

ENGINEER'S PRELIMINARY STUDY
AND
COST ESTIMATE
FOR THE
DEVELOPMENT OF A SANITARY LANDFILL OPERATION
FOR
HARDEE COUNTY, FLORIDA
S&G FILE NO. 7602-06

* * * * *

DECEMBER 1977

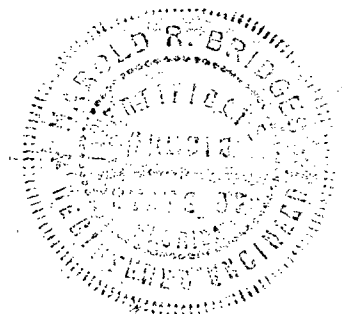
SMITH AND GILLESPIE ENGINEERS, INC.

JACKSONVILLE, FLORIDA

ENGINEER'S PRELIMINARY STUDY
AND
COST ESTIMATE
FOR THE
DEVELOPMENT OF A SANITARY LANDFILL OPERATION
FOR
HARDEE COUNTY, FLORIDA
S&G FILE NO. 7602-06

* * * * *

DECEMBER 1977



Harold R. Bridges

TABLE OF CONTENTS

	<u>Item</u>	<u>Page</u>
I.	AUTHORIZATION	1
II.	BACKGROUND	1
III.	PURPOSE AND SCOPE	2
IV.	DESCRIPTION OF THE REGIONAL AREA	2
	A. Location and Population	2
	B. Economy	4
	C. Climate	6
	D. Land Use	6
	E. Geology and Soils	9
	F. Topography	12
V.	SOLID WASTE GENERATION PROJECTIONS	14
	A. Future Population	14
	B. Per Capita Refuse Production	15
	C. Projected Solid Waste Generation	20
VI.	SANITARY LANDFILL CONSIDERATIONS	22
	A. Landfill Fundamentals	22
	1. Definition	22
	2. Ideal Landfill	22
	B. Landfill Requirements	24
	1. Necessary Land Area	24
	2. State Regulations	27
VII.	PROPOSED LANDFILL SITE	27
	A. Location	27
	B. Land Use	29
	C. Topography	29
	D. Soil Characteristics	29
	E. Hydrogeological Data	31

TABLE OF CONTENTS (CONT'D)

<u>Item</u>	<u>Page</u>
VIII. PRELIMINARY DESIGN	32
A. General	32
B. Design Calculations	35
1. Area and Cover	35
2. Drainage	36
3. Leachate Treatment	39
IX. COST ESTIMATE	41
X. LANDFILL DISCUSSION	43
XI. INCINERATION	46
A. Background	46
B. General	47
C. Preliminary Design	48
D. Cost Estimate	50
E. Energy Recovery	53
XII. CONCLUSIONS AND RECOMMENDATIONS	54

APPENDICES

A.	Rules of the Department of Environmental Regulation. Chapter 17-7. Resource Recovery and Management. Part I: Solid Waste Facilities.
B.	Site Evaluation for Sanitary Landfill. USDA Soil Conservation Service.
C.	Hydrogeological Information
D.	Consumat Incinerator Data

LIST OF EXHIBITS

	<u>Title</u>	<u>Page</u>
I.	Hardee County	3
II.	Wind Rose	8
III.	Geologic Strata of Hardee County	10
IV.	Soil Associations	11
V.	Topographic Map	13
VI.	Per Capita Refuse Production in the U.S.	16
VII.	Location of Proposed Site	28
VIII.	Topography of Proposed Site	30
IX.	Preliminary Layout	34
X.	Graphical Solution of Modified Ellipse Equation	38
XI.	Tile Drain Design Chart	40
XII.	Phased Construction Program	45

LIST OF TABLES

	<u>Title</u>	<u>Page</u>
I.	Nonagricultural Employment Characteristics 1974	5
II.	Normal Monthly Temperature and Rainfall at Wauchula	7
III.	Population Projections	15
IV.	Projected Per Capita Refuse Production	19
V.	Projected Solid Waste Generation	21
VI.	Landfill Area Requirements	26
VII.	Preliminary Cost Estimate for Sanitary Landfill	42
VIII.	Projected Ash and Unburnable Refuse	49
IX.	Preliminary Cost Estimate for Incineration	51

ENGINEER'S PRELIMINARY STUDY
AND
COST ESTIMATE
FOR THE
DEVELOPMENT OF A SANITARY LANDFILL OPERATION
FOR
HARDEE COUNTY, FLORIDA
S&G FILE NO. 7602-06

I. AUTHORIZATION

This "Engineer's Preliminary Study and Cost Estimate for the Development of a Sanitary Landfill Operation for Hardee County, Florida" was authorized by the City of Wauchula's Letter of Authorization dated May 17, 1977.

II. BACKGROUND

The City of Wauchula, City of Bowling Green and Town of Zolfo Springs each own and operate sanitary landfills for the disposal of solid refuse. Hardee County also utilizes these landfills for disposal of refuse from unincorporated areas of the county.

As is typical of most of the land area in Hardee County, the existing landfills are plagued with a high water table. Continued use of Wauchula's landfill is also problemned by its close proximity to the existing airport. Because of these problems, each of these landfills are presently being operated without permits and draft consent orders have been prepared by the Florida Department of Environmental Regulation which establish a time schedule for development of a new Resource Recovery and Management Facility.

The Hardee County Landfill Technical Committee has been working for some time on the development of a regional solid waste program. Agreement

has been made between the three municipalities and the Board of County Commissioners to work jointly on this project. Also, an offer has been extended by C. F. Mining Corporation for use of one of their properties as a county-wide landfill.

III. PURPOSE AND SCOPE

The primary purpose of this study is to evaluate the feasibility of the C. F. Mining Corporation property as a county-wide landfill. In preparing this evaluation, the characteristics of the proposed site will be analyzed and compared with those required for a sanitary landfill by the current rules of the Florida Department of Environmental Regulation.

In addition to the above, the scope of the study includes the following:

1. General description of the regional area.
2. Projection of solid wastes generated within Hardee County.
3. Preliminary design of the proposed county-wide sanitary landfill.
4. Estimation of the costs for developing and operating the proposed landfill.
5. Estimation of the costs for construction and operation of an incinerator facility.
6. Recommendation of a plan of action for regional solid waste disposal.

IV. DESCRIPTION OF THE REGIONAL AREA

A. Location and Population:

Hardee County is located in west-central Florida as shown in Exhibit I. The City of Wauchula, City of Bowling Green and Town of Zolfo Springs are the only incorporated municipalities within the planning area.

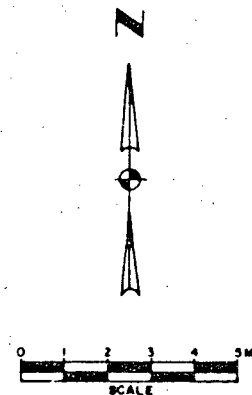
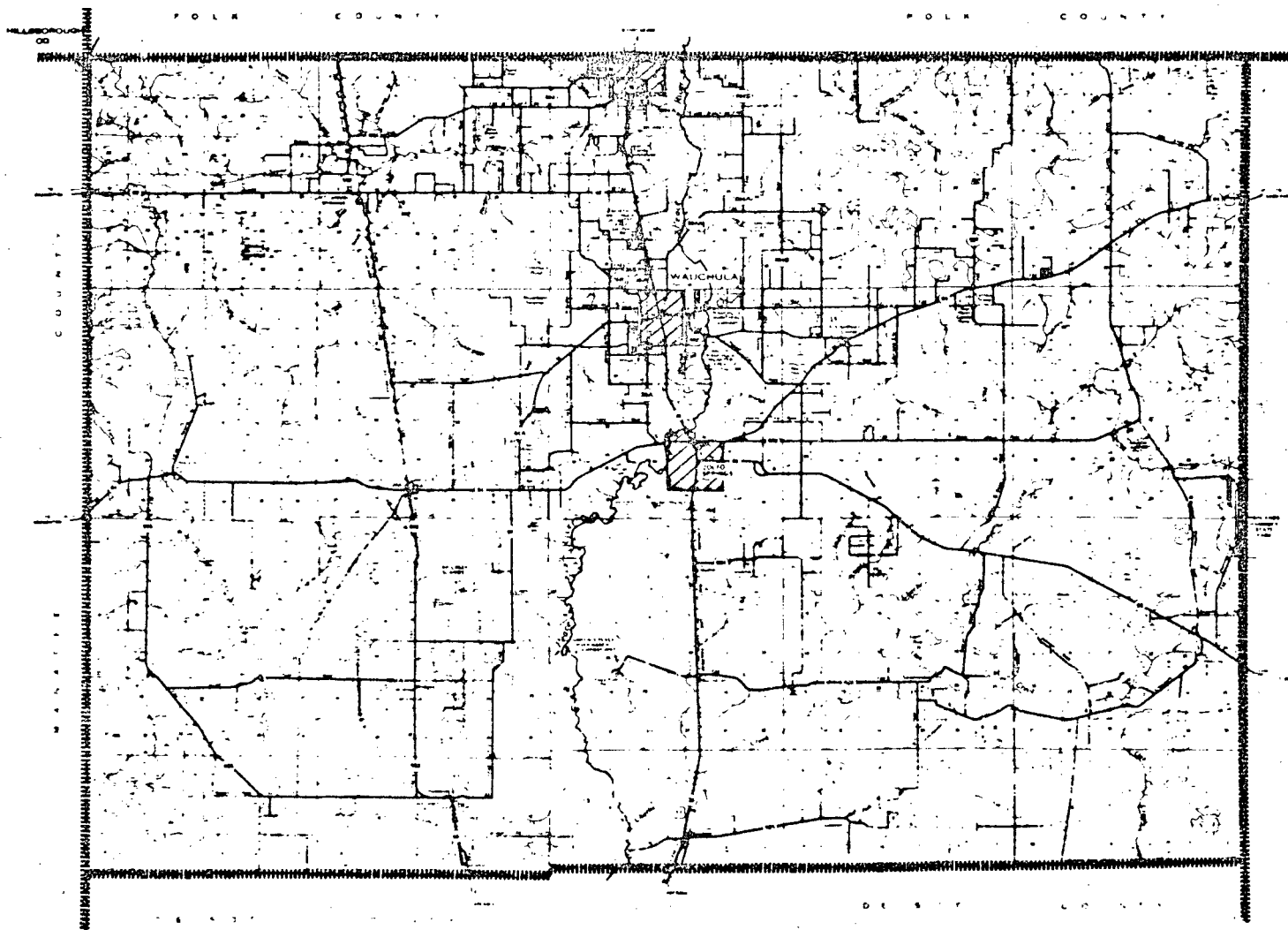


EXHIBIT I

HARDEE COUNTY

HARDEE COUNTY LANDFILL STUDY

7602-06

DEC., 1977

PREPARED BY
SMITH AND GILLESPIE ENGINEERS, INC.
JACKSONVILLE, FLORIDA

Estimates of the 1976 populations in Hardee County made by the Bureau of Economic and Business Research at the University of Florida are as follows:

Bowling Green	1,604
Wauchula	3,853
Zolfo Springs	1,336
<u>Unincorporated</u>	<u>11,526</u>
Hardee County	18,319

The population growth of Hardee County over the past 25 years has been sporadic as can be expected in an area of relatively small population and a limited economic base. Although the general trend has been one of increasing population, the rate of increase has been more closely associated with agricultural developments than with the growth of the rest of the state. The median age in Hardee County is also considerably lower than the state as a whole since there are no large retirement developments within the county.

B. Economy:

The economy of Hardee County is closely tied to agriculture. While only 30% of the jobs in the county are directly involved in agriculture, many of the remaining jobs are made possible by the indirect influence of agricultural operations. Characteristics of the nonagricultural employment in Hardee County are presented in Table I.

TABLE I
NONAGRICULTURAL EMPLOYMENT CHARACTERISTICS 1974

Employment Type	Percentage of Total	
	Hardee Co.	Florida
Manufacturing	11.1	13.2
Contract Construction	3.5	9.8
Transportation, Communication and Utilities	6.9	6.6
Wholesale & Retail Trade	29.2	25.7
Finance, Insurance and Real Estate	4.9	6.8
Government	32.6	17.6
Services, Mining and Miscellaneous	11.8	20.3

The primary agricultural activities in the county are cattle and citrus. Hardee County was the state's fourth largest producer of oranges during the 1973-74 season. The cash value of all agricultural products sold in Hardee County in 1969 ranked 14th among all of Florida's counties. The overall trend in this agriculturally-based economy has been one of improvement; although still below the Florida average, the per-capita income in Hardee County has increased from 69% of the U. S. average in 1965 to 78% in 1973.

C. Climate:

The climate of Hardee County is similar to that of most of Florida, and is generally considered to be subtropical. Winters are usually mild and dry, with the rainy summer season beginning in May or June and lasting through September. Summer precipitation is usually in the form of afternoon thundershowers although longer rains may occur during the late summer.

Average monthly temperature and rainfall values for Wauchula are shown in Table II. Although the average annual rainfall is more than 54 inches, the last few years have been considerably drier. The average annual rainfall for the period from 1970 through 1975 was 49.50 inches. Because the average annual runoff is 12 to 14 inches, this dry period represents a significant variation from normal conditions.

Winds are usually mild and are common from any direction. Most prevalent winds, however, are from the north and east. Nights are usually calm with most wind activity occurring in the afternoon, particularly in the summer. A wind rose for Hardee County is shown in Exhibit II.

D. Land Use:

The total area of Hardee County is approximately 530 square miles or 403,200 acres. The estimated breakdown of the county as to general land use is as follows:

TABLE II

NORMAL MONTHLY TEMPERATURE AND RAINFALL AT WAUCHULA

Month	Average Temperature (°F)	Monthly Rainfall (In.)
January	61.8	2.20
February	63.1	2.79
March	67.1	3.39
April	72.1	2.85
May	76.6	3.99
June	80.2	8.66
July	81.3	9.04
August	81.6	7.48
September	80.2	7.88
October	74.7	3.05
November	67.4	1.63
December	62.7	1.70

Average Annual Temperature: 72.4°F

Average Annual Rainfall: 54.66 Inches

(Data from 1941 through 1970)

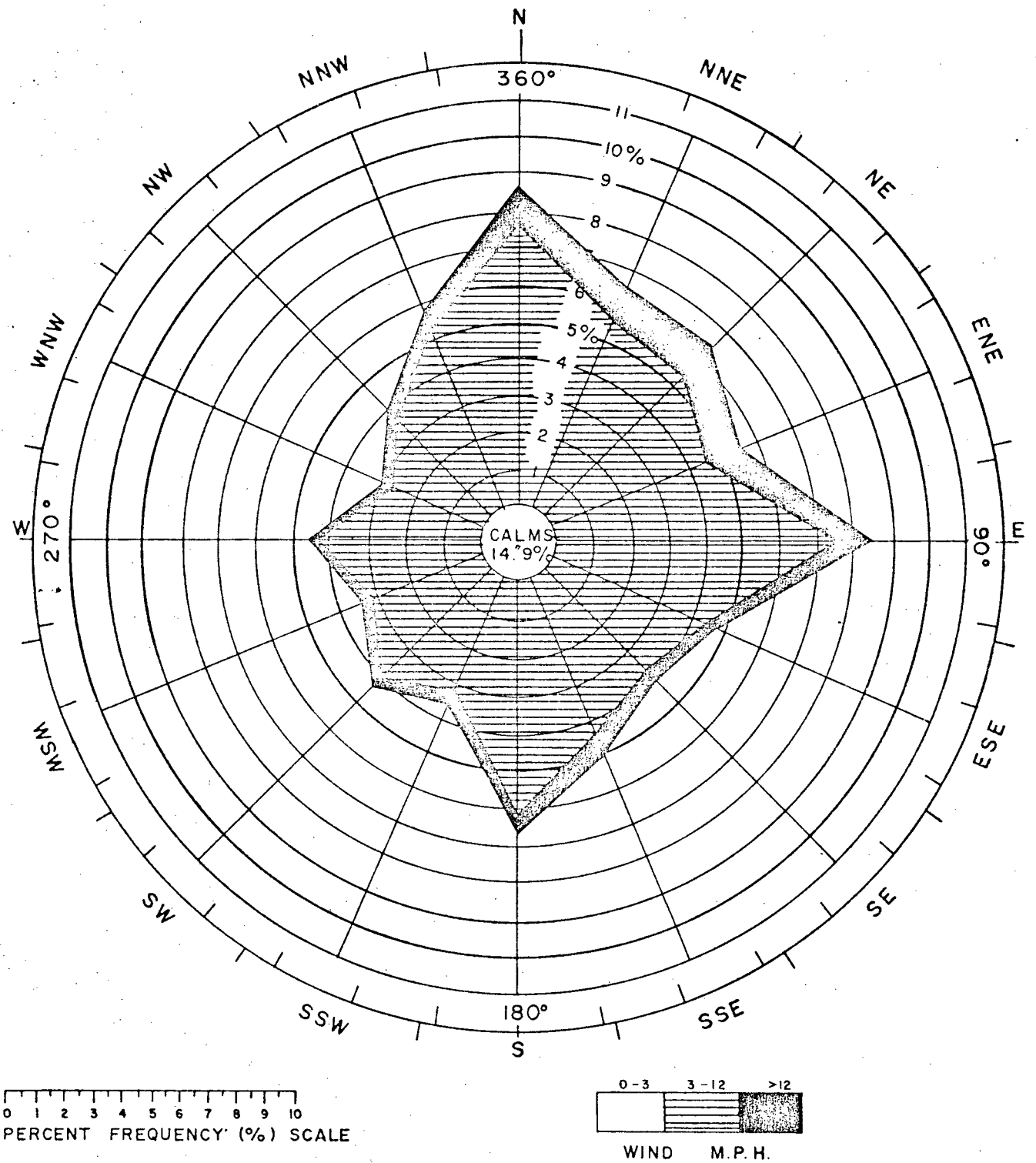


EXHIBIT II

WIND ROSE

HARDEE COUNTY LANDFILL STUDY

7602-06

DEC., 1977

SMITH AND GILLESPIE ENGINEERS, INC.
JACKSONVILLE, FLORIDA

Urban Areas	1.3%
Range and Woodland	48.1%
Improved Pasture	34.3%
Citrus Groves	16.2%
Public Parks	0.1%

E. Geology and Soils:

The geological origin of Hardee County is evidenced by its underlying sedimentary deposits from the Cenozoic Era. These strata generally slope downward toward the south and west. There is no evidence of violent geological activity; the layers remain stratified in the order of their deposition. Information on most of these sediments has been assimilated from well drilling and core data. The deepest strata are not penetrated by wells within Hardee County but their existence is indicated by consistent evidence found in wells in surrounding counties. For those formations that have been identified in Hardee County wells, a north-south cross section is shown in Exhibit III.

The locations of each of the seven different soil associations in Hardee County are shown in Exhibit IV. The soils of Hardee County are generally sandy, somewhat poorly drained soils, with significant high areas having better drainage. As may be expected in an agricultural area, soil characteristics have an important effect on the usage and value of land. Most of the areas with soils best suited for a sanitary landfill have been developed or are utilized for citrus production. These areas include the

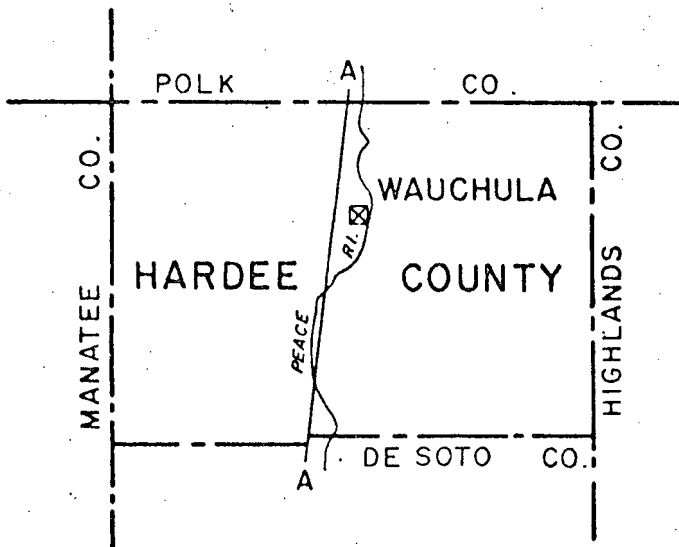
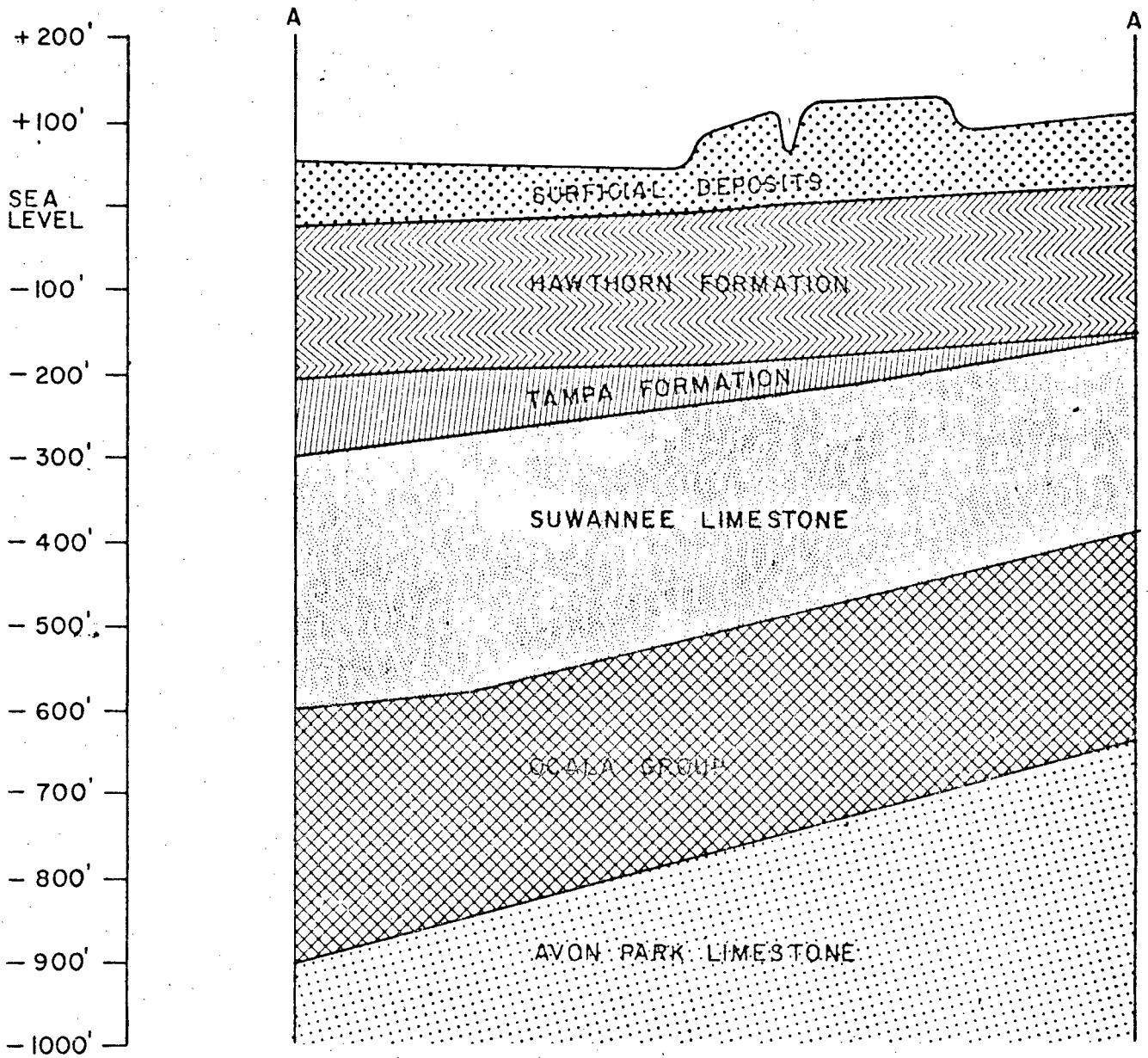


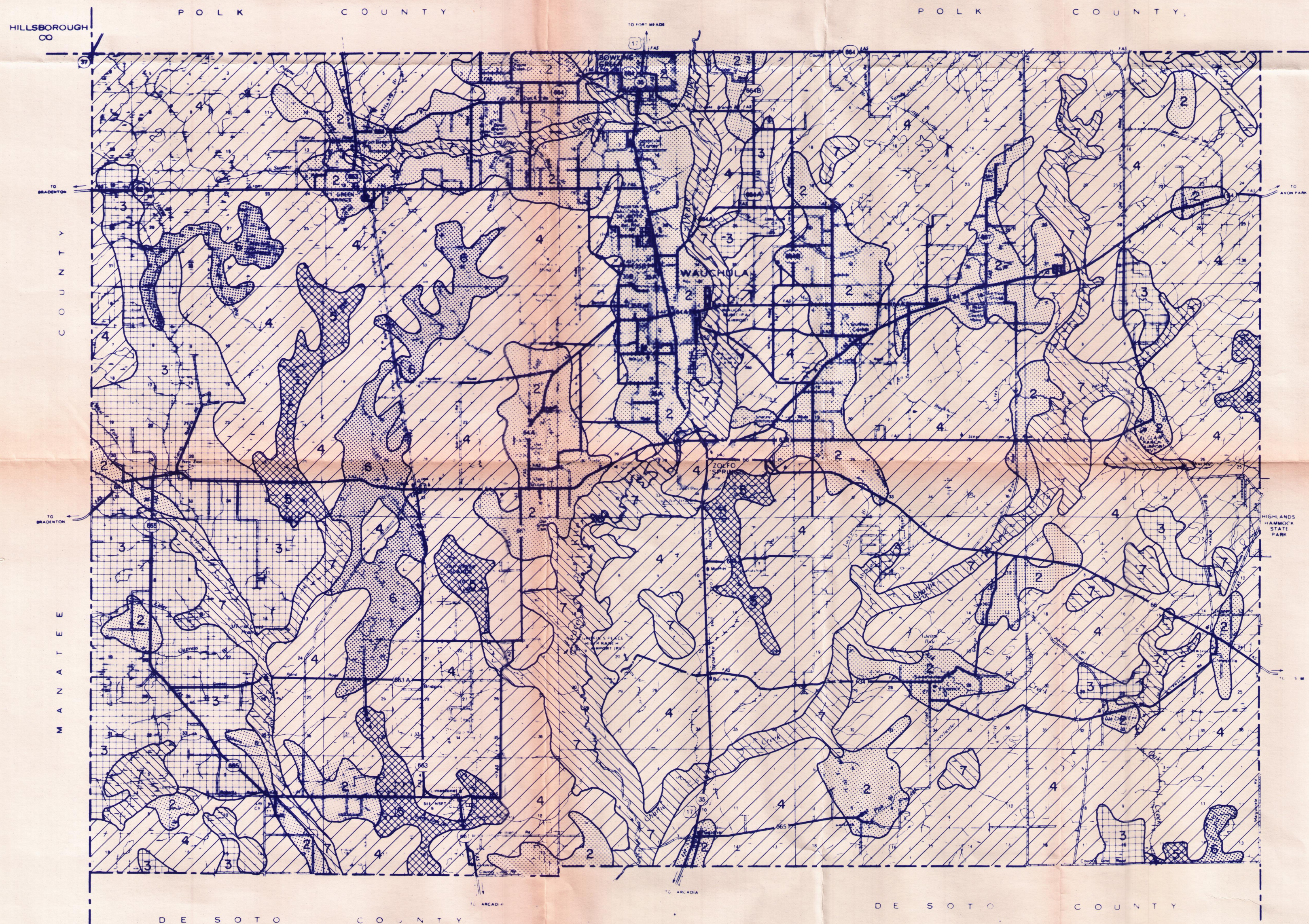
EXHIBIT III

GEOLOGIC STRATA OF HARDEE CO. HARDEE COUNTY LANDFILL STUDY

7602-06

DEC., 1977

PREPARED BY
SMITH AND GILLESPIE ENGINEERS, INC.
JACKSONVILLE, FLORIDA



LEGEND

- 1 ASTATULA-LAKE ASSOCIATION: GENTLY SLOPING TO SLOPING, EXCESSIVELY DRAINED SOILS THAT ARE SANDY TO 80 INCHES OR DEEPER.
- 2 TAVARES-ADAMSVILLE ASSOCIATION: NEARLY LEVEL TO GENTLY SLOPING, MODERATELY WELL TO SOMEWHAT POORLY DRAINED SOILS THAT ARE SANDY TO 80 INCHES OR DEEPER.
- 3 POMELLO-IMMOKALEE-TAVARES ASSOCIATION: NEARLY LEVEL TO GENTLY SLOPING, MODERATELY WELL AND POORLY DRAINED SOILS THAT HAVE SANDY LAYERS 30 TO 50 INCHES THICK OVER WEAKLY CEMENTED LAYERS, AND MODERATELY WELL DRAINED SOILS, SANDY TO 80 INCHES OR DEEPER.
- 4 MYAKKA-BASINGER ASSOCIATION: NEARLY LEVEL TO GENTLY SLOPING, POORLY DRAINED SANDY SOILS THAT HAVE WEAKLY CEMENTED LAYERS, AND POORLY DRAINED SOILS, SANDY TO 80 INCHES OR DEEPER.
- 5 POMPANO-DELRAY ASSOCIATION: NEARLY LEVEL, POORLY DRAINED SOILS, SANDY TO 80 INCHES OR DEEPER, AND VERY POORLY DRAINED SOILS THAT HAVE SANDY LAYERS MORE THAN 40 INCHES THICK OVER LOAMY SUBSOIL.
- 6 WABASSO-FELDA ASSOCIATION: NEARLY LEVEL, POORLY DRAINED SANDY SOILS THAT HAVE WEAKLY CEMENTED LAYERS OVERLYING LOAMY SUBSOIL, AND POORLY DRAINED SOILS THAT HAVE SANDY LAYERS 20 TO 40 INCHES THICK OVER LOAMY SUBSOIL.
- 7 SWAMP ASSOCIATION: FRESH WATER SWAMPS AND VERY POORLY DRAINED SOILS WHICH ARE USUALLY FLOODED.

HARDEE COUNTY LANDFILL STUDY

7602-06

DEC., 1977

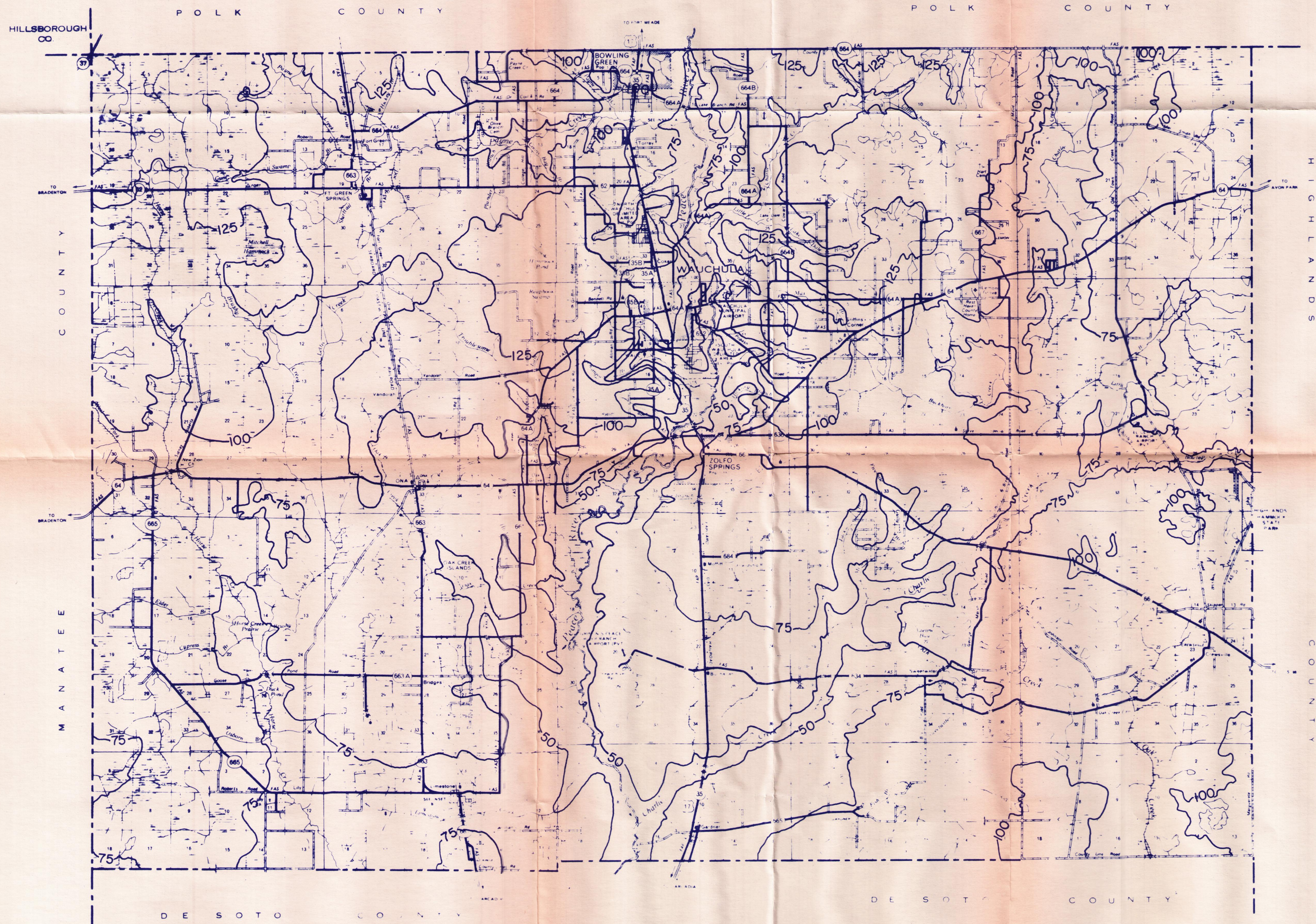
EXHIBIT IV SOIL ASSOCIATIONS

PREPARED BY
SMITH AND GILLESPIE ENGINEERS, INC.
JACKSONVILLE, FLORIDA

relatively better drained soils of the Astatula-Lake and Tavares-Adamsville Associations. The most predominate soils in Hardee County are those in the Myakka-Basinger Association which make up about 58 percent of the land area in the county. These soils are nearly level to gently sloping, poorly drained sandy soils with weakly cemented sandy subsoil and poorly drained soils, sandy throughout. Wetness is a hazard in the use and management of soils in this association. The soils of this association are suited to pasture.

