show the plume to decrease in conductivity toward a point roughly 350 to 400 feet south of the property line at which point the conductivity starts to increase. The reason for this increase could be related to changes in the soil texture or shallower depth to clays in the profile.

Two areas of high terrain conductivity appear to extend to Cypress Strand on the west side of the landfill. Maximum values in this area were 53 mmhos/m and 62 mmhos/m with the vertical dipoles and 38 mmhos/m and 82 mmhos/m using the horizontal dipoles. The more northern of the two areas exhibits the lower conductivities while the southern area is considerably higher. The relative magnitude in conductivity between the two plumes may be related to the time since emplacement of the fill or distance traveled from the cells. Traverse H was the only traverse run in this area due to the thick vegetation along Cypress Strand.

In summary, the terrain conductivity survey indicates areas of high terrain conductivity extending away from the landfill in all directions. Two areas of high values, one north and one south appear to extend beyond the property line. The other two areas may extend to Cypress Strand within the property boundary. None of the data indicate necessarily that the groundwater quality at the property boundary exceeds MCL concentrations.

PROPOSED GROUNDWATER MONITORING PLAN

The following groundwater monitoring plan shows the location of an unaffected natural background well, the downgradient wells, construction details of the monitor wells, and water sampling and chemical analysis protocol.

Well Locations

The proposed monitor well locations for the subject site are shown in Figure 8.

Surficial Aquifer Wells

Two new surficial aquifer monitor wells (GC-2, and GC-3) and three existing surficial aquifer monitoring wells (CW-2, GC-1, and CW-3) are proposed for the subject site. Well CW-2 is currently installed and monitored as the background well for the Lena Road Landfill. This well will also serve as the unaffected background well for the Gun Club site. It is located approximately 800 feet south of the Gun Club site. CW-3 is installed along the eastern boundary of the Gun Club site and is currently being monitored as part of the Lena Road Landfill monitoring program. GC-1 is located between the landfill and Cypress Strand on the west side of the Gun Club Landfill and was installed by FDER. GC-2 is located at the property boundary north of the landfill and GC-3 is located on the north side of the east-west ditch which runs along the southern boundary of the Gun Club site. Placement of the two new wells are based on the location of areas of high terrain conductivity detected during the EM survey. The selected sites are in areas when the terrain conductivity values were highest.

Secondary Artesian Aquifer Monitor Well

No wells in the secondary artesian aquifer are proposed to be monitored based on the wide areal extent and thickness of the confining beds at the site. In addition, the secondary artesian scale house well located at the northeast corner of the site is monitored as part of the Lena Road Landfill groundwater monitoring program.

Well Construction

The surficial aquifer wells will be constructed in the following manner after being permitted by the Manatee County Health Department. A Standard Penetration Test (SPT) boring will be drilled at each site in accordance with ASTM D-1586. Continuous soil sampling will be performed to a depth of 10 feet and at 5 foot intervals thereafter. These data will aid in locating the collection zone for the wells. After installation, the wells will be developed and an in situ permeability test performed.

A schematic of the surficial aquifer monitor well construction is presented in Figure 9. The 2-inch diameter wells would be fully screened below the water table and be installed by advancing a 4-inch hole to the final well depth, inserting a length of 2-inch diameter No. 8 slotted PVC pipe connected to a 2-inch diameter schedule 40 PVC riser, backfilling the annular space with silica sand to above the screen, installing a 6-inch tamped bentonite seal above the collection zone and backfilling with a bentonite/cement grout to land surface. The monitor wells will be protected by lockable vented caps. The length of the collection zone for the surficial aquifer well is expected to range from the full to 3/4 the thickness of the aquifer. Based on our knowledge of the area geology, the maximum depth of the wells will be between 10 and 20 feet.

The following pertinent hydrogeological data will be documented for each monitor well:

- Well identification
- Latitude/longitude of well
- Aquifer monitored
- Casing diameter
- Casing type and length
- Elevation at top of pipe
- Elevation at land surface
- Elevation of top and bottom of collection zone
- Total depth of well
- Screen type and slot size
- Lithologic description of the screened zone
- Permeability of screened zone
- Direction of groundwater flow in screened zone
- Manatee County well construction permit number

Sampling Protocol

Each well would be sampled quarterly. Grab samples would be taken using a peristaltic pump, submersible pump or bailer. The procedures for sampling are summarized as follows:

- Transport the sample bottles and preservatives to the site as provided by the water analysis laboratory.

- Rinse, with distilled water, the tubing or sampling device to be used for sample collection to avoid cross contamination.

- Measure in situ water level to the nearest .01 foot from the top of the casing. Purge the well of a minimum of three casing volumes prior to sampling. (A casing volume is determined by subtracting the water table depth from the depth of the well then calculating the volume within that length of casing.) Record water temperature, pH and electrical conductivity of the pumped water at the start of pumping and every 5 minutes thereafter. Guidelines for obtaining water level measurements are provided in Table 4.

- Withdraw water sample and place into proper container once measurement values from three consecutive readings are constant. Laboratory instructions (e.g., type of bottle, quantity of sample, and preservative) must be followed carefully and thoroughly. Record types of materials that the water sample contacted during collection (e.g., teflon, pvc, steel).

- Label sample bottle with well identification(s), final temperature, pH, conductivity, date and sampler's initials.

- Ice samples down and prepare for transportatiion to water analysis laboratory.

- Complete field note-taking as per water sample log sheet shown in Table 5. Document the pump operating time prior to collection of sample plus pumping rate at well in gallons per minute. Alternatively, document the casing volumes evacuated from the well prior to sampling.

- Transmit collected samples to water analysis laboratory within 24 hours of sampling. The chain of custody form to be used is shown in Table 6.

Sample collection, preparation and testing procedures will adhere to the applicable procedures set forth by the Florida Department of Environmental Regulation.

Groundwater Monitoring Parameters

The following recommended suite of chemical parameters to be analyzed for are based on the results of the monitoring at the adjacent Lena Road Landfill.

Field Determinations

- Water Level
- Temperature
- pH
- Specific conductance

Laboratory Determinations

- Bicarbonate
- Chloride
- Iron
- Total Dissolved Solids
- Total Kjeldahl Nitrogen
- Total Organic Carbon

The above physical and chemical analyses will be documented four times a year by Manatee County personnel. Based on the results of the monitoring at Lena Road, metal analyses should be performed on field-filtered samples. If the results of the initial sampling indicate the presence of leachate in any of the monitoring wells, then these wells will be resampled and the water analyzed for Volatile Organic Compounds (VOC) and chromium. If VOCs or chromium are not detected in the water samples from these wells, additional VOC or chromium analyses will be performed annually on the waters from these wells until the indicator parameters indicate concentrations of leachate lower than determined in the initial sampling.

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WELL INVENTORY FOR GUN CLUB LANDFILL

No.	Section Location	Name Address	Use	Total Depth	Casing Depth	Casing Diameter
1	S25, T34S, R18E*	Roland Pompey 1918 1st Ave. E.	Domestic	100'	42'	3"
2	S25, T34S, R18E	Tom Emmer Rubonia	-	-	-	4"
3	S25, T34S, R18E	Tom Emmer Rubonia	-	-	-	4"
4	S25, T34S, R18E	Harvey Brock 1833 8th Ave. E.	Irrigation	-	32'	3"
5	S25, T34S, R18E	Leon Esechenko Magnolia Manor	-	90'	37'	3"
6	S25, T34S, R18E	H.B. Brower Lena Road	Household	100'	30'	4"
7	S36, T34S, R18E	Frank Castoral Lena Road	Livestock	365'	42' 63'	4" 3"
8	S36, T34S, R18E	Howard Brower Brower Drive off Lena Road	Domestic	105'	51'	4"
9	S36, T34S, R18E	Hardie		450'	76'	4"
10	S36, T34S, R18E	Schmitt Rt.#64 Lorain Road	-	175'	89'	-

*Section 25, Township 34 South, Range 18 East
Source: Manatee County Health Department Well Records 1965 to May 1983

WELL INVENTOR OR GUN CLUB LANDFILL

No.	Section Location	Name Address	Use	Total Depth	Casing Depth	Casing Diameter
11	S36, T34S, R18E	Schaeffer Lena Road near Brower Drive	Domestic	202'	40'	4"
12	S1, T35S, R18E	Lehman Interprises 9800 Blk. of Cortez Road	Irrigation	100'	80'	4"
13	S1, T35S, R18E	Wiley Jackson P.O. Box 1316	Abandoned	-	-	-
14	S1, T35S, R18E	John Stephens 41st Street E.	Household	175'	84'	3"
15	S1, T35S, R18E	Jim Gay Braden River Ranchetts	Household	150'	50'	-
16	S1, T35S, R18E	MarNav Builders Braden River Ranchetts	Household	160'	42'	3"
17	S1, T35S, R18E	Kenneth M. Watts Lena Road	Water Horses	95'	35'	3"
18	S1, T35S, R18E	I.I. Redins Braden River Ranchetts	-	158'	52'	3"
19	S1, T35S, R18E	Bernard Mitchell 2808 41st Avenue E.	-	167'	37'	3"
20	S1, T35S, R18E	John Sanville	Cattle Watering	126'	50'	3"
21	S1, T35S, R18E	C.T. Adams 2508 Lena Road	Household	239'	84'	3"

WELL INVENTORY ... GUN CLUB LANDFILL (cont'd)

No.	Section Location	Name Address	Use	Total Depth	Casing Depth	Casing Diameter
22	S1, T35S, R18E	Luther Willis Braden River Ranchetts	Household	140'	62'	3"
23	S1, T35S, R18E	Pete Griffin Braden River Ranchetts	-	135'	44'	3"
24	S12, T35S, R18E	Ray Redell 5007 Coral Blvd.	Domestic Irrigation	-	63'	3"
25	S29, T34S, R19E	Tom & Evelyn Charies Hwy. 64	Irrigation	638'	85'	8"
26	S29, T34S, R19E	Tom & Evelyn Charies Hwy. 64	Irrigation	-	86'	8"
27	S29, T34S, R19E	Tom & Evelyn Charies Hwy. 64	-	658'	84'	8"
28	S29, T34S, R19E	Tom & Evelyn Charies Hwy. 64	-	654'	81'	8"
29	S29, T34S, R19E	Tom & Evelyn Charis Hwy. 64	Irrigation	640'	84'	8"
30	S29, T34S, R19E	Tom & Evelyn Charis Hwy. 64	-	681'	83'	8"
31	S29, T34S, R19E?	Robert Gadbois Upper Man. River Rd.	Domestic	110'	33'	4"
32	S29, T34S, R19E	Joe Warner Upper Man. River Rd.	- -	160'	63'	3"

Manatee County
File Number 84-058

WELL INVENTORY FOR GUN CLUB LANDFILL

No.	Section Location	Name Address	Use	Total Depth	Casing Depth	Casing Diameter
33	S29, T34S, R19E?	Moores Dairy Upper Man. River Rd.	Domestic	310'	63'	4"
34	S30, T34S, R19E	Manatee Dairies Rt.2 Box 3271	Dairy	490'	61'	6"
35	S30, T34S, R19E	R.F. Moore Upper Man. River Rd.	Lawn	88'	40'	4"
36	S32, T34S, R19E	Glen Watkins GWE Dairy Farms 717 1st Street	Stock	450'	98'	8"
37	S32, T34S, R19E	Louise Simmons Rt. 1 Parrish	Irrigation	525'	126'	4"
38	S5, T35S, R19E	Jack Taylor off Pope Road	Irrigation	1056'	102'	10'
39	S6, T35S, R19E	Manatee County Landfill Lena Road	-	160'	46'	3"
40	S7, T35S, R19E	Paul Tedder off SR 70	Irrigation	870'	82	6"
41	S7, T35S, R19E	Paul Tedder off SR 70	Irrigation	880'	80'	6"
42	S7, T35S, R19E	Paul Tedder	Irrigation	860'	83'	6"
43	S2, T35S, R18E	Bruce Bonnett 1003A 66th Ave. W	Domestic	178'	51'	4"

Manatee County
File Number 84-058

Table 1 (cont'd)

WELL INVENTORY FOR GUN CLUB LANDFILL

No.	Section Location	Name Address	Use	Total Depth	Casing Depth	Casing Diameter
44	S2, T35S, R18E	J. W. Smith Braden River Ranchette	Livestock	130'	44'	3"
45	S2, T35S, R18E	George Brown 7107 36th Ave. E.	Household	160'	42'	3"
46	S2, T35S, R18E	Terry Sellars 1331 26th Ave. E.	Domestic	143'	60'	4"
47	S2, T35S, R18E	Topps Construction Co. 2714 Cortez Rd.	Domestic	109'	42'	4"
48	S2, T35S, R18E	Frank Ray Bradenton Rv. Ranchette	Domestic	200'	37'	4"
49	S2, T35S, R18E	Sam Hardee Magnolia Manor	Domestic	118'	46'	4"
50	S2, T35S, R18E	C. Young 2916 69th St. E.	Domestic	130'	45'	3"
51	S2, T35S, R18E	Henry Franz Lot 118 Braden River Ranch	Domestic	170'	42'	4"
52	S2, T35S, R18E	H. M. Lee 6808 41st St. E.	Domestic	150'	30'	4"
53	S2, T35S, R18E	Doug Mark Braden Rv. Ranchette	Livestock	190'	30'	3"
54	S2, T35S, R18E	Ed Sanders 3812 63rd St. E.	Domestic	100'	30'	3"

WELL INVENTORY FOR GUN CLUB LANDFILL

No.	Section Location	Name Address	Use	Total Depth	Casing Depth	Casing Diameter
55	S2, T35S, R18E	Elmer Thorpe Braden Rv. Ranchette	Domestic	150'	55'	4"
56	S2, T35S, R18E	Ronney White 7203 28th Ave. E.	Livestock	150'	37'	3"
57	S2, T35S, R18E	Louis Graham Braden Rv. Ranchette	-	122'	42'	4"
58	S2, T35S, R18E	James Cassidy Magnolia Manor	Domestic	260'	37'	4"
59	S2, T35S, R18E	Mr. Wisharry 3610 63rd St. Ct. E.	Domestic	126'	37'	3"
60	S2, T35S, R18E	J. T. Overstreet -	Domestic	142'	63'	3"
61	S2, T35S, R18E	Elton Kirkland Braden Rv. Ranchette	-	130'	49'	3"
62	S2, T35S, R18E	Ray Pennington Braden Rv. Ranchette	Domestic	135'	42'	3"
63	S2, T35S, R18E	Harold Bennefeld 6310 41st Ave. E.	Domestic	125'	30'	3"
64	S2, T35S, R18E	Don Pennington Braden Rv. Ranchette	Domestic	135'	30'	3"
65	S2, T35S, R18E	Glen Penelmark -	-	180'	36'	3"

WELL INVENTORY FOR GUN CLUB LANDFILL

No.	Section Location	Name Address	Use	Total Depth	Casing Depth	Casing Diameter
66	S2, T35S, R18E	James Wood Braden Rv. Ranchette	-	182'	42'	3"
67	S2, T35S, R18E	Mr. Weber 51st Blvd., Elwood Park	-	81'	50'	3"
68	S2, T35S, R18E	John R. Dowling Braden Rv. Ranchette	Domestic	90'	42'	3"
69	S2, T35S, R18E	Stanley J. Wish 7503 41st Ave. E.	Domestic	132'	58'	3"
70	S2, T35S, R18E	Don Taylor Lot 20 Braden Rv. Ranchette	Domestic	150'	47'	3"
71	S2, T35S, R18E	Horace T. Gilley Braden Rv. Ranchette	Domestic	140'	54'	3"
72	S2, T35S, R18E	Marion Jones Braden Rv. Ranchette	Domestic	140'	42'	-
73	S2, T35S, R18E	William Loveland Braden Rv. Ranchette	Domestic	145'	55'	3"
74	S2, T35S, R18E	Garden Homes Lot 32 Braden Rv. Ranchette	Domestic	142'	53'	3"
75	S2, T35S, R18E	James H. Gilley Lot 31 Braden Rv. Ranchette	Domestic	120'	51'	3"

Ta 1 (cont'd)

WELL INVENTORY FOR GUN CLUB LANDFILL

No.	Section Location	Name Address	Use	Total Depth	Casing Depth	Casing Diameter
76	S2, T35S, R18E	James Rossney Braden Rv. Ranchette	Domestic	180'	34'	3"
77	S2, T35S, R18E	D. R. Witz Lot 511 Braden Rv. Ranchette	Domestic	150'	54'	3"
78	S2, T35S, R18E	Mark Bennett Braden Rv. Ranchette	-	140'	41'	3"
79	S2, T35S, R18E	Lardner Pope Braden Rv. Ranchette	-	165'	37'	4"
80	S2, T35S, R18E	Lloyd Culbreath Braden Rv. Ranchette	-	135'	37'	4"
81	S2, T35S, R18E	R. Copeland Braden Rv. Ranchette	-	128'	49'	3"
82	S2, T35S, R18E	Odell Griffin Lot 7 Braden Rv. Ranchette	Irrigation	160'	36'	3"
83	S2, T35S, R18E	J. Stanley Braden Rv. Ranchette	-	145'	33'	3"
84	S2, T35S, R18E	H. Rowe 6218 18th Ave. E.	Domestic	58'	31'	3"
85	S2, T35S, R18E	John Preston Braden Rv. Ranchette	Domestic	150'	35'	3"
86	S2, T35S, R18E	Robert Kocher Braden Rv. Ranchette	Domestic	125'	56'	3"

Table 2

PIEZOMETERS/OBSERVATION WELLS NEAR GUN CLUB LANDFILL AT LENA ROAD LANDFILL

Id Number	Well Dia. (inches)	Land Surface Elevation ft. (NGVD)	Riser Height (feet)	Collection Zone Elevation ft. (NGVD)	Aquifer	Latitude/Longitude Location	Lithology for Screen Interval	Permeability of Material at Screen Interval (cm/sec)	Remarks
MW-1	2	36.8	2.95	25.8 to 30.8	Surficial	82°26'43", 27°27'53"	fine sand	1.8×10^{-3}***	at TH-2
MW-2	2	35.9	1.97	23.9 to 28.9	Surficial	82°26'49", 27°28'02"	fine sand	1.8×10^{-3}	at TH-3
MW-3	2	35.6	0.35	22.6 to 27.6	Surficial	82°26'49", 27°27'56"	fine sand	4.7×10^{-3}	at TH-5
MW-4	2	36.8	2.65	23.3 to 28.3	Surficial	82°26'49", 27°28'12"	fine sand & clayey fine sand	-	at TH-9
MW-5	2	37.3	3.90	25.3 to 30.3	Surficial	82°26'23", 27°28'03"	sl. silty to silty fine sand	3.5×10^{-5}	at TH-11
MW-6	2	37.8	2.45	25.8 to 30.8	Surficial	82°26'23", 27°28'11"	sl. silty to silty fine sand	4.9×10^{-4}	at TH-12
MW-7	2	36.5	3.45	20.5 to 25.5	Surficial	82°26'32", 27°28'20"	fine sand	4.5×10^{-4}	at TH-14
MW-8	2	34.9	4.04	18.9 to 23.9	Surficial	82°26'41", 27°28'20"	fine sand	1.4×10^{-3}	at TH-15
MW-16	2	35.9	2.00	18.9 to 23.9	Surficial	82°26'40", 27°28'27"	fine sand	1.9×10^{-3}	at TH-16
MW-18	2	34.8	2.17	20.8 to 25.8	Surficial	82°26'48", 27°28'33"	fine sand	3.6×10^{-3}	at TH-18
MW-22	2	27.0*	2.71	17.0 to 22.0**	Surficial	82°26'38", 27°29'01"	sl. silty fine sand	4.5×10^{-4}	at TH-22
MW-30	2	31.0*	1.62	15.0 to 20.0**	Surficial	82°26'38", 27°28'48"	sl. silty to clayey fine sand	6.8×10^{-4}	at TH-30
MW-41	2	34.5*	1.75	7.5 to 12.5**	Surficial	82°,26'22", 27°28'32"	sl. silty to silty fine sand	5.5×10^{-4}	at TH-41
PZ-8	2	38.0*	2.50	7.5 to 12.5**	Surficial	82°26'49", 27°28'07"	sl. silty fine sand	3.1×10^{-3}	at TH-8
PZ-27	2	26.0*	1.875	11.0 to 16.0**	Surficial	82°26'55", 27°28'55"	sl. silty fine sand to sandy silt	5.4×10^{-4}	at TH-27
CW-1	2	38.0*	0.92	11.8 to 16.8**	Surficial	82°26'20", 27°28'08"	fine sand	10^{-3}***	also called S-1
CW-2	2	34.0*	2.50	7.5 to 12.5**	Surficial	82°27'01", 27°27'59"	fine sand	10^{-3}***	at TH-19, also called S-2
CW-3	2	36.0*	0.67	10.0 to 15.0**	Surficial	82°26'51", 27°28'17"	fine sand	10^{-3}***	near weight station

*Land surface elevations estimated from November 1982 Southern Resource Mapping Corporation 1" = 100' scale 2' contour interval topo map of landfill.
**Values in depth below land surface.
***Values estimated from correlation between engineering soils properties and hydraulic characteristics.

Table 3

SURFACE WATER QUALITY DATA

Sample Location:	CS-1	CS-2	LRD-1
Parameter:			
Temperature (field), ^{o}C	20	23	24
Conductivity (field), μmhos/cm	180	900	1150
pH (field)	5.4	2.9	3.4
Chloride, mg/l	24	76	115
Sulfate, mg/l	165	385	495
Conductivity, μmhos/cm	210	920	1140

Table 4

REPORT SHEET
PIEZOMETER AND OBSERVATION WELLS

FILE NUMBER: ________________ DATE: ______________ INSPECTOR: ____________________

Well Number	Time	Elevation at Top of Casing feet (NGVD)	Measured Distance to Water Level from Top of Well Casing (feet)	Distance from Top of Well Casing to Ground Surface (feet)	Depth to Water Below Ground Surface (feet)	Groundwater Elevation feet (NGVD)

Project Number____________

Table 5

WATER QUALITY SAMPLE
FIELD SHEET

Sample Source: Sampling Point Identification______________________________

Site Name/City/County ______________________________

Sample Type: Surficial Secondary Floridan Surface

Sampled By: ______________________________

Date & Time: ______________________________

Weather Conditions ______________________________

Well Depth: __________Ft. Water Level__________Ft. Above/Below LSD

Purging Method: __________ Time and/or amount: ______________

Sampling Method: ______________________________

Sample Containers: (number/size/type): ______________________

Reason for Sampling: ______________________________

Appearance of Sample: ______________ Odor:____________

Lab Performing Analysis: ______________________________

Temp:________°C pH:________ Cond:______________ μMHOS

Vol. Pumped (gals)	Temp	Cond.	pH	Remarks:

Table 6

TRANSFER OF CUSTODY

I, ______________________________ of ______________________________
(Signature) (Company)

hereby transfer the items listed below to

______________________________ of ______________________________
(Name) (Company)

Items Transferred

1.

2.

3.

4.

5.

6.

7.

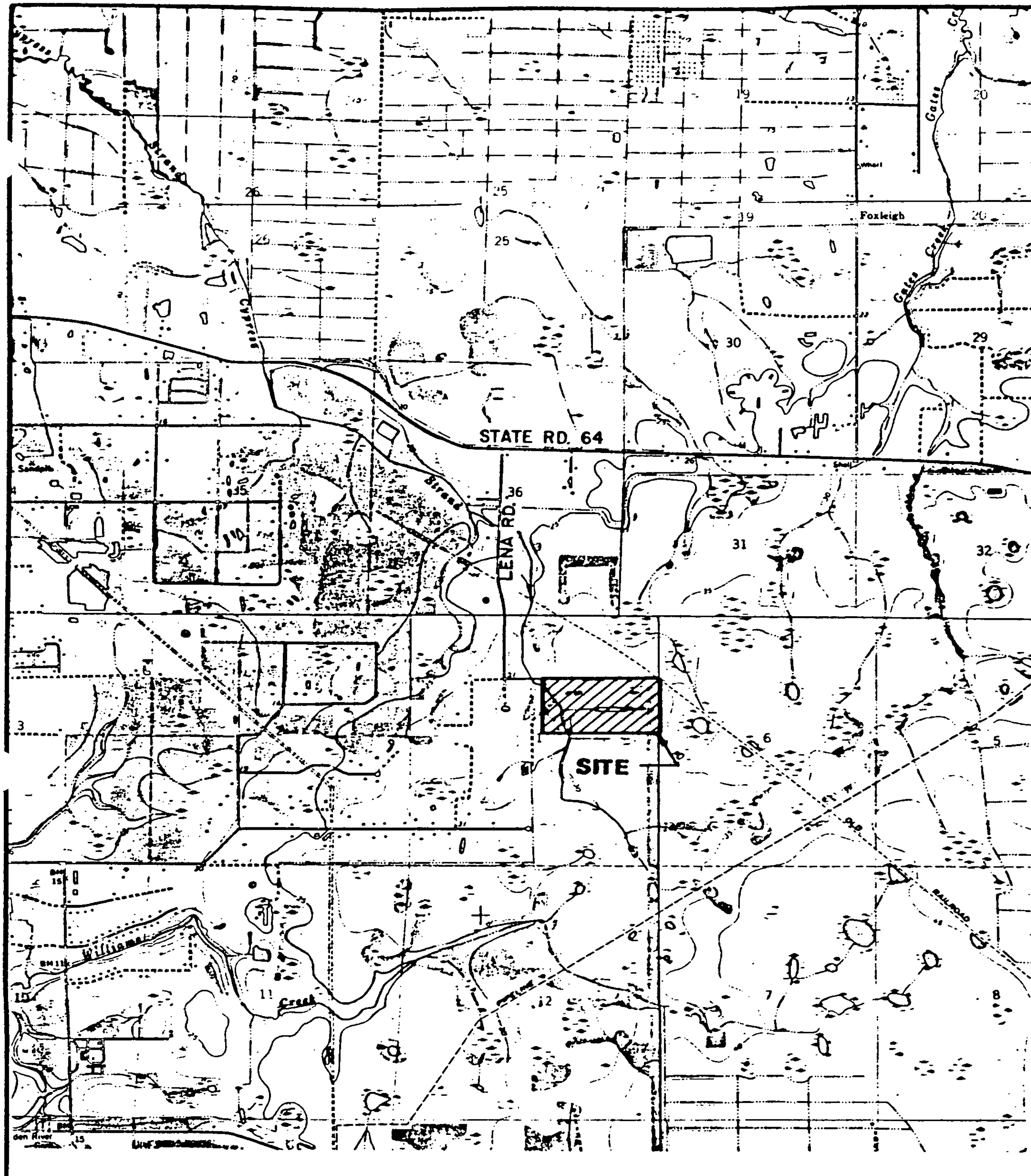
8.

9.

10.

