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Econlockhatchee Hydrologic Balance
"Maintaining the Balance"

by

M.P. Wanielista, R.D. Eaglin, R.L. Bennett, S.L. Underwood
August 1992

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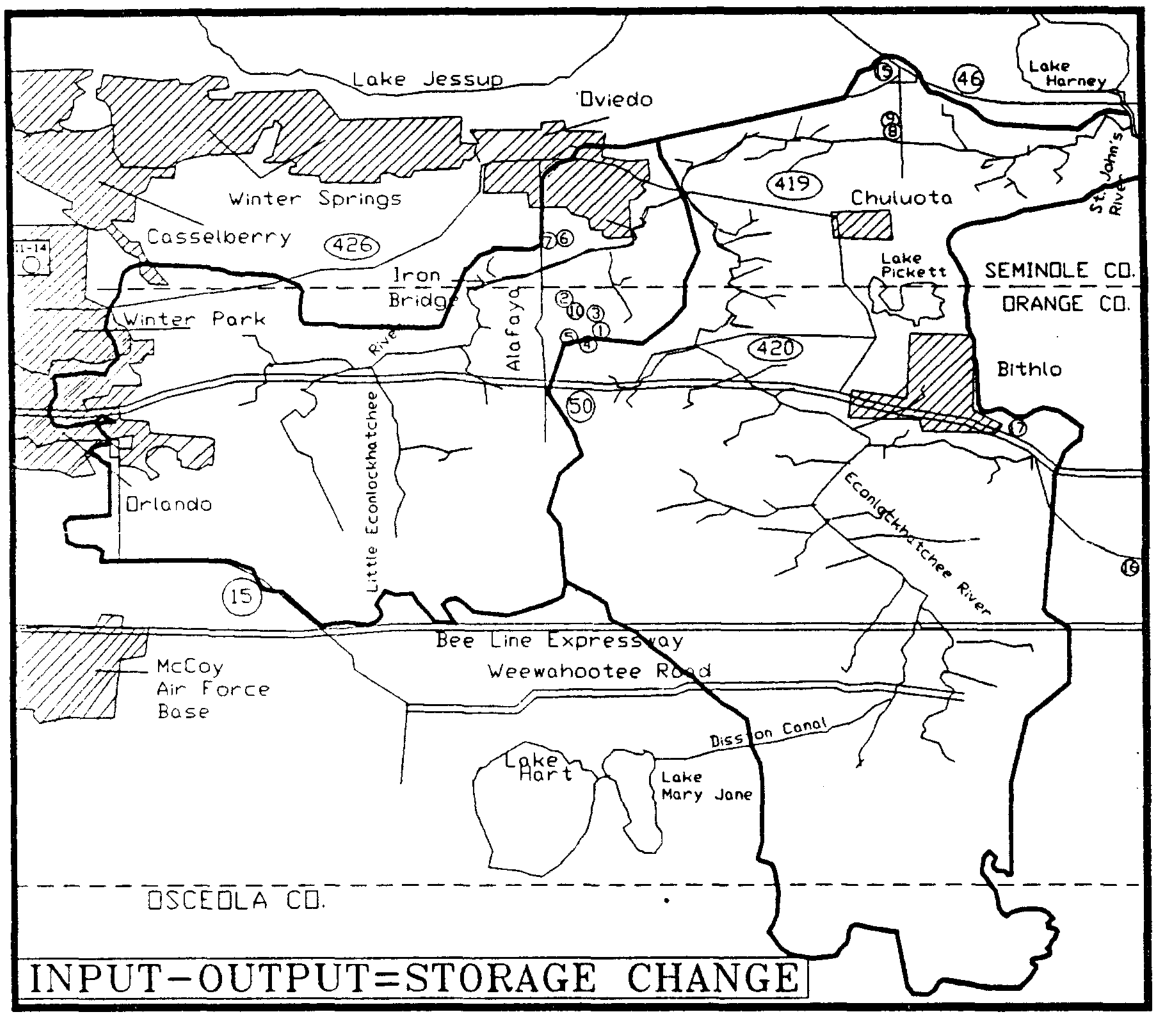

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Marty Wanielista......

August, 1992

TABLE OF CONTENTS

Appendix

LIST OF FIGURES

LIST OF TABLES

LIST OF TABLES (continued)

EXECUTIVE SUMMARY

In April of 1990, the St Johns River Water Management District Board directed its staff to begin rulemaking that will develop Econlockhatchee Basin-specific stormwater management rule criteria consistent with the River Task Force recommendations. From these recommendations, there were two (II.B and II.E) that specifically address water quantity/quality issues and require an estimate of the overall water budget for the entire Basin.

WATER TABLE ELEVATIONS

Recommendation II.B states "The District should prepare MSSW Basin criteria to address excessive lowering of the water table." However, there are limited historical water table elevation data available within the Basin and the measurement frequency was only a few times per year and no wells were located near stormwater facilities. Thus, the frequency for measurement at three existing surficial aquifer wells was increased to twice per week and 14 additional surficial aquifer wells were installed and measured at a twice per week rate over a one year period of time. Three of the wells were located in areas of potential aquifer discharge and the remaining eleven were located in areas of moderated recharge.

Rainfall gages were installed near two of the shallow well sites and rainfall volumes were reported on a twice per week interval. During the measurement cycle of one year (June 1, 1991 - May 31, 1992) the average rainfall based on the two sites was 52.60 inches, or approximately 2 inches greater than that reported at the Orlando jetport.

The shallow water table elevation data indicate that the water table elevations generally increase but extensively fluctuate during the wet season and decrease in the dry season. The wet season is defined as the months June through October and the dry season is November through May. Based on average data, the dry season water table is less than the wet season water table. The rainfall volume during the wet season at the two sites averaged 33.41 inches and exceeded by less than one standard deviation the average wet season volume of 29.53 inches. For the monitoring wells in the natural areas, the water table elevations exceeded the estimated seasonal high during the wet season. Seasonal high water table elevations were estimated by the USDA Soil Conservation Service. At wells in developed areas during the wet season, the water table fluctuation rarely increased to the estimated seasonal high water table, and based on the data of this report, development does lower the water table.

One of the well locations was near an above ground treated wastewater storage pond. At this location and based on the data collected, the seasonal high water table was exceeded and the ground water table was kept high presumably because of the above ground storage pond.

Groundwater elevation data near a stormwater reuse pond indicated that the surficial aquifer was kept higher than historical records. The permanent pool level in the pond was increased to a higher level than historical records by approximately two feet. By eliminating pond orifice discharge and substituting groundwater infiltration and irrigation of temporary storage, groundwater table levels in the area of the pond can be increased. The District should continue to monitor surficial aquifer water levels and rainfall. The data will prove valuable as a baseline for future decisions regarding the water resources, development decisions, and the natural environments of the Basin.

MAINTENANCE OF PRE-DEVELOPMENT CONDITIONS

Recommendation II.E states "Surface water management systems should maintain the pre-development on-site water storage characteristics and approximate the pre-development runoff rates and volumes from individual storms and total seasonal volumes". Historical data for Basin rainfall, wastewater discharges, and stream flow were available. Statistical measures and frequency distributions were developed for annual and seasonal rainfall volumes and stream flow. The historical yearly average rainfall based on three gages near the Watershed is 51.23 inches/year with a standard deviation of 6.74 inches. The wet season rainfall was about 60% of the yearly. The Basin rainfall statistics were compared to District wide statistics and the 60% yearly wet season value is similar to that of the District wide statistic.

Wastewater flows into the River are currently about 10-20% of yearly flow volume recorded at the Chuluota stream gage site. Projections of wastewater flow in the year 2000 if allowed to discharge into the River could double the current stream flow volume discharged.

Stream flow depth is recorded at Chuluota @ Snow Hill, Union

Park, and Magnolia Ranch. Comparison of the yearly flow volumes between the undeveloped Magnolia Ranch area versus the developing areas represented by the Union Park and the Chuluota gages indicate higher volumes of discharge at Union Park and Chuluota presumably because of the partly developing conditions. The increased discharge over a 12 year period is about equal to the average rainfall for one year. The maximum yearly discharge at Chuluota was 21.81 inches with an average of about 14 inches. The average yearly discharge at Magnolia Ranch is about 10 inches. Frequency distributions for the historical data were developed on a yearly, wet season, and dry season basis and can be used for comparison to future discharge volumes.

Peak discharges can be estimated by standard hydrograph generation methods provided rainfall excess and hydrograph shape factors are available. Hydrograph shape (attenuation) factors were estimated from historical hydrographs at the three gaging sites. Based on the data, hydrograph attenuation factors of 484, 256, and 256 appear reasonable for Chuluota, Union Park, and Magnolia Ranch respectively.

The historical rainfall, wastewater, and stream flow data were used in a water budget to pick an empirical equation for Basin evapotranspiration rates (ET) and to estimate net aquifer exchange. The average of yearly surficial aquifer exchange with deeper aquifers over the years of record was estimated to be close to zero. Also the net surficial aquifer storage was close to zero. However, yearly aquifer storage can change by as much as 2-3 inches/year. A water balance using average conditions for rainfall and evapotranspiration with assumptions of 2 inches/year wastewater flow, no net aquifer exchange, and no net storage change resulted in estimates of average yearly discharge at Chuluota. For natural conditions, the current average discharge is about 15 inches/year. It was about 14 inches/year with a wastewater input of 1 inch/year. For 20% and 40% developed directly connected impervious areas and no volume discharge controls, the average discharge is predicted to be about 22 and 30 inches/year respectively. Historically the yearly discharge has never exceeded about 22 inches/year.

The runoff volume can be controlled by reusing the stormwater within the watershed or by using other stormwater management methods to infiltrate stormwater into the surficial aquifer. Existing District permits show that there are currently reuse systems for irrigation purposes and for groundwater recharge. For a 20% directly connected impervious area, about 50% of the runoff water should be prevented from direct discharge by reuse or recharge. While a 40% directly connected area should reuse or recharge about 80% of the runoff water.

CHAPTER 1 INTRODUCTION

The Econlockhatchee River Basin, located in Orange, Osceola and Seminole counties, within the St. Johns River Water Management District, is undergoing the effects of rapid urbanization. Increases in directly connected impervious areas associated with urban areas may produce increased flood frequencies and pollution with reduction in the base flow. Thus, it is advisable to plan for possible water quantity and quality problems within the Basin.

1.1 PURPOSE AND SCOPE

The objectives of this work were to develop (1) historical statistical measures of hydrologic data, (2) a hydrologic balance for streamflow using both historical and projected watershed development, and (3) recommendations on maintenance of surficial aquifer water table levels and stormwater management for runoff discharge controls. Available historical hydrologic data were regional rainfall, streamflow, treated wastewater inputs, and limited amounts of evaporation, transpiration, and surficial aquifer levels. Since a limited amount of surficial aquifer level data were available, monitoring wells were constructed and the recorded water level fluctuations are reported.

1.2 LIMITATIONS

The report is limited to the use of hydrologic and water flow data for the Econlockhatchee River Basin. Two future land use plans identified by a percent directly connected impervious area and with and without a stormwater reuse plan are assumed.

CHAPTER 2 BASIN DESCRIPTION

2.1 THE RIVER

The Econlockhatchee River is located in the Central Florida Counties of Seminole, Orange and Osceola (see Figure 2.1). It is frequently referred to as two Rivers, namely the Big and Little Econlockhatchee. The Rivers flow from south to north with the Big Econlockhatchee headwaters in northern Osceola and southern Orange Counties while the Little Econlockhatchee headwaters are about 6 miles south of State Road 50 in Orange County and the City of Orlando. Both of the Rivers are blackwater streams at their origins. The confluence of the two Rivers is about 2 miles south-east of Oviedo. Northeast of Oviedo, the River turns to the east on its way to the St. John's River. The Econlockhatchee discharges into the St. John's River just south and upstream of Lake Harney. The River is the second largest tributary to the St. Johns River. The watershed area defined by the SJRWMD (1983) is about 270-280 square miles. The Big Econlockhatchee is about 38 miles long. The Little Econlockhatchee which is about 15 miles long drains 71 square miles (SJRWMD 1983). The most downstream gaging station, Chuluota at Snowhill, records drainage from about 241 square miles (USGS,1990). There are two other USGS long term maintained gaging stations; at Magnolia Ranch on the Big Econlockhatchee and on the Little Econlockhatchee at Union Park. The Big Econlockhatchee remains mostly in a natural state while the Little Econlockhatchee has been impacted by some channelization and dams (Browner, 1991).

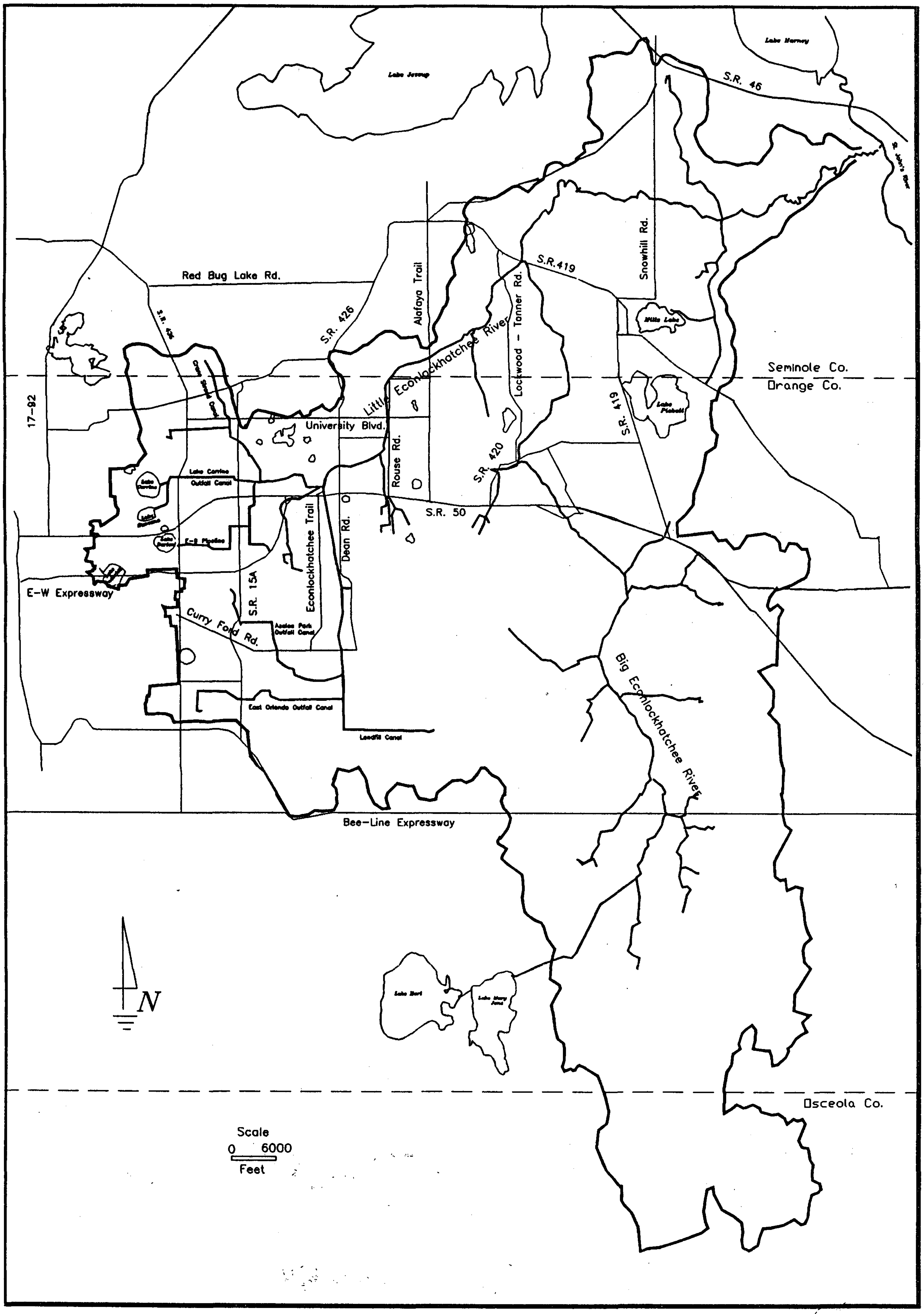


Figure 2.1 Vicinity Map for the Econlockhatchee River Basin

2.2 LAND USE

The Watershed is divided into four major land uses and the area in the three Counties is shown in Table 2.1. Within these land uses, the nonherbaceous (wooded) area is about 60%. The urban area is about 25% of the total. The Urban area is primarily in the Little Econlockhatchee Watershed, however in the later part of the 1980's the urban area of the Big Econlockhatchee has been increasing. Urban areas of the Watershed may cause flooding and water quality problems if the volume of runoff is not controlled because they have directly connected impervious areas leading from the watershed to the River or its tributaries. As the urban areas increase without stormwater runoff volume control, there may result higher volumes and rates of runoff into the River with lower base flow.

The Little Econlockhatchee River has been receiving urban area runoff for at least the last 15 years. To reduce flow rates on the Little Econlockhatchee, there are 13 major water control structures (Miller and Miller, 1984). However, at present, there are only a sparse number of flow volume limiting controls in the urban areas of the watershed for stormwater runoff.

The agricultural land use in the Watershed is about 13.72 % of the total and primarily within the Big Econlockhatchee. Range land for cattle make up a majority of the agricultural classification. In Osceola County, rangeland is 98% of the agricultural acres.

Table 2.1
Land Use in The Econlockhatchee River Basin[a]

Land Use	Area (acres)	Percentage
Urban		
Seminole	2563	1.47
Orange	39734	22.72
Osceola	0	0
Total	42297	24.19
Agricultural/Range		
Seminole	3475	1.99
Orange	11790	6.74
Osceola	8730	4.99
Total	23995	13.72
Wooded		
Seminole	17142	9.80
Orange	43601	24.93
Osceola	0	0
Total	60743	34.73
Wetlands/Water		
Seminole	8174	4.68
Orange	32190	18.41
Osceola	7473	4.27
Total	47837	27.36
Total area =	174,872 Acres 273.24 Square miles	17.9 % Seminole Co 72.8 % Orange Co. 9.3 % Osceola Co.

[a] adapted from Brown, et.al., 1990a

2.3 LAKES, WETLANDS, AND DEPRESSION AREAS

There exists within the watershed significant wetlands and water surfaces (about 27% of the area). There are at least 83 named lakes within the watershed (Brown, 1990b). The headwaters of the Rivers are primarily in wetlands or lakes. There are a number of small contiguous swamps. In the Little Econlockhatchee watershed, about 18% of 71 square miles is classified as wetlands

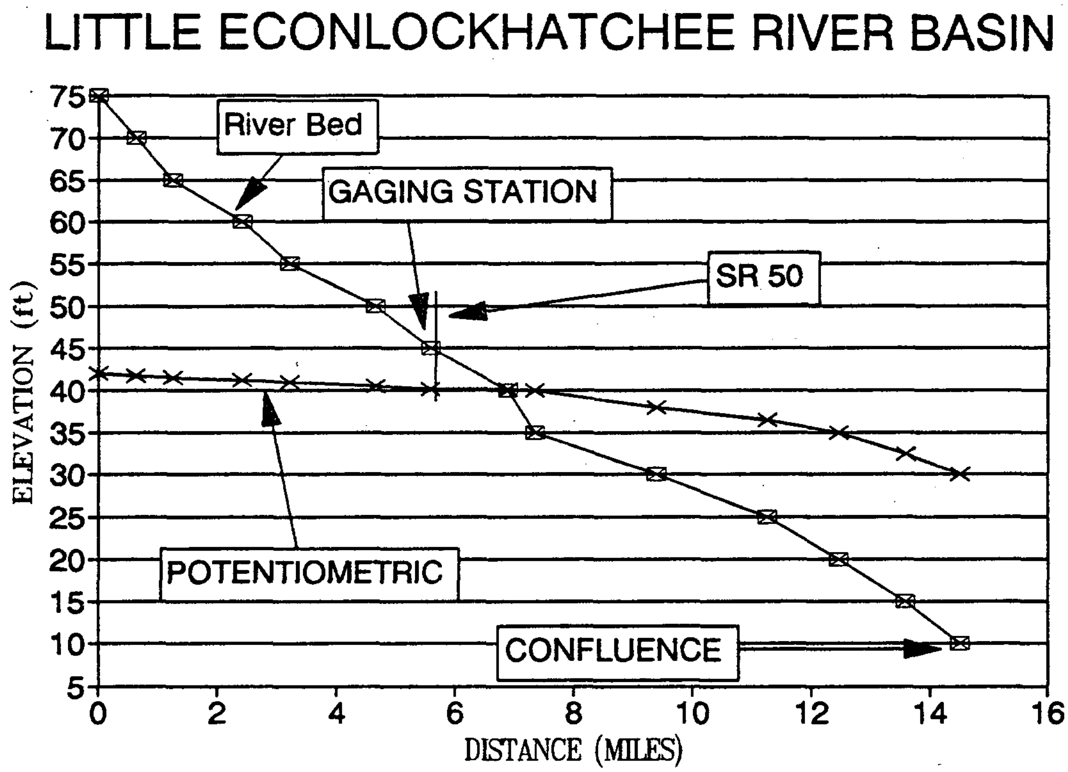
(Miller & Miller, 1984, page 4-3). The wetland areas of the Big Econlockhatchee are estimated at 31%. Due to the recent and projected urbanization within the Econlockhatchee Watershed, the wetlands most probably will decrease in size. However, major areas along the River most likely will exist in the future.

In addition to the wetlands and lakes, there is flat terrain in many locations with a few sinkholes in the eastern part of the watershed. Plus, there exists other depression storage areas. The combination of lake storage, depressional areas, flat terrain, and wetlands limit the volume and rate of runoff plus pollutants from reaching the River. As a rough estimate, there exists water and depressional storage areas on over 35% of the watershed. Both isolated and on-line lakes plus land depressions and wetlands occur throughout the Watershed.

2.4 GROUNDWATER INFILTRATION TO THE RIVER

Infiltration into the River can come from the surficial aquifer or from the deeper intermediate and Floridan aquifers into the surficial and then into the River. Infiltration from the deeper aquifer to the River may result when the potential pressure or actual groundwater levels are higher than the depth of water in the River. Significant groundwater pressures from deeper aquifers may exist to force the groundwater into the River. Since the River bed is at the low point in the topography of the land, it may be possible for the River to receive groundwater infiltration. A comparison of the confining aquifer pressure and the River bed elevation for the Little Econlockhatchee and the Econlockhatchee are shown in Figure 2.2 and Figure 2.3 respectively. If the confining layer pressure is below the River bed level and the confining layer is semi-porous, most likely any groundwater aquifer exchange will be from the surficial to the deeper aquifers. In the upstream areas of the River, the River bed is above the potentiometric deep aquifer pressure. However, from around State Road 50 to the St. John's River, the deeper aquifer pressure is above the River bed in both the Little and Big Econlockhatchee Rivers. At average flow conditions measured at Chuluota, the depth of flow is about 4-5 feet. At State Road 50, the average depth of flow is about 2-3 feet. Thus, there exists a potential for deeper aquifer water to move to the surficial aquifer and the River. The depth of water in the River must be considered when the potential is calculated. The majority of the River Basin below the confluence of the Little and Big Econlockhatchee Rivers has virtually no recharge to the deeper aquifers (Phelps, 1984). However, in higher elevations of the River Watershed around Geneva and eastern Orlando, recharge has been noted (Phelps, 1984). The reported observations by Phelps and Knockenmus are substantiated by the pressure versus River bed elevations of Figures 2.2 and 2.3.

The surficial water table is relatively close to the ground surface in parts of the watershed, but has been lowered by drainage structures (Tibbals, 1976). The surficial water table has been noted to vary between 0-20 feet of the ground surface and may be deeper in higher ground elevations (Knockenmus, 1975; Phelps and

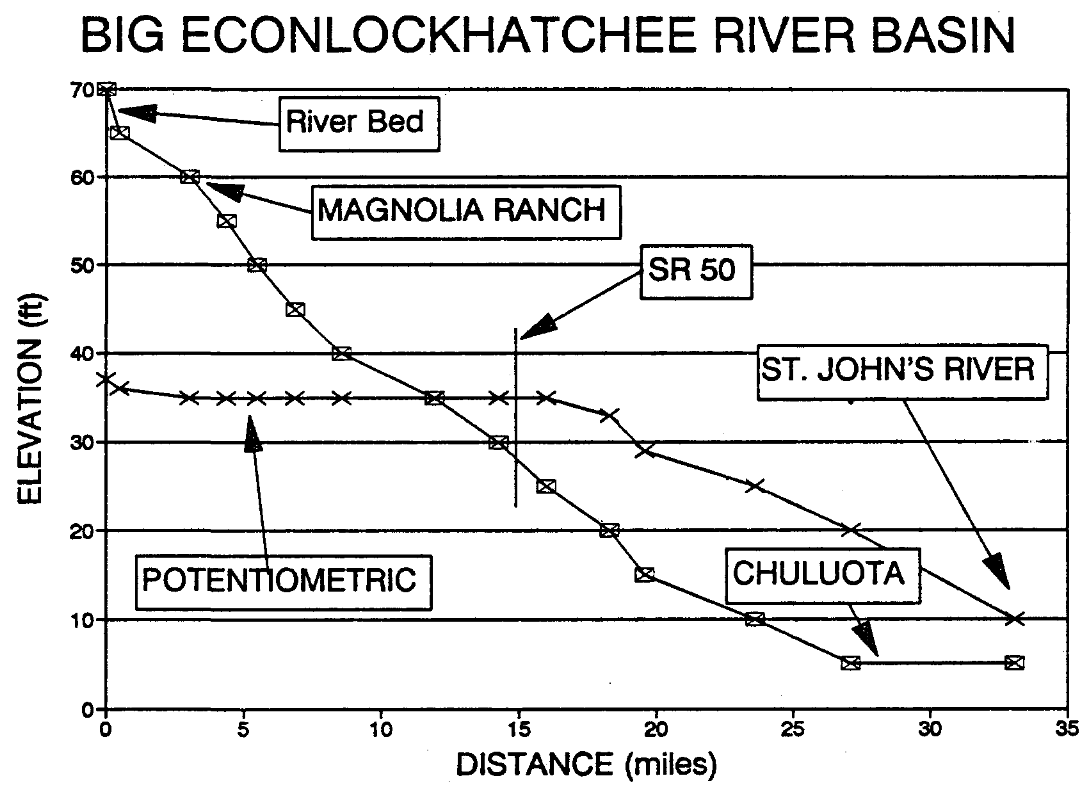


Potentiometric Data From Spechler, et. al. 1991

ENDING LOCATION --> CONFLUENCE WITH BIG ECONLOCKHATCHEE RIVER

Cumulative (miles)	RIVER BED ELEVATION (ft)	SLOPE %	POTENTIOMETRIC (ft)
0	75		42.0
0.65	70	0.2909	41.7
1.26	65	0.3132	41.5
2.42	60	0.1629	41.2
3.21	55	0.2395	40.9
4.65	50	0.1314	40.5
5.58	45	0.2036	40.2
6.88	40	0.1454	40.1
7.35	35	0.4072	40.0
9.40	30	0.0925	38.0
11.26	25	0.1018	36.5
12.47	20	0.1566	35.0
13.58	15	0.1697	32.5
14.51	10	0.2036	30.0

Figure 2.2 Little Econlockhatchee River Bed and Potentiometric Elevations vs. Distance



Potentiometric Data From Spechler, et. al. 1991

APPROXIMATE LOCATION	CUMULATIVE DISTANCE (miles)	RIVER BED ELEVATION (ft)	RIVER BED SLOPE %	POTENTIOMETRIC ELEVATION (ft)
	0.00	70		37
	0.50	65	0.19	36
Magnolia Ranch	3.00	60	0.04	35
	4.40	55	0.07	35
	5.50	50	0.09	35
	6.90	45	0.07	35
	8.60	40	0.06	35
	12.00	35	0.03	35
	14.30	30	0.04	35
S.R. 50	16.00	25	0.06	35
	18.30	20	0.04	33
	19.60	15	0.07	29
Chuluota	23.60	10	0.02	25
	27.10	5	0.03	20
St. Johns River	33.10	5	0.00	10

Figure 2.3 Big Econlockhatchee River Bed and Potentiometric Elevations vs. Distance

Rohrer, 1987). The surficial water table may drain into the River and Lakes within the Econlockhatchee watershed. The monitoring of the surficial aquifer wells and the water levels in the River in this work should provide data from which conclusions regarding surficial aquifer contributions to the River can be made.

2.5 TOPOGRAPHY

By most measures, the watershed is relatively flat ranging in elevation from about 5 feet to about 110 feet. The headwaters of the Big Econlockhatchee begin with an elevation of approximately 68 feet (SJRWMD, 1983) whereas the Little Econlockhatchee headwaters are at an elevation of about 85 feet. The surrounding land elevation at the headwaters ranges from a few feet to about 10-20 feet above the River Bed. At the confluence of the Little and Big Econlockhatchee the elevation is approximately 25 feet and falls to an elevation of 5 feet at the confluence with the St. John's River. See Figures 2.2 and 2.3 for profiles of the Rivers.

2.6 SOILS

In Southern Orange County the soil types consist of (USDA, 1989):

1. Smyrna-Basinger-St. Johns: Nearly level, poorly to very poorly drained soils that are sandy throughout.

In Northern Orange County the soil types consist of (USDA, 1989):

1. Smyrna-Pomello-Immokalee: Nearly level to gently sloping, poorly to moderately well drained soils that are sandy throughout.

In Seminole County the majority of the soils consist of (USDA, 1990):

1. Pompano-Nittaw-Basinger: Nearly level, poorly to very poorly drained mineral soils; some are sandy throughout, and some are mucky and have a clayey subsoil at a depth of about 10 inches or more; on the flood plains

2. Urban Land-Myakka-Eaugallie: Nearly level, poorly drained soils that are sandy throughout or have a loamy subsoil at a depth of about 40 inches or more; on the flatwoods.

3. Urban Land-Tavares-Millhopper: Nearly level to sloping areas of Urban land and moderately well drained soils that are sandy throughout or have a loamy subsoil at a depth of about 40 inches or more; on the uplands.

CHAPTER 3 HISTORICAL DATA ANALYSES

The purpose of this Chapter is to report on the availability of historical hydrologic data and to present statistical analyses based on the historical records. Comparisons to other hydrologic data within the District also are presented.

3.1 PRECIPITATION

Five rainfall stations are located within or near the Econlockhatchee watershed. These are as follows:

Table 3.1
Annual Average Precipitation with Location

Location	Annual Average	Period of Record
Bithlo + Christmas	51.92	1/1947 - 7/1991
Orlando (2 sites)	49.86	1/1952 - 4/1991
Sanford	51.21	1/1913 - 5/1991
Tosohatchee	45.49	1981 - 1990
Lake Harney at SR46	NA	1990 -

The average annual precipitation recorded for the Econlockhatchee watershed is calculated using the three closest stations with long term records using the formula:

$$P_{avg.} = \frac{P_1 + P_2 + P_3}{3} \qquad (3.1)$$

where: P_1 = Orlando station

P_2 = Bithlo station

P_3 = Sanford station

The Bithlo station is located within the Econlockhatchee watershed while the Orlando station is located near the southwestern boundary and the Sanford station is located near the northwestern boundary. The Tosohatchee station is located near the southeastern boundary of the watershed, but has data for only the last 10 years. Since the Orlando WSO McCoy station was replaced by the Orlando WSO AP station, these two records are considered as one. Also, the Bithlo station replaced the Christmas station, therefore they were also combined as one.

The average rainfall recorded at the stations do not exactly agree. This is assumed to be partly a function of the difference in the years of record or the variability of rainfall over time and the spatial variations of rainfall. Spatial variability may not be significant. To support this claim, the average annual rainfall for the time period 1947 - 1987 (years of record and reports at Bithlo) for the Orlando station was calculated as 50.16 inches per year. This compares with the Bithlo and the Sanford averages which are 51.92 and 51.61 inches per year for the same time period respectively. There is no statistical difference between average yearly rainfall recorded at Bithlo, Sanford, and Orlando at the .01 level of significance. Table 3.2 presents the yearly data with station averages and standard deviations. The yearly rainfall for the Econlockhatchee that will be used in further analyses in this report is rounded to 51 inches.

TABLE 3.2

Yearly Rainfall Data

YEAR	SANFORD	ORLANDO	BITHLO	AVERAGE
1947	67.38	63.00	60.23	63.54
1948	52.69	54.48	56.93	54.70
1949	53.40	44.28	53.89	50.52
1950	54.86	55.93	45.02	51.94
1951	54.91	57.92	50.48	54.44
1952	47.11	41.80	54.64	47.85
1953	74.06	65.85	65.39	68.43
1954	5.57	47.97	43.92	45.82
1955	53.05	42.26	44.20	46.50
1956	42.48	43.91	43.15	43.18
1957	54.81	50.93	54.21	53.32
1958	59.53	51.20	50.36	53.70
1959	62.28	63.77	61.30	62.45
1960	62.88	68.74	73.04	68.22
1961	37.41	41.78	47.58	42.26
1962	34.84	50.35	44.19	43.13
1963	51.72	45.28	61.77	52.92
1964	57.89	54.39	62.74	58.34
1965	48.80	47.40	50.34	48.85
1966	53.14	55.29	58.43	55.62
1967	41.97	40.91	49.34	44.07
1968	50.56	52.10	62.92	55.19
1969	51.19	55.18	55.24	53.87
1970	45.88	43.96	36.43	42.09
1971	48.72	40.09	52.92	47.24
1972	63.82	51.35	47.46	54.21

TABLE 3.2 (continued)				
1973	51.15	55.37	50.34	52.29
1974	45.31	44.38	54.20	47.96
1975	50.93	47.04	45.55	47.84
1976	45.68	47.08	53.47	48.74
1977	45.60	38.12	45.48	43.07
1978	51.07	50.59	48.76	50.14
1979	53.13	50.23	52.04	51.80
1980	48.41	41.21	39.73	43.12
1981	42.67	47.10	43.02	44.26
1982	61.56	51.61	55.88	56.35
1983	62.85	55.52	68.27	62.21
1984	47.71	44.44	49.05	47.07
1985	48.75	47.19	57.37	51.10
1986	43.90	49.83	41.36	45.03
1987	46.23	56.79	38.16	47.06
MEAN	51.61	50.16	51.92	51.23
STD Deviation	7.95	7.15	8.22	6.74

3.1.1 Dry vs Wet Season Statistics

A comparison to other stations within the District on a long term basis was also completed to illustrate similarities and differences among the stations in terms of yearly and seasonal (wet and dry) statistics. The wet season as defined by the District is during the months June through October, while the dry season is considered the months of November through May. The data are presented in Appendix A. A statistical summary is shown in Table 3.3. The statistics for each station are very close to one another which may indicate some common rules and regulations based on these statistics. On the average, the wet season rainfall in 5 months is about 60% (29.53 inches) of the total yearly, while the dry season rainfall is about 40% (19.54 inches) of the yearly in 7 months. The same conclusion on wet and dry season rainfall volumes was obtained by Rao (Rao, et.al., 1990), who also reports on the spatial variability within the District. The wet season rainfall should produce more stream flow in the Econlockhatchee relative to the dry season rainfall primarily because of the higher rainfall volume in a shorter time period (five months versus seven months for the dry season).