F. Topography:

Hardee County is generally flat area drained by a dendritic pattern of small creeks. A topographic map is shown in Exhibit V. The topography is noticeably different from that of the adjacent areas to the east and west. To the east, in Highlands County, are sandy hills and small, landlocked lakes along a north-south ridge. To the west, in Manatee County, the coastal area tends to be low and swampy. Between these two areas, the Peace River drains a shallow, north-south valley; Hardee County straddles the Peace River. The three largest tributaries of the Peace River in Hardee County are: Payne Creek, flowing in an easterly direction into the Peace River just south of Bowling Green; Charlie Creek, draining a large area in the east part of the County and discharging into the Peace River; and Horse Creek, flowing from the west part of Hardee County south into the Peace River in DeSoto County.



CONTOUR INTERVAL
= 25 FEET

HARDEE COUNTY LANDFILL STUDY
7602-06
DEC., 1977

EXHIBIT V
TOPOGRAPHIC MAP

PREPARED BY
SMITH AND GILLESPIE ENGINEERS, INC.
JACKSONVILLE, FLORIDA

The land in the area generally slopes toward the Peace River; between the river banks are wetland areas of varying width. Throughout the County there are numerous areas of relatively dry land interspersed with small swamps and bayheads. More extensive wetlands lie along the smaller tributaries of the Peace River.

V. SOLID WASTE GENERATION PROJECTIONS

A. Future Population:

The future population of Hardee County will be greatly influenced by the local economic situation. Because the economic future is dependent on many factors, it is difficult to predict, making population projections particularly difficult for small agricultural communities. In Hardee County, the most influential economic factor is likely to be the advent of mining in the County. Phosphate mining in Hardee County will definitely affect the economy and employment characteristics of the County, and will undoubtedly influence the population.

Data showing the population history of the municipalities and unincorporated area of Hardee County indicate that, except for the large percent increase in Zolfo Springs' population in the 1950's, the relative populations of these areas of Hardee County have been reasonably stable. For the purpose of this study, it is assumed that this trend will continue. Using this assumption and the population projections for the total county developed by the Bureau of Economic and Business Research at the University of Florida, the population projections presented in Table III were made.

TABLE III
POPULATION PROJECTIONS

AREA	YEAR				
	1980	1985	1990	1995	2000
Bowling Green	1,884	2,130	2,408	2,703	2,989
Wauchula	4,903	5,665	6,404	7,187	7,949
Zolfo Springs	1,557	1,799	2,033	2,282	2,524
Unincorporated	<u>13,596</u>	<u>15,706</u>	<u>17,755</u>	<u>19,928</u>	<u>22,038</u>
Total County	21,900	25,300	28,600	32,100	35,500

B. Per Capita Refuse Production:

The average per capita refuse production in the United States has increased from 1,000 pounds per capita per year in 1920 to about 1,750 pounds per capita per year in 1970 (See Exhibit VI). In a particular area such as Hardee County, there are four basic factors which influence the per capita refuse production. These factors are as follows:

1. Geographic
2. Economic
3. Industrial and Manufacturing Activity
4. Agricultural

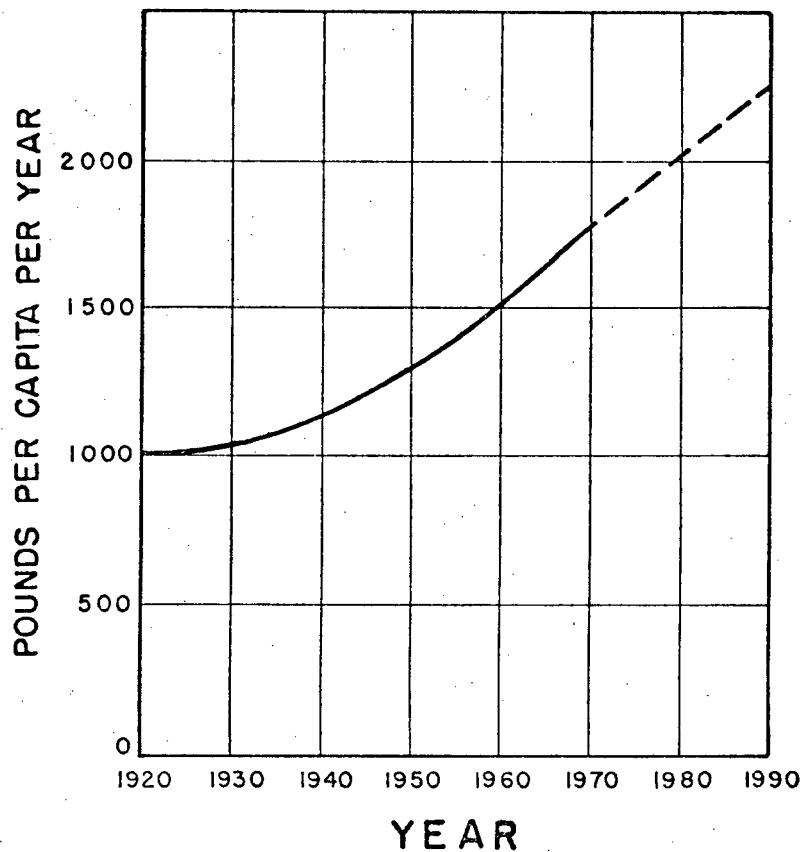


EXHIBIT VI

PER CAPITA REFUSE PRODUCTION IN THE U.S.

HARDEE COUNTY LANDFILL STUDY

7602-06

DECEMBER, 1977

PREPARED BY
SMITH AND GILLESPIE ENGINEERS, INC.
JACKSONVILLE, FLORIDA

Geographic characteristics of Hardee County such as the longer growing season produced by a warmer climate and sufficient annual rainfall increases the amount of yard trash generated from such things as grass clippings and tree trimmings. This is a significant factor for this particular geographical area.

The quantities of solid waste generated are affected by per capita income and other habits and characteristics of the populace. Of the three communities in Hardee County, all have similar characteristics of small cities in central Florida rural areas. The Cities of Wauchula and Bowling Green have populations with an annual income close to the national average, whereas Zolfo Springs is a community with a rather low annual income. This results in a slightly smaller quantity of refuse generated per capita from the three combined communities when compared to the national averages.

National average per capita waste production figures do include industrial and manufacturing wastes. This contributes a significant portion to the per capita average. Since industry represents a small percentage of the total business activity in the study area, the quantity of solid waste generated is less when compared to other industrial areas on the national averages. Practically all of the refuse produced in Hardee County originates in households, commercial business establishments, restaurants, institutions, and agriculture. The only substantial industry located in the area is a citrus processing plant in Wauchula. Refuse from this plant is not disposed of in the City landfill.

Agriculture wastes are principally the manures and crop residues from various agricultural pursuits, including dairy farms and the raising of livestock and poultry. Although it would not be economical to provide refuse collection service to all of the various farms and ranches in Hardee County, these sources will undoubtedly contribute to the waste to be disposed of at the proposed landfill. Sanitary problems of animal and agricultural waste disposal cannot be ignored. Such wastes are largely organic and readily decomposable so that they must be disposed of in a sanitary manner. Joint disposal of moderate quantities of agricultural wastes along with municipal refuse may be most satisfactory and economical. Agricultural wastes may slightly increase the total amount of waste.

The economic and the industrial activity factors reduce the average quantities generated in the area while the geographical and agricultural factors tend to increase the average. After consideration of the effects of each of these factors, it is estimated that the amount of solid waste per capita generated in 1970 in Hardee County would have been about 1,280 pounds per year.

Forecasting per capita refuse production quantities is complicated by many factors, such as changes in packaging materials, the increased use of home and institutional disposal devices, such as waste grinders and incinerators, changes in eating habits, i.e., prepared foods, and the increased use of disposable clothing and household furnishings.

Despite these changing factors, a reasonable forecasting formula is available, and that is: refuse quantities will continue to increase at the 2% per capita annual rate reported in the NAS-NCR "Waste Management and Control" report. Using the 2% increase and 1,280 pounds per year per capita for 1970, projections were made of the expected refuse quantities for the study area to the year 1995. These projected per capita refuse productions are presented in Table IV.

TABLE IV
PROJECTED PER CAPITA REFUSE PRODUCTION

YEAR	POUNDS/YEAR/CAPITA
1978	1,499
1979	1,530
1980	1,560
1981	1,592
1982	1,623
1983	1,656
1984	1,689
1985	1,723
1986	1,757
1987	1,792
1988	1,828
1989	1,865
1990	1,902
1991	1,940
1992	1,979
1993	2,018
1994	2,059
1995	2,100

C. Projected Solid Waste Generation:

It can be seen from the population data presented previously that much of the population of Hardee County is located in unincorporated areas. The areas inside and adjacent to the municipalities will be served by the regional collection service, however, it would not be economical to provide collection service to the less densely populated areas. It was determined from the location of present developments that approximately 40 percent of the unincorporated area population will be served by the regional collection service.

The remaining unincorporated area population (60 percent) are not expected to have regular collection service but will undoubtedly make frequent visits to the sanitary landfill. Due to the nature of personal sanitary landfill visits, it is estimated that 25 percent of the per capita refuse contributed by the collection areas will be contributed by areas without collection service.

From the population projections and estimates of per capita refuse production presented previously, the amount of solid waste to be disposed of at the proposed landfill were calculated. These projections are presented in Table V.

TABLE V
PROJECTED SOLID WASTE GENERATION

YEAR	TONS PER DAY*			Total Tons Per Year
	Areas with Collection	Areas Without Collection	Total	
1978	37.39	5.55	42.94	11,164
1979	39.28	5.83	45.11	11,729
1980	41.23	6.12	47.35	12,311
1981	43.30	6.43	49.73	12,930
1982	45.44	6.74	52.18	13,567
1983	47.72	7.22	54.94	14,284
1984	50.10	7.43	57.53	14,958
1985	52.60	7.81	60.41	15,707
1986	54.97	8.16	63.13	16,414
1987	57.46	8.53	65.99	17,157
1988	60.07	8.92	68.99	17,937
1989	62.81	9.32	72.13	18,754
1990	65.64	9.74	75.38	19,599
1991	68.52	10.17	78.69	20,459
1992	71.53	10.61	82.14	21,356
1993	74.64	11.08	85.72	22,287
1994	77.94	11.57	89.51	23,273
1995	81.35	12.07	93.42	24,289

*NOTE: Tons/day based on 5 days per week, 52 weeks per year.

VI. SANITARY LANDFILL CONSIDERATIONS

A. Landfill Fundamentals:

1. Definition: The often quoted basic definition of sanitary landfill comes from a Sanitary Landfill Manual of Practice, prepared by the American Society of Civil Engineers (ASCE) in 1959. It is still today an excellent working definition: "Sanitary Landfill is a method of disposing of refuse on land without creating nuisances or hazards to public health or safety, by utilizing the principles of engineering to confine the refuse to the smallest practical area, to reduce it to the smallest practical volume, and cover it with a layer of earth at the conclusion of each day's operation or at such more frequent intervals as may be necessary".

2. Ideal Landfill: The ideal landfill is easily accessible by service roads, but distant enough from development to not be a nuisance. The effect of landfill sites on the groundwater quality is a critical consideration. The four criteria responsible for groundwater quality protection are: (1) drainage, (2) depth to water table, (3) cover and (4) soil interface. The primary goal of the landfill is to retain the refuse for a sufficient period to render the contaminants harmless. If the refuse is retained for a sufficient amount of time, chemical and bacteriological reactions will break down the refuse to harmless compounds. The prevention of percolation through the waste to the water table must be insured.

The first visible sign of a good sanitary landfill site is a relatively high elevation. The most obvious disaster for a landfill would be an area of runoff collection. If the troublesome area is extensive, filling in the depressed area could become very costly. Not so obvious is the problem of direct surface flow to major streams. The groundwater flow is often indicated by surface flow. Diversion ditches, although costly, can correct surface flow passing over the landfill site, but groundwater flow will remain relatively constant.

A high water table relative to the land surface is the most significant consideration of local groundwater quality. An ideal landfill would have a water table in excess of 5 feet below the bottom of the fill. Regardless of the landfill elevation and drainage some water will percolate through the refuse. The layer of soil between the bottom of the fill and the top of the water table acts as a filter. The water table can be lowered but could again prove to be very costly.

A protective cover applied after completion of filling an area prevents excessive percolation through the refuse. Ideally a quantity of semi-unpermeable soil should be easily accessible on the landfill site. Clay is a commonly used cover. It prevents percolation and promotes runoff. If the site has good drainage characteristics the rainfall will runoff the covered fill to lower elevations uncontaminated by buried refuse.

The importance of the depth of soil interface below the refuse was discussed earlier. The type of soil between the water table and the refuse is also important. The longer the retention time of the contaminated water filtering down, the more broken down it will become. Therefore, the soil interface should have a slow permeability rate to detain filtration. A completely unpermeable soil interface could also be a problem, however, if the cover was semi permeable and allowed filtration, the water level could build up in the refuse and eventually reach the surface.

An ideal sanitary landfill allows minimal rainfall collection. The rainfall that falls in the immediate area runs off to lower elevations and downward seepage is minimized. The rainfall that does find its way to the refuse, either by seepage or rainfall during construction, travels vertically very slowly. The distance to travel by seepage to the groundwater elevation is great enough to insure protection of the groundwater quality.

B. Landfill Requirements:

1. Necessary Land Area: The volume requirements for a sanitary landfill are calculated using the following formula:

$$V = \frac{R}{D} (1 - C_r / 100) + C_v$$

where,

V = volume required for refuse disposed of per year in cubic yards.

R = amount of refuse in pounds per year to be handled at landfill.

D = average density of refuse in pounds per cubic yard;
estimated to be 300 pounds per cubic yard.

C_r = percent reduction of refuse from compaction;
assumed to equal 50 percent.

C_v = volume of cover material required in cubic yards;
assumed to be 30% of total compacted material.

Using the above assumptions:

$$V = 1.3 \frac{R}{300} \frac{(1 - 50)}{100} = 0.00217R$$

Now, if a depth of the refuse fill of six (6) feet is employed and six (6) inches of compacted cover are added at the end of each day and two (2) feet of final cover used, the total depth of the compacted sanitary landfill will be 8.5 feet. Therefore, the area required can be computed as follows:

$$A = \frac{V}{8.5} \times \frac{27}{43,560}$$

where, A = area required in acres.

Using the solid waste generation projections from Table V, the volume and area requirements were calculated. These results are presented in Table VI.

TABLE VI
LANDFILL AREA REQUIREMENTS

YEAR	Annual Requirements		Accumulative Area Required (Acres)
	Volume (Cu. Yds.)	Area (Acres)	
1978	48,374	3.53	3.53
1979	50,822	3.71	7.24
1980	53,344	3.89	11.13
1981	56,026	4.09	15.22
1982	58,786	4.29	19.51
1983	61,893	4.51	24.02
1984	64,813	4.73	28.75
1985	68,058	4.96	33.71
1986	71,122	5.19	38.90
1987	74,341	5.42	44.32
1988	77,721	5.67	49.99
1989	81,261	5.93	55.92
1990	84,922	6.19	62.11
1991	88,649	6.46	68.57
1992	92,536	6.75	75.32
1993	96,570	7.04	82.36
1994	100,842	7.35	89.71
1995	105,244	7.67	97.38

2. State Regulations: The regulations regarding sanitary landfills are covered in Rules of the Department of Environmental Regulation, Chapter 17-7, "Resource Recovery and Management, Part I: Solid Waste Facilities" (See Appendix A). These regulations require a soil survey by a qualified U.S.D.A. Soil Conservation Service and a hydrological survey. The site requirements state the location should (1) be easily accessible, (2) safeguard against water pollution, (3) have acceptable earth cover available, and (4) conform with proper zoning.

The Department of Environmental Regulation has the option to require the installation of monitoring wells if groundwater contamination is suspected. A minimum separation of five (5) feet shall be maintained between the solid waste and anticipated high groundwater table. The Department of Environmental Regulation may waive the separation requirement if it finds adequate controls such as perimeter ditches or well point systems. Other regulations regarding operation of sanitary landfills are included in Appendix A.

VII. PROPOSED LANDFILL SITE

A. Location:

The proposed landfill site is located in the NE 1/4 of Section 36, T.33S., R.24E. as shown in Exhibit VII. The site is located approximately three miles northwest of Wauchula and contains a total area of 160 acres.

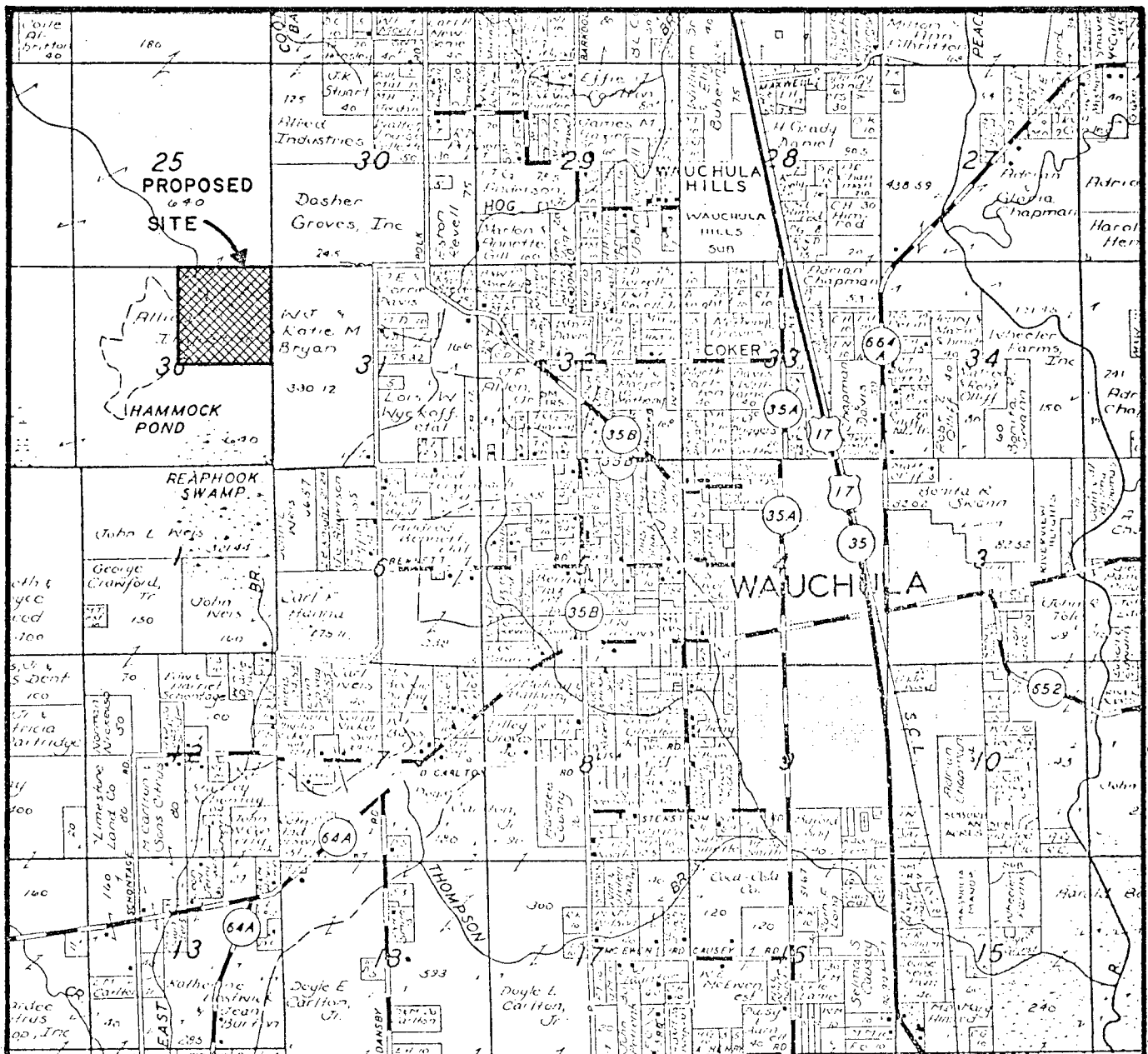


EXHIBIT VII

LOCATION OF PROPOSED SITE

HARDEE COUNTY LANDFILL STUDY

7602-06

DECEMBER, 1977

PREPARED BY

SMITH AND GILLESPIE ENGINEERS, INC.
JACKSONVILLE, FLORIDA

B. Land Use:

The proposed site and the lands to the north, south and west of it are presently used as unimproved rangeland. The land east of the proposed site is improved pasture. There is no development within a half mile of the proposed site and none is expected in the near future. Vegetation on the site consists primarily of grasses and scrub with little tree growth present.

C. Topography:

The existing elevations at the proposed site range from a low of 112.8 feet to a high of 120.5 feet as shown in Exhibit VIII. As indicated on this exhibit, the natural surface drainage flows to the northwest towards Plunder Branch, a tributary of Payne Creek. There is a small ridge running about N. 45° E. across the southeastern corner of the site which creates a drainage divide. Surface drainage to the south of this divide flows south toward East Branch, a tributary of Troublesome Creek. Surface drainage from the extreme southern portion of the site and north of this divide, flows southwesterly toward Dog Branch, also a tributary of Troublesome Creek.

D. Soil Characteristics:

An evaluation of the proposed site was prepared by the USDA Soil Conservation Service and a copy of this report is included in Appendix B. Referring to the soil map presented in this report, it is seen that the soils



EXHIBIT VIII

TOPOGRAPHY OF PROPOSED SITE

HARDEE COUNTY LANDFILL STUDY

7602-06

DECEMBER, 1977

PREPARED BY

SMITH AND GILLESPIE ENGINEERS, INC.
JACKSONVILLE, FLORIDA

at the proposed site are predominately Myakka fine sand with Floridana fine sand located in the wetter depressions on the site. Less extensive areas of Eau Gallie and Felda fine sands are located in the northwestern part of the proposed site.

All of these soils are characterized by a high water table within one foot of the ground level and rapid permeability of 6 to 20 inches per hour. The Eau Gallie soil contains a silty clay layer at a depth of 4 to 5 feet below the surface which varies from 5 to 10 feet thick. The Floridana fine sand also has a clay layer, however, it is not as distinctive as that of the Eau Gallie soil.

E. Hydrogeological Data:

Information on the hydrogeology of the proposed landfill site was provided by Mr. Bruce E. Warden, Chief Geologist, CF Mining Corporation. This information is included in Appendix C.

A contour map of the top of the clayey matrix surface is shown in Sketch 3 of Appendix C. This map indicates the potential flow of groundwater in the superficial layer to be towards the northeast and southeast.

Data from observation wells are also included in Appendix C. These data include the drillers logs for observation and prospect wells drilled in the area and recordings of continuous water level measurements made at the observation wells. Water level data are included for the following observation wells in the area:

Well No. SA8 - 36 feet deep, uncased

Well No. UF6 - 380 feet deep, casing to 84 feet

Well No. LF6 - 1,027 feet deep, casing to 471 feet

The data for Well No. SA8 indicate that the water level of the groundwater table varies over a range of approximately five (5) feet between 113 feet to 118 feet above mean sea level. Data from Wells No. UF6 and LF6, however, show that the potentiometric water level of the deeper aquifer varies over a range of about 30 feet between 30 feet to 60 feet above mean sea level.

VIII. PRELIMINARY DESIGN

A. General:

The principal limitations of the proposed site for use as a sanitary landfill are the high groundwater table coupled with poor natural drainage and the lack of suitable soil for cover material. Therefore, the feasibility of using the proposed site will depend primarily on the cost of lowering the water table and obtaining suitable cover material.

For a trench type sanitary landfill operation with a ten foot trench depth, the groundwater level would have to be maintained a minimum of 15 feet below the existing ground level. Because of the flat terrain and poor natural drainage of the site, use of this method of operation is not feasible. Therefore, the area method of landfill operation will have to be

used. With this method, the refuse is compacted on the existing ground surface, therefore, the groundwater level needs only to be lowered to a minimum of five feet below the ground surface.

A preliminary layout for the proposed sanitary landfill is shown in Exhibit IX. Considering the topography, drainage characteristics, vegetation and other characteristics of the proposed site, it is estimated that an area approximately 1,800 by 2,100 feet or 86 acres can be effectively used as landfill. Referring to the projected area requirements presented previously in Table VI, it is seen that this area would meet the landfill needs through the year 1993. Thus, the effective life of the landfill would be 15 years.

The preliminary design utilizes perimeter ditches and sub-surface drainage tile to maintain the desired water level. Drainage tile were used in lieu of interior ditches in order to conserve available land area for landfill.

Since the water table at the proposed site must be lowered by artificial drainage, it will be necessary to provide a pond for retaining and treatment of the leachate or water discharged from the landfill. The northwest corner of the proposed site is an ideal location for the retention pond since the area is underlain with clay and is located in the natural drainage course. Excavated material not required for pond construction should be preserved for cover material.

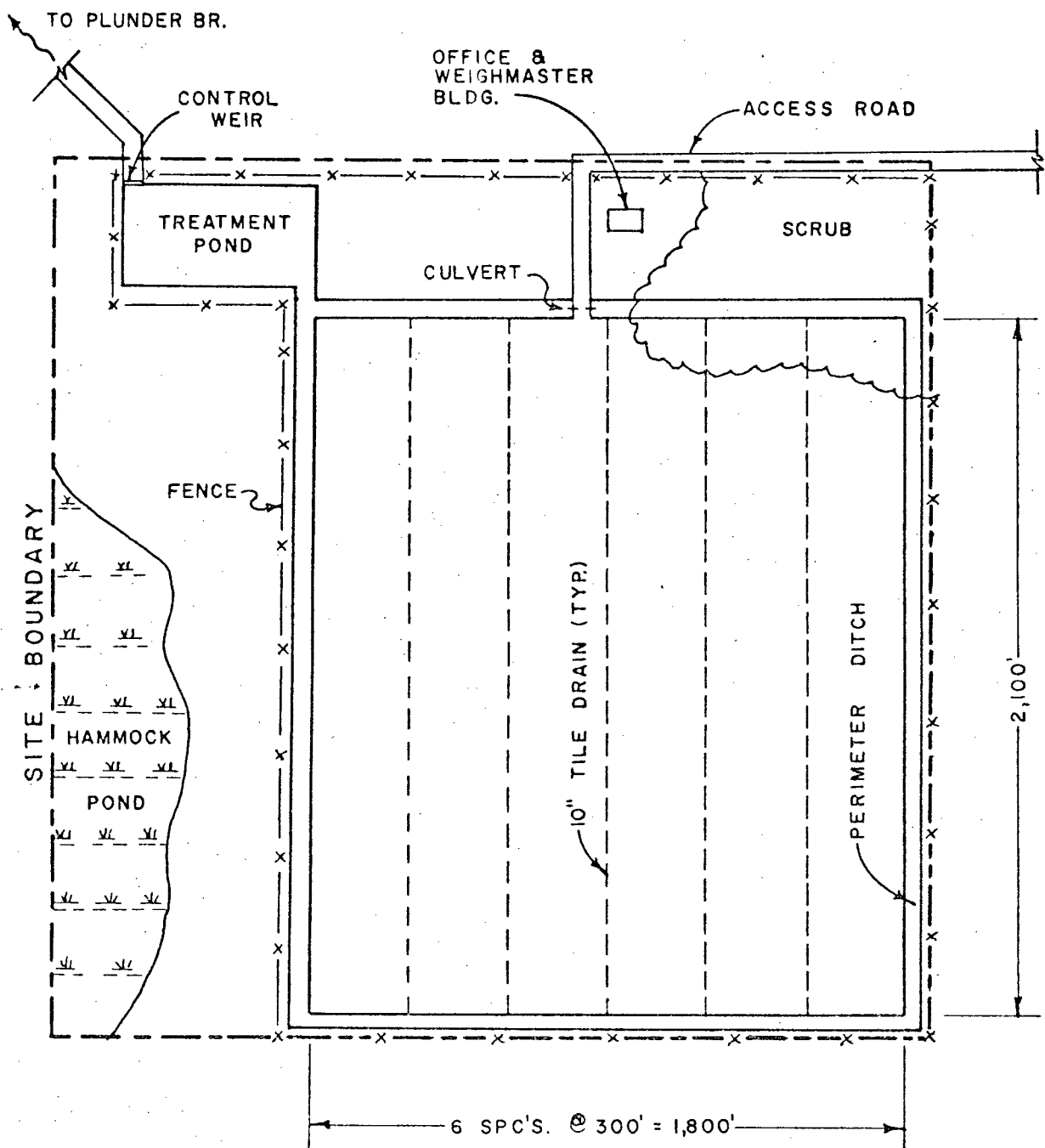


EXHIBIT IX

PRELIMINARY LAYOUT

HARDEE COUNTY LANDFILL STUDY

7602-06

DECEMBER, 1977

PREPARED BY

SMITH AND GILLESPIE ENGINEERS, INC.
JACKSONVILLE, FLORIDA

B. Design Calculations:

1. Area and Cover:

- a. Total acreage of site: 160 acres
- b. Total acreage available for placement of refuse: 86 acres
- c. Assume average depth of refuse: 8.5 feet
- d. Landfill life with 8.5 ft. average depth: 15 yrs.
(Through 1993, see Table VI)
- e. Daily cover material required:

Estimate daily cover at 3 foot depth of refuse
with 6 inch depth of cover

86 acres x 6 inches = 69,400 cu. yd.

f. Final cover material required:

86 acres x 2.0 ft. = 277,500 cu. yd.

Total cover = 346,900 cu. yd.

g. Cover material available:

Pond excavation: 64,500 cu. yd.

Dewatering ditch excavation: 83,800 cu. yd.

Total available: 148,300 cu. yd.

Needed: 198,600 cu. yd. additional cover
material

Note: Available cover is adequate for,

$$\frac{148,300 \times 27}{2.5 \times 43,560} = 38 \text{ acres}$$

or through year 1985 (See Table VI)

2. Drainage:

a. Total drainage area: 86 acres (0.13 sq. mi.)