Receipt of above listed items acknowledged by

______________________ ____________ ____________
(Signature) (Date) (Time)



SITE LOCATION

TOWNSHIP 35 SOUTH, RANGE 18 EAST

N

0 1000 2000
SCALE——FEET

SOURCE: USGS QUAD MAPS, LORRAINE, (1973), PARRISH (1973)

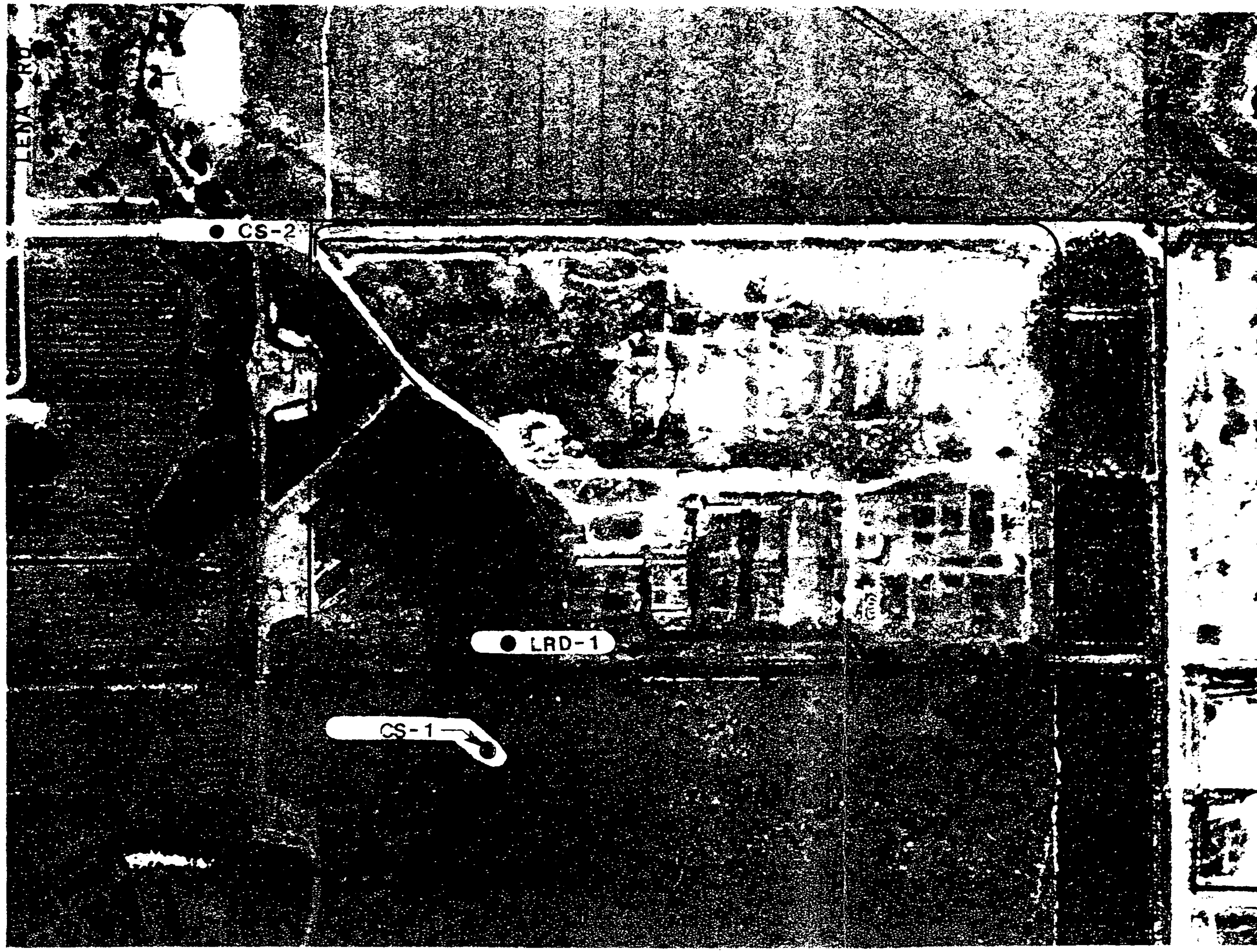
Ardaman & Associates, Inc.
Consulting Engineers in Soil Mechanics, Foundations, and Material Testing

HYDROGEOLOGICAL SURVEY
GUN CLUB LANDFILL
MANATEE COUNTY, FLORIDA

DRAWN BY: D.G.O.	CHECKED BY: LMP	DATE: 4/23/84
FILE NO. 84-058	APPROVED BY: H. G. Stangland	

FIGURE 1

BEST AVAILABLE COPY



LEGEND

CS-1 SURFACE WATER QUALITY SAMPLE
—·— EXTENT OF REFUSE

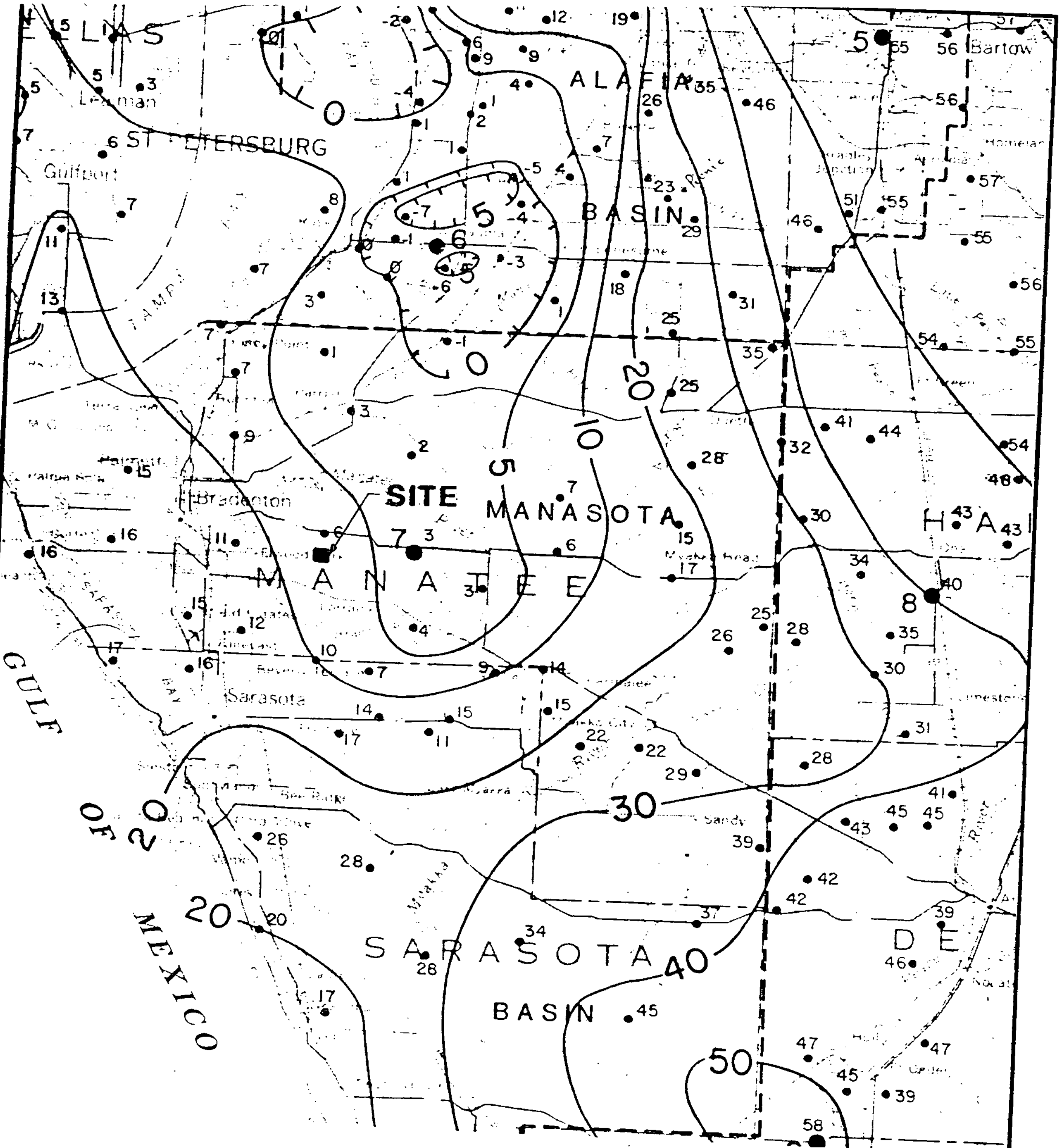
SCALE — FEET 200 400

AERIAL PHOTO OF SITE

Ardaman & Associates, Inc.
Consulting Engineers in Soil Mechanics, Foundations, and Material Testing

HYDROGEOLOGICAL SURVEY
GUN CLUB LANDFILL
MANATEE COUNTY, FLORIDA

DRAWN BY [illegible] CHECKED BY [illegible] DATE [illegible]
FILE N [illegible] APPROVED BY [illegible]



POTENTIOMETRIC SURFACE OF THE FLORIDAN AQUIFER MAY 1982

N

0 5 10
SCALE —— MILES

SOURCE: SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

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HYDROGEOLOGICAL SURVEY
GUN CLUB LANDFILL
MANATEE COUNTY, FLORIDA

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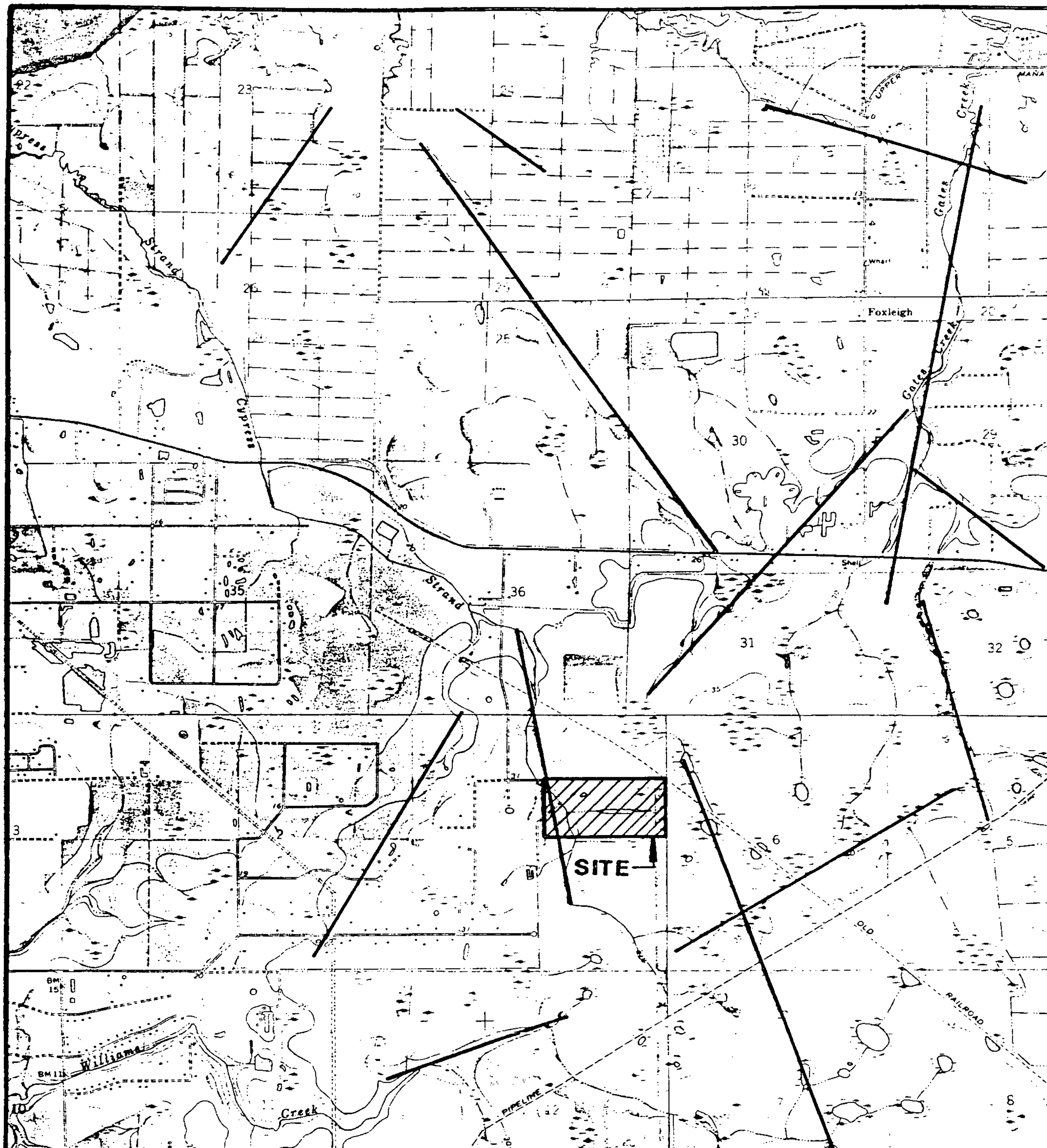
FILE NO. 84-058	APPROVED BY: H.G. Hendrickson	

FIGURE 3

5295



LINEMENTS IN THE SITE VICINITY

TOWNSHIP 35 SOUTH, RANGE 18 EAST

0 1000 2000
SCALE—— FEET

THIRD ORDER LINEAMENTS

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HYDROGEOLOGICAL SURVEY
GUN CLUB LANDFILL
MANATEE COUNTY, FLORIDA

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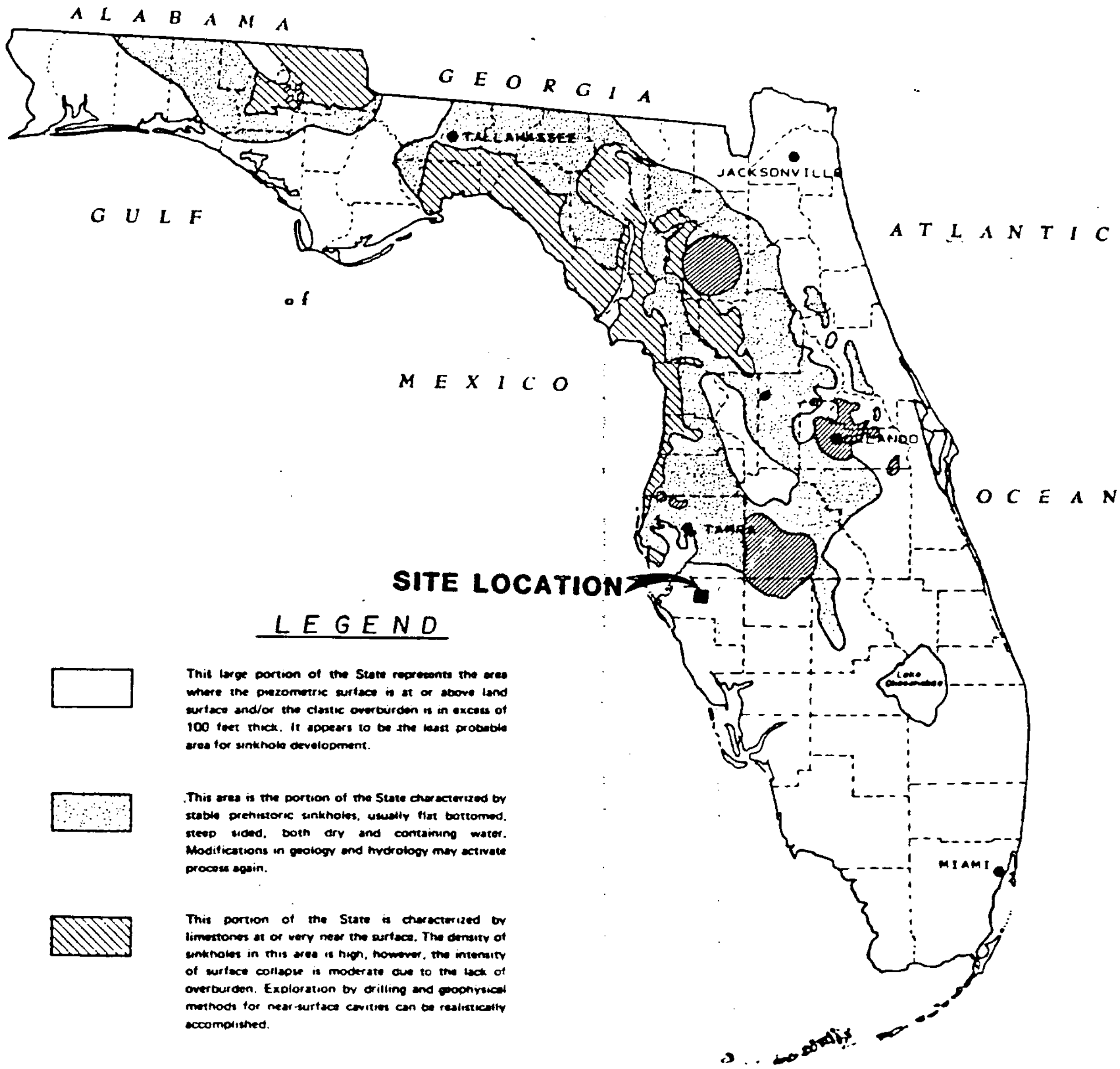
SOURCE: USGS QUAD MAPS, LORRAINE, (1973), PARRISH (1973)

52957

FIGURE 4



LEGEND

This large portion of the State represents the area where the piezometric surface is at or above land surface and/or the clastic overburden is in excess of 100 feet thick. It appears to be the least probable area for sinkhole development.

This area is the portion of the State characterized by stable prehistoric sinkholes, usually flat bottomed, steep sided, both dry and containing water. Modifications in geology and hydrology may activate process again.

This portion of the State is characterized by limestones at or very near the surface. The density of sinkholes in this area is high, however, the intensity of surface collapse is moderate due to the lack of overburden. Exploration by drilling and geophysical methods for near-surface cavities can be realistically accomplished.

This portion of the State has moderate overburden overlying cavernous limestones and appreciable water use. These areas have histories of steep-walled, wider sinkhole collapse but require more detailed study. A thick overburden or high water table present within these areas lessen the probability of sinks occurring.

MOST PROBABLE SINKHOLE REGIONS IN FLORIDA

Ardaman & Associates, Inc.
Consulting Engineers in Soil Mechanics, Foundations, and Material Testing

HYDROGEOLOGICAL SURVEY
GUN CLUB LANDFILL
MANATEE COUNTY, FLORIDA

DRAWN BY: D.G.O.	CHECKED BY: LMF	DATE: 4/23/84
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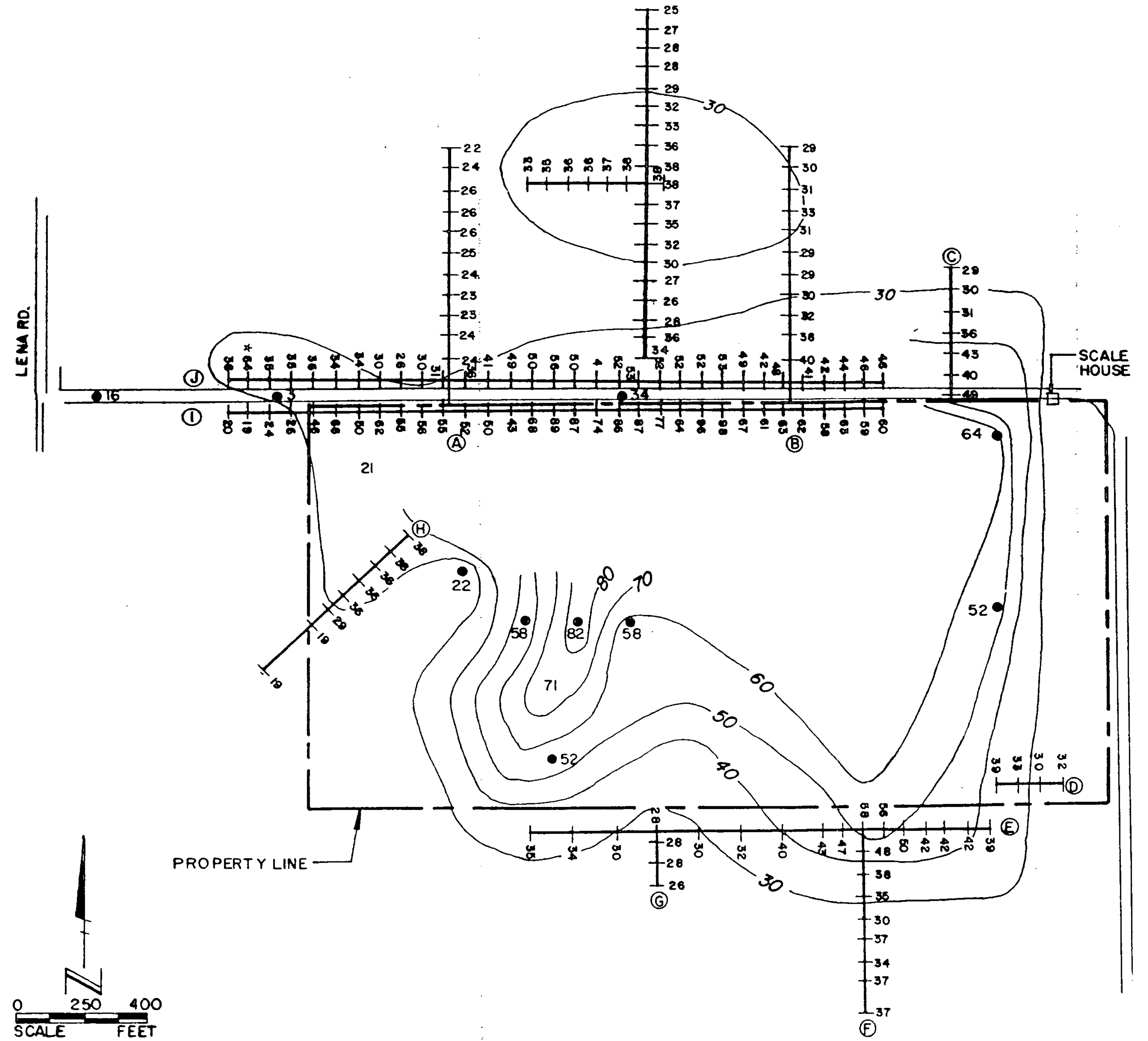
SOURCE: VERNON (1972), S.P. 16

52957

FIGURE 5



TERRAIN CONDUCTIVITY DATA

(10-METER SPACING / HORIZONTAL DIPOLES)

* CULTURAL INTERFERENCE

NOTE: DATA AND CONTOURS IN MILLIMHOS/METER

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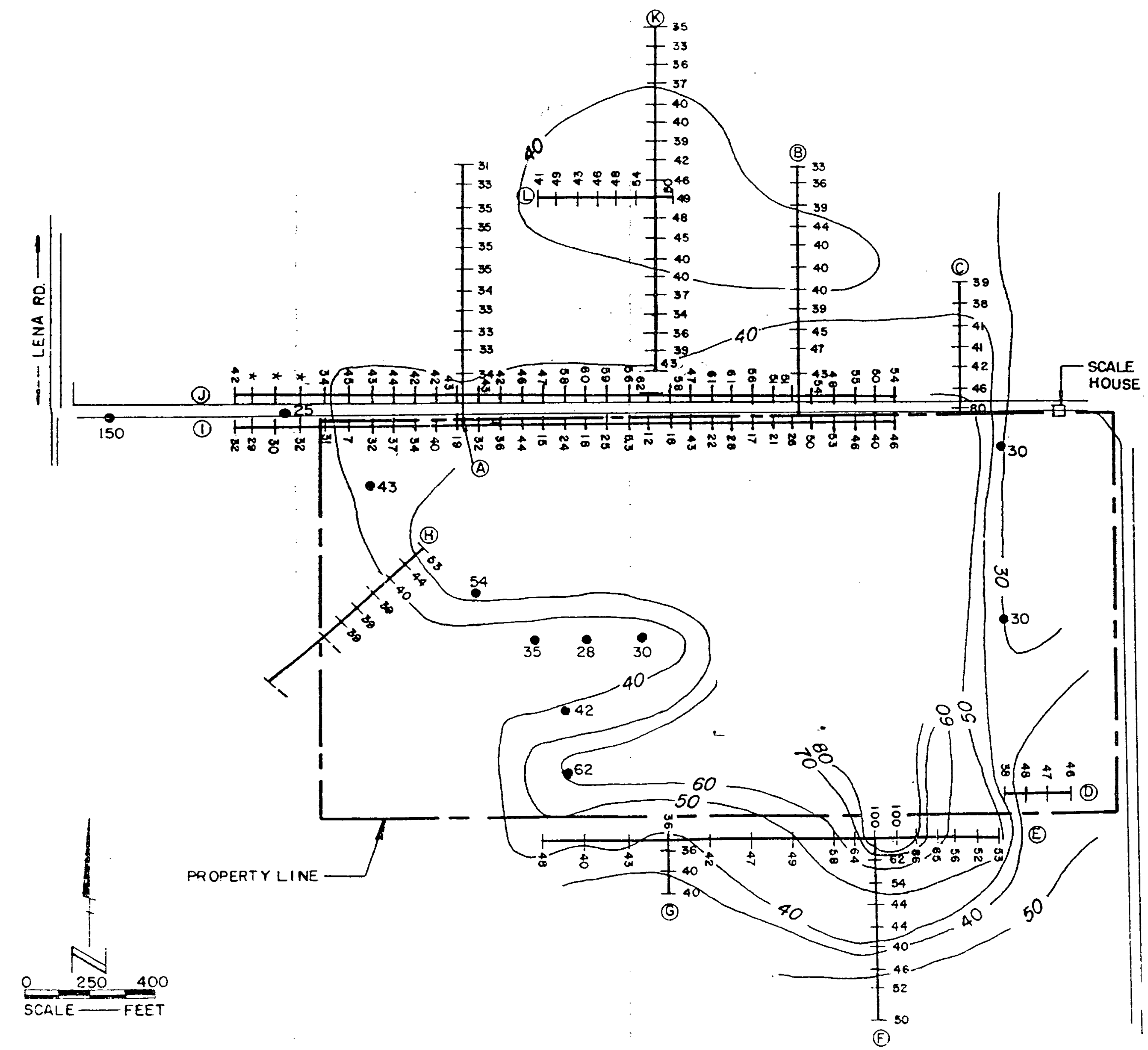
HYDROGEOLOGICAL SURVEY
GUN CLUB LANDFILL
MANATEE COUNTY, FLORIDA

DRAWN BY: D.C.O.	CHECKED BY: HES	DATE: 5/4/84
FILE NO 84-058	APPROVED BY:	

FIGURE 6

52957



TERRAIN CONDUCTIVITY DATA

(10-METER SPACING/VERTICAL DIPOLES)

* CULTURAL INTERFERENCE

NOTE: DATA AND CONTOURS IN MILLIMHOS/METER

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HYDROGEOLOGICAL SURVEY
GUN CLUB LANDFILL
MANATEE COUNTY, FLORIDA

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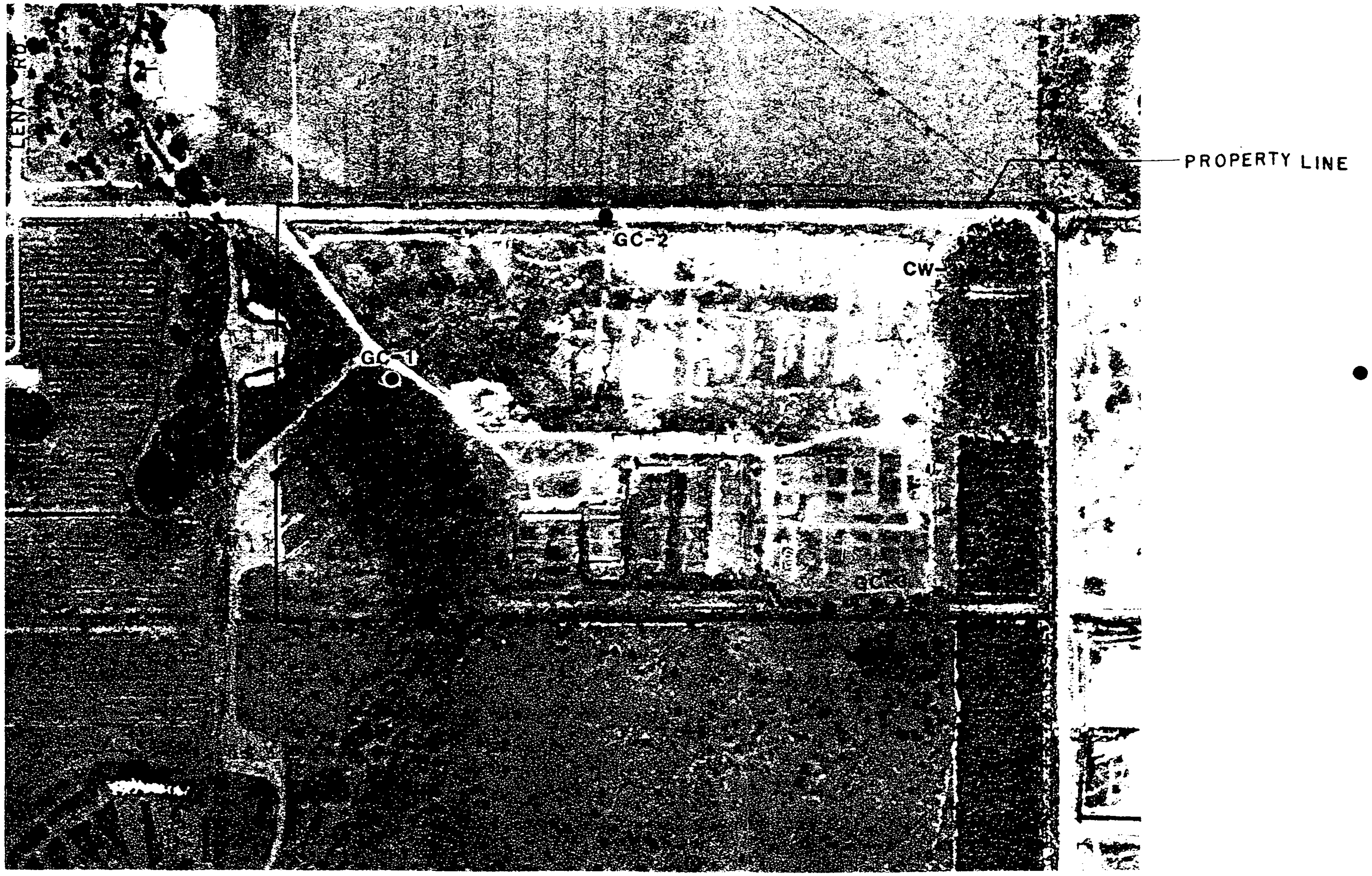
FILE NO 84-058	APPROVED BY:	

FIGURE 7



0 200 400
SCALE FEET

PROPOSED GROUNDWATER MONITOR WELL LOCATIONS

LEGEND

● [illegible]

Ardaman & Associates, Inc.
Consulting Engineers in Soil Mechanics, Foundations, and Material Testing

HYDROGEOLOGICAL SURVEY
[illegible] LANDFILL
[illegible] FLORIDA

DRAWN BY [illegible] CHECKED BY [illegible] DATE [illegible]
APPROVED BY [illegible]

Ardaman & Associates, Inc.