Table 3.3
Yearly, Wet Season, and Dry Season Precipitation Statistics for Long Term Measuring Stations in the District
(inches per time period)

Location	Years	Yearly		Wet Season		Dry Season	
		Mean	SD	Mean	SD	Mean	SD
Daytona	68	47.75	9.98	29.00	7.70	18.75	6.37
Gainesville	94	50.88	8.60	29.36	6.30	21.52	6.20
Jacksonville	124	51.57	9.49	30.82	7.59	20.75	6.08
Lisbon	110	47.72	7.24	28.40	6.44	19.32	5.68
Marineland	49	47.09	9.20	27.36	7.72	19.74	5.90
Melbourne	52	47.84	9.07	29.25	7.59	18.59	5.85
Orlando	99	50.64	8.06	32.52	6.37	18.12	5.38
Average[a]	85	49.07	8.81	29.53	7.1	19.54	5.92

[a] Average of data from the seven stations

3.1.2 Statistical Predictions

The data were placed into three files for statistical analyses, namely a yearly file, a wet season file, and a dry season file. An empirical distribution was developed of a less than or equal to type for each file. Six theoretical distributions were fit to the empirical ones. The six distributions were:

Normal Distribution

$$P(x) = \frac{1}{\sigma\sqrt{2\pi}} e^{-\frac{(x-\mu)^2}{2\sigma^2}} \tag{3.2}$$

where,

x = variable value
μ = population mean
σ = standard deviation

Log Normal Distribution

$$P(x) = \frac{1}{x\sigma\sqrt{2\pi}} e^{-\frac{[\ln x - \mu]^2}{2\sigma^2}} \tag{3.3}$$

where,

x = variable value
μ = population mean
σ = standard deviation

3-Parameter Log Normal Distribution

$$P(x) = \frac{1}{(x-a)\sigma\sqrt{2\pi}} e^{-\frac{[\ln(x-a)-\mu]^2}{2\sigma^2}} \tag{3.4}$$

where,

x = variable value
a = lower boundary
μ = population mean
σ = standard deviation

Gumbel Distribution

$$P(x) = \alpha e^{[-\alpha(x-\beta)-e^{-\alpha(x-\beta)}]} \tag{3.5}$$

where,

x = variable value
β = measure of central tendency
α = concentration parameter

Pearson Type III Distribution

$$P(x) = \frac{1}{\alpha\Gamma(\beta)}\left[\frac{x-\gamma}{\alpha}\right]^{\beta-1} e^{-[\frac{x-\gamma}{\alpha}]} \tag{3.6}$$

where,

μ = sample mean
σ = standard deviation
γ = coefficient of skew
β = shape parameter
α = scale parameter
$\Gamma(\beta)$ = gamma function

U.S.W.R.C. Log Pearson Type III Distribution

$$P(x) = \frac{1}{\alpha x\Gamma(\beta)}\left[\frac{\ln x - \gamma}{\alpha}\right]^{\beta - 1} e^{-[\frac{\ln x - \gamma}{\alpha}]} \tag{3.7}$$

where,

α = scale parameter
β = shape parameter
γ = location parameter
x = variable
$\Gamma(\beta)$ = gamma function

The parameters of the distributions were estimated using the algorithms developed by Kite (1985). Standard statistical tests for goodness of fit were applied for each theoretical distribution. The yearly graphs are shown in Appendix B, the wet season are in Appendix C, and the dry season are in Appendix D. The graphs display the goodness of fit, and in many cases the theoretical distributions fit very well and it is difficult to distinguish between the best fit by graphical visual comparisons. Thus, the theoretical distribution was considered to be the best fit to the empirical one using both statistical tests for goodness of fit and graphical observation. The results of the statistical tests with their ranking and the graphical rankings are shown in Tables A.9 - A.16. The statistical tests are objective in nature while the graphical observation is subjective and was based on the extremes of the distribution. The number of times the theoretical distribution was judged best by both the statistical test and by graphical observation are shown in Table 3.4.

Table 3.4

Number of Times Distribution Ranked Best (#1)
Using all Statistical Tests and Graphics for Goodness of Fit

Normal	26
Log-Normal	28
3 Parameter Log Normal	63
Gumbel	20
Pearson Type III	29
USWRC Log Pearson	46

Frequently, both the statistical test and the graphical comparison ranked the same distribution as best judged by how well the extremes of the empirical were fit by the theoretical. However, the same distribution was not judged the best for all sites or there was very little difference between the rankings. Nevertheless, for consistency in using the same distribution and based on the comparison Table 3.4, the 3-parameter log normal distribution computed by the maximum likelihood procedure when it converged was used to predict both flood and drought conditions on a yearly, wet season, and a dry season basis. The maximum likelihood method did not converge for the Gainesville and Orlando dry season data, therefore, predictions were based on the 3-parameter log normal direct method using the method of moments. Both methods were compared to each other and they produced very similar predictions for all of the data. For example, using yearly data at Orlando for the 100 year return period the maximum likelihood method yields 70.13 inches which compares favorably with the direct method of moments which yields 70.21 inches. Therefore, minimum loss of accuracy is obtained using the direct method. The results are shown in Tables 3.5 - 3.7.

The empirical and theoretical frequency distributions for yearly, wet season, and dry season, plus the predictors in Tables 3.5 - 3.7 can provide a basis for future rainfall comparisons, and are almost identical to the results presented by Rao (1990) using the method of mixed moments. Also available are the percentage of the yearly rainfall within the wet and dry seasons which are again very close to those presented by Rao (1990).

Table 3.5
Yearly Rainfall (inches) Prediction Based on the 3-Parameter Log Normal Distribution

FLOOD CONDITIONS

Location	Return Period (years)					
	2	5	10	25	50	100
Daytona Beach	46.35	55.52	61.30	68.33	73.40	78.37
Gainesville	50.54	58.03	62.16	66.73	69.78	72.58
Jacksonville	51.15	59.42	64.00	69.08	72.48	75.61
Lisbon	47.17	53.62	57.35	61.62	64.55	67.30
Marineland	46.33	54.60	59.42	64.98	68.81	72.43
Melbourne	46.94	55.12	59.99	65.69	69.66	73.45
Orlando	50.50	57.51	61.22	65.20	67.79	70.13
Vero Beach	50.31	60.34	66.49	73.84	79.06	84.11
Average	48.66	56.77	61.49	66.93	70.69	74.25
Std Deviation	2.13	2.41	2.82	3.60	4.34	5.18

Drought Conditions

Location	Return Period (years)					
	2	5	10	25	50	100
Daytona Beach	46.35	39.17	36.06	33.16	31.48	30.10
Gainesville	50.54	43.54	40.06	36.49	34.25	32.29
Jacksonville	51.15	43.48	39.69	35.81	33.39	31.27
Lisbon	47.17	41.51	38.83	36.17	34.55	33.16
Marineland	46.33	39.16	35.80	32.48	30.48	28.76
Melbourne	46.94	40.05	36.89	33.82	31.98	30.43
Orlando	50.50	43.59	40.01	36.23	33.80	31.63
Vero Beach	50.31	42.19	38.57	35.13	33.12	31.43
Average	48.66	41.59	38.24	34.91	32.88	31.13
Std Deviation	2.13	1.92	1.75	1.55	1.43	1.36

Table 3.6
Wet Season Rainfall Predictions (inches)
Based on the 3-Parameter Log Normal Distribution

FLOOD CONDITIONS

Location	Return Period (years)					
	2	5	10	25	50	100
Daytona Beach	27.94	34.99	39.41	44.77	48.63	52.40
Gainesville[a]	29.34	34.68	37.50	40.51	42.46	44.22
Jacksonville	30.45	37.09	40.80	44.93	47.70	50.26
Lisbon	27.93	33.66	36.95	40.71	43.27	45.68
Marineland	27.05	33.82	37.54	41.67	44.41	46.94
Melbourne	28.66	35.47	39.42	43.93	47.03	49.95
Orlando[a]	32.49	37.90	40.73	43.77	45.73	47.50
Vero Beach	31.98	38.44	41.90	45.65	48.11	50.34
Average	29.48	35.76	39.28	43.24	45.92	48.41
Std Deviation	1.99	1.83	1.81	2.00	2.33	2.76

DROUGHT CONDITIONS

Location	Return Period (years)					
	2	5	10	25	50	100
Daytona Beach	27.94	22.40	19.99	17.73	16.42	15.34
Gainesville[a]	29.34	24.03	21.27	18.34	16.46	14.77
Jacksonville	30.45	24.34	21.34	18.28	16.38	14.72
Lisbon	27.93	22.88	20.47	18.07	16.61	15.35
Marineland	27.05	20.72	17.58	14.35	12.33	10.56
Melbourne	28.66	22.69	19.87	17.08	15.38	13.92
Orlando[a]	32.49	27.12	24.33	21.35	19.44	17.72
Vero Beach	31.98	25.73	22.54	19.20	17.07	15.18
Average	29.48	23.74	20.92	18.05	16.26	14.70
Std Deviation	1.99	2.02	2.00	1.97	1.97	2.00

[a] Predictions based on the 3-Parameter Log Normal Direct Method

Table 3.7
Dry Season Rainfall Prediction (inches) Based on the 3-Parameter Log Normal Distribution

FLOOD CONDITIONS

Location	Return Period (years)					
	2	5	10	25	50	100
Daytona Beach	17.90	23.74	27.38	31.79	34.96	38.04
Gainesville	20.96	26.53	29.80	33.60	36.23	38.72
Jacksonville	20.17	25.60	28.81	32.55	35.15	37.62
Lisbon	18.87	23.94	26.89	30.26	32.59	34.78
Marineland	18.61	24.19	27.96	32.81	36.47	40.17
Melbourne	18.41	23.51	26.28	29.32	31.33	33.17
Orlando	17.80	22.56	25.26	28.29	30.35	32.26
Vero Beach	18.43	24.65	28.68	33.68	37.36	41.00
Average	18.89	24.34	27.63	31.54	34.31	36.97
Std Deviation	1.11	1.25	1.48	2.02	2.57	3.22

DROUGHT CONDITIONS

Location	Return Period (years)					
	2	5	10	25	50	100
Daytona Beach	17.90	13.28	11.26	9.36	8.26	7.35
Gainesville	20.96	16.19	13.98	11.80	10.50	9.38
Jacksonville	20.17	15.56	13.42	11.34	10.09	9.02
Lisbon	18.87	14.44	12.36	10.29	9.04	7.96
Marineland	18.61	14.65	13.06	11.65	10.87	10.25
Melbourne	18.41	13.58	11.14	8.62	7.03	5.63
Orlando	17.80	13.49	11.41	8.30	8.00	6.88
Vero Beach	18.43	13.74	11.77	9.96	8.94	8.11
Average	18.89	14.37	12.30	10.29	9.09	8.07
Std Deviation	1.11	1.06	1.08	1.19	1.33	1.48

3.2 WASTEWATER INPUTS

The effluent from wastewater treatment plants discharging within the boundaries of the watershed are inputs to the River. The origin of most if not all wastewater effluent is the Floridan aquifer through potable water treatment plants via homes and businesses. The major wastewater inputs to the River System are from the Orange County easterly plant to Big Econlockhatchee and the Iron Bridge facility to Little Econlockhatchee (FDER, 1992).

Table 3.8
Actual Operating Records Orange County Easterly Effluent to River

DATE	FLOW (MGD)	FLOW (IN/YR)[a]	PERMITTED FLOW (MGD)
1988	4.70	.410	13.50
1989	5.35	.467	13.50
1990	5.63	.491	13.50
1991	6.43	.561	13.50

Table 3.9
Actual Operating Records Iron Bridge Effluent to River

DATE	FLOW (MGD)	FLOW (IN/YR)[a]	PERMITTED FLOW (MGD)[b]
1983	19.02	1.66	24.00
1984	21.89	1.91	24.00
1985	24.58	2.14	24.00
1986	24.06	2.09	24.00
1987	20.84	1.82	24.00
1988	11.21	.98	24.00
1989	8.23	.72	24.00
1990	8.84	.77	24.00

[a] As calculated using the Chuluota gaging station watershed area of 241 sq. miles.
[b] Total with up to 12 MGD currently permitted to the River.

The permitted wastewater flow rates to the River are (FDER, 1992):

Orange County Easterly	13.50 MGD
Iron Bridge	12.00 MGD
Park Manor	.38 MGD
University Shores #1	.25 MGD
University Shores #2	.10 MGD

These flow rates can be converted to inches per year over the watershed as shown in Tables 3.8 and 3.9. Since the flow at Chuluota is usually in the range of 10-20 inches/year, the wastewater flow is about 10-20% of the total. The current total wastewater input to the River is primarily from the Iron Bridge and Orange County easterly plants. Once these flows are converted to (in/yr) the values of the other inputs, namely; Park Manor, Univ. Shores #1 and Univ. Shores #2 are negligible.

The future growth in wastewater discharges in the watershed was assessed and reported as shown in Table 3.10 for the year 2000 (Fitzgerald, 1988). No distinction among points of river discharge, wetland discharge, and other reuse options were made.

Table 3.10
Future Wastewater Flow Estimates

Orange County	50 MGD to Big Econlockhatchee
Orlando Iron Bridge	52 MGD to Little Econlockhatchee
Conserv I	30 MGD to Big Econlockhatchee
Total to River	132 MGD

The total of 132 MGD or 11.5 inches of discharge at the Chuluota gage is very significant and may affect the flooding and pollution of the Econlockhatchee River and the St John's River. However, the authors of this report believe that these predictions are very high and most likely will not be realized given the current regulatory constraints within the watershed.

3.3 STREAM FLOW

Three USGS gaging stations are located on the River, namely: Chuluota at Snowhill, Magnolia Ranch and Union Park. The most downstream gaging station is located at Chuluota about 10 miles upstream from the point of intersection with the St. Johns River. The average yearly discharge at Chuluota for the 55 years of record was 14.79 inches (1.09 cfs/mi^2) with a maximum of 40.92 inches (3.01 cfs/mi^2). At Magnolia Ranch, the average yearly discharge was 9.52 inches (0.70 cfs/mi^2), while at Union Park the average yearly discharge was 13.07 inches (0.96 cfs/mi^2). For the period of record, the average daily discharge at Chuluota, Magnolia Ranch, and Union Park were approximately 263 cfs, 24.2 cfs, and 25.6 cfs respectively. The average of maximum daily discharge for each year at Chuluota, Magnolia Ranch, and Union Park were 3078.72 cfs, 184.94 cfs, and 398.80 cfs respectively. Using a log-normal distribution to predict maximum daily stream flow in any year, the values for different return periods are shown in Table 3.11.

The yearly flow volume at Chuluota and at Union Park compared to Magnolia Ranch per watershed acre is less at Magnolia Ranch. The Magnolia Ranch watershed is not in Urban development and presumably more of the rainfall remains in depression areas and infiltrates into the surficial aquifer or evaporates. A plot of

Table 3.11
Maximum Daily Stream Flow (cfs) Predictions
for Any Year Based on the Log-Normal Distribution

Flood Conditions

	Return Period					
Location	2	5	10	25	50	100
Chuluota	2,458	4,323	5,809	7,959	9,753	11,710
Magnolia Ranch	153	257	337	452	545	646
Union Park	315	562	732	976	1,293	1,560

Drought Conditions

	Return Period					
Location	2	5	10	25	50	100
Chuluota	2,458	1,398	1,040	759	619	516
Magnolia Ranch	153	91	69	52	43	36
Union Park	315	177	130	94	77	64

yearly cumulative flows on Figure 3.1 over a 15 year period shows 214 inches of discharge measured at both Chuluota and Union Park and only 150 inches at Magnolia Ranch. The average difference is about 4.25 inches per year. In a 12 year period, the cumulative difference is about equivalent to one year of average rainfall (51 inches). The divergence may result from differences in depression storage, surficial aquifer recharge or discharge, and directly connected impervious area. The Magnolia Ranch area is not developed and contains a minimum of directly connected imperious area. Discharge from the aquifer to the River has a greater potential at Chuluota. However, Union Park has a near equal volume of discharge, presumably because a greater fraction of the watershed is impervious.

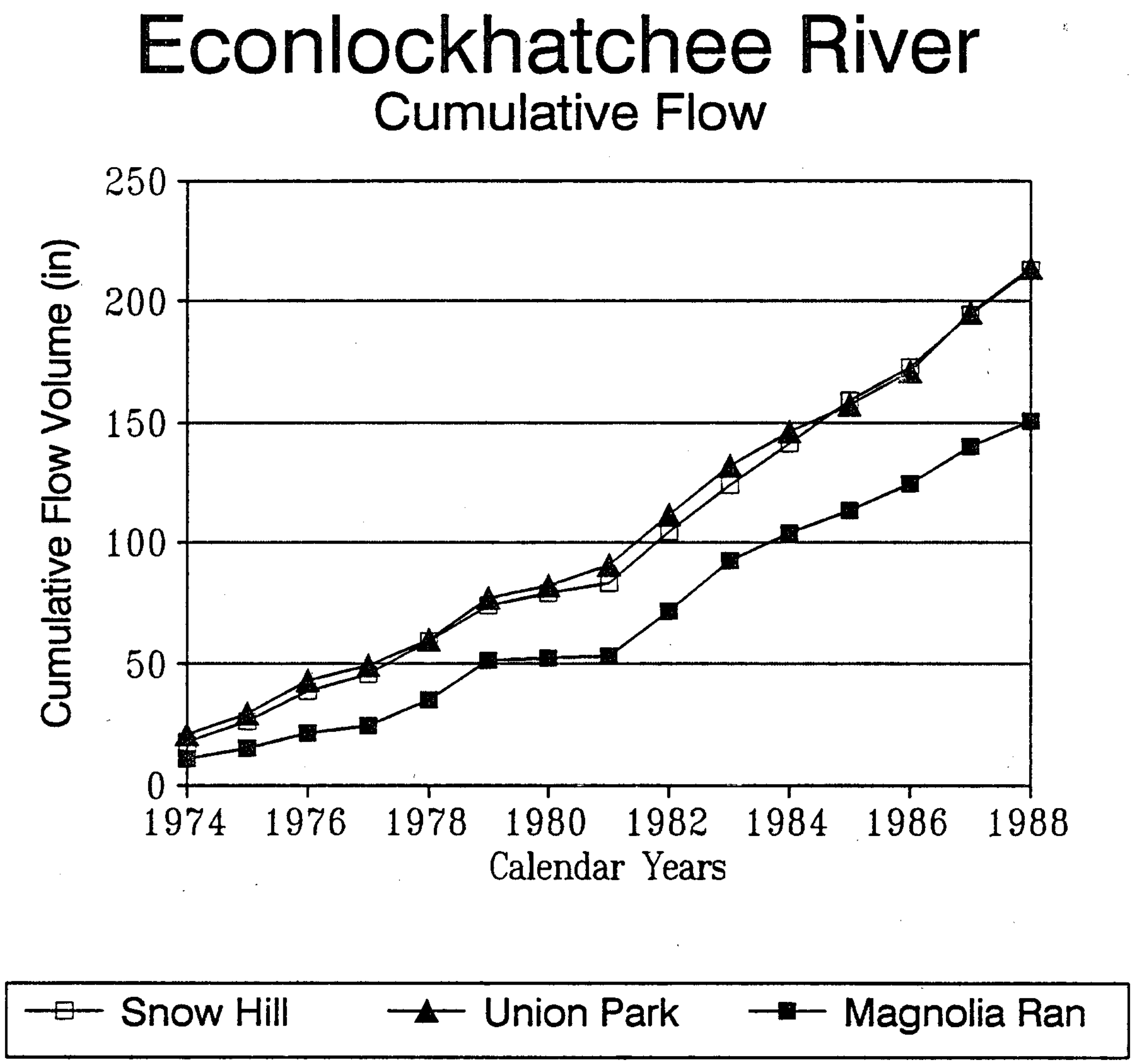


Figure 3.1 Comparisons of Cumulative Flows as Measured at Snow Hill @ Chuluota, Union Park, and Magnolia Ranch

3.3.1 Statistical Predictions

Empirical probability distributions were developed using daily, yearly, wet, and dry season streamflow data. Six theoretical distributions were fit to empirical distributions to determine the "best" fit. The procedures for developing the best fit distribution to the empirical one was developed by Kite (1985). The empirical distribution was developed using the Weibull plot position formula. A 3-Parameter log-normal was chosen to predict maximum yearly flow and a log-normal was chosen for the maximum daily flow.

Shown in Tables 3.12, 3.13, and 3.14, are predicted stream flow, in inches over the watershed area for given return period.

Table 3.12
Yearly Streamflow (inches) Prediction Based on the 3-Parameter Log Normal Distribution

Flood Conditions

Location	Return Period					
	2	5	10	25	50	100
Chuluota	13.43	19.75	24.08	29.70	33.98	38.33
Magnolia Ranch	9.13	14.33	17.32	20.72	23.04	25.21
Union Park	12.30	17.73	21.12	25.22	28.17	31.04

Drought Conditions

Location	Return Period					
	2	5	10	25	50	100
Chuluota	13.43	9.04	7.30	5.77	4.94	4.27
Magnolia Ranch	9.13	4.51	2.31	.12	0	0
Union Park	12.30	8.00	6.12	4.36	3.34	2.49

Table 3.13
Wet Season Streamflow (inches) Prediction Based on the 3-Parameter Log Normal Distribution[a]

Flood Conditions

Location	Return Period					
	2	5	10	25	50	100
Chuluota	8.65	13.45	16.70	20.87	24.02	27.21
Union Park	7.21	11.07	13.46	16.34	18.40	20.40

Drought Conditions

Location	Return Period					
	2	5	10	25	50	100
Chuluota	8.65	5.25	3.88	2.68	2.01	1.48
Union Park	7.21	4.13	2.77	1.49	.74	.12

[a]) The data set for Magnolia Ranch was for 18 years and was judged to be too short a period of time to base predictions on separating streamflow between the wet and dry seasons. This is believed to be the result of the flows being distributed between the wet and dry seasons because of long holding times in the wetland systems.

Table 3.14
Dry Season Streamflow (inches) Prediction Based on the 3-Parameter Log Normal Distribution[a]

Flood Conditions

Location	Return Period					
	2	5	10	25	50	100
Chuluota	3.85	7.36	10.59	15.78	20.51	26.02
Union Park	4.59	7.61	9.79	12.73	15.04	17.45

Drought Conditions

Location	Return Period					
	2	5	10	25	50	100
Chuluota	3.85	2.21	1.74	1.40	1.25	1.15
Union Park	4.59	2.64	1.90	1.29	.96	.70

[a]) The data set for Magnolia Ranch was for 18 years and was judged to be too short a period of time to base predictions on separating streamflow between the wet and dry seasons. This is believed to be the result of the flows being distributed between the wet and dry seasons because of long holding times in the wetland systems.

3.3.2 ATTENUATION FACTORS

Attenuation factors were estimated for the three stream gaging sites in the Econlockhatchee River. Daily stream flow records were plotted versus time. Hydrograph selections were made from the complete data record based on the occurrence of a single peak for both high and low flow conditions. The following equations were used to compute the attenuation factor given the time to peak and the recession time (Wanielista, 1990).

$$t_f = xt_p \tag{3.8}$$

where, t_f = falling limb time (same units as t_p)

t_p = time to peak, and

$$x = \left(\frac{2}{K}\right) - 1 \tag{3.9}$$

where, K = peak attenuation factor and area is in Acres.

The resulting streamflow hydrographs used in the analysis are shown in Appendix E and typical ones are shown for each site in Figures 3.2-3.4. A summary of estimated attenuation factors is shown in Table 3.15. The attenuation factors at Magnolia Ranch and Union Park site are essentially the same, namely the commonly used 256 (actual average values of 268 and 264). However, the Chuluota site is about 484 (an average of 507) with the area measured in square miles, which is equivalent to .787 with the area measured in acres. These factors suggest the Magnolia Ranch and Union Park sites provide significantly more storage in the River and longer times of concentration than does the Chuluota site.

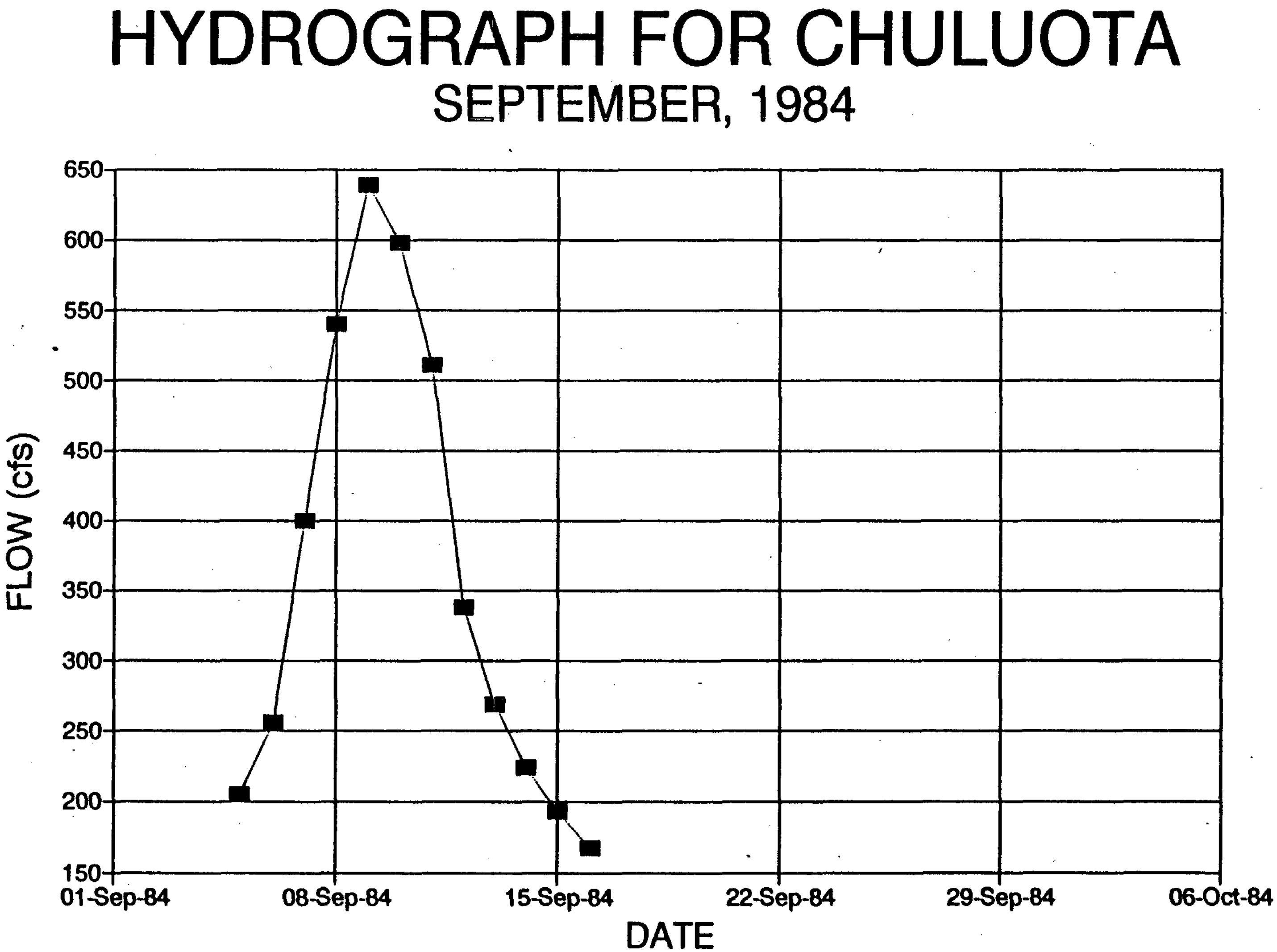


Figure 3.2 Typical Hydrograph Used For Estimating Attenuation at Chuluota

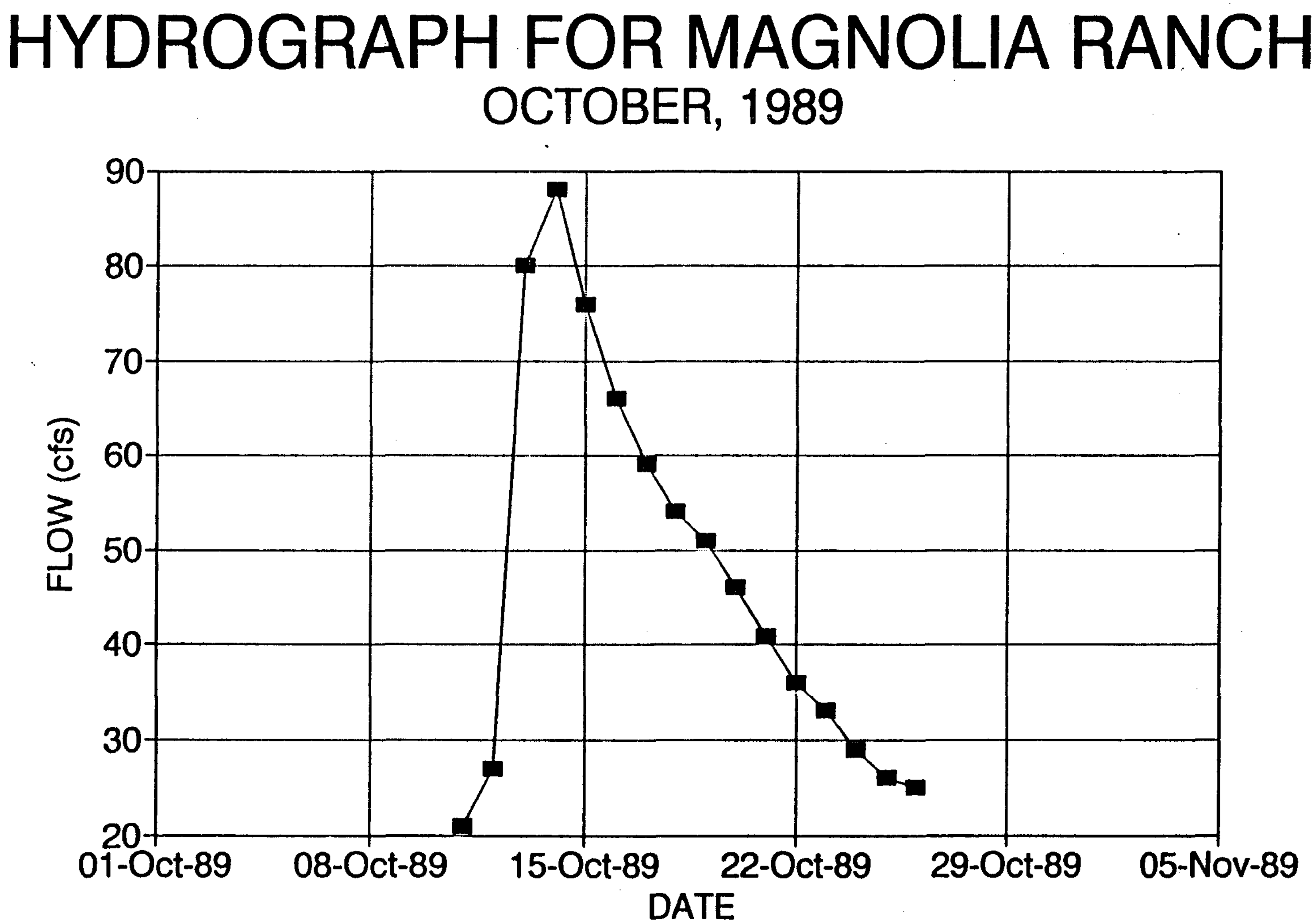


Figure 3.3 Typical Hydrograph Used For Estimating Attenuation at Magnolia Ranch

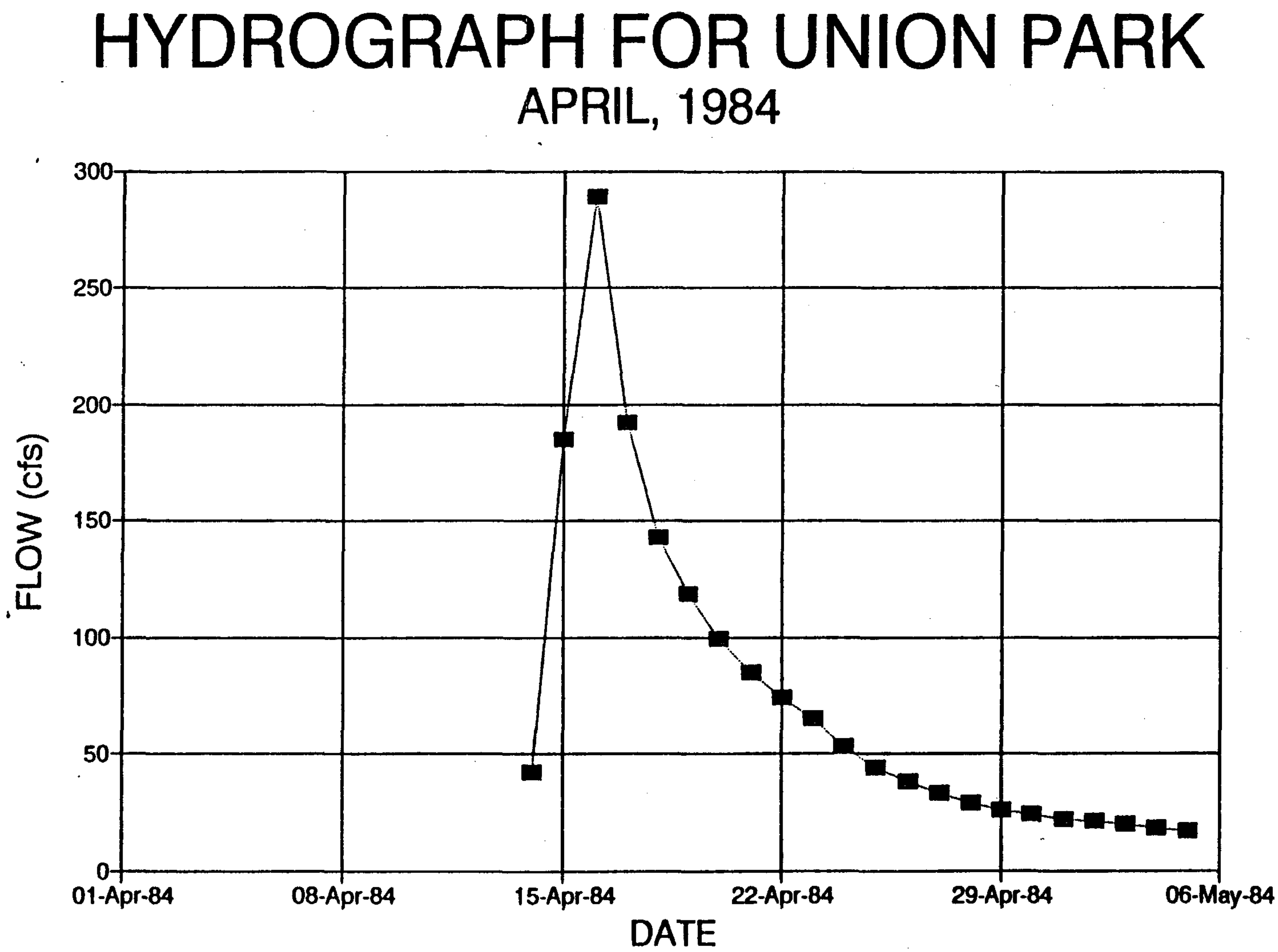


Figure 3.4 Typical Hydrograph Used For Estimating Attenuation at Union Park

TABLE 3.15 HYDROGRAPH ATTENUATION FACTORS (K)

DATE	CHULUOTA			UNION PARK			MAGNOLIA RANCH		
	K		Peak Flow	K		Peak Flow	K		Peak Flow
	sq. miles	acres	(cfs)	sq. miles	acres	(cfs)	sq. miles	acres	(cfs)
Sep 1981	553	0.857	464	286	0.444	170	286	0.444	17
Apr 1982	337	0.522	1370						
Dec 1982	430	0.667	143						
Apr 1983	537	0.833	1125						
Oct 1983 - Nov 1983							242	0.375	62
Apr 1984				235	0.364	290			
Sep 1984	516	0.800	640						
Mar 1987 - Apr 1987							221	0.343	360
Oct 1987				388	0.601	145			
Feb 1988	645	1.000	270						
Oct 1989	645	1.000	285	215	0.333	53	258	0.400	89
Dec 1989 - Jan 1990	397	0.615	770	215	0.333	77	312	0.483	87
AVERAGE	507	0.787		268	0.415		264	0.409	

NOTES

(1) Attenuation Factors (K) should be used for Econlockhatchee River hydrologic modeling and should not be used for small watersheds in the Basin.

(2) Attenuation Factors are given for cases when the units for measurement of watershed area is in acres or square miles.