Total contributing to dewatering ditch

Dewatering drainage coefficient = 1 in/day

Surface runoff = 6.36 in/day (10 yr. storm)

7.36 in/day x 86 acres x

$$\frac{43560 \text{ ft.}^2}{\text{acre}} \times \frac{1 \text{ ft.}}{12 \text{ in.}} \times \frac{1 \text{ day}}{86,400} = 27 \text{ cfs}$$

b. Capacity of Ditch:

$$Q = VA$$

where Q = discharge

V = velocity

A = area

velocity = 1.5 ft/s for fine sand

$$A = 27/1.5 = 18 \text{ sq. ft.}$$

For 2 ft. maximum liquid depth, width = 9 ft.

c. Slope of Ditch:

Use Manning's formula to determine slope of ditch:

$$V = \frac{1.486}{n} R^{2/3} S^{1/2}$$

where:

V = velocity

n = .03 for sand

$$R = \frac{\text{area of section}}{\text{wetted perimeter}}$$

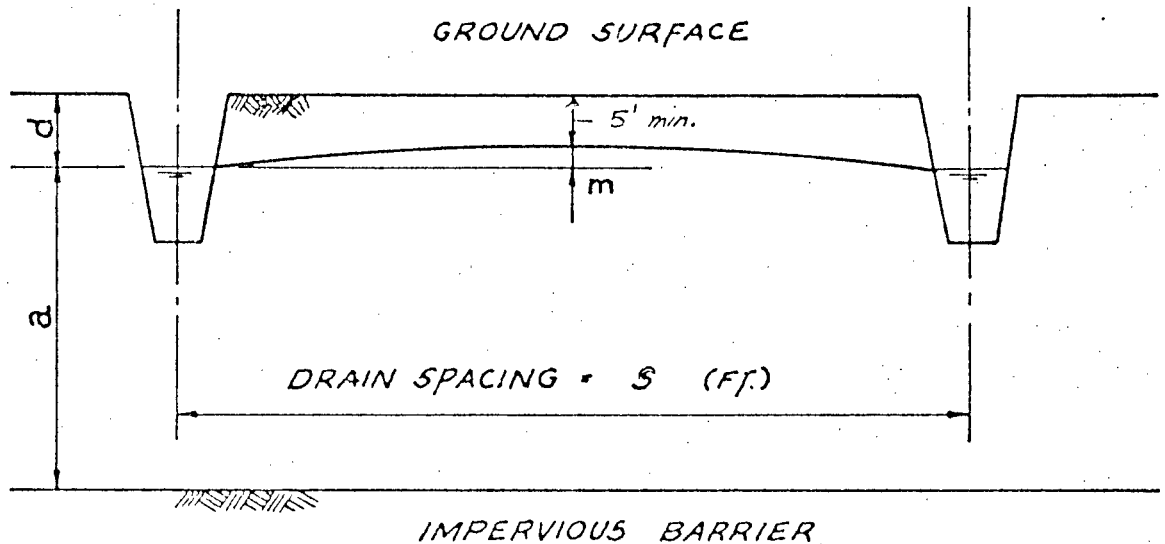
S = slope

Therefore,

$$S = \left(1.5 \times \frac{0.03}{1.486} \times 1.143\right)^2 = 1.20 \text{ ft./1000 ft.}$$

d. Drain Spacing:

Use modified ellipse equation:



Let maximum ditch depth = 10 feet

$$\begin{aligned} \text{Therefore, } m &= 10 - 5 - 2 \\ &= 3 \text{ feet} \end{aligned}$$

a = depth to barrier = 20 feet

K = average permeability = 10 in./hr.

q = drainage coefficient = 1 in./day = 0.042 in./hr.

$$\text{Therefore, } m/a = 0.15$$

$$q/K = 0.0042$$

From Exhibit X, $S/a = 15$

$$\begin{aligned} \text{Therefore, } S &= 15 \times 20 \\ &= 300 \text{ feet} \end{aligned}$$

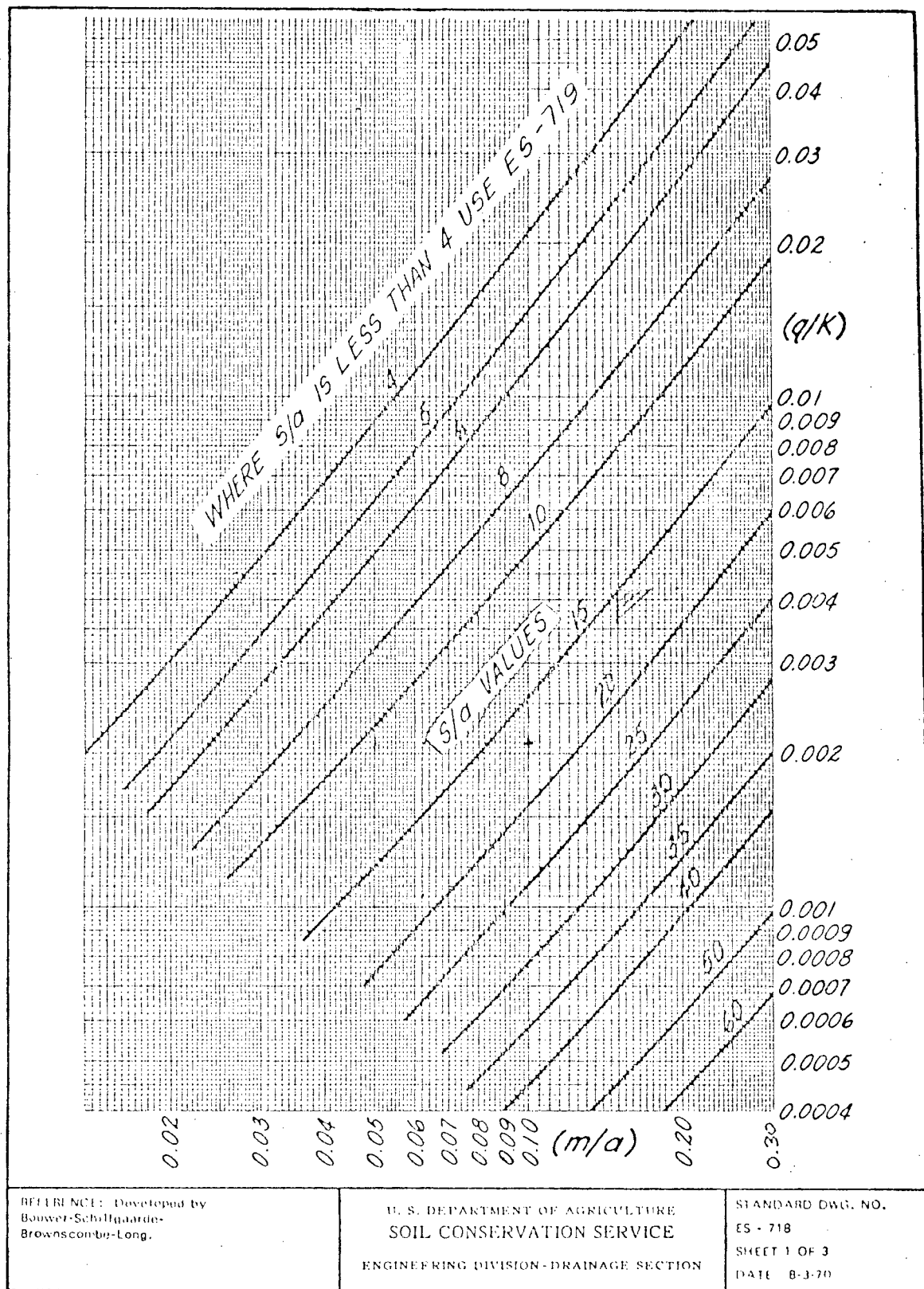


EXHIBIT X

GRAPHICAL SOLUTION OF MODIFIED ELLIPSE EQUATION

e. Underdrain Size:

$$\text{Acres/drain} = (300 \times 2,100)/43,560$$

$$= 14.5 \text{ acres}$$

$$\text{Grade} = 0.12 \text{ ft./100 ft.}$$

From Exhibit XI, use 10 inch tile

3. Leachate Treatment:

a. Leachate Quantity:

54" annual rainfall, 30% infiltration, 25% runoff,
remainder evapo-transpiration

16" infiltration/yr. at 86 acres

$$16" \times 86 \text{ ac.} \times 43,560 \times \frac{1}{12} \times 7.48 \times \frac{1}{365} = 102,360 \text{ gpd}$$

b. Leachate Quality:

Data from similar landfill sites reveal that the BOD
after filtering through the sand is less than 100 ppm
in the leachate. For safety 100 ppm will be used.

c. Aerobic Stabilization Pond Design:

$$\frac{100 \text{ ppm}}{10^6} \times \frac{\text{leachate}}{102,360 \text{ gpd}} \times 8.34 \text{ lb./gal.} = 85 \text{ lb./day BOD}_5$$

runoff (max. month = 11 inches)

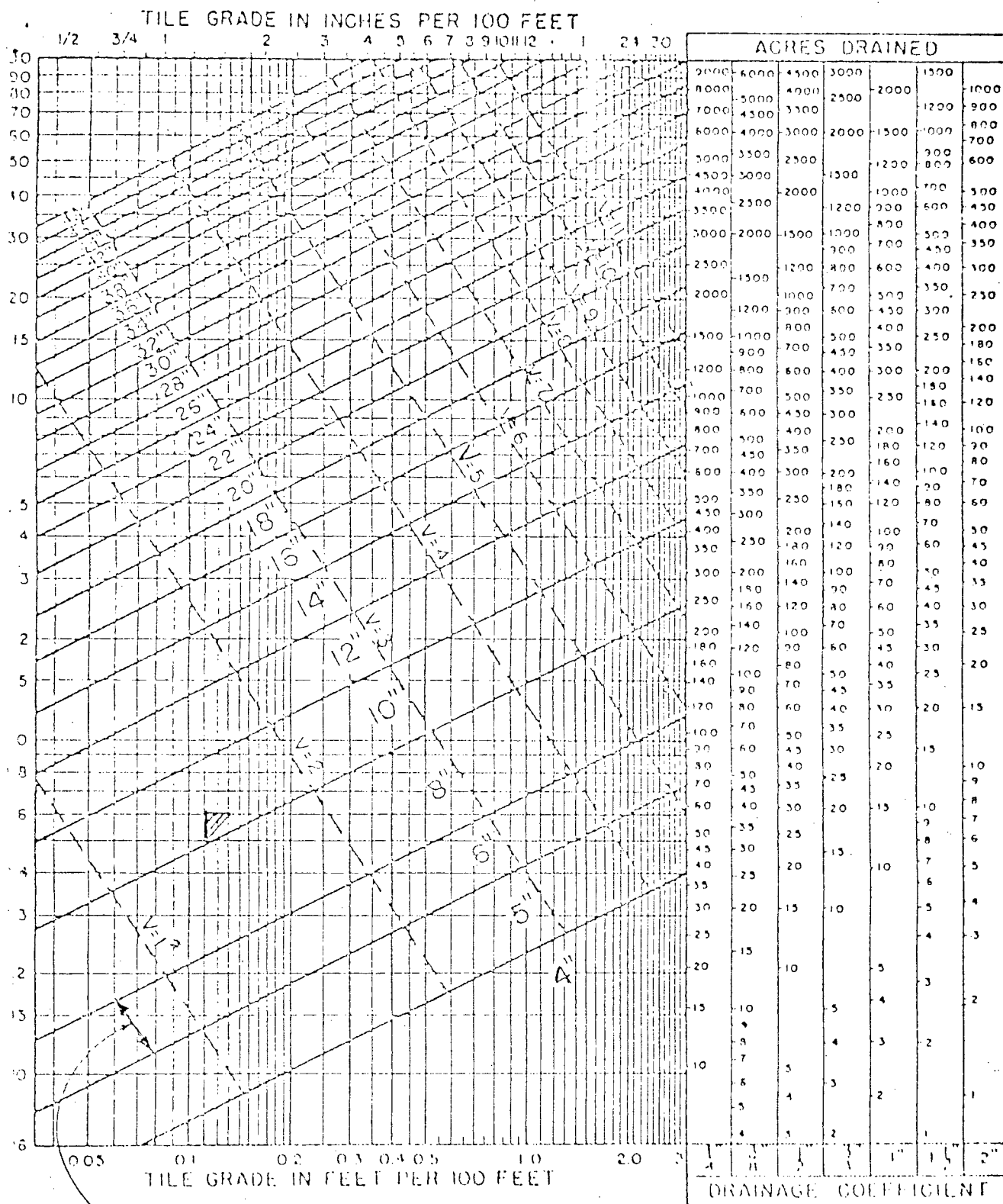
$$0.367 \text{ in./day from 86 acres} = 856,984 \text{ gpd}$$

$$\frac{5 \text{ ppm}}{10^6} \times 856,984 \text{ gpd} \times 8.34 \text{ lb./gal.} = 36 \text{ lb./day of BOD}_5$$

$$\text{Total Flow} = 959,344 \text{ gpd}$$

$$\text{Total BOD Loading} = 121 \text{ lb./day of BOD}_5$$

or 15 ppm



Space between lines is the range of tile capacity for the size shown between lines.

* V = velocity in feet per second

Reference: Yarnall-Woodward Formula $v = 138r^{3/2}$

U.S.D.A. Bulletin 854

EXHIBIT XI

TILE DRAIN DESIGN CHART

Using the formula:

$$\frac{d}{t} = 1.1 \frac{FS}{BOD_L}$$

d = pond depth = 10 ft. = 120 in.

t = detention time

F = oxygenation factor, assumed 1.0

S = solar radiation, assumed 200

BOD_L = ultimate BOD = $1.5 \times BOD_5 = 1.5 \times 15 = 22.5$ ppm

$$t = \frac{120'' (22.5)}{1.1 (1.0) (200)} = 12.3 \text{ days}$$

Required surface area:

$$\frac{959,344 \times 12.3}{7.48 \times 10 \times 43,560} = 3.6 \text{ acres}$$

Use 4 acre pond for 13.6 days detention

IX. COST ESTIMATE

The design calculations and preliminary layout indicate the means necessary to adequately develop a sanitary landfill at the proposed site. The ability to develop the proposed site for use as a sanitary landfill is not a question. However, the cost of doing so is. The estimated cost for developing the proposed landfill is shown in Table VII. Where applicable, unit costs are based on recent landfill projects of a similar nature.

TABLE VII
PRELIMINARY COST ESTIMATE
FOR SANITARY LANDFILL

BASIS: 8 Hours per Day, 5 Days per Week Operation
16,300 Tons per Year Average
7½% Interest, 15 Year Life crf = 0.11328

A. CAPITAL COST

<u>Quantity</u>	<u>Unit</u>	<u>Description</u>	<u>Unit Cost</u>	<u>Total Cost</u>
95	acres	Clearing and grubbing	\$200.00	\$ 19,000
83,800	cu. yd.	Perimeter ditch excavation	3.60	301,680
5,400	cu. yd.	Outfall ditch excavation	3.60	19,440
64,500	cu. yd.	Treatment pond excavation	1.00	64,500
10,500	feet	10-inch tile drain	6.00	63,000
58	feet	36-inch CMP culvert	35.00	2,030
5,333	sq. yd.	6-inch subbase and priming	5.00	26,670
5,333	sq. yd.	Asphaltic paving	3.00	16,000
6,200	feet	Fencing	1.50	9,300
1	L.S.	Potable water well	--	2,500
1	L.S.	Weighmaster and office building	--	20,000
1	L.S.	Scales and equipment	--	55,000
1	L.S.	Septic tank and drainfield	--	1,500
1	L.S.	Outside lighting	--	2,000
1	L.S.	Scale pits and approaches	--	10,000
Subtotal				\$612,620
Engineering, Survey, Borings, Legal				30,600
10% Contingencies				61,300
TOTAL				\$704,520
YEARLY AMORTIZATION				\$ 79,810

Yearly Equipment Amortization (Bulldozer, Pumps, etc.,
considering replacement every 5 years and including salvage value) \$ 15,000

TOTAL ANNUAL CAPITAL COST \$ 94,810

B. OPERATING COST

Excavating and Hauling Cover Material (32,000 cu. yd. required for
16,300 tons/year average, estimated unit cost = \$2.00/cu. yd.) \$ 64,000

Labor (2 men at \$4.00/hour) \$ 16,640

Supplies, fuel, oil, electricity, grass seeding, testing, etc. \$ 20,000

TOTAL ANNUAL OPERATING COST \$100,640

The cost estimates presented in Table VII are summarized as follows:

Average Capital Cost per Ton per Year	=	\$5.82/Ton
Average Operating Cost per Ton per Year	=	<u>\$6.17/Ton</u>
Total Average Cost per Ton per Year	=	\$11.99/Ton

It is noted that these costs include only the costs for landfill development and operation. Costs for refuse collection and hauling are not included.

X. LANDFILL DISCUSSION

It is concluded that the C. F. Mining Corporation property which is proposed for use as a county-wide landfill can be developed for such a purpose. Due to the high water table and poor natural drainage of the proposed site, the area method of landfill operation will have to be used and an extensive system of artificial drainage constructed. The estimated capital cost required to develop the proposed site is \$704,520. The estimated life of the landfill is 15 years or through the year 1993.

The major costs involved in the development and operation of the proposed landfill are the costs for constructing the drainage system and the costs for obtaining suitable cover material.

Phased construction could be employed to reduce the impact of the initial construction cost. A suggested phasing program is depicted in Exhibit XII and the capital costs involved with each phase are as follows:

PHASE 1

21.5 acres, 5 year life, through 1982.
Cost for clearing and grubbing 30.5 acres,
one-fourth of perimeter ditches and tile,
outfall ditch, pond, culvert, subbase and
paving, fencing, lighting, buildings,
scales, engineering, survey, borings, and
legal plus 10% contingencies..... \$389,430

PHASE 2

21.5 acres, 4 year life, through 1986.
Cost for clearing and grubbing 21.5 acres,
and one-fourth of perimeter ditches and
tile plus 10% contingencies..... \$140,550

PHASE 3

21.5 acres, 4 year life, through 1990.
Cost for clearing and grubbing 21.5 acres,
and one-fourth of perimeter ditches and
tile plus 10% contingencies..... \$178,270

PHASE 4

21.5 acres, 3 year life, through 1993.
Cost for clearing and grubbing 21.5 acres,
and one-fourth of perimeter ditches and
tile plus 10% contingencies..... \$225,090

The construction costs shown above for Phases 2, 3 and 4 include an
inflationary factor of 6 percent. Year 1978 costs at an interest rate of 7½
percent are as follows:

Phase 1.....	\$389,430
Phase 2.....	97,900
Phase 3.....	92,990
Phase 4.....	87,910
Total (1978 dollars)	<u>\$668,230</u>

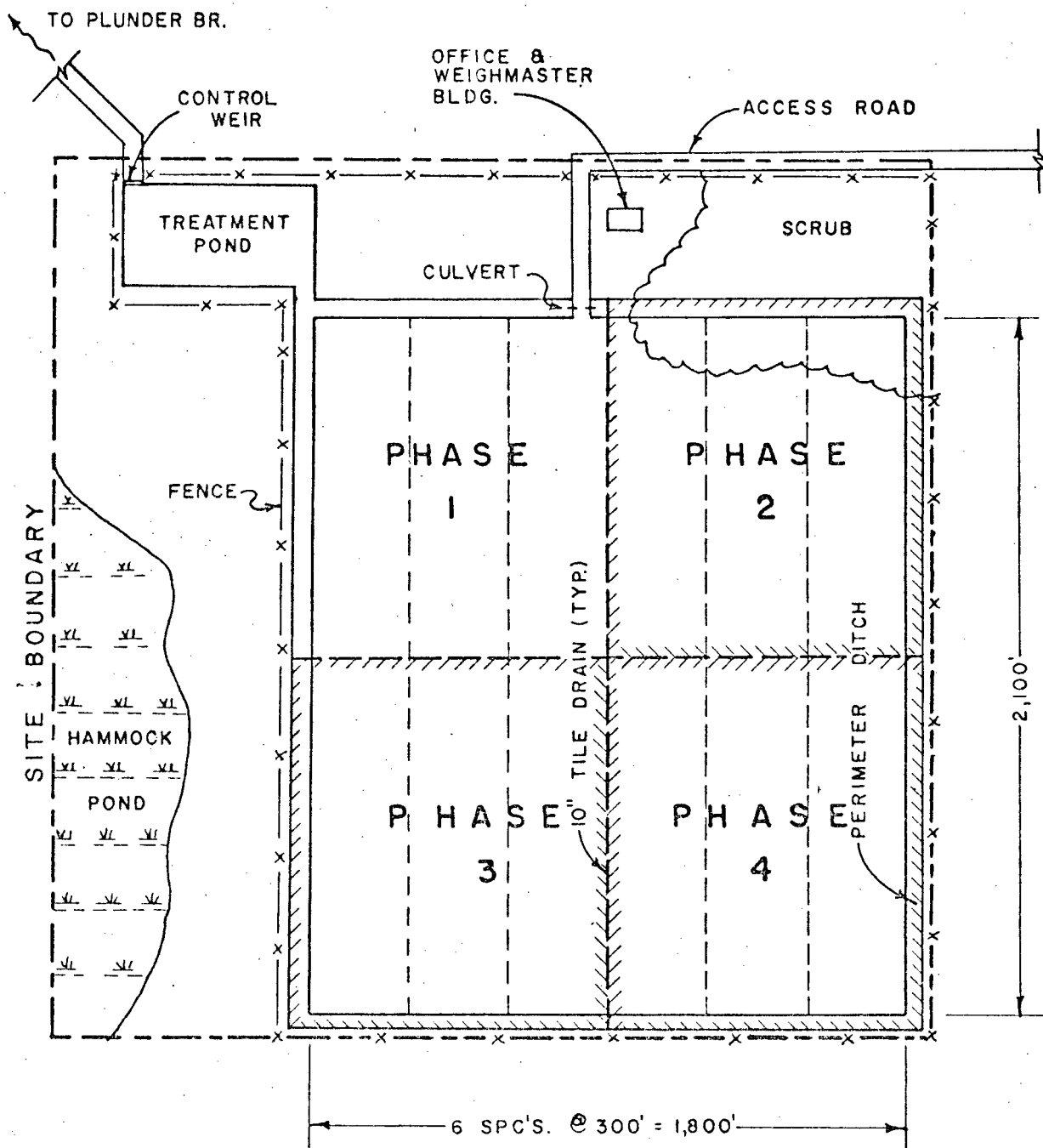


EXHIBIT XII

PHASED CONSTRUCTION PROGRAM

HARDEE COUNTY LANDFILL STUDY

7602-06

DECEMBER, 1977

PREPARED BY

SMITH AND GILLESPIE ENGINEERS, INC.

JACKSONVILLE, FLORIDA

The estimated cost of excavating and hauling cover material accounts for 64 percent of the annual operating cost and 33 percent of the total annual cost. The estimated cost for cover material is based on the premise that suitable cover material could be obtained in the area just north of the proposed site. If this is not possible and cover material has to be hauled from a greater distance, the cost of cover material will be considerably greater.

The problem of obtaining suitable cover material is not unique to the proposed site nor Hardee County and many of the present landfills in Florida are operated using less than ideal cover material. If approval can be obtained from the Florida Department of Environmental Regulation to allow use of the existing soils at the proposed site as cover material, the estimated operating costs would be reduced significantly.

This would also result in a considerable reduction in the construction costs of future expansions since it would allow an operation whereby the drainage ditches could be excavated for cover material as the landfilling progresses.

XI. INCINERATION

A. Background:

Considerable interest has been expressed in the use of incineration instead of a sanitary landfill for disposal of solid refuse in Hardee County. Of particular interest is the Consumat Systems, Inc.

incinerator system. Data regarding the Consumat incinerator system have been evaluated and the installation in Orlando, Florida, has been visited by officials of the City of Wauchula and Hardee County.

An evaluation of the Consumat incinerator system for solid refuse disposal for the City of Wauchula was included in Engineer's Preliminary Report on Regional Solid Waste Study for City of Wauchula, June 1976. It was concluded in this report that, for the City of Wauchula alone, the use of incineration would be more cost-effective than use of a sanitary landfill. For the Greater Wauchula Area, it was concluded that the costs for incineration and sanitary landfill were essentially equal. The scope of this report did not include the evaluation of incineration or sanitary landfill for the entire Hardee County area.

B. General:

The Consumat Systems, Inc. incineration system is a modular type installation utilizing pre-manufactured units which are field assembled. Units can be arranged in single or multiple assemblies which can process from 8 to 250 tons of municipal waste per day. Information from brochures which describe this system is included in Appendix D.

Discussions with DER and FAA have indicated that Consumat incineration could be installed at the Wauchula Airport since this type of disposal facility does not attract birds nor does it contribute to blowing paper and debris, the types of hazards which preclude a sanitary landfill at the airport. In addition, the incinerator is reported to

FALSE

be free from smoke and odors. Based on tests conducted on a similar type installation, EPA has indicated that the Consumat will meet current Federal emission standards as contained in 42 CFR Part 76.8 (See Appendix D).

Data from Orlando's Consumat incineration facility (see Appendix D) show that a 32 to 1 reduction in volume can be obtained through the incinerator. In other words, the volume of the ash is about 3 percent of the original volume of the refuse. This ash, along with unburnable materials such as furniture, white goods (i.e., stoves and refrigerators), tree stumps, etc., must be properly disposed of. It is suggested that an area be set aside to temporarily store salvageable materials for pickup by a junk dealer. The ash and remaining unburnables must be disposed of in an approved landfill in accordance with the Rules of the Department of Environmental Regulation, Chapter 17-7. For the purpose of this study, it is estimated that this material will amount to 10 percent of the collected refuse.

The projected amounts of burnable refuse and unburnable refuse plus ash are shown in Table VIII. Also shown is the area required for landfill of the unburnables and ash. This area was calculated using a four foot depth of uncompacted fill.

C. Preliminary Design:

The design life for the proposed landfill was 15 years, therefore, for comparison a 15 year design life will also be used for

TABLE VIII
PROJECTED ASH AND UNBURNABLE REFUSE

Year	Tons Per Day*		Acres Required for Landfill of Unburnable & Ash	
	Burnable Refuse	Unburnables & Ash	Annual	Accumulative
1978	33.20	3.58	0.69	0.69
1979	34.88	3.76	0.73	1.42
1980	36.62	3.95	0.76	2.18
1981	38.46	4.14	0.80	2.98
1982	40.35	4.35	0.84	3.82
1983	42.48	4.58	0.89	4.71
1984	44.49	4.79	0.93	5.64
1985	46.72	5.03	0.97	6.61
1986	48.82	5.26	1.02	7.63
1987	51.03	5.50	1.06	8.69
1988	53.35	5.75	1.11	9.80
1989	55.78	6.01	1.16	10.96
1990	58.30	6.28	1.21	12.17
1991	60.85	6.56	1.27	13.44
1992	63.52	6.85	1.32	14.76
1993	66.29	7.14	1.38	16.14
1994	69.23	7.46	1.44	17.58
1995	72.24	7.79	1.51	19.09

*NOTE: Tons/day based on 6 days per week, 52 weeks per year.

incinerator facilities. From the projections in Table VIII, the average annual quantity of burnable refuse during the next 15 years is 48.4 tons per day or 15,100 tons per year. Therefore, a 50 ton per day facility consisting of four C-760M Consumat units is required. The 50 tons per day capacity is based on a 10 hour per day charging rate. If operated full time, the facility could handle a maximum of 80 tons per day.

The incinerator facilities can be located, with reasonable restrictions, almost anywhere in the county where sufficient land, access roads, electricity and water are available. The existing Wauchula Airport would be a very suitable site. Therefore, that site was considered when developing the following cost estimate.

D. Cost Estimate:

The estimated costs for constructing and operating the incinerator facility are shown in Table IX. For items common to both landfill and incineration (i.e., scales, septic tank, etc.), the same costs as presented previously in this report are used.

The cost estimates presented in Table IX are summarized as follows:

Average Capital Cost per Ton per Year	=	\$6.35/Ton
Average Operating Cost per Ton per Year	=	<u>\$5.56/Ton</u>
Total Average Cost per Ton per Year	=	\$11.91/Ton

Again it is noted that these costs include only the costs for construction and operation of the incinerator facility. Cost for refuse collection and hauling are not included.

TABLE IX
PRELIMINARY COST ESTIMATE
FOR INCINERATION

BASIS: 10 Hours per Day Charging Rate
6 Days per Week Operation
7-1/2% Interest, 15 Year Life crf = 0.11328

A. CAPITAL COST

<u>Description</u>	<u>Total Cost</u>
4 C-760M Consumat Incinerators including frieght, rigging, installation and start-up, permits and testing, training of operators, and warranty service	\$440,000
Building	120,000
Grading and Compacting	10,000
Foundations	16,000
Site Paving	5,000
Electrical	8,000
Water Supply	2,500
Septic Tank and Drainfield	1,500
Scales and Equipment	55,000
Scale Pits and Approaches	10,000
4 Loading Bridges	6,000
Lance, Hoe and Spare Parts	5,000
Subtotal	\$679,000
Engineering, Survey, Borings, Legal	33,900
10% Contingencies	67,900
TOTAL	\$780,800
YEARLY AMORTIZATION	\$ 88,450
Yearly Equipment Amortization (Model 700 Bobcat, pumps, etc., considering replacement every 5 years and including salvage value)	\$ 15,000
TOTAL ANNUAL CAPITAL COST	<u>\$103,450</u>

TABLE IX (CONT'D)

B. OPERATING COST

<u>Description</u>	<u>Total Cost</u>
Fuel Oil at 5 gallon/ton \$0.42 per gallon, average 15,100 tons/yr. burnable	\$ 31,710
Electricity at 12 kwh/ton, \$0.04 per kwh	7,250
Labor (2 men at \$4.00/hour)	24,960
Maintenance at \$0.50/ton	7,550
Excavating and hauling cover material for landfill of ash and unburnables, 4,560 cu. yd./year, average at \$2.00/cu. yd.	9,120
Miscellaneous expenses	<u>10,000</u>
TOTAL ANNUAL OPERATING EXPENSES	<u>\$ 90,590</u>

E. Energy Recovery:

One of the potential advantages of an incineration facility is that the waste heat generated may be recovered for useful purposes.

Consumat Systems, Inc. markets energy conversion units which can be added to the incinerator to produce steam. The estimated cost of these units and potential value of the steam produced are listed below.

4 CRS-503 Heat Recovery Units including
complete installation, spare parts, engineer-
ing and contingencies..... \$200,000

YEARLY AMORTIZATION..... \$ 22,650

Annual Cost for Labor, Maintenance,

Water, etc..... \$ 20,000

TOTAL ANNUAL COST..... \$ 42,650

Annual Value of Steam:

20,000 lbs. per hour at 100 psi. Equivalent
to 175 gallons of No. 6 oil per hour at 80%
efficiency. At 30¢ per gallon = \$52.50 per hour.

Annual Value..... \$163,800

NET SAVINGS..... \$121,150

This potential net savings is equivalent to \$7.43 per ton of refuse collected. This is a "potential" savings because in order to be realized, a buyer of the steam produced would have to be located close to the incinerator facility.

XII. CONCLUSIONS AND RECOMMENDATIONS

The primary purpose of this study was to evaluate the feasibility of the C.F. Mining Corporation property as a county-wide sanitary landfill. As discussed previously, it is feasible to develop this site as a sanitary landfill, however, the drainage and cover requirements make the cost of doing so very high. Over the expected 15 year life of the landfill, the estimated total cost per ton of refuse collected is \$11.99 per ton.

As an alternative to landfilling, the construction and operation of an incinerator facility was evaluated. Based on a 15 year life, the estimated total cost per ton of refuse collected is \$11.91 per ton.

These estimated costs for landfilling and incineration are close enough to be considered equal. Therefore, the choice between the two alternatives depends largely on other factors. A major factor is the potential that incineration offers for energy recovery through the production of steam. Even if a buyer for the steam is not immediately available, this potential energy source would be an attraction for new industry in Hardee County.

Another consideration is that when the effective life of the proposed landfill is over (projected for the year 1993), either a new landfill or an alternative method of refuse disposal will have to be developed. The incinerator facility, however, could be operated for a longer time each day in order to extend its effective life.

There are few restrictions as to where an incinerator facility could be located, however, the location of a landfill is very dependent on site conditions. Very little area in Hardee County is suitable for a sanitary landfill. Other problems associated with landfills such as surface water and groundwater pollution, insects and rodents, and blowing debris are much less for incinerator facilities.

Based on the aforementioned factors and the results of this study it is respectfully recommended that serious consideration be given to the installation of a Consumat Incinerator System.

APPENDIX A

Rules of the Department
of Environmental Regulation

Chapter 17-7

Resource Recovery and Management
Part I: Solid Waste Facilities

**RULES
OF THE
DEPARTMENT OF POLLUTION CONTROL
CHAPTER 17-7**

RESOURCE RECOVERY AND MANAGEMENT

PART I: SOLID WASTE FACILITIES

- 17-7.01 Declaration of Intent
- 17-7.02 Definitions
- 17-7.03 Resource and Recovery
- 17-7.04 Prohibitions
- 17-7.05 Sanitary Landfill Criteria
 - (1) Location Responsibilities
 - (2) Operations Plans
 - (3) Operations
- 17-7.06 Special Waste Handling
- 17-7.07 Dump Closing and Conversion
- 17-7.08 Supervision and Inspection
- 17-7.09 Volume Reduction Plants
- 17-7.10 Applications for Permit
- 17-7.11 Permit Forms

17-7.01 Declaration of Intent.

The Florida Department of Pollution Control finds and declares that improper disposal of solid waste on or in the land and use of dumps as a means of final disposal results in or contributes to air pollution, water pollution, and land blight. The Department further finds that regulation of land disposal of solid waste will reduce air pollution, water pollution and the use of the land as an uncontrolled receptacle for improperly treated waste. The Department further finds that properly designed, operated and monitored disposal of solid waste on or in the land enhances the environment.

It is the intent of the Department to require that solid waste disposal be conducted in a manner and under conditions that will eliminate the dangerous and deleterious effects of improper solid waste disposal upon air quality, water quality, soils and human health.

The Department shall plan for and regulate the storage, collection, transport, separation, processing, recycling and disposal of solid waste in order to protect the public safety, health and welfare, to enhance the environment for the people of the state, and to recover resources which have the potential for further use, and to assure that the final irreducible residue disposed on or in the land enhances the environment.

The Department will establish, maintain and promote a cooperative state program of planning and technical assistance for resource recovery and management; require counties and municipalities to plan for and provide efficient, environmentally acceptable resource recovery and management; review design and issue permits for operation of resource recovery and management facilities; promote the application of resource recovery systems which preserve and enhance the quality of air, water and land resources.

Pursuant to Sections 403.061(3),(7) and Sections 403.701 through 403.713, Florida Statutes, the execution and enforcement of any section regarding actual or potential pollution of the air or

waters is under the jurisdiction of the Department of Pollution Control. Chapter 17-7 F.A.C. replaces all applicable sections of Chapter 10 D-12 F.A.C.

General Authority 403.061 FS. Law Implemented 403.021, 403.031, 403.061, 403.087, 403.701 through 403.713 FS. Chapter 74-342. History—New 10-1-74.

17-7.02 Definitions.

The following words, phrases or terms as used in this Chapter, unless the context indicates otherwise, shall have the following meaning:

(1) "Solid Waste" is garbage, rubbish, refuse, or other discarded solid or semi-solid materials resulting from domestic, commercial, industrial, agricultural activities and Governmental operations excluding solids or dissolved material in domestic sewage or other significant pollutants in water resources such as silt, dissolved or suspended solids in industrial waste water effluents, dissolved materials in irrigation return flows or other common water pollutants.

(2) "Resource Recovery" means the process by which materials, excluding those under control of the Atomic Energy Commission, which still have useful physical or chemical properties after serving a specific purpose are reused or recycled for the same or other purposes, including use as an energy source.

(3) "Recycling" means the reuse of solid waste in manufacture, agriculture, power production, or other process.

(4) "Resource Management" means the process by which solid waste is collected, transported, stored, separated, processed, or disposed of in any other way according to an orderly, purposeful, and planned program.

(5) "Resource Recovery and Management Facility" means any solid waste disposal area, volume reduction plant, or other facility the purpose of which is resource recovery or the disposal, recycling, processing, or storage of solid waste.

(6) "Sanitary Landfill" is a disposal facility employing an engineered method of disposing of solid waste on land in a manner which minimizes environmental hazards by spreading the solid wastes in thin layers, compacting the solid wastes to the smallest practical volume, and applying cover material once each working day.

(7) "Dump" is a land disposal site at which solid waste is disposed of in a manner which does not protect the environment and is exposed to the elements, vectors and scavengers.

(8) "Ground Water" is subsurface water in the zone of saturation of the earth's crust. The top of this zone of saturation is commonly defined as the water table.

(9) "Hazardous Wastes" are materials or combinations of materials which require special management techniques because of their acute and/or chronic effects on air and water quality; on fish,

wildlife, or other biota; and on the health and welfare of the public. These materials include, but are not limited to, volatile, chemical, biological, explosive, flammable, radioactive and toxic materials.

(10) "Abandoned Vehicles" are passenger automobiles, trucks, trailers, farm equipment, etc., that have no remaining useful life and are left unattended on public or private property.

(11) "White Goods" are inoperative and discarded refrigerators, ranges, washers, water heaters and other similar domestic and commercial appliances.

(12) "Volume Reduction Plant" includes, but is not limited to, incinerators, pulverizers, compactors, shredding and baling plants, transfer stations, composting plants and other plants which accept and process solid waste for recycling or disposal.

(13) "Cell" is a volume of solid waste compacted on an inclined plane and enclosed by a layer of earth.

(14) "Lift" is a completed horizontal series of cells.

(15) "Daily Cover" is a six (6) inch layer of compacted earth used to enclose a cell once each working day.

(16) "Intermediate Cover" is a layer of compacted earth one foot in depth applied to a partially completed landfill where final cover is not to be applied within one year of cell completion.

(17) "Final Cover" is a layer of compacted earth two feet in depth applied to a completed landfill the top six (6) inches of which is loosely compacted to promote plant growth.

(18) "Leachate" is a liquid that has percolated through solid waste and contains dissolved or suspended materials that may contaminate surface or underground waters used as sources of food, water supplies, recreation, etc.

(19) "Working Face" is that portion of a sanitary landfill where waste is discharged, spread and compacted prior to placement of daily cover.

(20) "Monitoring Wells" are strategically located shallow and deep wells from which water samples are drawn for analysis of possible contaminants and from which direction of ground water flow is determined.

(21) "Infectious Wastes" are those wastes resulting from the operation of medical clinics, hospitals, abattoirs, and other facilities producing waste which may consist of, but are not limited to, human and animal parts, contaminated bandages, pathological specimens, hypodermic needles, contaminated clothing, and surgical gloves.

(22) "Putrescible Wastes" are materials capable of decomposition, causing environmental nuisances and/or obnoxious odors.