Consultants in Soils, Hydrogeology,
Foundations and Materials Testing

July 12, 1984
File Number 82-7047

Briley, Wild and Associates, Inc.
Post Office Box 607
1042 U.S. Highway 1, North
Ormond Beach, Florida 32074

Attention: Mr. John W. Cumming, P.E.

Subject: Geotechnical Exploration at the Gun Club Landfill, Manatee County, Florida

Gentlemen:

As requested by Mr. Cumming and authorized by Manatee County, we have completed a geotechnical exploration at the subject site and are pleased to present the results of that study. This report was prepared for the exclusive use of Briley, Wild and Associates and Manatee County in accordance with generally accepted geotechnical engineering practices. No other warranty, expressed or implied, is made.

SITE CONDITIONS

The Gun Club site is a closed landfill located in Section 1, Township 35 South, Range 18 East, Manatee County, Florida. The site, as shown on Figure 1, is bounded on the north by Lena Road and on the east by the Lena Road landfill. Cypress Strand borders the west side of the landfilled area and a ditch which flows into Cypress Strand is found along the south side. Figure 2 is a copy of an October 1980 aerial photo of the site provided by Manatee County.

A detailed description of site topography, geology and hydrogeology can be found in Ardaman & Associates, Inc. report of May 11, 1984 entitled "Groundwater Monitoring Plan, Gun Club Landfill".

FIELD EXPLORATION PROGRAM

The field exploration for this project involved the drilling of eight Standard Penetration Test (SPT) borings and the collection of five undisturbed samples to be used for laboratory permeability testing. The locations of the test borings are shown in Figure 2. All the borings were located by pacing from property lines, property corners and roadways. Elevations were estimated from a Briley, Wild and Associates, Inc. topographic map dated May 1984. Therefore, both the locations shown and elevations noted should be considered accurate only to the degree implied by the method used.

The eight test borings were conducted utilizing the SPT method (ASTM D-1586) as summarized in Appendix 1. Following the field classification of recovered soil samples, representative samples were placed in air-tight jars and transported to our office for routine laboratory classification and testing. Upon completion of each boring, the resulting hole was backfilled with a bentonite-cement grout.

Five relatively undisturbed Shelby tube samples were taken at various depths within selected holes for laboratory determination of vertical permeabilities. A description of the undisturbed sampling procedures is included in Appendix 2.

The field investigation results and general subsurface conditions encountered in each boring are presented in Figure 3. Soil stratification is based on an examination of the field boring logs by a geotechnical engineer. The stratification lines represent the approximate boundaries between soil types of significantly different engineering properties although the actual transition may be gradual. In some cases, variations in properties not considered pertinent to our engineering evaluations may have been omitted for clarity.

The groundwater level at the time of our field investigation, May 23-29, 1984, varied from 2.8 to 5.0 feet below land surface or between 25.0 and 33.5 feet NGVD. Seasonal and annual fluctuations in groundwater levels are anticipated at the site. This field investigation was completed at the end of the dry season, typically, a time of low groundwater levels.

LABORATORY TESTING PROGRAM

All recovered disturbed (split-spoon) and relatively undisturbed (Shelby tube) samples obtained during the field survey were returned to our laboratory for visual examination and determination of engineering properties. All split-spoon samples taken in the field were reclassified in the laboratory using the procedures outlined by the Unified Soil Classification System. The results of the tests, including the percent passing the No. 200 sieve, were used to aid in classification and in defining the stratification of the site soils. All tests were performed in accordance with current ASTM standards. The laboratory test results are provided beside the location of each tested sample on the soil profile in Figure 3.

Moisture contents and in-place dry densities were determined for all of the relatively undisturbed Shelby tube samples. This information aided in classifying the soils and estimating engineering soil properties used in the analyses. These results are presented beside the respective tube locations on Figure 3. The in situ dry densities ranged from 72.7 to 98.3 pounds per cubic foot.

The constant head permeability tests were performed in specially manufactured triaxial-type permeameters with the test specimens encased in latex membranes. The head difference across the samples was monitored with an electric pore pressure transducer and manually recorded from a digital voltmeter. Water was used as the permeant, and the quantity of flow occurring through the specimens was monitored with time in 20 cc-burettes. Sufficient quantities of flow were allowed to pass through the specimens until constant values of the coefficient of permeability were obtained. The results of the vertical permeability tests are presented in Figure 3 adjacent to the location of the sample tested.

ANALYSES/RECOMMENDATIONS

All eight of the test borings conducted on the site encountered clay and/or clayey sand which, for all practical purposes, may be considered impermeable. These layers occur between approximately 9 and 22.5 feet below the surface. The subsurface profile agrees closely with that encountered in 42 test holes drilled on the adjacent Lena Road landfill site. Deeper borings on that site indicate the presence of additional dense, fine-grained (i.e., clay and silt) impervious soils below 60 feet. These strata represent the upper units of the Hawthorn Formation which separate the surficial aquifer from the artesian aquifer systems. This confining bed exhibits areal continuity and would, therefore, effectively limit downward percolation of leachate.

A surficial, unconfined aquifer system occurs in the sands and slightly silty to silty sands encountered between the ground surface and approximately a depth of 10 to 15 feet. This zone is recharged directly by local rainfall. Water levels encountered in this system for the most part ranged between 2.5 and 4.0 feet below ground surface. These levels can fluctuate widely with variations in rainfall and evapotranspiration. Localized drawdown of the water table can be seen near the ditch along the southern side of the site and along Cypress Strand. Movement of the shallow groundwater is mostly toward these two relief areas. Some flow probably occurs towards the north as implied by the data from an earlier electromagnetic conductivity survey. Vertical movement of water downward is restricted due to the presence of clays and clayey sands. Vertical permeabilities of these layers ranged from 4.9×10^{-7} to 4.9×10^{-8} centimeters per second (0.001 to 0.0001 feet per day). The U.S. Geological Survey has estimated recharge through the confining beds at less than 2 inches per year.

The recommended leachate collection system consists of ditches and a slurry wall. The slurry wall would be built along the west side of the landfill, i.e., parallel to Cypress Strand. The wall should be placed adjacent to the tree line and beyond any emplaced trash. The slurry wall should extend down to the clay layer to provide an effective seal against the westerly migration of leachate. A perforated drain pipe with associated gravel pack should be buried immediately east of the slurry wall to skim off and collect groundwater leachate and divert it into the south leachate collection ditch.

Along the south wall of the landfill, a dual ditch system similar to that used at the existing Lena Road site could be utilized to collect leachate. Alternatively, if sufficient land is not available, the slurry wall and perforated drain pipe can be extended along this wall. Leachate will be routed to the Lena Road landfill treatment facilities.

Three options exist for leachate containment along the north side of the site. First, additional land could be purchased and a dual ditch system installed on the north side of Lena Road. Second, if land purchase is not possible, a slurry wall/drain system could be installed between Lena Road and the landfill. Third, a leachate collection ditch could potentially be excavated into the north face of the landfill with the spoil placed back on the landfill. All three options require the collected leachate to be routed to the Lena Road landfill treatment facilities.

The existing ditch, part of the Lena Road landfill collection system, located to the east, can be utilized for collecting the leachate prior to diverting it to the treatment facilities.

From a hydrogeological point of view, once the above mentioned lèachate collection system is installed, the Gun Club landfill could be opened for use as an active landfill.

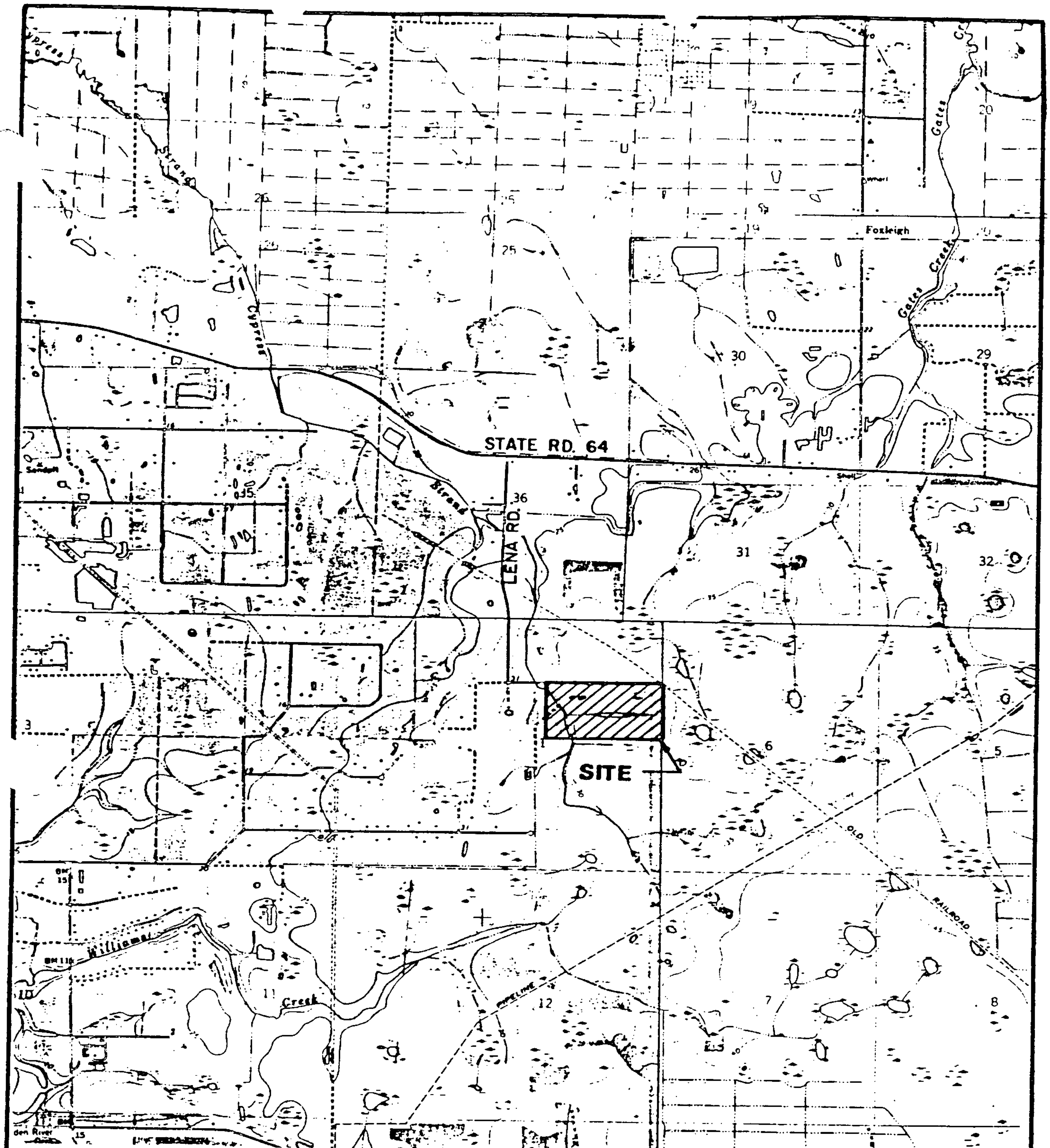
We appreciate the opportunity to serve you on this project. If you have any questions concerning this report or if we can be of further assistance, please do not hesitate to contact the undersigned.

Very truly yours,
ARDAMAN & ASSOCIATES, INC.

Herbert G. Stangland, Jr., P.E.
Senior Water Resources Engineer
Florida Registration No. 16713

John E. Garlanger, Ph.D., P.E.
Principal

LMP:ed
bc: Scott Davidson



SITE LOCATION

TOWNSHIP 35 SOUTH, RANGE 18 EAST

N

0 1000 2000
SCALE——FEET

SOURCE: USGS QUAD MAPS, LORRAINE, (1973), PARRISH (1973)

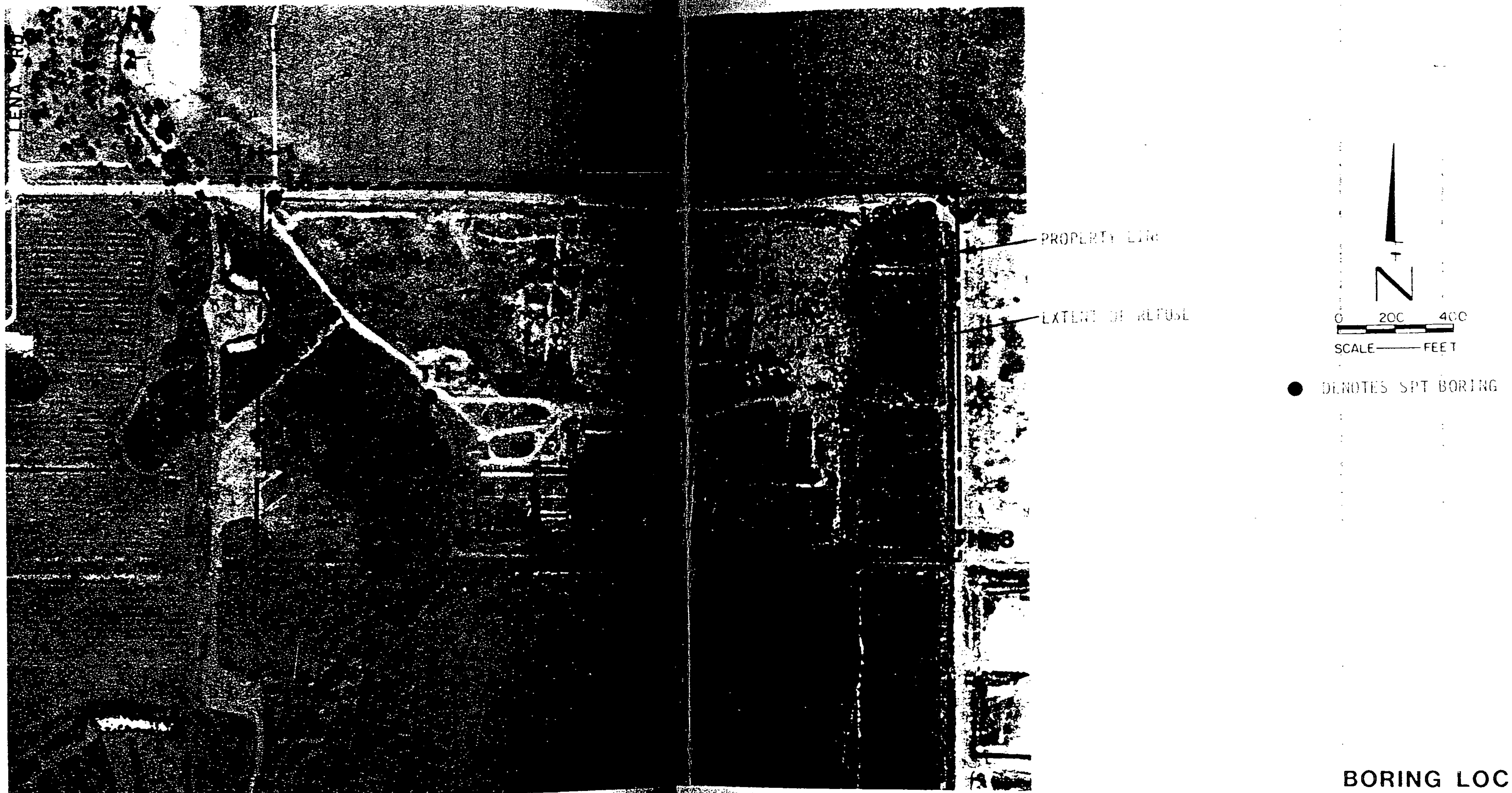
Ardaman & Associates, Inc.
Consulting Engineers in Soil Mechanics, Foundations, and Material Testing

GEOTECHNICAL EXPLORATION
GUN CLUB LANDFILL
MANATEE COUNTY, FLORIDA

DRAWN BY: D.G.O.	CHECKED BY: FKC	DATE: 6/27/84
FILE NO. 82-7047	APPROVED BY: H. G. Strandland	

FIGURE 1

BEST AVAILABLE COPY

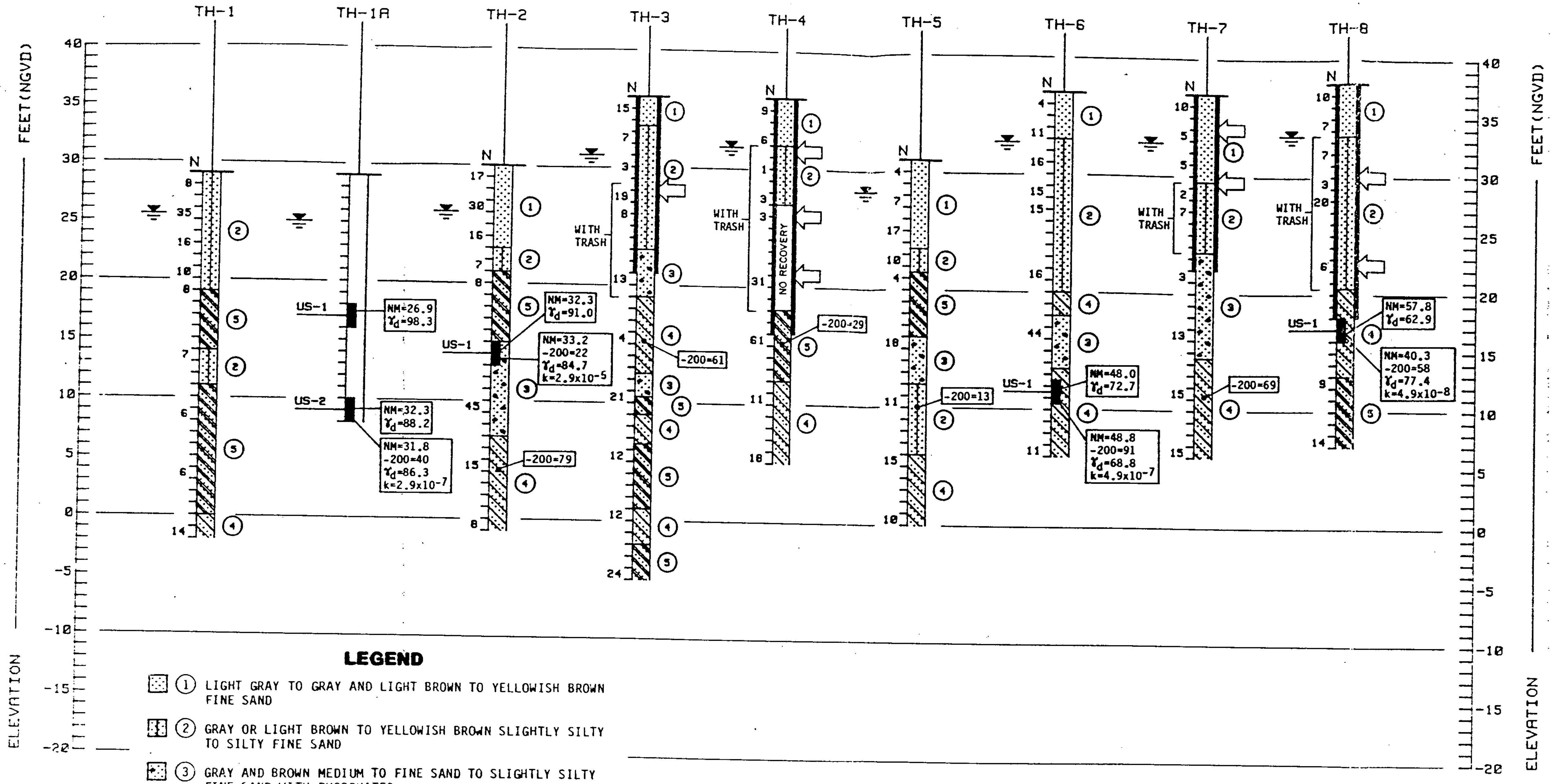


BORING LOCATION PLAN

Ardaman & Associates, Inc.
Consulting Engineers in Soil Mechanics, Foundations, and Material Testing

GEOTECHNICAL EXPLORATION
GUN CLUB LANDFILL
MANATEE COUNTY, FLORIDA

DRAWN BY | CHECK



LEGEND

- (1) LIGHT GRAY TO GRAY AND LIGHT BROWN TO YELLOWISH BROWN FINE SAND
- (2) GRAY OR LIGHT BROWN TO YELLOWISH BROWN SLIGHTLY SILTY TO SILTY FINE SAND
- (3) GRAY AND BROWN MEDIUM TO FINE SAND TO SLIGHTLY SILTY FINE SAND WITH PHOSPHATES
- (4) GRAY AND GREEN OR BROWN TO LIGHT YELLOWISH BROWN CLAY AND SANDY CLAY WITH OCCASIONAL TRACES OF PHOSPHATES AND SEAMS OF FINE SAND
- (5) GRAY AND GREEN SLIGHTLY CLAYEY TO CLAYEY FINE SAND WITH OCCASIONAL TRACES OF PHOSPHATES, SHELL OR CEMENTED SAND
- GROUND WATER LEVEL
- N STANDARD PENETRATION RESISTANCE IN BLOWS PER FOOT
- UNDISTURBED SHELBY TUBE SAMPLE
- LOSS OF DRILLING CIRCULATION
- NM NATURAL MOISTURE CONTENT IN PERCENT
- -200 PERCENT PASSING U.S. NO.200 SIEVE
- γ_d IN-SITU DRY DENSITY IN lb/ft^3
- k COEFFICIENT OF PERMEABILITY IN cm/sec

ENGINEERING CLASSIFICATION

Cohesionless Soils

Description	Blow Count "N"
VERY LOOSE	0 TO 4
LOOSE	4 TO 10
MEDIUM DENSE	10 TO 30
DENSE	30 TO 50
VERY DENSE	ABOVE 50

Cohesive Soils

Description	Unconfined Compressive Strength, TSF	Blow Count "N"
VERY SOFT	BELOW .25	0 TO 2
SOFT	.25 TO .50	2 TO 4
MEDIUM STIFF	.50 TO 1.0	4 TO 8
STIFF	1 TO 2	8 TO 15
VERY STIFF	2 TO 4	15 TO 30
HARD	ABOVE 4	ABOVE 30

"WHILE THE BORINGS ARE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT THEIR RESPECTIVE LOCATIONS AND FOR THEIR RESPECTIVE VERTICAL REACHES, LOCAL VARIATIONS CHARACTERISTIC OF THE SUBSURFACE MATERIALS OF THE REGION ARE ANTICIPATED AND MAY BE ENCOUNTERED. THE BORING LOGS AND RELATED INFORMATION ARE BASED ON THE DRILLER'S LOGS AND VISUAL EXAMINATION OF SELECTED SAMPLES IN THE LABORATORY. THE DELINEATION BETWEEN SOIL TYPES SHOWN ON THE LOGS IS APPROXIMATE AND THE DESCRIPTION REPRESENTS OUR INTERPRETATION OF SUBSURFACE CONDITIONS AT THE DESIGNATED BORING LOCATION AND ON THE PARTICULAR DATE DRILLED.

GROUNDWATER ELEVATIONS SHOWN ON THE BORING LOGS REPRESENT GROUNDWATER SURFACES ENCOUNTERED ON THE DATES SHOWN. FLUCTUATIONS IN WATER TABLE LEVELS SHOULD BE ANTICIPATED THROUGHOUT THE YEAR. ABSENCE OF WATER SURFACE DATA ON CERTAIN BORINGS IMPLIES THAT NO GROUNDWATER DATA IS AVAILABLE, BUT DOES NOT NECESSARILY MEAN THAT GROUNDWATER WILL NOT BE ENCOUNTERED AT THESE LOCATIONS OR WITHIN THE VERTICAL REACHES OF THESE BORINGS".

Ardaman & Associates, Inc.
Consulting Engineers in Soil Mechanics, Foundations, and Material Testing

GEOTECHNICAL EXPLORATION
GUN CLUB LANDFILL
MANATEE COUNTY, FLORIDA

DRAWN BY: R.J.F.	CHECKED BY: EKC	DATE: 6/27/84
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FIGURE 3

52951

Appendix 1

SPT PROCEDURE

STANDARD PENETRATION TEST

The standard penetration test is a widely accepted method of *in situ* testing of foundation soils (ASTM D-1586). A 2-foot long, 2-inch O.D. split-barrel sampler attached to the end of a string of drilling rods is driven 18 inches into the ground by successive blows of a 140-pound hammer freely dropping 30 inches. The number of blows needed for each 6 inches of penetration is recorded. The sum of the blows required for penetration of the second and third 6-inch increments of penetration constitutes the test result or N-value. After the test, the sampler is extracted from the ground and opened to allow visual examination and classification of the retained soil sample. The N-value has been empirically correlated with various soil properties allowing a conservative estimate of the behavior of soils under load.

The tests are usually performed at 5-foot intervals. However, more frequent or continuous testing is done by our firm through depths where a more accurate definition of the soils is required. The test holes are advanced to the test elevations by rotary drilling with a cutting bit, using circulating fluid to remove the cuttings and hold the fine grains in suspension. The circulating fluid, which is a bentonitic drilling mud, is also used to keep the hole open below the water table by maintaining an excess hydrostatic pressure inside the hole. In some soil deposits, particularly highly pervious ones, NX-size flush-coupled casing must be driven to just above the testing depth to keep the hole open and/or to prevent the loss of circulating fluid.

Representative split-spoon samples from soils at every 5 feet of drilled depth and from every different stratum are brought to our laboratory in air-tight jars for further evaluation and testing, if necessary. Samples not used in testing are stored for at least six months prior to being discarded. After completion of a test boring, the hole is kept open until a steady state groundwater level is recorded. The hole is then sealed, if necessary, and backfilled.

Appendix 2

UNDISTURBED PROCEDURE

UNDISTURBED SAMPLING

Undisturbed sampling implies the recovery of soil samples in a state as close to their natural condition as possible. Complete preservation of in situ conditions cannot be realized; however, with careful handling and proper sampling techniques, disturbance during sampling can be minimized for most geotechnical engineering purposes. Examination and testing of undisturbed samples gives a more accurate estimate of in situ soil behavior than is possible with disturbed samples.

Normally, we obtain undisturbed samples by pushing a 2.875-inch I.D., thin wall seamless steel tube, 24 inches into the soil with a single stroke of a hydraulic ram. The sampler, which is a Shelby tube, is 30 inches long. After the sampler is retrieved, the ends are sealed in the field and it is transported to our laboratory for further examination and testing, as needed.

In some instances, when even less disturbed samples are required, a fixed-piston sampling device is used. The fixed-piston sampler is a 2.875-inch I.D. Shelby tube with a piston inside it. While the sampler is lowered into the bore hole, the piston is located at the lower end of the sampling tube. The piston is then placed at the bottom of the hole on top of the soil to be sampled, and is held stationary while the tube is smoothly pushed past the piston 24 inches into the soil. The sample is sheared from the parent soil by rotating the sampling device. After the sampler is brought out of the hole, the ends of the tube are sealed and the sample is brought back to our laboratory.

Four major improvements over our conventional undisturbed sampling procedures are achieved with the piston sampler; a larger sample is obtained; no soil enters the tube as the sampler is lowered to the sampling depth; excess soil does not enter the tube during the sampling operation; and a vacuum is generated between the piston and the sample as the sampler is being retrieved, thus helping to retain the sample in the tube.

Responses to FDER Letter of Incompleteness
Gun Club Groundwater Monitoring Plan
Bradenton, Florida

Ardaman & Associates, Inc.

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Fort Myers, 2508 Rockfill Road, Fort Myers, Florida 33901, Phone (813)337-1288
Miami, 7476—7478 N.W. 8th Street, Miami, Florida 33126, Phone (305) 261-1682
'anama City Beach, 8801 C West Alternate Highway 98, Panama City Beach, Florida 32407, Phone (904) 234-7822
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Tallahassee, 3175 West Tharpe Street, Tallahassee, Florida 32303, Phone (904) 576-6131

Ardaman & Associates, Inc.