Example problem:

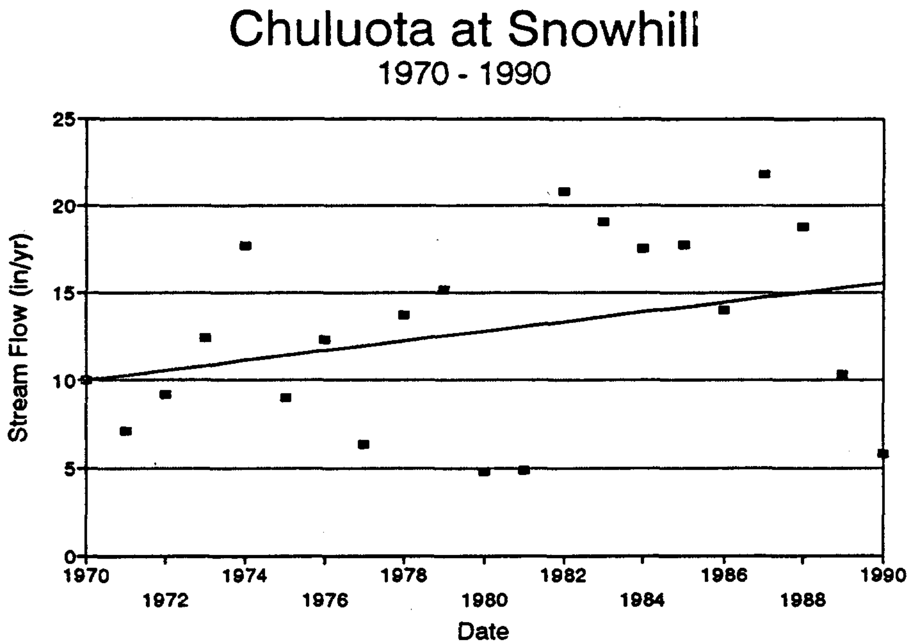
Given: Intensity = 1 in/hr
Area = 640 Acres = 1 square mile

Find: Qp = KiA at Union Park
for Area in acres
Qp = (0.415)(1)(640) = 266 cfs
for Area in square miles
Qp = (268)(1)(1) = 268 cfs

3.3.3 STREAM FLOW TRENDS

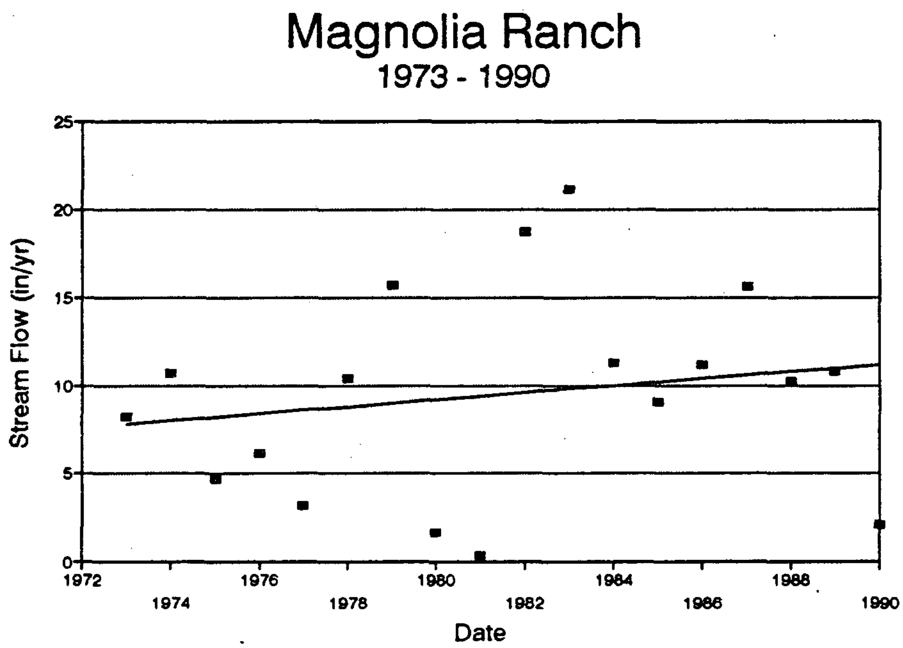
The volume of stream flow on a yearly basis may be changing with time, and the existence of stream flow trends (increasing or decreasing) over the years may be the result of rainfall or land use changes. Expanding development may increase groundwater and runoff flow into the River if stormwater volume is not controlled. A lowering of the water table by ditching or other means without volume control will drain groundwater at a faster rate into the River. Also, directly connected impervious areas will transport greater volumes of runoff to the River relative to on-site volume controls. In the rural environment, the conversion of woodland areas to pasture may affect the volume of flow in the River.

To demonstrate the existence of trend lines in flow data, the yearly stream flow data in inches per year were graphed versus time. These graphs are shown in Figures 3.5, 3.6, and 3.7. For all three locations, the stream flow trend showed an increase with time. The Chuluota and Union Park sites have exactly the same rate of increase, calculated as 0.28 inches/year. The Magnolia Ranch site shows an increase that is lower at 0.20 inches/year. The time series of rainfall shown in Figure 3.8 displays no change with an average yearly rainfall of about 47 inches or 4 inches less than the record average. At all three flow measuring sites, the trend (slope of the line) is significantly different than zero at the 0.01 level of significance as measured by the "t" statistic, while the rainfall trend is not significantly different than zero. For the past 21 years, yearly stream flow volume has been increasing.



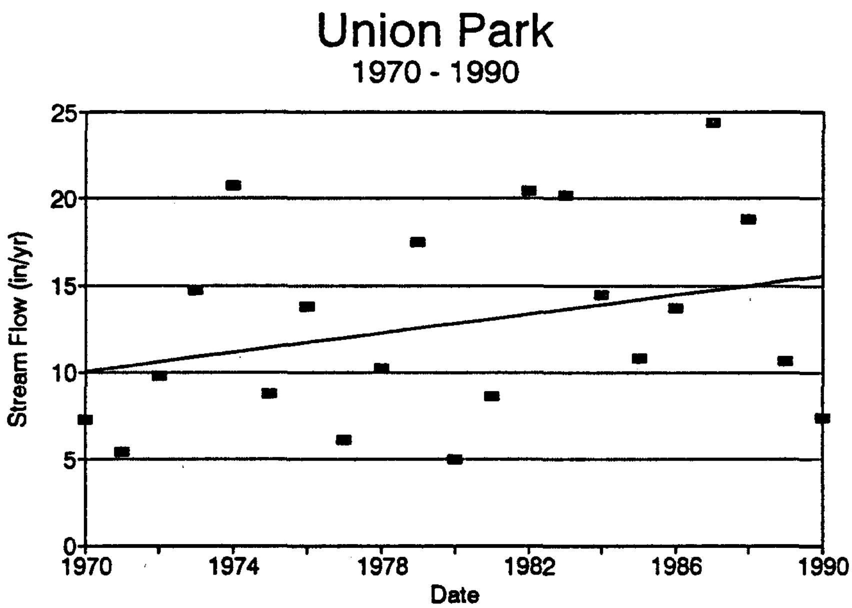
Stream Flow = 9.71 + 0.28 (Years Since 1969); N = 21; R^2 = 0.10

Figure 3.5 Actual Stream Flow and Estimated Trend Line at Chuluota



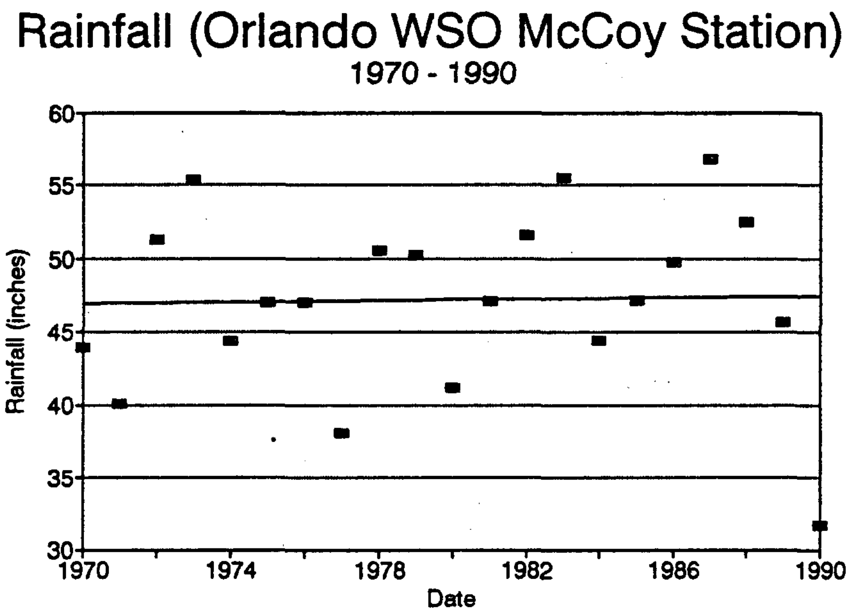
Stream Flow = 7.65 + 0.20 (Years Since 1972); N = 18; R^2 = 0.03

Figure 3.6 Actual Stream Flow and Estimated Trend Line at Magnolia Ranch



Stream Flow = 9.78 + 0.28 (Years Since 1969); N = 21; R^2 = .09

Figure 3.7 Actual Stream Flow and Estimated Trend Line at Union Park



Rainfall = 46.93 + 0.03 (Years Since 1969); N = 21; R^2 = 0

Figure 3.8 Precipitation Measured at Orlando (1970-1990) and Extimated Trend Line

3.4 EVAPORATION AND TRANSPIRATION

Evaporation data can be obtained from NOAA Climatological Data publications. The closest station is located in Lisbon, approximately 28 miles northwest of the watershed. The data are available in monthly totals. However, there are no data available on measured daily ET when considered over the entire Econlockhatchee basin, therefore, part of this work will be devoted to estimating the ET rates for the Basin as estimated from a mass balance.

3.5 GROUNDWATER MOVEMENT

Groundwater movement includes all passage of water through the aquiclude (upward or downward) due to pressure differences and the horizontal movement of groundwater. A profile of the streambed vs. the potentiometric head of the Floridian aquifer was developed for both the Big and Little Econlockhatchee (See Figures 2.2 and 2.3). The results show the Floridian aquifer has the potential to discharge into the lower portions of the River. For the Big Econlockhatchee, the possibility of upward flow into the River begins at approximately Bithlo and continues through to the confluence with the St. John's River. For the Little Econlockhatchee, the potential exists from approximately Union Park to the confluence with the Big Econlockhatchee where, as previously mentioned has the potential of Floridian discharge to occur. Because of the low rates and difficulty of determination, these will be assumed insignificant. However, the level of insignificance will be tested later in this report, and from a mass balance, estimates will be made for the net effect of groundwater movement in the Basin.

3.6 STORAGE

The storage of the surficial aquifer is related to the groundwater table. Unfortunately, little information exists on groundwater table levels that can help estimate storage for past years. The surficial aquifer levels reported for the study year can be used to estimate storage. Spier (1963) developed a relationship between the depth to the groundwater table and the amount of potential ground water storage. Using Spier's relationship, storage over time can be derived from information on changing groundwater tables. Also, the storage will be estimated by mass balance in Chapter 5.

CHAPTER 4 AQUIFER DEPTH MONITORING WELLS

Data on groundwater level fluctuations with time within the Econlockhatchee watershed are needed to help determine groundwater storage volume and groundwater movement into or out of the River. To determine groundwater fluctuations in the surficial aquifer over a one year period, 14 monitoring wells (MW) were installed. Ten are within the watershed and four adjacent to a stormwater reuse pond, see Figure 4.1 for a general location map and Appendix J (Figures J.1 - J.5) for the specific location of the wells. The USGS also provided access to five of their wells. Groundwater elevations were monitored at the 14 monitoring wells and five USGS wells at a frequency of about twice a week.

Water table monitoring wells can be used to understand water table fluctuations and the relationships between water tables and soil morphology (IFAS 1987a). The shallow monitoring wells were a window into the aquifer from which water level data were collected that are representative of the quantity of water that is moving through the formation (Aller,L. et al., 1989a).

Several methods and materials exist to monitor water tables, such as open-sided vs. cased wells. An open-sided well, also known as an observation well or perforated pipe, allows water to enter into the pipe from the surrounding soil anywhere along the length of the pipe. Water table measurements obtained from open-sided wells can be highly misleading if the well allows water perched above a slowly permeable layer to drain into the well. This is most

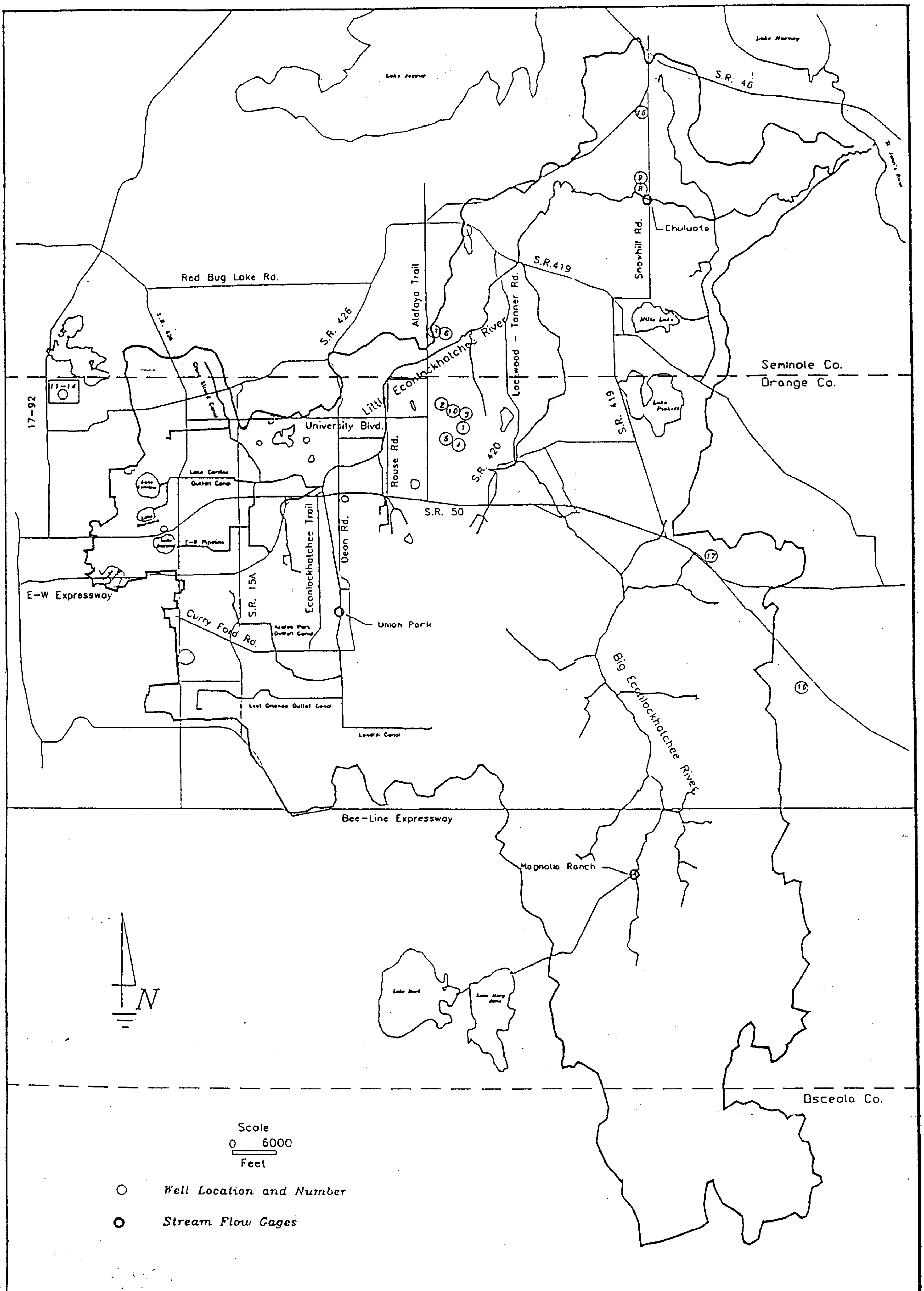


Figure 4.1 Vicinity Map for Well Locations and Stream Flow Gages

likely to occur where an open-sided well penetrates horizons or layers having contrasting permeabilities. Examples of such are soils having relatively loamy or clayey subsoils (argillic horizons), organic-stained zones (spodic horizons), or other restrictive soil layers (IFAS 1987b). Due to the likelihood of running into one or more of these problems, cased wells were used.

Cased wells or "piezometer wells" only allow water to enter into the pipe at a specific depth, and movement along the exterior portion of the pipe is prohibited by ensuring a tight fit between the well casing and the surrounding soil. As a result, a cased well yields a measure of the total hydraulic head of water at the depth of the opening of the pipe. The hydraulic head is the sum of the gravity head and the pressure head, and it is given by the elevation of the surface of the water in the pipe referenced to some datum (IFAS 1987c).

4.1 INSTALLATION OF SHALLOW MONITORING WELLS

Soil Boring:

To begin the operation, a soil sample was taken using a solid flight auger following standard procedures (ASTM D-1452). By this method a solid, continuous auger was drilled down to approximately 15 feet and extracted. The soil samples are scraped from the auger flights upon extraction. Due to the amount of disturbance that occurs, this method provides samples of moderate quality down to the first occurrence of water, and generally unreliable samples below that level (Aller, L. et al., 1989b).

Well Drilling:

A 4 in. solid flight auger was used to drill the wells to 5 feet below the existing water table. After the auger was drilled, a 2 inch PVC pipe with a 5 foot screen protruding into the water table was used as the monitoring well. Figure 4.2 is a well completion diagram for MW-5 as installed by Universal Engineering.

Filter Pack:

When the natural formation materials surrounding the well intake are deliberately replaced by coarser, graded material introduced from the surface, the well is artificially filter packed. The primary purpose of a filter pack is to filter out fine materials from the formation adjacent to the well. Additionally, the artificial well pack stablizies the borehole and cuts down on the settlement of materials above the well intake (Aller, L. et al., 1989c). A silica sand was used for the monitoring wells.

The filter pack should extend from the bottom of the well to approximately 2 to 5 feet above the average water table level. This allows for the settlement of the filter pack and acts as a buffer from the annular seal.

Annular Seal:

The purpose of the annular seal is to prevent water or contaminants from entering the borehole. A bentonite seal was used and resulted in complete filling of the annular space about one foot above the filter pack (Aller, L. et al., 1989d). The bentonite pellets were poured to a thickness of approximately one foot above the filter pack to act as a sealant and as a separator between the

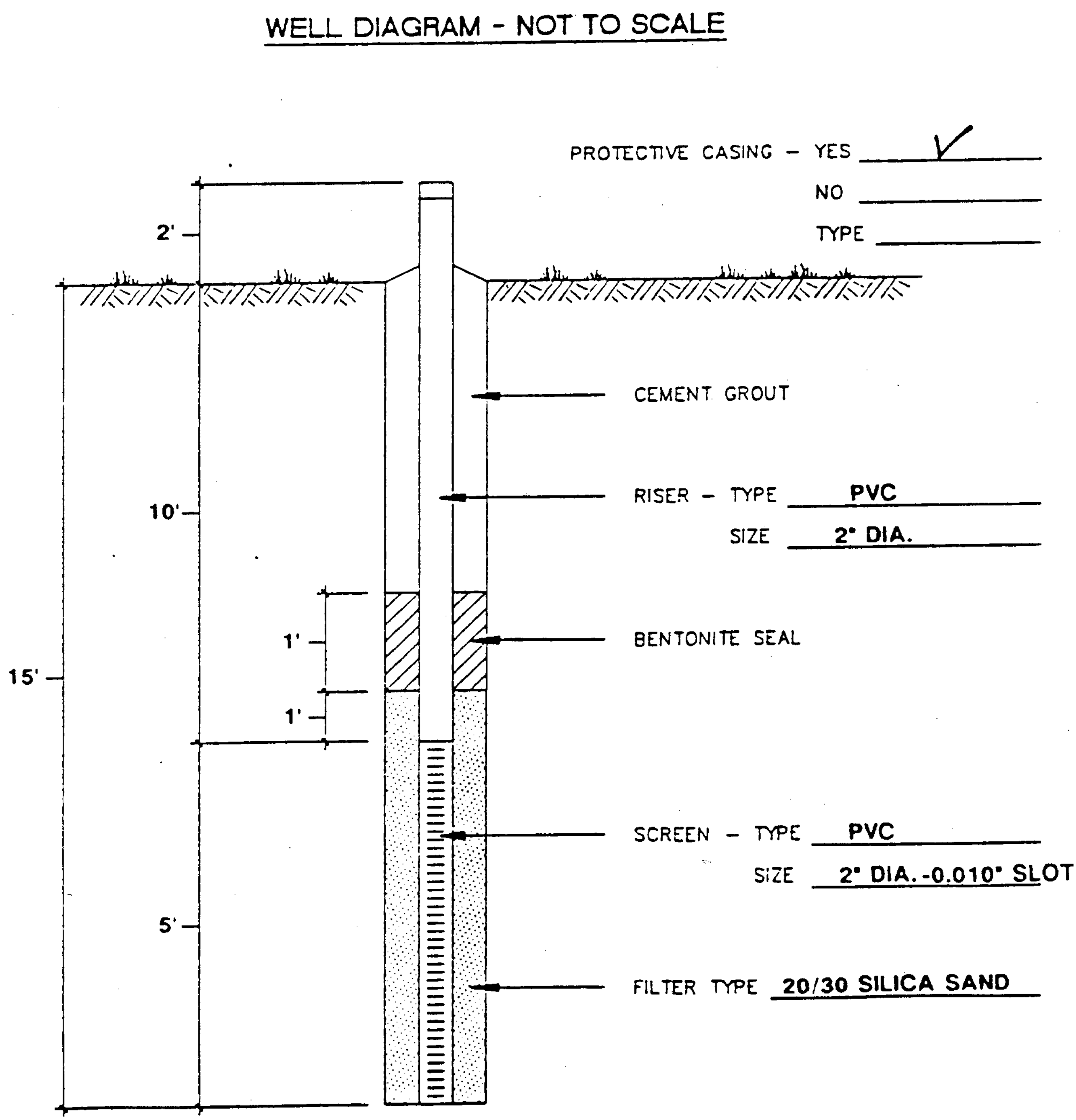


Figure 4.2 Well Completion Diagram - Site MW-5

filter pack and the neat cement. Neat cement is a mixture of portland cement and water in the proportion of 5 to 6 gallons per 94 pound bag of cement.

Casing:

Following the annular sealant a protective casing was placed over the screen. The purpose of the installation of a casing is to provide access from the surface to some point in the subsurface. Access to the monitored zone is through the casing and into the screened intake. Therefore, the casing allows piezometric head measurements and ground-water quality sampling (Aller, L. et al., 1989e).

4.2 LOCATIONS OF WELLS

Fourteen surficial aquifer monitoring wells were installed at five different locations: UCF (4), Central Florida Research Park (2), Canterbury retreat (2), Winter Park Civic Center (4), and Demetree Property (2). At the three existing USGS sites, surficial, intermediate, and Floridan aquifer levels were monitored (see Figures 4.1 and Figures J.1 - J.5). A total of 17 shallow wells were monitored for water levels from June 1, 1991 to May 31, 1992, and the results are documentaed in this report.

4.3 SOIL DESCRIPTIONS AND ESTIMATED SEASONAL HIGH WATER TABLE

With the assistance of the Soil Conservation Service (Kriz, 1991 and Noble, 1992), the soils were classified at the shallow well locations and the seasonal high water table was estimated using standard spodic layer identification procedures. At five of the shallow well locations, the soils were considered to be composed of primarily fill and construction site materials and thus the soil map unit and seasonal high water tables were at best a preliminary estimate. The results of the survey are shown in Table 4.1. Soil description was determined in the field using hand-auger samples. For the first ten shallow wells, five are in the natural area with minimal effects of development on the shallow groundwater levels and five are in developed areas. The next four wells are adjacent to a stormwater reuse pond in the City of Winter Park. The remaining three wells were constructed and maintained by the USGS before the start of this work.

4.4 Soil Permeability

Two different tests for permeability were performed at most of the fourteen shallow well locations, namely the falling head field permeability at all fourteen well locations and a pumped test at nine well locations. All of the field tests for falling head permeability were done by Universal Engineering Sciences and the pump tests were done by both Universal and the University with duplicate tests at some sites by the University. The pump test data reported are average values of the two tests at each of nine wells. The duplicate pump tests were within 1 foot/day at each sites. The pump test permeability values are generally considered more accurate. The permeability values are reported in Table 4.2. Appendix J shows boring logs at the 14 locations and illustrates

Table 4.1
Soil Classification and Seasonal High Water Table

Location (Site #)	Map Unit Soil Description (USDA Class)	Seasonal High Water Table (Feet below grade)	Site Development
UCF East 1	#44 Smyrna Fine Sand	1.67	Developed area near above ground pond
UCF Pond 2	#37 Fine Sand	0.50	Developed area near a stormwater pond
UCF Oaks 3	#34 Pomello Fine Sand	3.50	Natural area
CFR East 4	Immokalee Fine Sand	2.33	Developed area with mostly fill
CFR West 5	#54 Zolfo Fine Sand	2.67	Developed area near a stormwater pond
Canterbury 6	#54 Zolfo Fine Sand	3.33	Natural area near a natural lake
Canterbury 7	Tavares Fine Sand	5.83	Developed area near a 2 lane highway
Demetree 8	Basinger & Delray Sand	0.83	Natural area near the River
Demetree 9	Basinger & Delray Sand	0.83	Natural area in a field
UCF Center 10	Fill and Fine Sand	ND[b]	Developed area with largely fill
Reuse Pond 11-14	Fill, Peat and Fine Sand	ND[b]	Developed area with largely fill
Geneva 15	#3 Paola Fine Sand	7.50	Natural area 100' from highway 426
Cocoa K 16	#44 Smyrna Fine Sand	0.50	Natural area 50' from highway 520
Bithlo 17	#44 Smyrna Fine Sand	2.17	Developed area near highway 50

[a] Determination made by David Kriz and Chris Nobel, SCS (1991-92)
[b] Not detected

Table 4.2
Permeability Estimates Using Two Methods

Location (Site #)	Map Unit Soil Description (USDA Class)	Estimated Permeability	
		Falling Head (Feet/Day)	Pump Test (Feet/Day)
UCF East 1	#44 Smyrna Fine Sand	12.37	8.40
UCF Pond 2	#37 St. John's Fine Sand	2.46	1.90
UCF Oaks 3	#34 Pomello Fine Sand	3.05	6.30
CFR East 4	Immokalee Soil Series	<.01	0.50
CFR West 5	#54 Zolfo Fine Sand	5.60	6.10
Canterbury 6	#54 Zolfo Fine Sand	1.03	4.80
Canterbury 7	Tavares Fine Sand	17.98	8.50
Demetree 8	Basinger & Delray Fine Sand	17.87	9.50
Demetree 9	Basinger & Delray Fine Sand	24.45	10.00
UCF Center 10	Fill Material and Muck	20.45	None
Reuse Field West 11	Fill mixed with Sand	6.16	None
Reuse Pond West 12	Fill mixed with Peat/Sand	22.98	None
Reuse Pond South 13	Fill mixed with Peat/Sand	3.16	None
Reuse Field South 14	Fill mixed with Sand	16.93	None

the soil types, the water table during installation, and the falling head permeability values.

The permeability values from the pump test data indicate rates ranging from 0.5 - 10.0 feet/day (0.25 - 5.0 inches/hour). The rates indicate a lateral movement of water in the surficial aquifer at the well sites. Thus, a potential exists for surficial aquifer groundwater movement within the watershed. Whenever a surface depression (lake, river, or wetland) occurs, potential exists for the depression to receive groundwater from the surficial aquifer. With these relatively high permeabilities and depression areas to accumulate groundwater flow, River stream flow is most likely composed of some surficial aquifer water.

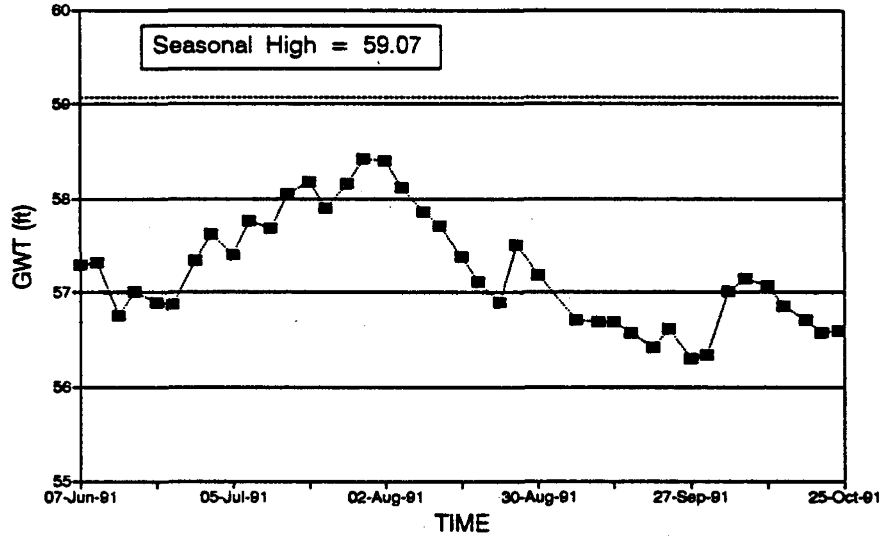
4.5 Water Table Fluctuations

The water table of the surficial aquifer will vary with the amount of precipitation, transpiration losses, dewatering by pumping or drainage ditches, additions from above ground wastewater ponds, lateral groundwater movement, and if close to the surface, evaporation losses.

During the wet season of any year, defined as June through October, significant rainfall (greater than about 60% of yearly or 30 inches) may increase the water table above the estimated seasonal high water mark. The average rainfall recorded in the Watershed was 33.41 inches during the wet season with 33.04 inches at the University and 33.78 inches at the Demetree site. Typical plots of fluctuations in the water table for the wet season are shown in Figures 4.3 and 4.4. All water table fluctuation data and

Well # 4. CFRP-East-Wet Season

Ground Elevation 61.40



Top of well elevation (ft)	63.59
Height of pvc pipe above ground (ft)	2.19

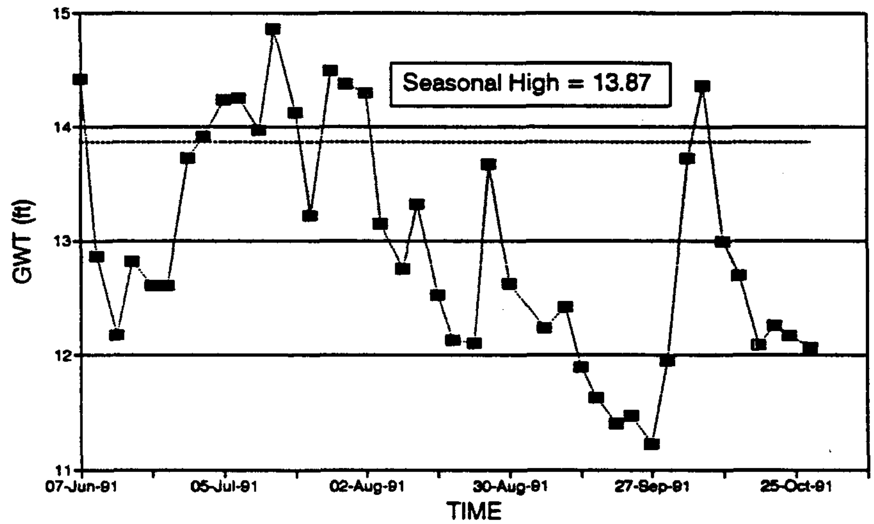
DATE	TIME	DEPTH ft	DWT ft	GWT ft
07-Jun-91	09:45	6.29	4.10	57.30
10-Jun-91	12:00	6.27	4.08	57.32
14-Jun-91	10:08	6.83	4.64	56.76
17-Jun-91	09:35	6.58	4.39	57.01
21-Jun-91	09:20	6.69	4.50	56.90
24-Jun-91	10:28	6.71	4.52	56.88
28-Jun-91	09:22	6.25	4.06	57.34
01-Jul-91	09:12	5.96	3.77	57.63
05-Jul-91	09:02	6.19	4.00	57.40
08-Jul-91	08:55	5.83	3.64	57.76
12-Jul-91	09:04	5.90	3.71	57.69
15-Jul-91	09:32	5.54	3.35	58.05
19-Jul-91	09:13	5.42	3.23	58.17
22-Jul-91	10:02	5.69	3.50	57.90
26-Jul-91	11:54	5.44	3.25	58.15
29-Jul-91	08:50	5.17	2.98	58.42
02-Aug-91	09:32	5.19	3.00	58.40
05-Aug-91	12:00	5.48	3.29	58.11
09-Aug-91	09:30	5.73	3.54	57.86
12-Aug-91	13:13	5.88	3.69	57.71

DATE	TIME	DEPTH ft	DWT ft	GWT ft
16-Aug-91	10:15	6.21	4.02	57.38
19-Aug-91	10:35	6.48	4.29	57.11
23-Aug-91	17:04	6.69	4.50	56.90
26-Aug-91	14:48	6.08	3.89	57.51
30-Aug-91	15:08	6.40	4.21	57.19
06-Sep-91	18:10	6.88	4.69	56.71
10-Sep-91	14:45	6.90	4.71	56.69
13-Sep-91	16:24	6.90	4.71	56.69
16-Sep-91	14:21	7.02	4.83	56.57
20-Sep-91	15:28	7.17	4.98	56.42
23-Sep-91	14:31	6.98	4.79	56.61
27-Sep-91	15:58	7.29	5.10	56.30
30-Sep-91	14:00	7.25	5.06	56.34
04-Oct-91	13:36	6.58	4.39	57.01
07-Oct-91	14:06	6.44	4.25	57.15
11-Oct-91	14:05	6.52	4.33	57.07
14-Oct-91	16:24	6.73	4.54	56.86
18-Oct-91	16:20	6.88	4.69	56.71
21-Oct-91	13:45	7.02	4.83	56.57
24-Oct-91	16:01	7.00	4.81	56.59

WET SEASON STATISTICS	GWT (feet)
# of Data Points = 40	
Standard Deviation	0.59
Average	57.23
Maximum	58.42
Minimum	56.30

Figure 4.3 Water Table Fluctuation at Site 5 (Developed Area)

Well # 8. Demetree at River-Wet Season
Ground Elevation 14.70



Top of well elevation (ft)	17.30
Height of pvc pipe above ground (ft)	2.60

DATE	TIME	DEPTH ft	DWT ft	GWT ft
07-Jun-91	13:10	2.88	0.28	14.42
10-Jun-91	13:20	4.44	1.84	12.86
14-Jun-91	11:20	5.12	2.52	12.18
17-Jun-91	11:00	4.48	1.88	12.82
21-Jun-91	10:45	4.69	2.09	12.61
24-Jun-91	15:20	4.69	2.09	12.61
28-Jun-91	10:51	3.58	0.98	13.72
01-Jul-91	10:29	3.38	0.78	13.92
05-Jul-91	10:23	3.06	0.46	14.24
08-Jul-91	10:04	3.04	0.44	14.26
12-Jul-91	10:07	3.33	0.73	13.97
15-Jul-91	10:34	2.44	-0.16	14.86
19-Jul-91	10:28	3.17	0.57	14.13
22-Jul-91	10:13	4.08	1.48	13.22
26-Jul-91	10:04	2.81	0.21	14.49
29-Jul-91	10:20	2.92	0.32	14.38
02-Aug-91	10:31	3.00	0.40	14.30
05-Aug-91	12:55	4.15	1.55	13.15
09-Aug-91	11:05	4.54	1.94	12.76
12-Aug-91	14:11	3.98	1.38	13.32
16-Aug-91	11:25	4.77	2.17	12.53

DATE	TIME	DEPTH ft	DWT ft	GWT ft
19-Aug-91	12:10	5.17	2.57	12.13
23-Aug-91	16:00	5.19	2.59	12.11
26-Aug-91	16:03	3.63	1.03	13.67
30-Aug-91	16:38	4.67	2.07	12.63
06-Sep-91	17:15	5.06	2.46	12.24
10-Sep-91	09:55	4.88	2.28	12.42
13-Sep-91	14:36	5.40	2.80	11.90
16-Sep-91	15:40	5.67	3.07	11.63
20-Sep-91	14:24	5.90	3.30	11.40
23-Sep-91	15:34	5.83	3.23	11.47
27-Sep-91	14:46	6.08	3.48	11.22
30-Sep-91	17:25	5.35	2.75	11.95
04-Oct-91	16:22	3.58	0.98	13.72
07-Oct-91	16:36	2.94	0.34	14.36
11-Oct-91	16:47	4.31	1.71	12.99
14-Oct-91	15:13	4.60	2.00	12.70
18-Oct-91	14:29	5.21	2.61	12.09
21-Oct-91	15:25	5.04	2.44	12.26
24-Oct-91	14:43	5.13	2.53	12.17
28-Oct-91	15:49	5.23	2.63	12.07

WET SEASON STATISTICS	GWT (feet)
# of Data Points = 41	
Standard Deviation	0.99
Average	12.97
Maximum	14.86
Minimum	11.22

Figure 4.4 Water Table Fluctuation at Site 8 (Undeveloped Area)

graphs are shown in Appendix K. Figure 4.3 is typical of the wells in a developed area for which the water table was lowered and for this site, the water table during the wet season never exceeded the estimated historical seasonal high water level. A typical fluctuation in a natural area is shown in Figure 4.4 and the seasonal high water table was exceeded on 11 of 41 measurements or 27% of the time. Additional data on fluctuations above the estimated seasonal high water table are shown in Table 4.3. Site one is located near (132 feet from the edge of) an above ground wastewater pond. The water table elevation during the wet season was most likely affected by the pond because the seasonal high water table was exceeded on 11 of the 41 measurements or 27% of the time.