(23) "Milled Refuse" is refuse that has been mechanically ground, shredded or pulverized.

General Authority 403.061 FS. Law Implemented 403.021, 403.031, 403.061, 403.087, 403.701 through 403.713 FS. Chapter 74-342. History—Transferred from 10D-12.02, 10-1-74.

17-7.03 Solid Waste Resource Recovery and Management Responsibilities.

(1) All counties, municipalities or other governmental agencies shall be responsible for providing adequate, safe and sanitary resource recovery and management facilities within their

respective jurisdictions. This responsibility may be delegated to a private operator through a franchise or contract.

(2) Garbage storage and collections. Putrescible wastes which are set out for individual collection by a collection service shall be retained in watertight receptacles of impervious material which are provided with tight fitting closures suitable to protect the contents from flies, insects, rats and other animals. Garbage collection shall be made at such intervals and collection equipment shall be of such design as meets the approval of the Department.

(3) All facility operators other than counties, municipalities or other governmental agencies shall post a performance bond or other approved security with the agency within whose jurisdiction the site is located in an amount consistent with the scope of the operation.

(4) The person making application for a resource recovery and management facility permit shall submit to the Department four copies of an engineering plan of the proposed operation prepared by a Professional Engineer registered in the State of Florida. Said Engineer shall be required to make periodic inspections of the facility to insure that design integrity is maintained.

(5) All plans and applications for a permit to construct and operate a sanitary landfill shall be signed by a Professional Engineer registered in the State of Florida in accordance with the provisions of Chapter 471 FS. If the person is acting as a public officer employed by the State, a county or a municipality and where the total estimated cost is less than ten thousand dollars, this requirement may be waived in accordance with Chapter 471.05(4) FS.

(6) The Department, following a review of the facility plans, shall impose such revisions as necessary, including provisos, in connection with the issuance of a permit for construction and/or operation.

The Department may consider minimized requirements for those counties, municipalities and small communities having a very small population of a principally rural nature if the Department determines that no significant threat to environmental quality or public health will result.

(7) Permits. —

(a) After January 1, 1975, no resource recovery and management facility or site shall be operated, maintained, constructed, expanded, or modified without an appropriate and currently valid permit issued by the Department as defined in Chapter 17-4 F.A.C. Provided that no public nuisance or any condition adversely affecting the public health is created and provided that the activity does not violate other state or local laws, ordinances, rules, regulations or orders, no permit under this section shall be required for the following activities:

1. Persons who dispose of solid waste resulting from their own activities on their own property;
2. Normal farming operations.

(b) Existing resource recovery and management facilities which meet the criteria of this rule may be issued an operation permit upon application and approval by the Department.

(c) Temporary operating permits may be issued to existing resource recovery and management facilities upon submission of a compliance schedule to correct deficiencies. An operation permit shall be issued by the Department when the facility meets all criteria.

Failure to correct deficiencies within the compliance schedule will result in formal enforcement procedures.

(8) All persons operating existing facilities on the effective date of this rule shall take necessary corrective actions as expeditiously as possible so as to be in full compliance with these regulations no later than July 1, 1977.

(9) Garbage feeding of hogs or other animals. Feeding of garbage to hogs without first adequately cooking said material in a manner prescribed by the Department of Agriculture and Consumer Services in accordance with provision of Chapter 585.50 FS. is prohibited. A feeding permit shall be obtained from the Department of Agriculture and Consumer Services, and approval granted by the Department of Pollution Control before such feeding commences. After cooking, the garbage shall be fed to hogs on impervious feeding platforms. Platforms and surrounding areas shall be maintained in such a manner as to prevent environmental nuisances.

General Authority 403.061 FS. Law Implemented 403.021, 403.031, 403.061, 403.087, 403.701 through 403.713 FS. Chapter 74-342. History—Transferred from 10D-12.03, 10D-12.04, 10D-12.07, 10-1-74.

17-7.04 Prohibitions.

(1) No solid waste shall be disposed of except by sanitary landfill, incineration, recycling process, or other method approved by the Department and consistent with applicable approved county or municipal programs.

(2) Unless otherwise approved by the Department and/or based on installation of approved control measures, no solid waste shall be disposed of by being placed:

(a) in or within 200 feet of any natural or artificial body of water, except canals used to lower site water tables, or on the watershed of any surface public water supply where leachate or runoff may result in violation of city, county, State or Federal Laws and regulations concerning the pollution of ground or surface waters.

(b) on the banks of a stream known to be hydraulically connected to any aquifer.

(c) in a sink hole or in the immediate area thereof.

(d) in a limestone, or gravel pit.

(e) in an area subject to frequent and periodic flooding unless drainage provisions approved by the Department are installed.

(f) where the water table is less than five (5) feet below normal ground surface, unless otherwise approved by the Department, following installation of permanent control methods.

(g) in an area immediately adjacent to or within the cone of influence of public water supply pumping.

(h) within two hundred (200) feet of any habitation or place of business that is served by a public water supply system or within one thousand (1000) feet of any habitation or place of business that is served by an individual potable shallow water supply well located on the premises.

(i) in any area open to public view from any major thoroughfare without proper screening where it can practically be provided.

(j) on any public highway, road or alley or the right-of-way thereof.

(k) within the boundaries of any airport property whether such airport be for public, private or limited use (FS. 330.30, Florida Administrative Rules 14-60).

(l) within two (2) miles of the closest point of any runway at any airport licensed by the State of Florida or any airport operated by the Federal Government which are or may be used by turbo-jet aircraft; or within one mile of any aircraft runway used only by piston engine type aircraft unless it has been determined by the Federal Aviation Administration that the proposed facility poses no safety hazard to aircraft in the vicinity.

(m) no burning of solid waste shall be permitted at any land disposal site except in accordance with the provisions of Chapter 17-5 F.A.C.

(n) in any other than the above defined areas that in the opinion of the Department would result in damage to the environment.

(3) Hazardous Waste: The land disposal or incineration of hazardous waste which would create a condition harmful to the environment, shall at the owners expense, be rendered safe and sanitary prior to delivery to the disposal facility. Should a hazardous waste be of such a chemical composition that it cannot be rendered innocuous, the producer of such wastes must confer with appropriate authorities or the Department to determine a safe disposal or storage method.

(4) Infectious waste shall be properly incinerated or processed by an alternate method which has been approved by the Department. No raw infectious waste shall be deposited in any sanitary landfill.

(5) Transportation and disposal of solid waste into or through the State, into or across county or municipal boundaries shall not be impeded provided such transport and disposal is in accordance with the provisions of this rule; does not degrade the environment, cause a health hazard or create a physical or aesthetic nuisance.

(6) The construction of buildings, sewage, or gas or water supply mains, parking lots, or paved areas on or through completed portions of sites filled with solid waste is prohibited unless specifically approved by the Department.

(7) These prohibitions do not apply to those persons exempted by 403.707(1) FS.

General Authority 403.061 FS. Law Implemented 403.021, 403.031, 403.061, 403.087, 403.701 through 403.713 FS. History—Transferred from 10D-12.06, 10D-12.07, 10-1-74.

17-7.05 Sanitary Landfill Criteria.

(1) Location Requirements.

(a) Soil Survey

Solid waste shall be disposed of only in areas where an adequate soil survey by a qualified U.S.D.A. Soil Conservation Service or other Soil Scientist has been made using the U.S.D.A. Soil Conservation Service taxonomy. The degree of limitation of the soils found shall be rated in accordance with the U.S.D.A. Soil Conservation Service Guide for Interpreting Engineering Uses of Soils. Such requirement may be waived by the Department only after being advised in writing by the Soil Scientist that the soils are such that a determination of soil series is not possible.

(b) Hydrological Survey

Solid waste shall be disposed of only in areas where an adequate hydrological survey has been made. Where this is not feasible the best available information from Water Management Districts, U.S. Geological Survey, Florida Bureau of Geology or other acceptable sources shall be required.

(c) Site Requirements

The land disposal site location shall:

1. be easily accessible by collection vehicles, automobiles and where applicable, transfer vehicles;
2. safeguard against water pollution originating from the disposal of solid waste;
3. have an adequate quantity of acceptable earth cover available. The cover material should be easily workable, compactable, and should not contain organic matter conducive to the harborage and/or breeding of vectors;
4. conform with the proper zoning.

(2) Operation Plans — The proposed operational plans shall include:

(a) Map or aerial photograph of the area showing land use and zoning within ¼ mile of the solid waste disposal site. This photograph shall be of sufficient scale to show all homes, industrial buildings, wells, watercourses, dry runs, rock out-croppings, roads and other significant details.

(b) Plot plan of the site showing dimensions, location of soil borings, proposed trenching plan and original elevation, cover stock piles, and fencing. Cross sections shall be included on the plot plan or on separate sheets showing both the original and proposed fill elevations. The scale of the plot plan should not be greater than 200 feet to the inch.

(c) The design of the sanitary landfill shall include one or more topographic maps at a scale of not over 200 feet to the inch with 5-foot contour intervals. These maps shall show: the proposed fill area; any borrow area; access roads; grades required for proper drainage of each lift and typical cross section of a lift; special drainage devices if necessary; fencing; equipment facilities; and all other pertinent information.

(d) A report shall accompany the plans indicating:

1. population and area to be served by the proposed site.
2. anticipated type, annual quantity and source of solid waste, expressed in cubic yards of compacted materials.
3. anticipated life of the site.
4. geological formations and groundwater elevations to a depth of at least 10 feet below proposed excavations and lowest elevation of the site. Such data shall be obtained by soil borings or other appropriate means.
5. soil map, interpretive guide sheets, and a report giving the suitability of the site for such an operation.
6. source and characteristics of cover material.
7. type and amount of equipment to be provided at the site for excavating, earth moving, spreading, compaction and other needs.
8. persons responsible for actual operation and maintenance of the site and intended operating procedures.

(e) Operational design features. The disposal site shall be provided with operation features and appurtenances necessary to maintain a clean and orderly operation. These minimum features are:

1. operational plans to direct and control the use of the site;

2. the site shall be surrounded by a fence or other suitable barrier;

3. an all-weather access road to the site. A special area with a stabilized roadway shall be provided within the site for wet weather operations.

4. signs indicating name of operating authority, traffic flow, hours of operation, and charges for disposal (if any):

5. scales for weighing solid waste received at the landfill; or, in lieu thereof, estimates of the number of cubic yards received. Quantitative records shall be forwarded to the Department upon request.

6. suitable dust control methods such as approved chemicals, oils, or water sprays;

7. litter control devices; portable fences, or other suitable means.

8. fire protection and fire-fighting facilities adequate to insure the safety of employees and provisions to deal with accidental burning of solid waste within the sanitary landfill;

9. emergency first aid equipment to provide adequate treatment of accidents, especially those associated with hazardous wastes.

(f) Personnel and Facilities. In order to provide proper staffing and suitable facilities the following shall be required at all sites, except where otherwise approved by the Department, in writing, for sites serving less than 5,000 people.

1. A trained equipment operator in full time attendance during operating hours.

2. Employees shall be trained in the proper and safe operation of all equipment and first aid procedures.

3. Communication facilities for use in emergencies.

(g) Equipment. To assure adequate operation the following is required:

1. equipment sufficient for spreading, compacting, and covering operations;

2. sufficient reserve equipment, or arrangements to provide alternate equipment within 24 hours following equipment breakdown;

3. safety devices on equipment to shield and protect the operators from potential hazards during operation;

(h) The Department recommends:

1. A potable water supply.

2. A suitable employee shelter.

3. Handwashing and toilet facilities.

4. Equipment wash-out facilities.

5. Electric service for operations and repairs.

6. Equipment shelter for maintenance and storage of parts, equipment and tools.

(3) Operations.

(a) At the time of design approval or at any time ground water contamination is suspected the Department shall have the option to require the installation of monitoring wells and may specify the number, location, and depth of monitoring wells in addition to the frequency of samples to be taken, and the analyses to be run.

(b) A minimum separation of five (5) feet shall be maintained between putrescible solid waste and anticipated high ground water table. Nonputrescible and insoluble materials such as brick, stone, concrete, and similar materials but not yard clippings, asphalt

or other bituminous materials may be deposited below the anticipated high ground water table if in the determination of the Department such deposition will not result in the pollution of ground water. The Department may at its discretion waive this requirement if it finds adequate controls such as perimeter ditches or well point systems are provided. Exceptions will not normally be granted for areas where the soil is saturated or the capillary fringe reaches the soil surface an average of more than two months per year, seven out of ten years.

(c) Sanitary landfills shall provide for the collection, control and treatment of surface runoff from the site to meet established water quality standards of the receiving waters.

(d) Any leachate emanating from a landfill shall be collected and treated if it is a potential source of water pollution.

(e) The grade of the completed refuse cells and lifts in addition to the final cover shall drain the surface runoff water to prevent uncontrolled ponding. Thus, it is best to slightly oversize initial grades so that good drainage will be maintained after final settlement.

(f) All completed portions of sanitary landfills which have received final cover and no future vehicular traffic is anticipated shall be planted with grass or acceptable cover vegetation to minimize infiltration, erosion and dust.

(g) All sanitary landfills where gas generated by decomposition of wastes cannot readily be dispersed into the atmosphere shall be provided with a gas control system. This requirement is particularly applicable to all multiple lift sites.

(h) 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.

(i) All solid waste except materials such as abandoned vehicles, white goods and certain hazardous wastes as specified by the Department shall be compacted to form cells which have a vertical depth not to exceed ten (10) feet with working face and side grades at a slope of approximately thirty (30) degrees.

(j) All cells shall receive a compacted cover of six (6) inches of earth once each working day.

(k) 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.

(l) An intermediate cover of one (1) foot of compacted earth in addition to the daily six (6) inch 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 especially on all sites where multiple lifts are to be constructed.

(m) All completed cells shall receive a final cover of two (2) feet of earth compacted in six (6) inch layers within one (1) year of cell completion with the final six (6) inches loosely compacted to promote plant growth.

(n) The side slopes in addition to the top of all completed sanitary landfills constructed five (5) feet or more above surrounding ground elevation shall have a minimum of three and one half (3½) feet of compacted earth cover (which is the sum of daily, intermediate and final cover). The sides shall have a slope not to exceed one (1) foot vertical to three (3) feet horizontal to minimize erosion.

(o) Pesticides used to control rodents, flies and other insects shall be as specified by the Florida Department of Agriculture and Consumer Services. (Chapter 5 E-2).

(p) Scavengers shall not be permitted at any sanitary landfill site.

(q) Alternate procedures not included in this section shall require Department approval.

General Authority 403.061 FS. Law Implemented 403.021, 403.031, 403.061, 403.087, 403.701, through 403.713 FS. Chapter 74-342. History—Transferred from 10D-12.07, 10-1-74.

17-7.06 Special Waste Handling.

(1) Disposal of waste sludges and liquids, including septic tank contents referred to in 17-13.09, shall be with special consideration of air and water pollution and health and safety of landfill employees. Appropriate provisions shall be made for handling these waste materials in a landfill, only where alternate disposal methods are not available and when such disposal does not violate laws and regulations.

(2) If abandoned vehicles are brought to the site, they may be stored temporarily in a separate area, provided arrangements have been made for frequent removal to an automobile shredding, or compacting plant. If such arrangement has not been made all abandoned automobiles, white goods and similar materials shall be compacted before being placed in the fill area to minimize voids.

(3) In the event of natural disasters, in which large accumulations of debris are created-- such as trees and buildings that have been destroyed, the debris may be transported to an area remote from habitation, and burned, in accordance with Chapter 17-5.08(1).

(4) Landfilling milled solid waste without daily soil cover can be an environmentally acceptable method of final disposal. The same engineering principles involved in sanitary landfill sites must be employed, including a properly designed, and operated milling facility. The Department will grant approvals contingent upon the following conditions:

(a) Particle size. Seventy percent (70) of all milled refuse, dry weight, shall be capable of passing through a three (3) inch screen.

(b) Waste must be spread to a smooth contour and compacted promptly after placement and left undisturbed to prevent odors. Wind blowing of milled refuse and paper shall be controlled.

(c) Gas entrapment in milled solid waste is minimal, however, addition of cover or possible migration of gases through fissures, etc., requires the same attention to gas control as a sanitary landfill.

(d) All solid waste storage areas in the milling facility must be maintained and cleaned at the end of each day's operations, or during continuous operation, as necessary, to prevent fly, rodent or other vector problems. All milling equipment must be maintained to control spillage and to achieve the required milled product quality.

(e) An operational plan must include provision for removal and proper disposal of wastes within 24 hours should the mill facility break down or operational quality is diminished. The operational plan must include provision for a stock pile of emergency soil cover material and a plan to convert the operation to a sanitary landfill.

(f) Upon completion of the site, it shall be closed, covered with a final one (1) foot thick soil

cover and shall be seeded or planted with grass or suitable cover vegetation to minimize erosion.

General Authority 403.061 FS. Law Implemented 403.021, 403.031, 403.061, 403.087, 403.701 through 403.713 FS. Chapter 74-342. History—Transferred from 10D-12.07, 10-1-74.

17-7.07 Dump Closing.

It shall be required of all persons operating land disposal sites which are dumps, as defined in Section 17.02(7) to eliminate or convert them to sanitary landfills as expeditiously as possible but no later than July 1, 1977. The sites shall be closed in accordance with the following criteria:

(1) Access to the site shall be restricted by a fence or other appropriate and effective means.

(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) Burning of solid waste shall be prohibited except upon approval by the Department.

(5) The site shall be closed to incoming solid waste as soon as the alternate site is in operation.

(6) Steps shall be taken, where potential water pollution exists, to prevent its continuance by diverting surface waters around the site, removing wastes from the water table or by other means approved by the Department.

(7) Upon completion, the closed site shall be seeded or planted with grass or suitable cover vegetation to minimize erosion.

General Authority 403.061 FS. Law Implemented 403.021, 403.031, 403.061, 403.087, 403.701 through 403.713 FS. Chapter 74-342. History—Transferred from 10D-12.07, 10-1-74.

17-7.08 Supervision and Inspection.

(1) Supervision of the operation shall be the responsibility of a qualified person experienced in the operation of a resource recovery and management facility.

(2) Routine inspections and evaluations of facility operations shall be made by the Department. A notice of deficiencies, with recommendations for their correction, shall be provided to the person responsible for the operation.

(3) Inspection of a completed sanitary landfill shall be made by the Department before the earthmoving equipment is removed from the site. Any corrective work shall be performed before the landfill project is accepted by the Department as completed. Arrangements shall be made for the repair or restoration of the final cover as required for at least two years following completion.

General Authority 403.061 FS. Law Implemented 403.021, 403.031, 403.061, 403.087, 403.701 through 403.713 FS. Chapter 74-342. History—Transferred from 10D-12.07, 10-1-74.

17-7.09 Volume Reduction Plants.

(1) Permits will be required for all volume reduction plants as defined in Section 17-7.02(12).

(2) Volume reduction plants shall be designed and operated to meet all applicable rules of the Department including Chapters 17-2 and 17-3 F.A.C. and shall be reviewed for permitting based on the receipt of comprehensive data on the process and its relative potential as a pollution source.

(3) Recovered resources resulting from such facilities and which may be offered for sale shall comply with applicable regulations of all appropriate State agencies.

(4) Experimental methods and operations will be reviewed by the Department for a permit based on purpose and design effectiveness.

General Authority 403.061 FS. Law Implemented 403.021, 403.031, 403.061, 403.087, 403.701 through 403.713 FS. Chapter 74-342. History—New 10-1-74.

17-7.10 Application for Permit.

STATE OF FLORIDA

DEPARTMENT OF POLLUTION CONTROL.

CONSTRUCT ()
APPLICATION TO A SOLID WASTE
OPERATE ()
RESOURCE RECOVERY AND MANAGEMENT FACILITY

Applicant:
(Owner or authorized agent)

Street Address:

Mailing Address:
(If different from above)

(City)

(County)

Location of Site:

(Township, Range, Section, & Lat., Long.)

(Name of Access Road and Crossroad)

Towns and Areas to be Served:

Population Served: _____ Area of Site: _____ Acres

Date Site Ready to Receive Refuse: _____

General Requirements

A permit is required for each Resource Recovery and Management Facility. Separate applications for each permit, four copies each, should be submitted to the Regional Office of the Department of Pollution Control. Complete appropriate sections of the application for the type of facility proposed: sanitary landfill, incinerator, volume reduction plant, etc.

Each application shall be accompanied by an application fee of \$20.00 payable by check drawn in favor of "State of Florida, Department of Pollution Control."

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 clear the application through appropriate local planning agencies. Comments from

any of these agencies shall be forwarded with the application to the Department.

Information contained in the application shall conform to requirements of Chapter 17-7 F.A.C. All entries should be typed or printed in ink. If additional space is needed, separate, properly identified sheets of paper may be attached.

All documents submitted to support the application should be on 8.5" x 11" paper.

Processing of the application will begin when the foregoing requirements have been met.

Permit Number _____ Issue Date _____

Review Date _____ Expiration Date _____

(1) Statement by Applicant and Engineer

A. Applicant

The undersigned owner, or authorized representative*, of _____ is aware that statements made in this form and attached exhibits are an application for a _____ Permit from the Florida Department of Pollution Control 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 the rules and regulations of the Department. It is understood that the Permit is not transferable, and, if granted a permit, the Department will be notified prior to the sale or legal transfer of the permitted establishment.

Signature of owner or agent

Name and Title

Date: _____
*Attach letter of authorization

B. Professional Engineer Registered in Florida

This is to certify that the engineering features of this resource recovery and management facility have been designed/examined by me and found to conform to engineering principles 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 for proper maintenance and operation of the facility.

Signature _____ Mailing Address: _____

Name: _____ Telephone No.: _____
(please type)
Florida Registration Number _____ Date: _____
(please affix seal)

(2) Sanitary landfill including milled refuse disposal sites requirements, Required Attachments
(Submit in the order listed)

1. Maps
 - A. A location map drawn to a scale of one inch equals one half mile showing the contours and elevation of the area surrounding the site.
 - B. A topographic map of the site drawn to a scale not to exceed one inch equals two hundred feet showing existing and final grades.
2. Drawings which shall include:
 - A. Property lines
 - B. Land use including existing habitations; other structures; public roads and highways; shallow and deep wells; trees; etc.
 - C. Area and depth of the proposed fill
 - D. All borrow areas
 - E. Location and elevation of surface and highest ground waters
 - F. A wind rose to show prevailing winds
 - G. Special provisions for surface and subsurface drainage and erosion control

- H. Leachate treatment and control provisions
- I. Necessary provisions for gas control
- J. Method of operation and completion
- K. Cross sections showing typical lifts not to exceed ten feet compacted depth of refuse
- L. The necessary grade for proper drainage of each lift and the final grade of the completed operation
- M. Locations of stockpiled cover material
- N. Access routes, approach roads and on-site roads
- O. Fencing, direction and information signs
- P. Weighing facilities, locker room; toilet and shower facilities; equipment shelter, and wash-out facilities
- Q. Locations of existing and proposed utilities
- R. Fire Control and potable water supply locations
3. Hydrogeological Report which shall include:
 - A. Thickness and character of the overburden (soil)
 - B. Character of bedrock
 - C. Depth of the water table and potentiometric surfaces
 - D. Depth to the shallow ground water aquifer and artesian aquifer
 - E. Local and regional ground water flow systems
 - F. Chemical quality of surface and ground water. (See Page 24 - A Handbook for Sanitary Landfills in Florida for list of substances to be tested for.)
 - G. Frequency and extent of flooding of the area.
 - H. Nature and volume of the waste materials to be buried
4. Soils Survey which shall include
 - A. Depth to seasonal high watertable
 - B. Soil Series
 - C. Soil Drainage Class
 - D. Flooding
 - E. Permeability
 - F. Slope
 - G. Soil Texture (dominant to depth of 60")
 - H. Depth to bedrock
 - I. Stoniness Class
 - J. Rockiness Class
5. Equipment - Discuss
 - A. Present - types, sizes, numbers
 - B. Proposed - types, sizes, numbers
6. Discuss projected amount of waste to be handled including basis for projection.
7. Operating procedures - explain methods of
 - A. Controlling the length and width of the working face
 - B. Disposing of large items, special industrial, and hazardous wastes
 - C. Confining papers to the site
 - D. Waste handling in the wake of a natural disaster
 - E. Emergency provisions for insect and rodent control
 - F. Providing adequate site supervision
 - G. Controlling unauthorized fires
 - H. Maintaining an all weather access road
 - I. Posting operating hours, fee schedule, waste restrictions, the name, address and phone number of the operating agent
 - J. Locating signs to direct traffic
8. Land Disposal Data Form

NOTE: Additional information may be required as determined by the Department.

(3) Land Disposal Site Data Form

LAND DISPOSAL SITE DATA FORM
(Fill in and check blocks as appropriate.)

DELETE
ADD
CHANGE
INACTIVE

CONTROL NO. _____

1. COUNTY		2. SITE		3. DATE	
4. STREET ADDRESS					
5. LOCATION		UTM		TOWNSHIP RANGE SECTION	
6. RESPONSIBLE OPERATING AUTHORITY					
7. OWNERSHIP			8. ADDRESS		
9. PHONE NO.			10. POPULATION SERVED		
11. NO. OF ACRES		12. METHOD OF OPERATION			
		(a) TRENCH <input type="checkbox"/> (c) WETLAND <input type="checkbox"/> (e) DUMP <input type="checkbox"/> (b) AREA <input type="checkbox"/> (d) HIGH-RISE <input type="checkbox"/> (f) OTHER <input type="checkbox"/>			
13. TOPOGRAPHY		(a) QUARRY <input type="checkbox"/> (c) STRIPMINE <input type="checkbox"/> (e) GULLY <input type="checkbox"/> (g) MARSH <input type="checkbox"/> (b) BORROW PIT <input type="checkbox"/> (d) HILLSIDE <input type="checkbox"/> (f) LEVEL AREA <input type="checkbox"/>		14. SCALES YES <input type="checkbox"/> NO <input type="checkbox"/>	
15. SURROUNDING LAND-USE		(a) RESIDENTIAL <input type="checkbox"/> (c) AGRICULTURAL <input type="checkbox"/> (e) VACANT <input type="checkbox"/> (b) COMMERCIAL <input type="checkbox"/> (d) INDUSTRIAL <input type="checkbox"/>			
16. ZONING		(a) RESIDENTIAL <input type="checkbox"/> (c) AGRICULTURAL <input type="checkbox"/> (e) VACANT <input type="checkbox"/> (b) COMMERCIAL <input type="checkbox"/> (d) INDUSTRIAL <input type="checkbox"/>		17. YEAR BEGUN	
18. PLANNED FINAL USE		(a) PARK <input type="checkbox"/> (c) BUILDING CONSTRUCTION <input type="checkbox"/> (e) NONE <input type="checkbox"/> (b) PARKING LOT <input type="checkbox"/> (d) AIRPORT <input type="checkbox"/> (f) OTHER <input type="checkbox"/>			
19. TYPES OF WASTE RECEIVED		(a) RESIDENTIAL <input type="checkbox"/> (e) SEPTIC TANK PUMPINGS <input type="checkbox"/> (i) HAZARDOUS, CLINI- (b) COMMERCIAL <input type="checkbox"/> (f) SEWAGE SLUDGE <input type="checkbox"/> CAL, HOSPITAL <input type="checkbox"/> 20. YES <input type="checkbox"/> (c) INDUSTRIAL <input type="checkbox"/> (g) INCINERATOR RESIDUE <input type="checkbox"/> (j) WATER TREATMENT, <input type="checkbox"/> BURNING NO <input type="checkbox"/> (d) AGRICULTURAL <input type="checkbox"/> (h) DEAD ANIMALS <input type="checkbox"/> SLUDGE <input type="checkbox"/>			
21. DAYS OPEN FOR DISPOSAL		S M T W T F S		22. FREQUENCY OF COVER	
				NONE <input type="checkbox"/> S M T W T F S	
23. DEPTH OF WATER TABLE		24. SOIL PERMEABILITY			
25. NO. OF WELLS WITHIN ONE MILE		SHALLOW DEEP		26. (a) NONE <input type="checkbox"/> (c) OCCASIONAL <input type="checkbox"/> (b) RARE <input type="checkbox"/> (d) FREQUENT <input type="checkbox"/>	
27. NO. OF ROADWAYS ADJACENT TO SITE		28. SLOPE OF SITE			
29. NO. OF RESIDENCES OR BUSINESSES WITHIN 1000 FEET		30. SOIL SERIES			
31. SOIL TEXTURE		(a) SAND <input type="checkbox"/> (c) LOAMY-SAND <input type="checkbox"/> (e) SANDY CLAY LOAM <input type="checkbox"/> (b) SANDY-LOAM <input type="checkbox"/> (d) SANDY CLAY <input type="checkbox"/> (f) CLAY <input type="checkbox"/>		32. YES <input type="checkbox"/> FERCED NO <input type="checkbox"/>	
33. MONITORING WELLS		34. POTENTIAL WATER POLLUTION		(a) IMMEDIATE <input type="checkbox"/> (c) LOW <input type="checkbox"/> (b) HIGH <input type="checkbox"/>	
35. DUMPING IN WATER		36. PERIMETER DITCH		37. LINER	
YES <input type="checkbox"/> NO <input type="checkbox"/>		YES <input type="checkbox"/> NO <input type="checkbox"/>		YES <input type="checkbox"/> NO <input type="checkbox"/>	
38. LINER TYPE		(a) PLASTIC <input type="checkbox"/> (c) BENTONITE <input type="checkbox"/> (e) OTHER <input type="checkbox"/> (b) ASPHALT <input type="checkbox"/> (d) CLAY <input type="checkbox"/> (f) NONE <input type="checkbox"/>		39. WELL POINT SYSTEM YES <input type="checkbox"/> NO <input type="checkbox"/>	
40. OXIDATION POND		41. POND AREA		42. DEPTH OF SOILS TO BEDROCK	
YES <input type="checkbox"/> NO <input type="checkbox"/>					
43. EVIDENCE OF LEACHING		44. FINAL LEACHATE TREATMENT NEEDED		YES <input type="checkbox"/> NO <input type="checkbox"/>	
YES <input type="checkbox"/> NO <input type="checkbox"/>					
45. FINAL TREATMENT		(a) CHLORINATION <input type="checkbox"/> (c) OZONATION <input type="checkbox"/> (e) OTHER <input type="checkbox"/> (b) AERATION <input type="checkbox"/> (d) ADVANCED <input type="checkbox"/> (f) NONE <input type="checkbox"/>		46. RODENT PROBLEM YES <input type="checkbox"/> NO <input type="checkbox"/>	
47. DISCHARGE		(a) CANAL <input type="checkbox"/> (c) STREAM <input type="checkbox"/> (e) OTHER <input type="checkbox"/> (b) DITCH <input type="checkbox"/> (d) LAKE <input type="checkbox"/> (f) MARSH <input type="checkbox"/>		48. RODENT CONTROL YES <input type="checkbox"/> NO <input type="checkbox"/>	
49. CELL DEPTH OF REFUSE		50. INSECT PROBLEM		51. INSECT CONTROL	
YES <input type="checkbox"/> NO <input type="checkbox"/>		YES <input type="checkbox"/> NO <input type="checkbox"/>		YES <input type="checkbox"/> NO <input type="checkbox"/>	
52. BLOWING PAPER CONTROL		53. FULL TIME ATTENDANT		YES <input type="checkbox"/> NO <input type="checkbox"/>	
YES <input type="checkbox"/> NO <input type="checkbox"/>		YES <input type="checkbox"/> NO <input type="checkbox"/>			
54. ALL WEATHER ACCESS ROAD		55. GAS CONTROL		YES <input type="checkbox"/> NO <input type="checkbox"/>	
YES <input type="checkbox"/> NO <input type="checkbox"/>		YES <input type="checkbox"/> NO <input type="checkbox"/>			
56. SPREADING OF REFUSE IN 2 FT. LAYERS		YES <input type="checkbox"/> NO <input type="checkbox"/>			
57. ONE (1) FT. INTERMEDIATE COVER APPLIED WITHIN ONE (1) WEEK CELL COMPLETION		YES <input type="checkbox"/> NO <input type="checkbox"/>			
58. TWO (2) FT. FINAL COVER APPLIED WITHIN ONE (1) YEAR CELL COMPLETION		YES <input type="checkbox"/> NO <input type="checkbox"/>			
59. EQUIPMENT AVAILABLE DAILY		(a) CRAWLER TRACTOR <input type="checkbox"/> (c) HYDRAULIC BACK HOE <input type="checkbox"/> (e) PAN SCRAPER <input type="checkbox"/> (g) BRUSH HOG <input type="checkbox"/> (b) RUBBER TIRED TRACTOR <input type="checkbox"/> (d) LANDFILL COMPACTOR <input type="checkbox"/> (f) DRAGLINE <input type="checkbox"/> (h) TRASH PUMPS <input type="checkbox"/>			
60. PROPOSED COST OF OPERATION		\$7/CU. YD. \$/TON			
61. NAME OF PERSON COMPLETING FORM					
62. REVIEW DATE		63. PERMIT NO.		64. ISSUE DATE	
				65. EXPIRATION DATE	

H11
4-74

STATE OF FLORIDA

DEPARTMENT OF POLLUTION CONTROL

INSTRUCTIONS FOR THE

"LAND DISPOSAL SITE DATA FORM"

The purpose of these instructions is to provide information to those filling out the "Land Disposal Site Data Form" so that the data is complete and it can be processed in Tallahassee without delay. This form is designed for computerization so as to enable the Department to have instant access to information on all registered land disposal sites operated in the State of Florida. This data form must be completed by the applicant as follows:

The control number and the delete, add, change and inactive block are for the Department's use only.