Consultants in Soils, Hydrogeology, Foundations and Materials Testing

September 19, 1984
File Number 84-058

Manatee County Government
Utilities Department
Solid Waste Division
Caller Service 25010
Bradenton, Florida 33506

Attention: Mr. Charles Hunsicker

Subject: Responses to FDER Letter of Incompleteness
Gun Club Groundwater Monitoring Plan

Gentlemen:

The following responses address items brought up by FDER in their letter of incompleteness on the subject project.

1. The monitoring plan has shown the location of the proposed unaffected natural background well (CW-2), as required in Chapter 17-4.245(6)(d), F.A.C. The water quality of this well, as reported in Table 4.4, page 4-8 of the Ardaman and Associates March 1983 Report which was submitted to your office, strongly indicates that this well does not represent background water quality in this area. "Background" zinc, lead and chromium concentrations in a sample from this well all exceed applicable surface or ground water quality standards. Concentrations of these metals are similar to those in other monitor wells which have high concentrations of standard landfill monitoring parameters.

Tables 7 through 13 enclosed herein summarize the water quality data for the Lena Road monitor wells including the results presented in the Ardaman & Associates, Inc. March 1983 Report. The tables show filtered and unfiltered results from monitor wells installed as per the consent order decree. Background, as well as leachate influenced wells, are included in the 7 wells. Figure 3.1 from the 1983 Ardaman Report is provided to show the location of these monitor wells. The water quality data indicate that filtered results are representative, while unfiltered samples are not representative of groundwater at the site. Particulate matter in the unfiltered groundwater samples are not characteristic of groundwater quality at the site. It is our opinion that CW-1, as well as CW-5, are probably unaffected by leachate at this site. CW-1 is located some 300 feet beyond the leachate collection ditch. As shown in Table 11, four filtered analyses for CW-1 all indicate that iron is the only metal above drinking water MCL levels in the groundwater. Zinc, lead and chromium concentrations exceeded MCL levels only for the unfiltered analyses. We believe that the high iron levels represent background conditions. The CW-2 well was not sampled as part of the consent decree; however, we would expect that filtered samples would not contain detectable quantities of lead, mercury, and chromium. The CW-2 well is farther

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away from the leachate collection ditch than CW-1 (i.e., 1000 feet). In our opinion, based on the data collected to date, all surficial aquifer monitor wells should have analyses performed on filtered and not unfiltered water samples. We believe that the CW-2 well is suitable for a background well. Analyses for the indicator parameters should confirm this opinion.

2. The consultants, who have completed several detailed investigations of this site should propose another well as a surficial aquifer background monitoring well, and justify the location of this well using hydrologic data from their investigations, to be submitted as an addendum to the monitoring plan, unless they can prove that the water quality of well CW-2 is representative of surficial aquifer background quality.

Tables 7 through 13 show water quality analyses on both filtered and unfiltered groundwater samples from the Lena Road site. Analyses on Wells CW-1 and MW-8 have data which indicate that filtered samples are more representative of groundwater quality than unfiltered samples. The CW-2 well is expected to show background quality when analyses are performed on field-filtered samples. We recommend that the CW-2 well be analyzed for the indicator parameters and for dissolved metals (on field-filtered samples). The CW-2 well is over 1000 feet away from the leachate control ditch along the west side of the Lena Road Landfill and is over 750 feet on the other side of the ditch along the south side of the Gun Club Landfill. Hydraulic gradients in this area are toward these ditches from CW-2, not the reverse. The water levels in the ditches are the low elevations on the water table in this area.

Two other possible sites have been studied for the location of a background well at the Gun Club site. MW-1 at the Lena Road Landfill has a water quality that is characteristic of background quality. The well is located approximately 100 feet outside the leachate control ditch, is in an area where cells have not yet been filled and is in a remote area. For the long-term, because this well site is relatively close to the landfill, we do not believe it provides the safety factor in distance away from the landfill that the CW-2 site provides. On the other hand, the CW-2 site is in an area that might be disturbed in the future. We understand that this area is in the vicinity of the proposed new regional sewage treatment plant.

The area between the power line and the Cypress Strand on the extreme west edge of the Gun Club Landfill property is the other possible site. The hydraulic gradients in this area would be toward and not away from Cypress Strand. It is in a remote area probably not to be disturbed in the future. The site characteristics appear suitable for a background well. Ardaman & Associates, Inc. could be satisfied with any of the 3 sites for a background well here: CW-2, MW-1, or west of Cypress Strand. None of the locations are ideal.

3. Existing and proposed wells may be unsatisfactory for monitoring organic compounds if they are constructed with glued PVC joints. There should be some additional information provided concerning the construction of existing wells CW-2 and CW-3, proposed as monitoring wells. The total depth, construction materials, and a schematic diagram of each should be submitted, pursuant to Chapter 17-4.245(6)(d), F.A.C.

No glued PVC joints will be utilized for new monitor wells in this plan. New well(s) will be constructed during the well implementation phase of this program. The list of data presented in paragraph 2 on page 9 in the plan will be provided for each well used in the monitoring program. These data will be provided to FDER with the well completion report at the end of the well construction phase once locations for wells are agreed to by the County and FDER. Table 14 indicates the known details about the existing monitor wells.

4. The proposed ground water monitoring parameters are based upon the results of monitoring at the Lena Road Landfill. Given the reported results in the Ardaman March 1983 Report alone, a much more comprehensive list of routine monitoring parameters will have to be proposed. This list must include all parameters which have been found in ground water in concentrations above Class II ground water or Class III surface water standards. In addition, other parameters as deemed necessary will have to be monitored at this site, based upon previous DER, EPA, and Ardaman and Associates, Inc. sampling and anticipated landfill leachate parameters. Analyses for metal should be run on unfiltered rather than filtered samples, in accordance with Chapter 17-3.401(6), F.A.C., unless a compelling reason can be provided for analyzing filtered samples.

The proposed monitoring philosophy is explained as follows: All data points will be monitored for the specified indicator parameters initially. The location with the highest indicator parameter concentrations (the "interceptor" well) will then be sampled and analyzed for the indicator parameters plus the remaining parameters on the primary and secondary drinking water list (except for radionuclides). In addition, this well water will also be analyzed for priority pollutants. If the results of the routine monitoring of indicator parameters from the downgradient wells ever indicates the presence of leachate, then this well(s) will be resampled and the water analyzed for the critical "interceptor" well parameters. Critical, in the case of the primary and secondary drinking water parameters, are parameters above MCL concentrations from the "interceptor" well results. For priority pollutants, critical means parameters detected in the "interceptor" well analysis. If the added parameters from the leachate influenced downgradient well(s) are not at or above critical concentrations in the analyses, then these added parameters will be reanalyzed on an annual basis until the indicator parameters have concentrations lower than determined in the initial sampling. Added parameters with critical concentrations will be monitored on a quarterly basis. Table 15 presented herein summarizes the recent water quality data for indicator parameters from the Lena Road Landfill monitor wells. MW-1 is obviously a "background" well and MW-8 is an "interceptor" well. The results support use of our proposed list of indicator parameters. All water quality data presented in Tables 7 through 13 and 15 since the first analysis January 5, 1983, except for an EPA sample at two sites, are from filtered, not unfiltered water samples. We believe that filtered samples are more representative of groundwater quality than unfiltered samples. (See responses 1 through 3, above.)

5. No wells are proposed in the secondary artesian aquifer(s), based upon the wide areal extent and thickness of confining beds at this site. Confining beds

in the vicinity of this site include units 4, 5, and 7, based upon numerous sieve analyses of test boring samples and Figure 5.1, a permeability versus percent fines graph included in the Ardaman March 1983 Report. Units 4 and 7 are sufficiently impermeable to qualify as confining beds using the empirically derived graph of Figure 5.1; however, Unit 5, also considered a confining bed, has a mean percent fines of 30% with a median value of under 26%. These statistics indicate that there is a significant likelihood of Unit 5 having an overall average permeability of 10 cm/sec or greater. Of the 33 borings (Ardaman March 1983 Report) at the Lena Road site which penetrated depths of at least 20 feet, 3 borings contained neither Unit 4 or 7. Therefore, the integrity of sediments below the unconfined aquifer which would provide an adequate impermeable barrier remains questionable. A downgradient monitoring well in the secondary artesian zone must be proposed, which will be located in an area to best detect any contamination of the first productive zone (aquifer) beneath the surficial aquifer. Construction details and other specifics for this well which differ from proposed shallow aquifer wells must be provided. This information may be requested by citing Chapter 17-4.245(6)(d), F.A.C.

Ardaman & Associates, Inc. has had a dialogue with various FDER staff on the subject of the integrity of the confining layer since the March 1983 Ardaman Report was published. An enclosed Ardaman Report dated February 24, 1984 documents our final conclusions on this subject. This report includes additional hydrogeological data specifically collected to address this item. Based on our evaluation of the boring data at locations where the confining layer was completely penetrated, it appears that the minimum thickness of this uppermost confining layer is 7 feet. At most of the deeper boring locations this layer was more than 20 feet thick.

If a secondary artesian zone well has to be considered, we recommend that data be collected from the Lena Road weight station well and/or the newly proposed Lena Road artesian aquifer well before making a final decision on any artesian aquifer well at the Gun Club site.

6. The depth of refuse emplacement at the Gun Club site is uncertain, and should be identified. According to Rick Hicks, there may be some measurements of depth of refuse which are available from the consultants who have worked at the landfills. This information may be requested by citing Chapter 17-4.245(6)(d)12, F.A.C.

A July 12, 1984 geotechnical survey by Ardaman & Associates, Inc. for the Gun Club site is enclosed for your information. This report shows available measurements on refuse depths.

7. Although there has been a question as to the direction of ground water flow in the surficial aquifer underlying this site, it is reasonable that radial flow from the Lena Road and Gun Club Landfills is occurring. The primary criteria for locating monitoring wells are (1) where does available data indicate that the greatest degradation of ground (or surface) water quality has occurred and (2) monitoring is crucial between a pollution source and water resources which are being utilized.

> In either case, downgradient monitoring wells would best be located to the north or west, in the direction of Cypress Strand. In my opinion, well GC-3 is not optimally located to detect subsurface contaminant migration which would be an imminent threat to surface water or drinking water supplies. This well does qualify as a downgradient well at the edge of the zone of discharge, but this requirement is also met by well GC-2. Well GC-3 might be better placed west of its proposed location.

Well GC-3 is located in an area of highest terrain conductivity along the south boundary of the site. We do not understand where a better site is west of this location along the south boundary of the property. However, we have no objection to placing the well further west of its proposed location if FDER will identify the location and it is accessible to our equipment.

We trust that these responses adequately address the FDER items. Please do not hesitate to contact the undersigned when we can be of further assistance.

Very truly yours,
ARDAMAN & ASSOCIATES, INC.

Herbert G. Stangland, Jr., P.E.
Senior Water Resources Engineer
Florida Registration No. 16713

John E. Garlanger, Ph.D., P.E.
Principal

HGS:cc
Enclosures

cc: Mr. Gary Schmidt (w/encl.)

Table 7

SUMMARY OF RECENT WATER QUALITY DATA FOR MW-1
LENA ROAD LANDFILL

Parameter	01-05-83	11-01-83	12-13-83	01-10-84	02-06-84	04-09-84
Metals						
Fe, mg/l	6.1(UF)	2.01	2.02	1.69	1.46	2.49
Mn, mg/l	-	LD	LD	LD	LD	LD
Zn, mg/l	-	.01	.04	.05	.02	.05
Hg, mg/l	-	LD	LD	LD	LD	LD
Cr, mg/l	-	LD	LD	LD	.03	LD
Cd, mg/l	-	LD	LD	LD	LD	LD
Pb, mg/l	-	LD	LD	LD	LD	LD
Indicators						
TDS, mg/l	-	350	144	300	136	123
Cond., μmhos/cm	7500/204(L)	52	58	57	52	-
pH, units	6.8/8.45(L)	5.5(L)	6.1(L)	5.8	5.6	5.5
TOC, mg/l	-	-	14.2	15.5	12.8	8.1
TKN, mg/l	-	-	.74	.49	0.59	-
Cl, mg/l	33	8.4	3.92	1.98	2.4	26.8
SO_4, mg/l	-	2.6	<2.5	<2.5	1.4	5
HCO_3, mg/l	-	10.0	13.7	18.5	15	-
Na, mg/l	-	5.7	7.65	5.0	7.3	6.8
K, mg/l	-	-	1.0	1.0	0.6	.8
NO_3-N, mg/l	-	LD	LD	LD	LD	.09
F, mg/l	-	.07	-	-	-	-
Color, units	-	160	-	-	-	-
Ca, mg/l	-	5.6	-	-	-	-
Mg, mg/l	-	14.4	-	-	-	-

(L) - Laboratory
(LD - Lower than detection limit
(UF) - Unfiltered
Data not labeled (UF) are filtered

Table 8

SUMMARY OF RECENT WATER QUALITY DATA FOR MW-3
LENA ROAD LANDFILL

Parameter	01-05-83	11-01-83	12-13-83	01-10-84	02-06-84	04-09-84	EPA
Metals							
Fe, mg/l	8.8(UF)	5.86	4.86	4.39	4.7	5.4	15.0(UF)
Mn, mg/l	-	LD	LD	LD	LD	LD	.045(UF)
Zn, mg/l	-	.01	.02	.02	.02	.03	.08(UF)
Hg, mg/l	-	LD	LD	LD	LD	LD	.0004(UF)
Cr, mg/l	-	LD	LD	LD	.03	LD	-
Cd, mg/l	-	LD	LD	LD	LD	LD	-
Pb, mg/l	-	LD	LD	LD	LD	LD	.02(UF)
As, mg/l	-	-	-	-	-	-	.06(UF)
Indicators							
TDS, mg/l	-	340	340	404	310	350	
Cond., µmhos/cm	1600/696(L)	330(L)	392	402	410	-	
pH, units	7.0/6.9(L)	6.2(L)	7.4(L)	6.1	6.1	6.4	
TOC, mg/l	-	-	12.1	11.0	11.2	8.1	
TKN, mg/l	-	-	.97	.57	0.74	-	
Cl, mg/l	107	75.6	82.2	71.1	72.7	91.6	
SO_4, mg/l	-	46.9	66.0	66.7	6.5	15.0	
HCO_3, mg/l	-	62	73.2	77.6	72.6	-	
Na, mg/l	-	50.2	68.9	35.8	73.0	50.3	
K, mg/l	-	-	1.57	2.15	1.16	.9	
NO_3-N, mg/l	-	LD	.02	LD	LD	.04	
F, mg/l	-	.18	-	-	-	-	
CO_2, mg/l		65.4	-	-	-	-	
Color, units	-	140	-	-	-	-	
Ca, mg/l	-	27.2	-	-	-	-	
Mg, mg/l	-	13.4	-	-	-	-	

(L) - Laboratory
(LD - Lower than detection limit
(UF) - Unfiltered
Data not labeled (UF) are filtered

Table 9

SUMMARY OF RECENT WATER QUALITY DATA FOR MW-7
LENA ROAD LANDFILL

Parameter	01-05-83	05-26-83	12-13-83	01-10-84	02-06-84	04-09-84	EPA
Metals							
Fe, mg/l	22(UF)	19.9	4.41	3.78	1.61	205	4.5(UF)
Mn, mg/l	-	-	LD	LD	LD	LD	.08(UF)
Zn, mg/l	-	.053	.02	.01	.01	.05	.015(UF)
Hg, mg/l	-	-	LD	LD	LD	LD	-
Cr, mg/l	-	LD	LD	LD	.02	LD	.02(UF)
Cd, mg/l	-	-	LD	LD	LD	LD	-
Pb, mg/l	-	.014	LD	LD	LD	LD	.005(UF)
Indicators							
TDS, mg/l	-	-	416	592	396	435	
Cond., μmhos/cm	6000/5130(L)	-	395	398	-	-	
pH, units	6.2/8.8(L)	-	7.3(L)	7.0	7.0	7.3	
TOC, mg/l	-	-	41.5	90.5	6.6	39.5	
TKN, mg/l	-	-	20.0	20.0	13	-	
Cl, mg/l	567	-	90.0	54.3	87.2	115	
SO_4, mg/l	-	-	< 2.5	40.3	3.2	-	
HCO_3, mg/l	-	-	145	201	157	-	
Na, mg/l	-	-	76.5	37.8	92.1	70.1	
K, mg/l	-	-	29.3	39.4	40.0	36.7	
NO_3-N, mg/l	-	-	.02	LD	LD	.03	

(L) - Laboratory
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(UF) - Unfiltered
Data not labeled (UF) are filtered

Table 10

SUMMARY OF RECENT WATER QUALITY DATA FOR MW-8
LENA ROAD LANDFILL

Parameter	01-05-83	05-26-83	12-13-83	01-10-84	02-06-84	04-09-84
Metals						
Fe, mg/l	27(UF)	-	9.11	32.5	17.7	30.8
Mn, mg/l	-	-	LD	LD	LD	LD
Zn, mg/l	-	-	.01	0.01	0.02	.05
Hg, mg/l	.002(UF)	-	LD	LD	LD	LD
Cr, mg/l	.08(UF)	-	LD	LD	LD	LD
Cd, mg/l	.16(UF)	-	LD	LD	LD	LD
Pb, mg/l	-	-	LD	LD	LD	LD
Indicators						
TDS, mg/l	-	-	1896	1892	1662	1665
Cond., μmhos/cm	3450/4270	-	2930	3170	3300	-
pH, units	6.3/8.85(L)	-	7.2(L)	6.8	6.6	6.9
TOC, mg/l	-	-	110	118	139	94.8
TKN, mg/l	-	-	181	136	186	-
Cl, mg/l	400	-	328	301	313	285
SO_4, mg/l	-	-	<2.5	<2.5	1.5	-
HCO_3, mg/l	-	-	2011	1792	1882	-
Na, mg/l	-	-	388	222	284	224
K, mg/l	-	-	252	468	36.4	239
NO_3-N, mg/l	-	-	.10	LD	.10	.03

(L) - Laboratory
(LD - Lower than detection limit
(UF) - Unfiltered
Data not labeled (UF) are filtered

Table 11

**SUMMARY OF RECENT WATER QUALITY DATA FOR CW-1
LENA ROAD LANDFILL**

Parameter	01-05-83	05-26-83	12-13-83	01-10-84	02-06-84	04-09-84
Metals						
Fe, mg/l	4.5(UF)	6.8	6.0	6.93	6.01	5.87
Mn, mg/l	-	-	LD	LD	LD	LD
Zn, mg/l	2.6(UF)	LD	.01	.02	.03	.03
Hg, mg/l	.003(UF)	-	LD	LD	LD	LD
Cr, mg/l	.06(UF)	LD	LD	LD	LD	LD
Cd, mg/l	LD(UF)	-	LD	LD	LD	LD
Pb, mg/l	.17(UF)	LD	LD	LD	LD	LD
Indicators						
TDS, mg/l	-	-	212	460	266	258
Cond., μmhos/cm	434/313	-	250	268	222	-
pH, units	7.5/8.9(L)	-	7.9(L)	6.1	6.0	6.4
TOC, mg/l	-	-	31.0	28.5	3.1	24.9
TKN, mg/l	-	-	1.3	.74	.94	
Cl, mg/l	49	-	32.3	24.7	27.1	46.5
SO_4, mg/l	20	-	21.2	22.8	23.0	12
HCO_3, mg/l	-	-	102	97.3	106	-
Na, mg/l	-	-	27	23.0	30.1	29.6
K, mg/l	-	-	<1.0	1.3	.43	.3
NO_3-N, mg/l	175	-	LD	LD	LD	.03
COD, mg/l	124	-	-	-	-	-
Color, units	120	-	-	-	-	-

(L) - Laboratory
(LD - Lower than detection limit
(UF) - Unfiltered
Data not labeled (UF) are filtered

Table 12

SUMMARY OF RECENT WATER QUALITY DATA FOR CW-4
LENA ROAD LANDFILL

Parameter	12-13-83	01-10-84	02-06-84	04-09-84
Metals				
Fe, mg/l	3.64	4.36	2.92	4.06
Mn, mg/l	LD	LD	LD	LD
Zn, mg/l	.02	.02	0.03	.02
Hg, mg/l	LD	LD	LD	LD
Cr, mg/l	LD	LD	LD	LD
Cd, mg/l	LD	LD	LD	LD
Pb, mg/l	LD	LD	LD	LD
Ca, mg/l	.03	-	-	-
Indicators				
TDS, mg/l	792	972	720	702
Cond., µmhos/cm	820(813)L	810	880	-
pH, units	7.6(L)	6.8	6.8	7.3
TOC, mg/l	5.1	20.5	15.7	12.8
TKN, mg/l	2.0	.78	1.1	-
Cl, mg/l	92.0	88.9	85.3	98.3
SO_4, mg/l	94.9	87.5	89.7	100.0
HCO_3, mg/l	359	341	344	-
Na, mg/l	33.7	31.7	38	34.2
K, mg/l	1.07	1.32	.76	.6
NO_3-N, mg/l	.25	LD	LD	.02
F, mg/l	.625	-	-	-
Ca, mg/l	131	-	-	-
Mg, mg/l	31.7	-	-	-

(L) - Laboratory
(LD - Lower than detection limit
(UF) - Unfiltered
Data not labeled (UF) are filtered

Table 13

SUMMARY OF RECENT WATER QUALITY DATA FOR CW-5
LENA ROAD LANDFILL

Parameter	12-13-83	01-10-84	02-14-84
Metals			
Fe, mg/l	5.31	4.86	3.62
Mn, mg/l	LD	LD	.05
Zn, mg/l	.01	.01	.01
Hg, mg/l	LD	LD	LD
Cr, mg/l	LD	LD	LD
Cd, mg/l	LD	LD	LD
Pb, mg/l	LD	LD	LD
Indicators			
TDS, mg/l	224	284	176
Cond., µmhos/cm	238/289(L)	299	175
pH, units	6.6(L)	-	5.8
TOC, mg/l	5.1	4.5	4.0
TKN, mg/l	1.1	.51	.63
Cl, mg/l	41.1	35.6	36.3
SO_4, mg/l	32.8	22.8	14.8
HCO_3, mg/l	65.8	48.0	46.2
Na, mg/l	19.4	21.1	16.4
K, mg/l	7.47	6.28	5.4
NO_3-N, mg/l	0.12	LD	LD
F, mg/l	.08	-	-
Ca, mg/l	26.5	-	-
Mg, mg/l	8.08	-	-

(L) - Laboratory
(LD - Lower than detection limit
(UF) - Unfiltered
Data not labeled (UF) are filtered

Table 14

PIEZOMETERS/OBSERVATION WELLS FOR LENA ROAD LANDFILL

Id Number	Well Dia. (inches)	Land Surface Elevation ft. (NGVD)	Riser Height (feet)	Collection Zone Elevation ft. (NGVD)	Aquifer	Latitude/Longitude Location	Lithology for Screen Interval	Permeability of Material at Screen Interval (cm/sec)	Remarks
MW-1	2	36.8	2.95	25.8 to 30.8	Surficial	82°26'43", 27°27'53"	fine sand	1.8×10^{-3}*	at TH-2
MW-2	2	35.9	1.97	23.9 to 28.9	Surficial	82°26'49", 27°28'02"	fine sand	1.8×10^{-3}	at TH-3
MW-3	2	35.6	0.35	22.6 to 27.6	Surficial	82°26'49", 27°27'56"	fine sand	4.7×10^{-3}	at TH-5
MW-4	2	36.8	2.65	23.3 to 28.3	Surficial	82°26'49", 27°28'12"	fine sand & clayey fine sand	-	at TH-9
MW-5	2	37.3	3.90	25.3 to 30.3	Surficial	82°26'23", 27°28'03"	sl. silty to silty fine sand	3.5×10^{-5}	at TH-11
MW-6	2	37.8	2.45	25.8 to 30.8	Surficial	82°26'23", 27°28'11"	sl. silty to silty fine sand	4.9×10^{-4}	at TH-12
MW-7	2	36.5	3.45	20.5 to 25.5	Surficial	82°26'32", 27°28'20"	fine sand	4.5×10^{-4}	at TH-14
MW-8	2	34.9	4.04	18.9 to 23.9	Surficial	82°26'41", 27°28'20"	fine sand	1.4×10^{-3}	at TH-15
MW-16	2	35.9	2.00	18.9 to 23.9	Surficial	82°26'40", 27°28'27"	fine sand	1.9×10^{-3}	at TH-16
MW-18	2	34.8	2.17	20.8 to 25.8	Surficial	82°26'48", 27°28'33"	fine sand	3.6×10^{-3}	at TH-18
MW-22	2	27.0*	2.71	17.0 to 22.0**	Surficial	82°26'38", 27°29'01"	sl. silty fine sand	4.5×10^{-4}	at TH-22
MW-30	2	31.0*	1.62	15.0 to 20.0**	Surficial	82°26'38", 27°28'48"	sl. silty to clayey fine sand	6.8×10^{-4}	at TH-30
MW-41	2	34.5*	1.75	7.5 to 12.5**	Surficial	82°,26'22", 27°28'32"	sl. silty to silty fine sand	5.5×10^{-4}	at TH-41
PZ-8	2	38.0*	2.50	7.5 to 12.5**	Surficial	82°26'49", 27°28'07"	sl. silty fine sand	3.1×10^{-3}	at TH-8
PZ-27	2	26.0*	1.875	11.0 to 16.0**	Surficial	82°26'55", 27°28'55"	sl. silty fine sand to sandy silt	5.4×10^{-4}	at TH-27
CW-1	2	38.0*	0.92	11.8 to 16.8**	Surficial	82°26'20", 27°28'08"	fine sand	10^{-3}*	also called S-1
CW-2	2	34.0*	2.50	7.5 to 12.5**	Surficial	82°27'01", 27°27'59"	fine sand	10^{-3}*	at TH-19, also called S-2
CW-3	2	36.0*	0.67	10.0 to 15.0**	Surficial	82°26'51", 27°28'17"	fine sand	10^{-3}*	near weight station

*Land surface elevations estimated from November 1982 Southern Resource Mapping Corporation 1" = 100' scale 2' contour interval topo map of landfill.
**Values in depth below land surface.

Table 15

SUMMARY OF WATER QUALITY DATA FOR INDICATOR PARAMETERS
LENA ROAD LANDFILL

Parameter	MW-1	MW-3	MW-7	MW-8	CW-1	CW-4	CW-5
Fe, mg/l	1.5-2.5	4.4-5.9	1.6-4.5	9.1-32	5.9-6.9	2.9-4.4	3.6-5.3
TDS, mg/l	123-350	310-404	396-592	1660-1900	212-460	702-972	176-284
Cond., µmhos/cm	52-58	330-410	395-398	2930-3300	222-268	810-880	175-299
pH, units	5.5-5.8	6.1-6.4	7.0-7.3	6.6-6.9	6.0-6.4	6.8-7.3	5.8
TOC, mg/l	8-15	8-12	7-90	95-139	3-31	5-20	4-5.1
TKN, mg/l	.5-.75	.6-1.0	13-20	136-186	.74-1.3	.78-2.0	.51-1.1
Cl, mg/l	2-27	71-92	54-115	301-328	25-46	85-98	35-41
SO_4, mg/l	1-5	6-67	2-40	1.5-2.5	12-23	88-100	15-33
HCO_3, mg/l	10-18	62-78	145-201	1790-2010	97-106	341-359	46-66
Na, mg/l	5-8	36-73	38-92	222-388	23-30	32-38	16-21
Ca, mg/l	6	27	29-40	40-500	.5-1.0	131	26.5
Mg, mg/l	14	13	-	-	-	32	8.1
Color, units	160	140	-	-	120	-	-

November 1983 to April 9, 1984 Data

LENA ROAD LANDFILL

MANATEE COUNTY, FLORIDA

STAGE III

(GUN CLUB)

DESIGN REPORT

NOVEMBER 1984

briley, wild & associates, inc.
CONSULTING ENGINEERS AND PLANNERS

MANATEE COUNTY, LENA ROAD LANDFILL

OPERATING PERMIT APPLICATION

FOR STAGE III (GUN CLUB)

Report to Florida D.E.R.

Table of Contents

1.0 Summary

This report has been prepared for Manatee County to accompany the application for a permit to construct and operate a solid waste management facility known as the Lena Road Landfill - Stage III (Gun Club).