Increases in the elevation of the surficial aquifer appear to be related to most rainfall events as shown in Figures K.1.1 and K.9.1. There must be significant rainfall to cause percolation to the water table once the rain has infiltrated into the ground. All the surficial aquifer elevations follow similar fluctuation patterns, increasing and decreasing at about the same time.

4.5.1 FLUCTUATIONS RELATED TO HYDROLOGIC SOIL TYPE

The soils at each well location were given a hydrologic soil classification as determined by the predominate map soil type and as reported by the SCS (Kriz and Nobel, 1991-1992). Soil type A has the greatest infiltration potential while type D has the least. The yearly and seasonal water table level fluctuations were related to the soil types and are compared in Table 4.4. The D type soil had the least fluctuation while types A, B, and C had about the

Table 4.3
Exceedence of the Seasonal High Water Table
During the Five Month Wet Season

Location (Site #)	Exceedence of Seasonal High Water Table		Estimated Seasonal High Water Table Location (Feet below grade)	Site Development
	Number	%[a]		
UCF East 1	11	27	1.67	Developed area near above ground pond
UCF Pond 2	2	5	0.50	Developed area near a stormwater pond
UCF Oaks 3	13	32	3.50	Natural area
CFR East 4	0	0	2.33	Developed area with mostly fill
CFR West 5	0	0	2.67	Developed area near a stormwater pond
Canterbury 6	9	22	3.33	Natural area near a natural lake
Canterbury 7	1	2	5.83	Developed area (37 ft) from a 2 lane highway
Demetree 8	11	27	0.83	Natural area near the River
Demetree 9	7	17	0.83	Natural area in a field
UCF Center 10	ND[b]	ND	ND	Developed area with mostly fill

[a] based on 41 measurements or 2 per week.

[b] ND is not detected

Table 4.4

Classification of Hydrologic Soil Type with Seasonal Groundwater Table Fluctuation

SOIL TYPE	LOCATION	ESHWT*	SOIL	SEASON	FLUCTUATION ft
A	7. CANTERBURY FIELD	5.83	TAVARES FINE SAND	WET	2.27
				DRY	1.42
				YEAR	3.11
	15. GENEVA S-2	7.50	ASTATULA PAOLA FINE SAND	WET	1.27
				DRY	3.04
				YEAR	4.11
			Yearly Average		3.61
B/D	1. UCF EAST**	1.67	SMYRNA FINE SAND	WET	4.08
				DRY	3.75
				YEAR	5.10
	2. UCF POND	0.50	ST.JOHNS FINE SAND	WET	1.40
				DRY	1.54
				YEAR	1.90
	4. CFR EAST	2.33	SANIBEL MUCK	WET	2.12
				DRY	1.42
				YEAR	2.71
	8. DEMETREE RIVER	0.83	BASINGER DELRAY FINE SAND	WET	3.64
				DRY	3.06
				YEAR	4.27
	9. DEMETREE FIELD	0.83	BASINGER DELRAY FINE SAND	WET	3.21
				DRY	3.20
				YEAR	4.02
	16. COCOA K	0.50	SMYRNA IMMOKALEE FINE SAND	WET	2.06
				DRY	3.09
				YEAR	3.25
	17. BITHLO 3	2.17	SMYRNA IMMOKALEE FINE SAND	WET	2.31
				DRY	2.79
				YEAR	4.21
			Yearly Average		3.64
C	3. UCF OAKS	3.50	POMELLO FINE SAND	WET	3.79
				DRY	2.67
				YEAR	5.38
	5. CFR WEST	2.67	ZOLFO FINE SAND	WET	1.89
				DRY	1.27
				YEAR	2.69
	6. CANTERBURY LAKE	3.33	ZOLFO FINE SAND	WET	1.60
				DRY	1.02
				YEAR	2.14
			Yearly Average		3.40
D	10. UCF CENTER***	0.00	BASINGER FINE SAND	WET	0.85
				DRY	0.71
				YEAR	0.85
			Yearly Average		0.80

* ESHWT = Estimated Seasonal High Water Table by SCS (depth in feet below ground level)
** *UCF East affected by surface ponding of treated wastewater*
*** UCF Center affected by dewatering activities

same average fluctuation. The comparison of fluctuations among soil types should not be generalized to all areas because fluctuations are primarily controlled by drain pipes, pumping, and ponding.

4.5.2 FLUCTUATIONS RELATED TO STORMWATER POND CONTROLS

Surface ponds used to lower the water table may reduce the water table fluctuations. To illustrate the possible reduction, the water table level fluctuations were divided into three classes of data, namely pond control (Table 4.5); no pond control (Table 4.5); and reuse pond control (Table 4.6). Based on the data collected for this report, the yearly average water table fluctuations were lowest (2.36 feet) with pond control compared to no pond control (4.01 feet) and compared to reuse pond control (4.21 feet).

4.5.3 SURFICIAL AQUIFER LEVELS COMPARED TO DEEPER AQUIFER PRESSURE

At two of the USGS sites, an opportunity exists to compare the surficial aquifer elevations to a deeper aquifer to determine possible exchange between the aquifers. Based on the data, Figures 4.5 and 4.6 were developed indicating that at these sites the surficial pressure (level) was above the deeper aquifer pressure (level). Thus the possibility does exist for exchange from the surficial to the deeper aquifers at these sites.

Table 4.5

POND CONTROL VERSUS NO POND CONTROL ECONLOCKHATCHEE RIVER BASIN MONITORING WELL SITES WITH ANNUAL FLUCTUATIONS OF GROUNDWATER TABLE LEVELS (JUNE 7, 1991 - MAY 30, 1992)

POND CONTROL

SOIL TYPE	LOCATION	ESHWT* FT	SOIL NAME	SEASON	FLUCTUATION FT
B/D	2. UCF POND	0.50	ST.JOHNS	WET	1.40
			FINE SAND	DRY	1.54
				YEAR	1.90
	4. CFR EAST	2.33	SANIBEL	WET	2.12
			MUCK	DRY	1.42
				YEAR	2.71
	5. CFR WEST	2.67	ZOLFO	WET	1.89
			FINE SAND	DRY	1.27
				YEAR	2.69
	6. CANTERBURY	3.33	ZOLFO	WET	1.60
C	LAKE		FINE SAND	DRY	1.02
				YEAR	2.14
			YEARLY AVERAGE		2.36

NO POND CONTROL

SOIL TYPE	LOCATION	ESHWT* Ft	SOIL NAME	SEASON	FLUCTUATION Ft
A	7. CANTERBURY	5.83	TAVARES	WET	2.27
	FIELD		FINE SAND	DRY	1.42
				YEAR	3.11
	15. GENEVA S-2	7.5	ASTATULA	WET	1.27
			PAOLA	DRY	3.04
			FINE SAND	YEAR	4.11
B/D	9. DEMETREE	0.83	BASINGER	WET	3.21
	FIELD		DELRAY	DRY	3.20
			FINE SAND	YEAR	4.02
	16. COCOA K	0.50	SMYRNA	WET	2.06
			IMMOKALEE	DRY	3.09
			FINE SAND	YEAR	3.25
	17. BITHLO 3	2.17	SMYRNA	WET	2.31
			IMMOKALEE	DRY	2.79
			FINE SAND	YEAR	4.21
C	3. UCF OAKS	3.50	POMELLO	WET	3.79
			FINE SAND	DRY	2.67
				YEAR	5.38
			YEARLY AVERAGE		4.01

* ESHWT = Estimated Seasonal High Water Table by SCS (depth in feet below ground level)

Table 4.6

Seasonal and Yearly Groundwater Table Fluctuation at the Reuse Pond Site

LOCATION	ESHWT* Ft	SOIL TYPE	SEASON	FLUCTUATION Ft
		FILL	WET	2.67
WELL # 11. REUSE POND WEST	1.67	MUCK	DRY	1.12
			YEAR	3.42
		FILL	WET	3.16
WELL # 12. REUSE FIELD WEST	4.50	MUCK	DRY	1.62
			YEAR	4.20
		FILL	WET	3.59
WELL # 13. REUSE POND SOUTH	0.00	HEMIC	DRY	2.11
		MUCK	YEAR	4.94
		FILL	WET	3.59
WELL # 14. REUSE FIELD SOUTH	2.67	MUCK	DRY	1.58
			YEAR	4.21
		YEARLY AVERAGE (ALL)		4.19
		YEARLY AVERAGE (POND)		4.18
		YEARLY AVERAGE (FIELD)		4.21

* ESHWT = Estimated Seasonal High Water Table by SCS (depth in feet below ground level)

Well #17. Bithlo 3 Intermediate well with respect to Surficial well-Yearly

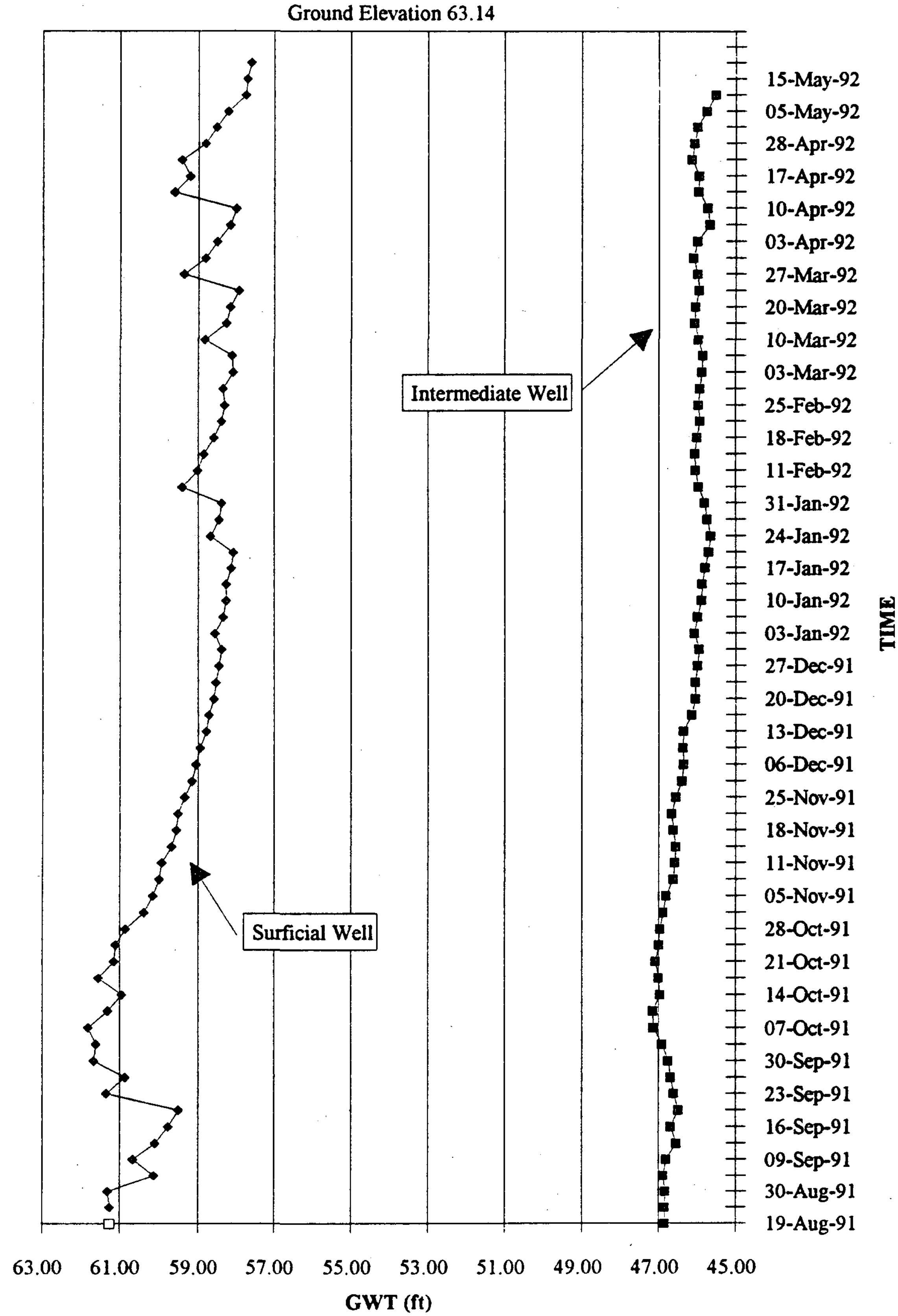


FIGURE 4.5 Aquifer Elevation Difference at Bithlo 3

Well #16. Cocoa K (Floridian aquifer) -Yearly

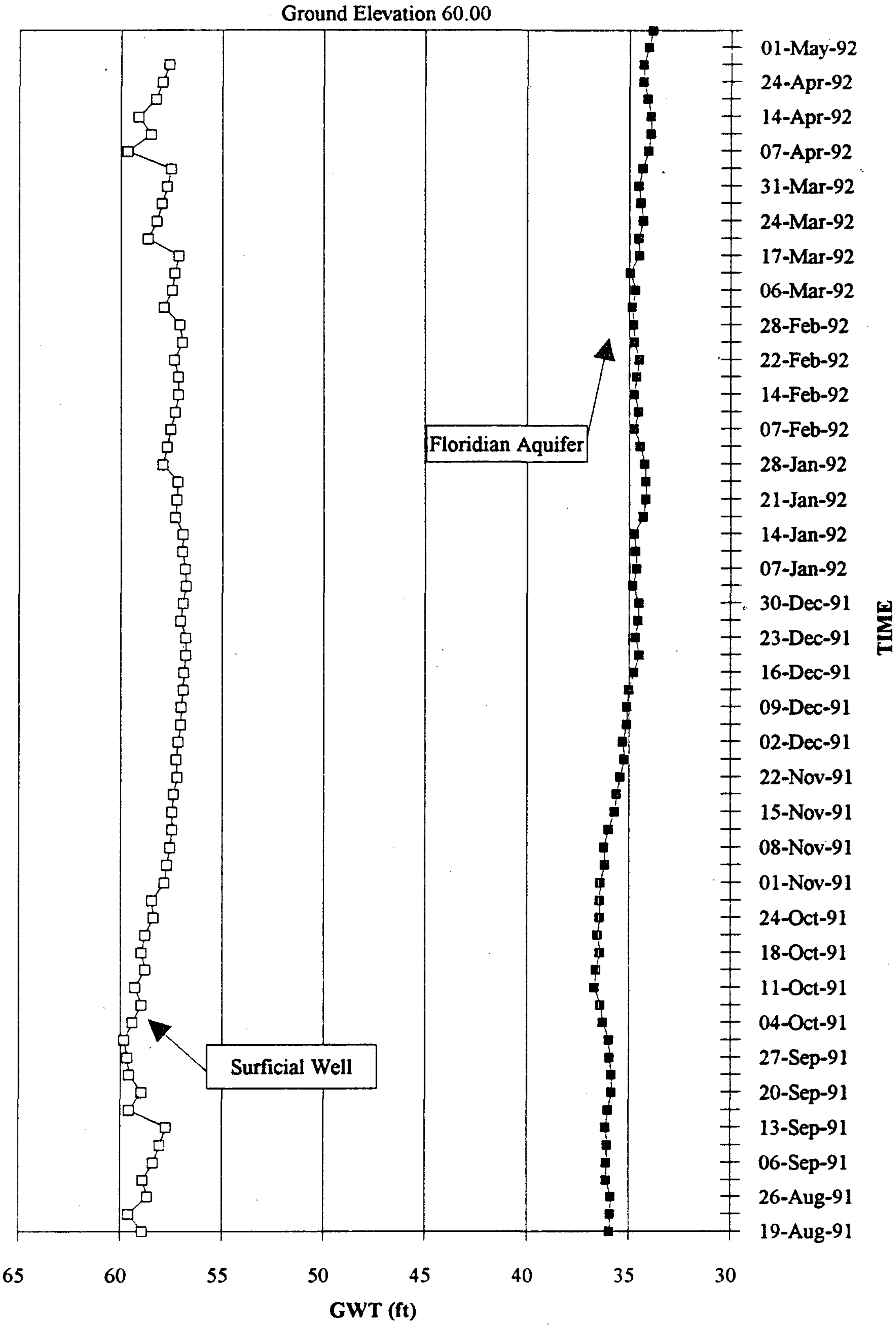


FIGURE 4.6 Aquifer Elevation Difference at Cocoa K

CHAPTER 5 WATERSHED HYDROLOGIC BALANCE

The purpose of this Chapter is to estimate those components of a hydrologic balance that cannot be easily and accurately measured namely, evapotranspiration and aquifer exchange. Once an estimate of evapotranspiration and storage are known the effects of River flow volume resulting from future development can be estimated.

5.1 MASS BALANCE

A mass balance of the Econlockhatchee River can be attempted by considering the movement of water across defined boundaries of the watershed. The surface area boundaries are those defined by the St. Johns River Water Management District with the top boundary being the ground surface and the bottom boundary layer as the aquiclude separating the surficial aquifer from the deeper aquifers. The mass balance is based on the continuity equation:

$$Inputs - Outputs = \Delta\ Storage \tag{5.1}$$

and can be written in volume terms with units of inches per time period:

$$P + WW - D - ET \pm G = \Delta\ S = S_2 - S_1 \tag{5.2}$$

where
- P = precipitation
- WW = wastewater inputs
- D = stream flow discharge
- ET = evapotranspiration
- G = groundwater surficial aquifer movement
- S = storage within the watershed.

with (P) precipitation data available from rainfall records; (WW) wastewater inputs known from wastewater discharge records. Other discharges, such as irrigation, are assumed to equal zero. Stream flow (D) data are available from the United States Geological Survey stream flow recording stations. Changes in basin storage can be estimated from elevation changes in the surficial aquifer table. Evapotranspiration estimates either may be made independent of the mass balance using published empirical equations or be estimated from the mass balance assuming a net surficial aquifer exchange of zero over the mass balance period.

5.2 MODEL FOR ESTIMATING ET

Evapotranspiration is the most difficult variable to measure on a watershed basis of the six variables in equation 5.2. Thus, it is frequently estimated using a mass balance approach and then comparison of the resulting values are made using independent estimates. Expanding the terms and rearranging equation 5.2, the general equation used for mass balance calculations is:

$$S_2 = S_1 + P - D - ET + WW \pm G \tag{5.3}$$

let,

$$\Delta S = (S_2 - S_1)$$

Surficial aquifer recharge from deeper aquifers and subsequent discharge to the river as measured at the Chuluota gage may be possible because the potentiometric head of the Floridan aquifer at the gage site is greater than the surficial aquifer head (Spechler et. al., 1991). However, about 85% of the basin has the potential for discharge from the surficial to the deeper aquifers (Aucott, 1988). The weighted average discharge to the river as measured at the Chuluota gage and based on published area discharge data (Aucott, 1988) is:

Sum of surficial aquifer movement times percent area

G = (5 in/yr)(15/100) + (-1 in/yr)(60/100) +

(-.5 in/yr)(25/100) = - .02 in/yr

The rate of movement for the total watershed is near zero. Assuming surficial aquifer exchange is negligible, calculated ET (ET_{cal}) from a mass balance in units of inches/year is:

$$ET_{cal} = P - \Delta S + WW - D_a \qquad (5.4)$$

where;
P = determined from rainfall records
WW = determined from discharge records
D_a = determined from Econlockhatchee stream flow data
ET_{cal} = calculated from the mass balance
S = estimated by Speir's equation (Speir and Weaver, 1960)

Storage is calculated based on Speir's equation relating surficial aquifer storage to water table depth (DWT). Depth to water table elevations used are those recorded by the USGS for the Bithlo-3 Well station # 283249081053203. The use of the Bithlo-3 record for DWT at all three sites in the mass balance is an assumption based on site specific conditions, and assumes all other groundwater elevation changes are relative to the one site. As shown in the previous Chapter, groundwater elevation changes exhibited the same trends at all the natural sites. Speir's relationship is:

$$
\begin{aligned}
S &= 0.6(DWT) && 0.0<DWT<0.5 \\
S &= 0.30 + 1.00(DWT-0.5) && 0.5<DWT<1.0 \\
S &= 0.80 + 1.35(DWT-1.0) && 1.0<DWT<2.0 \\
S &= 2.15 + 1.55(DWT-2.0) && 2.0<DWT<3.0
\end{aligned} \quad \textbf{(5.5)}
$$

where; S = watershed storage, inches
DWT = depth to water table, feet

The calculated evapotranspiration values (ET_{cal}) from the mass balance for Chuluota are shown in Table 5.1 and the spreadsheet calculations for the mass balance are shown in Table 5.2. Other methods for calculating ET are also shown in Table 5.1 and will be discussed latter. The ET_{cal} values were first analyzed to determine whether or not they relate to 3 directly measured variables (DWT, D, and P) using a statistical analysis program (SYSTAT). No apparent strong correlation was found to exist between ET_{cal} and the three independent variables. However, the regression analysis that was performed on ET_{cal} versus rainfall data showed that ET increased with precipitation indicating that water availability within the watershed has an effect on evapotranspiration. Values of ET were calculated from the equation developed by the regression analysis (ET_{fit}) and are shown in Appendix I as Tables I-1, I-2, and I-3 for the three stream gaging locations. Also shown on these spreadsheets are the calculations for the mass balance. When the fitted values (ET_{fit}) were compared to the ET_{cal} values, high residuals existed indicating the regression model is inaccurate as a predictor. Therefore, additional methods to determine evapotranspiration were sought.

TABLE 5.1
A Comparison For Chuluota at Snowhill For ET Calculated Using Turner's ET Equations ET_{ws} and ET_{max} Versus ET Calculated (ET_{cal}) From Mass Balance (inches/year)

	CHULUOTA AT SNOWHILL				
	ET_{cal}	ET_{max}	$ET_{max}-ET_{cal}$	ET_{ws}	$ET_{ws}-ET_{cal}$
1970	28.73	33.00	4.28	31.14	2.41
1971	43.87	35.67	-8.21	33.63	-10.24
1972	44.52	39.13	-5.39	36.87	-7.65
1973	39.17	38.19	-0.98	35.99	-3.18
1974	29.55	36.03	6.48	33.97	4.42
1975	40.05	35.97	-4.07	33.92	-6.13
1976	37.67	36.43	-1.25	34.34	-3.33
1977	35.78	33.52	-2.26	31.62	-4.16
1978	35.23	37.13	1.89	35.00	-0.24
1979	37.24	37.95	0.71	35.77	-1.47
1980	38.96	33.54	-5.41	31.65	-7.31
1981	39.81	34.14	-5.67	32.20	-7.61
1982	34.52	40.16	5.64	37.83	3.32
1983	46.20	42.93	-3.27	40.42	-5.78
1984	30.05	35.58	5.54	33.55	3.51
1985	33.68	37.60	3.92	35.44	1.76
1986	36.60	34.54	-2.07	32.57	-4.03
1987	25.40	35.58	10.17	33.55	8.14
1988	35.43	38.40	2.97	36.18	0.76
1989	34.87	33.57	-1.30	31.66	-3.20
SUM			1.73		-40.02

TABLE 5.2

HYDROLOGIC MASS BALANCE
ON THE
ECONLOCKHATCHEE RIVER AT CHULUOTA, NET SURFICIAL AQUIFER DISCHARGE = 0

D = SURFICIAL DISCHARGE
Dc = CALCULATED DISCHARGE BY MASS BALANCE
Da = MEASURED STREAMFLOW
D FIT = DWT*(-1.485) + 15.04
DRAINAGE AREA = 241 Square Miles

G.W.T. = GROUND WATER TABLE
DWT = DEPTH TO WATER TABLE
P = RAINFALL
ET = EVAPOTRANSPIRATION
WW= WASTEWATER INPUTS
G = GROUNDWATER INFILTRATION

S1 = INITIAL STORAGE VOLUME
S2 = FINAL STORAGE VOLUME

FRACTION NONHERBACEOUS (C) 0.59

STORAGE = SPEIR'S
Dc = P - (S2-S1) - ETmax + WW

ETcal = P + WW - Da - (S2-S1)
ETmax = 2.14(1-C)P^.657 + 4.53C^1.76*P^.68

CHULUOTA AT SNOWHILL

DATE	P (in/yr)	Da (cfs)	Da (in/yr)	Dc (in/yr)	D FIT	Da-Dc	WW (MGD)	WW (in/yr)	G.W.T. (ft)	DWT (ft)	STORAGE (in)	CHANGE STORAGE	ETmax (in/yr)	ETcal (in/yr)
1970	42.09	177.54	10.00	12.45	13.60	-2.45			62.17	0.97	0.77	3.36	33.00	28.73
1971	47.24	126.05	7.10	7.84	10.17	-0.74			59.86	3.28	4.13	-3.73	35.67	43.87
1972	54.21	162.45	9.15	15.64	14.15	-6.49			62.54	0.60	0.40	0.56	39.13	44.50
1973	52.29	220.15	12.40	14.81	13.37	-2.41			62.02	1.12	0.96	0.72	38.19	39.17
1974	47.96	314.07	17.69	12.65	12.59	5.04			61.49	1.65	1.68	0.72	36.03	29.55
1975	47.84	159.08	8.96	10.70	11.83	-1.74			60.98	2.16	2.40	-1.17	35.97	40.05
1976	48.74	218.02	12.28	11.10	13.08	1.18			61.82	1.32	1.23	-1.21	36.43	37.67
1977	43.07	112.92	6.36	10.48	14.99	-4.12			63.11	0.03	0.02	0.93	33.52	35.78
1978	50.14	243.05	13.69	14.23	13.39	-0.54			62.03	1.11	0.95	1.22	37.13	35.23
1979	51.80	268.44	15.12	13.29	12.05	1.83			61.13	2.01	2.17	-0.56	37.95	37.24
1980	43.12	83.27	4.69	9.05	12.66	-4.36			61.54	1.60	1.61	-0.53	33.54	38.96
1981	44.26	86.11	4.85	9.72	13.24	-4.87			61.93	1.21	1.08	-0.40	34.14	39.81
1982	56.35	368.93	20.78	17.24	13.73	3.54			62.26	0.88	0.68	1.05	40.16	34.52
1983	62.21	338.21	19.05	19.56	12.53	-0.51	19.02	1.66	61.45	1.69	1.73	-1.38	42.93	46.20
1984	47.07	310.87	17.51	14.82	14.22	2.69	21.89	1.91	62.59	0.55	0.35	1.42	35.58	30.05
1985	51.10	314.96	17.74	17.46	12.48	0.28	24.58	2.14	61.42	1.72	1.77	1.82	37.60	33.68
1986	45.03	248.38	13.99	9.12	10.69	4.87	24.06	2.10	60.21	2.93	3.59	-3.47	34.54	36.60
1987	47.06	387.04	21.80	14.97	14.73	6.83	20.84	1.82	62.93	0.21	0.13	1.67	35.58	25.40
1988	52.71	333.07	18.76	14.79	12.45	3.97	11.21	0.98	61.40	1.74	1.80	-0.50	38.40	35.43
1989	43.16	183.04	10.31	9.01	13.00	1.30	8.23	0.72	61.77	1.37	1.30	-1.30	33.57	34.87
MEAN	48.87	232.78	13.11	12.95	12.95		18.55	1.62					36.45	36.37
STD DEV	4.98	92.33	5.20	3.18	1.18		5.90	0.51					2.48	5.21
SUM	977.45	4655.64	262.23	258.94	258.94	3.29	129.83	11.32					729.06	727.31

TABLE 5.2 (continued) for Example Calculations

Given Columns: Date, P, Da(cfs), WW, GWT, DWT for Chuluota, 1970

Column (Da inches/yr)

$$Da\left(\frac{inches}{yr}\right) = \frac{177.46\ \left(\frac{ft^3}{sec}\right) * 86{,}400\ \left(\frac{sec}{day}\right) * 365\ \left(\frac{day}{yr}\right)}{241 (sq.\ miles) * 640\ \left(\frac{acres}{sq.mile}\right)}$$

$$\frac{12\left(\frac{inches}{ft}\right)}{43{,}560\ \left(\frac{ft^2}{acre}\right)} = 10.00\ \frac{inches}{yr}$$

Column (ET_{max})

$$ET_{max} = 2.14(1-.59)(42.09)^{.657} + 4.53(.59)^{1.76}(42.09)^{.68} = 33.00\ \left(\frac{in}{yr}\right)$$

Column (Dc inches/yr)

$$Dc\ \left(\frac{inches}{yr}\right) = 42.09\ \left(\frac{inches}{yr}\right) - (4.13-.77) - 33.00 + 0.00$$

$$= 12.45\ \left(\frac{inches}{yr}\right)$$

Column (Da-Dc)

$$Da - Dc = 10.00 - 12.45 = -2.45\ in/yr$$

Column (WW inches/yr)

$$WW\ \left(\frac{inches}{yr}\right) = \frac{MGD * 365\ \left(\frac{day}{yr}\right)}{7.48\ \left(\frac{gal}{ft^3}\right) * 241\ (sq.miles) * 640\ \left(\frac{acres}{sq.mile}\right)}$$

$$\frac{1}{43{,}560\ \left(\frac{ft^2}{acre}\right) * 12\ \left(\frac{inches}{ft}\right)}$$

Column (ET_{cal} inches/yr)

$$ET_{cal}\ \left(\frac{inches}{yr}\right) = 42.09 + 0.00 - 10.00 - (4.13 - .77) = 28.73\ \left(\frac{inches}{year}\right)$$

An alternate method used in calculating ET is Thornthwaite's equation, which is:

$$ET = 1.6(10\frac{t}{TE})^a \tag{5.6}$$

where:
a = .49239 + .01792TE
ET = monthly evapotranspiration (cm)
t = mean monthly temperature (C)
TE = Thornthwaite's temperature efficiency

$$index = \sum_{i=1}^{12}(\frac{t_i}{5})^{1.514} \tag{5.7}$$

Thornthwaite's equation yielded results consistent with the design purposes of the equation, that is, the equation only takes into account temperature, and assumes a readily available supply of water. In other words, it does not take into account dry seasons which may reduce evapotranspiration because less water is available in the plant root zone and fewer water surfaces exist. The results obtained by Thornthwaite's method were compared to those results obtained from the mass balance by calculating the residuals. Very high residuals were found indicating a substantial difference between the two methods.

Another method for determining evapotranspiration was developed by Kenneth M. Turner from the California Department of Water Resources (Turner, 1991). Turner's equation for watershed evapotranspiration is:

$$ET_{ws} = 2.14(1-C)P^{.647} + 2.67C^{.865}*P^{.677} \tag{5.8}$$

where,

ET_{ws} = watershed evapotranspiration
C = fraction of nonherbaceous coverage
(1-C) = fraction of herbaceous coverage
P = precipitation

Turner's equation was developed for large unmanaged watersheds in a mediterranean or sub-tropical climate, similar to that of Florida. The equation takes into account herbaceous and non-herbaceous (woody) vegetation and has been calibrated for evapotranspiration and rainfall in inches for a watershed in California (Lake Cachuma on the Santa Ynez River). Turner suggests this equation does not yield values as variable as the historical data; therefore, it is not useful for calculating extreme values and in fact under-estimates the actual values. As a result, Turner suggested an equation for the maximum possible evapotranspiration for a given watershed as

$$ET_{max} = 2.14(1-C)P^{.657} + 4.53C^{1.76} * P^{.68} \tag{5.9}$$

where;

ET_{max} = Maximum annual watershed evapotranspiration (inches)
C = Fraction of nonherbaceous vegetation over watershed
P = Precipitation (inches)

The rates calculated by Turner's ET_{max} and ET_{ws} equations were compared with the evapotranspiration rates calculated from the mass balance (ET_{cal}) to determine which equation produces the best results. From physical observation and aerial photos, we use a C factor of 0.60.

The ET_{ws} model as previously stated frequently under-estimates the rate of evapotranspiration. This is shown in Table 5.1 and Tables 5.3 and 5.4 by the relatively high negative sum of the differences at each site between the evapotranspiration rates calculated by Turner's ET_{ws} equation and the mass balance method ET_{cal} and the sum of the differences for Chuluota were -40.02; Magnolia Ranch were -209.70; and Union Park were -30.70. However, the results attained by the ET_{max} equation compares favorably with those rates calculated by the mass balance method and the sum of differences were 1.73, 26.13, and 3.23 for Chuluota, Magnolia Ranch and Union Park repectively. The fraction nonherbaceous was varied until the lowest sum of differences was obtained. The fraction of vegetated areas used for the best fit equation were compared to vegetation maps and the fractions are at least reasonable.

The mass balance was repeated twice again with the first assumption being a net aquifer exchange of +1 inch/year and next an exchange of -1 inch/year. Evapotranspiration values were calculated from the mass balance (ET_{cal}) and then were compared to independent estimates of ET. Again, ET_{max} was the best predictor as measured by the mass balance estimate and that estimated by an empirical equation.

Therefore, based on the mass balance analysis and equations for estimating ET for the Econlockhatchee River Basin, Turner's ET_{max} equation is a more accurate estimator of the true evapotranspiration rates of the watershed and will be used in a mass balance equation to predict future stream flows.

Table 5.3
A Comparison For Magnolia Ranch For ET Calculated Using Turner's ET Equations ET_{ws} and ET_{max} Versus ET Calculated (ET_{cal}) From Mass Balance (inches/year)

	MAGNOLIA RANCH				
	ET_{cal}	ET_{max}	$ET_{max}-ET_{cal}$	ET_{ws}	$ET_{ws}-ET_{cal}$
1972	47.06	42.38	-4.67	28.34	-18.72
1973	42.34	41.37	-0.98	27.68	-14.66
1974	34.83	39.02	4.19	26.18	-8.65
1975	41.91	38.96	-2.95	26.14	-15.77
1976	42.56	39.45	-3.11	26.45	-16.11
1977	38.97	36.29	-2.68	24.42	-14.55
1978	37.54	40.21	2.67	26.94	-10.60
1979	34.49	41.10	6.61	27.52	-6.97
1980	40.39	36.32	-4.06	24.44	-15.95
1981	43.22	36.97	-6.25	24.85	-18.37
1982	35.86	43.51	7.65	29.06	-6.80
1983	40.75	46.51	5.76	30.98	-9.77
1984	33.99	38.53	4.55	25.86	-8.12
1985	38.43	40.73	2.30	27.27	-11.15
1986	33.68	37.40	3.72	25.13	-8.55
1987	29.60	38.53	8.93	25.86	-3.74
1988	41.15	41.59	0.44	27.83	-13.32
1989	32.32	36.35	4.03	24.45	-7.87
SUM			26.13		-209.70

TABLE 5.4
A Comparison For Union Park For ET Calculated Using Turner's ET Equations ET_{ws} and ET_{max} Versus ET Calculated (ET_{cal}) From Mass Balance (inches/year)

	UNION PARK				
	ET_{cal}	ET_{max}	$ET_{max}-ET_{cal}$	ET_{ws}	$ET_{ws}-ET_{cal}$
1970	31.46	32.58	1.12	31.07	-0.39
1971	45.52	35.21	-10.32	33.55	-11.97
1972	43.88	38.62	-5.25	36.78	-7.10
1973	36.82	37.70	0.87	35.91	-0.92
1974	26.51	35.57	9.06	33.89	7.39
1975	40.20	35.51	-4.69	33.84	-6.36
1976	36.13	35.96	-0.18	34.26	-1.87
1977	36.01	33.09	-2.92	31.55	-4.46
1978	38.66	36.65	-2.02	34.92	-3.75
1979	34.85	37.46	2.61	35.68	0.84
1980	38.64	33.11	-5.52	31.57	-7.06
1981	36.04	33.70	-2.34	32.13	-3.92
1982	34.83	39.64	4.81	37.74	2.92
1983	43.35	42.37	-0.98	40.32	-3.03
1984	31.15	35.12	3.98	33.47	2.33
1985	38.43	37.12	-1.31	35.36	-3.07
1986	34.75	34.09	-0.65	32.50	-2.25
1987	20.97	35.12	14.15	33.47	12.50
1988	34.41	37.90	3.49	36.10	1.69
1989	33.81	33.13	-0.68	31.59	-2.22
SUM			3.23		-30.70

5.3 MODEL FOR ESTIMATING NET SURFICIAL AQUIFER MOVEMENT

The mass balance model using the ET_{max} equation and historical data for stream flow, wastewater, precipitation, and storage change will be used to check the assumption that net surficial aquifer water movement over long periods of time is near zero. Also, the yearly changes can be estimated using a model based on a time frame of one year. Rearranging equation 5.2 with (D_a = D and ET_{max} = ET) to solve for net surficial aquifer groundwater movement yields:

$$G = -P - WW + D_a + ET_{max} - S_1 + S_2 \qquad (5.10)$$

where: G = net surficial aquifer water movement to the surficial from the deeper aquifers.