1. County — This is self-explanatory.
2. Site — The name of the land disposal site — not to exceed 30 spaces. Abbreviate if necessary.
3. Date — The date of this report shall be expressed as the month, day, year, in numbers, (i.e., 1-1-73).
4. Address — The actual address of the land disposal site or the route by which access to the site is made, not to exceed 70 spaces.
5. Location — The location of the disposal site in both UTM Co-ordinates and the township, range and section.
6. Responsible Operating Authority — The authority responsible for the operation of the disposal site. Abbreviate where necessary so as to not exceed 40 spaces.
7. Ownership — The agency or individual who owns or leases this particular site. Abbreviate if necessary, so as not to exceed 30 spaces.
8. Address — The mailing address of the agency shown in Item 7. Abbreviate if necessary so as not to exceed 30 spaces.
9. Phone Number — The phone number of the agency shown in Item 7.
10. Population Served — The population which this disposal site is estimated to serve.
11. Number of Acres — The total number of acres of land purchased or leased for the operation of this site.
12. Method of Operation — More than one item may be checked.
13. Topography — The topography of the area in which the site is located. Check one only.
14. Scales — Check whether scales are available at the site to determine the weight of the waste received.
15. Surrounding Land-Use — Check as many blocks as are appropriate to give the predominant land use within the immediate area of the site. If there is no specific surrounding land use then (e) Vacant would be checked.
16. Zoning — Check if the site is located in an area which is zoned. If there is no zoning in the area, then (e) Vacant shall be checked.
17. Year Begun — Year in which the operation of this site is to be begun or was begun.
18. Planned Final Use — Check if there is a planned final use which is listed; however, if there is no final use established for the site, check (e) None; or if the final use is not listed, then check (f) Other. Check only one.
19. Types of Waste Received — Check all types of waste received at this site.
20. Burning — Chapter 17-5 prohibits open burning; however, check to denote whether new sites plan to use air curtain incinerators to handle land clearing waste.
21. Days Open for Disposal — Circle the days on which the site is open for disposal.
22. Frequency of Cover — Circle the days on which the site receives a 6" cover of compacted earth. If the site receives cover at intervals less frequently than once per week, then check none.
23. Depth of Water Table — Indicate the depth to the seasonal high shallow ground water aquifer in feet.
24. Soil Permeability — Indicate the rate at which water will percolate through the soil in terms of inches per hour.
25. Number of Wells Within One Mile — Indicate the number of private water supply wells within one mile of the site to the left of the word — Shallow. Indicate

the number of public water supply wells or deep wells within one mile of the site to the left of the word — Deep.

26. Flooding — Periods when the water-table rises above the surface — If two per/yr. or greater, check (d) Frequent. If one per/yr., check (c) Occasional. If less than once in (2) two years, check (b) Rare.
27. Number of Roadways Adjacent to Site —
28. Slope of Site — Indicate the general slope of the site area expressed as a percentage.
29. Number of Residences or Businesses Within 1000 Feet
30. Soil Series — Indicate the predominant soil series at the site to a depth of at least 60". This information may be obtained from the required soils survey.
31. Soil Texture — Check the one which best describes the general soil texture at the site.
32. Fenced — This refers to permanent fencing surrounding the site.
33. Monitoring Wells — Check to indicate whether test wells exist to monitor any degradation of groundwater quality.
34. Potential Water Pollution — This should be evaluated on the basis of the relationship between the bottom of the landfill and the water table; the types of underlying soils; the type and amount of material used for cover; and types of materials being disposed of at the site.
35. Dumping In Water — This is self-explanatory.
36. Perimeter Ditch — This indicates the existence of a suitable ditch surrounding the site for the interception of surface and subsurface waters which would normally flow through or from the site; the collection of these liquids to receiving waters or to a treatment pond.
37. Liner — Indicate whether an impervious material is being placed on undisturbed earth on which solid waste is deposited to retard the movement of leachate into the shallow groundwater aquifer.
38. Liner Type — Check one of the materials listed which is being used for a liner.
39. Well Point System — Indicate whether there is a well point system used to lower the water table in the immediate area of the landfill.
40. Oxidation Pond — Check whether or not there exists a pond to receive liquids collected in the perimeter ditch and/or leachate collection system to oxidize or otherwise treat these liquids and remove settleable solids.
41. Pond Area — Indicate area in acres.
42. Depth of Soils to Bedrock — Indicate the measured depth of soil in feet between the surface and bedrock. This information may be obtained from the required geological survey.
43. Evidence of Leaching — Leaching often manifests itself in the form of springs of dark liquid coming from the sides of land disposal sites or through the contamination of nearby shallow water wells. On new sites, this has to be a judgement evaluation based on designs under similar conditions.
44. Final Treatment Needed — Indicate whether liquids collected from existing or proposed sites will need final treatment prior to discharge.
45. Final Treatment — If final treatment is indicated in Item 44, then check this item to enable the Department to determine if the proper type of treatment is to be provided. It may be either a single type or a combination of methods; however, if a single method is to be used other than those listed, then check (e) Other. If it is a combination of (a) (b) or (c), in addition to spray irrigation, then check (d) Advanced.
46. Rodent Problem — Indicate whether a proposed or an existing site has or will have a need for rodent control measures.
47. Discharge — Check the receiving waters into which the collected liquids from the perimeter ditch or oxidation pond are discharged. Do not check more than one.
48. Rodent Control — This is to be used in conjunction with Item 46 to indicate whether rodent control is being adequately provided.
49. Cell Depth of Refuse — Vertical depth in feet of refuse between the base and the top surface of compacted refuse before cover material is added.
50. Insect Problem — The same basis as Item 46.
51. Insect Control — The same basis as Item 48.
52. Blowing Paper Control — Indicate control if the site is policed daily and a portable snowfence or other measure is used to help control blowing papers.
53. Full Time Attendant — This is self-explanatory.
54. All Weather Access Road — This is self-explanatory.
55. Gas Control — Are special relief devices provided to

- collect and disperse methane and other gasses?
56. Spreading of Refuse in 2 Feet Layers — When constructing a refuse cell in a sanitary landfill, the refuse should be spread in two foot layers and compacted to a thickness of one foot in order to achieve maximum compaction.
 57. One Foot Intermediate Cover Applied Within One Week of Cell Completion — This is self-explanatory.
 58. Two Foot Final Cover Applied Within One Year of Cell Completion — This is self-explanatory.
 59. Equipment Available Daily — The types of equipment available daily for sanitary landfill operation. Check as many as are applicable.
 60. Proposed Cost of Operation — This should be an estimate of the cost of operation at an existing site or projected cost of operation at a proposed site.
 61. Name of Person Completing Form — This is self-explanatory.

Items 62, 63, 64, and 65 are for Department use only.

(4) Volume Reduction Plant Requirements. These pertain to incinerators, pulverizers, compactors, shredding and baling plants, transfer stations, composting plants and other plants which accept and process solid waste for recycling or disposal.

1. Maps

(a) Location map drawn to a scale of one inch equals one half mile, showing general geographic features of the area surrounding the site.

(b) Topographic map of the site drawn to a scale of one inch equals 200 feet, showing existing and final contours.

2. Drawings, to include:

(a) Property lines, site dimensions.

(b) Land use, including habitations and other structures, roads, wells, vegetation, etc.

(c) Equipment used in the operation with equipment components shown in sufficient detail to indicate method of operations.

(d) Process flow, materials handling and storage.

(e) Location of existing and proposed utilities.

(f) Access routes, approach roads and on-site roads.

3. Process description to show:

(a) Method of operation.

(b) Type and volume of materials processed.

(c) Population and area served.

(d) Employee facilities.

(e) Provisions for disposal of residual waste after processing.

(f) Type of materials recovered and disposition of same.

(g) Process water and treatment after use.

(h) Auxiliary fuel.

(i) Schedule of operations.

(j) Site management.

(k) General maintenance procedures.

4. Emergency procedures

(a) Alternate waste handling procedures in the event of equipment breakdown, natural disasters.

(b) Corrective or alternate procedures in the event of diminished operational quality.

General Authority 403.051 FS. Law Implemented 403.021, 403.031, 403.051, 403.087, 403.701 through 403.713 FS. Chapter 74-342. History—New 10-1-74.

(5) Volume Reduction Plant Data

VOLUME REDUCTION PLANT DATA		
Control No. _____		(Dept. Use)
1. County	2. Site Name	3. Date
4. Street Address		
5. Location, UTM or Lat. & Long.		Township Range Section
6. Operating Authority		
7. Owner		8. Address
9. Phone No.		10. Population Served
11. Adjacent Land Use	(a) Residential _____ (b) Commercial _____	(c) Agricultural _____ (d) Industrial _____ (e) Other _____
12. Operations Hours/Day		13. Days Operated S M T W T F S
14. Type of Operation	(a) Incineration _____ (b) Baling _____ (c) Compacting _____	(d) Shredding _____ (e) Composting _____ (f) Transfer Stn. _____ (g) Pyrolysis _____ (h) Other _____
15. Waste Received Tons/Day		or Cu. Yds./Day
RESOURCE OR ENERGY RECOVERY FACILITY		
16. Material Recovered, Tons/Week		
(a) Paper _____	(e) Glass _____	
(b) Ferrous Metals _____	(f) Non-Ferrous Metals _____	
(c) Aluminum _____	(g) Rubber _____	
(d) Plastics _____	(h) Other _____	
17. Energy Recovery		
(a) Hi-Pressure Steam Lbs./Hr. _____	(e) Gas, Cubic Ft./Hr. _____	
(b) Low-Pressure Steam Lbs./Hr. _____	(f) Gas, BTU/Hr. _____	
(c) Electricity KW/Hr. _____	(g) Oil, Gal/Hr. _____	
(d) Chilled Water Gal/Hr. _____	(h) Oil, BTU/Hr. _____	
	(i) Other Quantity _____	
18. Process Water		19. Final Residue
(a) Discharged To _____	(a) % of Waste Received _____	
(b) Treatment _____	(b) Disposal To _____	
(c) Recycled _____		
20. Supplementary Fuel		21. Estimated Operating Cost
(a) Type _____	(a) Total/Waste Ton \$ _____	
(b) Quantity/Hr. _____	(b) Material Salvage Value \$ _____	
	(c) Net Operating Cost \$ _____	

17-7.11 Permit Forms.

(1) Temporary operation permit

STATE OF FLORIDA

DEPARTMENT OF POLLUTION CONTROL

TEMPORARY OPERATION PERMIT

FOR A SOLID WASTE RESOURCE RECOVERY
AND MANAGEMENT FACILITY

Permit no. _____ Date _____

Pursuant to the provisions of section 403.061(16) and 403.707 of Chapter 403 Florida Statutes
and Chapters 17-4 and 17-7 Florida Administrative Code. This permit is issued to:

For the operation of the following:

Located at: _____

In accordance with the application dated _____
and in conformity with the statements and supporting data entered therein, all of which are
filed with the department and are considered apart of this permit.

This permit shall be effective from the date of issue until _____

or until revoked or surrendered and shall be subject to all laws of the state and the rules
and regulations of the department.

REGIONAL ENGINEER_____
PETER P. BALJET
EXECUTIVE DIRECTOR

(2) Construction Permit.

STATE OF FLORIDA
DEPARTMENT OF POLLUTION CONTROL
CONSTRUCTION PERMIT

FOR A SOLID WASTE RESOURCE RECOVERY
AND MANAGEMENT FACILITY

Permit no. _____ Date _____

Pursuant to the provisions of section 403.061(16) and 403.707 of Chapter 403 Florida Statutes
and Chapters 17-4 and 17-7 Florida Administrative Code. This permit is issued to:

For the operation of the following:

Located at: _____

In accordance with the application dated _____
and in conformity with the statements and supporting data entered therein, all of which are
filed with the department and are considered apart of this permit.

This permit shall be effective from the date of issue until _____

or until revoked or surrendered and shall be subject to all laws of the state and the rules
and regulations of the department.

REGIONAL ENGINEER_____
PETER P. BALJET
EXECUTIVE DIRECTOR

(3) Operation Permit.

STATE OF FLORIDA
DEPARTMENT OF POLLUTION CONTROL

OPERATION PERMIT

FOR A SOLID WASTE RESOURCE RECOVERY
AND MANAGEMENT FACILITY

Permit no. _____ Date _____

Pursuant to the provisions of section 403.061(16) and 403.707 of Chapter 403 Florida Statutes and Chapters 17-4 and 17-7 Florida Administrative Code. This permit is issued to:

For the operation of the following:

Located at: _____

In accordance with the application dated _____
and in conformity with the statements and supporting data entered therein, all of which are
filed with the department and are considered apart of this permit.

This permit shall be effective from the date of issue until _____

or until revoked or surrendered and shall be subject to all laws of the state and the rules
and regulations of the department.

REGIONAL ENGINEER_____
PETER P. BALJET
EXECUTIVE DIRECTOR

General Authority 403.061 FS. Law Implemented 403.021,
403.031, 403.061, 403.087, 403.701 through 403.713 FS.
Chapter 74-342, History—New 10-1-74.

APPENDIX B

Site Evaluation for Sanitary Landfill
USDA Soil Conservation Service

SITE EVALUATION FOR SANITARY LANDFILL

HARDEE COUNTY -

By: Tilman W. Robinson, District
Conservationist
USDA, Soil Conservation Service
Wauchula, Florida 33873

Warren G. Henderson, Soil Scientist
USDA, Soil Conservation Service
Ft. Myers, Florida 33902

In cooperation with the Hardee Soil and
Water Conservation District.

SITE EVALUATION FOR SANITARY LANDFILL

Hardee County Florida

Introduction

The Board of County Commissioners of Hardee County Florida has requested assistance with the evaluation of the east 1/2 of Section 36; T 33 S; Range 24 east or 320 acres. The site is located about 3 miles west of the city of Wauchula.

Pertinent Topographic Feature:

At present the site is being used as native pastureland. The topographic features are flat to gently sloping. The drainage is ill defined with Reaphook Swamp to the south Hammock Pond to the west. The general slopes of the land is to the northwest.

Scope of The Report:

The information contained in this report is not intended to be specific enough for detailed design of engineering installations. Detailed on site investigations should be made to verify the data given and to collect additional data that may be required.

The information given for any specific soil is generalized, but it is the best available estimate of the engineering properties of that soil to a depth of 80 inches. The intent of the report is to make possible a good, though general, evaluation of the site for the proposed use.

The site has been evaluated on the basis of soil limitations for use as: (1) Area type landfill; (2) Trench type landfill, and (3) Suitability of soil for cover material. The classification of landfill types is very general for the purposes of this report, the principal difference being the source of cover material. In the trench type, material from the trench is used for cover material, while cover material for the area type is brought from another location.

Soils

For the location of specific soil types, see the attached soil map and legend. Also, attached is a table giving ratings as to the degree of limitation for two types of landfills. Included in the table are certain soil properties that influence the suitability of the soil for the proposed use.

The principal soil properties that limit the suitability of the site for the proposed use are: (1) Depth to water table, (2) Poor natural drainage, (3) High permeability rate, (4) Frequent flooding. The following is a discussion of how each of these restrict the suitability of the site.

Depth to Water Table:

The high water table of most soils fluctuates from season to season. For the purpose of this discussion, the depth given for the high water table is during the summer, which is the season of highest occurrence.

The proximity of the water table to the surface is of importance in determining if there is a danger of polluting the water table.

Natural Drainage:

Natural drainage refers to how well water is removed from the soils under natural conditions. Very poorly drained soils are usually in depressions and low areas that do not permit water to shed. Well drained soils shed water readily. Poorly drained soils are usually wet for significant periods of time, which makes them difficult to manipulate.

Permeability Rate:

The permeability rate refers to the rate at which water moves through the soil under saturated conditions when allowed to drain freely. Rapidly permeable soils are undesirable since they may allow the leachate to reach the water table. This is usually a problem only when the water table is within a few feet of the surface.

Frequent Flooding:

This refers to the periodic inundation of the soil. The period of inundation is of significant length to be a major hazard to the use of the soil.

Summary and Conclusions:

Principal site limitations are high water table, rapidly permeability and soil that is unsuitable for cover material. The water table can be controlled by a subdrainage system using either open ditches or closed drains at the proper depth and spacing.

The effective depth of the subdrains will determine how deep landfill trenches can be constructed without intercepting the water table.

The effects of rapid permeability will be difficult if not impossible to control unless a relatively impervious cover material from another source can be used. This would reduce the percolation of rain water through the buried waste into the underlying ground water.

The site appears to have fewer limitations for the area type disposal method. However, the scarcity of cover material (clay) may eliminate this type of system.

Additional conservation measures that are needed and should be used on a sanitary landfill operation include: (1)

Establish vegetation on the completed re-filled areas such as bahiagrass (2) A buffer zone of trees may be desired around the area to serve as windbreaks and site barriers.

FL-CONS-10
USDA-SCS
10/73

MAJOR SOIL PROPERTIES, DEGREE AND NATURE OF LIMITATIONS FOR SELECTED USES

Prepared for: _____ Prepared by: _____ Date: 3-18-77

Soil name and map symbol	Relevant Soil Properties ^{1/}						Degree and Nature of Limitation ^{1/}			
	Depth to seasonal high water table	Flood hazard (wetness)	Permeability (most restrictive layer) (In./Hr.)	Texture (various depths to 60")	Slope	Natural Drainage	Septic tanks	Sanitary landfill type	Low buildings, roads and streets	Source of cover material for area type landfill
9-Floridana, f.s. 10-Felda, f.s.	+2.0' above gr. - 1.0' below ground	Frequent Jul-Feb.	Rapid 6.0' - 20' in per hr.	fine sand	0-2%	poor	severe	severe	_____	poor-sandy material
6-Eau Gallie, f.s.	+ 1.0' above grd. to - 1.0' below ground	Commonly Jul-Jan.	Rapid 6.0 - 20 in. per hr.	fine sand	0-2%	poor	severe	severe	_____	poor-sandy material
2-Myakka, f.s.	0.0'-1.0' & level to 1.0' below gnd.	none to temporary	Rapid 6.0'-20 in. per hr.	fine sand	0.2%	poor	severe	severe	_____	poor-sandy material

Nature of Limitation: 1. Highwater table 2. poor nat. drainage 3. rapid perm. rate 4. frequent flooding

^{1/} Data shown only for properties most relevant to the planned land use.

Soils rated as SLIGHT have few or no limitations for the use. Soils rated as MODERATE have limitations that reduce to some degree their desirability for the purpose being considered. They require some corrective measures. Soils rated as SEVERE have unfavorable soil properties or features that severely restrict their use and desirability for the purpose. Major soil reclamation, special design, or intense maintenance is required.

HARDEE COUNTY SOIL SURVEY SANITARY LANDFILL SITE

CONS-1

SOIL AND CAPABILITY

DEPARTMENT OF AGRICULTURE SOIL
COOPERATING WITH

FLORIDA AGRICULTURAL EXPERIMENT STATION AND
HARDEE

SOIL CONSERVATION DISTRICT

OPERATOR Hardee County
UNIT NO. 348 COUNTY Hardee FLORIDA
OX. SCALE 1" = 600' 1320' DATE _____
OLD SHEET AND FARM NOS. _____

Iws-4 Nearly level, very wet, slightly acid to neutral soils with sandy surface soils and clayey subsoils underlain by calcareous materials.

49 - Floridana, f.s.

40 - Felda, f.s.

Vsw-2 Nearly level, moderately wet, strongly acid, sandy soils underlain by organic-stained pan.

36 - Eau Gallie, f.s.

72 - Myakka, f.s.

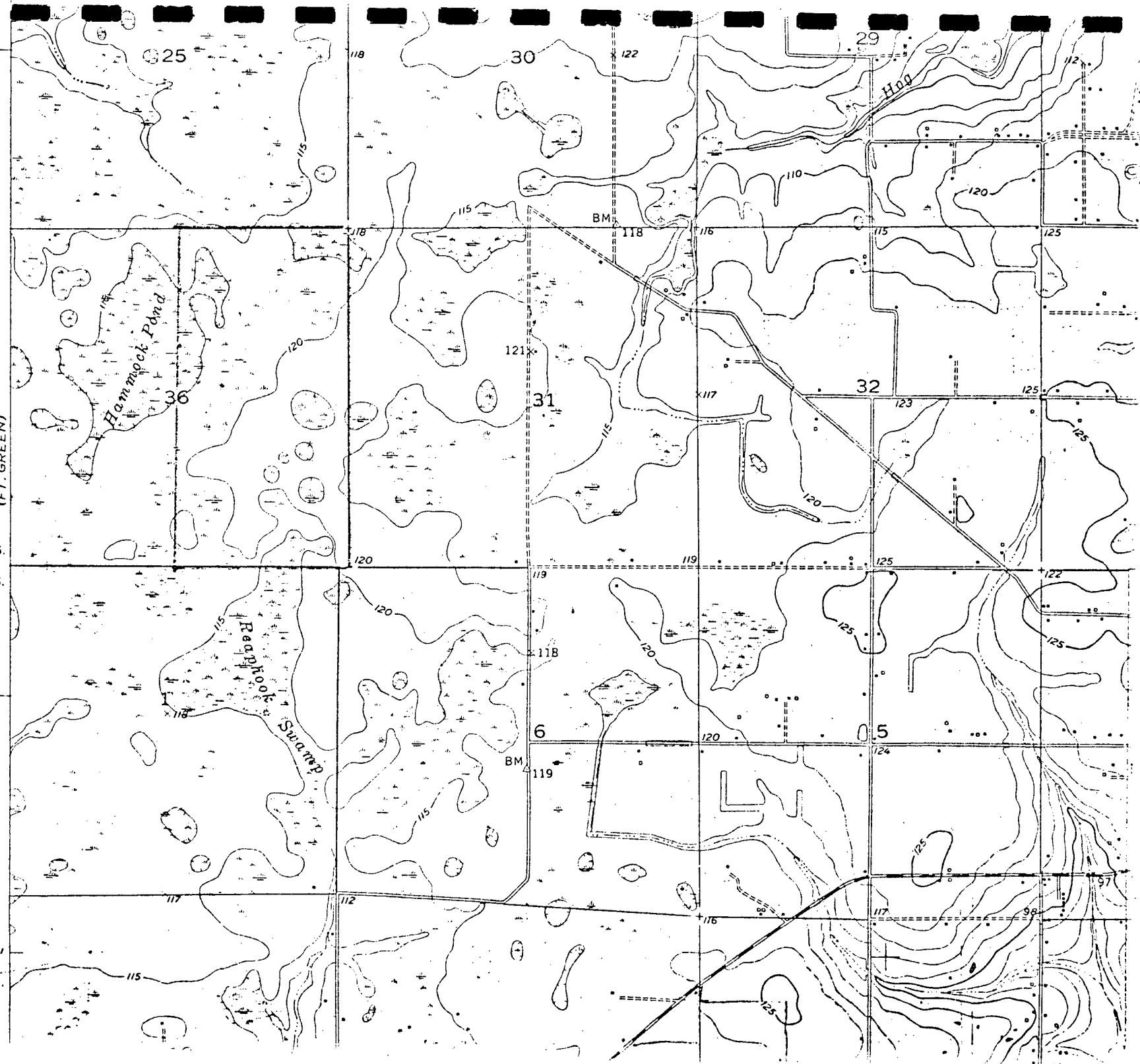




(FT. GREEN)

T. 33 S.
T. 34 S.

32'30"

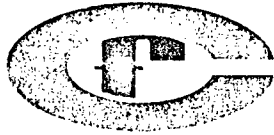


APPENDIX C

Hydrogeological Information

CF MINING CORPORATION, Subsidiary of

Post Office Box 1549
Wauchula, Florida 33873
Telephone: 813/ 375-2257



CF Industries, Inc.

Hardee Phosphate Complex

October 17, 1977

Mr. Joseph T. Hollingsworth
County Engineer, Hardee County
Road Department Office
Post Office Box 1334
Wauchula, Florida 33873

Dear Joe:

Relative to your request for additional information on the potential land fill site in Section 36, T. 33S., R. 24E., we are sending the following information:

- 1) Four sketches showing drainage and potential cell location.
- 2) Drillers logs for water wells.
- 3) Prospect logs.
- 4) Water levels in surrounding wells.
- 5) Aerial photo showing proposed site.
- 6) Contour map showing proposed site.

Please note that Sketch 1 shows the land fill site on existing topography, while Sketch 2 indicates existing drainages from the site. Sketch 3 indicates the potential drainage on top of the clayey matrix surface. Sketch 4 shows a proposed version of individual cell location within the site. This type of location would be advisable for future mining operations.

Should you have any questions or require additional information, please feel free to call.

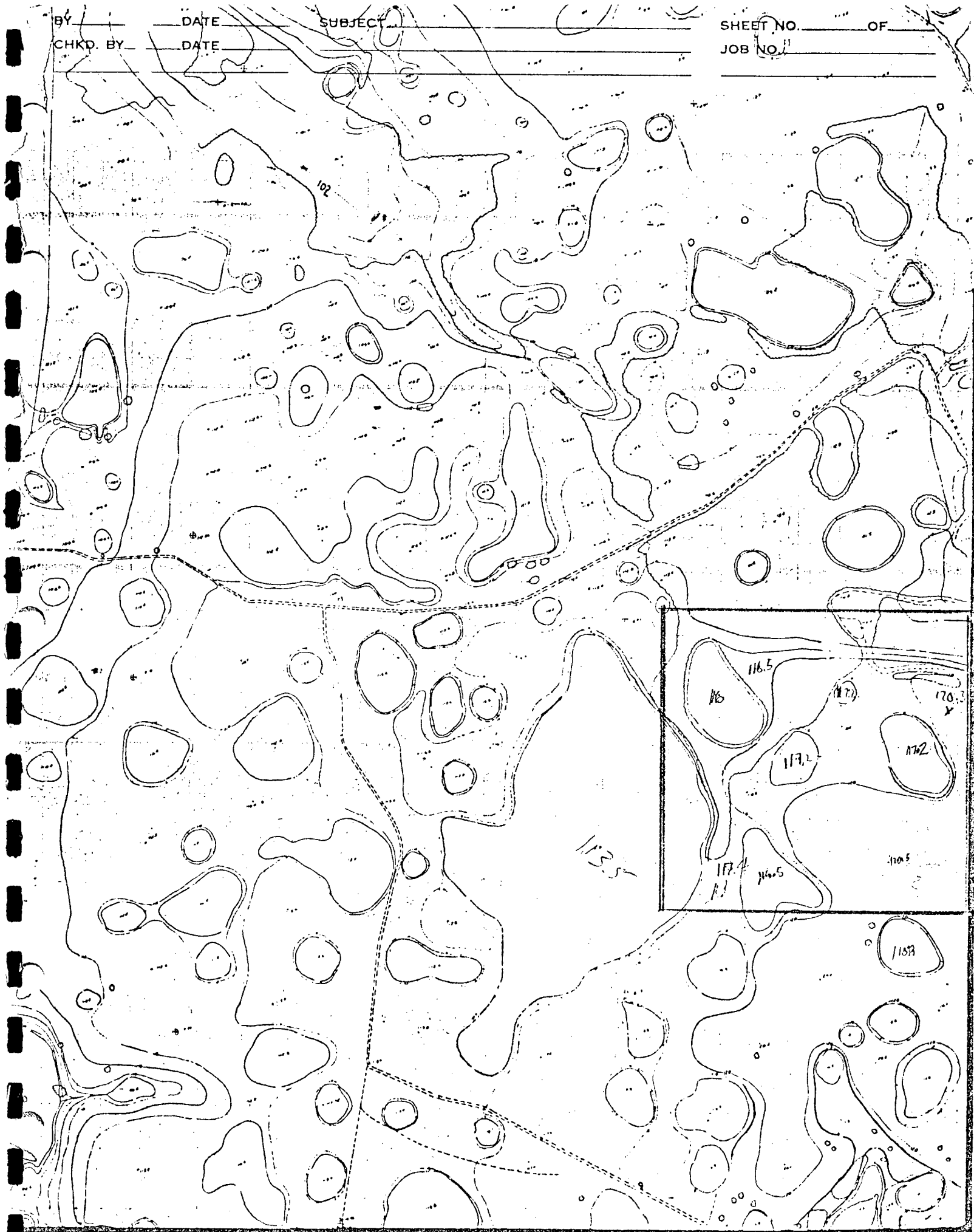
Very truly yours,

Bruce E. Warden
Chief Geologist

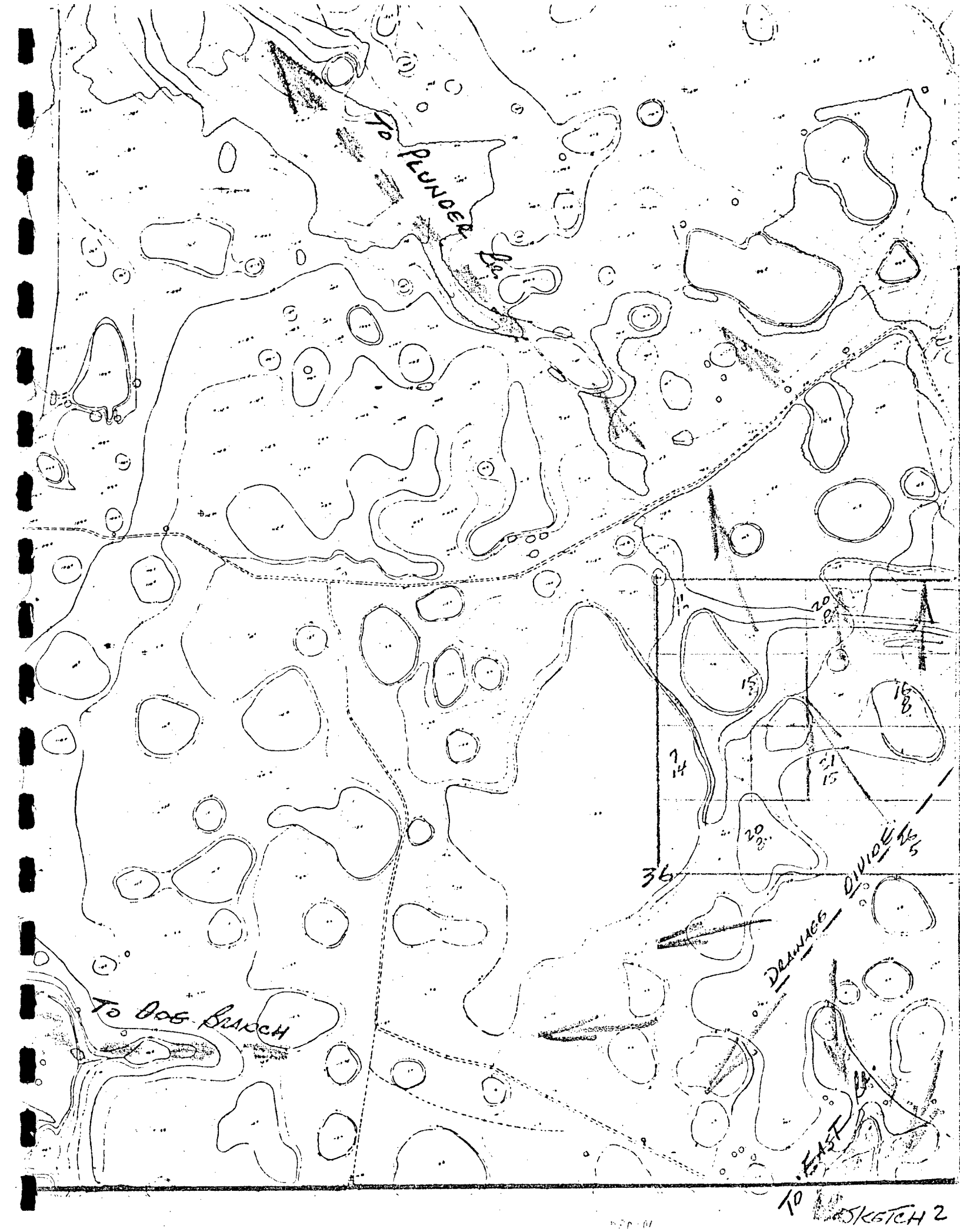
BEW/by
attachments

cc: A. L. Holmes, Jr. (w/o attach)-

BY _____ DATE _____ SUBJECT _____ SHEET NO. _____ OF _____
CHKD. BY _____ DATE _____ JOB NO. _____



SKETCH 1



BY _____ DATE _____

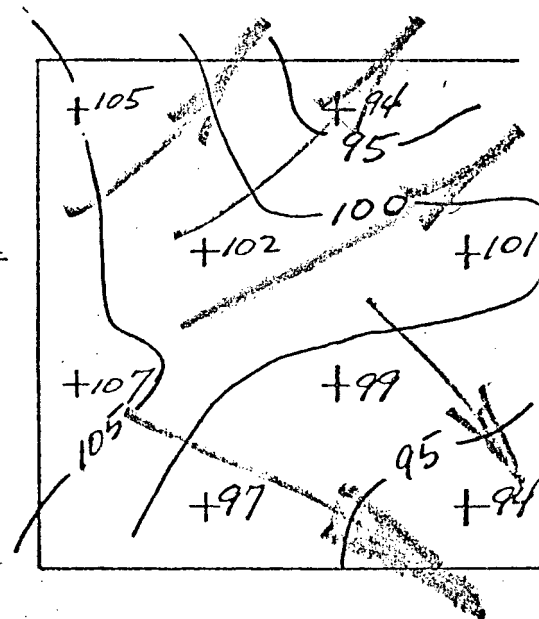
SUBJECT _____

SHEET NO. _____ OF _____

CHKD. BY _____ DATE _____

JOB NO. _____

POTENTIAL DRAINAGE
ON TOP OF MATRX SURFACE



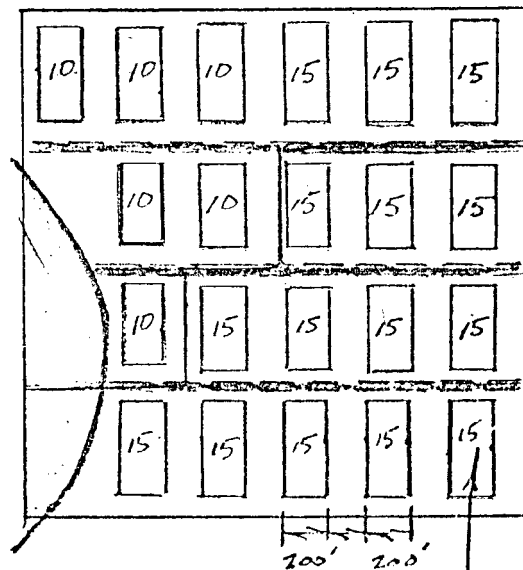
SKETCH 3

BY _____ DATE _____
 CHKD. BY _____ DATE _____

SUBJECT _____

SHEET NO. _____ OF _____
 JOB NO. _____

Scale:
 $1" = 1000'$
Proposed Location of Individual Cells



NOTE:
 AREA OUTLINED IN
 YELLOW WILL BE REMOVED!