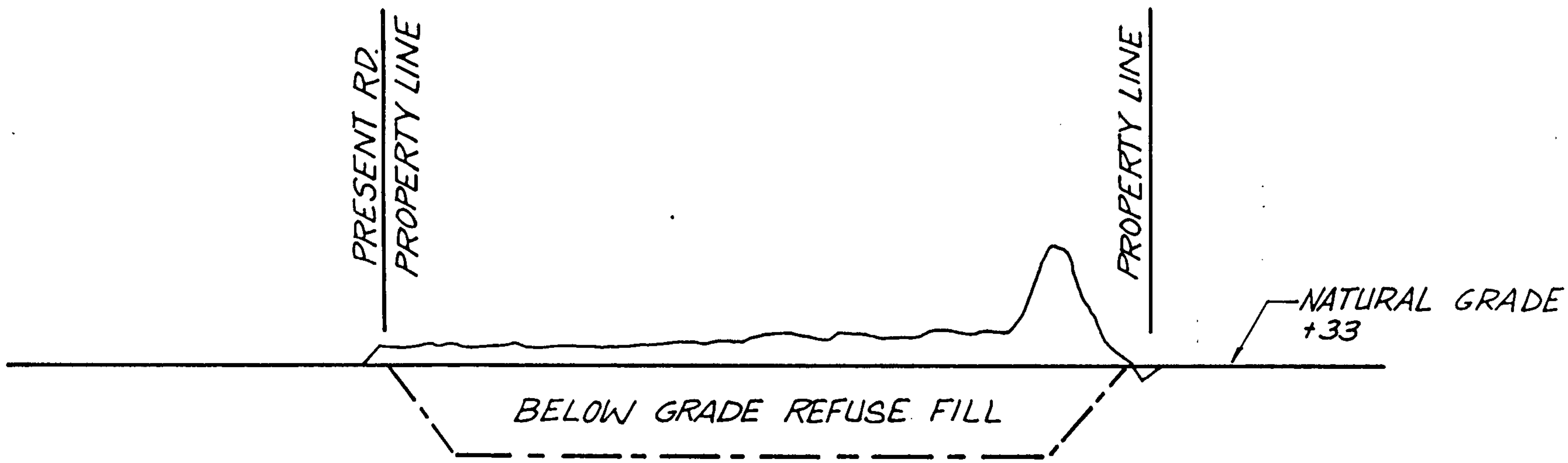
1.1 Background

The Lena Road Landfill Stage III (Gun Club) is located in Section 1, Township 35 South, Range 18 East in Manatee County, Florida. The site is bounded by Lena Road on the north, the Stage I Landfill on the east, Cypress Strand on the west, and a drainage ditch on the south. The property is the site of an old abandoned county landfill. The site is still owned by Manatee County, but is presently being leased to a private organization which uses the site for a gun and archery club. Various kinds of debris have been piled up for backstops for the target ranges. A cross section through the existing site is shown on Exhibit 1.

It has been reported that groundwater contamination has migrated northward from the landfill site. It is the intent of Manatee County to prevent the spread of groundwater contamination from the site, to install a leachate collection system to remove and properly dispose of already contaminated groundwater, and to reduce the amount of percolation available for future leachate formation. The County also intends to improve the aesthetics of the site and to provide proper closure including cover and grading.

1.2 General Design Approach

As indicated in the March 3, 1983 report by Ardaman and Associates, the entire site is underlain by a deep, continuous clay layer which effectively prevents the vertical movement of leachate to the Floridan



EXISTING SECTION

SCALE: HORIZ.: 1" = 300'
VERT.: 1" = 30'

EXHIBIT 1
EXISTING CROSS SECTION

aquifer, which is approximately 300 feet below natural grade in this area. To prevent the lateral movement of potentially contaminated groundwater away from the site, and to prevent uncontaminated groundwater from entering the site and becoming contaminated, a slurry wall will be constructed to surround the site. Included within the slurry wall will be the gun club site and the area immediately north of the gun club, where a leachate plume is believed to extend. A leachate collection system will be installed inside the slurry wall to allow groundwater from the site to be pumped to the leachate pond in Stage I. A peripheral berm will be constructed to conduct surface runoff and to provide stormwater detention.

All exposed refuse will be regraded as necessary to allow surface water to drain from the site and covered with two feet of final cover material. To allow maximum usage of the site, it is proposed to place additional solid waste inside the area, enclosed by the slurry wall and leachate underdrains. This material will be compacted and covered until the contours shown on the plans are achieved.

2.0 Projections of Amount and Nature of Refuse to be Handled

To achieve the desired final contours at the Stage III site, approximately 2,575,000 cubic yards of material would be required. The cover soil requirement has been estimated to be 20 percent of the total volume. Therefore, of the 2,575,000 cubic yards of material, approximately 515,000 cubic yards would be cover material and 2,060,000 cubic yards would be compacted solid waste.

Landfill records for 1982 indicated that the average daily solid waste disposal rate was 700 tons per day, or 218,400 tons per year. Compacted to 1,000 lb/cubic yard, this represents 436,800 cubic yards per year.

Therefore, the Stage III site would be able to accept the refuse generated in Manatee County for a period of approximately 4.7 years. Residential solid waste, commercial solid waste, and yard debris will be accepted at the site. Hazardous waste, including radioactive waste and industrial sludges, will not be accepted.

3.0 Estimated Final Contours Required

The final contours necessary for proper drainage and optimum use of the site are shown on the plans. The proposed interim closure section and final closure section are shown on Exhibit 2.

4.0 Separation of Stormwater Drainage and Leachate Drainage

4.1 General

Ardaman and Associates report dated July 12, 1984, which is included as a part of this permit application includes the Geotechnical and Hydrogeological investigation of the Stage III area. This, and other Ardaman investigations at the site, have revealed the following general conditions upon which the groundwater control for the site is based:

1. The entire Lena Road Landfill site is underlain by a deep, continuous, clay layer which will effectively prevent the vertical movement of leachate to the Floridan aquifer which is approximately 300 feet below natural grade in this location.

2. There is no potential for sink hole formation in the vicinity of the landfill.

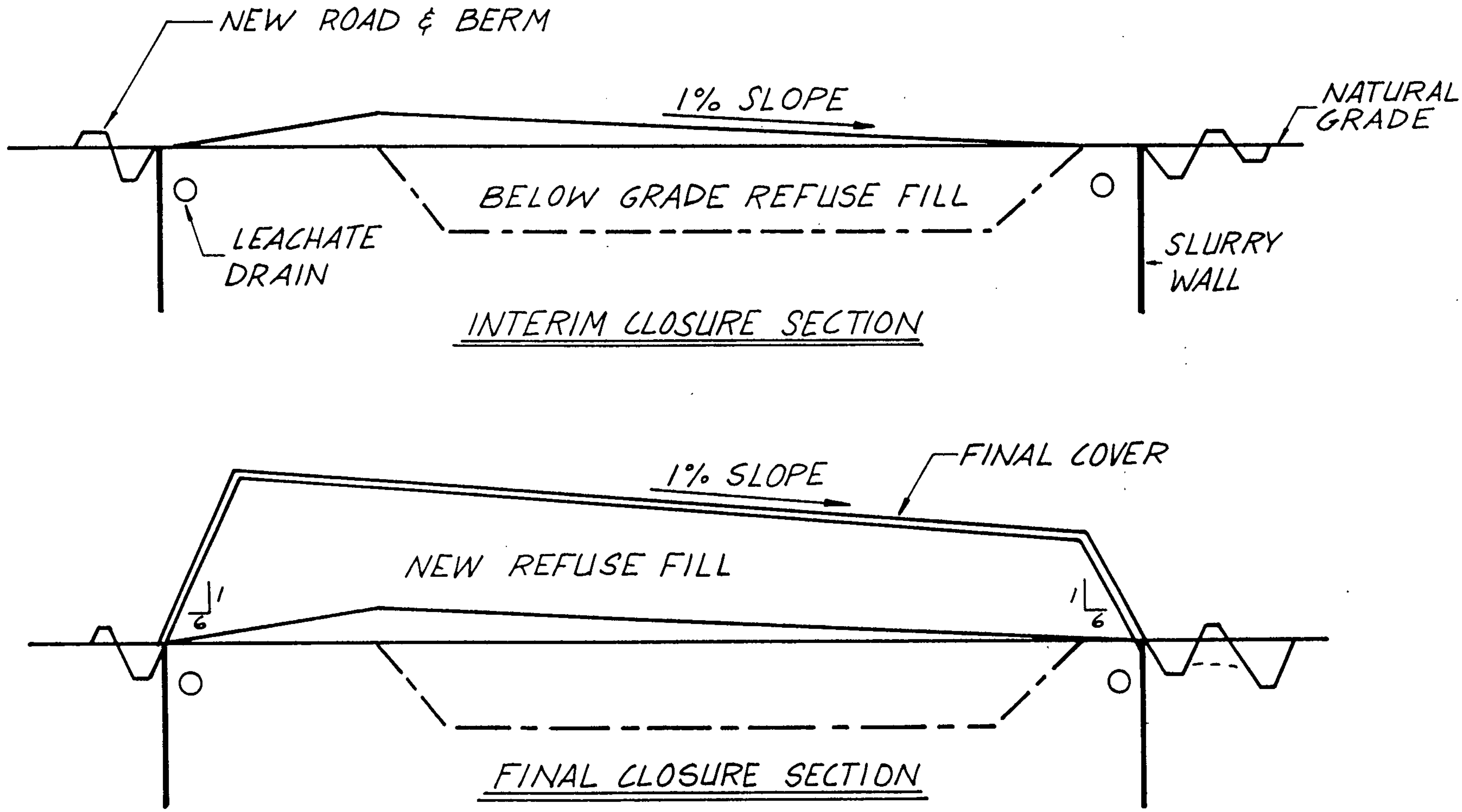


EXHIBIT 2
PROPOSED CROSS SECTIONS

3. Lateral movement of leachate from the site may be prevented either by dewatering enclosing ditches below the groundwater level or by constructing subsurface slurry walls of impermeable material to the clay layer.

4. There is an ample supply of clayey fine sand on site for use as an impervious top cover soil layer to close out the landfill site.

5. Annual water balance studies indicate that under a controlled irrigation program less than 1/2" of water per year is anticipated to percolate into the landfill.

4.2 Leachate

Leachate consists of the liquid fraction of the solid waste, liquid generated during the decay of the organic fraction of the solid waste, and extraneous water that comes into contact with the solid waste. The slurry wall around the site will prevent the lateral movement of groundwater into the fill from the surrounding areas. Therefore, with proper landfill operation, the only major source of extraneous water will be the precipitation that percolates through the cover material.

During construction of the landfill, rainwater may enter the exposed refuse at the working face or penetrate the six inches of daily cover. It is proposed to keep the working face as small as practical and to complete the landfill cover as the landfill progresses, thereby reducing the potential exposure to direct infiltration.

Leachate will be collected in a wrapped perforated drainage pipe constructed parallel with the slurry wall on the landfill side of the wall. The collected leachate will be pumped to the Stage I leachate pond and disposed of on-site through the Stage I spray irrigation system.

A water balance was performed to estimate the quantity of leachate that could reasonably be expected to be produced during the active life of the landfill. The infiltration area would consist of all the area within the slurry wall enclosure, including the working face, the closed portion of the landfill, and the unused portion. The water balance, included in Appendix A, indicates that approximately 5.7 inches per year of infiltration will penetrate the surface and become leachate.

After the site is closed, Ardaman and Associates has estimated that evapotranspiration and runoff may be maintained at high enough levels to limit infiltration to 0.5 inches per year. To achieve this, three objectives must be accomplished:

1. Proper construction and compaction of the final cover layer;

2. establishment of a healthy crop of turf grass and proper irrigation and maintenance of the grass to produce a high evapotranspiration rate; and,

3. proper maintenance of the landfill final contours and drainage facilities to maximize runoff.

The leachate collection system must be capable of functioning under the maximum expected loading. This will occur when the slurry wall is first constructed and the leachate collection system is removing existing groundwater, as well as leachate. This loading is estimated to be the equivalent of 15 inches per year. The actual loading will be attenuated by the solid waste's capacity to adsorb large quantities of water until the waste is saturated. The waste will release this water gradually over time, based on the waste's compaction, composition, and construction.

4.3 Stormwater

The natural drainage from the Stage III site is to the south and west to the Cypress Strand. It is proposed that a peripheral berm be constructed around the site to collect surface runoff and direct it to the Cypress Strand.

The project site totals 77 acres. The Manatee County Soil Atlas indicates that the soil mantle in the site was principally Eau Gallie fine sand (hydrologic group B/D by SCS). Runoff computations for the site were based on hydrologic group D.

Detailed stormwater runoff computations of the 25-Year - 24-Hour Frequency Design Rainfall for both the present and future site condition are shown in Appendix B. For the 25-Year - 24-Hour Design Rainfall, the present peak discharge rate from the site is 346 cfs, and the future peak discharge rate is 166 cfs. The detention pond was designed to attenuate the peak runoff from the future site. A storage volume of 12.45 Ac.-Ft. will be required so that the present peak runoff rate will not be exceeded. While detention facilities are designed for a 25 year - 24 hour Design Rainfall, the conveyance system leaving the site is sized for a 100 year storm.

Runoff from this site will be collected in the perimeter drainage ditches which also will be utilized for stormwater detention. The ditch bottom elevation is 35.0 with a width of 20 ft. Side slopes are 3 to 1, length is 7,000 ft. and the overflow weir will be set at elevation 38.5 ft. The dimensions of this ditch provide storage for 14 Ac.-Ft. of runoff exceeding the required 12.45 Ac.-Ft. for this site.

The collected stormwater runoff will overflow through a weir into the adjacent wetland, which is presently a drainage path.

To comply with the DER stormwater management regulations, the storage capacity of the detention pond should be restored within 72 hours following a rainfall event. The underdrain system is designed to discharge the detained 12.45 Ac.-Ft. of runoff in 72 hours. A total of 600 ft. of 8-inch underdrain pipes will be installed under the pond bottom for this purpose.

5.0 Equipment

The current sanitary landfill operation at the Lena Road site has in use the following major items of equipment:

1 - 1-1/2 cubic yard diagline
1 - 3/4 cubic yard diagline
1 - Compactor
1 - Loader
1 - Pan scraper
3 - Dozers

The projected work of remediating the Stage III site is to be performed concurrently with the ongoing operation of the existing landfill.

Major new work items which are projected in the report include:

1. Constructing subsurface slurry wall trenches.

2. Construct leachate collection system and leachate pump station.

3. Construct the perimeter berm and drainage ditch for surfacewater collection.

6.0 Contingency Plan

The Lena Road Landfill, including Stages I and II as projected, will have by far the largest available capacity for solid waste disposal in this part of Florida. The area of the entire site, totalling almost 450 acres is sufficient to cope with most conceivable natural disasters, such as flood, wind or fire. The temporary movement of the active working disposal point as much as 3/4 of a mile in distance is possible within the property limits. In the remote possibility of a more general disaster, the Sarasota Landfill would be available for back-up. However, as stated earlier, the very size of the Lena Road Landfill makes it more logical for it to act as a back-up for other sites than to be dependent on others.

Concerning possible equipment failure, it has been the policy at the landfill to use short-term rental equipment to supplement the regular plant machinery when extended breakdowns occur. This policy has proven workable and is planned to continue.

7.0. Operating Procedures

1. Responsible Personnel

Operating authority	- Manatee County Department of Public Utilities
Department Manager	- Richard A. Wilford
Landfill Superintendent	- Ronald Cox

2. Control of Type of Waste Received at Site

   No disposal of hazardous, chemical, flammable or infectious waste is contemplated at this landfill site. Visual inspection of the refuse trucks is the responsibility of the weight master. Spotters at the operating face have the responsibility for further inspection of refuse loads as they are unloaded. Any suspicious loads will be held up or rejected subject to approval by County or State environmental authorities.

3. Weigh scales are planned for installation in approximately one years time. Scale installation will be coordinated with the construction of a new entrance to the landfill directly from State Route 64.

4. Monitor Wells shall be provided in accordance with the recommendations of the Ardaman Report, page 6-2 of Chapter 6. These wells are listed as follows:

   MW-1
   2
   3
   4

5
6
7
8
CW-1
2
3
TH-16
TH-41

5. Monitoring Points

Monitoring of the surface runoff in the ditch is recommended along with monitoring of the leachate at the pump station and the leachate pond.

6. All solid waste shall be spread in layers of approximately two (2) feet in thickness and compacted to approximately one (1) foot in thickness before the next layer is applied. Bulky materials such as tree stumps or large pieces of concrete which are not easily compacted shall be worked into other materials as much as practical. Following such compaction the solid waste shall be covered with initial cover.

7. All compacted solid waste shall be formed into cells with working face and side grades at a slope of approximately thirty (30) degrees. Cell depth shall be constrained by the type of operation, the daily volume of waste, width of the working face, and good safety pratices.

8. The working face of a cell shall be kept as narrow as is consistent with the proper operation of trucks and equipment to minimize exposed areas.

9. An intermediate cover of one (1) foot of compacted earth in addition to six (6) inch initial cover shall be applied within seven (7) days of cell completion if final cover is not to be applied within one (1) year of cell completion.

10. Pesticides used to control rodents, flies and other insects shall be as specified by the Florida Department of Agriculture and Consumer Services. (Chapter 5E-2, F.A.C.).

11. Uncontrolled and unauthorized scavenging shall not be permitted at landfill site.

Land disposal site shall be closed in accordance with the following criteria:

1. Access to the site shall be restricted by an effective barrier designed to prevent unauthorized entry into the landfill site.

2. Information signs shall be placed at the entrance to the site and on roads leading to the site stating that it is closed, the penalty for dumping at the site, the location and hours of operation of the alternate approved site and the name of the operating agency.

3. A responsible person shall be assigned to supervise the closing procedures on a full time basis during the closing operations.

4. Two (2) feet of final cover material is required before final closing of the site. The cover material shall be compacted in six (6) inch layers with the final six (6) inches loosely compacted to promote plant growth. The sides of all completed landfills shall have a slope not steeper than one (1) foot vertical to three (3) feet horizontal to minimize erosion.

5. Upon completion, the closed site shall be seeded or planted with grass or suitable cover vegetation.

6. After completion, the closed site shall be properly maintained. This includes erosion control, maintenance of grass cover, prevention of ponding and prevention of deposited waste from becoming a hazard or nuisance until the site is stabilized.

7. Continued monitoring of the potential polluting sites is required. Collection and treatment of leachate will also be required until the site is stabilized.

8. Upon completion the closed site shall be publicly recorded in the county property recording office.

8.0 Zoning Conformance

The area on which the Facility is located is zoned A, an agricultural zoning. Public uses are permissible in all zoning districts, such as A-agricultural zones.

9.0 Gas Migration Control

Due to the presence of biodegradable organics in the landfill it is anticipated that some generation of methane will occur. Volatile toxic compounds are not anticipated since compounds which contain or generate such compounds are not accepted at this landfill.

The problem of gas control is thus limited to the control of the lateral movement of methane offsite. The basic devices employed at this site to contain leachate movement will also be effective in restricting gas migration. These include the surface water ditches and the subsurface impermeable slurry trenches. The typar wrapped drain pipes upstream of the slurry trenches will also aid as methane vent conductors to the leachate pump station.

No additional special devices are anticipated to be needed to restrain methane migration.

APPENDIX A

WATER BALANCE
LENA ROAD LANDFILL - STAGE III
(GUN CLUB)

APPENDIX A

WATER BALANCE
LENA ROAD LANDFILL - STAGE III (GUN CLUB)

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
T.°F	60.9	61.8	66.4	70.8	76.0	79.7	81.2	81.5	80.5	74.5	67.5	62.0	
H.I.	5.85	6.13	7.62	9.13	11.05	12.49	13.09	13.21	12.81	10.48	7.99	6.25	116.1
U.P.E.	.05	.06	.08	.11	.15	.17	.18	.19	.18	.14	.09	.06	
P.E.	1.38	1.58	2.47	3.53	5.22	5.86	6.37	6.44	5.51	3.39	2.43	1.62	45.80
P. in	2.77	3.03	2.92	2.02	3.24	7.38	8.82	9.60	8.45	3.10	1.97	2.37	55.67
P-P.E.	1.39	1.45	.45	-1.51	-1.98	1.52	2.45	3.16	2.94	- .29	- .46	.75	9.87
Acc. Pot. W.L.				-1.51	-3.49	-1.97				- .29	- .75		
ST	3.0	3.0	3.0	1.79	.90	1.52	3.0	3.0	3.0	2.71	2.32	3.0	
ST				-1.21	- .89	+ .62	+1.48			- .29	- .39	+ .68	
A.E.	1.38	1.58	2.47	3.23	4.13	5.86	6.37	6.44	5.51	3.39	2.36	1.62	44.34
S	1.39	1.45	.45	0	0	.90	.97	3.16	2.94	0	0	.07	
R.O.	.70	.72	.22	0	0	.45	.48	1.58	1.47	0	0	.04	
Perc	.69	.73	.23	0	0	.45	.49	1.58	1.47	0	0	.03	5.67

NOTES

The monthly water balance was calculated using the procedures and tables presented in "Instruction and Tables for Computing Potential Evapotranspiration and the Water Balance" by C.W. Thornthwaite and J.R. Mather, Drexel Institute of Technology Publications, Climatology Volume X, Number 3, 1957.

T °F	Average monthly temperature in degrees from Climatological Data - National Oceanic and Atmospheric Administration.
H.I.	Heat Index - from Thornthwaite and Mather
U.P.E.	Unadjusted potential evapotranspiration - from Thornthwaite and Mather.
P.E.	Potential evapotranspiration - from Thornthwaite and Mather
P	Total average monthly precipitation in inches from Climatological Data: National Oceanic and Atmospheric Administration.
P-P.E.	Precipitation minus the potential evapotranspiration.
Acc. Pot W.L.	Accumulated potential water loss - calculated as per Thornthwaite and Mather.
ST	Storage - soil moisture storage calculated as per Thornthwaite and Mather.
ST	Change in soil moisture storage

A.E. Actual evapotranspiration - calculated as per Thornthwaite and Mather.

S Moisture surplus - calculated as per Thornthwaite and Mather.

R.O. Runoff - assumed to be 50 percent of the surplus water available for runoff.

Perc. Percolation - the moisture surplus minus the runoff.

APPENDIX B

SURFACE RUNOFF CALCULATIONS

(REFERENCE: SCS TR-55)

Landowner MANATEE COUNTY　　Location LENA ROAD LANDFILL

Engineer BRILEY, WILD & ASSOC., INC.　　Practice GUN CLUB (STAGE III)

Date 10/25/84　　Zoning OK ______　　Drainage Area 77 Ac

PRESENT (✓) FUTURE ( ) LAND USE DESCRIPTION	CONDITION	HYDROLOGIC SOIL GROUP A ACRES	A CN	B ACRES	B CN	C ACRES	C CN	D ACRES	D CN	PRODUCT ACRES X CN
Pasture or Range Land	Poor		68		79		86	~~77~~	89	~~6545~~
	Good		40		61		74		80	
Wood or Forest Land	Poor		52		66		77		83	
	Moderate		40		55		70		77	
Cultivated Land or Groves	Poor		72		81		88		91	
	Good		62		71		78		81	
Impervious Land	NA		95		95		95		95	
Shell Parking	NA		45		60		75		80	
Swampland	NA		-		-		-		90	
See Table 2-2 (TR55) Residential Land	Avg. % Impervious									
1/8 Acre	65		77		85		90		92	
1/4 Acre	38		61		75		83		87	
1/3 Acre	30		57		72		81		86	
1/2 Acre	.25		54		70		80		85	
1 Acre	20		51		68		79		84	

% SLOPE	FACTOR (SF)
0-.2	0.5 Flat
.2-.6	0.7 "
.7-.8	0.9 "
1.0	1.0 "
2.0	1.1 "
3-5	1.0 Mod.
6-7	1.1 "
8-12	0.9 Steep
13-20	1.0 "
21-25	1.1 "
26-35	1.2 "

Drainage Area (DA) 77 Acres(Ac)　Total Product 6545

Weighted Curve Number(CN) = $\frac{\text{Total Product}}{\text{DA (Ac)}}$

$= \frac{6545}{77}$ = CN 85

Design Frequency Storm	Rainfall, In.	Runoff, In.
25 Year	9	7.19
100 Year	11	9.14

Average Slope of Drainage Area = 0.5 %

Peak Rate of Discharge, 25 Year = 33 cfs/In. of Runoff

Peak Discharge (Q), 25 Year = 33 (Peak Rate of Q) cfs/In. X 7.19 (Runoff) In X 0.7 (SF) = 166 cfs

Runoff Volume (V), 25 Year = 7.19 (Runoff) In X 77 (DA) Ac X $\frac{1}{12}$ = 46. Ac-Ft

Peak Rate of Discharge, 100 Year = ______ cfs/In. of Runoff

Peak Discharge (Q), 100 Year = ______ (Peak Rate of Q) cfs/In. X ______ (Runoff) In. X ______ (SF) = ______ cfs

Weighted CN greater than 75, compute Retention Volume, 1st Inch of Rainfall = Runoff ______ X DA ______ X $\frac{1}{12}$ = ______ Ac-f

100 Year Peak Retention - TR 55 Page 7-8 - 7-10

$\frac{Q_o}{Q_i}$ = $\frac{\text{Present Peak}}{\text{Future Peak}}$ from Surface Runoff Work Sheet　V_s = Volume Storage　V_r = Future Runoff

$\frac{Q_o}{Q_i}$ = $\frac{166}{346}$ = 0.48　Find $\frac{V_s}{V_r}$ from Chart 7-2 pg. 7-8 = 0.29　$\frac{\frac{V_s}{V_r} \text{ X Future Runoff x Drainage Area}}{12}$

0.29 x 6.69 x 77/12 = 12.45 Ac-FT

Form Date 10/22/79

SURFACE RUNOFF WORK SHEET

(REFERENCE: SCS TR-55)

Landowner MANATEE COUNTY

Location LENA ROAD LANDFILL

Engineer BRILEY, WILD & ASSOC., INC.

Practice GUN CLUB (STAGE III)

Date 10/25/84 Zoning OK ______

Drainage Area 77 Ac

PRESENT ( ) FUTURE (✓) LAND USE DESCRIPTION	CONDITION	HYDROLOGIC SOIL GROUP A ACRES	A CN	B ACRES	B CN	C ACRES	C CN	D ACRES	D CN	PRODUCT ACRES X CN
Pasture or Range Land	Poor		68		79		86		89	
	Good		40		61		74	70	80	5600
Wood or Forest Land	Poor		52		66		77		83	
	Moderate		40		55		70		77	
Cultivated Land or Groves	Poor		72		81		88		91	
	Good		62		71		78		81	
Impervious Land	NA		95		95		95		95	
Shell Parking	NA		45		60		75		80	
Swampland	NA		-		-		-	7	90	630
See Table 2-2 (TR55) Residential Land	Avg.% Impervious									
1/8 Acre	65		77		85		90		92	
1/4 Acre	38		61		75		83		87	
1/3 Acre	30		57		72		81		86	
1/2 Acre	.25		54		70		80		85	
1 Acre	20		51		68		79		84	

% SLOPE	FACTOR (SF)
0-.2	0.5 Flat
.2-.6	0.7 "
.7-.8	0.9 "
1.0	1.0 "
2.0	1.1 "
3-5	1.0 Mod.
6-7	1.1 "
8-12	0.9 Steep
13-20	1.0 "
21-25	1.1 "
26-35	1.2 "

Drainage Area (DA) 77 Acres (Ac) Total Product 6230

Weighted Curve Number (CN) = $\frac{\text{Total Product}}{\text{DA (Ac)}}$

SLOPE 1.0% 49Ac
16.7% 28Ac
0 % 10Ac
WEIGHED SLOPE = 6.7%

$= \frac{6230}{77}$ = CN 80.9 ~ 81

Design Frequency Storm	Rainfall, In.	Runoff, In.
25 Year	9	6.69
100 Year	11	8.61

Average Slope of Drainage Area = 6.7 %

Peak Rate of Discharge, 25 Year = 47 cfs/In. of Runoff

Peak Discharge (Q), 25 Year = 47 (Peak Rate of Q) cfs/In. X $\frac{6.69}{\text{(Runoff)}}$ In X $\frac{1.1}{\text{(SF)}}$ = 346 cfs

Runoff Volume (V), 25 Year = $\frac{6.69}{\text{(Runoff)}}$ In X $\frac{77}{\text{(DA)}}$ Ac X $\frac{1}{12}$ = 43 Ac-Ft

Peak Rate of Discharge, 100 Year = ______ cfs/In. of Runoff

Peak Discharge (Q), 100 Year = ______ (Peak Rate of Q) cfs/In. X ______ (Runoff) In. X ______ (SF) = ______ cfs

Weighted CN greater than 75, compute Retention Volume, 1st Inch of Rainfall = Runoff ______ X DA ______ X $\frac{1}{12}$ = ______ Ac-f

100 Year Peak Retention - TR 55 Page 7-8 - 7-10

$\frac{Q_o}{Q_i} = \frac{\text{Present Peak}}{\text{Future Peak}}$ from Surface Runoff Work Sheet V_s = Volume Storage V_r = Future Runoff

$\frac{Q_o}{Q_i}$ = ______ Find $\frac{V_s}{V_r}$ from Chart 7-2 pg. 7-8 $\frac{\frac{V_s}{V_r} \text{ X Future Runoff x Drainage Area}}{12}$

Form Date 10/22/79

Ardaman & Associates, Inc.