When the net groundwater movement is from the surficial to the deeper aquifers, the sign of the term G will be negative indicating a loss of storage. Some of the parameters on the right-hand side of equation 5.10 (P, WW, D_a) were directly measured, while ET_{max} and groundwater storage are estimated by indirect measures. Thus, there are no assumptions of negligible or zero quantities.

<u>For the Chuluota site:</u>

The mass balance for the Chuluota site is based on twenty years of data and is shown in spreadsheet form in Table I.4 in Appendix I. Equation 5.10 is listed and parameter values in units of inches/year are:

$$G = -P - WW + D_a + ET_{max} - S_1 + S_2$$

G = -977.45 - 11.32 + 262.23 + 729.06 - 0.77 + 1.30

G = 3.05 inches or 0.15 inches/year to the surficial aquifer.

For the Magnolia Ranch Site:

The mass balance data for the Magnolia Ranch site using 18 years of data is placed into spreadsheet form and is shown in Table I.5 in Appendix I with parameter values of:

$$G = -888.12 - 0 + 175.58 + 715.23 - 0.40 + 1.30$$

G = 3.59 inches or 0.20 inches/year to the surficial aquifer.

For the Union Park site:

The mass balance is shown in Appendix I for 20 years of data and with parameter values of:.

$$G = -977.45 - 0 + 261.81 + 715.42 - 0.77 + 1.30$$

G = -1.31 inches or -0.07 inches/year from the surficial aquifer.

Essentially, the net exchange of water between aquifers at the three sites over 18 to 20 years using the data of this report is approximately equal to zero. However, changes from year to year are possible because of significantly greater or lesser rainfall amounts in any one year compared to the average rainfall. The variability is shown in Tables I.7, I.8, and I.9 in Appendix I. A surficial aquifer water level change from the deeper aquifer to the surficial aquifer are shown by a positive G value.

5.4 FUTURE AVERAGE YEARLY STREAM FLOW PREDICTIONS

Using the results from the previous sections, a mass balance equation was developed for the Chuluota gage site to predict average yearly stream flow (inches/year) assuming surficial aquifer discharge to the river and storage change are negligible.

$$D_p = P + WW - ET_{max} \quad (5.11)$$

where; D_p = predicted stream flow (inches/year)

The predicted stream flow was compared to the actual data for stream flow assuming the net surficial aquifer input to the River and yearly storage change were zero (see Table 5.5 and Tables I.5 and I.6). A graph of predicted versus actual flow is shown in Figure 5.1. Reasonable agreement was found around the average actual stream flow (about 14 -15 inches/year). Also reasonable agreement was obtained as measured by the sum of the difference in the cumulative error being close to zero (3.29 inches/20 years at Chuluota, 3.09 inches/18 years at Magnolia Ranch, and 3.23 inches/20 years at Union Park). Differences between the actual and the predicted for each year do exist, but are lower around average rainfall and runoff conditions. The absolute residuals between predicted and measured were arranged in an empirical probability distribution and the normal distribution best fit the empirical, indicating the residuals are random in nature (see Figure I.1).

A more factual and accurate predictive yearly stream flow equation should consider runoff to the River from directly connected impervious areas separately from pervious areas. As an example using past data, consider the years 1979 and 1986 that have near average yearly rainfall and stream flow. Assume that the watershed has 4% directly connected impervious area, a 2% additional lake area for stormwater management, and a lake evaporation of 50 inches/year. Calculations for predictive stream flow considering directly connected impervious areas and wastewater

TABLE 5.5

PREDICTED STREAM FLOW
ASSUMING STORAGE CHANGE AND NET SURFICIAL AQUIFER DISCHARGE = 0
ON THE ECONLOCKHATCHEE RIVER AT CHULUOTA

Dp = PREDICTED STREAMFLOW BY MASS BALANCE
Da = MEASURED STREAMFLOW
P = RAINFALL

ET = EVAPOTRANSPIRATION
WW= WASTEWATER INPUTS
FRACTION NONHERBACEOUS (C 0.59

DP = P - ETmax + WW

ETmax = 2.14(1-C)P^.657 + 4.53C^1.76*P^.68

CHULUOTA AT SNOWHILL

DATE	P (in/yr)	Da (cfs)	Da (in/yr)	WW (MGD)	WW (in/yr)	ETmax (in/yr)	Dp (in/yr)
1970	42.09	177.54	10.00			33.00	9.09
1971	47.24	126.05	7.10			35.67	11.57
1972	54.21	162.45	9.15			39.13	15.08
1973	52.29	220.15	12.40			38.19	14.10
1974	47.96	314.07	17.69			36.03	11.93
1975	47.84	159.08	8.96			35.97	11.87
1976	48.74	218.02	12.28			36.43	12.31
1977	43.07	112.92	6.36			33.52	9.55
1978	50.14	243.05	13.69			37.13	13.01
1979	51.80	268.44	15.12			37.95	13.85
1980	43.12	83.27	4.69			33.54	9.58
1981	44.26	86.11	4.85			34.14	10.12
1982	56.35	368.93	20.78			40.16	16.19
1983	62.21	338.21	19.05	19.02	1.66	42.93	20.94
1984	47.07	310.87	17.51	21.89	1.91	35.58	13.40
1985	51.10	314.96	17.74	24.58	2.14	37.60	15.64
1986	45.03	248.38	13.99	24.06	2.10	34.54	12.59
1987	47.06	387.04	21.80	20.84	1.82	35.58	13.30
1988	52.71	333.07	18.76	11.21	0.98	38.40	15.29
1989	43.16	183.04	10.31	8.23	0.72	33.57	10.31
MEAN	48.87	232.78	13.11	18.55	1.62	36.45	12.99
STD DEV	4.98	92.33	5.20	5.90	0.51	2.48	2.75
SUM	977.45	4655.64	262.23	129.83	11.32	729.06	259.71

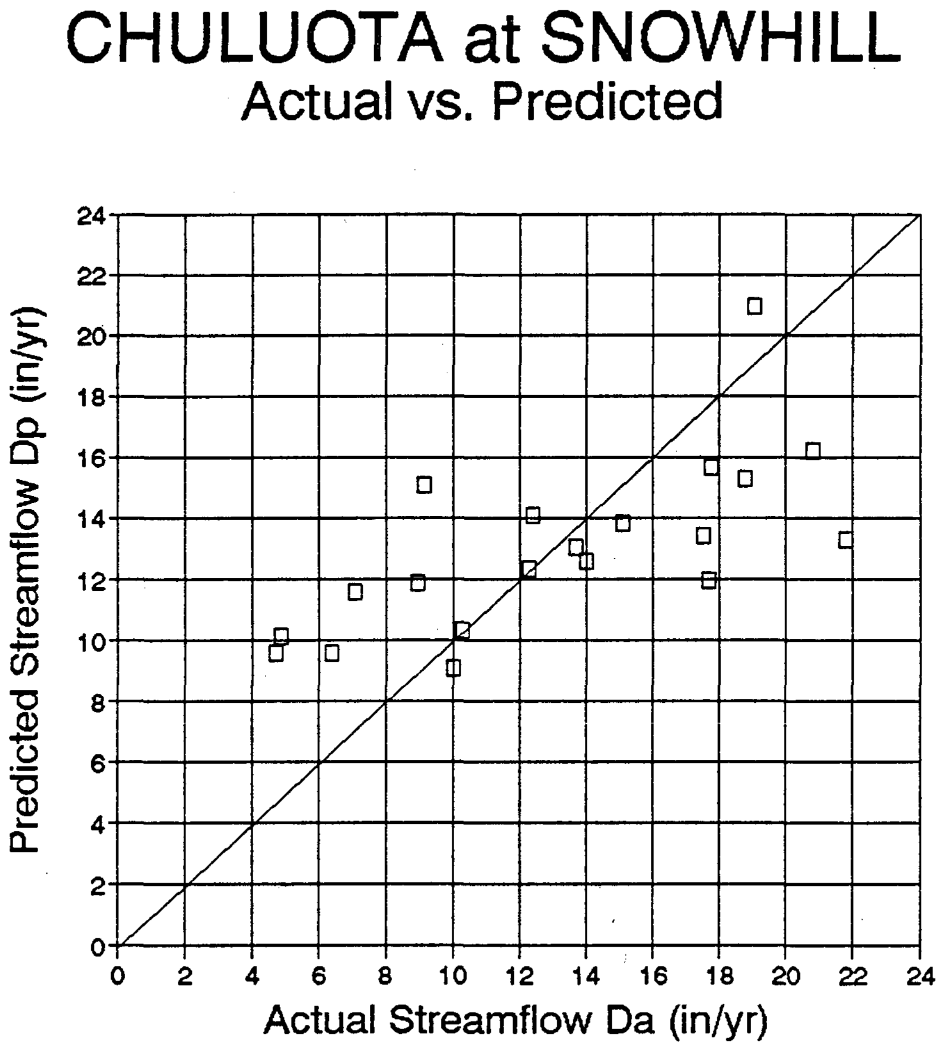


Figure 5.1 Predicted versus Actual Average Yearly Stream Flow Using Equation 5.11.

inputs are:

Flow = discharge from pervious + directly connected impervious

= Rain (fraction pervious) + WW - ET_{max}

+ Runoff (fraction impervious) - Evaporation (fraction ponds)

for 1979:

{51.80(.94) + 0 - 37.95(.94)} + {51.80(.06) - 50(.02)} = 15.13 in

and predicted flow in 1979 is 15.13 inches which compares to an actual flow of 15.12 inches and using equation 5.11, the predicted was 13.85 inches.

for 1986:

{45.03(.94) + 2.1 - 34.54(.94)} + {45.03(.06) - 50(.02)} = 13.66 in

and predicted flow in 1986 is 13.66 inches which compares to an actual flow of 13.99 inches and using equation 5.11, the predicted was 12.59 inches. Thus, separating the directly connected impervious area may produce more accurate estimates for near average yearly conditions.

Equation (5.11) was modified to include discharge to the River from directly connected impervious areas and evaporation from newly created stormwater pond areas, and is written as:

Discharge = Discharge from pervious + directly connected impervious

$$D_p = \{P(f_p) + WW - ET_{max}(f_p)\} + \{R(1-f_p) - E(f_{pond})\} \qquad \textbf{(5.12)}$$

where; D_p = predicted stream flow (in/yr)
R = rainfall excess discharged from directly connected impervious areas or managed watersheds (in/yr)
E = pond evaporation based on 50 inches/year
f_p = fraction pervious area in the watershed
f_{pond} = fraction of stormwater pond area, assumed at 5%.

The rainfall on the directly connected impervious area can be directly discharged, or some of the rainfall excess from the directly connected areas can be managed by reuse or diverted to pervious areas. The managed discharge from the directly connected impervious area is then defined as that remaining after diversion of rainfall excess from impervious surfaces to pervious ones or that remaining for discharge after the reuse of ponded water.

Yearly stream flow will be predicted for Chuluota using average rainfall conditions (assumed 51.00 inches/year), Turner's ET_{max} equation, negligible storage and surficial aquifer changes, wastewater inputs (assumed 2 inches/year at Chuluota), and three managed discharges from the directly connected impervious areas. The three managed rainfall excess conditions for 20% and 40% directly connected impervious areas are assumed as:

100% discharge from the impervious areas to the River,
50% discharge from the impervious areas to the River, and
10% discharge from impervious areas to the River.

The first condition for fraction discharged is assumed to be the current practice when development occurs, however in some cases more ponded water than runoff may be discharged to the River because the discharge elevation for a pond may be set below the groundwater table and thus the water table is lowered (Wanielista, Yousef, and Boss, 1988). Natural areas are assumed to have no directly connected impervious areas.

Substituting into equation (5.12) for each site and discharge condition including a natural condition results in the following predictions of stream flow. As an example for a developed condition of 20% directly connected impervious area, the evapotranspiration area is reduced to 75% of the total area with a pond area of 5%. Assumptions for the nonherbaceous fraction used in calculating ET_{max} are those that were used in fitting the best mass balance equation in the previous sections.

$$D_p = \{P(f_p) + WW - ET_{max}(f_p)\} + \{R(1-f_p) - E(f_{pond})\}$$

<u>For Chuluota</u>:

0/0[a] $D_p = \{51(1) + 2 - 37.6(1)\} + \{51(0) - 50(0)\}$
D_p = 15.4 inches/year

20/100 $D_p = \{51(.75)+2-37.6(.75)\} + \{51(.25)-50(.05)\}$
D_p = 22.3 inches/year

20/50 $D_p = \{51(.75)+2-37.6(.75)\} + \{51(.25)(.50)-50(.05)\}$
D_p = 15.9 inches/year

20/10 $D_p = \{51(.75)+2-37.6(.75)\} + \{51(.25)(.10)-50(.05)\}$
D_p = 10.8 inches/year

40/100 $D_p = \{51(.55)+2-37.6(.55)\} + \{51(.45)-50(.05)\}$
D_p = 29.8 inches/year

40/50 $D_p = (51(.55)+2-37.6(.55)\} + \{51(.45)(.50)-50(.05)\}$
D_p = 18.4 inches/year

40/10 $D_p = \{51(.55)+2-37.6(.55)\} + \{51(.45)(.10)-50(.05)\}$
D_p = 12.6 inches/year

[a] The first number is the directly connected impervious area and the second number is the percent of runoff from the directly connected impervious area that is discharged.

Impervious areas cause a reduction of evapotranspiration area with an increase in stormwater runoff. For the assumed development conditions, average annual stream flow increases unless a fraction of the runoff water can be reused in the watershed. Based on the assumptions of this report and a goal of maintaining yearly volumetric flow at the Chuluota gage when the watershed has 20% and 40% directly connected areas, a reduction in the volume of runoff from the impervious area should be about 50 % and 80% respectfully.

CHAPTER 6 CONCLUSIONS AND RECOMMENDATIONS

6.1 CONCLUSIONS

This project is in response to the April, 1990 Governing Board's directives to its staff to begin rulemaking that will develop Econlockhatchee Basin-specific stormwater management rule criteria consistent with the River Task Force recommendations. From these recommendations, two (II.B and II.E) specifically address water quantity/quality issues and require an estimate of the overall water budget for the entire Basin.

This project's objectives were:

(1) To develop an estimate of the overall water budget for the entire Basin using historical data.

(2) To perform statistical analysis on the historical hydrologic data.

(3) To install and monitor surficial aquifer wells within the Basin.

(4) To provide recommendations for the maintenance of surficial aquifer water table levels and stormwater management runoff discharge controls.

6.1.1 HISTORICAL DATA

The average yearly rainfall throughout the Econlockhatchee River Basin is approximately 51 inches of which 60 percent occurs during the wet season (June - October) and 40 percent occurs during the dry season (November - May). The same conclusion on wet and dry season rainfall volumes was obtained by the District.

Three USGS gaging stations are located on the River, namely: Chuluota at Snowhill, Magnolia Ranch and Union Park. The average yearly discharge at Chuluota for the 55 years of record was 14.79 inches (1.09 cfs/mi^2) with a maximum 40.92 inches (3.01 cfs/mi^2). At Magnolia Ranch, the average yearly discharge was 9.52 inches (0.70 cfs/mi^2), while at Union Park the average yearly discharge was 13.07 inches (0.96 cfs/mi^2). For the period of record, the average daily discharge at Chuluota, Magnolia Ranch, and Union Park were approximately 263 cfs, 24.2 cfs, and 25.6 cfs respectively. The average of maximum daily discharge for each year at Chuluota, Magnolia Ranch, and Union Park were 3078.72 cfs, 184.94 cfs, and 398.80 cfs respectively. Yearly stream flow volumes show a steady increase over the years of record.

Attenuation factors were estimated at each stream gaging site. The resulting attenuation factors for Chuluota, Magnolia Ranch and Union Park were 507, 268 and 264 respectively. These factors suggest the Magnolia Ranch and Union Park sites provide significantly more storage in the River and longer times of concentration than does the Chuluota site.

6.1.2 WATER TABLE FLUCTUATIONS

During the wet season and in partly developed areas and based on the data of this work, the water table rarely exceeded the estimated seasonal high value. It appears that the stormwater ponds and other practices related to development in the developed areas are responsible for the lowering of the water table. For the undeveloped sites, the water table did exceed the seasonal high water table a greater percentage of the time relative to the developed conditions.

6.2 STORMWATER RULES AND RECOMMENDATIONS

The following recommendations, based on the results of this work are:

1. Attenuation factors for stream flow measured at the three gaging sites should be given consideration in hydrologic modeling for flood control and water quality predictions. Specific values recommended for Chuluota, Magnolia Ranch, and Union Park are 484, 256, and 256 respectively.
2. The surficial aquifer should not be lowered by surface stormwater detention ponds. The discharge control elevation for the detention ponds should be set at or near the estimated seasonal high or reuse ponds should be used.
3. Volume control from directly connected impervious areas can be accomplished using reuse ponds or other methods to return ponded water to the ground, thus reducing the volume of discharge. It is recommended that at least 50% of the runoff water be reused or returned to the ground before discharge.
4. Hydrologic balances on a daily basis to incorporate the effect of groundwater on stream flow should be initiated to develop more accurate water quantity and quality

models.

5. Surficial aquifer levels and rainfall measurements should be continued in the Basin to provide base-line historical data on which future decisions related to development and protection of the water resources can be enhanced and technically supported.

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APPENDIX A

PRECIPITATION DATA

TABLE A.1 Rainfall data for Daytona Beach, Wet Season, Dry Season and Yearly

DAYTONA BEACH 1923-1990

Estimated Values

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEARLY	WET SEASON (JUNE-OCT)	DRY SEASON (NOV-MAY)
1923	0.80	0.93	2.48	1.24	6.58	7.45	5.13	6.77	2.15	5.58	0.09	1.14	40.34	27.08	13.26
1924	2.35	3.42	7.34	1.72	3.06	5.22	7.04	3.01	12.79	24.82	1.61	2.33	74.71	52.88	21.83
1925	2.60	1.77	2.07	0.92	6.01	3.21	5.61	2.39	1.51	2.41	1.45	6.80	36.75	15.13	21.62
1926	4.40	1.45	4.07	4.32	1.23	12.62	11.73	3.59	3.19	2.67	3.22	0.84	53.33	33.80	19.53
1927	0.59	2.09	1.36	0.89	0.40	9.08	3.68	3.19	2.82	4.15	2.16	1.10	31.51	22.92	8.59
1928	0.98	1.44	3.08	4.35	5.94	5.26	4.99	3.53	7.34	3.17	0.21	0.80	41.09	24.29	16.80
1929	0.39	0.60	1.27	3.48	3.22	1.66	6.30	3.81	6.61	2.00	0.72	2.86	32.92	20.38	12.54
1930	2.13	2.55	8.17	1.87	2.85	15.44	2.05	2.80	5.66	2.56	2.04	6.58	54.70	28.51	26.19
1931	3.87	1.01	2.66	7.46	3.50	1.68	5.67	8.72	5.26	0.83	0.59	2.50	43.75	22.16	21.59
1932	1.53	0.71	2.81	0.38	6.77	10.00	1.64	5.52	3.57	4.14	9.58	0.14	46.79	24.87	21.92
1933	3.45	2.12	1.17	2.88	2.60	3.44	4.56	5.70	5.18	5.83	2.66	0.25	39.84	24.71	15.13
1934	0.55	3.11	3.59	5.24	12.15	11.50	6.04	5.00	3.21	2.56	0.40	1.81	55.16	28.31	26.85
1935	1.98	3.87	0.25	3.73	5.03	6.84	8.75	5.17	7.71	3.26	1.34	1.78	49.71	31.73	17.98
1936	3.94	8.82	2.24	0.91	2.97	9.74	4.28	3.45	1.99	4.78	2.10	2.50	47.72	24.24	23.48
1937	1.13	4.50	4.80	3.88	3.35	1.92	3.99	5.52	8.38	4.05	7.70	1.35	50.57	23.86	26.71
1938	0.98	2.00	1.00	0.66	2.40	3.31	7.43	0.50	12.26	3.01	2.10	1.25	36.90	26.51	10.39
1939	1.26	0.20	0.82	6.07	1.93	7.10	4.92	3.00	6.69	3.43	0.55	0.57	36.54	25.14	11.40
1940	1.74	1.59	1.79	2.29	1.31	2.73	8.13	3.84	10.14	0.15	0.06	3.50	37.27	24.99	12.28
1941	3.44	4.30	3.59	2.45	1.35	7.89	10.03	5.93	2.28	13.58	5.56	3.71	64.11	39.71	24.40
1942	2.04	2.19	6.13	0.84	2.04	11.01	2.12	3.65	6.35	0.47	1.05	2.10	39.99	23.60	16.39
1943	1.45	0.18	6.41	2.65	2.94	3.94	10.87	11.29	11.08	7.10	0.59	0.71	59.21	44.28	14.93
1944	1.59	0.30	7.14	2.95	0.36	7.28	13.77	8.67	6.28	4.04	0.60	0.11	53.09	40.04	13.05
1945	3.53	0.89	0.47	1.50	1.48	5.04	7.04	6.08	9.00	4.78	0.78	4.14	44.73	31.94	12.79
1946	1.59	2.76	1.62	0.49	2.65	3.80	8.00	10.05	10.08	3.57	2.70	0.59	47.90	35.50	12.40
1947	0.74	6.03	5.16	4.89	4.58	12.44	9.39	6.12	6.04	5.56	1.84	0.73	63.52	39.55	23.97
1948	3.92	1.16	5.14	2.36	0.49	2.40	10.43	7.31	9.82	8.29	1.07	1.93	54.32	38.25	16.07
1949	0.37	1.95	2.01	7.12	1.40	4.24	5.96	11.46	6.26	3.65	1.86	3.93	50.21	31.57	18.64
1950	0.15	0.59	3.53	2.79	2.13	6.45	5.56	3.88	5.86	13.00	0.74	2.54	47.22	34.75	12.47
1951	0.77	2.46	1.18	3.28	2.53	2.66	3.88	4.19	14.02	8.54	3.15	2.88	49.54	33.29	16.25
1952	0.66	6.76	3.01	1.66	4.39	1.35	1.26	9.02	11.92	5.41	1.96	0.71	48.11	28.96	19.15
1953	1.75	3.35	7.75	4.97	1.46	1.37	8.67	19.89	10.00	2.70	1.20	4.85	67.96	42.63	25.33
1954	0.37	0.46	2.33	6.29	3.21	2.35	3.50	3.04	1.88	4.91	3.98	1.24	33.56	15.68	17.88
1955	2.47	1.43	1.84	1.78	1.55	7.76	5.67	2.64	6.66	3.17	2.61	1.22	38.80	25.90	12.90
1956	2.55	0.90	0.25	2.42	2.48	7.41	3.01	4.06	1.94	5.82	0.46	0.06	31.36	22.24	9.12
1957	0.97	1.62	3.13	1.73	5.65	4.23	10.53	4.01	10.65	1.80	0.82	1.34	46.48	31.22	15.26
1958	3.94	4.73	5.52	2.24	2.27	6.06	1.96	4.00	2.19	8.52	1.77	1.95	45.15	22.73	22.42
1959	4.53	2.13	7.70	3.17	2.40	8.13	5.68	3.60	5.26	7.12	4.26	2.26	56.24	29.79	26.45
1960	1.16	9.13	7.52	0.76	0.62	10.75	8.70	6.84	10.96	0.97	0.53	1.24	59.18	38.22	20.96
1961	1.96	3.70	1.17	2.16	2.39	6.81	5.16	7.68	3.20	2.25	2.85	0.73	40.06	25.10	14.96
1962	0.90	0.82	1.82	0.78	0.16	7.96	10.04	8.50	8.84	3.57	2.49	0.71	46.59	38.91	7.68
1963	2.91	5.83	1.46	1.40	6.82	7.42	6.89	2.01	5.43	2.71	7.98	2.17	53.03	24.46	28.57
1964	5.29	2.65	4.84	3.61	2.58	4.73	7.67	10.81	11.39	3.54	3.13	2.52	62.76	38.14	24.62
1965	2.22	3.00	3.05	1.00	0.08	9.00	3.72	2.97	4.33	3.65	0.97	2.14	36.13	23.67	12.46

TABLE A.1 (Continued)

DAYTONA BEACH 1923-1990

Estimated Values

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEARLY	WET SEASON (JUNE-OCT)	DRY SEASON (NOV-MAY)
1966	2.89	5.58	0.36	2.56	6.77	15.19	7.09	7.93	4.49	4.60	1.19	1.60	60.25	39.30	20.95
1967	1.26	3.98	0.31	0.00	0.73	7.51	9.04	3.02	5.56	0.19	0.00	2.98	34.58	25.32	9.26
1968	0.42	1.73	1.79	0.40	4.79	14.38	6.25	11.09	6.07	7.44	2.43	1.38	58.17	45.23	12.94
1969	1.53	2.03	2.74	0.12	6.47	2.47	2.61	9.40	8.89	6.97	1.96	5.03	50.22	30.34	19.88
1970	3.94	3.79	3.59	2.08	1.68	2.62	3.65	3.61	3.54	3.87	0.31	0.72	33.40	17.29	16.11
1971	0.61	5.48	2.00	2.57	3.12	4.73	3.20	3.97	7.20	9.53	1.33	2.49	46.23	28.63	17.60
1972	2.37	3.97	6.66	1.41	4.02	7.06	3.22	8.29	0.42	3.08	10.96	2.48	53.94	22.07	31.87
1973	4.66	2.02	2.63	3.09	2.41	4.32	4.69	7.58	5.14	4.40	0.75	2.54	44.23	26.13	18.10
1974	0.30	1.10	3.19	0.44	2.66	8.65	6.31	9.96	10.50	1.42	0.48	2.20	47.21	36.84	10.37
1975	1.66	2.27	1.52	2.96	2.99	9.00	6.89	3.16	6.61	5.84	1.46	0.83	45.19	31.50	13.69
1976	0.60	0.70	2.03	4.27	12.33	11.14	1.07	3.80	5.10	1.90	3.38	6.00	52.32	23.01	29.31
1977	4.69	2.45	1.43	0.41	4.61	1.15	2.23	7.91	6.55	1.46	3.04	4.74	40.67	19.30	21.37
1978	2.89	5.98	2.31	3.30	0.56	7.48	5.53	7.99	4.63	8.31	0.07	4.89	53.94	33.94	20.00
1979	7.10	1.94	4.08	3.96	6.13	3.03	11.69	5.24	15.20	2.13	7.96	0.56	69.02	37.29	31.73
1980	3.75	0.76	2.41	2.54	3.62	5.57	5.82	4.13	1.83	2.42	3.12	1.39	37.36	19.77	17.59
1981	0.32	5.54	3.00	0.29	1.74	1.03	4.69	7.19	7.59	1.08	2.57	4.64	39.68	21.58	18.10
1982	2.46	2.08	5.81	6.03	4.68	8.29	5.31	3.21	4.96	3.23	1.58	2.53	50.17	25.00	25.17
1983	2.51	5.96	7.71	6.17	3.86	6.37	1.92	6.82	8.57	10.11	2.01	11.98	73.99	33.79	40.20
1984	1.46	3.44	1.31	5.29	6.09	2.84	6.77	4.02	10.73	1.09	3.52	0.20	46.76	25.45	21.31
1985	0.79	0.58	1.49	3.14	3.42	6.81	2.16	9.83	10.62	4.08	0.41	2.05	45.38	33.50	11.88
1986	7.16	1.28	1.85	0.44	0.99	3.5	14.43	3.47	3.58	3.47	5.08	2.76	48.01	28.45	19.56
1987	2.21	6.64	7.94	0.28	2.65	3.81	2.78	4.89	5.63	2.77	5.87	0.25	45.72	19.88	25.84
1988	5.36	1.72	4.57	1.68	1.78	2.39	2.94	4.79	6.81	1.24	6.7	0.93	40.91	18.17	22.74
1989	6.82	0.64	2.01	2.92	2.02	1.84	2.44	4.47	5.04	11.64	0.88	3.93	44.65	25.43	19.22
1990	1.42	5.61	1.94	1.48	1.45	2.71	5.85	7	1.61	5.88	0.83	0.34	36.12	23.05	13.07
MEAN	2.28	2.78	3.23	2.58	3.25	6.10	5.88	5.82	6.54	4.65	2.37	2.27	47.75	29.00	18.75
STD Deviation	1.70	2.06	2.21	1.82	2.39	3.57	3.03	3.11	3.37	3.81	2.34	1.98	9.98	7.70	6.37

TABLE A.2 Rainfall data for Gainesville, Wet Season, Dry Season and Yearly

GAINESVILLE 1897-1990 (inches)

Estimated Values

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEARLY	WET SEASON (JUNE-OCT)	DRY SEASON (NOV-MAY)
1897	2.05	8.78	0.96	4.89	2.18	4.41	7.18	5.99	7.29	4.31	1.08	4.35	53.47	29.18	24.29
1898	1.07	3.49	0.83	2.85	2.06	3.28	12.71	8.21	3.47	6.27	2.93	3.31	50.48	33.94	16.54
1899	3.81	4.15	0.80	0.14	1.75	2.43	6.89	7.69	3.98	1.76	0.57	1.15	35.12	22.75	12.37
1900	3.98	1.85	7.85	7.83	4.05	10.12	4.15	2.33	2.66	2.39	0.69	4.34	52.24	21.65	30.59
1901	2.69	9.20	6.97	1.60	2.03	8.66	7.76	9.54	4.08	3.30	0.27	2.97	59.07	33.34	25.73
1902	0.27	3.43	4.15	1.70	1.14	8.21	4.85	2.77	10.42	3.30	4.27	7.31	51.82	29.55	22.27
1903	5.15	5.29	6.68	0.37	5.05	5.71	5.72	8.63	4.12	0.70	0.25	1.49	49.16	24.88	24.28
1904	11.79	2.83	1.35	1.83	0.88	6.08	7.33	4.29	4.95	2.77	2.63	2.32	49.05	25.42	23.63
1905	0.94	3.29	2.64	1.54	4.27	8.82	8.30	14.90	5.99	2.95	0.46	5.63	59.73	40.96	18.77
1906	3.00	1.73	1.57	0.56	6.67	10.55	10.28	4.49	2.29	1.83	0.11	0.35	43.43	29.44	13.99
1907	0.81	0.87	0.32	3.08	3.91	4.35	6.78	5.55	10.39	2.57	2.38	4.54	45.55	29.64	15.91
1908	3.28	2.95	0.16	1.66	1.78	8.95	6.28	5.31	9.62	2.38	0.65	0.10	43.12	32.54	10.58
1909	3.15	1.71	1.88	1.02	1.83	4.28	16.41	4.84	1.48	1.00	0.30	3.77	41.67	28.01	13.66
1910	1.44	2.04	2.67	1.49	1.46	11.89	6.89	9.32	1.27	6.70	2.79	0.76	48.72	36.07	12.65
1911	1.84	0.13	1.09	1.23	4.45	2.91	3.45	8.16	5.87	1.50	4.53	3.68	38.84	21.89	16.95
1912	5.38	2.47	5.99	1.42	3.25	11.63	5.98	7.71	8.72	4.14	1.33	3.02	61.04	38.18	22.86
1913	2.94	4.83	5.79	0.63	2.67	4.07	9.39	7.93	6.50	2.53	0.29	6.70	54.27	30.42	23.85
1914	5.29	3.60	3.40	1.28	0.16	4.82	7.02	3.08	7.23	3.03	1.54	5.18	45.63	25.18	20.45
1915	3.00	2.98	4.39	0.88	2.43	5.02	3.81	5.32	5.34	7.21	2.59	4.88	47.85	26.70	21.15
1916	0.61	0.22	0.82	1.20	5.15	6.15	8.00	7.12	3.69	2.04	3.95	7.25	46.20	27.00	19.20
1917	0.98	2.53	1.40	2.34	0.88	2.70	6.73	5.74	6.60	0.55	0.72	1.62	32.79	22.32	10.47
1918	2.90	0.25	1.98	5.11	2.72	4.61	4.36	10.21	5.46	3.81	3.39	3.46	48.26	28.45	19.81
1919	2.06	4.50	5.37	1.36	4.67	7.83	6.49	8.12	6.90	3.32	1.46	2.23	54.31	32.66	21.65
1920	3.19	6.61	1.01	8.24	5.52	5.99	7.00	5.73	11.36	0.34	4.86	3.86	63.71	30.42	33.29
1921	3.39	0.82	0.14	1.32	3.03	5.70	15.03	2.82	2.46	6.03	4.97	1.44	47.15	32.04	15.11
1922	3.03	3.45	3.25	2.16	7.59	3.93	5.09	6.25	4.26	7.86	0.17	4.29	51.33	27.39	23.94
1923	1.05	2.06	1.95	0.89	8.01	12.51	2.30	7.04	1.81	1.94	0.23	1.93	41.72	25.60	16.12
1924	5.53	3.56	9.97	5.15	0.84	5.66	14.45	3.20	6.50	5.53	0.39	1.18	61.96	35.34	26.62
1925	5.43	2.30	1.41	0.88	2.46	4.84	8.11	6.06	2.00	3.21	0.97	8.02	45.69	24.22	21.47
1926	5.59	1.42	4.93	4.51	1.60	8.85	7.03	7.00	5.69	0.88	4.39	1.60	53.49	29.45	24.04
1927	0.19	5.78	2.33	0.46	0.46	10.53	5.46	5.48	1.02	2.33	1.03	1.82	36.89	24.82	12.07
1928	1.26	2.73	2.91	8.52	4.50	7.64	9.23	11.91	9.38	1.41	0.22	1.03	60.74	39.57	21.17
1929	6.33	1.51	4.53	4.24	3.89	7.06	6.24	5.71	8.86	1.31	0.25	4.88	54.81	29.18	25.63
1930	3.87	3.11	6.49	2.12	4.99	12.03	3.10	3.40	8.64	1.08	1.68	4.90	55.41	28.25	27.16
1931	2.02	2.72	5.05	2.83	2.85	1.53	10.35	6.82	1.41	0.16	0.49	0.84	37.07	20.27	16.80
1932	1.41	1.90	5.26	1.61	1.21	10.00	3.89	4.78	3.44	1.15	5.89	0.37	40.91	23.26	17.65
1933	2.86	2.55	3.74	8.40	3.71	1.62	6.27	7.57	8.21	3.24	0.59	0.56	49.32	26.91	22.41
1934	0.44	4.65	2.58	6.03	6.52	8.57	6.33	5.01	1.68	5.75	0.52	0.86	48.94	27.34	21.60
1935	1.74	2.05	0.69	2.72	2.67	5.83	11.18	12.15	11.03	0.40	0.67	1.97	53.10	40.59	12.51
1936	3.97	7.88	2.78	0.46	3.09	7.21	7.00	5.11	1.08	8.13	0.10	2.63	49.44	28.53	20.91
1937	3.32	4.60	3.03	5.81	2.68	2.74	4.72	13.92	4.49	4.40	3.88	1.76	55.35	30.27	25.08
1938	1.90	2.24	1.38	0.68	5.34	9.63	5.11	5.95	4.61	9.19	0.74	0.53	47.30	34.49	12.81
1939	1.84	5.70	1.00	4.51	3.77	10.45	6.67	7.28	2.15	1.51	1.65	3.33	49.86	28.06	21.80
1940	2.65	4.17	2.89	6.91	3.34	5.77	5.86	5.47	2.70	0.09	0.32	8.72	48.89	19.89	29.00