$345' \times 15' = 518 \text{ Ac.-ft.}$
 $13.3 \text{ Ac.} \times 10' = 133 \text{ Ac.-ft.}$
 EST. TOTAL 656 Ac.-ft.
 $656 \times 143 = 1058128 \text{ Cu. yds.}$
 ($200 \times 500'$ CELL)
 (2.3 Acres)

SKETCH 4

1. OWNER: C. E. Paalty

Name

Bartow FL
Address City State

2. LOCATION OF WELL: 1424 S. 11th St. Bartow

Street Address/Road

Ft. Green Spgs. Hendee
City County

25 T33S 21E
Section Township Range

3. PURPOSE OF WELL:

☐ Domestic ☐ Irrigation ☐ Public Supply
☐ Industrial ☐ Stock ☐ Other 716-7

4. TYPE OF WORK:

☐ New Well ☐ Plugging ☐ Other 286
☐ Deepening ☐ Reconditioning

5. QUALITY:

☐ Clear ☐ Colored ☐ Sulfur ☐ Salty ☐ Other _____

CHECK TEST MADE

☐ None ☐ Bacteria ☐ Chemical
Chloride _____ PPM
(Check ☐ if test was for sodium chloride)
Temperature _____
Well Disinfected ☐ Yes ☐ No

Test By:
☐ County Health Dept.
☐ State Health Dept.
☐ U.S.G.S.
☐ Other _____
Name _____
Address _____

6. EQUIPMENT:

☒ Rotary ☐ Cable Tool ☐ Other _____
☐ Jet ☐ Reverse Rotary

7. GROUT:

☐ None ☐ Cement ☐ Other
Describe and give number of bags (94)lb. From (ft) To (ft)

Describe and give number of bags (94)lb.	From (ft)	To (ft)

8. CASING AND LINER PIPE:

Diameter (inches) Kind From (ft) To (ft)

Diameter (inches)	Kind	From (ft)	To (ft)
<u>12</u>	<u>PVC SLOTTED</u>	<u>0</u>	<u>36</u>

(Check One) ☐ Threaded & Coupled ☐ Welded Only
☐ T & C & Welded ☒ Other 2 1/2 inch 40 lb

9. WATER LEVEL:

Water level after well completed 4.96 feet
☐ Above ☒ Below land surface
Well Flowing: ☐ Yes ☒ No Flow _____ gal/min

10. SCREENS:

Make Materials Diameter (in) Slot Size Location (ft) Below Surface From (ft) To (ft)

Make	Materials	Diameter (in)	Slot Size	Location (ft) Below Surface	From (ft)	To (ft)

11. UPPER END OF WELL:

☐ Pump Installed ☐ Valve ☐ Cap ☒ Other

12. PUMPING TEST:

Date _____ ☐ Test Pump ☐ Permanent Pump

Measure point is _____

which is _____ feet ☐ above ☐ below land surface

Static water level _____ feet ☐ above ☐ below measure point

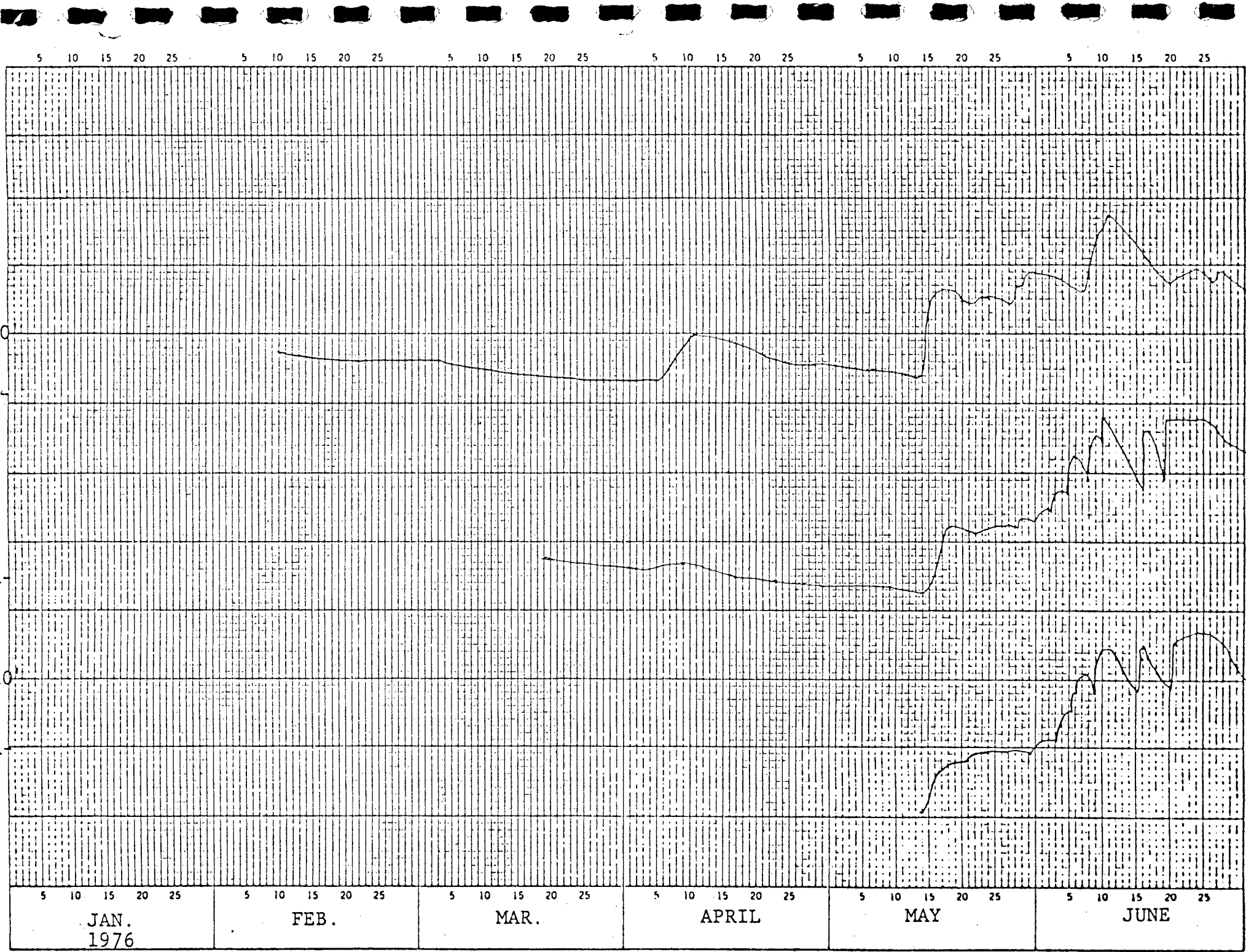
Maximum Drawdown _____ feet below measure point

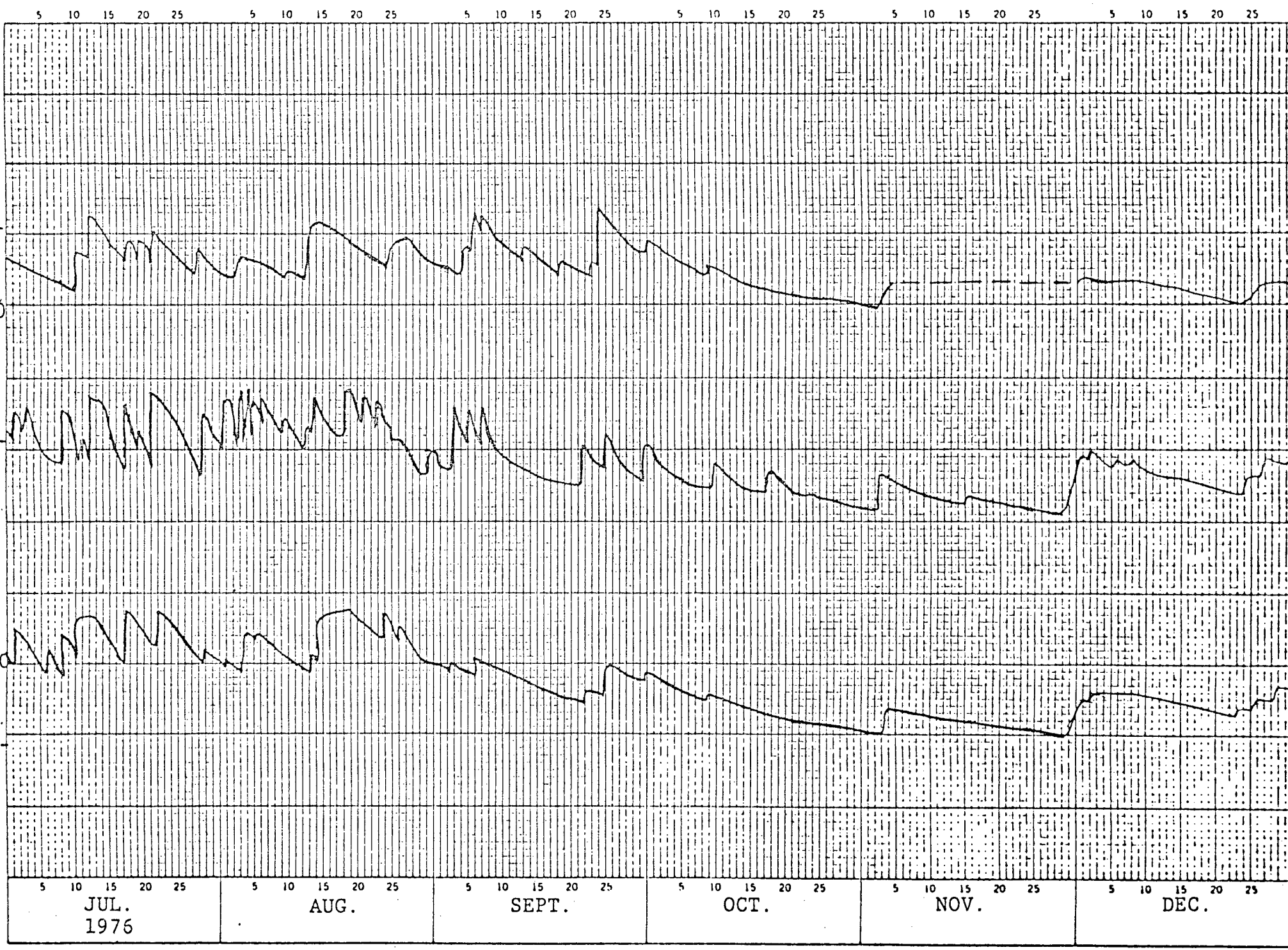
14. WELL LOG:

Well bore (in)	Depth (feet)		Note each type of material, producing zones, & cavities if any. Give description at not less than 20 foot intervals and at changes.
	From	To	
	0	2	Top soil
	2	10	White fine sand, soft
	10	28	White sandy clay, soft
	28	33	White clay
	33	35	Brown clay - limestone
			36 ft. PVC

15. CONTRACTOR'S CERTIFICATION:

This work was done under my jurisdiction and this report is true to the best of my knowledge and belief. The work commenced on 9/5/75 and was completed on 9/5/75



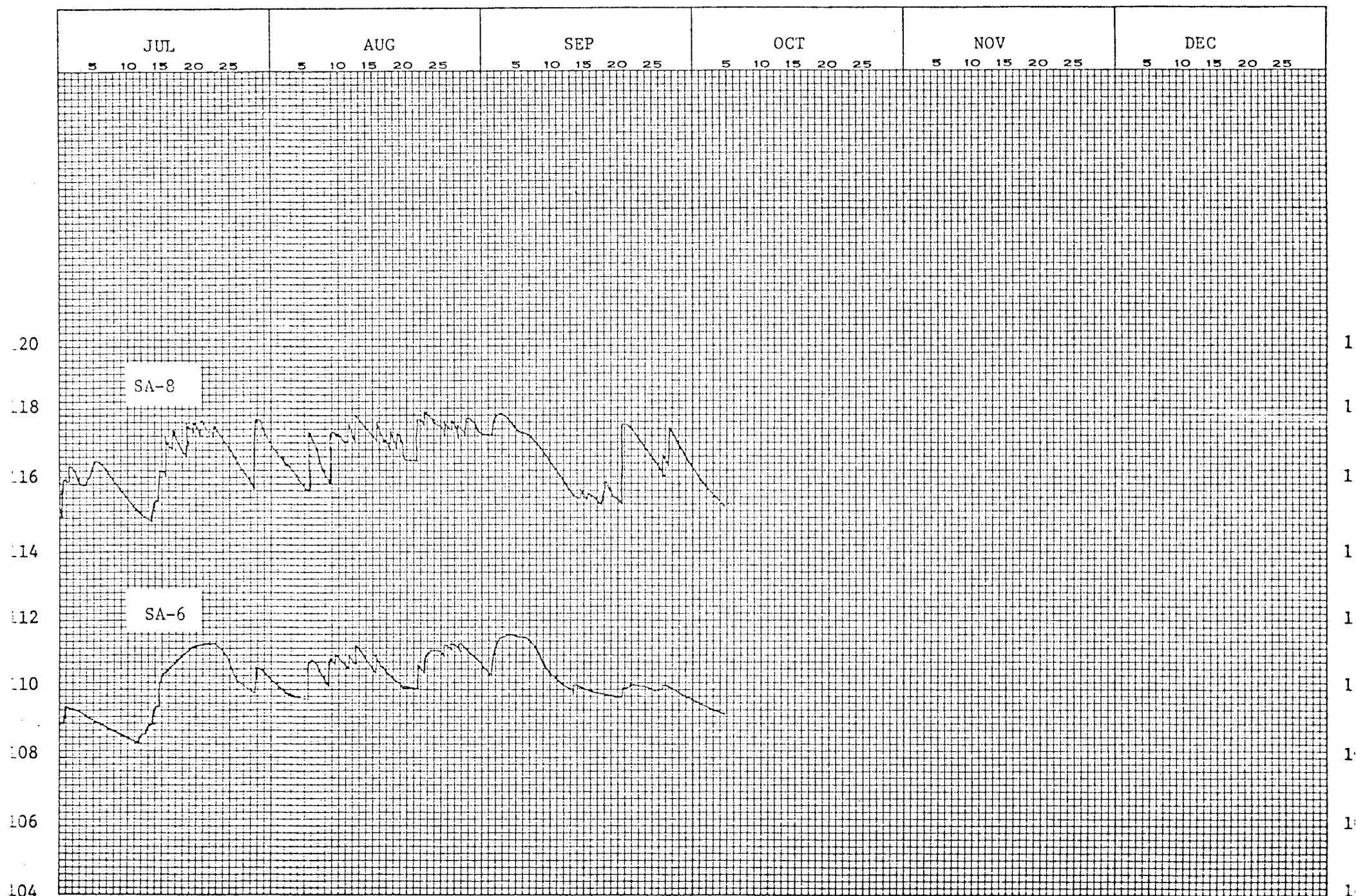


WATER ELEVATION IN FEET MSL



MADE IN U.S.A.

WATER ELEVATION IN FEET MSL



1. OWNER: C. E. Realty

Name
P.O. Box 1420 Orlando, Fl.
Address City State

2. LOCATION OF WELL: W. M. SULLIVAN WADCH

Street Address/Road
Ft. Green Sogs., Fl. Hardse

City County

Subdivision Lot No.
25 T33S 24E
Section Township Range

3. PURPOSE OF WELL:

☐ Domestic ☐ Irrigation ☐ Public Supply
☐ Industrial ☐ Stock ☒ Other WATER SUPPLY

4. TYPE OF WORK:

☐ New Well ☐ Plugging ☒ Other AB
☐ Deepening ☐ Reconditioning

5. QUALITY:

☒ Clear ☐ Colored ☐ Sulfur ☐ Salty ☐ Other _____

CHECK TEST MADE

☐ None ☐ Bacteria ☐ Chemical
Chloride _____ PPM
(Check ☐ if test was for sodium chloride)
Test By: ☐ County Health Dept.
☐ State Health Dept.
☐ U.S.G.S.
☐ Other _____

Temperature _____ °F Name _____

Well Disinfected ☐ Yes ☐ No Address _____

6. EQUIPMENT:

☒ Rotary ☐ Cable Tool ☐ Other _____
☐ Jet ☐ Reverse Rotary

7. GROUT:

☐ None ☐ Cement ☐ Other

Describe and give number of bags (94)lb. From (ft) To (ft)

<u>CEMENTED TO SURFACE</u>	<u>0</u>	<u>24</u>

8. CASING AND LINER PIPE:

Diameter (inches) Kind From (ft) To (ft)

<u>2" BLACK STEEL</u>	<u>0</u>	<u>24</u>

(Check One) ☒ Threaded & Coupled ☐ Welded Only
☐ T & C & Welded ☐ Other _____

9. WATER LEVEL:

Water level after well completed 65' 1/4 feet

☐ Above ☐ below land surface

Well Flowing: ☐ Yes ☐ No Flow _____ gal/min

10. SCREENS:

Make Materials Diameter (in) Slot Size Location (ft) Below Surface
From (ft) To (ft)

11. UPPER END OF WELL:

☐ Pump Installed ☐ Valve ☐ Cap ☐ Other

12. PUMPING TEST:

Date _____ ☐ Test Pump ☐ Permanent Pump

Measure point is _____

which is _____ feet ☐ above ☐ below land surface

Static water level _____ feet ☐ above ☐ below measure point

Maximum Drawdown _____ feet below measure point

14. WELL LOG:

Well bore (in)	Depth (feet)		Note each type of material, producing zones, & cavities if any. Give description at not less than 20 foot intervals and at changes.
	From	To	

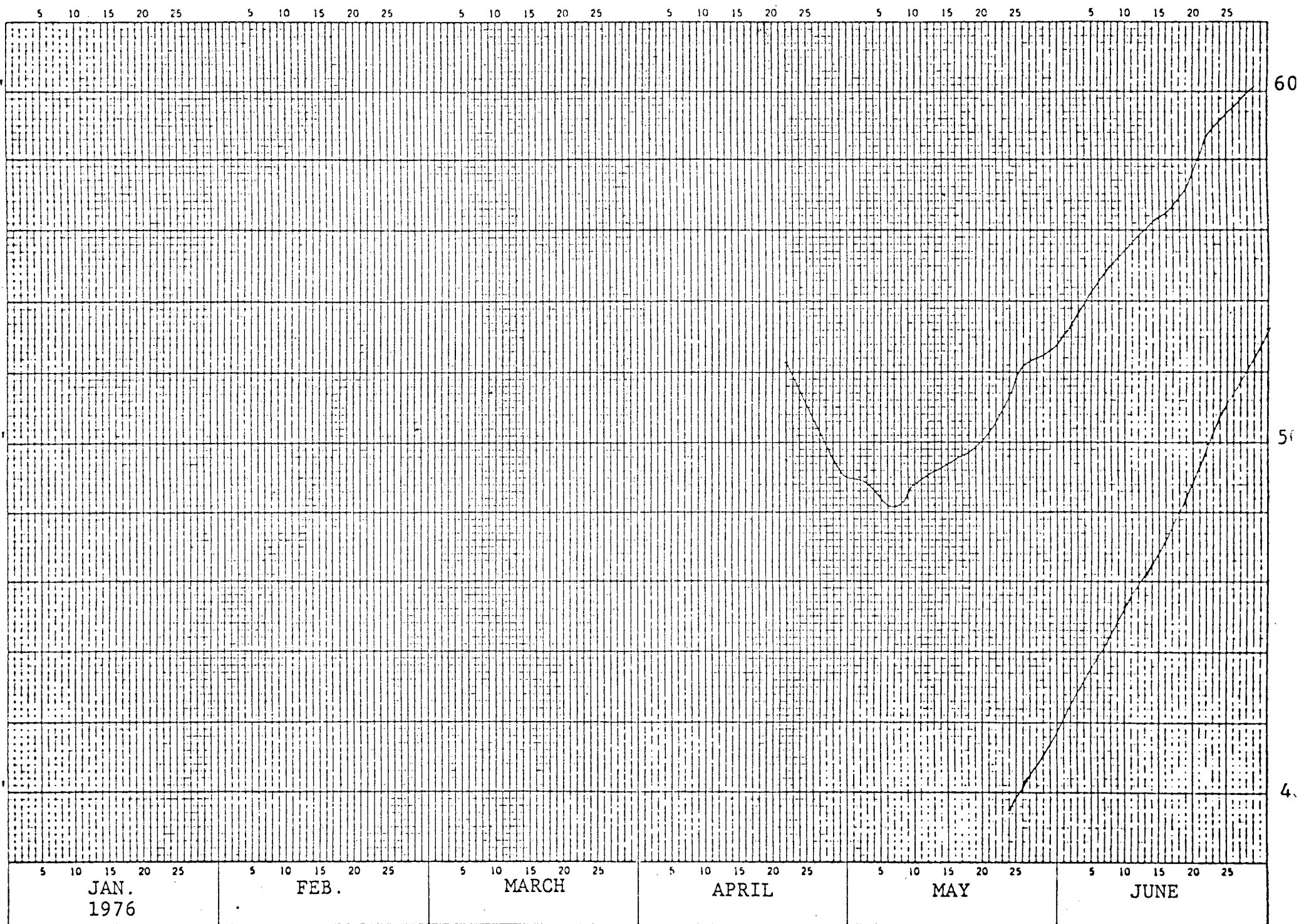
0	2	Top soil
2	10	White sand
10	22	White clay
22	35	White clay
35	60	White & brown clay
60	75	White clay
75	88	White clay & limestone
88	110	" "
110	115	White sandy clay - soft
115	120	" "
120	132	Limestone & white clay
132	154	White clay & limestone
154	176	Blue & white clay - limestone
176	198	Limestone streaks - clay
198	242	Limestone streaks - clay
242	264	Brown limestone - stks. clay
264	352	Limestone -stks. of clay
352	374	Blue clay & sand -stks. of limestone
374	380	Blue clay

Set 84' of 8" casing cemented with 50 bags cement

15. CONTRACTOR'S CERTIFICATION:

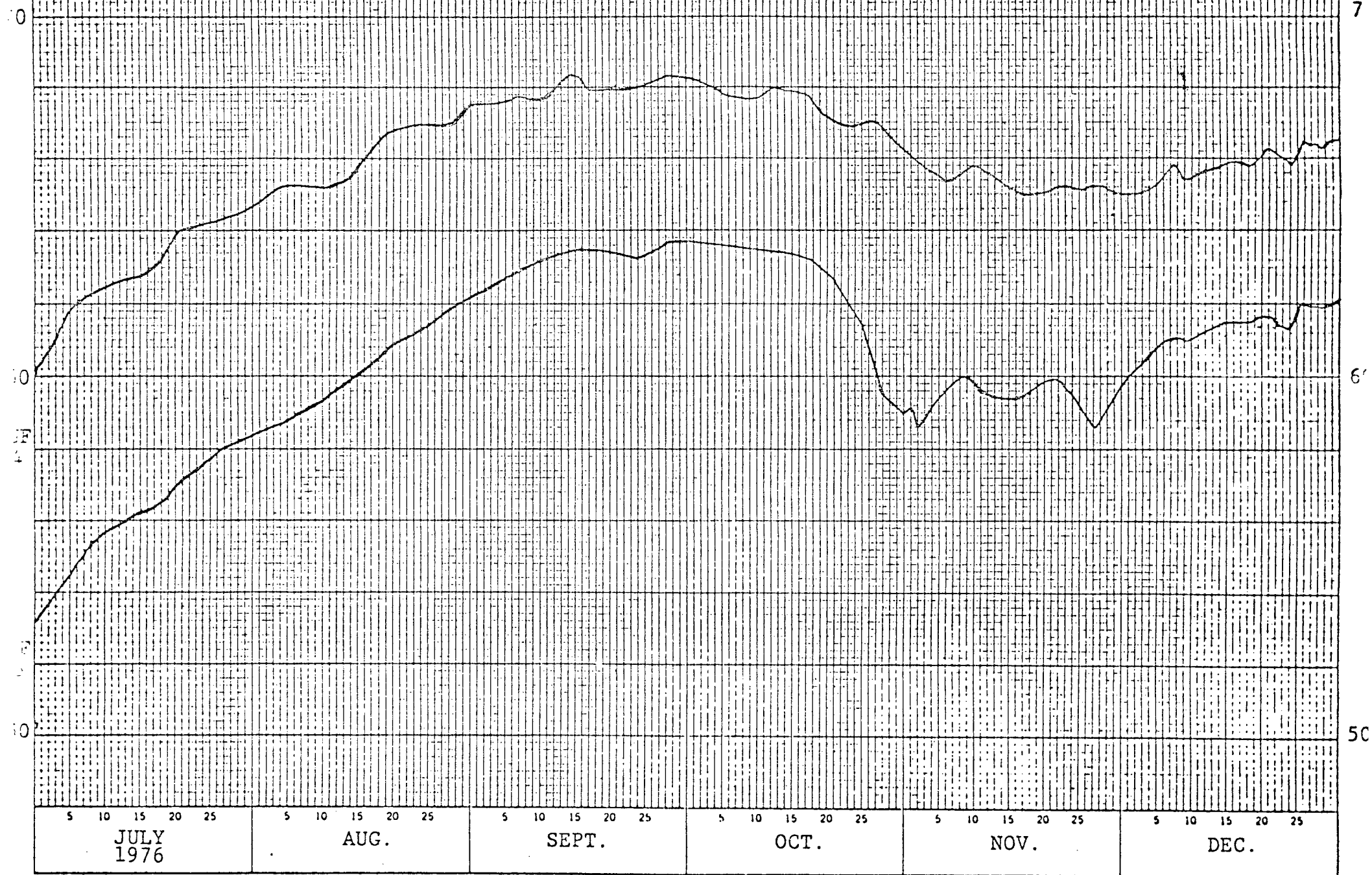
This work was done under my jurisdiction and this report is true to the best of my knowledge and belief. The work commenced on 11/5/75 and was completed on 11/13/75

WATER ELEVATION IN FEET ABOVE MSL

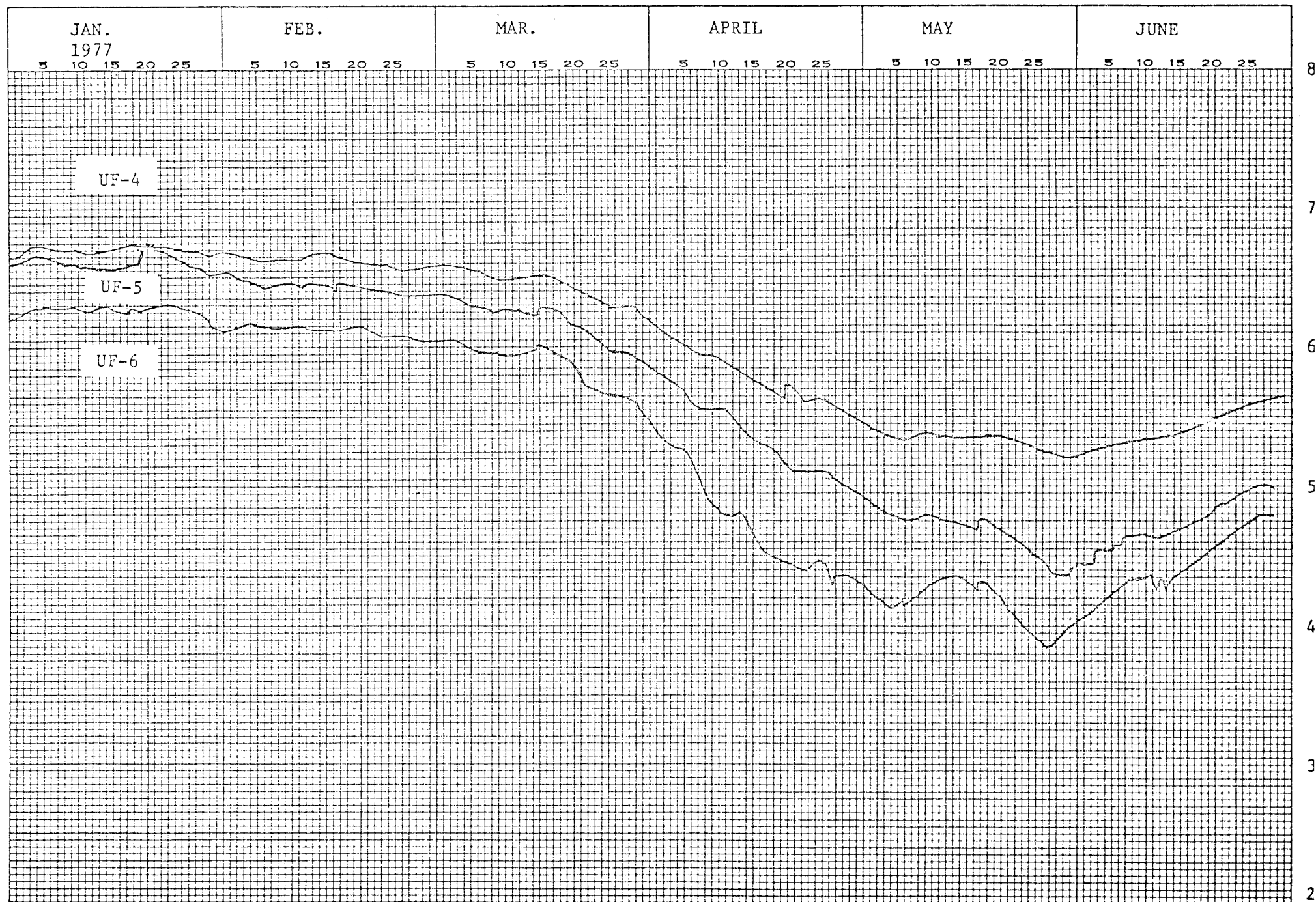


WATER ELEVATION IN FEET ABOVE MSL

5 10 15 20 25 5 10 15 20 25 5 10 15 20 25 5 10 15 20 25 5 10 15 20 25

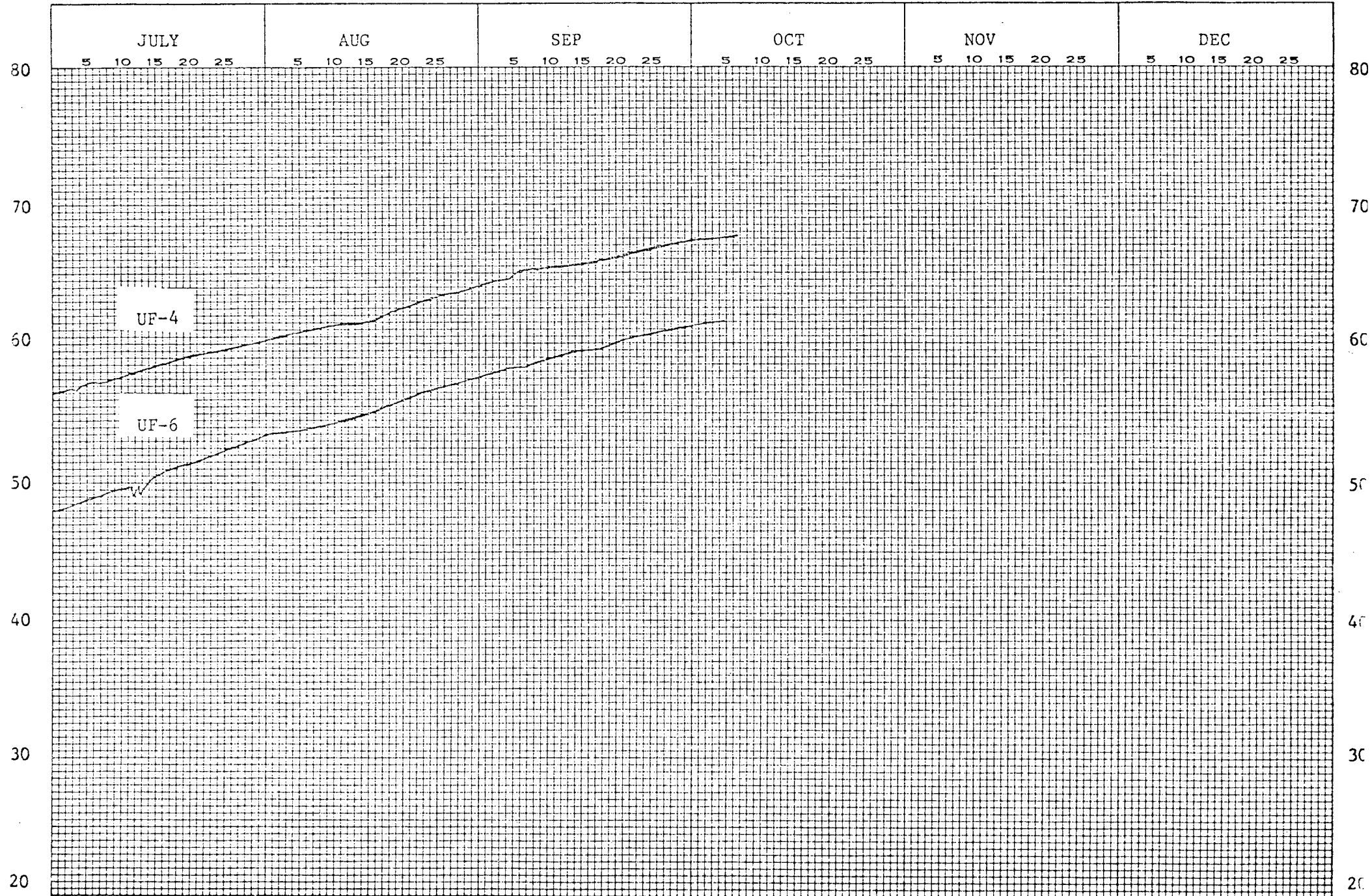


WATER ELEVATION IN FEET MSL



WATER ELEVATION IN FEET MSL

1977



1. OWNER: C. F. Realty

Name
D.D. Drawer 1810 Bartow, Fl.
Address City State

2. LOCATION OF WELL: 1111 STUART RANCH

Street Address/Road
1111 STUART RANCH
City County

Subdivision Lot No.
25 T33S 24E
Section Township Range

3. PURPOSE OF WELL:

☐ Domestic ☐ Irrigation ☐ Public Supply
☐ Industrial ☐ Stock ☒ Other

4. TYPE OF WORK:

☐ New Well ☐ Plugging ☒ Other
☐ Deepening ☐ Reconditioning

5. QUALITY:

☐ Clear ☐ Colored ☐ Sulfur ☐ Salty ☐ Other

CHECK TEST MADE

☐ None ☐ Bacteria ☐ Chemical
Chloride PPM
(Check ☐ if test was for sodium chloride)
Temperature °F
Well Disinfected ☐ Yes ☐ No
Test By: ☐ County Health Dept.
☐ State Health Dept.
☐ U.S.G.S.
☐ Other
Name
Address

6. EQUIPMENT:

☒ Rotary ☐ Cable Tool ☐ Other
☐ Jet ☐ Reverse Rotary

7. GROUT:

☐ None ☐ Cement ☐ Other

Describe and give number of bags (94)lb. From (ft) To (ft)
315 bags 0 92'
CEMENTED TO SURFACE 0 121'