Consultants in Soils, Hydrogeology,
Foundations and Materials Testing

December 31, 1984
File Number 82-7047

Briley, Wild & Associates
Post Office Box 607
Ormond Beach, Florida 32074

Attention: Mr. John W. Cumming, P.E.

Subject: Proposal for Additional Deep Monitor Wells at the Lena Road and Gun Club Landfill Sites

Gentlemen:

During the week of December 14, 1984, the FDER stated that additional "deep" monitor wells will be required to prove that the existing landfills are not the source of contaminates alleged to be entering a private domestic well in the vicinity of the landfill. Under our existing contract, one deep monitor well is being installed north of the Lena Road landfill in a location just outside the proposed slurry wall in this area (i.e., SA-1). The additional "deep" wells will be similarly installed in detail to the well now under construction. The proposed wells are 4-inch diameter PVC wells with 50± feet of screw-coupled casing and 50 feet of open hole for a total depth of 100 feet. No SPT boring nor <u>in situ</u> permeability will be performed for any of these new wells. Cuttings <u>will be</u> logged from the rotary wash drilling procedure. A core log for TH-43 is included for reference.

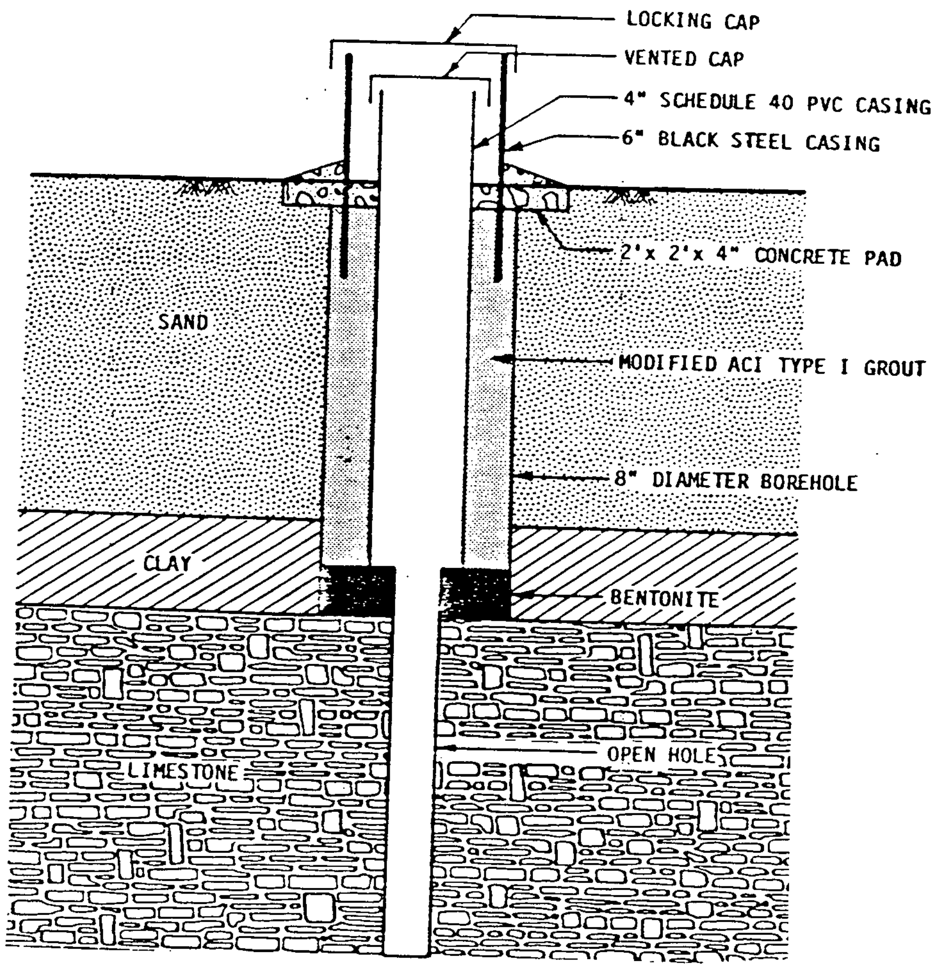
Three new wells are proposed for this program. These wells are shown on Figure 3.1 (i.e., SA-2, SA-3, and SA-4). Two of these sites are on the Adams property north of Lena Road, and north of the proposed slurry wall. The third well is west of the Gun Club landfill, south of Lena Road and east of Cypress Strand at the GC-1 surficial aquifer monitor well site. The estimated costs for these wells are $2000 each or $6000. Monthly invoices will be based on the time expended, materials used and unit prices in accordance with our existing fee schedule for the well under construction. Please do not hesitate to contact the undersigned should you have questions or need additional information. We appreciate the opportunity for continued service on this project.

Very truly yours,
ARDAMAN & ASSOCIATES, INC.

Herbert G. Stangland, Jr., P.E.
Senior Water Resources Engineer

John E. Garlanger, Ph.D., P.E.
Principal
Florida Registration No. 19782

HGS:cc
Enclosure
cc: G. Schmidt (w/encl.)



SCHEMATIC OF SECONDARY ARTESIAN AQUIFER WELL INSTALLATION

Ardaman & Associates, Inc.
Consulting Engineers in Soil Mechanics, Foundations, and Material Testing

HYDROGEOLOGICAL INVESTIGATION
LENA ROAD LANDFILL
MANATEE COUNTY, FLORIDA

DRAWN BY: H.A.D.	CHECKED BY:	DATE: 5/2/85
FILE NO. 82-7047	APPROVED BY:	

84758

K&E 19-1353

FIGURE 3

See February 24, 1984 report for copy of core log for TH-43.

See March 3, 1983 report, Figure 3.1, for the well locations.

Ardaman & Associates, Inc.

Consultants in Soils, Hydrogeology,
Foundations and Materials Testing

January 8, 1985
File Number 82-7047

Florida Department of Environmental Regulation
7601 Highway 301 North
Tampa, Florida 33610

Attention: Mr. Ed Snipes

Subject: Lena Road Landfill - Proposed Locations for Intermediate Aquifer Monitor Wells

Gentlemen:

In December 1984, FDER and Manatee County discussed at a meeting in Tampa the FDER water quality analyses for the Lena Road and Gun Club landfill areas. The Adams property well water had selected priority pollutants above detection limits. The enclosed proposal identifies the existing and proposed secondary artesian well network for determining possible contamination from the landfill areas. The network of artesian aquifer wells includes SA-1 (i.e., well under construction), F (i.e., existing weigh station well), SA-2, SA-3, and DER SA Well (i.e., Adams property wells), and SA-4 (proposed well between Gun Club landfill and Cypress Strand). The SA-2 and SA-3 wells are at the approximate edge of the plume in the surficial aquifer as documented by the EM surveys.

Please review the enclosed map for concurrence with location of secondary artesian aquifer wells. Your prompt attention to this matter is appreciated.

Very truly yours,
ARDAMAN & ASSOCIATES, INC.

Herbert G. Stangland, Jr., P.E.
Senior Water Resources Engineer

John E. Garlanger, Ph.D., P.E.
Principal
Florida Registration No. 19782

HGS:cc
Enclosure

cc: J. Cumming
Briley, Wild & Associates

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

A60
82-7047

SOUTHWEST DISTRICT

7601 HIGHWAY 301 NORTH
TAMPA, FLORIDA 33610

January 30, 1985

Mr. John E. Garlanger, Ph.D., P.E.
Ardaman & Associates, Inc.
Post Office Box 13003
Orlando, FL 32809

Dear Mr. Garlanger:

Re: Proposal for additional intermediate monitor wells at the Lena Road and Gun Club Landfill Sites, Manatee County

The Department has reviewed and approves of the locations of the four intermediate wells (SA-1 under construction, SA-2, SA-3, and SA-4) contained in Ardaman and Associates' proposal dated January 3, 1985.

Please contact Gardner Strasser of our Groundwater Section, or myself if you have any questions.

Sincerely,

Andrew S Berry

Andrew S. Berry
Environmental Specialist

ASB/lgb

cc: Gardner Strasser
Rick Hicks, Groundwater, Tallahassee, DER

Ardaman & Associates, Inc.

Consultants in Soils, Hydrogeology, Foundations and Materials Testing

February 1, 1985
File Number 82-7047

Florida Department of Environmental Regulation
7601 Highway 301 North
Tampa, Florida 33610

Attention: Mr. Gardner Strasser

Subject: Lena Road Landfill - Proposed Seal Procedures for Intermediate Aquifer Monitor Wells

Gentlemen:

As requested, this letter documents the seal procedures to be used for the intermediate aquifer wells for the subject wells. This letter supplements information already provided to Mr. Ed Snipes in our letter dated January 8, 1985 on subject project. In that letter the figure entitled, "Schematic of Secondary Artesian Aquifer Well Installation", shows the proposed well construction. The following procedures more fully document the procedures to be used.

- The 8-inch diameter hole will be drilled with mud into the first hard layer to set the casing.
- The 4-inch diameter schedule 40 PVC casing will be inserted into the open hole.
- The inside of the 4-inch diameter pipe will be drilled out with clean water from the weigh station well. The tools will be steam cleaned before inserting them inside the 4-inch diameter casing.
- Bentonite balls will be placed inside the casing at the bottom and the casing will be lifted up to allow the bentonite balls to form a seal at the bottom of the 8-inch hole as shown in the above mentioned figure. The casing will be inserted into the bentonite ball layer.
- A cement grout using 1 bag cement with 6 gallons of well water will be tremie grouted from the bottom to the top in the 4-inch annular space.
- The cement grout will set for 24 hours before the 2.94-inch diameter open hole is drilled through the bottom of the casing to the desired depth (i.e., 50$^{\pm}$ feet of open hole). The tools will be steam cleaned with water from the weigh station well before drilling the open hole.

8008 S. Orange Avenue, P.O. Box 13003, Orlando, Florida (305) 855-3860
Offices in: Bartow, Bradenton, Cocoa, Fort Lauderdale, Fort Myers, Miami, Naples, Panama City Beach, Riviera Beach, Sarasota, Tallahassee

We trust that this explanation meets your requirements. If any other information is needed, please do not hesitate to contact us. Well construction will begin February 4, 1985 on the four new wells.

Very truly yours,
ARDAMAN & ASSOCIATES, INC.

Herbert G. Stangland, Jr., P.E.
Senior Water Resources Engineer

John E. Garlanger, Ph.D., P.E.
Principal
Florida Registration No. 19782

HGS:cc

cc: J. Cumming, Briley, Wild & Associates
T. Leto, Ardaman & Associates
E. Snipes, FDER

Ardaman & Associates, Inc.

Consultants in Soils, Hydrogeology,
Foundations and Materials Testing

May 8, 1985
File Number 82-7047

Briley Wild and Associates, Inc.
Post Office Box 607
Ormond Beach, Florida 32074

Attention: Mr. John Cumming

Subject: Response to FDER Questions, Construction Permit Application, Lena Road Landfill, Stage III, Manatee County, Florida

Gentlemen:

The following are our responses to the questions posed by FDER in their letter of December 14, 1984 concerning the above subject permit application.

4.a. Please provide specifications on construction and supervision of the slurry wall. (Include composition and mixing method for slurry wall material.)

Refer to pages 2-22 to 2-27 of the Project Manual entitled "Lena Road Landfill Improvements - Stage I; Part A - Slurry Wall and Leachate Collection System; Manatee County, Florida".

4.b. What assurances can be given that the slurry wall is tied into the confining clays throughout the extent of the wall?

As stated in the project manual, a qualified representative of the Engineer will examine the soil excavated from the bottom of the trench to confirm the presence of the confining clay. Measurements made of the depth to the top of the clay layer and the bottom of the trench at 50-foot intervals will document that the trench is excavated 3 feet into the confining clay. The top of the clayey stratum at approximately 400-foot intervals will also be determined prior to letting bids for the project through the performance of soil test borings.

7. Please provide details on the location, construction and sampling of the intermediate depth monitoring wells north of the Gun Club site.

The location of the two intermediate depth monitoring wells installed north of the Gun Club landfill are shown in Figure 1. These wells were initially drilled on February 2 through 11, 1985. Casing was set at a depth of 50 feet and an open hole was drilled to a depth of 100 feet. Pumping of these wells at this depth and in situ permeability tests indicated very low specific capacities and permeabilities. Consequently, on April 21 through 27, 1985 the wells were deepened to 160 feet, which is the same depth as the well at the landfill weigh

8008 S. Orange Avenue, P.O. Box 13003, Orlando, Florida (305) 855-3860
Offices in: Bartow, Bradenton, Cocoa, Fort Lauderdale, Fort Myers, Miami, Naples, Panama City Beach, Riviera Beach, Sarasota, Tallahassee

station. The wells at these depths also had low specific capacities. However, samples were obtained from each of these wells by the drillers and submitted to Manatee County for determination of the parameters listed below:

- pH
- Conductivity
- Total Alkalinity
- Turbidity
- TOC
- Chloride

After the results of these analyses are obtained and reviewed a decision will be made on the requirements for further development of the well and/or the wells will be sampled and analyzed for VOC's and purgeables (FAC 17-22).

8. Analyses for metal should be run on unfiltered rather than filtered samples.

It has been our experience that analyses for metals performed on samples having turbidities in excess of 1 to 3 NTU are likely to indicate results that are not representative of groundwater quality. Suspended solids at these turbidities are very low, less than 1 to 2 mg/l. At these low levels, the water would appear to be essentially clear. Although we agree that a monitor well with turbidity in excess of 10 to 20 NTU (i.e., with cloudy water) should probably be developed further prior to sampling, we do not believe that purging and pumping at a slower rate (e.g., less than 1 gpm) will assure turbidities less than 1 to 3 NTU for all wells. Field filtering samples with turbidities less than 10 NTU is not at all difficult and does not add significantly to the sampling time. Furthermore, we have found no evidence that filtering affects the analytical results.

If FDER insists that analyses for metals be performed on unfiltered samples, we recommend that the samples also be analyzed for turbidity. If the measured turbidity exceeds 1 NTU the analytical results should contain a note which states that the analyses for metals may not be representative of actual groundwater quality.

9. The pH and conductivity of the well discharge should stabilize prior to sampling.

We agree.

10. Well MW-1 appears to be more acceptable as a background well than CW-2.

We have no objection.

11. Existing monitoring wells in the vicinity of the Gun Club, which may have glued joints, may be used for monitoring if organic parameters related to PVC and PVC glue are discounted provided, however, that they are not significantly higher than the levels reported in the ORT report.

We agree.

12. The following table shows a proposed parameter list and monitoring frequency for this facility.

Parameter or Parameter Group	Monitoring Frequency
Volatile Organic Compounds	Quarterly for at least one year
All other priority organic pollutants	Initially and then at least annually
Primary and Secondary Metals	Initially and then at least annually
Indicator parameters (field pH, field conductance, TDS, TKN nitrate, chloride, sodium, hydrogen sulfide	Quarterly, review data after 1 year and possibly modify

Please provide the rationale for any variation from this schedule.

The above parameter list may be appropriate for monitoring the water quality within a suspected leachate plume, e.g., downgradient from a landfill without a functioning leachate collection system. The proposed Stage III landfill expansion will be surrounded by a slurry wall to contain and an underdrain system to collect leachate from the landfill. The purpose of the proposed monitoring system (see response to question 15) is to monitor the performance of the slurry wall, which will be located beyond the limits of any existing plume. (The location of the wall will be determined based on EM survey data and sampling of temporary well points.)

Existing groundwater quality at each of the proposed wells will be determined by sampling and analyzing the well water initially for the following list of parameters.

- Primary and Secondary Drinking Water Standards, excluding microbiological, radiological and trihalomethane parameters (17-22 FAC)
- Purgeables (17-22 FAC)

After the slurry wall and leachate collection system is installed and the Stage III expansion becomes operational, all of the monitor wells will be sampled and analyzed quarterly for the following list of indicator parameters.

- pH (field)
- Conductivity (field)
- Temperature (field)
- TDS
- TKN
- TOC
- Total Alkalinity
- Sodium
- Chloride
- Turbidity

If the results of the quarterly monitoring indicate an increasing trend in the above parameters (or a decreasing trend in pH) for three successive quarters then at the end of the fourth quarter, the list of parameters to be analyzed for will be expanded to include the following:

- Primary Drinking Water Inorganics
- Primary Drinking Water Organics and Volatile Organics

13. The ORT samples clearly show that three wells tapping the secondary artesian units contained volatile organic compounds. A well should be constructed west (downgradient) of the Gun Club Landfill and completed to monitor the water-producing strata encountered beneath confining beds. Total depth of the wells should be similar to the depth of the FDER intermediate aquifer wells, about 100 feet.

    Although we disagree that the ORT samples clearly show that three wells tapping the secondary aquifer contained volatile organic compounds, we agree that the proposed monitoring plan for the landfill expansion should contain a secondary aquifer well downgradient from the Gun Club landfill. The well may have to be deeper than 100 feet, however (see response to Question 7).

14. A (surficial aquifer) well located along the southern property boundary in the vicinity of the westernmost EM conductivity measurements made by the consultant parallel to that boundary would be appropriate.

    We have no objection.

15. Since the Gun Club site is now going to be proposed as an additional fill area and may be expanded northward, revised monitoring well locations should be submitted.

    Groundwater monitoring for the Stage III landfill expansion will utilize seven new wells located as shown on Figure 1. The surficial aquifer wells will monitor the performance of the slurry wall. These wells will be screened from 6 feet below ground surface to within 1 foot of the top of the clayey layer at the bottom of the surficial aquifer, i.e., for essentially the full depth of the aquifer. A schematic of the proposed wells is shown in Figure 2. As shown the wells are located approximately 50 feet downgradient from the edge of the slurry wall within the zone of discharge to provide early detection of any leakage through the wall.

The surficial aquifer monitor wells will use 2-inch diameter threaded PVC casing and will be installed in 4-inch boreholes. The wells will be developed by purging and pumping until the water is clear of sediment. All wells will have steel protective casing with a hinged locked cap. A 2.5-foot square concrete pad sloping away from the well will be installed around each well.

Three intermediate aquifer wells will monitor the performance of the confining clay layer. These 4-inch diameter wells will be cased for approximately 50 feet and will be open hole from 50 feet to 160 feet. The weigh station well at the landfill is 160 feet deep. A schematic of the proposed wells is shown in Figure 3. These wells will be developed by pumping until the water is clear of sediment. These wells will also have a hinged locked cap and be surrounded by a 2.5-foot square concrete pad.

We trust that the above responses are sufficient for your immediate needs. If you have additional questions or need further assistance, please do not hesitate to contact us.

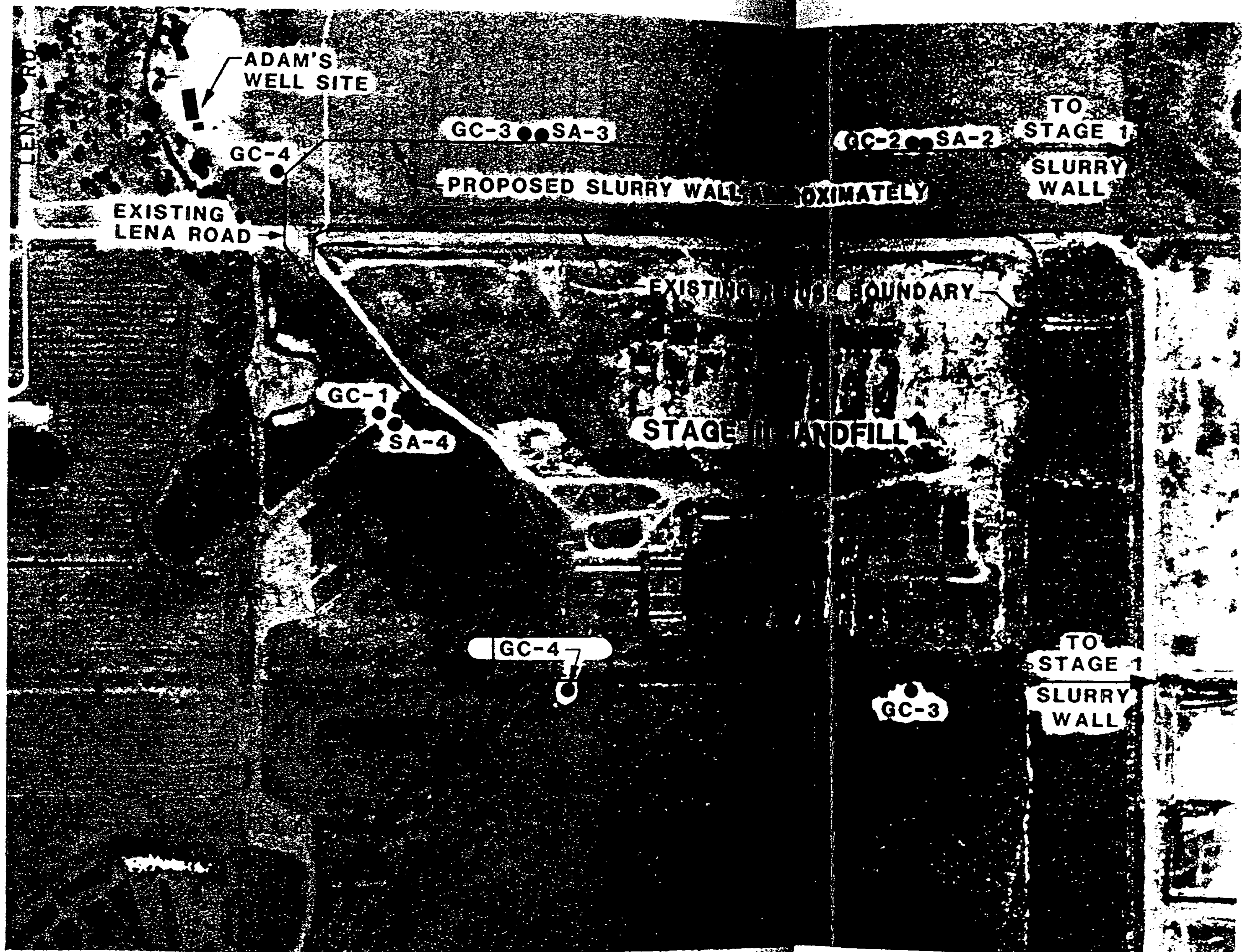
Very truly yours,
ARDAMAN & ASSOCIATES, INC.

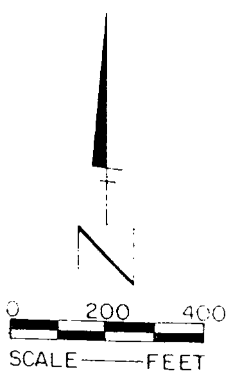
Herbert G. Stangland, Jr., P.E.
Senior Water Resources Engineer

John E. Garlanger, Ph.D., P.E.
Principal
Florida Registration No. 19782

JEG:ed

Enclosures





PROPOSED MONITORING WELL LOCATIONS

(PHOTO TAKEN 10/80)

LEGEND

—·— EXTENT OF REFUSE

● MONITORING WELL LOCATIONS

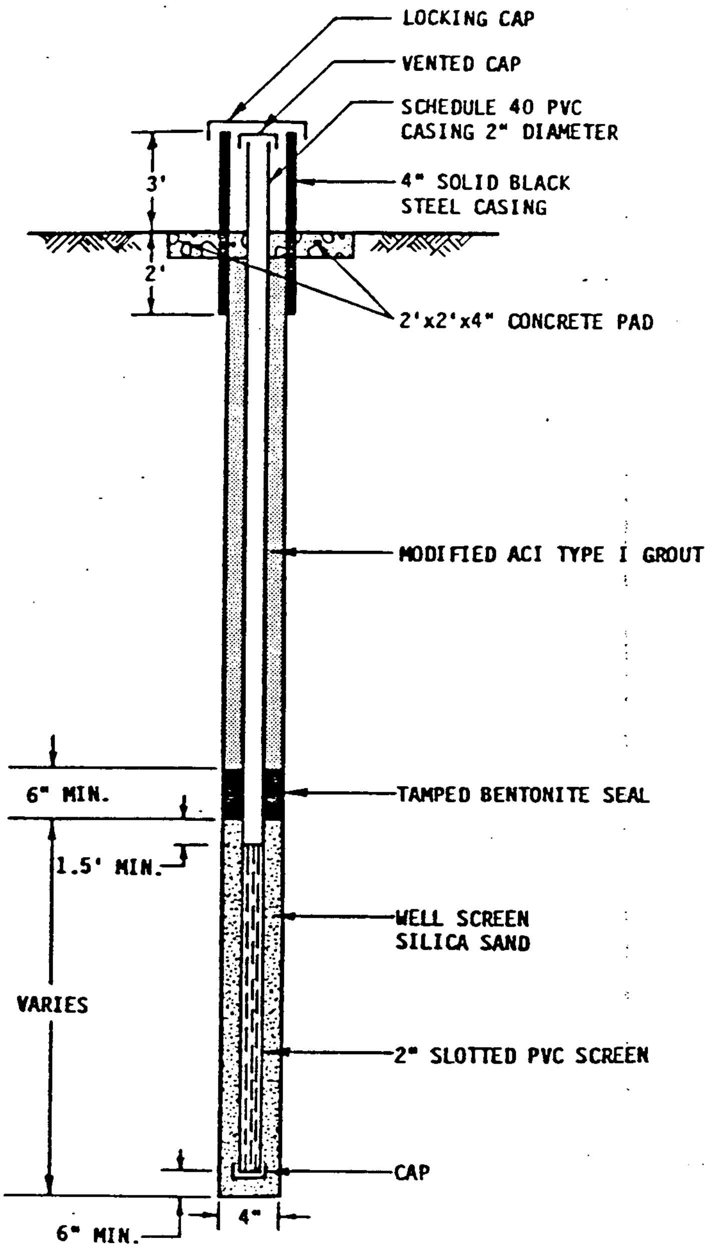
SA- ARTESIAN AQUIFER WELL

GC- SURFICIAL AQUIFER WELL

N[illegible]

Ardaman & Associates, Inc. Consulting Engineers in Soil Mechanics, Foundations, and Material Testing	
HYDROGEOLOGICAL SURVEY GUN CLUB LANDFILL MANATEE COUNTY, FLORIDA	
DRAWN BY [illegible] CHECKED BY [illegible]	DATE [illegible]
FILE NO. 82-7047	APPROVED BY [illegible]

FIGURE [illegible]



SCHEMATIC OF MONITORING WELL INSTALLATION

Ardaman & Associates, Inc.
Consulting Engineers in Soil Mechanics, Foundations, and Material Testing