TABLE A.2 (Continued)

GAINESVILLE 1897-1990 (inches)
Estimated Values

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEARLY	WET SEASON	DRY SEASON
1941	3.51	3.26	2.27	3.71	1.77	10.57	5.76	6.12	3.15	5.88	2.90	6.24	55.14	31.48	23.66
1942	4.09	4.54	7.25	0.52	0.54	9.31	2.79	5.08	5.88	2.21	0.39	4.70	47.30	25.27	22.03
1943	1.45	0.12	2.77	2.55	4.94	5.53	6.50	8.07	5.41	0.26	0.40	2.43	40.43	25.77	14.66
1944	4.02	1.59	8.57	6.44	1.80	2.22	9.32	7.16	2.66	10.00	0.31	1.13	55.22	31.36	23.86
1945	2.25	1.63	0.00	4.28	2.72	5.42	9.52	15.15	4.26	1.39	2.00	9.22	57.84	35.74	22.10
1946	1.95	2.74	2.26	1.70	7.00	11.58	10.25	5.67	4.13	4.57	1.28	0.19	53.32	36.20	17.12
1947	1.40	4.67	8.75	1.70	4.16	5.52	9.98	5.26	9.84	7.20	3.28	2.00	63.76	37.80	25.96
1948	6.19	1.83	8.51	2.06	2.99	3.31	7.94	9.82	3.35	5.96	1.20	3.10	56.26	30.38	25.88
1949	1.16	5.94	2.45	8.95	0.49	7.57	9.95	14.43	6.72	1.09	4.17	0.26	63.18	39.76	23.42
1950	0.11	0.54	4.75	2.16	0.92	2.80	12.63	1.45	11.99	6.35	0.24	2.79	46.73	35.22	11.51
1951	1.07	1.05	5.00	2.16	2.31	3.95	9.73	10.99	7.46	3.22	6.48	2.55	55.97	35.35	20.62
1952	1.04	7.32	2.33	3.20	4.44	3.31	3.85	3.99	4.66	4.73	0.88	2.39	42.14	20.54	21.60
1953	4.60	1.05	3.87	8.43	2.29	12.35	6.71	12.78	6.18	3.19	2.60	7.62	71.67	41.21	30.46
1954	1.12	1.64	2.58	3.05	3.54	3.81	3.75	5.02	4.79	2.70	1.44	1.80	35.24	20.07	15.17
1955	3.60	3.14	1.66	1.21	1.88	7.83	10.51	4.71	4.40	1.15	2.54	0.09	42.72	28.60	14.12
1956	3.14	4.19	0.84	2.78	4.51	9.67	7.24	6.81	3.05	5.57	0.16	0.02	47.98	32.34	15.64
1957	0.59	2.37	5.12	3.94	6.69	7.51	8.72	10.33	6.50	1.94	2.12	0.87	56.70	35.00	21.70
1958	4.10	3.80	7.15	5.68	5.54	4.91	7.62	8.98	1.56	3.91	3.36	3.25	59.86	26.98	32.88
1959	3.72	4.37	10.48	4.12	9.25	4.44	4.00	7.33	5.25	5.65	1.69	0.84	61.14	26.67	34.47
1960	2.51	3.76	7.48	2.73	1.37	12.80	9.40	7.63	6.38	6.12	0.12	2.64	62.94	42.33	20.61
1961	2.50	6.15	1.27	3.54	1.07	4.14	9.10	12.83	3.15	0.77	2.35	0.88	47.75	29.99	17.76
1962	1.66	1.87	2.30	1.79	2.19	8.35	7.04	8.62	6.00	3.28	1.92	1.69	46.71	33.29	13.42
1963	2.21	4.52	2.56	1.30	3.51	3.57	6.83	3.21	3.14	0.26	3.25	2.91	37.27	17.01	20.26
1964	8.87	6.61	1.87	4.23	1.61	4.86	10.59	14.15	13.04	2.15	2.40	6.57	76.95	44.79	32.16
1965	2.51	5.80	4.82	1.78	2.21	15.74	10.86	7.62	5.16	1.54	1.55	4.41	64.00	40.92	23.08
1966	3.58	6.18	1.93	1.85	8.92	7.26	4.46	5.11	12.25	1.44	0.59	1.13	54.70	30.52	24.18
1967	3.55	5.52	1.33	0.39	4.35	9.31	10.16	7.74	3.03	0.29	0.99	5.88	52.54	30.53	22.01
1968	0.67	2.36	2.23	0.18	3.15	5.95	9.45	12.27	5.21	4.25	3.09	1.02	49.83	37.13	12.70
1969	1.51	4.59	5.42	0.91	2.97	2.77	6.55	8.48	9.64	1.27	3.70	5.74	53.55	28.71	24.84
1970	4.32	7.92	7.55	2.98	6.93	6.53	7.36	10.80	1.87	1.97	0.15	2.15	60.53	28.53	32.00
1971	3.00	3.85	2.08	2.99	3.75	3.59	5.47	12.73	3.10	4.46	2.22	3.10	50.34	29.35	20.99
1972	4.98	3.31	7.51	2.89	9.19	10.22	3.16	12.99	1.12	0.99	7.27	4.15	67.78	28.48	39.30
1973	4.16	4.33	6.14	5.74	3.97	6.72	6.29	2.93	3.84	0.51	0.84	5.13	50.60	20.29	30.31
1974	0.25	2.58	2.39	1.17	5.68	10.05	7.95	7.20	7.27	0.91	1.03	4.03	50.51	33.38	17.13
1975	3.11	4.25	0.99	2.21	5.01	4.87	6.45	4.41	12.55	3.01	1.05	3.69	51.60	31.29	20.31
1976	1.20	1.49	1.46	3.19	6.65	11.37	4.59	2.84	5.36	2.21	2.78	4.97	48.11	26.37	21.74
1977	3.35	4.16	1.22	0.63	0.46	2.26	1.44	7.10	5.72	0.13	1.95	4.94	33.56	16.65	16.91
1978	6.20	4.98	4.52	0.64	3.45	3.90	10.36	9.64	0.25	0.47	0.00	4.79	49.20	24.62	24.58
1979	8.69	2.34	1.17	8.18	3.36	4.55	4.39	7.39	12.23	0.11	1.32	6.09	59.82	28.67	31.15
1980	6.20	1.88	2.97	4.18	5.08	2.29	8.66	3.18	3.71	1.70	1.43	0.28	41.56	19.54	22.02
1981	1.20	6.21	3.54	0.40	0.83	6.79	2.91	4.98	1.10	0.81	4.20	2.97	35.94	16.59	19.35
1982	5.21	5.00	5.42	8.73	3.11	8.74	6.76	6.18	7.10	1.21	1.65	1.47	60.58	29.99	30.59
1983	2.89	5.29	7.19	7.26	4.20	10.04	4.18	1.64	10.95	1.36	4.44	5.91	65.35	28.17	37.18
1984	1.19	4.76	3.24	3.26	6.92	2.88	6.15	3.36	2.40	1.79	2.86	0.44	39.25	16.58	22.67

TABLE A.2 (Continued)

GAINESVILLE 1897-1990 (inches)
Estimated Values

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEARLY	WET SEASON	DRY SEASON
1985 ----------------	1.05	1.90	1.20	3.90	3.10	6.10	5.10	14.50	2.40	3.60	2.90	1.80	47.55	31.70	15.85
1986 ----------------	3.60	5.00	3.20	0.50	1.10	4.70	6.60	6.40	3.00	3.60	4.10	4.00	45.80	24.30	21.50
1987 ----------------	3.60	5.20	10.00	0.40	4.10	2.90	3.70	5.10	3.80	0.10	4.70	0.50	44.10	15.60	28.50
1988 ----------------	4.9	4.6	7.5	1.50	2.80	3.20	4.20	13.80	11.00	1.10	3.00	1.20	58.80	33.30	25.50
1989 ----------------	0.60	0.60	2.10	1.30	1.80	10.68	8.98	8.70	7.00	2.40	1.70	3.80	49.66	37.76	11.90
1990 ----------------	1.70	2.70	3.40	3.40	3.10	8.90	9.90	8.10	1.90	3.30	0.90	1.40	48.70	32.10	16.60
MEAN	2.97	3.52	3.61	2.95	3.48	6.63	7.16	7.31	5.39	2.88	1.93	3.06	50.88	29.36	21.52
STD Deviation	2.03	1.97	2.56	2.34	2.08	3.14	2.82	3.31	3.16	2.24	1.62	2.19	8.60	6.30	6.20

TABLE A.3 Rainfall data for Jacksonville, Wet Season, Dry Season and Yearly

JACKSONVILLE 1867-1990 (inches)
Estimated Values

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEARLY	WET SEASON (JUNE-OCT)	DRY SEASON (NOV-MAY)
1867	4.62	4.95	4.10	1.85	2.85	10.49	11.07	8.00	14.60	4.70	0.40	0.93	68.56	48.86	19.70
1868	2.80	2.25	1.35	2.82	3.85	12.40	7.70	4.70	6.15	3.20	0.25	2.05	49.52	34.15	15.37
1869	4.05	7.45	2.40	4.25	0.81	7.66	5.51	5.60	7.00	4.15	1.65	3.65	54.18	29.92	24.26
1870	1.05	2.25	5.40	3.20	1.50	8.15	2.65	4.40	9.35	7.10	5.29	1.95	52.29	31.65	20.64
1871	0.80	1.80	7.15	0.60	4.65	16.75	3.95	13.70	7.50	3.62	3.53	2.65	66.70	45.52	21.18
1872	3.44	2.70	7.32	2.43	1.25	6.67	2.92	6.41	10.79	6.37	1.76	4.81	56.87	33.16	23.71
1873	3.96	0.59	5.29	0.56	5.52	8.41	7.75	6.21	10.47	5.65	2.88	3.38	60.67	38.49	22.18
1874	0.82	7.33	2.13	1.60	5.38	5.92	7.48	6.89	7.07	0.10	2.94	0.65	48.31	27.46	20.85
1875	4.48	8.93	1.80	2.98	9.08	5.41	0.14	10.19	4.50	4.49	2.18	3.42	57.60	24.73	32.87
1876	0.61	3.05	5.41	7.89	1.87	4.17	2.82	8.07	3.73	8.92	2.60	6.12	55.26	27.71	27.55
1877	2.65	1.09	2.53	3.01	2.47	10.47	4.82	4.82	5.15	6.75	4.49	3.32	51.57	32.01	19.56
1878	3.14	5.32	2.37	5.38	1.52	5.03	4.63	2.85	21.12	3.81	1.39	3.86	60.42	37.44	22.98
1879	0.63	3.51	1.35	2.97	4.25	1.25	5.44	8.39	8.24	9.45	1.24	0.46	47.18	32.77	14.41
1880	3.17	6.17	1.69	1.50	6.24	3.00	5.94	8.96	5.21	16.25	6.09	1.29	65.51	39.36	26.15
1881	9.12	1.12	2.89	4.57	2.61	2.82	7.61	10.23	4.58	2.87	3.41	2.86	54.69	28.11	26.58
1882	2.58	1.09	0.89	5.23	2.20	5.14	5.75	5.65	4.39	10.30	5.70	4.34	53.26	31.23	22.03
1883	4.77	0.48	3.84	4.48	3.16	7.05	6.88	7.63	7.28	7.26	0.09	0.42	53.34	36.10	17.24
1884	4.78	2.45	2.63	2.32	5.45	6.89	6.02	5.21	5.68	4.12	5.43	4.04	55.02	27.92	27.10
1885	7.18	5.23	5.66	1.24	7.74	8.98	7.16	7.56	19.63	3.36	0.50	7.76	82.00	46.69	35.31
1886	2.81	1.87	6.74	3.08	2.81	4.78	14.97	6.25	4.91	2.47	0.97	3.20	54.86	33.38	21.48
1887	4.34	0.34	3.51	4.15	7.15	9.68	8.90	5.76	9.40	1.57	0.10	3.70	58.60	35.31	23.29
1888	0.49	4.38	1.57	0.93	5.46	2.92	8.30	4.89	11.15	6.00	4.16	2.88	53.13	33.26	19.87
1889	5.89	3.85	1.38	3.95	0.51	6.89	8.24	5.25	8.49	1.26	0.51	0.00	46.22	30.13	16.09
1890	0.63	0.51	2.89	0.95	9.20	1.80	9.70	4.26	4.88	9.07	2.26	1.37	47.52	29.71	17.81
1891	1.19	0.32	4.02	1.72	2.78	3.31	4.08	3.67	10.83	4.43	1.53	3.46	41.34	26.32	15.02
1892	3.99	0.77	0.76	0.11	1.34	6.38	3.16	4.84	14.04	3.34	0.64	2.52	41.89	31.76	10.13
1893	0.98	6.87	8.90	2.67	4.18	4.66	4.54	10.02	6.09	4.48	1.76	3.08	58.23	29.79	28.44
1894	2.29	3.44	3.12	0.83	1.49	4.93	7.10	9.24	16.63	3.24	3.72	0.81	56.84	41.14	15.70
1895	4.63	3.61	3.63	4.40	2.26	4.98	11.21	2.54	4.66	0.58	3.12	1.18	46.80	23.97	22.83
1896	2.53	1.66	2.51	0.49	1.24	9.41	4.25	6.16	2.19	3.03	4.55	2.17	40.19	25.04	15.15
1897	1.89	7.10	1.60	5.18	1.35	5.01	3.67	6.27	16.23	6.00	1.56	4.83	60.69	37.18	23.51
1898	0.43	2.10	2.04	2.45	1.81	2.13	12.03	5.44	3.46	6.74	2.34	4.74	45.71	29.80	15.91
1899	3.98	3.38	1.35	3.21	1.86	4.52	6.12	3.90	5.10	2.73	0.07	2.35	38.57	22.37	16.20
1900	1.71	3.17	7.95	7.34	2.90	8.45	3.83	2.07	4.33	7.14	1.06	3.90	53.85	25.82	28.03
1901	2.64	6.76	6.57	1.08	5.31	9.64	4.26	6.12	7.38	1.37	0.36	2.73	54.22	28.77	25.45
1902	0.08	3.64	4.20	2.02	1.82	3.65	6.89	4.74	12.78	5.90	4.18	5.82	55.52	33.76	21.76
1903	4.44	5.23	2.55	1.54	14.80	3.22	2.54	6.60	2.80	2.83	3.82	1.66	52.03	17.99	34.04
1904	6.77	2.70	1.35	0.81	2.90	4.92	5.25	2.74	6.09	11.70	2.26	1.68	49.17	30.70	18.47
1905	1.80	4.65	6.47	2.02	6.68	2.72	5.14	10.97	6.18	2.89	0.60	5.65	55.77	27.90	27.87
1906	3.46	3.06	1.03	0.30	14.31	4.58	8.96	5.38	2.29	2.39	0.01	1.09	46.86	23.60	23.26
1907	0.14	0.55	0.76	5.27	5.40	2.71	5.55	6.53	10.44	1.37	1.96	4.39	45.07	26.60	18.47
1908	2.24	2.98	1.16	2.93	3.89	4.35	9.68	2.90	21.79	2.97	0.47	0.90	56.26	41.69	14.57
1909	1.17	1.51	4.24	1.80	2.26	8.93	8.43	5.18	4.98	0.08	0.99	2.30	41.87	27.60	14.27

TABLE A.3 (Continued)

JACKSONVILLE 1867-1990 (inches)
Estimated Values

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEARLY	WET SEASON (JUNE-OCT)	DRY SEASON (NOV-MAY)
1910	1.06	2.43	1.89	0.60	2.18	6.72	6.13	5.82	3.12	8.02	1.64	1.07	40.68	29.81	10.87
1911	0.89	0.13	2.16	0.36	3.33	2.96	2.35	10.16	0.90	5.26	2.68	4.20	35.38	21.63	13.75
1912	4.76	2.65	3.27	4.96	3.53	9.62	6.74	5.32	7.69	3.17	0.82	2.91	55.44	32.54	22.90
1913	1.53	4.87	5.87	1.32	1.06	4.55	6.28	3.32	3.74	1.35	0.32	4.49	38.70	19.24	19.46
1914	3.31	4.55	1.84	0.30	2.00	1.32	5.13	8.47	6.39	2.34	3.87	5.20	44.72	23.65	21.07
1915	4.10	2.44	2.47	0.49	3.67	1.55	9.36	4.08	8.41	5.45	1.07	3.46	46.55	28.85	17.70
1916	0.90	0.19	0.59	0.46	3.32	6.45	3.93	6.76	5.25	4.77	2.76	7.47	42.85	27.16	15.69
1917	0.41	1.46	1.81	0.82	1.83	3.03	10.36	6.65	3.47	0.38	0.23	2.11	32.56	23.89	8.67
1918	2.78	0.21	2.31	5.96	2.50	3.32	3.35	3.12	6.17	3.97	3.26	2.60	39.55	19.93	19.62
1919	1.73	3.77	3.24	1.26	7.32	13.79	6.32	6.96	5.63	1.81	1.06	4.61	57.50	34.51	22.99
1920	1.21	9.16	0.82	3.42	7.41	8.27	5.47	7.46	7.14	0.11	5.38	3.35	59.20	28.45	30.75
1921	2.04	0.62	0.57	1.23	4.02	2.71	9.76	7.70	1.73	6.37	2.27	1.60	40.62	28.27	12.35
1922	3.21	5.56	3.69	1.39	7.18	5.88	3.91	7.71	6.70	8.84	0.58	2.54	57.19	33.04	24.15
1923	1.37	1.93	1.15	0.98	8.73	4.94	5.14	4.67	4.89	4.75	0.06	1.38	39.99	24.39	15.60
1924	5.09	2.65	7.18	3.00	0.49	4.21	12.17	3.55	8.88	8.08	0.38	1.15	56.83	36.89	19.94
1925	4.52	0.90	1.14	1.54	4.75	5.65	5.22	5.63	2.41	3.13	1.51	6.98	43.38	22.04	21.34
1926	4.89	1.66	2.20	3.89	1.66	9.33	10.81	3.18	9.55	2.22	3.37	1.58	54.34	35.09	19.25
1927	0.40	3.54	1.67	0.18	0.09	7.56	6.85	1.98	2.39	2.20	0.83	2.75	30.44	20.98	9.46
1928	0.68	3.54	4.38	8.19	2.33	4.10	8.96	5.85	9.25	2.33	0.67	1.34	51.62	30.49	21.13
1929	3.96	1.28	2.14	5.09	6.09	4.10	8.21	6.02	8.58	0.83	0.08	3.02	49.40	27.74	21.66
1930	2.55	2.61	10.00	1.86	3.70	10.13	4.74	0.76	3.62	1.57	2.69	3.11	47.34	20.82	26.52
1931	3.36	1.49	4.69	3.41	5.93	2.97	2.20	4.86	0.07	1.86	0.97	2.57	34.38	11.96	22.42
1932	0.40	1.12	5.05	3.20	2.25	23.32	6.92	4.26	6.61	2.62	5.55	0.49	61.79	43.73	18.06
1933	2.18	3.23	2.97	7.16	3.04	6.84	10.30	4.68	3.76	11.99	0.95	0.72	57.82	37.57	20.25
1934	1.08	3.48	2.18	2.92	6.33	13.23	5.07	5.98	1.99	5.24	0.31	0.70	48.51	31.51	17.00
1935	2.77	1.69	1.13	2.66	5.28	3.03	9.87	9.07	9.15	0.40	0.31	1.34	46.70	31.52	15.18
1936	1.82	5.11	2.93	1.77	2.38	6.15	5.88	5.99	1.61	12.62	0.79	1.98	49.03	32.25	16.78
1937	4.52	4.05	2.49	4.01	1.24	4.73	9.69	10.78	7.87	2.61	2.57	0.64	55.20	35.68	19.52
1938	5.21	1.41	1.55	1.81	7.04	7.57	9.99	9.15	5.91	11.21	0.47	0.68	62.00	43.83	18.17
1939	1.76	2.49	1.43	4.62	4.34	4.82	7.71	5.97	5.89	4.06	2.05	2.13	47.27	28.45	18.82
1940	2.94	4.28	1.05	3.28	2.28	9.34	8.43	6.59	2.87	0.10	0.29	5.61	47.06	27.33	19.73
1941	1.97	3.14	2.18	0.99	1.04	8.10	6.72	4.89	9.35	9.00	3.57	7.71	58.66	38.06	20.60
1942	3.13	4.70	6.05	0.14	1.04	7.99	3.98	3.22	8.47	0.68	0.51	2.22	42.13	24.34	17.79
1943	1.32	0.52	3.73	1.25	4.91	5.72	9.22	7.79	7.07	0.48	1.68	1.60	45.29	30.28	15.01
1944	3.77	1.79	7.60	6.57	2.50	6.38	14.20	8.03	5.61	10.04	1.19	0.31	67.99	44.26	23.73
1945	5.26	0.90	0.12	3.08	3.26	8.00	8.99	11.65	14.27	2.58	0.53	7.63	66.27	45.49	20.78
1946	2.15	1.17	2.98	2.70	5.14	4.01	10.05	11.75	3.26	4.13	2.38	0.14	49.86	33.20	16.66
1947	4.51	4.36	5.11	4.22	3.01	9.02	7.61	4.93	15.80	13.50	7.12	3.08	82.27	50.86	31.41
1948	5.18	2.61	11.06	4.90	2.09	3.74	6.80	8.47	11.00	5.07	0.67	3.18	64.77	35.08	29.69
1949	1.63	5.46	1.61	3.96	1.58	5.59	4.82	10.13	19.36	2.53	2.69	1.61	60.97	42.43	18.54
1950	0.06	1.79	3.88	3.70	2.87	2.19	10.68	2.68	16.74	11.45	0.68	1.90	58.62	43.74	14.88
1951	0.53	1.71	2.28	1.23	1.46	3.86	6.69	2.19	10.11	1.41	2.28	1.80	35.55	24.26	11.29
1952	0.80	3.89	3.91	2.49	9.49	3.99	3.85	9.57	6.39	2.46	0.64	1.27	48.75	26.26	22.49
1953	3.68	1.94	2.21	6.79	0.61	3.29	9.30	12.36	9.55	5.34	1.74	7.08	63.89	39.84	24.05

TABLE A.3 (Continued)

JACKSONVILLE 1867-1990 (inches)
Estimated Values

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEARLY	WET SEASON (JUNE-OCT)	DRY SEASON (NOV-MAY)
1954	0.85	1.74	1.47	0.37	0.73	3.26	5.71	4.06	8.73	6.23	1.68	2.00	36.83	27.99	8.84
1955	3.09	2.46	1.66	1.50	4.51	2.70	5.53	3.85	10.56	5.36	1.90	0.21	43.33	28.00	15.33
1956	2.91	2.94	0.81	2.33	3.98	7.87	8.25	5.24	2.89	13.44	0.38	0.04	51.08	37.69	13.39
1957	0.33	1.69	3.87	1.61	5.25	7.10	12.34	3.30	8.33	3.50	1.55	1.31	50.18	34.57	15.61
1958	3.39	3.74	3.38	8.24	3.79	3.96	4.37	4.67	4.75	5.07	2.02	2.76	50.14	22.82	27.32
1959	2.97	5.22	9.75	2.65	9.20	2.94	4.51	2.86	5.67	3.12	2.24	0.95	52.08	19.10	32.98
1960	2.07	5.17	6.94	3.54	1.18	4.70	16.21	6.50	8.57	2.95	0.11	1.51	59.45	38.93	20.52
1961	2.87	4.85	1.17	4.16	3.06	5.27	3.48	10.64	1.02	0.27	0.89	0.47	38.15	20.68	17.47
1962	2.16	0.52	3.10	2.36	1.12	8.22	6.31	10.07	4.37	1.13	2.08	2.46	43.90	30.10	13.80
1963	5.39	6.93	2.23	1.75	1.74	12.49	6.47	4.95	4.91	1.53	2.70	3.60	54.69	30.35	24.34
1964	7.29	6.55	1.76	4.65	4.80	4.67	6.12	5.63	10.31	5.09	3.33	4.83	65.03	31.82	33.21
1965	0.65	5.50	3.91	0.95	0.94	9.79	2.71	9.58	11.02	1.75	1.92	3.75	52.47	34.85	17.62
1966	4.56	5.97	0.71	2.25	10.43	7.74	11.09	3.88	5.94	1.38	0.21	1.14	55.30	30.03	25.27
1967	3.05	4.35	0.81	2.00	1.18	12.90	5.22	12.31	1.80	1.13	0.24	4.69	49.68	33.36	16.32
1968	0.82	3.05	1.20	0.99	2.17	12.25	6.84	16.24	2.68	5.09	1.30	1.09	53.72	43.10	10.62
1969	0.84	3.39	4.23	0.34	3.78	5.12	5.89	15.10	10.33	9.81	4.56	3.87	67.26	46.25	21.01
1970	4.18	8.85	9.98	1.77	1.84	2.65	7.60	10.96	3.20	3.95	0.00	1.57	56.55	28.36	28.19
1971	2.01	2.55	2.41	4.07	1.90	5.52	5.07	12.83	4.17	6.46	0.83	5.87	53.69	34.05	19.64
1972	5.77	3.48	4.43	2.98	8.26	6.75	3.15	9.76	2.60	4.46	4.22	1.43	57.29	26.72	30.57
1973	4.64	5.07	10.18	11.61	5.33	4.10	5.45	7.49	7.86	4.08	0.44	4.32	70.57	28.98	41.59
1974	0.28	1.28	3.47	1.53	4.14	5.53	9.83	11.23	8.13	0.34	1.03	1.73	48.52	35.06	13.46
1975	3.48	2.58	2.46	5.78	7.00	5.21	6.36	6.23	5.24	3.63	0.39	1.79	50.15	26.67	23.48
1976	2.29	1.05	3.41	0.63	10.02	4.26	5.41	6.37	8.56	1.63	2.43	4.81	50.87	26.23	24.64
1977	2.96	3.24	1.03	1.76	3.07	2.65	1.97	7.26	7.45	1.68	3.11	3.38	39.56	21.01	18.55
1978	4.64	4.17	2.83	2.24	9.18	2.62	6.67	2.39	4.40	1.26	0.80	1.84	43.04	17.34	25.70
1979	6.28	3.75	1.00	4.18	7.54	5.91	4.67	4.78	17.75	0.25	3.64	2.01	61.76	33.36	28.40
1980	2.61	1.06	6.83	3.91	3.02	4.59	5.29	3.97	3.03	2.69	2.32	0.21	39.53	19.57	19.96
1981	0.92	4.53	5.41	0.32	1.48	3.31	2.46	6.47	1.22	1.35	4.92	2.38	34.77	14.81	19.96
1982	3.00	1.67	4.26	3.60	3.55	8.06	3.81	6.93	9.32	3.37	1.93	2.02	51.52	31.49	20.03
1983	7.19	4.27	8.46	4.65	1.38	6.86	6.11	4.63	4.61	4.29	3.32	6.42	62.19	26.50	35.69
1984	2.13	4.67	5.77	3.14	1.46	4.76	6.01	3.78	12.28	1.53	3.30	0.13	48.96	28.36	20.60
1985	1.05	1.45	1.26	2.76	2.08	3.71	6.33	8.93	16.82	8.34	2.07	3.59	58.39	44.13	14.26
1986	4.19	4.72	5.44	0.93	2.13	2.53	3.27	9.60	1.99	1.80	2.85	4.65	44.10	19.19	24.91
1987	4.09	6.47	6.27	0.14	0.75	4.18	4.40	4.48	7.13	0.30	5.02	0.16	43.39	20.49	22.90
1988	6.36	6.08	2.65	3.44	1.35	3.71	4.50	8.48	16.36	2.35	4.27	1.13	60.68	35.40	25.28
1989	1.73	1.77	2.14	2.79	1.55	3.66	8.98	9.16	14.37	1.39	0.51	3.40	51.45	37.56	13.89
1990	1.84	4.07	1.59	1.34	0.18	1.59	6.53	3.81	2.60	4.54	1.17	1.94	31.20	19.07	12.13
MEAN	2.83	3.24	3.41	2.79	3.77	5.96	6.60	6.58	7.41	4.28	1.98	2.72	51.57	30.82	20.75
STD Deviation	1.85	2.04	2.41	2.03	2.80	3.33	2.83	2.93	4.57	3.34	1.59	1.85	9.49	7.59	6.08

TABLE A.4 Rainfall data for Lisbon, Wet Season, Dry Season and Yearly

LISBON 1891-1990 (inches)

Estimated Values

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEARLY	WET SEASON (JUNE-OCT)	DRY SEASON (NOV-MAY)
1891	1.69	1.20	5.76	3.46	2.25	5.55	5.67	4.28	8.22	3.49	1.73	3.14	46.44	27.21	19.23
1892	3.31	0.95	1.25	1.67	2.34	5.67	2.76	9.00	8.07	1.91	0.33	4.26	41.52	27.41	14.11
1893	2.24	4.81	3.26	0.84	2.33	7.47	2.92	3.22	6.11	4.55	3.13	4.03	44.91	24.27	20.64
1894	2.32	0.98	0.88	1.10	1.69	6.19	5.46	4.08	13.49	3.76	2.66	1.41	44.02	32.98	11.04
1895	3.38	2.85	1.94	3.41	4.97	3.79	7.26	8.09	6.74	1.05	2.10	1.19	46.77	26.93	19.84
1896	7.27	2.67	1.13	0.26	2.45	7.79	6.79	6.78	2.97	0.84	2.59	1.82	43.36	25.17	18.19
1897	2.53	7.30	1.34	1.52	1.84	6.33	6.21	7.36	12.72	5.43	1.22	1.72	55.52	38.05	17.47
1898	1.08	1.43	0.64	0.47	1.92	5.94	10.16	10.95	7.18	4.54	1.77	2.38	48.46	38.77	9.69
1899	5.15	9.60	1.18	4.19	0.79	7.22	13.55	6.02	6.20	3.23	0.35	1.28	58.76	36.22	22.54
1900	2.75	4.26	6.14	5.86	4.25	8.78	7.98	4.43	3.74	4.84	0.72	2.88	56.63	29.77	26.86
1901	1.42	2.52	4.77	0.92	5.97	5.35	5.93	13.00	13.75	1.01	0.89	1.94	57.47	39.04	18.43
1902	0.51	4.37	4.56	1.79	3.55	5.31	2.10	2.47	8.18	6.28	1.30	1.96	42.38	24.34	18.04
1903	6.09	5.72	4.29	0.44	6.06	7.60	5.73	4.39	6.96	0.43	1.54	1.30	50.55	25.11	25.44
1904	5.93	2.35	0.36	3.88	1.69	6.20	6.07	5.84	5.79	3.20	2.02	1.26	44.59	27.10	17.49
1905	0.40	1.63	4.37	2.45	3.30	4.49	2.62	14.10	5.34	0.91	0.38	5.65	45.64	27.46	18.18
1906	5.57	0.76	3.39	1.21	5.53	7.24	7.52	6.08	3.01	1.61	0.46	0.34	42.72	25.46	17.26
1907	0.10	1.93	0.09	2.05	4.16	5.47	9.25	6.78	4.20	0.89	0.80	5.12	40.84	26.59	14.25
1908	1.67	2.34	0.02	5.99	2.17	4.39	5.01	5.73	11.39	1.88	1.52	0.87	42.98	28.40	14.58
1909	2.29	2.10	3.89	1.76	4.29	8.96	20.00	8.08	0.94	0.20	0.73	1.52	54.76	38.18	16.58
1910	0.60	3.07	1.38	0.63	3.17	9.63	12.73	7.09	0.53	10.14	1.30	0.77	51.04	40.12	10.92
1911	1.73	0.00	1.63	0.63	5.02	2.09	5.80	7.76	1.97	4.01	3.59	3.72	37.95	21.63	16.32
1912	7.08	1.40	4.39	2.06	6.51	14.15	5.71	4.26	8.44	3.95	1.99	1.61	61.55	36.51	25.04
1913	1.22	4.57	6.28	5.55	2.06	2.35	3.50	5.66	2.89	1.84	0.47	2.95	39.34	16.24	23.1
1914	7.55	3.48	1.32	1.45	4.17	3.45	5.10	2.59	6.86	4.02	4.35	3.74	48.08	22.02	26.06
1915	3.93	3.82	1.25	1.38	4.99	2.38	9.81	2.99	3.05	10.65	0.87	1.97	47.09	28.88	18.21
1916	0.78	0.66	1.81	1.05	3.84	3.79	10.16	5.80	4.95	5.51	7.02	2.10	47.47	30.21	17.26
1917	0.73	0.97	1.53	0.86	1.94	5.06	7.95	6.77	6.17	1.77	0.48	1.12	35.35	27.72	7.63
1918	3.30	0.06	1.48	4.55	1.02	5.55	3.90	6.30	5.04	13.28	4.73	2.85	52.06	34.07	17.99
1919	1.98	4.07	4.37	1.41	6.47	8.83	5.53	5.47	5.28	1.02	5.49	3.61	53.53	26.13	27.4
1920	1.55	4.28	0.99	5.33	5.72	7.10	6.89	4.32	5.42	1.41	6.12	1.86	50.99	25.14	25.85
1921	0.89	0.82	0.68	0.91	6.26	7.03	6.94	4.15	3.04	8.09	0.98	3.33	43.12	29.25	13.87
1922	0.87	1.71	1.72	0.70	5.62	7.27	7.91	4.07	7.19	4.49	0.38	1.73	43.66	30.93	12.73
1923	0.92	1.17	1.79	1.73	10.85	4.57	5.09	6.55	4.85	3.00	0.39	1.62	42.53	24.06	18.47
1924	2.77	3.60	6.95	4.90	3.21	7.04	14.49	6.56	3.39	4.64	0.36	0.70	58.61	36.12	22.49
1925	3.98	2.36	1.26	0.67	2.72	7.74	8.80	4.94	3.12	2.13	1.75	6.68	46.15	26.73	19.42
1926	4.90	1.79	4.57	3.18	1.04	9.53	8.64	5.98	7.18	1.35	3.05	0.54	51.75	32.68	19.07
1927	0.24	1.83	3.22	1.02	2.17	5.22	5.50	2.47	4.73	3.23	1.99	1.08	32.70	21.15	11.55
1928	1.03	0.88	3.30	7.07	3.23	3.57	4.96	6.94	14.91	3.39	0.22	1.23	50.73	33.77	16.96
1929	3.41	0.53	1.38	1.62	4.71	7.05	6.44	9.17	7.37	0.96	1.18	2.88	46.70	30.99	15.71
1930	2.19	3.52	9.80	2.58	4.56	9.08	3.00	1.15	10.76	1.31	0.48	7.41	55.84	25.30	30.54
1931	3.09	0.98	5.13	6.31	8.77	0.95	7.06	4.85	4.25	2.94	0.17	1.53	46.03	20.05	25.98
1932	1.15	0.92	3.36	0.39	6.19	4.23	1.72	7.02	3.28	1.59	7.78	0.77	38.40	17.84	20.56
1933	1.36	1.28	3.20	6.62	3.07	5.83	13.34	7.53	13.87	4.24	3.77	0.49	64.60	44.81	19.79
1934	0.45	3.53	2.39	4.66	6.24	16.47	7.51	5.20	2.86	0.65	0.24	0.74	50.94	32.69	18.25

TABLE A.4 (Continued)