8. CASING AND LINER PIPE:

Diameter (inches) Kind From (ft) To (ft)
10" BLUE STEEL 0 92'
10" BLUE STEEL 0 121'
(Check One) ☐ Threaded & Coupled ☐ Welded Only
☐ T & C & Welded ☐ Other

9. WATER LEVEL:

Water level after well completed 73 feet
☐ Above ☐ below land surface
Well Flowing: ☐ Yes ☐ No Flow gal/min

10. SCREENS:

Location (ft) Below Surface
Make Materials Diameter (in) Slot Size From (ft) To (ft)
WUIV F

11. UPPER END OF WELL:

☐ Pump Installed ☐ Valve ☒ Cap ☐ Other

12. PUMPING TEST:

Date ☐ Test Pump ☐ Permanent Pump
Measure point is
which is feet ☐ above ☐ below land surface
Static water level feet ☐ above ☐ below measure point
Maximum Drawdown feet below measure point

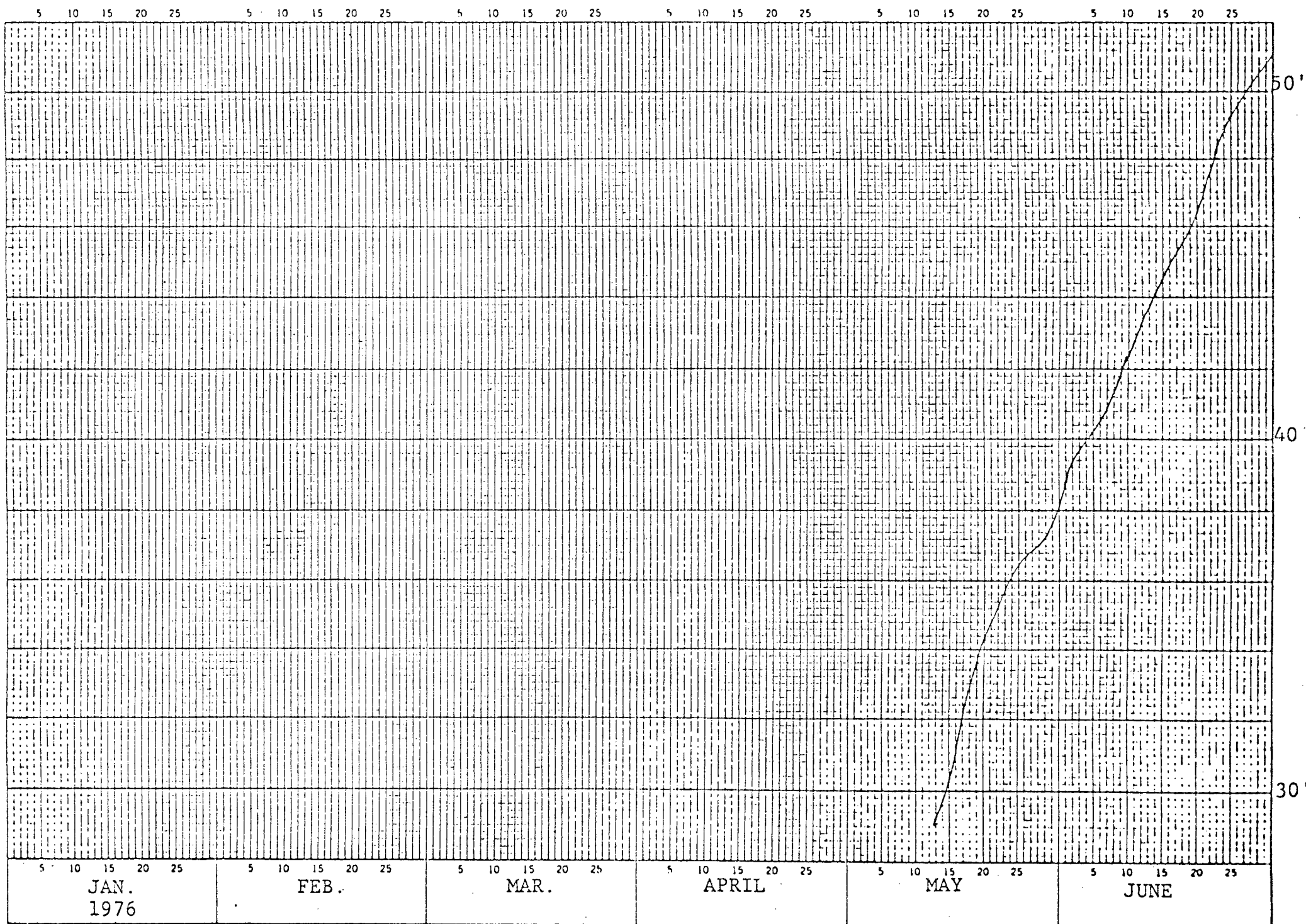
14. WELL LOG:

Well bore (in)	Depth (feet)		Note each type of material, producing zones, & cavities if any. Give description at not less than 20 foot intervals and at changes.
	From	To	
	0	10	Sand & rock mixture
	10	20	Limestone and phosphate
	20	30	" "
	30	40	Limestone & Clay
	40	50	" "
	50	60	Limestone & Phosphate
	60	70	Limestone & Phosphate & Clay
	70	80	" "
	80	90	Limestone & Phosphate
	90	100	Limestone & Clay
	100	210	Limestone & Clay
	210	320	Limestone & Clay
	320	330	Limestone & Clay - dolomite
	330	360	Limestone & Clay - hard
	360	385	Limestone & Clay - grey & white
	385	400	Limestone & Clay
	400	410	Grey clay
	410	430	Green clay
	430	440	Green limestone
	440	450	Clay - limestone
	450	460	Clay - limestone
	460	770	White limestone
	770	850	White limestone
	850	860	White limestone - & Dolomite
	860	890	" "
	890	900	Brownish limestone
	900	930	Brownish limestone
	930	940	Small cavity brownish limestone
	940	970	Brown limestone
	970	1000	Brown limestone some clay
	1000	1027	Brown limestone dolomite
			16" casing 104'
			93 ft. to ground level-215 ba
			of cement
			471' of 10" casing
			469' of 2" cementing

15. CONTRACTOR'S CERTIFICATION:

This work was done under my jurisdiction and this report is true to the best of my knowledge and belief. The work commenced on 2-5-76 and was completed on 3-1-76

WATER ELEVATION 1. FEET ABOVE MSL





5 10 15 20 25 5 10 15 20 25 5 10 15 20 25 5 10 15 20 25 5 10 15 20 25

0

70

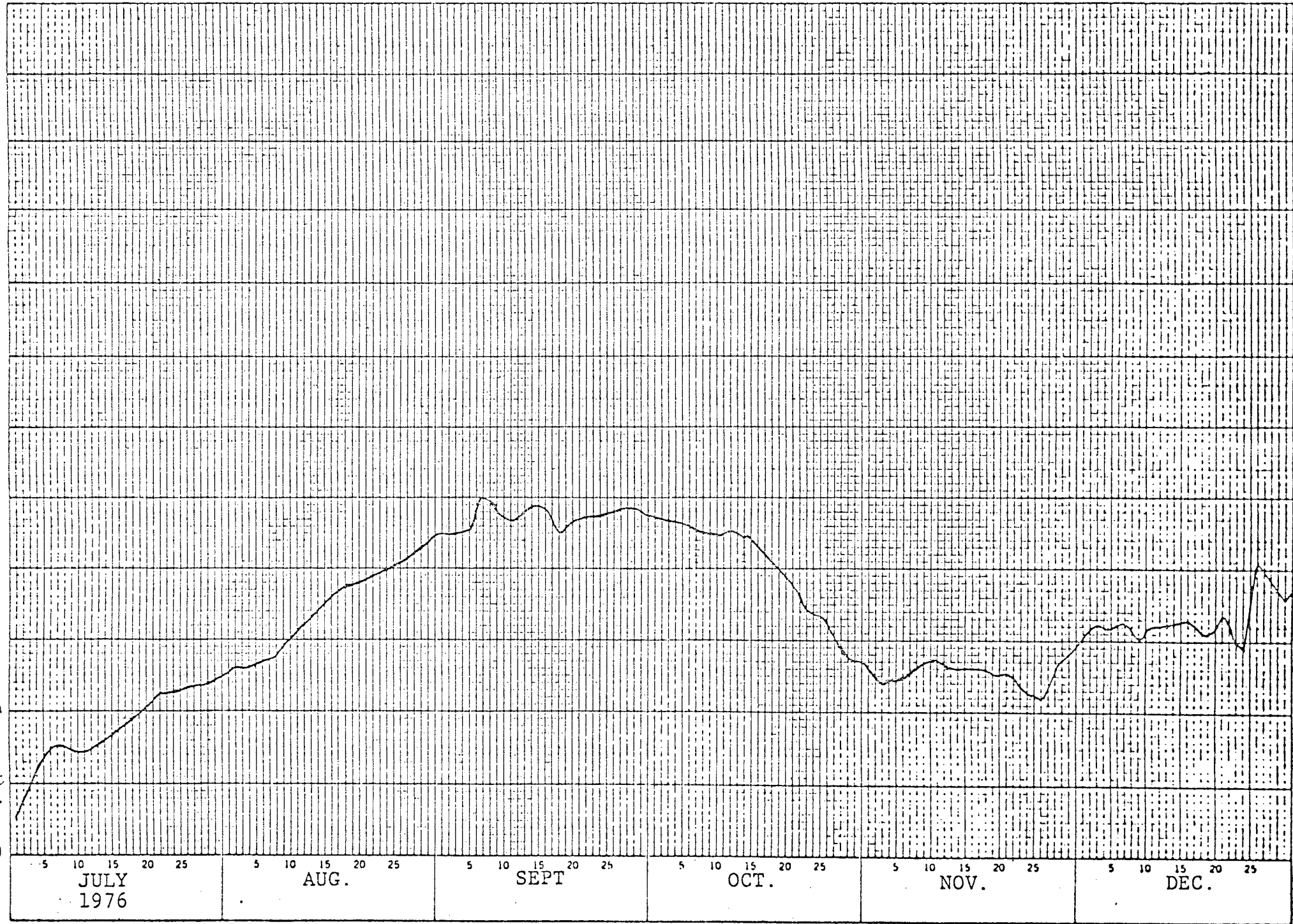
50

60

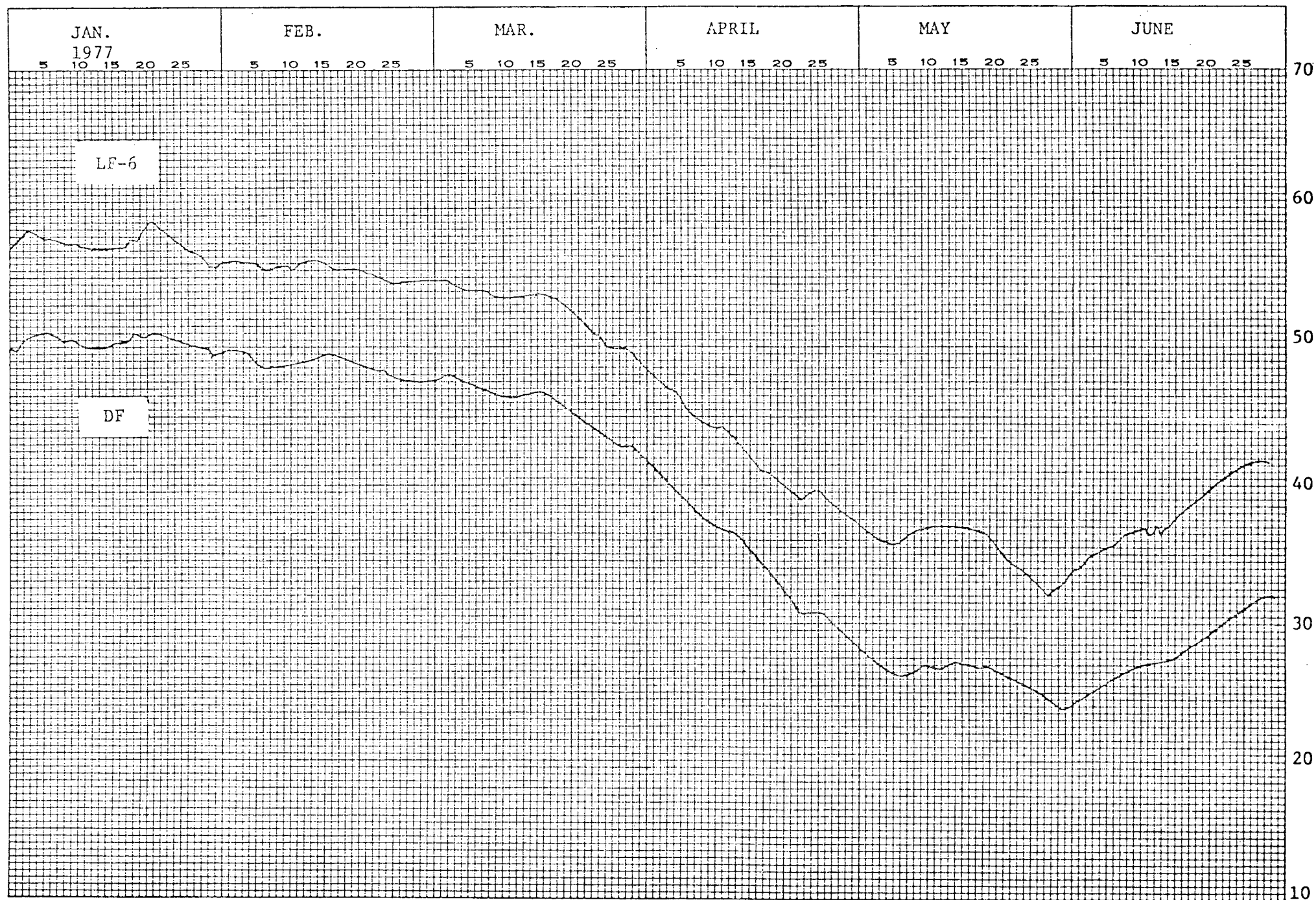
A

50

5



WATER ELEVATION IN FEET MSL



1977
WATER ELEVATION IN FEET MSL



Pt. Green Springs, Fl. Hardee

City County

Subdivision Lot No.

25 T33S 24E

Section Township Range

3. PURPOSE OF WELL:

☐ Domestic ☐ Irrigation ☐ Public Supply
☐ Industrial ☐ Stock ☐ Other 1/5/77

4. TYPE OF WORK:

☐ New Well ☐ Plugging ☐ Other C. 35
☐ Deepening ☐ Reconditioning

5. QUALITY:

☒ Clear ☐ Colored ☐ Sulfur ☐ Salty ☐ Other

CHECK TEST MADE

☐ None ☐ Bacteria ☐ Chemical
 Chloride PPM
 (Check ☐ if test was for sodium chloride)

Test By:
☐ County Health Dept.
☐ State Health Dept.
☐ U.S.G.S.
☐ Other

Name

Address

Temperature °F

Well Disinfected ☐ Yes ☐ No

6. EQUIPMENT:

☐ Rotary ☐ Cable Tool ☐ Other
☐ Jet ☐ Reversal Rotary

7. GROUT:

☐ None ☐ Cement ☐ Other

Describe and give number of bags (94)lb. From (ft) To (ft)

8. CASING AND LINER PIPE:

Diameter (inches) Kind From (ft) To (ft)

2" PVC SLOTTED 0 45

(Check One) ☐ Threaded & Coupled ☐ Welded Only
☐ T & C & Welded ☐ Other

9. WATER LEVEL:

Water level after well completed 4.25 feet

☐ Above ☐ below land surface

Well Flowing: ☐ Yes ☐ No Flow gal/min

10. SCREENS:

Make Materials Diameter (in) Slot Size Location (ft) Below Surface
 From (ft) To (ft)

NONE

11. UPPER END OF WELL:

☐ Pump Installed ☐ Valve ☐ Cap ☐ Other

12. PUMPING TEST:

Date ☐ Test Pump ☐ Permanent Pump

Measure point is

which is feet ☐ above ☐ below land surfaceStatic water level feet ☐ above ☐ below measure point

Maximum Drawdown feet below measure point

Discharge at maximum drawdown gal/min

After hours

13. PUMP INSTALLED:

Type Make Model No.

Motor Power Make H.P.

0 2
 2 16
 16 30
 30 44

Top Soil
 Fine sand, soft
 White clay - med. hard
 Blue & white clay med. hard

45 ft. PVC

SA #9

15. CONTRACTOR'S CERTIFICATION:

This work was done under my jurisdiction and this report is true to the best of my knowledge and belief. The work commenced on 9/3/75 and was completed on 9/3/75

Layne Atlantic Co.

1907

Contractor

License Number

P. O. Box 5780

Signature of Representative

P.O. Box or Street

LITHOLOGY
00 So - Sand • Fi - Fine Med - Medium Co - Coarse
01 Cl - Clay
02 Sa - Sand rock
03 Clayey Sand - ClSa
04 SaCl - sandy Clay
05 Ls - Limestone
06 Peat
07 Gravel
08 Leached Zone
09 Slimes
10 Tailings
11 Overburden - Spoil
12 Marl
13 Iron rock
14 Dol - Dolomitic
15 Calc - Calcareous
16 Si - Silt

PERCENTAGE
Pp - Pebble
Pg - Sand size
B - Barren
Tr - Trace 0-5%
Ln - Lean 5-10%
Med. - Moderate 10-30%
Abt - Abundant > 30%

MISCELLANEOUS
Al - Aluminum
Ca - Calcium
Deb - Debris
Frag - Fragmented
Foss - Fossiliferous
Ir - Iron rock
Lch - Leached
Mx - Muck
Mt - Marl
Msv - Massive
Mtx - Matrix
OS - Overburden
Org - Organic
Pt - Peat
Slm - Slime
Sms - Seams
Sp - Spoil
Spy - Soupy

Drilling Log Explanation

	COLOR	Void Depth:	
		CODES	THICKNESS:
Gvl - Gravel	Lt - Light Med - Medium Dk - Dark	HARDNESS	
Hp - Hardpan	20. Wh - White 28. Bn - Brown	SANDS - < 20% - 30% CLAY	
I - Iron	21. Cr - Cream 29. Gm - Green	CLAYS - > 20% to 30% CLAY	
Ib - Interbedded	22. Tan - Tan 30. Yel - Tan	DIGGING	
Sr - Sand rock	23. Yel - Yellow 31. Bl - Blue	D1 - Soupy	40. Lo - Loose - sifts thru fingers when dry
Stn - Stained	24. Pnk - Pink 32. Gy - Gray	D2 - Easy	41. Fm - Firm - easily penetr. with knife
Ta - Tailings	25. Am - Amber 33. Blx - Black	D3 - Normal	42. So - Soft - easily penetrated with finger
W/o - With out	26. Rd - Red 34. Ol - Olive	D4 - Slow	43. Fm - Firm - can penetrate with finger
W/ - With	27. Yel - Brn 35. Grn - Gray	PUMPING	
U/m - Unminable		P1 - Very easy	44. St - Stiff - can dent with finger
Wt - Wet		P2 - Easy	45. Tq - Tough - great resistance to knife
		P3 - Normal	46. Dn - Dense - great resistance to rock hc
		P4 - Slow	47. Ch - Chalky - similar to stiff hard clays
			48. Hd - Hard - rings at hammer blow
			49. Bky - Blocky
			50. Shy - Shaley

MINABLE - U/M	
D5 - Very difficult	P5 - Very Difficult
D6 - Non diggable	P6 - Non Pumpable

TYPE OF DRILL 4th F-1250 COMPANY CF IND.

[illegible]

HOLE NO. 0-10 DATE DRILLED 15 AUG 75 LOCATION 36-33-24
TIME SET UP _____ TIME START _____ TIME FINISHED _____
DRILLER JONES LOGGER PARKER SAMPLER BYARS
TYPE OF DRILL 4 F-1250 COMPANY CF IND.

[illegible]

E. PASTURE - REDRILL

DRILL RIG NUMBER FAILING 1500 RIG # 55 COMPANY CFI

[illegible]

TYPE OF DRILL 4th F-1250 COMPANY C.F. LTD.

DEPTH FROM TO		SAMPLE TAKEN	LENGTH RUN	MEASURED RECOVERED	REMARKS
0	13				Fi BN SA
13	16	17-20	3	3	Fm GY CL CONT. 16'
16	22	20-23	3	3	Fi BN CL-SA w/ LN BLK BH & LCH
		23-31	8	8	Pg.
22	24				STIF GY & BN SA-CL w/ V. LN, BLK, BH & LCH Pg.
24	31				STL, YEL & WI CL & LM w/ HD YEL LS & V. LN BLK & BN Pg.
					SPLIT
				1.	16-22 LM
				2.	22-24 LN

APPENDIX D

CONSUMAT INCINERATOR DATA

ENVIRONMENTAL PROTECTION AGENCY

Date: March 19, 1971

Reply to
Attn of: FF - DA

Subject: Compliance Test - Consumat, Model H-760 incinerator

To: All Applicable Federal Agencies

1. We have received a report prepared by an independent testing concern on the compliance test of the Consumat, Model H 760 incinerator manufactured by:

Waste Control Systems, Inc.
3700 Greenway Plaza
Houston, Texas 77027

2. The test results show that the incinerator will meet the emission standards in the Code of Federal Regulations (Title 42 CFR Part 76.8) when burning Public Health Service standard waste (similar to Type 1) and when operated in the following manner.

3. Type 1 waste is charged at a rate of 2100 pounds per hour for 8 hours. Following the last charge of the day, the burners and controls will continue to operate automatically for a six-hour period and then shut down automatically. The ash is raked out the following morning.

4. Based on the performance of the incinerator during the compliance test it is believed the unit will not exceed the Federal emission standards while burning the following wastes at the capacities shown.

MAXIMUM CHARGING RATE, #/HR BASED ON AN 8-HR. CHARGING PERIOD.				
MODEL	TYPE WASTE			COMMENTS
	0	1	2	Provided with Mechanical Loader
H 760	1650	2100	2900	

5. If additional information is required, please contact the Federal Facilities Branch.

F. Winkler

Frederick Winkler
Chief, Compliance and
Evaluation Section

ORLANDO INCINERATOR PLANT
DAILY LOG

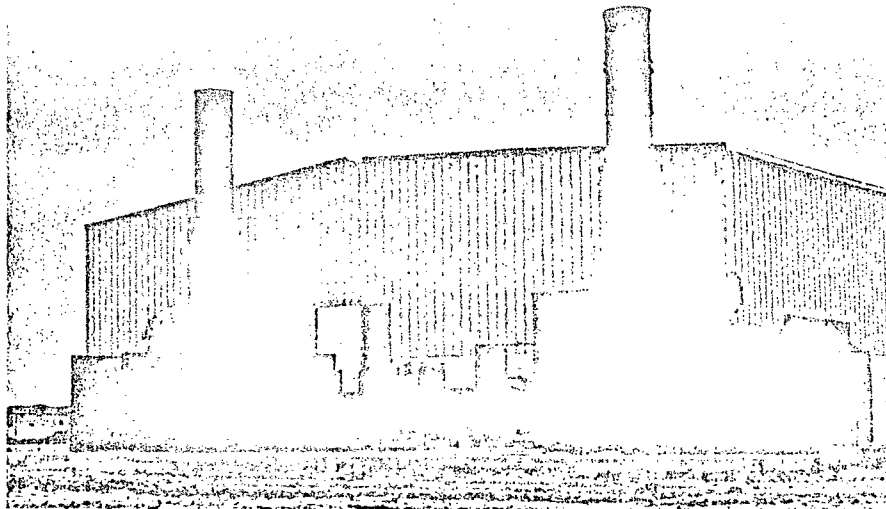
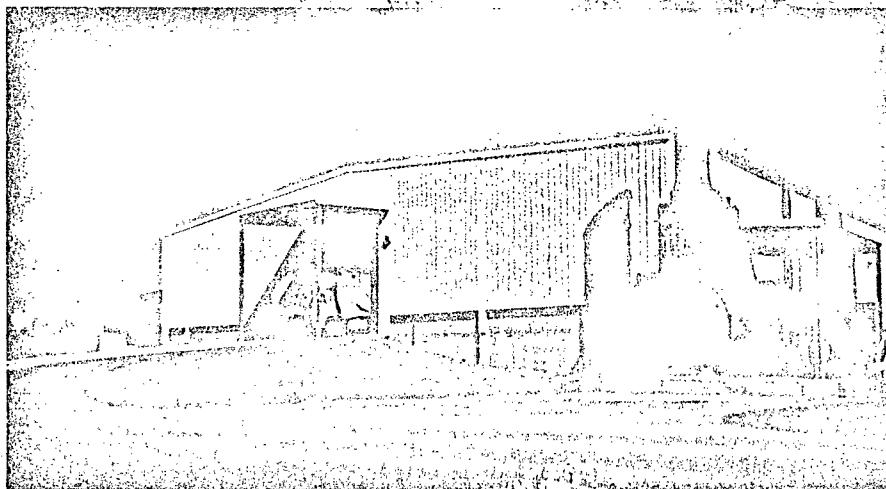
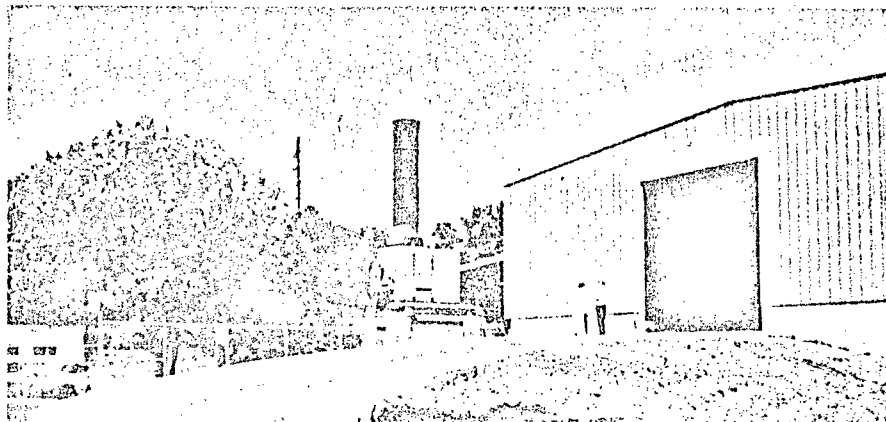
* Avg. KWH per Ton --- 12.05

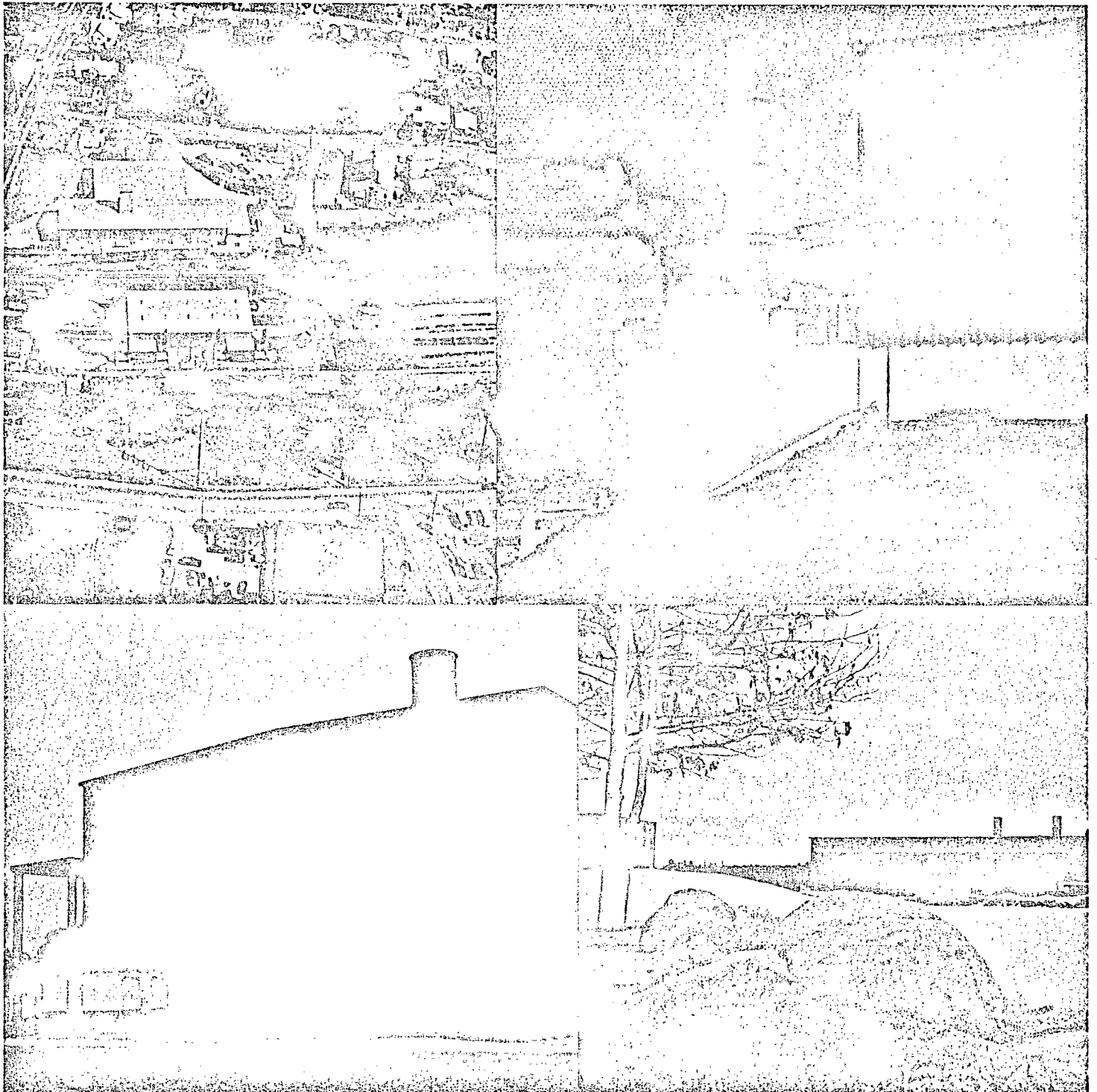
The Track Record

The next several pages contain photographs showing a few of the 32 CONSUMAT® municipal installations. These installations represent solutions to municipal problems from Florida to Washington State, Maine to Texas and installations in other countries.

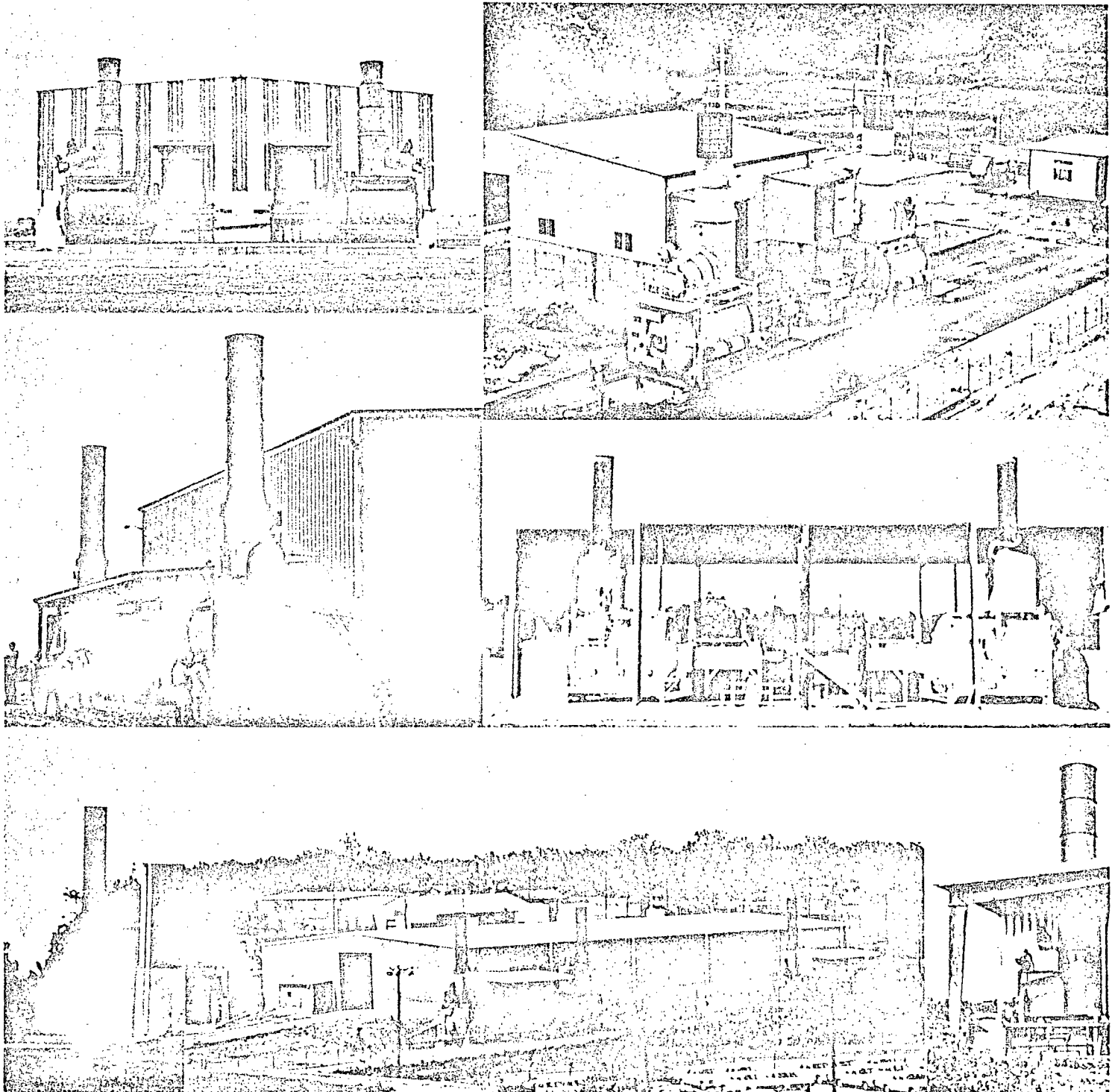
These installations have given Consumat Systems broad operating experience dealing with a wide range of waste mixtures under a variety of temperatures and weather conditions.

While operations differ from city to city, performance data is consistent among properly operated CONSUMAT® installations. The CONSUMAT® design and operating experience has resulted in a track record which will allow a city to plan and operate its facility with confidence.