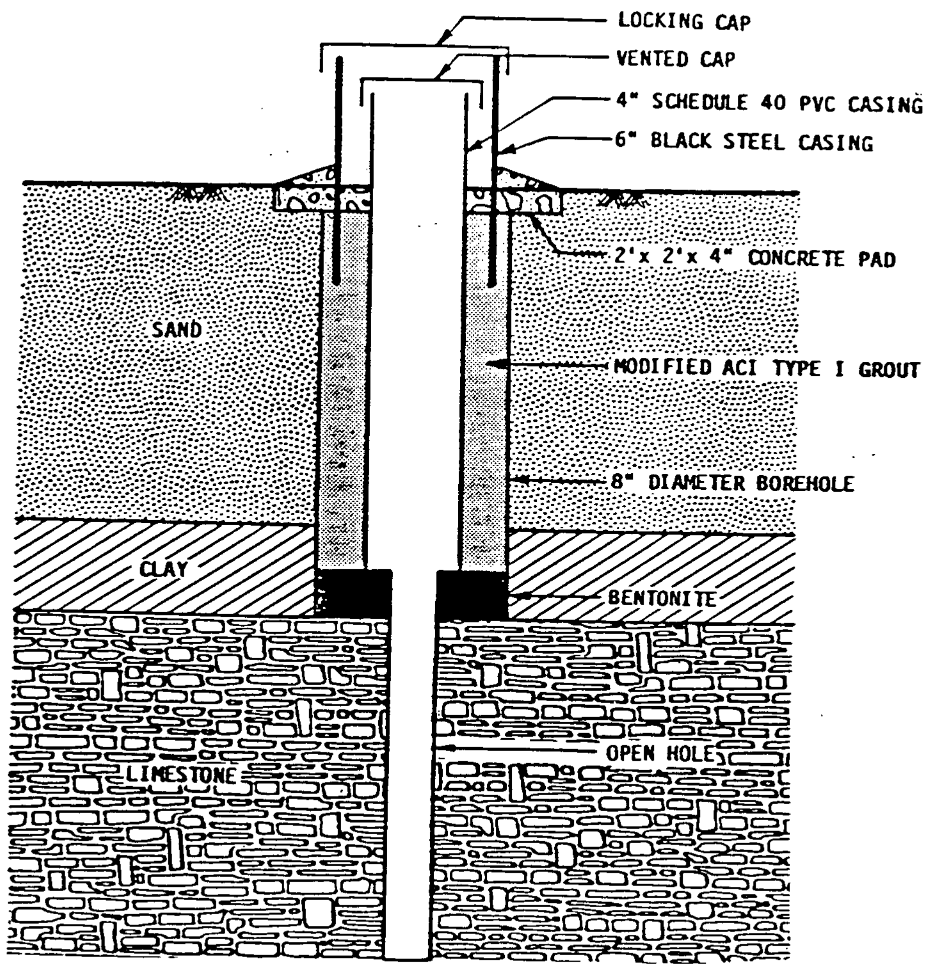
HYDROGEOLOGICAL SURVEY
GUN CLUB LANDFILL
MANATEE COUNTY, FLORIDA

DRAWN BY: H.A.D.	CHECKED BY: HGS	DATE: 5/2/85
FILE NO. 82-7047	APPROVED BY: [signature]	

64758

K&E 19-1353

FIGURE 2



SCHEMATIC OF SECONDARY ARTESIAN AQUIFER WELL INSTALLATION

Ardaman & Associates, Inc.
Consulting Engineers in Soil Mechanics, Foundations, and Material Testing

HYDROGEOLOGICAL SURVEY
GUN CLUB LANDFILL
MANATEE COUNTY, FLORIDA

DRAWN BY: H.A.D.	CHECKED BY: HGS	DATE: 5/2/85
FILE NO. 82-7047	APPROVED BY:	

64758

K&E 19-1353

FIGURE 3

EXHIBIT "H"

STATE OF FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION
FINANCIAL RESPONSIBILITY CHECKLIST

I GENERAL INFORMATION:

ID No. ______

Facility Name: Lena Road Landfill Permit No.: S041-118353 Expiration Date: 6/1/92

Address (Main Entrance): 3333 Lena Road, Bradenton, Florida 34202

Address (Mailing): Caller Service 25010, Bradenton, Florida 34206

Permittee (Operating Authority): Manatee Facility Lat/Long: 27°28'/82°26' Fill Acreage: 307.6

TYPE OF LANDFILL:

X Class I
__ Class II
__ Class III: Trash/Yard Trash
__ Exempt; Type of Exemption: ______

Closure Plan Approved:
X Yes
__ No

Reviewing Person (Include Title): Robert Hall, Utility Engineer Date: 2/10/92

II GENERAL SOLID WASTE LANDFILL:

A. Type of Financial Document Submitted to Ensure Financial Responsibility:

__ Trust Fund Agreement
__ Letter of Credit
__ Insurance Certificate
__ Standby Trust Fund Agreement
__ Performance Bond (only for landfills with an approved closure plan)
__ Financial Guarantee Bond
__ Escrow Account
X Other (Explain): Reserve Fund

B. General Solid Waste Landfill Estimated Itemized Closure Cost for the Time Period in the Landfill Operation When the Extent and Manner of its Operation Makes Closing Most Expensive

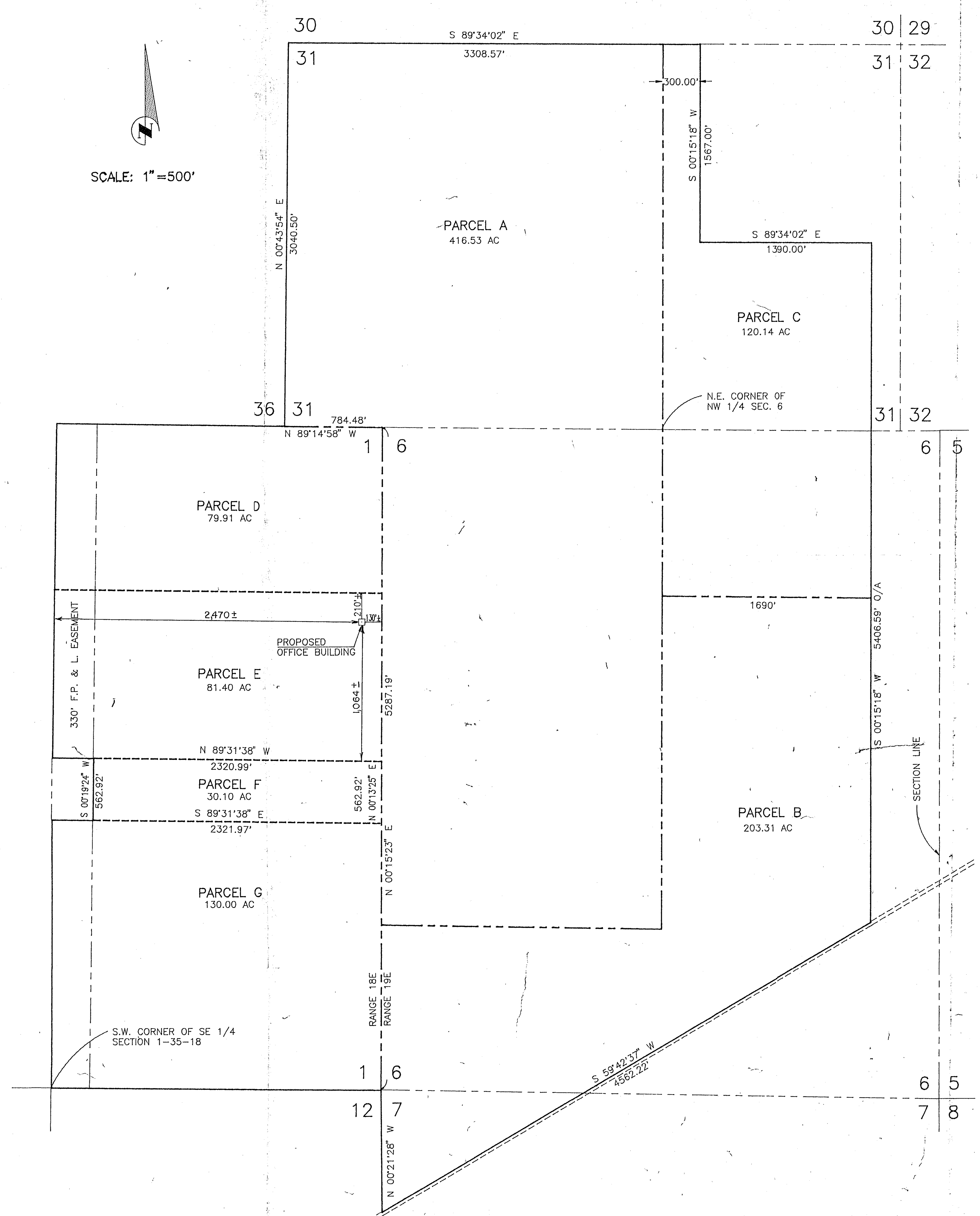
ITEM	UNIT COST	TOTAL COST	SOURCE OF ESTIMATE (THIRD PARTY WORK)
1. MONITORING WELLS			
Borehole Excavation			
Backfill	7,600	250,000	Ardaman
Gravel Pack			
Slotted Screen			
Casing			
Cap			
2. SLOPE AND FILL			
Excavation	N/A	N/A	
Placement/Spreading			
Compaction			
Delivery of Off Site Material			
3. COVER MATERIAL			
Clay Admixture			
Synthetic Material	.44/SF	5,888,216	In-House
On-Site Clay/Soil			
Off Site Clay/Soil	6.50/CY	6,442,722	
4. TOP SOIL COVER			
Purchase	6.00	1,486,932	Westra Construction
Delivery	1.50	371,733	
Spreading	2.00	499,644	
Compaction	1.50	371,733	
5. CONTOUR GRADING AND SURFACE WATER DIVERSION (STORMWATER CONTROL)			
Excavation, Grading and Recontouring			
Diversion Ditch and Berm Construction			
6. GAS MIGRATION CONTROL			
Passive Type			
Active Type	Active	600,000	
7. REVEGETATION			
Spreader			
Soil Preparation/Grading			
~~Seeding~~ Sod	2.25/SY	3,344,233	
Fertilizer			
Mulch			
Sprinkling			
8. SECURITY SYSTEM			
Fencing			
Gate(s)	160 acres	50,000	
Sign(s)			
9. BENCHMARK INSTALLATION	5@5,000	25,000	
10. CERTIFICATION OF CLOSURE	1600/acre	500,000	
TOTAL CLOSURE COST		19,829,213	

C. General Solid Waste Landfill Estimated Itemized Annual Cost of Long Term Care.

	ITEM	UNIT COST	TOTAL ANNUAL COST	SOURCE OF ESTIMATE (Third Party Work)
1.	GROUNDWATER MONITORING Quality Sampling	3,125	100,000	
2.	GAS MONITORING		20,000	
3.	MAINTENANCE OF LEACHATE COLLECTION SYSTEM AND GROUNDWATER MONITORING WELLS		50,000	
4.	COLLECTION AND DISPOSAL/ TREATMENT OF LEACHATE		50,000	
5.	BENCHMARK MAINTENANCE	5 @ 2,000	10,000	
6.	LANDSCAPE MAINTENANCE Mowing Fertilizing Sprinkling		35,000	
7.	MAINTENANCE OF COVER INTEGRITY AND SURFACE WATER CONTROLS		35,000	
8.	REMEDIAL ACTION		25,000	
	TOTAL ANNUAL COST OF LONG TERM CARE		325,000	

SECTION 8

DRAWING INDEX



PARCEL "A" (FORMERLY PARCEL A AND B) DESCRIPTION: AS FURNISHED

THE SOUTH 1/2 OF THE N.W. 1/4 AND THE NORTH 1/2 OF THE S.W. 1/4 OF SECTION 6, TOWNSHIP 35 SOUTH, RANGE 19 EAST.

ALSO:

THE NORTH 1/2 OF THE N.W. 1/4 OF SECTION 6, TOWNSHIP 35 SOUTH, RANGE 19 EAST; AND ALL OF SECTION 31, TOWNSHIP 34 SOUTH, RANGE 19 EAST; LESS THAT PART OF SECTION 31, LYING EAST OF A LINE WHICH IS THE NORTHERLY EXTENSION OF THE EAST LINE OF THE N.W. 1/4 OF SECTION 6, TOWNSHIP 35 SOUTH, RANGE 19 EAST.

PARCEL "B" DESCRIPTION: AS FURNISHED

THAT PART OF SECTION 6, TOWNSHIP 35 SOUTH, RANGE 19 EAST, LYING NORTHERLY OF THE NORTHERLY LINE OF THAT CERTAIN GAS LINE EASEMENT RUNNING DIAGONALLY THROUGH THE PROPERTY; LESS THE SOUTH 1/2 OF THE N.W. 1/4 AND THE NORTH 1/2 OF THE S.W. 1/4 OF SAID SECTION 6; ALSO LESS THAT PART OF SECTION 6, LYING NORTHERLY OF A LINE WHICH IS THE EASTERLY EXTENSION OF THE NORTH LINE OF THE SOUTH 1/2 OF THE N.W. 1/4 OF SAID SECTION 6; ALSO LESS THAT PART OF SECTION 6 LYING EASTERLY OF A LINE WHICH IS PARALLEL WITH AND 1690 FEET EASTERLY OF THE EAST LINE OF THE N.W. 1/4 OF SAID SECTION 6 AND ANY NORTHERLY OR SOUTHERLY EXTENSION THEREOF.

ALSO:

THAT PART OF SECTION 7, TOWNSHIP 35 SOUTH, RANGE 19 EAST LYING NORTHERLY OF THE NORTHERLY LINE OF THAT CERTAIN GAS LINE EASEMENT RUNNING DIAGONALLY THROUGH THE PROPERTY

PARCEL "C" DESCRIPTION: AS FURNISHED

THAT PART OF SECTION 6, TOWNSHIP 35 SOUTH, RANGE 19 EAST, MORE FULLY DESCRIBED AS BEING BOUNDED ON THE NORTH BY THE NORTH LINE OF SAID SECTION 6, AND BOUNDED ON THE WEST BY THE EAST LINE OF THE N.W. 1/4 OF SAID SECTION 6, AND BOUNDED ON THE SOUTH BY THE EASTERLY EXTENSION OF THE NORTH LINE OF THE SOUTH 1/2 OF THE N.W. 1/4 OF SAID SECTION 6, AND BOUNDED ON THE EAST BY A LINE WHICH LIES 1690 FEET EASTERLY OF AND PARALLEL WITH THE EAST LINE OF THE N.W. 1/4 OF SAID SECTION 6.

ALSO:

THAT PART OF SECTION 31, TOWNSHIP 34 SOUTH, RANGE 19 EAST, MORE FULLY DESCRIBED AS BEING BOUNDED ON THE NORTH BY THE NORTH LINE OF SAID SECTION 31, AND BOUNDED ON THE WEST BY A LINE WHICH IS THE NORTHERLY EXTENSION OF THE EAST LINE OF THE N.W. 1/4 OF SECTION 6, TOWNSHIP 35 SOUTH, RANGE 19 EAST, AND BOUNDED ON THE SOUTH BY A LINE WHICH LIES 1567 FEET SOUTHERLY OF AND PARALLEL WITH THE NORTH LINE OF SECTION 31, TOWNSHIP 34 SOUTH, RANGE 19 EAST AND BOUNDED ON THE EAST BY A LINE, WHICH LIES 300 FEET EASTERLY OF AND PARALLEL WITH THE NORTHERLY EXTENSION OF THE EAST LINE OF THE N.W. 1/4 OF SECTION 6, TOWNSHIP 35 SOUTH, RANGE 19 EAST.

ALSO:

THAT PART OF SECTION 31, TOWNSHIP 34 SOUTH, RANGE 19 EAST, MORE FULLY DESCRIBED AS BEING BOUNDED ON THE NORTH BY A LINE WHICH LIES 1567 FEET SOUTHERLY OF AND PARALLEL WITH THE NORTH LINE OF SECTION 31, TOWNSHIP 34 SOUTH, RANGE 19 EAST AND BOUNDED ON THE WEST BY THE NORTHERLY EXTENSION OF THE EAST LINE OF THE N.W. 1/4 OF SECTION 6, TOWNSHIP 35 SOUTH, RANGE 19 EAST, AND BOUNDED ON THE SOUTH BY THE SOUTH LINE OF SECTION 31, TOWNSHIP 34 SOUTH, RANGE 19 EAST, (ALSO BEING THE NORTH LINE OF SECTION 6, TOWNSHIP 35 SOUTH, RANGE 19 EAST) AND BOUNDED ON THE EAST BY A LINE WHICH LIES 1690 FEET EAST OF AND PARALLEL WITH THE NORTHERLY EXTENSION OF THE EAST LINE OF THE N.W. 1/4 OF SECTION 6, TOWNSHIP 35 SOUTH, RANGE 19 EAST.

ALL OF THE ABOVE BEING AND LYING IN MANATEE COUNTY, FLORIDA

PARCELS A, B, AND C, BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

BEING AT THE S.W. CORNER OF SECTION 31, TOWNSHIP 34 SOUTH, RANGE 19 EAST; THENCE N 00°43'54" E, ALONG WEST BOUNDARY OF SAID SECTION 31, A DISTANCE OF 3040.50 FEET TO THE N.W. CORNER OF SAID SECTION 31; THENCE S 89°34'02" E, ALONG NORTH BOUNDARY OF SAID SECTION 31, A DISTANCE OF 3308.57 FEET; THENCE S 00°15'18" W, A DISTANCE OF 1567.00 FEET; THENCE S 89°34'02" E, A DISTANCE OF 1390.00 FEET; THENCE S 00°15'18" W, DISTANCE OF 5406.59 FEET TO THE NORTH RIGHT OF WAY LINE OF A GAS LINE EASEMENT; THENCE S 59°42'37" W, ALONG SAID RIGHT OF WAY LINE, A DISTANCE OF 4562.22 FEET TO THE WEST BOUNDARY OF SECTION 7, TOWNSHIP 35 SOUTH, RANGE 19 EAST; THENCE N 00°21'28" W, ALONG SAID WEST BOUNDARY LINE OF SAID SECTION 7, TO THE S.W. CORNER OF SECTION 6, TOWNSHIP 35 SOUTH, RANGE 19 EAST; THENCE N 00°15'23" E, ALONG WEST BOUNDARY OF SAID SECTION 6, A DISTANCE OF 5287.19 FEET TO THE N.W. CORNER OF SAID SECTION 6; THENCE N 89°14'58" W, ALONG SOUTH BOUNDARY OF SECTION 31, TOWNSHIP 34 SOUTH, RANGE 19 EAST, A DISTANCE OF 784.48 FEET TO THE POINT OF BEGINNING. LYING AND BEING IN MANATEE COUNTY, FLORIDA.

SUBJECT TO PERTINENT EASEMENTS, RIGHTS OF WAY, AND RESTRICTIONS OF RECORD.

CONTAINING 740.20 ACRES, MORE OR LESS.

PARCEL "D" (FORMERLY ADAMS PROPERTY)

THE NORTH HALF (N 1/2) OF THE NORTHEAST QUARTER (NE 1/4) OF SECTION 1, TOWNSHIP 35 SOUTH, RANGE 18 EAST, MANATEE COUNTY, FLORIDA, LESS ANY PORTION CONVEYED TO EAST AND WEST COAST RAILWAY IN DEED BOOK 61, PAGE 547, PUBLIC RECORDS OF MANATEE COUNTY, FLORIDA; SUBJECT TO RIGHT-OF-WAY AGREEMENT RECORDED IN OFFICIAL RECORDS BOOK 485, PAGE 250, AND SUBJECT TO EASEMENT TO FLORIDA POWER & LIGHT COMPANY RECORDED IN OFFICIAL RECORDS BOOK 981, PAGE 3999, BOTH OF PUBLIC RECORDS OF MANATEE COUNTY, FLORIDA.

PARCEL "E" (OLD GUN CLUB)

S 1/2 OF NE 1/4 SUBJECT TO EASEMENT AS DESCRIBED IN OFFICIAL RECORDS BOOK 485, PAGE 242, PRMCF P-1-1 PI#001464400009.

PARCEL "F" (KNOWN AS WWTP)

THE NORTH 30 ACRES OF THE SE 1/4 OF SECTION 1, TWP 35 S., RANGE 18 E., MANATEE COUNTY, FLORIDA, LESS THE WEST 330 FEET OF FLORIDA POWER AND LIGHT COMPANY EASEMENT, MORE PARTICULARLY DESCRIBED AS FOLLOWS: BEGIN AT THE NE CORNER OF THE SE 1/4 OF SECTION 1, TWP 35 S., RGE 18 E; THENCE N 89°31'38" W, ALONG THE NORTH LINE OF SAID SE 1/4, 2320.99 FEET TO THE INTERSECTION WITH THE EAST LINE OF A 330 FOOT WIDE FLORIDA POWER AND LIGHT COMPANY EASEMENT; THENCE S 00°19'24" W, ALONG SAID EAST EASEMENT LINE, PARALLEL TO THE WEST LINE OF SAID SE 1/4 AND 330.0 FEET EASTERLY THEREFROM, 562.92 FEET; THENCE S 89°31'38" E, PARALLEL TO THE NORTH LINE OF SAID SE 1/4, 2321.97 FEET TO THE INTERSECTION WITH THE EAST LINE OF SAID SE 1/4; THENCE N 00°13'25" E, ALONG SAID EAST LINE, 562.92 FEET THE P.O.B., BEING AND LYING IN THE SE 1/4 OF SECTION 1, TWP. 35S, RGE 18E, MANATEE COUNTY, FLORIDA. CONTAINING 30.00 ACRES

PARCEL "G" (UNDEVELOPED PROPERTY)

THE SE 1/4 OF SECTION 1, TOWNSHIP 35 SOUTH, RANGE 18 EAST, LESS 30 ACRES PREVIOUSLY CONVEYED TO MANATEE COUNTY, RECORDED IN OFFICIAL RECORD BOOK 947, PAGE 1386, OF THE PUBLIC RECORDS OF MANATEE COUNTY, FLORIDA, SUBJECT TO FLORIDA POWER AND LIGHT COMPANY EASEMENT AS DESCRIBED IN OFFICIAL RECORD BOOK 1006, PAGE 2513; AND SUBJECT TO UTILITY EASEMENT AS DESCRIBED IN OFFICIAL RECORD BOOK 1029, PAGE 3064.

THIS SKETCH IS A TRUE REPRESENTATION OF THE ABOVE LEGAL DECRIPTION OF LANDS OF MANATEE COUNTY IN THE VICINITY OF THE LENA ROAD LANDFILL, AND IS NOT A SURVEY. THE ABOVE DESCRIPTIONS ARE FROM OFFICIAL RECORDS ON FILE IN MANATEE COUNTY, FLORIDA, AS OF MAY 11, 1990.

John G. Parker

JOHN G. PARKER,

P.L.S. #4502, STATE OF FLORIDA
MAY 14, 1990

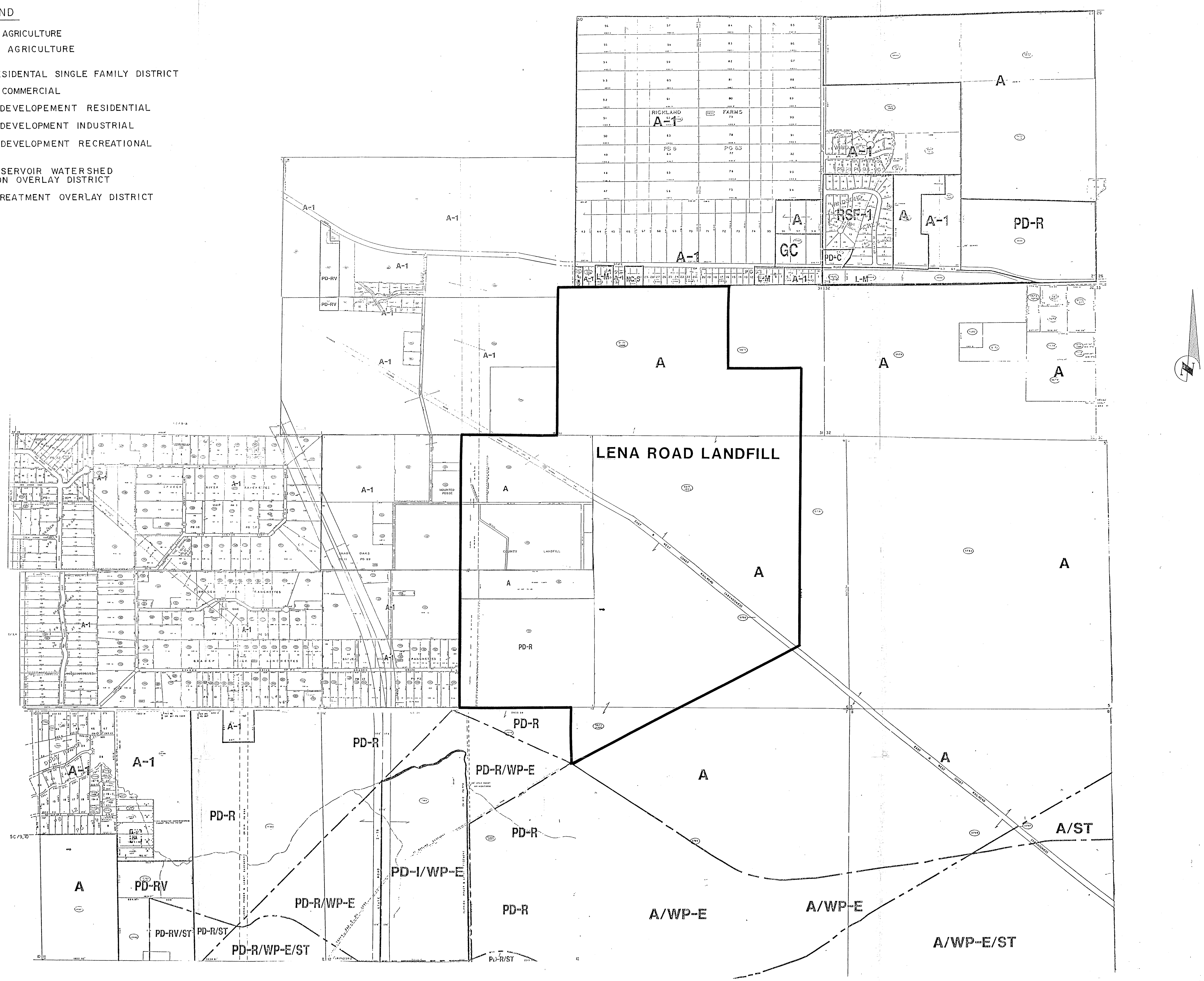
PROPOSED OFFICE BUILDING
LOCATION ADDED 5/15/90
JGP

SKETCH OF LEGAL DESCRIPTIONS FOR MANATEE COUNTY PROPERTIES (LENA ROAD LANDFILL AREA)

DESIGNED R.T.H. CHECKED J.G.P. DATE 5/90 SCALE 1"=500'
DRAWN V.M. COMP JOB NO. FILE NO. SHEET 1 OF 10

LEGEND

A: GENERAL AGRICULTURE
A - I: SUBURBAN AGRICULTURE
RSF - (1, 2, 3, 4.5) RESIDENTAL SINGLE FAMILY DISTRICT
GC: GENERAL COMMERCIAL
PDR: PLANNED DEVELOPEMENT RESIDENTIAL
PDI: PLANNED DEVELOPMENT INDUSTRIAL
PDRV: PLANNED DEVELOPMENT RECREATIONAL VEHICLE
WPE: EVERS RESERVOIR WATERSHED PROTECTION OVERLAY DISTRICT
ST: SPECIAL TREATMENT OVERLAY DISTRICT