LISBON 1891-1990 (inches)
Estimated Values

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEARLY	WET SEASON (JUNE-OCT)	DRY SEASON (NOV-MAY)
1935	1.29	1.96	0.57	5.03	4.54	5.25	6.72	8.76	8.37	0.94	1.30	1.88	46.61	30.04	16.57
1936	4.96	8.02	3.44	3.38	4.91	7.38	5.78	9.89	3.25	6.88	0.89	2.74	61.52	33.18	28.34
1937	2.59	4.14	4.17	2.73	4.91	3.12	10.11	10.05	5.77	2.93	3.93	1.20	55.65	31.98	23.67
1938	1.87	0.33	2.20	0.14	3.00	9.07	10.16	5.04	6.20	3.01	2.61	0.34	43.97	33.48	10.49
1939	1.18	1.67	0.50	2.34	2.14	10.17	4.62	6.73	6.50	1.58	0.20	1.90	39.53	29.60	9.93
1940	1.84	2.94	2.77	2.51	0.50	4.71	9.63	6.11	4.06	0.08	0.26	5.36	40.77	24.59	16.18
1941	3.10	4.26	3.32	4.75	1.20	6.88	13.26	2.19	3.64	5.06	3.11	3.90	54.67	31.03	23.64
1942	2.78	2.65	6.99	1.23	0.64	9.30	3.16	2.30	9.60	0.15	0.08	4.09	42.97	24.51	18.46
1943	0.94	0.24	3.76	1.76	6.66	6.08	5.40	8.73	5.55	1.32	0.39	1.17	42.00	27.08	14.92
1944	2.41	0.52	3.97	3.95	3.47	4.44	13.73	7.04	7.51	9.41	0.46	0.23	57.14	42.13	15.01
1945	3.12	0.24	0.67	1.59	1.96	11.93	11.46	10.41	7.39	1.25	0.29	4.66	54.97	42.44	12.53
1946	2.21	3.81	0.25	1.21	7.53	5.50	7.98	4.27	6.86	1.95	2.17	0.48	44.22	26.56	17.66
1947	0.52	3.31	4.18	7.35	1.84	3.92	5.70	9.45	9.07	2.26	2.24	0.56	50.40	30.40	20
1948	6.22	0.62	3.39	1.71	0.70	1.07	11.39	7.87	10.52	1.57	0.20	2.13	47.39	32.42	14.97
1949	0.37	1.07	1.60	5.75	1.20	10.40	7.52	16.44	6.30	2.92	1.51	1.96	57.04	43.58	13.46
1950	0.09	0.39	4.38	1.22	1.51	3.58	6.22	5.95	12.97	11.85	0.06	4.31	52.53	40.57	11.96
1951	0.50	2.53	1.35	1.49	0.40	6.21	6.85	3.32	8.07	0.80	3.75	2.45	37.72	25.25	12.47
1952	0.53	6.51	5.81	0.91	4.18	3.80	6.92	2.43	5.75	4.71	0.55	1.20	43.30	23.61	19.69
1953	2.95	4.85	6.48	5.43	1.47	4.45	6.55	9.35	8.20	2.26	2.32	4.90	59.21	30.81	28.4
1954	0.98	1.54	1.28	2.69	2.92	3.30	4.93	6.47	2.63	5.12	3.52	2.13	37.51	22.45	15.06
1955	2.48	0.90	3.17	3.17	4.19	3.83	7.65	5.45	6.49	2.77	3.50	0.50	44.10	26.19	17.91
1956	4.08	1.56	0.76	1.62	6.48	4.11	3.27	3.79	4.29	11.68	0.50	0.00	42.14	27.14	15
1957	1.11	2.20	3.42	4.46	9.69	5.41	4.41	8.44	9.37	1.30	1.01	2.98	53.80	28.93	24.87
1958	5.54	4.65	7.22	3.42	2.53	4.11	4.19	4.35	0.33	9.53	1.77	2.47	50.11	22.51	27.6
1959	5.24	2.28	9.54	6.21	5.61	5.09	9.22	7.60	9.26	5.97	0.62	0.94	67.58	37.14	30.44
1960	1.59	6.67	10.54	3.37	0.71	5.10	8.96	4.40	11.82	4.41	0.15	2.21	59.93	34.69	25.24
1961	2.60	2.74	2.82	1.48	3.23	3.11	3.42	7.39	2.15	0.93	1.48	1.76	33.11	17.00	16.11
1962	1.20	0.65	1.81	1.54	1.41	5.72	5.41	9.48	6.46	3.09	1.05	0.84	38.66	30.16	8.5
1963	4.00	5.91	2.55	2.05	5.71	3.94	5.95	4.11	4.25	0.24	4.22	2.15	45.08	18.49	26.59
1964	5.33	4.53	6.26	1.50	2.19	3.92	7.60	7.09	6.94	1.10	0.39	3.60	50.45	26.65	23.8
1965	1.90	3.72	2.10	2.17	1.58	6.60	11.54	10.97	1.78	3.76	0.77	2.78	49.67	34.65	15.02
1966	3.63	5.55	0.76	3.23	3.76	8.48	8.51	5.66	9.43	0.50	0.28	0.80	50.59	32.58	18.01
1967	1.62	4.64	0.87	0.32	1.70	5.21	7.48	11.08	4.55	0.45	0.07	2.66	40.65	28.77	11.88
1968	0.66	2.25	2.08	0.50	6.80	9.36	7.96	9.10	3.37	6.18	2.38	1.06	51.70	35.97	15.73
1969	1.45	3.04	5.03	1.32	1.87	2.72	7.87	9.54	4.35	9.22	1.49	5.17	53.07	33.70	19.37
1970	3.66	5.84	4.25	2.06	2.19	3.47	2.44	4.84	2.45	2.99	0.65	1.46	36.30	16.19	20.11
1971	1.39	4.50	1.91	2.70	3.34	6.61	6.47	5.04	3.03	3.21	1.73	2.57	42.50	24.36	18.14
1972	1.96	4.48	7.02	0.16	2.00	5.61	2.86	5.45	5.02	2.16	7.18	2.26	46.16	21.10	25.06
1973	4.52	2.46	3.56	3.66	5.37	5.90	7.31	5.61	4.32	1.81	0.28	7.20	52.00	24.95	27.05
1974	0.10	2.74	3.57	1.01	3.77	13.50	6.97	5.59	4.07	0.23	0.65	1.94	44.14	30.36	13.78
1975	2.18	3.42	1.27	3.70	4.66	2.84	4.30	9.36	5.33	4.71	2.39	1.27	45.43	26.54	18.89
1976	2.04	0.64	3.07	2.64	11.41	5.42	4.79	3.10	7.36	1.01	3.36	3.75	48.59	21.68	26.91
1977	3.74	3.20	2.20	0.41	0.64	3.91	6.47	6.67	3.41	1.32	2.33	5.74	40.04	21.78	18.26
1978	3.56	6.26	3.72	0.87	5.94	6.02	8.12	3.23	3.03	1.02	0.00	4.86	46.63	21.42	25.21

TABLE A.4 (Continued)

LISBON 1891-1990 (inches)
Estimated Values

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEARLY	WET SEASON (JUNE-OCT)	DRY SEASON (NOV-MAY)
1979	7.15	2.13	3.73	0.94	10.51	1.60	5.21	6.45	14.58	0.43	3.62	1.14	57.49	28.27	29.22
1980	3.18	1.59	2.19	6.44	5.17	4.37	3.75	4.77	4.36	1.61	4.58	0.57	42.58	18.86	23.72
1981	0.34	2.22	3.51	0.12	1.43	5.41	6.13	5.54	1.17	1.53	2.21	4.82	34.43	19.78	14.65
1982	3.25	4.86	6.92	7.78	7.83	8.43	6.52	3.31	10.10	1.69	1.02	0.96	62.67	30.05	32.62
1983	2.67	6.71	7.78	5.89	1.55	6.04	2.71	5.21	3.22	1.71	3.34	6.38	53.21	18.89	34.32
1984	1.85	3.50	1.56	5.34	7.74	4.36	11.96	3.46	2.96	0.51	1.08	0.69	45.01	23.25	21.76
1985	1.20	0.90	1.90	2.70	2.00	5.60	6.20	7.80	4.30	3.90	1.40	2.80	40.70	27.80	12.90
1986	7.10	1.70	2.80	0.80	4.00	8.20	3.10	6.60	1.70	1.20	2.50	4.20	43.90	20.80	23.10
1987	2.40	4.00	10.50	0.10	4.30	5.00	1.80	2.60	5.80	0.90	4.60	0.70	42.70	16.10	26.60
1988	4.70	2.80	5.60	1.30	2.10	9.70	9.60	4.20	6.80	3.20	3.80	0.90	54.70	33.50	21.20
1989	3.60	0.40	2.70	3.30	4.20	5.00	4.10	10.30	3.40	1.70	1.90	4.20	44.80	24.50	20.30
1990	1.60	3.60	1.80	4.90	0.70	10.20	6.20	5.20	2.50	2.10	1.60	3.80	44.20	26.20	18.00
Mean	2.58	2.82	3.26	2.61	3.79	6.04	6.90	6.32	5.98	3.16	1.85	2.41	47.72	28.40	19.32
STD Deviation	1.85	1.95	2.33	1.96	2.40	2.69	3.14	2.69	3.26	2.82	1.69	1.69	7.24	6.44	5.68

TABLE A.5 Rainfall data for Marineland, Wet Season, Dry Season and Yearly

Marineland 1942-1990 (inches)

Estimated VAlues

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEARLY	WET SEASON (JUNE-OCT)	DRY SEASON (NOV-MAY)
1942	0.73	3.61	7.74	0.32	1.83	13.21	3.10	3.59	4.96	0.57	0.56	4.18	44.40	25.43	18.97
1943	0.85	0.62	3.32	2.34	2.38	1.17	3.31	6.76	13.48	3.40	2.34	0.83	40.80	28.12	12.68
1944	2.40	0.90	9.57	2.78	0.45	7.55	13.81	5.52	4.04	8.29	0.28	0.26	55.85	39.21	16.64
1945	2.98	0.39	0.22	3.24	0.27	7.27	6.25	8.09	7.55	2.79	2.04	4.84	45.93	31.95	13.98
1946	1.30	2.84	3.74	0.60	4.44	3.35	5.56	6.51	10.68	3.80	3.79	0.14	46.75	29.90	16.85
1947	1.69	6.54	6.26	8.09	2.56	6.72	5.57	2.95	4.17	7.27	3.15	1.11	56.08	26.68	29.40
1948	4.99	0.75	6.95	3.27	1.12	2.10	7.51	6.05	12.37	5.42	1.19	3.10	54.82	33.45	21.37
1949	0.33	5.23	0.53	5.67	1.81	3.00	2.14	12.60	11.83	3.32	1.24	1.44	49.14	32.89	16.25
1950	0.12	0.76	3.37	0.82	5.37	5.04	4.38	1.78	7.59	9.23	1.11	2.37	41.94	28.02	13.92
1951	0.60	2.07	2.67	0.30	1.71	3.67	9.11	3.29	13.76	11.51	3.92	2.90	55.51	41.34	14.17
1952	0.49	5.56	3.01	2.32	4.86	1.03	1.68	5.09	5.57	7.09	0.84	1.01	38.55	20.46	18.09
1953	2.47	1.59	5.61	4.91	0.58	1.39	5.60	15.23	19.55	3.88	1.93	5.15	67.89	45.65	22.24
1954	0.16	1.33	1.83	0.38	0.80	2.03	2.22	1.53	5.37	5.27	5.28	1.87	28.07	16.42	11.65
1955	2.64	2.71	1.43	1.51	1.39	5.68	6.74	3.59	6.06	5.51	1.82	0.79	39.87	27.58	12.29
1956	2.37	2.95	0.59	4.28	3.38	4.70	4.69	3.57	2.39	9.95	0.30	0.03	39.20	25.30	13.90
1957	0.87	2.78	2.47	2.18	5.51	6.89	7.85	11.45	6.67	9.15	1.46	3.34	60.62	42.01	18.61
1958	3.33	3.30	6.94	2.32	1.86	1.21	3.06	4.04	6.31	6.53	2.73	2.30	43.93	21.15	22.78
1959	3.25	3.50	7.71	3.17	2.60	4.81	2.76	3.64	5.12	1.86	4.67	1.58	44.67	18.19	26.48
1960	1.37	4.32	8.59	1.11	0.48	4.41	9.51	4.08	16.68	3.46	0.49	1.29	55.79	38.14	17.65
1961	2.59	3.07	2.71	3.20	2.62	2.60	3.20	6.85	2.60	1.83	2.58	1.10	34.95	17.08	17.87
1962	1.69	0.21	2.79	1.96	2.55	6.51	7.02	10.16	6.09	1.06	1.36	1.24	42.64	30.84	11.80
1963	2.91	5.03	1.55	1.46	2.87	3.30	5.36	4.19	14.15	2.23	4.49	2.32	49.86	29.23	20.63
1964	6.68	5.25	2.20	3.67	3.41	2.85	5.33	9.14	10.18	2.83	9.29	4.38	65.21	30.33	34.88
1965	0.86	4.56	2.33	0.27	1.25	9.61	5.96	9.13	5.86	3.89	1.29	2.37	47.38	34.45	12.93
1966	3.49	6.63	0.18	1.70	6.79	8.15	5.94	5.67	5.70	2.13	0.20	0.88	47.46	27.59	19.87
1967	3.61	6.10	0.41	0.18	1.00	5.30	8.24	2.40	3.88	1.10	0.09	2.85	35.16	20.92	14.24
1968	0.37	2.00	1.20	1.12	4.69	7.57	5.82	14.50	3.60	7.20	1.60	1.30	50.97	38.69	12.28
1969	1.64	2.60	5.88	1.10	3.59	2.90	1.50	9.20	13.80	9.03	3.00	3.70	57.94	36.43	21.51
1970	3.90	4.30	5.00	1.90	1.80	3.90	5.93	6.08	2.20	1.50	0.40	1.70	38.61	19.61	19.00
1971	1.20	6.10	2.50	4.20	1.84	4.60	0.70	5.16	2.00	5.40	0.80	3.60	38.10	17.86	20.24
1972	3.60	4.80	4.70	2.70	6.94	8.54	5.20	8.70	1.30	3.20	5.70	2.70	58.08	26.94	31.14
1973	4.42	2.30	5.42	3.87	3.30	3.30	6.60	7.30	6.80	3.50	0.20	3.40	50.41	27.50	22.91
1974	0.45	1.70	4.50	0.78	2.50	7.40	5.30	6.11	7.19	0.61	0.50	0.90	37.94	26.61	11.33
1975	1.80	3.20	1.60	2.30	5.50	9.20	6.20	4.90	4.20	6.80	2.40	2.00	50.10	31.30	18.80
1976	1.60	1.40	0.50	2.30	7.40	10.90	2.50	7.20	2.80	0.90	2.50	8.00	48.00	24.30	23.70
1977	3.30	3.70	1.70	0.70	3.90	2.40	2.20	4.40	3.20	0.50	3.30	6.40	35.70	12.70	23.00
1978	3.10	5.00	2.70	2.30	2.00	4.60	8.30	3.20	4.50	5.40	0.30	4.40	45.80	26.00	19.80
1979	7.50	2.80	2.30	3.00	7.50	2.50	3.70	2.70	18.10	0.20	4.40	2.00	56.70	27.20	29.50
1980	6.10	2.00	2.70	3.30	3.20	3.80	3.70	1.90	2.50	2.80	3.50	0.80	36.30	14.70	21.60
1981	0.50	2.90	3.30	0.40	2.30	1.50	7.00	5.10	3.00	4.60	5.10	3.90	39.60	21.20	18.40
1982	2.30	1.40	6.20	8.30	2.50	9.60	3.80	4.70	11.20	2.20	1.20	1.60	55.00	31.50	23.50
1983	3.20	6.70	6.90	4.70	2.80	10.40	3.00	3.90	7.70	9.80	2.80	8.50	70.40	34.80	35.60
1984	1.40	5.80	3.80	3.10	3.10	3.40	6.40	3.70	13.80	1.80	3.50	0.30	50.10	29.10	21.00

TABLE A.5 (Continued)

Marineland 1942-1990 (inches)
Estimated VAlues

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEARLY	WET SEASON (JUNE-OCT)	DRY SEASON (NOV-MAY)
1985	0.40	1.10	2.20	3.10	3.30	4.30	4.40	13.80	6.30	4.08	0.41	2.05	45.44	32.88	12.56
1986	7.16	3.00	5.00	0.20	0.80	3.90	4.90	4.50	3.10	4.60	4.80	3.70	45.66	21.00	24.66
1987	2.40	5.20	8.50	0.20	0.10	3.20	3:50	0.50	4.50	2.20	3.70	0.90	34.90	13.90	21.00
1988	7.00	4.30	7.80	0.50	2.60	1.30	6.40	1.60	8.70	2.70	5.40	1.40	49.70	20.70	29.00
1989	4.80	1.10	3.20	1.40	4.30	1.60	1.40	4.90	9.30	9.90	0.88	3.80	46.58	27.10	19.48
1990	1.50	5.10	1.94	3.90	0.40	2.69	3.00	3.30	2.50	4.60	3.30	0.80	33.03	16.09	16.94
MEAN	2.54	3.29	3.76	2.40	2.86	4.84	5.05	5.80	7.24	4.43	2.41	2.48	47.09	27.36	19.74
STD Deviation	1.93	1.84	2.49	1.85	1.89	2.92	2.45	3.41	4.53	2.94	1.91	1.87	9.20	7.72	5.90

TABLE A.6 Rainfall data for Melbourne, Wet Season, Dry Season and Yearly

Melbourne 1939-1990 (inches)

Estimated Values

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEARLY	WET SEASON (JUNE-OCT)	DRY SEASON (NOV-MAY)
1939	0.37	0.11	2.79	3.17	5.43	6.79	7.39	8.01	10.92	8.25	1.37	0.48	55.08	41.36	13.72
1940	3.55	3.42	3.43	1.29	1.80	2.08	5.47	3.63	9.44	0.67	0.48	7.89	43.15	21.29	21.86
1941	3.63	5.07	2.74	3.18	1.03	7.41	8.25	3.77	5.39	7.31	7.40	3.10	58.28	32.13	26.15
1942	2.41	3.40	5.53	2.86	4.05	8.48	3.88	5.13	3.47	0.93	0.57	2.53	43.24	21.89	21.35
1943	1.11	0.40	6.19	1.93	2.70	4.34	10.95	4.37	4.30	3.74	2.84	0.48	43.35	27.70	15.65
1944	0.76	0.14	5.03	3.31	0.47	7.09	11.95	6.53	3.52	8.00	1.09	0.25	48.14	37.09	11.05
1945	4.76	0.32	1.13	1.87	0.16	8.98	7.14	3.09	18.54	3.73	4.62	1.64	55.98	41.48	14.50
1946	0.84	3.48	2.25	0.52	4.95	5.62	8.66	6.24	6.39	4.27	3.63	0.89	47.74	31.18	16.56
1947	1.57	4.93	5.00	2.63	6.92	13.45	6.07	9.05	11.54	8.20	2.99	1.81	74.16	48.31	25.85
1948	3.99	1.21	3.15	1.41	5.47	3.17	4.88	6.79	19.68	2.70	1.32	2.28	56.05	37.22	18.83
1949	0.35	1.72	0.97	2.50	2.15	9.19	1.46	9.99	9.97	3.96	1.31	3.14	46.71	34.57	12.14
1950	0.57	2.02	6.59	2.10	5.08	1.44	3.95	2.93	3.91	10.45	0.93	0.93	40.90	22.68	18.22
1951	0.24	3.04	1.05	8.15	3.16	2.62	6.02	2.18	9.81	5.52	4.19	1.49	47.47	26.15	21.32
1952	2.30	2.97	4.11	0.35	3.12	1.64	3.94	4.15	10.40	11.31	0.70	1.05	46.04	31.44	14.60
1953	1.97	3.25	2.92	7.37	1.75	5.39	4.58	10.88	8.83	10.72	4.87	1.49	64.02	40.40	23.62
1954	1.09	2.02	2.24	2.75	5.68	8.90	7.44	2.41	6.06	4.75	2.10	1.07	46.51	29.56	16.95
1955	1.73	1.39	1.59	1.98	2.69	6.10	0.81	5.21	8.86	6.87	0.34	1.12	38.69	27.85	10.84
1956	1.30	0.88	0.03	2.81	1.63	3.21	8.93	2.16	5.69	13.86	0.53	0.50	41.53	33.85	7.68
1957	1.62	3.74	4.54	4.86	4.56	4.60	8.65	6.56	5.88	2.45	1.82	3.19	52.47	28.14	24.33
1958	7.46	3.30	5.09	4.26	2.06	3.79	5.67	7.57	4.22	7.19	3.87	3.45	57.93	28.44	29.49
1959	2.93	4.31	6.45	3.51	3.81	8.33	1.90	3.82	7.87	6.01	4.14	1.76	54.84	27.93	26.91
1960	0.50	5.52	7.88	1.80	7.00	6.20	11.58	6.80	16.04	4.28	0.70	0.60	68.90	44.90	24.00
1961	3.50	0.60	2.35	2.94	5.40	5.15	6.54	5.79	5.52	1.38	2.15	0.26	41.58	24.38	17.20
1962	1.08	1.00	3.01	1.57	0.83	3.53	9.46	10.45	9.45	0.96	3.08	0.81	45.23	33.85	11.38
1963	2.18	7.24	2.28	0.29	4.82	5.31	4.41	2.67	14.07	2.19	9.72	2.07	57.25	28.65	28.60
1964	2.89	5.55	2.07	0.37	4.67	3.31	6.00	12.12	5.48	3.65	2.38	1.90	50.39	30.56	19.83
1965	0.71	2.77	3.92	0.69	0.17	6.46	2.55	3.45	3.11	4.55	2.22	1.92	32.52	20.12	12.40
1966	5.50	5.20	3.71	1.20	5.45	15.98	5.18	7.96	7.04	3.78	0.90	1.72	63.62	39.94	23.68
1967	1.08	3.87	1.56	0.12	1.20	11.03	7.28	3.39	7.72	1.48	0.31	1.63	40.67	30.90	9.77
1968	0.60	2.28	0.64	2.03	4.74	16.37	3.60	5.51	4.90	8.90	1.60	0.00	51.17	39.28	11.89
1969	2.00	0.90	10.13	0.28	4.47	7.62	4.30	8.55	6.16	7.69	5.24	2.54	59.88	34.32	25.56
1970	4.43	1.32	5.04	1.62	3.69	1.74	5.65	1.62	7.86	4.45	0.32	0.97	38.71	21.32	17.39
1971	0.13	4.47	1.75	0.54	1.76	3.83	4.68	1.14	6.05	6.20	2.72	3.28	36.55	21.90	14.65
1972	0.69	5.10	1.91	3.05	5.78	9.59	2.38	6.59	1.80	3.13	5.10	1.71	46.83	23.49	23.34
1973	4.08	1.41	2.32	6.11	3.85	6.10	4.85	4.03	5.02	6.11	0.82	3.26	47.96	26.11	21.85
1974	0.09	0.85	0.10	1.12	2.36	7.39	9.05	4.17	5.04	2.63	1.31	2.39	36.50	28.28	8.22
1975	0.51	3.08	2.37	1.92	4.47	7.58	5.60	2.10	8.67	5.26	1.06	0.41	43.03	29.21	13.82
1976	1.04	0.56	0.70	0.63	13.83	4.96	2.18	3.74	13.56	0.62	2.91	2.12	46.85	25.06	21.79
1977	2.41	1.91	1.98	0.40	2.09	4.64	5.37	2.94	6.98	7.00	7.03	3.21	45.96	26.93	19.03
1978	1.88	3.48	3.21	0.05	4.70	7.24	11.61	6.98	4.53	5.42	0.42	5.68	55.20	35.78	19.42
1979	8.17	0.67	0.79	1.96	7.31	5.84	4.01	2.91	14.05	0.69	3.67	0.72	50.79	27.50	23.29
1980	3.57	3.31	1.67	1.95	4.18	2.19	4.09	2.59	4.18	1.59	3.07	3.79	36.18	14.64	21.54

TABLE A.6 (Continued)

Melbourne 1939-1990 (inches)
(shaded) Estimated Values

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEARLY	WET SEASON (JUNE-OCT)	DRY SEASON (NOV-MAY)
1981 ----------	0.30	3.81	1.49	0.39	3.07	1.53	2.62	8.36	3.95	1.75	3.75	0.95	31.97	18.21	13.76
1982 ----------	1.67	1.38	5.01	4.87	7.24	6.88	4.15	2.27	5.00	1.50	2.63	2.42	45.02	19.80	25.22
1983 ----------	4.67	11.14	4.05	1.88	3.35	5.24	2.20	6.06	3.03	7.15	1.81	4.24	54.82	23.68	31.14
1984 ----------	0.76	2.69	0.77	0.77	3.35	1.68	3.62	4.48	6.19	0.39	9.11	0.72	34.53	16.36	18.17
1985 ----------	0.50	0.60	1.70	5.50	1.40	5.40	3.30	6.20	12.30	6.80	2.70	2.60	49.00	34.00	15.00
1986 ----------	3.50	1.30	2.63	0.20	0.60	7.70	3.50	4.50	4.70	7.50	1.10	5.80	43.03	27.90	15.13
1987 ----------	1.80	1.30	6.70	0.20	5.10	4.30	6.10	3.30	4.80	1.30	10.30	0.60	45.50	19.80	25.70
1988 ----------	2.10	2.40	5.20	0.80	0.80	3.60	5.30	5.50	1.80	0.80	2.60	1.20	32.10	17.00	15.10
1989 ----------	5.20	0.50	4.20	2.90	0.90	3.10	4.20	7.60	3.70	8.26	0.80	3.80	45.16	26.86	18.30
1990 ----------	0.80	3.60	0.50	0.20	2.10	7.30	8.70	6.40	7.10	10.00	1.00	0.80	48.50	39.50	9.00
MEAN	2.17	2.71	3.16	2.14	3.64	5.99	5.62	5.28	7.39	4.97	2.76	2.01	47.84	29.25	18.59
STD Deviation	1.84	2.06	2.13	1.84	2.40	3.29	2.68	2.57	4.01	3.24	2.39	1.55	9.07	7.59	5.85

TABLE A.7 Rainfall data for Orlando, Wet Season, Dry Season and Yearly

ORLANDO 1892-1990

Estimated Values

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEARLY	WET SEASON (JUNE-OCT)	DRY SEASON (NOV-MAY)
1892	1.72	2.00	1.29	0.60	2.67	4.37	1.63	9.05	9.12	4.66	0.07	2.03	39.21	28.83	10.38
1893	2.09	1.51	2.15	1.51	5.31	8.90	3.74	6.34	5.77	9.02	2.67	1.89	50.90	33.77	17.13
1894	1.86	0.98	0.88	1.14	3.39	7.86	7.02	7.61	14.95	4.70	3.22	0.56	54.17	42.14	12.03
1895	1.29	3.11	1.70	5.15	7.31	3.21	4.36	4.78	4.27	3.78	1.57	1.78	42.31	20.40	21.91
1896	5.03	2.95	1.39	0.00	2.71	11.18	10.66	5.24	3.88	1.07	3.53	1.95	49.59	32.03	17.56
1897	1.16	3.99	0.38	2.83	1.25	6.53	9.26	4.32	15.77	3.55	1.91	2.62	53.57	39.43	14.14
1898	0.64	1.26	0.54	0.15	1.19	1.13	7.31	10.93	3.43	5.55	1.09	3.68	36.90	28.35	8.55
1899	5.04	8.71	0.96	3.61	0.96	4.15	7.01	6.28	7.77	9.22	0.12	0.93	54.76	34.43	20.33
1900	3.32	2.45	6.93	3.39	4.72	7.62	10.83	7.41	5.53	6.78	1.51	3.36	63.85	38.17	25.68
1901	1.07	3.27	3.89	2.47	2.15	11.81	4.28	13.18	11.12	2.20	0.54	1.28	57.26	42.59	14.67
1902	1.25	4.50	1.81	2.27	1.52	6.94	5.43	3.53	13.66	4.90	0.52	1.35	47.68	34.46	13.22
1903	5.69	5.48	8.37	0.51	3.59	11.05	8.41	3.68	8.08	1.69	2.71	1.00	60.26	32.91	27.35
1904	4.02	2.45	1.09	2.20	2.16	9.12	6.41	6.33	5.00	8.44	1.80	1.06	50.08	35.30	14.78
1905	0.41	2.12	5.13	1.71	8.12	8.13	6.15	17.13	13.11	3.42	0.33	8.43	74.19	47.94	26.25
1906	5.03	0.84	2.80	1.27	9.40	11.75	5.65	3.12	1.87	1.39	0.23	0.05	43.40	23.78	19.62
1907	0.02	0.10	0.15	2.20	2.75	8.17	9.96	9.20	5.15	1.91	0.29	4.15	44.05	34.39	9.66
1908	3.57	1.56	0.25	3.74	5.50	4.84	7.03	7.04	9.94	3.18	2.31	0.68	49.64	32.03	17.61
1909	1.31	1.14	1.40	2.17	2.41	3.13	12.71	8.34	3.41	1.30	0.65	0.67	38.64	28.89	9.75
1910	1.01	2.69	2.65	0.38	2.87	15.25	9.71	6.36	2.82	11.73	2.80	0.80	59.07	45.87	13.20
1911	0.64	0.06	1.29	2.36	3.07	4.94	6.27	5.66	3.71	4.23	4.73	2.65	39.61	24.81	14.80
1912	8.54	1.92	2.11	4.30	6.60	12.17	7.48	7.72	9.63	4.97	1.80	1.21	68.45	41.97	26.48
1913	0.92	5.10	5.57	1.34	2.08	2.35	10.53	6.59	5.61	2.64	0.17	3.49	46.39	27.72	18.67
1914	5.23	3.31	2.10	2.25	2.39	7.73	2.93	7.51	8.79	4.15	1.30	3.83	51.52	31.11	20.41
1915	4.36	4.34	1.41	0.86	7.29	1.91	9.13	4.23	5.06	19.10	2.24	2.21	62.14	39.43	22.71
1916	1.08	0.63	0.28	2.59	5.10	6.87	8.31	5.92	4.95	4.58	4.60	3.61	48.52	30.63	17.89
1917	1.15	1.17	2.41	0.56	5.78	3.89	11.17	8.15	8.87	3.55	0.19	0.92	47.81	35.63	12.18
1918	3.72	0.14	1.72	8.24	2.11	5.37	12.30	3.34	6.60	7.25	2.30	3.23	56.32	34.86	21.46
1919	3.01	4.25	5.68	1.17	10.37	5.19	11.49	5.46	2.38	0.80	3.99	3.45	57.24	25.32	31.92
1920	1.08	4.85	0.72	6.72	6.67	5.89	7.49	5.35	13.96	1.55	3.62	2.23	60.13	34.24	25.89
1921	0.52	1.76	0.87	1.51	7.07	6.62	6.46	4.13	1.93	10.57	3.28	2.91	47.63	29.71	17.92
1922	1.06	1.38	1.27	0.10	5.88	9.75	4.84	9.38	7.78	6.95	0.75	2.06	51.20	38.70	12.50
1923	0.56	0.27	2.63	0.83	10.42	12.36	7.54	5.85	5.79	3.73	0.17	1.45	51.60	35.27	16.33
1924	3.08	5.31	7.36	4.02	2.56	8.99	13.37	3.96	6.14	9.58	0.15	1.71	66.23	42.04	24.19
1925	5.87	1.46	1.89	1.02	4.78	5.67	6.83	10.30	2.55	1.93	1.74	7.96	52.00	27.28	24.72
1926	4.03	1.67	5.51	4.67	0.57	11.36	9.50	5.35	7.04	1.00	3.66	0.48	54.84	34.25	20.59
1927	0.11	1.71	2.30	0.62	0.47	3.84	9.03	5.71	4.13	3.89	0.74	1.29	33.84	26.60	7.24
1928	0.79	0.89	4.07	8.97	3.77	4.06	7.71	10.89	13.22	0.91	0.37	0.69	56.34	36.79	19.55
1929	1.38	0.34	1.30	2.13	7.37	6.01	12.49	8.03	11.52	3.84	1.63	1.41	57.45	41.89	15.56
1930	1.96	2.83	12.24	3.37	2.98	13.37	7.50	3.78	6.49	1.87	0.87	4.01	61.27	33.01	28.26
1931	2.50	1.32	6.29	2.77	3.83	2.27	5.10	6.03	2.78	1.11	0.11	3.59	37.70	17.29	20.41
1932	0.48	0.27	2.43	0.46	5.56	12.38	2.73	5.42	2.50	1.11	5.09	0.10	38.53	24.14	14.39
1933	1.29	2.93	1.59	3.70	2.90	9.18	5.32	8.06	13.32	4.25	1.71	0.25	54.50	40.13	14.37
1934	0.87	4.13	1.69	4.70	7.84	12.57	9.00	2.12	2.43	1.63	0.18	0.60	47.76	27.75	20.01

TABLE A.7 (continued)

ORLANDO 1892-1990
Estimated Values

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEARLY	WET SEASON (JUNE-OCT)	DRY SEASON (NOV-MAY)
1935	1.48	2.37	1.32	3.27	1.91	4.54	10.75	5.70	7.78	3.34	1.02	2.81	46.29	32.11	14.18
1936	3.27	6.63	2.90	2.46	5.34	8.90	3.99	5.21	6.64	4.21	3.23	1.61	54.39	28.95	25.44
1937	1.57	5.53	3.12	3.66	3.91	4.27	4.58	10.31	8.00	3.01	3.07	0.90	51.93	30.17	21.76
1938	0.91	0.62	1.65	0.37	5.96	8.23	4.29	4.68	3.30	4.43	1.47	0.23	36.14	24.93	11.21
1939	0.64	0.24	0.95	3.88	3.61	16.95	9.24	7.73	4.34	2.13	0.39	0.82	50.92	40.39	10.53
1940	3.79	3.29	3.93	2.86	1.83	6.70	11.52	7.68	6.54	0.10	0.24	5.67	54.15	32.54	21.61
1941	3.69	3.61	2.31	4.52	2.05	10.10	10.07	8.30	5.82	5.01	3.06	2.72	61.26	39.30	21.96
1942	2.03	3.48	5.90	1.87	2.26	9.38	5.47	6.06	3.81	0.11	0.10	2.55	43.02	24.83	18.19
1943	1.71	0.39	4.51	1.45	4.76	7.07	8.60	7.69	11.74	4.07	1.08	1.22	54.29	39.17	15.12
1944	2.43	0.16	5.16	2.45	2.14	7.61	13.16	7.66	6.20	4.29	0.38	0.03	51.69	38.94	12.75
1945	3.76	0.15	0.30	0.84	3.41	9.83	12.38	6.24	12.24	2.12	0.91	3.30	55.48	42.81	12.67
1946	1.95	1.89	2.22	0.73	5.38	5.85	11.25	8.25	5.72	2.87	1.21	1.22	48.54	33.94	14.60
1947	0.36	4.44	6.18	5.67	2.51	10.28	10.55	7.74	8.31	4.16	2.19	0.61	63.00	41.04	21.96
1948	6.41	0.90	3.24	2.77	0.85	4.07	8.76	12.30	10.87	2.55	0.45	1.31	54.48	38.55	15.93
1949	0.31	0.47	0.29	3.02	2.54	7.97	6.05	8.83	8.25	1.51	1.22	3.82	44.28	32.61	11.67
1950	0.13	0.48	3.44	4.82	2.93	5.55	8.27	3.48	7.93	14.51	0.09	4.30	55.93	39.74	16.19
1951	0.52	2.28	0.96	5.99	1.40	5.08	14.51	7.84	9.34	3.08	4.86	2.06	57.92	39.85	18.07
1952	0.70	5.82	6.67	2.88	2.45	2.32	4.43	6.51	4.94	3.69	0.74	0.65	41.80	21.89	19.91
1953	2.86	2.89	3.03	6.18	1.67	6.28	6.85	15.19	8.84	3.50	4.78	3.58	65.85	40.66	25.19
1954	0.45	1.16	0.99	4.44	3.55	5.81	13.64	4.39	3.99	5.07	2.68	1.80	47.97	32.90	15.07
1955	2.00	1.12	1.59	1.36	3.13	4.73	6.88	6.65	6.97	4.10	2.17	1.56	42.26	29.33	12.93
1956	1.66	0.90	0.16	4.03	3.70	5.41	5.88	6.10	6.27	8.24	1.26	0.30	43.91	31.90	12.01
1957	0.91	1.93	3.76	4.74	8.58	4.39	4.35	9.45	7.47	1.68	0.82	2.85	50.93	27.34	23.59
1958	4.49	2.83	6.16	3.79	2.68	3.83	9.93	3.40	1.65	7.27	2.48	2.69	51.20	26.08	25.12
1959	2.78	4.55	7.69	4.91	4.44	7.95	8.02	6.77	8.33	5.97	0.99	1.37	63.77	37.04	26.73
1960	1.49	5.64	10.54	2.55	0.50	9.50	19.57	3.20	11.21	3.17	0.30	1.07	68.74	46.65	22.09
1961	1.75	2.82	2.21	0.28	0.43	8.08	9.93	6.99	4.84	2.87	0.92	0.66	41.78	32.71	9.07
1962	1.11	2.08	3.55	1.58	2.74	3.11	12.77	5.11	12.24	1.90	2.46	1.70	50.35	35.13	15.22
1963	3.17	4.76	2.69	1.23	3.56	6.67	3.83	3.54	6.72	0.46	6.39	2.26	45.28	21.22	24.06
1964	6.18	3.42	4.65	2.14	2.74	6.11	6.68	9.00	9.47	1.64	0.45	1.91	54.39	32.90	21.49
1965	1.79	3.67	3.02	0.66	0.52	7.36	11.55	5.49	5.99	4.06	1.06	2.23	47.40	34.45	12.95
1966	4.45	6.31	2.57	1.92	6.57	9.77	6.73	7.76	6.25	1.88	0.09	0.99	55.29	32.39	22.90
1967	0.84	5.49	1.31	0.28	1.69	11.16	4.63	6.83	5.88	0.35	0.03	2.42	40.91	28.85	12.06
1968	0.65	2.76	2.27	0.30	3.72	18.28	5.60	3.44	5.91	5.47	2.82	0.88	52.10	38.70	13.40
1969	2.22	3.30	5.52	2.38	1.40	5.04	6.73	7.17	6.44	9.45	0.87	4.66	55.18	34.83	20.35
1970	4.05	6.77	3.66	0.45	4.08	4.92	5.97	5.91	3.25	2.60	0.24	2.06	43.96	22.65	21.31
1971	0.45	2.98	1.46	1.52	4.31	4.39	8.29	7.51	2.98	3.06	1.21	1.93	40.09	26.23	13.86
1972	0.99	4.96	5.06	1.39	3.76	6.33	3.98	16.11	0.43	2.34	4.11	1.89	51.35	29.19	22.16
1973	4.82	2.73	4.13	2.82	4.74	6.63	6.24	7.33	11.53	1.10	0.74	2.56	55.37	32.83	22.54
1974	0.18	0.63	3.67	1.17	2.69	15.28	6.01	6.56	5.78	0.48	0.31	1.62	44.38	34.11	10.27
1975	0.98	1.49	1.10	1.36	7.52	9.70	9.26	4.75	4.97	4.74	0.66	0.51	47.04	33.42	13.62
1976	0.37	0.83	1.72	2.16	10.36	9.93	7.05	3.25	5.87	0.74	2.03	2.77	47.08	26.84	20.24
1977	1.81	1.76	1.82	0.14	1.47	4.47	6.61	6.28	7.03	0.43	2.60	3.70	38.12	24.82	13.30
1978	2.49	5.45	2.14	0.61	3.16	10.00	11.92	5.13	4.31	1.51	0.18	3.69	50.59	32.87	17.72