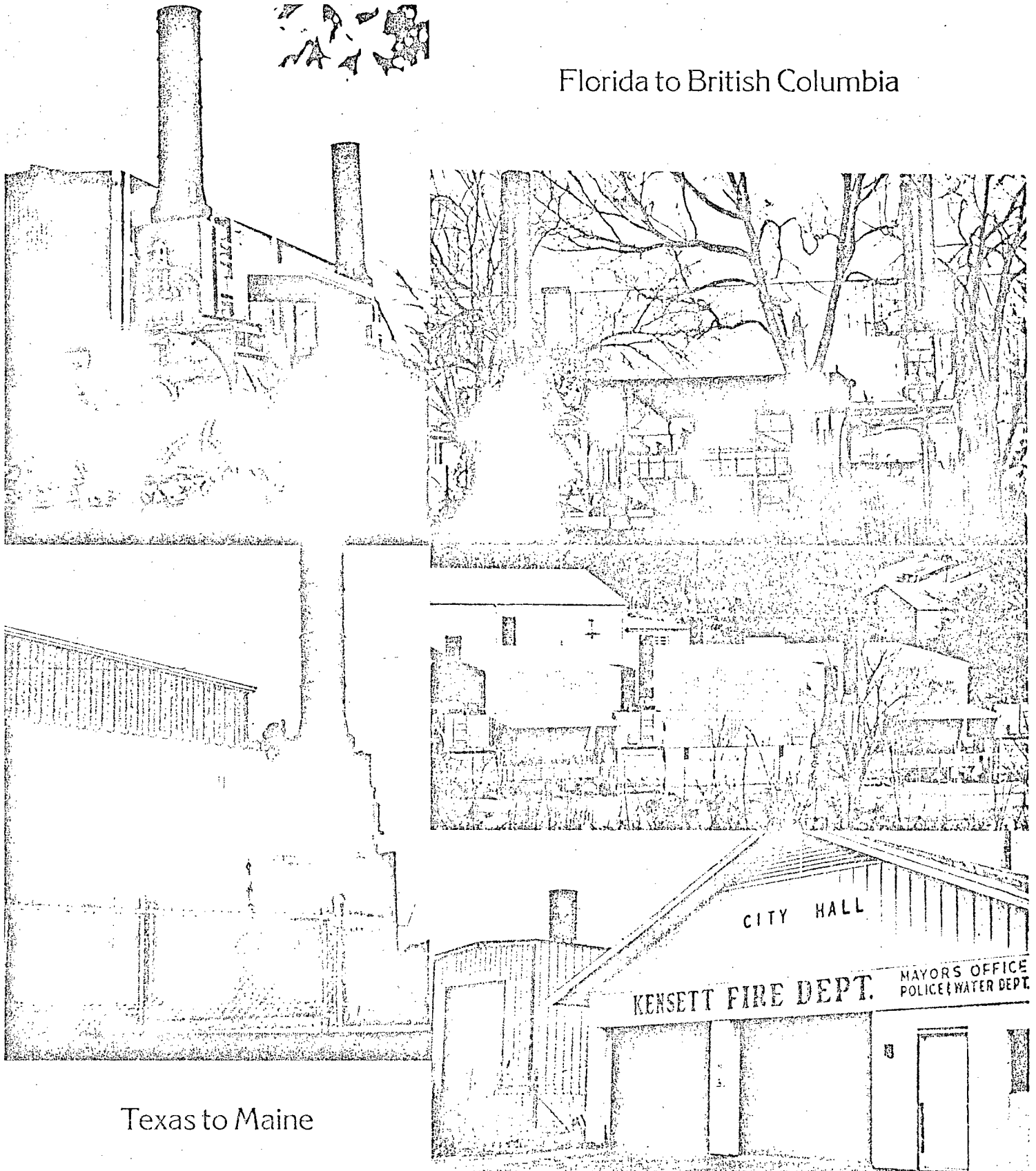




"Doing something practical." An answer to solid waste disposal plus an alternate source of energy.



Florida to British Columbia



Texas to Maine

CONSUMAT® MUNICIPAL SIZING GUIDE

MANUAL ASH REMOVAL SYSTEM

(Calculated on 10 Hour Charging Rate)

<u>TONS PER DAY</u>		<u>NO. OF UNITS</u>		<u>CONSUMAT® MODEL NO.</u>
<u>Min.</u>	<u>Max.</u>			
0	7	1		C-325M
7	14	2		C-325M
14	20	2		C-550M
20	25	2		C-760M
25	38	3		C-760M
38	50	4		C-760M
50	75	6	(Dual Ldrs. Rec.)	C-760M
75	100	8	" "	C-760M
100	150	12	" "	C-760M
150	200	16	" "	C-760M

CONSUMAT® MUNICIPAL SIZING GUIDE

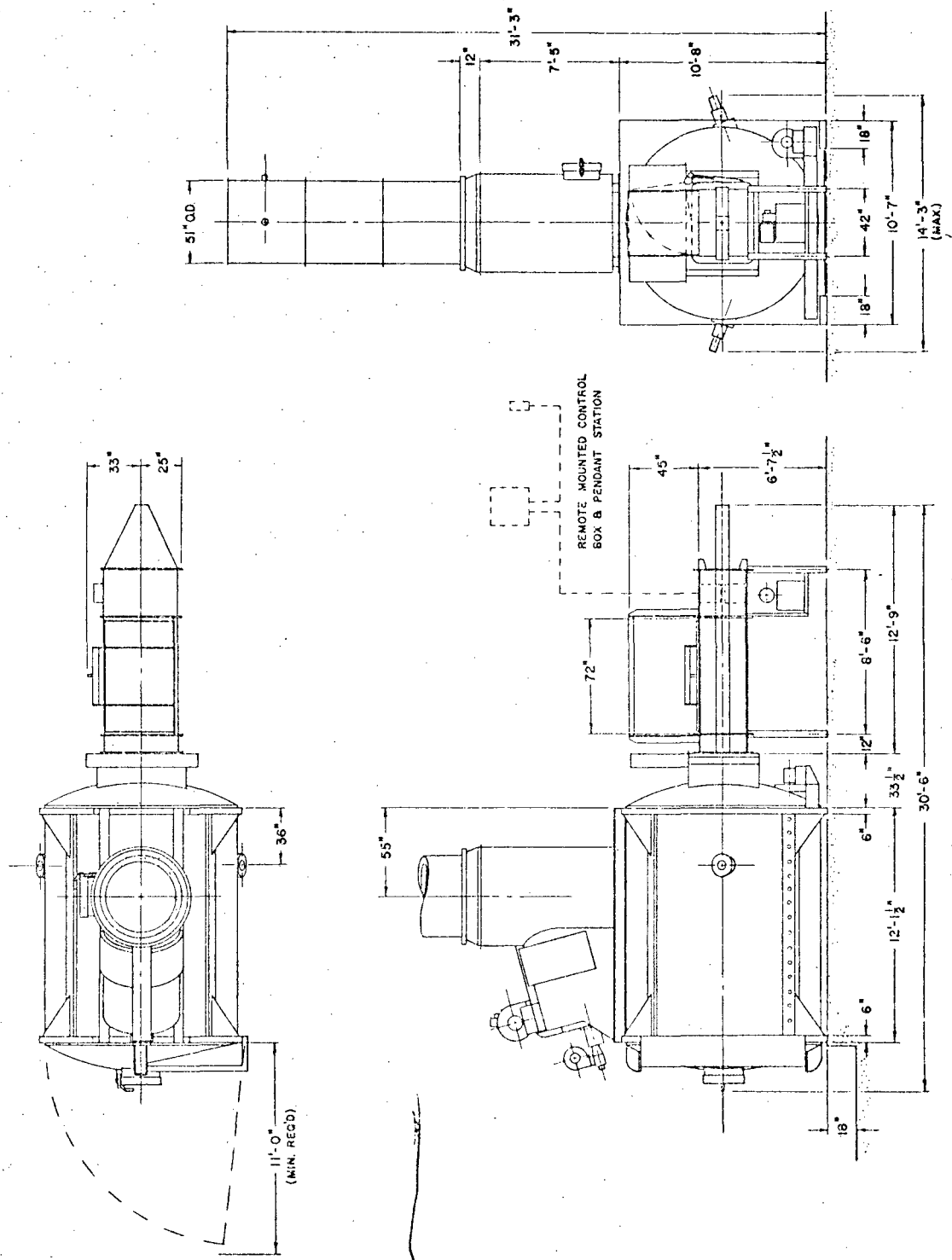
AUTOMATIC ASH REMOVAL SYSTEMS

RECOMMENDED FOR CONTINUOUS OPERATION

(Calculated on 24 Hour Charging Rate)

<u>TONS PER DAY</u>		<u>NO. OF UNITS</u>	<u>CONSUMAT® MODEL NO.</u>
<u>Min.</u>	<u>Max.</u>		
0	11	1	C-325MA
11	22	2	C-325MA
22	32	2	C-550MA
32	40	2	C-760MA
40	60	3	C-760MA
60	80	4	C-760MA
80	120	6 (Dual Ldrs. Rec.)	C-760MA
120	160	8 " "	C-760MA
160	240	12 " "	C-760MA
240	320	16 " "	C-760MA

MODEL C-760M



SPECIFICATIONS C-760M

CHARGING RATE	1,900 to 2,500 Lb./Hr. (Based on 10 hour day)
APPROX. WEIGHT	70,000 lbs.
LOWER CHAMBER	1/4" thick H.R. steel lined with 2" mineral wool insulation and 5" high strength 2600°F. cast refractory in upper section, slag resistant fire brick in lower section and abrasion resistant cast refractory in charging tap-in.
ASH REMOVAL DOOR	Full diameter hinged door with 16" x 16" inspection door, both refractory lined and insulated, with asbestos gaskets at sealing surfaces.
UPPER CHAMBER	3/16" H.R. steel lined with 1-1/2" mineral wool insulation and 4-1/2" insulating 2800°F. refractory.
STACK	Three 4' sections lined with 3" insulating refractory. Two 3" diameter standard test ports.
BURNERS (STD.):	Forced air, manufactured by Eclipse.
1. Upper Chamber	One special WC-7: High fire - 2,000,000 Btu/Hr.; Low fire - 600,000 to 1,000,000 Btu/Hr.
2. Lower Chamber	Two special WC-7: 1,000,000 Btu/Hr. (max.) each.
ELECTRICAL SERVICE REQUIRED	220 volt, three-phase, 60 cycle, 70 amp; 110 volt, 60 cycle, 20 amp.
GAS SERVICE REQUIRED	4000 CFH (max.) @ 1 psi
CONTROL CABINET	Weatherproof NEMA boxes. Wiring meets NEMA requirements.
CONTROLS: SEMI-AUTO-- MATIC - REMOTE MOUNTED	
1. Burner Flame Safety	Electronic flame sensor in spark-ignited pilot. System complies with F.I.A./F.M. requirements for gas burners.
2. Timers for Burners	Five hour type, Paragon No. 536-045-0 or equivalent.
3. Gas Valves	ASCO No. 8040 B5(1-1/4"), 8215A70 (1-1/2") and 8215A80(2") or equivalent.
4. Transformers	Dongan Cat. No. A06-SA6 primary voltage 115/120, secondary voltage 6000, 60 cycle (one required per burner).
5. Lower Chamber Temp. Controller	Honeywell No. R7380-2273-1 or equivalent, 0 to 2200°F. for type "K" thermocouple.
6. Upper Chamber Temp. Controller	Honeywell Dialatrol No. R7352, 0 to 2400°F. or equivalent for control of upper burner fuel and proportional control of secondary air. Type "K" thermocouple in ceramic tube.

SPECIFICATIONS C-760M - Cont'd.

FORCED AIR SUPPLY

1. Lower Chamber

Blower Dayton No. 2C739 or equivalent. Approximately 1020 CFM at 3" W.C. Motor, 2 HP, 3450 RPM, TEFC, 208,220/440V, 60 HZ, 3P, NEMA 56 Frame, Baldor No. 3608 or equivalent.

2. Upper Chamber

Blower Dayton No. 2C652 or equivalent. Approximately 1920 CFM at 3" W.C. Motor, 5 HP, 3450 RPM, TEFC, 208,220/440V, 60HZ, 3P, NEMA 213 Frame, Baldor No. M3706 or equivalent.

Upper burner blower Dayton No. 4C108 or equivalent. Approximately 680 CFM at 3" W.C. Motor, 1 HP, 3450 RPM, TEFC, 208,220/440V, 60 HZ, 3P, NEMA 56 Frame, Baldor No. M3545 or equivalent.

LOADER

Model ML-525A with 30" x 42" x 72" hopper (52-1/2 cu. ft.) and 10 HP hydraulic power unit. Pendant control station for actuation of charging cycle.

FINISH

Heat resistant silicone alkyd paint, Rust-Oleum No. A29-8801, gray.

OPTIONS

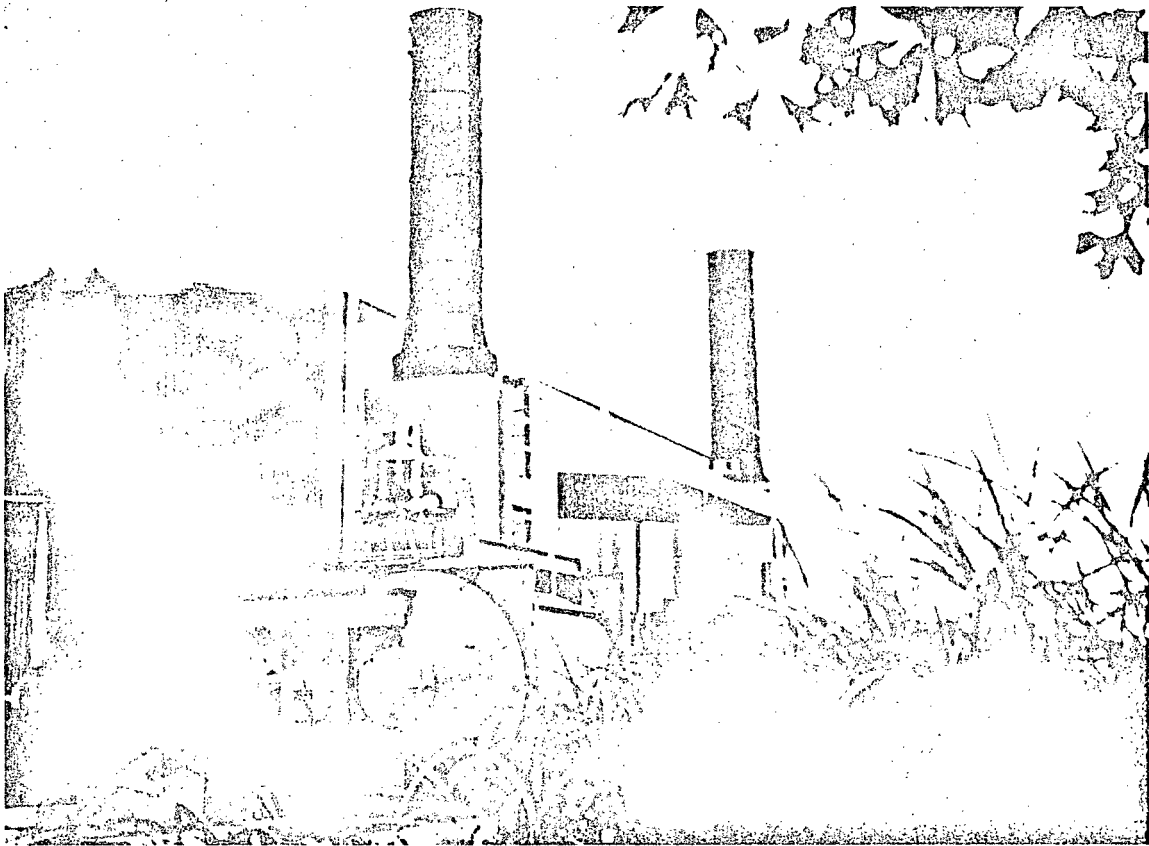
OIL BURNERS

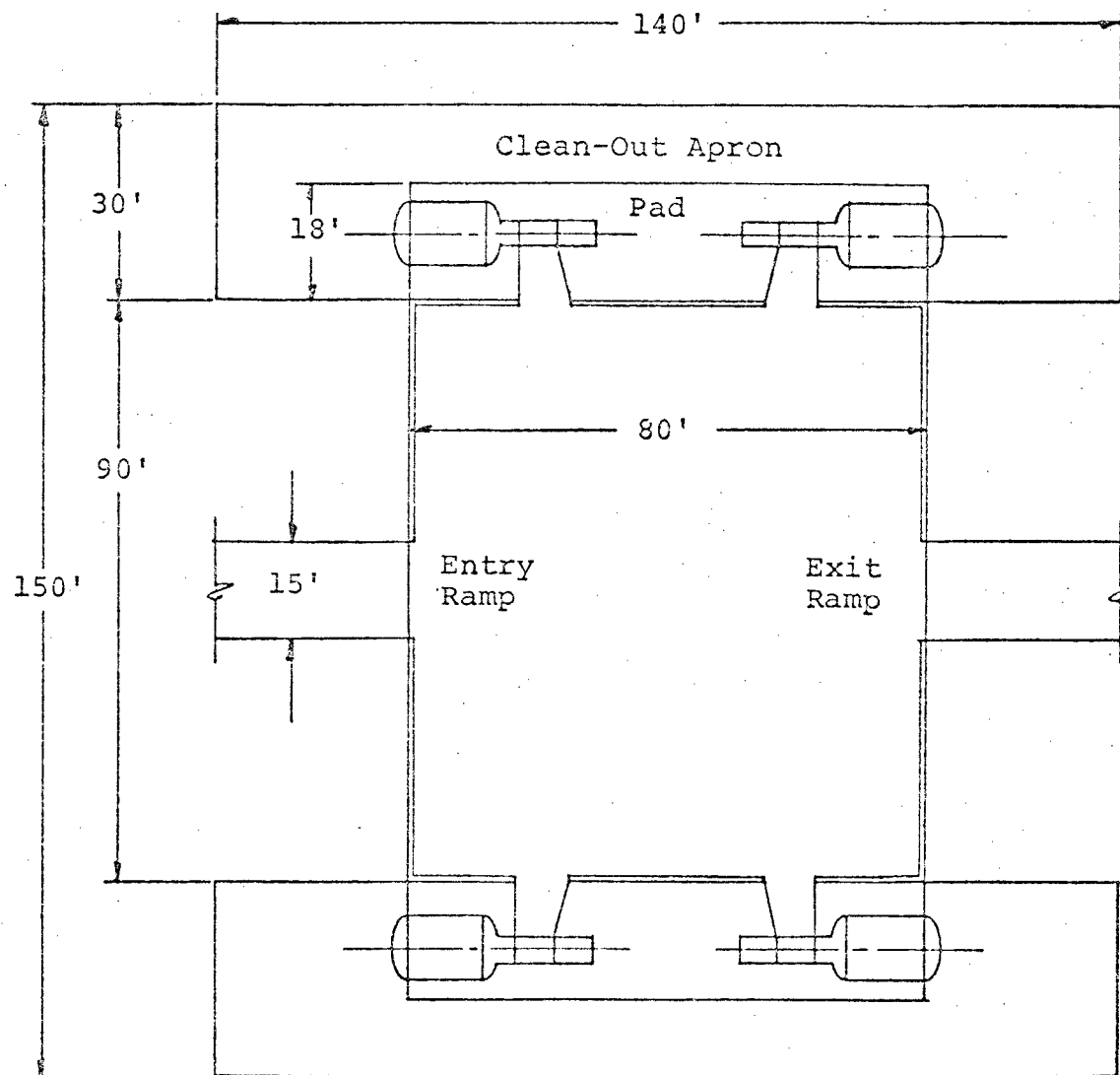
FUEL ECONOMIZER PACKAGE

DUAL-FUEL BURNERS

STEAM HEAT RECOVERY SYSTEM
Model CRS-503 or CRS-504

50 TON MUNICIPAL FACILITY





BASIC FLOOR PLAN

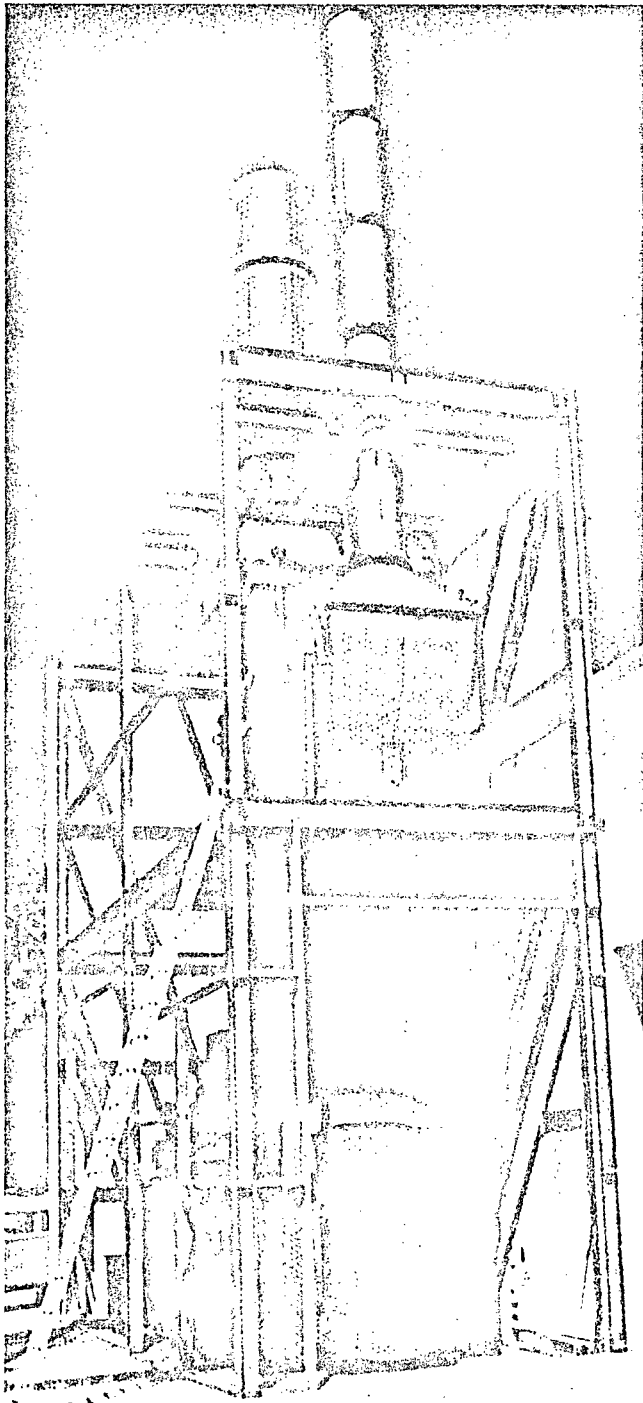
C-760M

50-Ton Plant

50 TON CONSUMAT® WASTE DISPOSAL SITE

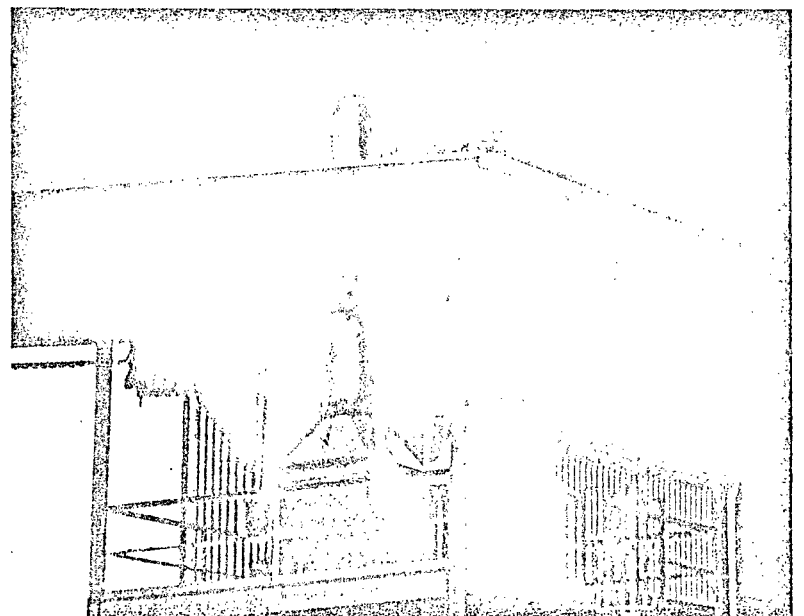
The following information is based upon municipal operating experience gained from 32 installations equipped with 87 CONSUMAT® municipal modules.

Land Requirements	A 50 ton municipal CONSUMAT® facility requires approximately one and one-quarter acres with easy access to hard surfaced road for both waste delivery and ash removal. Optimum dimensions would be 180' x 300'.
Floor Area	Dimensions: 90' x 80' or 7200 square feet.
Ceiling Height	In order to accomodate the unloading of packer trucks all buildings should have a minimum internal ceiling clearance of 19'.
Door Clearance	18' x 18' minimum.
Entrance Ramp	Concrete or asphalt, minimum width 15', grade not to exceed 10%.
Bulkhead	The metal building should be supported by concrete bulkhead minimum 4' from the floor.
Ventilation	In regions requiring closed buildings, adequate ventilation should be provided with minimum of five air changes per hour.
Water Supply	Adequate water supply should be installed to deliver 40 psi as standard.
Electrical Requirements	See specifications for specific equipment.
Auxiliary Fuel	Auxiliary fuel supply should be provided to deliver a maximum of 4 MCF of natural gas or 27 gallons of oil or 44 gallons of propane per hour per module.

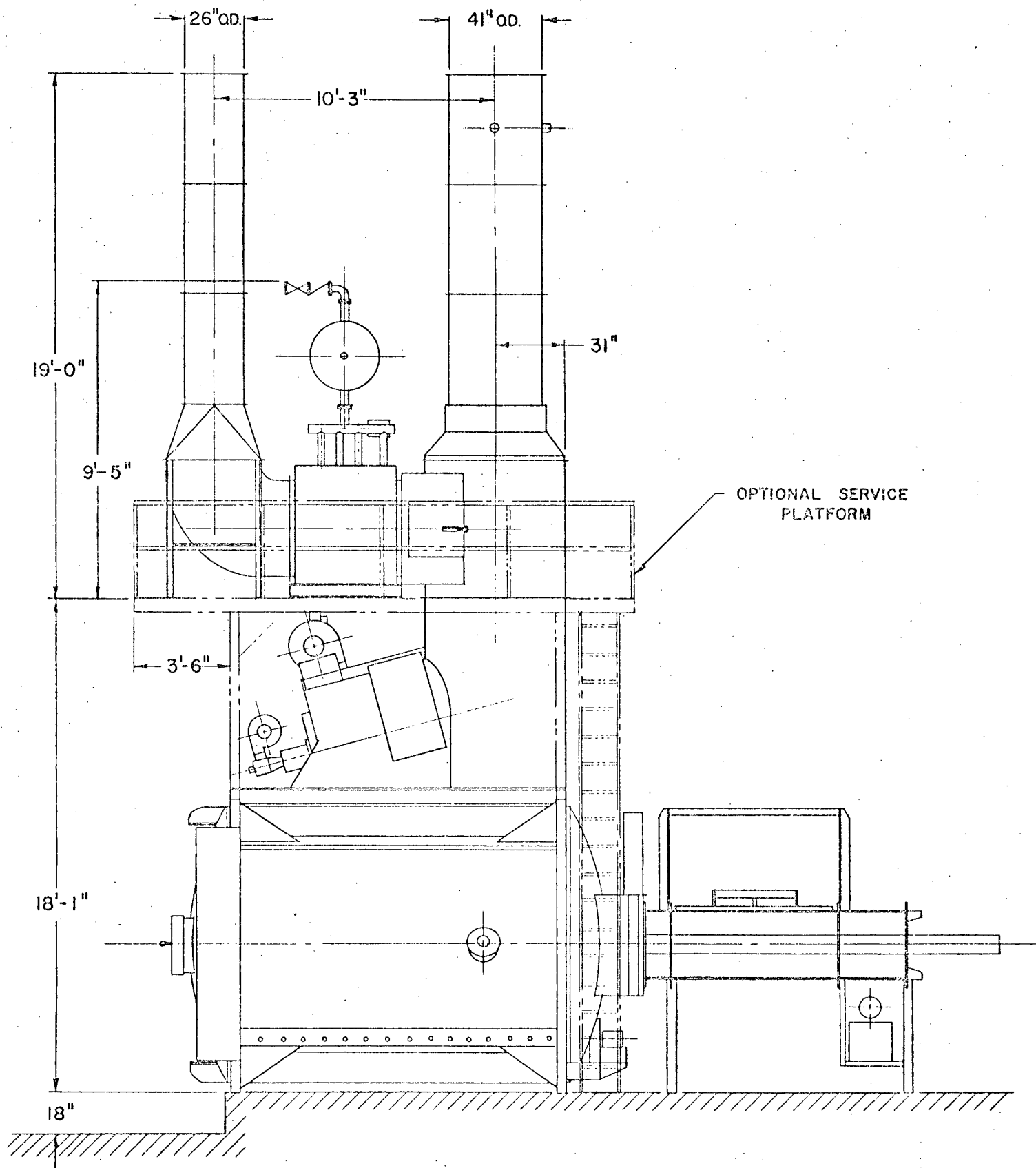


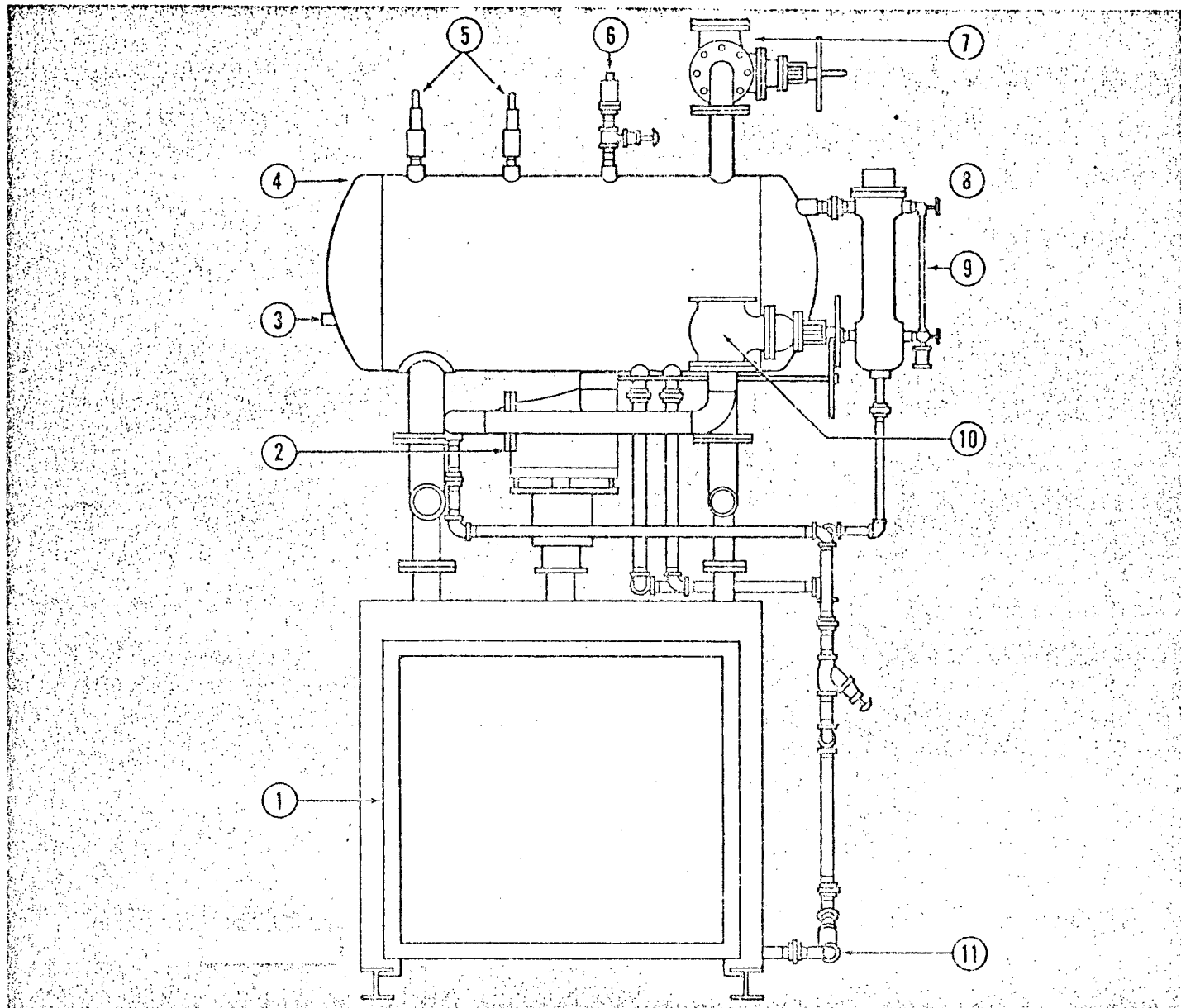
The photographs on this page show several CONSUMAT® energy conversion installations. The patented CONSUMAT® energy system operates with two stacks to give the system a wide range of operational flexibility. The large stack is used to operate the equipment as an incinerator only. The smaller stack carries the flow when the system is producing steam. Partial heat extraction can be maintained by dividing the flow. This flow control is maintained by a patented aerodynamic valving arrangement resulting in several unique features.

The system is completely fail safe. In the event of a power failure or control failure the system will immediately direct the hot gases through the dump stack. This, of course, results in enormous capital savings by eliminating the need for a condenser or other heat dissipating device.



MODEL C-760M/CRS-504





The system, as delivered, includes the following items:

CRS Model Numbers	103 104	203 204	303 304	503 504	803 804
1. Water Tube Section	24x21	24x36	36x40	42x48	54x58
2. Soot Blower ¹	C-V	C-V	C-V	C-V	C-V
3. Water Feed	1"	1"	1"	1½"	1½"
4. Separator ²	HSS10	HSS20	HSS20	HSS40	HSS60
5. Relief Valves (2)	1½"	1½"	2"	2"	2"
6. Vent Valve	½"	½"	½"	½"	½"
7. Steam Outlet	2"	2"	2½"	3"	4"
8. Level Controls & Alarms ³	—	—	—	—	—
9. Sight Glass ³	—	—	—	—	—
10. Soot Blower Valve	2"	2"	2½"	2½"	2½"
11. Drain Valve	1"	1"	1"	1"	1"

1 Copes-Vulcan D5-M 2 Riley-Beaird Designation 3 Supplied to Match Separator
Manufacturer may substitute material of equivalent or better quality without notice.