MANATEE COUNTY PUBLIC WORKS DEPARTMENT

LENA ROAD LANDFILL ZONING & LAND USE PLAN 485-4615-534

REVISION		DATE
	BY	DATE
SURVEYED		
DESIGNED		
DRAWN	P.H	1/92
CHECKED		

FILE NO.: 485-4615-534
PROJECT NO.:
VERTICAL SCALE:
HORIZONTAL SCALE: 1" = 800'
SEAL

SHEET 2 OF 10

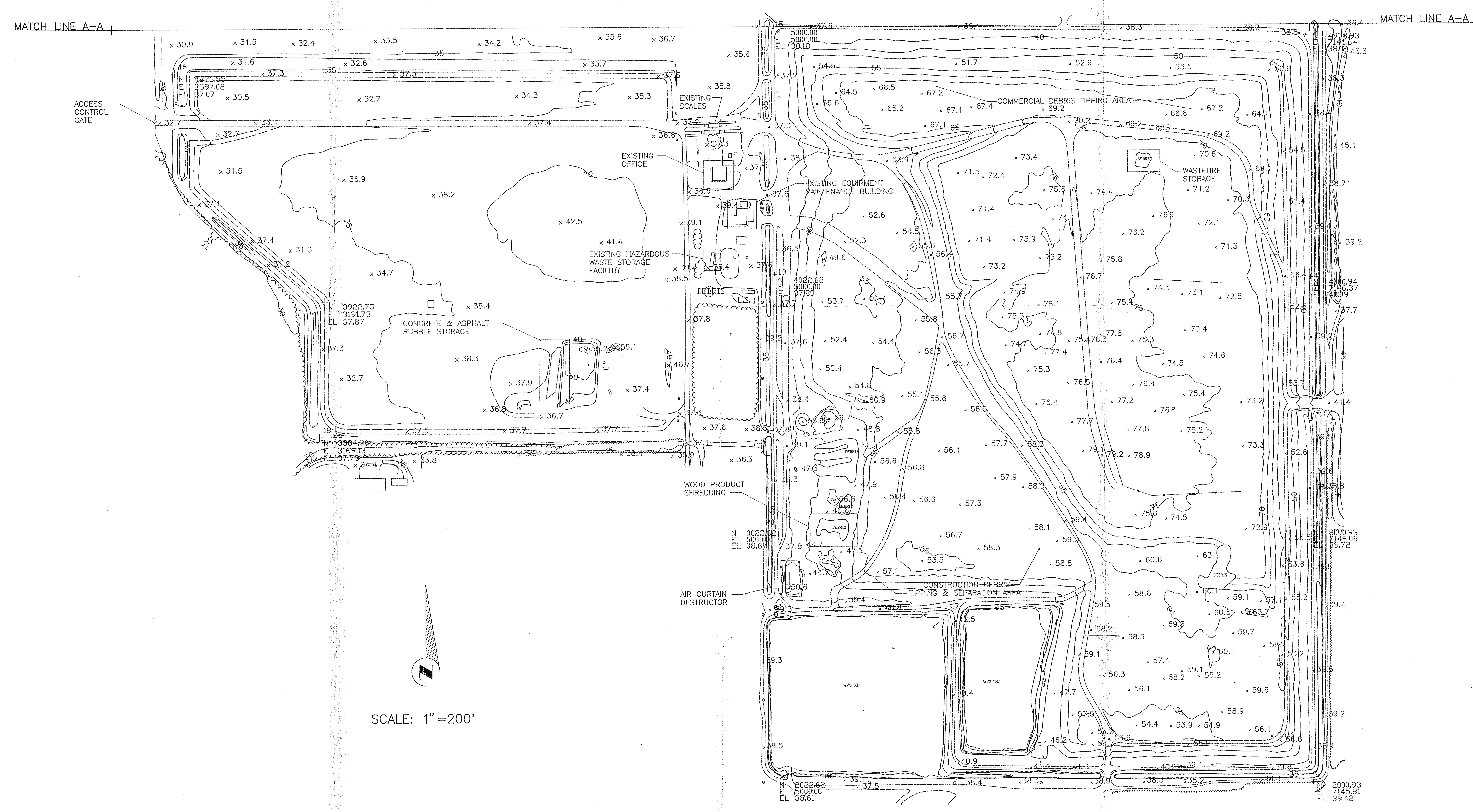
MANATEE COUNTY
PUBLIC WORKS
DEPARTMENT

(4)

LENA ROAD LANDFILL
AERIAL VIEW

REVISION		DATE
	BY	DATE
SURVEYED		
DESIGNED		
DRAWN		
CHECKED		
FILE NO.:		
PROJECT NO.:		
HORIZONTAL SCALE: 1" = 200'		
SEAL		

SHEET 3 OF 10



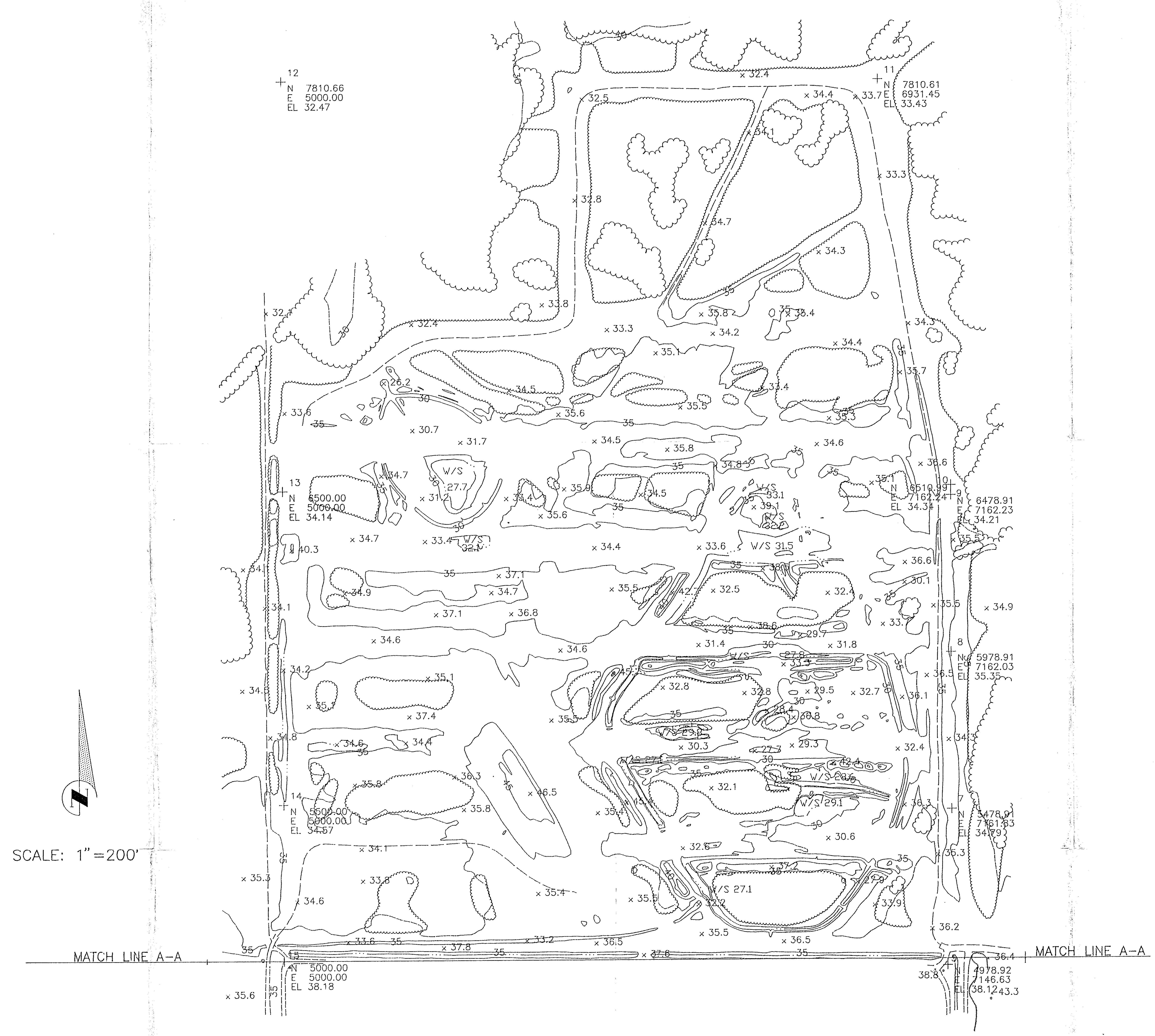
SCALE: 1"=200'

MANATEE COUNTY PUBLIC WORKS DEPARTMENT

LENA ROAD LANDFILL EXISTING CONTOURS PROJECT NO. 485-4615-534

REVISION		DATE
	BY	DATE
SURVEYED		
DESIGNED		
DRAWN		
CHECKED		
FILE NO.:		
PROJECT NO.:		
VERTICAL SCALE: HORIZONTAL SCALE:		
SEAL		

SHEET 4 OF 10



MANATEE COUNTY
PUBLIC WORKS
DEPARTMENT

LENA ROAD LANDFILL
EXISTING CONTOURS
PROJECT NO. 485-4615-534

REVISION		DATE
	BY	DATE
SURVEYED	I.F. ROOKS	8/91
DESIGNED	LLP	2/92
DRAWN	MAH	2/92
CHECKED		

FILE NO.:

PROJECT NO.: 485-4615-534

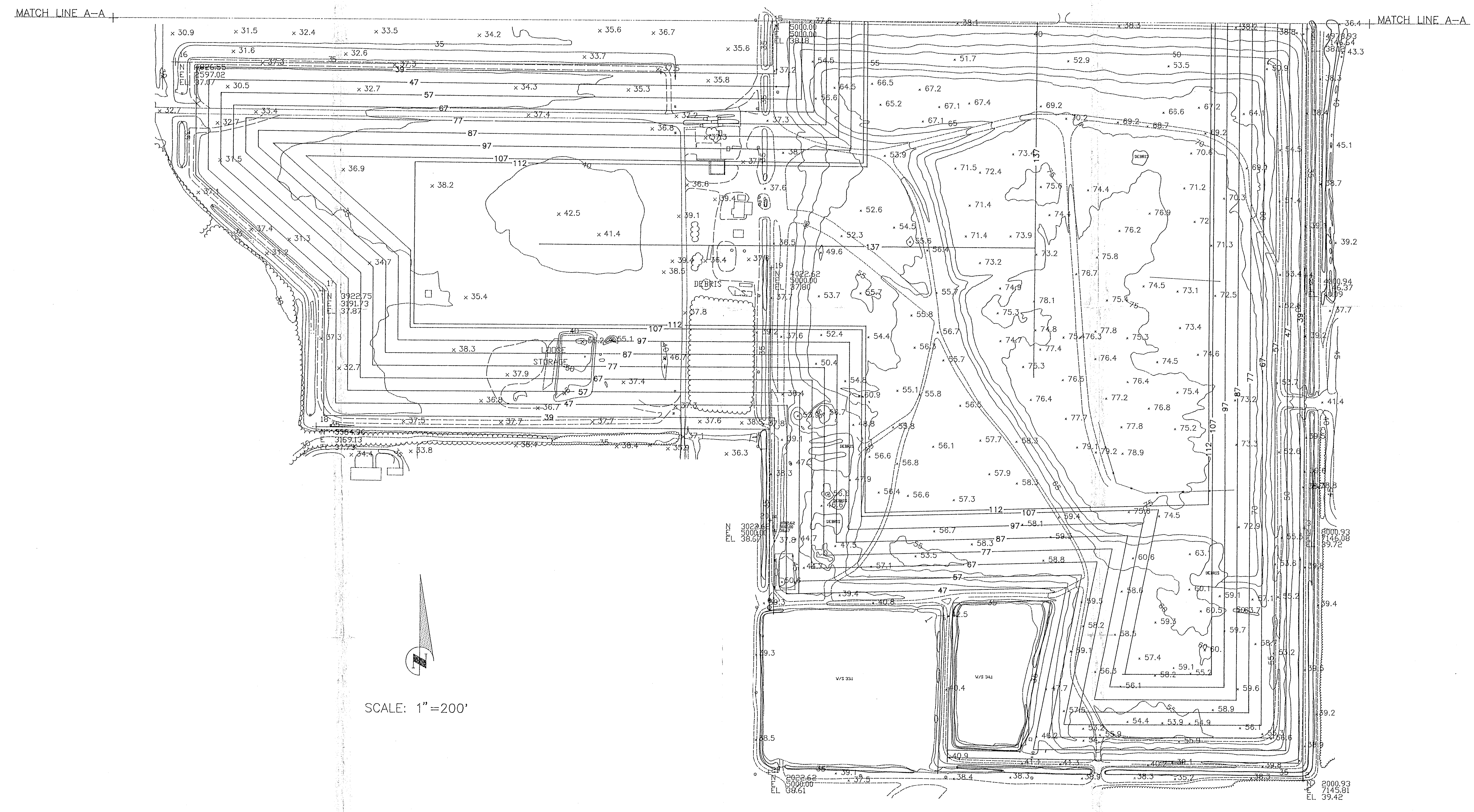
VERTICAL SCALE:
HORIZONTAL SCALE: NOTED

SEAL

SHEET 5 OF 10

AF 44943

(7)



SCALE: 1"=200'

MANATEE COUNTY PUBLIC WORKS DEPARTMENT

LENA ROAD LANDFILL PROPOSED CONTOURS PROJECT NO. 485-4615-534

REVISION		DATE
	BY	DATE
SURVEYED		
DESIGNED		
DRAWN		
CHECKED		

FILE NO. :

PROJECT NO.:

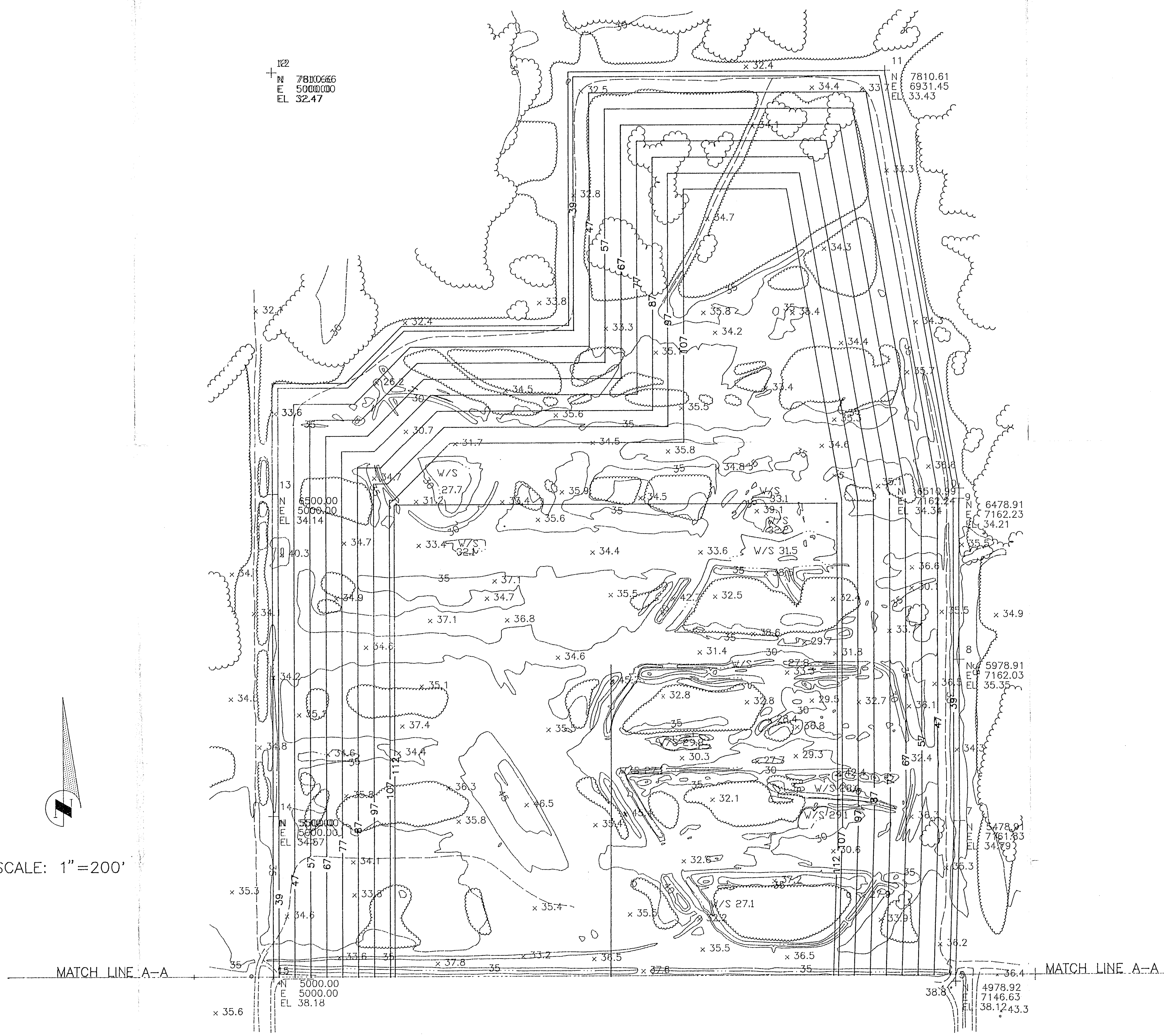
VERTICAL SCALE :
HORIZONTAL SCALE :

SEAL

SHEET 6 OF 10

AF 44943

(8)



SCALE: 1"=200'

MANATEE COUNTY
PUBLIC WORKS
DEPARTMENT

LENA ROAD LANDFILL
PROPOSED CONTOURS
PROJECT NO. 485-4615-534

REVISION		DATE
	BY	DATE
SURVEYED		
DESIGNED		
DRAWN		
CHECKED		

FILE NO.:

PROJECT NO.:

VERTICAL SCALE:
HORIZONTAL SCALE:

SEAL

SHEET (7) OF (10)

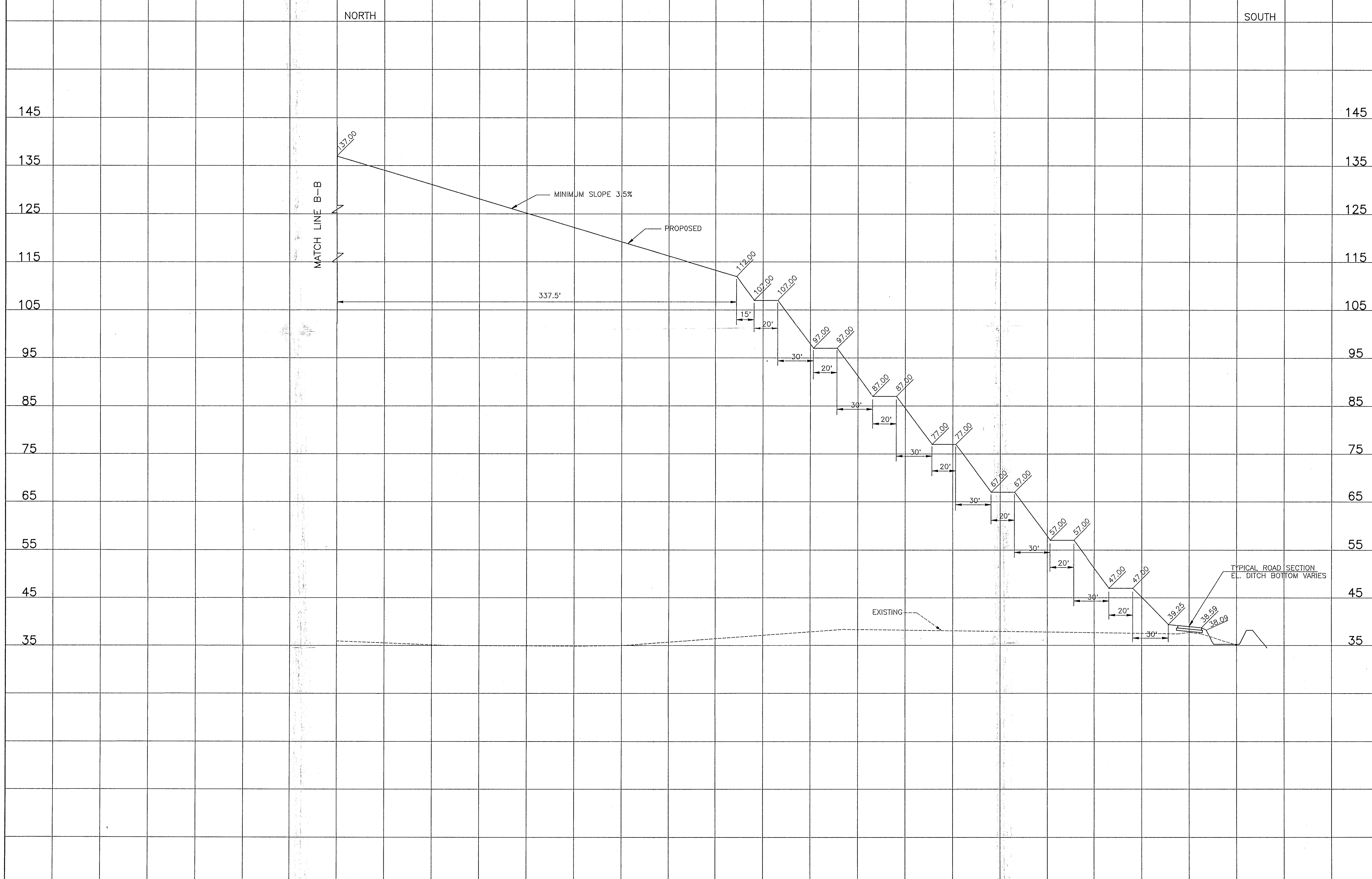
LENA ROAD LANDFILL (9)

4615

SCALE: HORZ. 1"=40 VERT. 1"=10'

CUT		FILL	
A	V	A	V

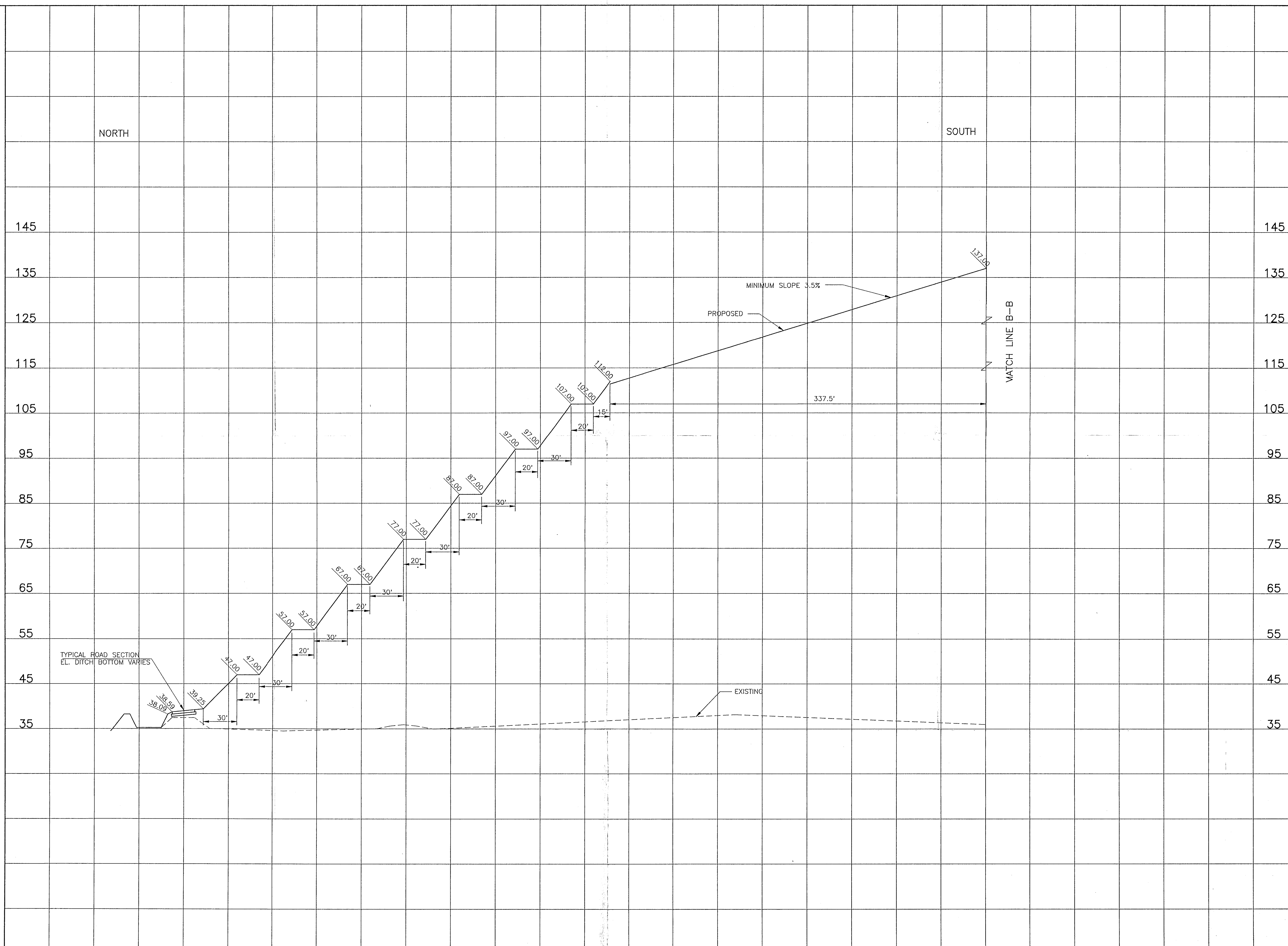
FINAL SURVEY NOTEBOOK No. SURVEYED PLOTTED TEMPLATE AREAS AREAS CHECKED BY DATE



ORIGINAL SURVEY NOTEBOOK No.0 SURVEYED PLOTTED TEMPLATE AREAS AREAS CHECKED BY NAME NAME DATE DATE

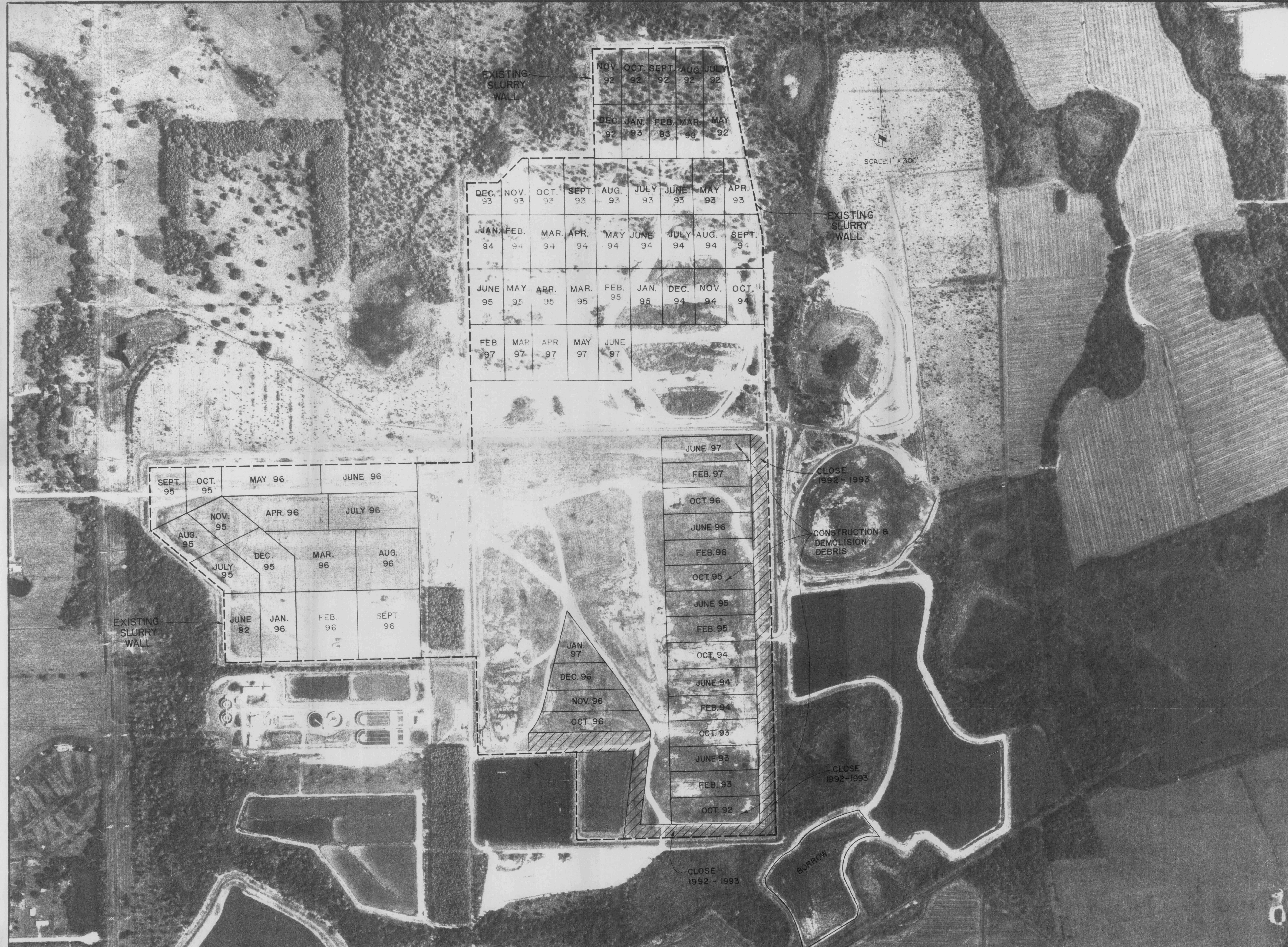
LENA ROAD LANDFILL (10)

4615	SCALE: HORZ. 1"=40' VERT. 1"=10'			
	CUT		FILL	
	A	V	A	V



FINAL SURVEY
NOTEBOOK
No.

ORIGINAL SURVEY
NOTEBOOK
No.
NAME
DATE



MANATEE COUNTY
PUBLIC WORKS
DEPARTMENT

LENA ROAD LANDFILL

PROPOSED FILL AND CLOSURE SCHEDULE

REVISION		DATE
	BY	DATE
SURVEYED		
DESIGNED	G.Y.	3/92
DRAWN	K.E.	3/92
CHECKED	L.L.P.	3/92
FILE NO.		
PROJECT N		
VERTICAL SCALE		
HORIZONTAL SCALE 1" = 300		
SEAL		

SHEET 10 OF 10