TABLE A.7 (continued)

ORLANDO 1892-1990
Estimated Values

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEARLY	WET SEASON (JUNE-OCT)	DRY SEASON (NOV-MAY)
1979 ------------	6.48	1.45	3.24	1.08	7.66	4.00	7.95	5.88	9.19	0.43	1.93	0.94	50.23	27.45	22.78
1980 ------------	2.45	1.64	1.51	4.07	6.96	5.25	5.14	2.92	3.70	0.55	6.55	0.47	41.21	17.56	23.65
1981 ------------	0.21	4.36	1.85	0.18	2.02	12.49	3.53	5.60	8.26	3.13	2.50	2.97	47.10	33.01	14.09
1982 ------------	1.72	1.34	4.85	6.27	5.29	6.06	11.81	5.03	6.96	0.74	0.53	1.01	51.61	30.60	21.01
1983 ------------	2.08	8.32	5.37	3.21	1.77	7.82	6.49	4.83	5.16	3.78	1.36	5.33	55.52	28.08	27.44
1984 ------------	2.01	2.73	1.85	6.21	3.20	5.32	6.19	7.89	6.19	0.56	2.10	0.19	44.44	26.15	18.29
1985 ------------	0.91	1.27	4.59	1.69	3.00	4.54	7.28	11.63	5.45	2.55	0.82	3.46	47.19	31.45	15.74
1986 ------------	7.23	1.84	2.63	0.49	0.88	9.50	5.85	5.99	4.50	5.63	1.69	3.60	49.83	31.47	18.36
1987 ------------	1.27	1.74	11.38	0.59	1.40	3.54	7.95	6.07	8.64	3.41	10.29	0.51	56.79	29.61	27.18
1988 ------------	3.12	1.38	6.07	2.02	2.82	4.17	9.44	7.94	5.67	1.42	7.44	1.00	52.49	28.64	23.85
1989 ------------	3.80	0.15	1.35	2.28	2.38	6.79	4.74	6.20	10.29	1.75	1.44	4.49	45.66	29.77	15.89
1990 ------------	0.23	4.13	1.92	1.73	0.55	6.22	6.68	3.78	2.46	2.10	1.05	0.83	31.68	21.24	10.44
MEAN	2.24	2.62	3.10	2.47	3.78	7.33	7.90	6.75	6.82	3.73	1.81	2.10	50.64	32.52	18.12
STD Deviation	1.83	1.92	2.42	1.87	2.39	3.37	3.05	2.72	3.27	3.12	1.78	1.56	8.06	6.37	5.38

TABLE A.8 Rainfall data for Vero Beach, Wet Season, Dry Season and Yearly

VERO BEACH 1943-1990 (inches)
Estimated Values

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEARLY	WET SEASON (JUNE-OCT)	DRY SEASON (NOV-MAY)
1943	0.26	1.15	5.73	2.73	3.10	2.87	9.14	5.51	9.32	3.68	1.53	0.66	45.68	30.52	15.16
1944	1.01	0.12	2.33	4.06	1.35	5.35	5.26	4.35	10.02	15.45	1.01	0.41	50.72	40.43	10.29
1945	1.00	0.05	0.59	2.00	2.06	3.80	8.90	3.32	10.24	7.16	5.11	2.89	47.12	33.42	13.70
1946	1.17	1.09	2.70	0.02	6.24	5.29	4.13	10.95	3.90	2.72	4.10	1.74	44.05	26.99	17.06
1947	2.14	3.86	6.48	3.69	4.04	6.10	6.84	7.23	13.95	5.94	4.51	0.79	65.57	40.06	25.51
1948	2.60	0.55	4.01	3.31	4.52	3.51	9.32	11.17	16.54	4.85	1.53	1.24	63.15	45.39	17.76
1949	0.54	1.97	0.19	3.85	4.38	10.77	3.07	5.90	7.49	6.66	0.51	3.48	48.81	33.89	14.92
1950	0.32	1.56	2.96	1.17	2.34	2.80	3.43	2.01	4.00	11.37	2.20	1.07	35.23	23.61	11.62
1951	0.44	3.05	0.82	8.83	3.29	3.41	6.20	4.92	7.49	9.68	4.25	0.99	53.37	31.70	21.67
1952	2.01	5.68	2.39	1.39	2.76	1.53	3.92	7.34	4.15	11.89	0.39	0.68	44.13	28.83	15.30
1953	1.73	1.72	4.44	3.93	0.99	4.47	6.26	6.77	12.77	11.47	4.45	1.97	60.97	41.74	19.23
1954	1.30	1.96	1.83	5.60	3.90	8.68	6.57	2.82	10.56	5.49	6.40	0.84	55.95	34.12	21.83
1955	2.99	2.46	3.51	2.16	2.68	4.18	4.47	5.91	2.55	3.79	0.13	2.72	37.55	20.90	16.65
1956	0.98	1.77	0.09	3.68	1.05	2.28	3.35	5.74	8.03	11.53	0.38	0.33	39.21	30.93	8.28
1957	9.08	4.90	5.70	6.21	5.71	3.78	5.17	6.65	9.09	3.73	1.56	1.93	63.51	28.42	35.09
1958	7.03	1.68	4.54	3.84	4.37	4.70	3.19	1.99	4.28	3.01	0.82	4.52	43.97	17.17	26.80
1959	3.29	1.54	7.92	3.22	6.82	10.83	4.82	5.51	9.14	7.59	3.24	1.86	65.78	37.89	27.89
1960	0.21	4.06	7.43	2.84	4.19	7.36	9.66	4.37	20.29	1.96	1.66	0.68	64.71	43.64	21.07
1961	3.21	0.97	3.52	1.38	2.74	2.96	1.69	4.89	3.01	6.46	1.79	0.08	32.70	19.01	13.69
1962	0.44	1.01	2.94	2.49	1.46	4.64	4.75	4.19	7.08	0.75	3.35	0.71	33.81	21.41	12.40
1963	1.05	4.53	2.65	0.72	4.79	5.07	5.06	4.59	15.38	8.22	4.07	5.40	61.53	38.32	23.21
1964	2.11	4.07	1.29	1.58	2.61	2.17	5.79	5.88	5.53	7.66	1.84	2.43	42.96	27.03	15.93
1965	0.32	6.83	5.98	0.23	0.29	6.43	7.95	5.02	5.82	7.91	2.89	1.55	51.22	33.13	18.09
1966	4.23	6.20	2.39	2.14	4.79	11.44	8.73	2.74	6.53	13.06	2.08	1.25	65.58	42.50	23.08
1967	1.67	3.08	1.43	0.66	0.30	4.74	8.16	4.96	3.42	7.34	0.41	1.69	37.86	28.62	9.24
1968	1.19	2.23	0.54	2.88	7.36	18.24	10.58	6.50	7.78	7.23	2.33	0.15	67.01	50.33	16.68
1969	2.52	1.16	8.67	1.96	5.49	1.59	7.08	7.65	10.87	9.93	4.19	1.68	62.79	37.12	25.67
1970	4.62	2.77	5.93	0.31	2.77	4.74	4.34	3.52	10.27	6.18	0.11	0.40	45.96	29.05	16.91
1971	0.59	3.01	1.59	0.94	3.57	8.02	12.22	2.55	7.95	7.09	2.15	2.25	51.93	37.83	14.10
1972	1.34	4.44	1.48	5.65	7.30	11.20	2.31	6.33	2.98	2.54	3.46	1.67	50.70	25.36	25.34
1973	5.75	2.01	2.25	2.64	9.05	11.90	9.00	8.24	8.58	4.95	2.26	1.68	68.31	42.67	25.64
1974	2.64	1.91	1.91	2.97	4.35	9.19	7.14	8.48	4.36	3.13	2.94	1.66	50.68	32.30	18.38
1975	0.21	3.81	2.03	0.62	7.72	7.75	3.69	6.44	5.92	4.73	1.61	1.02	45.55	28.53	17.02
1976	0.55	0.61	0.52	2.23	8.41	10.29	2.14	5.94	9.02	2.35	2.13	3.29	47.48	29.74	17.74
1977	2.75	0.69	1.05	1.10	3.12	10.63	2.60	5.86	7.94	2.23	3.21	6.68	47.86	29.26	18.60
1978	1.67	2.93	3.14	0.67	4.34	5.48	4.63	7.01	3.27	3.20	4.72	5.20	46.26	23.59	22.67
1979	4.71	1.22	1.06	1.89	12.06	3.77	6.20	5.44	17.42	1.65	3.92	1.47	60.81	34.48	26.33
1980	2.37	3.46	2.46	3.06	3.38	4.09	5.14	1.22	7.18	1.54	3.52	2.28	39.70	19.17	20.53
1981	0.17	2.13	1.45	0.37	2.31	3.15	2.17	18.26	7.76	3.04	3.09	0.80	44.70	34.38	10.32
1982	1.21	4.35	10.73	5.39	7.60	8.54	9.73	9.40	7.39	3.09	11.71	2.60	81.74	38.15	43.59
1983	4.17	9.96	4.74	2.89	1.15	6.35	4.13	9.07	3.20	15.58	1.58	4.32	67.14	38.33	28.81
1984	2.02	4.24	2.32	1.02	6.53	2.14	4.51	7.09	12.67	3.64	13.65	1.98	61.81	30.05	31.76

TABLE A.8 (Continued)

VERO BEACH 1943-1990 (inches)
Estimated Values

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEARLY	WET SEASON (JUNE-OCT)	DRY SEASON (NOV-MAY)
1985	0.95	0.06	2.20	5.20	1.60	3.60	9.90	6.40	12.00	4.10	1.70	3.48	51.19	36.00	15.19
1986	5.72	1.69	4.20	0.10	1.70	8.10	6.80	3.40	5.90	14.00	3.10	3.70	58.41	38.20	20.21
1987	1.50	1.20	5.40	0.20	5.10	3.00	6.90	2.70	4.80	6.70	7.40	0.30	45.20	24.10	21.10
1988	2.30	1.70	5.20	2.30	3.60	3.50	12.40	3.60	1.40	1.10	0.40	2.40	39.90	22.00	17.90
1989	2.00	1.20	4.50	3.40	1.40	3.70	4.40	4.10	8.30	7.00	0.20	2.50	42.70	27.50	15.20
1990	1.00	2.70	0.50	1.60	3.60	6.10	4.30	10.80	8.20	4.70	1.50	0.40	45.40	34.10	11.30
MEAN	2.15	2.61	3.29	2.52	4.05	5.92	6.00	5.93	8.04	6.23	2.94	1.95	51.63	32.12	19.51
STD Deviation	1.89	1.93	2.38	1.84	2.47	3.41	2.67	2.92	4.07	3.81	2.61	1.47	10.88	7.47	6.86

TABLE A.9

DAYTONA BEACH YEARLY RAINFALL STATISTICAL SUMMARY AND GRAPHICAL COMPARISON

	SSE	Rank	Standard Error	Rank	Kolmogorov	Rank	Chi-Square	Rank	Graphical Rank
Normal Distribution	233.32	6	1.85	6	0.074	6	2.00	1	6
Log Normal Distribution	82.68	5	1.10	5	0.044	1	8.18	5	5
3 Parameter Log Normal	59.56	1	0.94	1	0.059	3	8.18	5	1
Gumbel Distribution	62.72	3	0.96	3	0.059	3	7.15	2	4
Pearson Type III Event	60.71	2	0.94	1	0.059	3	7.56	3	3
USWRC Log Pearson	72.69	4	1.03	5	0.044	1	7.56	3	1

DAYTONA BEACH WET SEASON RAINFALL STATISTICAL SUMMARY AND GRAPHICAL COMPARISON

	SSE	Rank	Standard Error	Rank	Kolmogorov	Rank	Chi-Square	Rank	Graphical Rank
Normal Distribution	163.23	6	1.55	6	0.132	6	7.35	6	6
Log Normal Distribution	60.93	4	0.95	3	0.088	2	6.94	3	2
3 Parameter Log Normal	58.69	1	0.93	1	0.088	2	6.32	2	2
Gumbel Distribution	60.90	3	0.95	3	0.074	1	5.91	1	1
Pearson Type III Event	61.10	5	0.95	3	0.088	2	6.94	3	2
USWRC Log Pearson	60.68	2	0.94	2	0.088	2	6.94	3	2

DAYTONA BEACH DRY SEASON RAINFALL STATISTICAL SUMMARY AND GRAPHICAL COMPARISON

	SSE	Rank	Standard Error	Rank	Kolmogorov	Rank	Chi-Square	Rank	Graphical Rank
Normal Distribution	99.97	6	1.21	5	0.059	1	3.03	5	6
Log Normal Distribution	39.02	4	0.76	4	0.059	1	2.00	2	1
3 Parameter Log Normal	36.79	2	0.74	2	0.059	1	0.97	1	1
Gumbel Distribution	39.56	5	0.76	4	0.059	1	12.91	6	1
Pearson Type III Event	38.20	3	0.75	3	0.059	1	2.21	3	1
USWRC Log Pearson	36.17	1	0.73	1	0.059	1	2.21	3	1

TABLE A.10

GAINESVILLE YEARLY RAINFALL STATISTICAL SUMMARY AND GRAPHICAL COMPARISON

	SSE	Rank	Standard Error	Rank	Kolmogorov	Rank	Chi-Square	Rank	Graphical Rank
Normal Distribution	94.80	5	1.00	5	0.096	1	5.489	4	5
Log Normal Distribution	84.69	4	0.95	4	0.117	5	6.830	5	1
3 Parameter Log Normal	75.40	1	0.90	1	0.096	1	5.340	3	2
Gumbel Distribution	******METHOD DOES NOT CONVERGE******								
Pearson Type III Event	78.13	3	0.91	3	0.096	1	4.447	1	2
USWRC Log Pearson	76.70	2	0.90	1	0.106	4	4.447	1	2

GAINESVILLE WET SEASON RAINFALL STATISTICAL SUMMARY AND GRAPHICAL COMPARISON

	SSE	Rank	Standard Error	Rank	Kolmogorov	Rank	Chi-Square	Rank	Graphical Rank
Normal Distribution	37.13	1	0.63	1	0.096	1	5.489	2	3
Log Normal Distribution	97.41	3	1.02	3	0.117	4	4.596	1	5
3 Parameter Log Normal	97.41	4	1.02	3	0.117	4	5.489	2	1
Gumbel Distribution	382.64	5	2.02	5	0.096	1	5.638	5	6
Pearson Type III Event	******METHOD DOES NOT CONVERGE******								
USWRC Log Pearson	38.25	2	0.64	2	0.096	1	5.489	2	1

GAINESVILLE DRY SEASON RAINFALL STATISTICAL SUMMARY AND GRAPHICAL COMPARISON

	SSE	Rank	Standard Error	Rank	Kolmogorov	Rank	Chi-Square	Rank	Graphical Rank
Normal Distribution	89.14	5	0.97	5	0.096	1	11.149	2	6
Log Normal Distribution	62.61	4	0.82	4	0.149	5	10.553	1	1
3 Parameter Log Normal	47.20	2	0.71	1	0.128	2	13.234	5	1
Gumbel Distribution	96.96	6	1.02	6	0.149	6	13.532	6	5
Pearson Type III Event	48.19	3	0.72	3	0.128	2	11.745	3	1
USWRC Log Pearson	46.88	1	0.71	1	0.128	2	11.745	3	1

TABLE A.11

JACKSONVILLE YEARLY RAINFALL STATISTICAL SUMMARY AND GRAPHICAL COMPARISON

	SSE	Rank	Standard Error	Rank	Kolmogorov	Rank	Chi-Square	Rank	Graphical Rank
Normal Distribution	188.24	5	1.23	5	0.081	1	2.5645	1	4
Log Normal Distribution	181.30	4	1.21	4	0.113	5	4.4839	5	5
3 Parameter Log Normal	154.48	1	1.12	1	0.097	2	2.6774	2	1
Gumbel Distribution	******METHOD DOES NOT CONVERGE******								
Pearson Type III Event	158.08	2	1.13	2	0.097	2	3.3548	3	1
USWRC Log Pearson	162.75	3	1.15	3	0.097	2	3.3548	3	1

JACKSONVILLE WET SEASON RAINFALL STATISTICAL SUMMARY AND GRAPHICAL COMPARISON

	SSE	Rank	Standard Error	Rank	Kolmogorov	Rank	Chi-Square	Rank	Graphical Rank
Normal Distribution	83.58	4	0.82	4	0.113	1	3.129	1	4
Log Normal Distribution	115.19	5	0.96	5	0.137	5	6.403	5	5
3 Parameter Log Normal	52.94	1	0.65	1	0.113	2	3.807	2	1
Gumbel Distribution	362.05	6	1.71	6	0.153	6	9.790	6	6
Pearson Type III Event	54.80	2	0.66	2	0.113	2	3.807	2	1
USWRC Log Pearson	58.45	3	0.69	3	0.113	2	3.807	2	1

JACKSONVILLE DRY SEASON RAINFALL STATISTICAL SUMMARY AND GRAPHICAL COMPARISON

	SSE	Rank	Standard Error	Rank	Kolmogorov	Rank	Chi-Square	Rank	Graphical Rank
Normal Distribution	108.58	6	0.94	6	0.089	1	5.2742	5	6
Log Normal Distribution	32.02	3	0.51	2	0.137	5	2.2258	1	1
3 Parameter Log Normal	28.42	1	0.48	1	0.113	2	4.4839	4	1
Gumbel Distribution	66.67	5	0.73	5	0.137	5	11.2581	6	5
Pearson Type III Event	31.70	2	0.51	2	0.113	2	3.6935	2	1
USWRC Log Pearson	32.91	4	0.52	4	0.113	2	3.6935	2	1

TABLE A.12

LISBON YEARLY RAINFALL STATISTICAL SUMMARY AND GRAPHICAL COMPARISON

	SSE	Rank	Standard Error	Rank	Kolmogorov	Rank	Chi-Square	Rank	Graphical Rank
Normal Distribution	82.19	5	0.91	5	0.060	1	5.28	5	5
Log Normal Distribution	37.31	2	0.61	1	0.070	2	2.34	1	4
3 Parameter Log Normal	37.11	1	0.61	1	0.070	2	3.32	4	1
Gumbel Distribution	1025.66	6	3.20	6	0.100	6	11.44	6	6
Pearson Type III Event	38.26	4	0.62	4	0.070	2	2.62	2	1
USWRC Log Pearson	37.46	3	0.61	1	0.070	2	2.62	2	1

LISBON WET SEASON RAINFALL STATISTICAL SUMMARY AND GRAPHICAL COMPARISON

	SSE	Rank	Standard Error	Rank	Kolmogorov	Rank	Chi-Square	Rank	Graphical Rank
Normal Distribution	52.50	5	0.72	5	0.060	4	3.88	5	5
Log Normal Distribution	28.44	4	0.53	4	0.060	4	2.76	4	4
3 Parameter Log Normal	20.56	2	0.45	2	0.050	1	0.38	1	1
Gumbel Distribution	116.14	6	1.08	6	0.080	6	5.56	6	6
Pearson Type III Event	21.46	3	0.46	3	0.050	1	1.50	2	1
USWRC Log Pearson	19.56	1	0.44	1	0.050	1	1.50	2	1

LISBON DRY SEASON RAINFALL STATISTICAL SUMMARY AND GRAPHICAL COMPARISON

	SSE	Rank	Standard Error	Rank	Kolmogorov	Rank	Chi-Square	Rank	Graphical Rank
Normal Distribution	54.79	4	0.74	4	0.080	4	10.74	5	4
Log Normal Distribution	67.36	5	0.82	5	0.090	5	5.84	1	5
3 Parameter Log Normal	32.19	2	0.57	2	0.070	1	7.52	2	1
Gumbel Distribution	108.42	6	1.04	6	0.100	6	13.40	6	6
Pearson Type III Event	32.71	3	0.57	3	0.070	1	9.90	3	1
USWRC Log Pearson	30.02	1	0.55	1	0.070	1	9.90	3	1

TABLE A.13

MARINELAND YEARLY RAINFALL STATISICAL SUMMARY AND GRAPHICAL COMPARISON

	SSE	Rank	Standard Error	Rank	Kolmogorov	Rank	Chi-Square	Rank	Graphical Rank
Normal Distribution	96.35	6	1.40	6	0.122	6	1.429	1	6
Log Normal Distribution	53.00	1	1.04	1	0.102	2	2.286	5	1
3 Parameter Log Normal	55.34	3	1.06	3	0.102	2	1.429	1	1
Gumbel Distribution	81.83	5	1.29	5	0.082	1	5.429	6	5
Pearson Type III Event	59.80	4	1.10	4	0.102	3	1.429	1	1
USWRC Log Pearson	53.63	2	1.05	2	0.102	4	1.429	1	1

MARINELAND WET SEASON RAINFALL STATISICAL SUMMARY AND GRAPHICAL COMPARISON

	SSE	Rank	Standard Error	Rank	Kolmogorov	Rank	Chi-Square	Rank	Graphical Rank
Normal Distribution	42.74	3	0.93	3	0.122	4	4.857	1	4
Log Normal Distribution	74.83	5	1.24	5	0.102	2	7.714	6	5
3 Parameter Log Normal	36.76	1	0.87	1	0.122	4	4.857	1	1
Gumbel Distribution	113.22	6	1.52	6	0.082	1	7.143	5	6
Pearson Type III Event	39.78	2	0.90	2	0.122	4	4.857	1	1
USWRC Log Pearson	54.46	4	1.05	4	0.102	2	4.857	1	1

MARINELAND DRY SEASON RAINFALL STATISICAL SUMMARY AND GRAPHICAL COMPARISON

	SSE	Rank	Standard Error	Rank	Kolmogorov	Rank	Chi-Square	Rank	Graphical Rank
Normal Distribution	98.48	6	1.42	6	0.102	3	3.4286	5	6
Log Normal Distribution	37.92	5	0.88	5	0.082	1	1.7143	1	1
3 Parameter Log Normal	30.70	1	0.79	1	0.102	3	1.7143	1	1
Gumbel Distribution	36.22	3	0.86	3	0.102	3	11.4286	6	1
Pearson Type III Event	41.25	6	0.92	6	0.102	3	2.8571	3	1
USWRC Log Pearson	36.83	4	0.87	4	0.082	2	2.8571	3	1

TABLE A.14

MELBOURNE YEARLY RAINFALL STATISTICAL SUMMARY AND GRAPHICAL COMPARISON

	SSE	Rank	Standard Error	Rank	Kolmogorov	Rank	Chi-Square	Rank	Graphics Rank
Normal Distribution	138.42	6	1.63	6	0.115	6	4.5385	2	6
Log Normal Distribution	69.05	4	1.15	3	0.077	1	4.8077	3	2
3 Parameter Log Normal	65.97	2	1.13	2	0.077	1	4.8077	3	2
Gumbel Distribution	59.68	1	1.07	1	0.077	1	3.1923	1	1
Pearson Type III Event	71.11	5	1.17	5	0.077	1	4.8077	3	2
USWRC Log Pearson	68.87	3	1.15	3	0.077	1	4.8077	3	2

MELBOURNE WET SEASON RAINFALL STATISTICAL SUMMARY AND GRAPHICAL COMPARISON

	SSE	Rank	Standard Error	Rank	Kolmogorov	Rank	Chi-Square	Rank	Graphics Rank
Normal Distribution	48.77	5	0.97	5	0.115	6	2.1154	1	6
Log Normal Distribution	34.69	4	0.82	4	0.077	2	4.5385	5	3
3 Parameter Log Normal	27.77	1	0.73	1	0.077	2	2.1154	1	2
Gumbel Distribution	64.33	6	1.11	6	0.058	1	6.4231	6	5
Pearson Type III Event	30.27	3	0.76	3	0.077	2	3.4615	3	3
USWRC Log Pearson	28.86	2	0.74	2	0.077	2	3.4615	3	1

MELBOURNE DRY SEASON RAINFALL STATISTICAL SUMMARY AND GRAPHICAL COMPARISON

	SSE	Rank	Standard Error	Rank	Kolmogorov	Rank	Chi-Square	Rank	Graphics Rank
Normal Distribution	23.68	2	0.67	2	0.077	2	2.923	1	1
Log Normal Distribution	79.06	5	1.23	5	0.077	2	4.000	5	5
3 Parameter Log Normal	22.72	1	0.66	1	0.058	1	2.923	1	1
Gumbel Distribution	90.57	6	1.32	6	0.077	2	10.192	6	6
Pearson Type III Event	24.83	3	0.69	3	0.077	2	2.923	1	1
USWRC Log Pearson	52.66	4	1.01	4	0.077	2	2.923	1	4

TABLE A.15

ORLANDO YEARLY RAINFALL STATISTICAL SUMMARY AND GRAPHICAL COMPARISON

	SSE	Rank	Standard Error	Rank	Kolmogorov	Rank	Chi-Square	Rank	Graphical Rank
Normal Distribution	92.23	2	0.97	2	0.061	1	2.040	5	5
Log Normal Distribution	125.41	5	1.13	5	0.091	5	1.475	4	1
3 Parameter Log Normal	90.27	1	0.95	1	0.061	1	1.333	1	2
Gumbel Distribution	******METHOD DOES NOT CONVERGE******								
Pearson Type III Event	92.51	3	0.97	2	0.061	1	1.333	1	3
USWRC Log Pearson	118.53	4	1.09	4	0.061	1	1.333	1	3

ORLANDO WET SEASON RAINFALL STATISTICAL SUMMARY AND GRAPHICAL COMPARISON

	SSE	Rank	Standard Error	Rank	Kolmogorov	Rank	Chi-Square	Rank	Graphical Rank
Normal Distribution	30.18	1	0.55	1	0.091	2	5.010	4	1
Log Normal Distribution	87.88	3	0.94	3	0.111	3	2.465	1	4
3 Parameter Log Normal	87.88	3	0.94	3	0.111	3	4.303	2	1
Gumbel Distribution	******METHOD DOES NOT CONVERGE*****								
Pearson Type III Event	******METHOD DOES NOT CONVERGE******								
USWRC Log Pearson	30.62	2	0.56	2	0.081	1	4.303	2	1

ORLANDO DRY SEASON RAINFALL STATISTICAL SUMMARY AND GRAPHICAL COMPARISON

	SSE	Rank	Standard Error	Rank	Kolmogorov	Rank	Chi-Square	Rank	
Normal Distribution	49.32	4	0.71	4	0.091	1	6.424	2	1
Log Normal Distribution	116.05	5	1.08	5	0.131	2	5.010	1	6
3 Parameter Log Normal	44.97	1	0.67	1	0.111	2	6.566	3	1
Gumbel Distribution	162.35	6	1.28	6	0.121	5	21.838	6	5
Pearson Type III Event	48.65	2	0.70	2	0.111	2	6.566	3	1
USWRC Log Pearson	48.65	2	0.70	2	0.111	2	6.566	3	1

TABLE A.16

VERO BEACH YEARLY RAINFALL STATISTICAL SUMMARY AND GRAPHICAL COMPARISON

	SSE	Rank	Standard Error	Rank	Kolmogorov	Rank	Chi-Square	Rank	Graphical Rank
Normal Distribution	247.96	6	2.27	6	0.146	6	6.542	6	6
Log Normal Distribution	194.56	2	2.01	1	0.125	4	5.083	1	5
3 Parameter Log Normal	198.04	3	2.03	3	0.104	2	5.958	5	3
Gumbel Distribution	239.78	5	2.24	5	0.083	1	5.667	4	1
Pearson Type III Event	201.50	4	2.05	4	0.104	2	5.083	1	3
USWRC Log Pearson	194.53	1	2.01	1	0.125	4	5.083	1	1

VERO BEACH WET SEASON RAINFALL STATISTICAL SUMMARY AND GRAPHICAL COMPARISON

	SSE	Rank	Standard Error	Rank	Kolmogorov	Rank	Chi-Square	Rank	Graphical Rank
Normal Distribution	28.16	2	0.77	2	0.083	1	2.167	1	4
Log Normal Distribution	57.29	5	1.09	5	0.104	4	3.625	6	5
3 Parameter Log Normal	27.16	1	0.75	1	0.083	1	2.750	2	2
Gumbel Distribution	131.58	6	1.66	6	0.104	4	2.750	2	6
Pearson Type III Event	30.36	3	0.80	3	0.083	1	2.750	2	2
USWRC Log Pearson	42.09	4	0.94	4	0.104	4	2.750	2	1

VERO BEACH DRY SEASON RAINFALL STATISTICAL SUMMARY AND GRAPHICAL COMPARISON

	SSE	Rank	Standard Error	Rank	Kolmogorov	Rank	Chi-Square	Rank	Graphical Rank
Normal Distribution	158.67	6	1.82	6	0.104	6	3.333	4	6
Log Normal Distribution	52.33	1	1.04	1	0.083	1	3.042	3	1
3 Parameter Log Normal	54.86	4	1.07	4	0.083	1	1.583	2	1
Gumbel Distribution	52.83	2	1.05	2	0.083	1	0.708	1	1
Pearson Type III Event	62.57	5	1.14	5	0.083	1	4.208	5	1
USWRC Log Pearson	53.92	3	1.06	3	0.083	1	4.208	5	1

APPENDIX B

YEARLY RAINFALL DISTRIBUTIONS

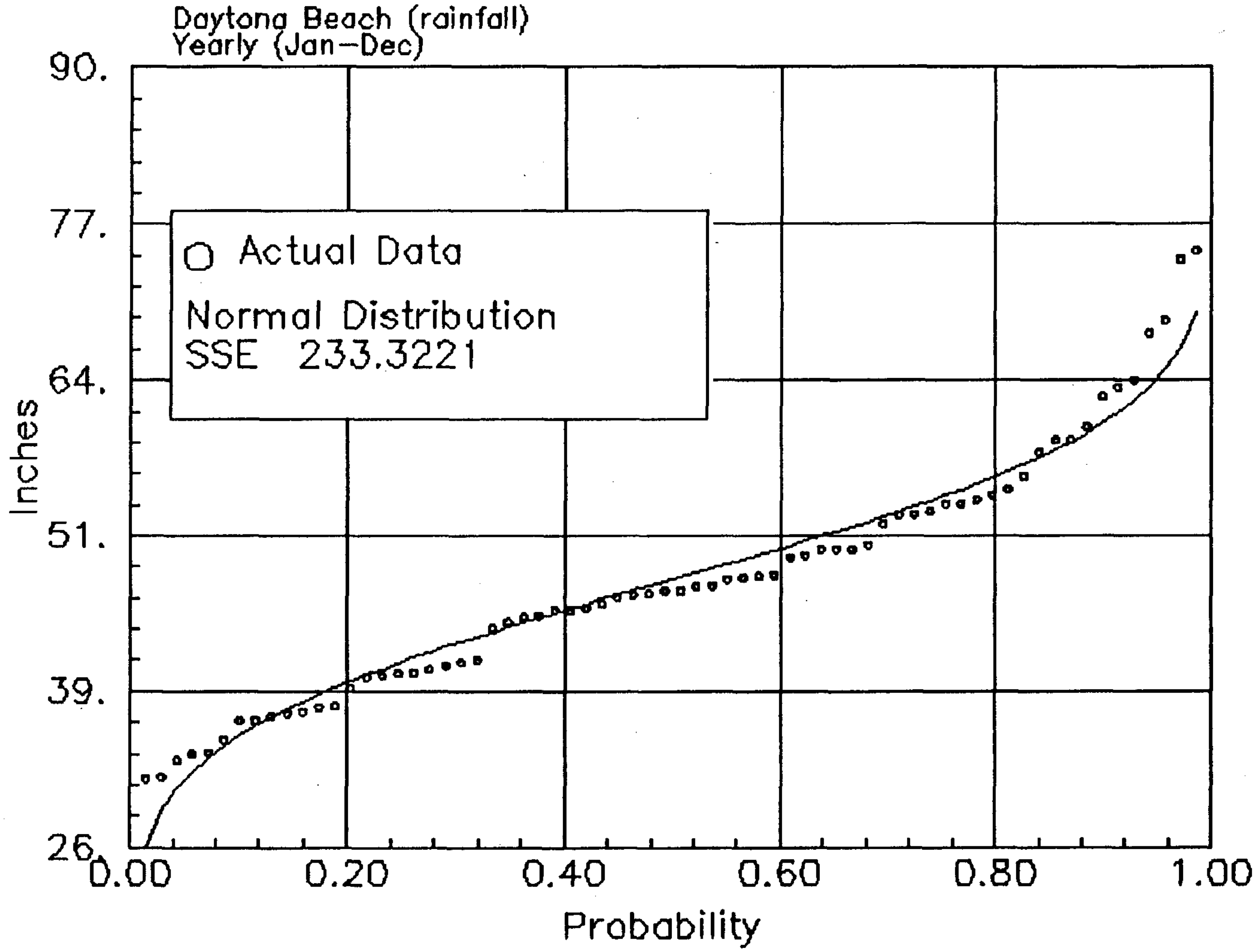


Figure B.1.1 Daytona Beach, Yearly rainfall distribution for the years of (1923–1990)

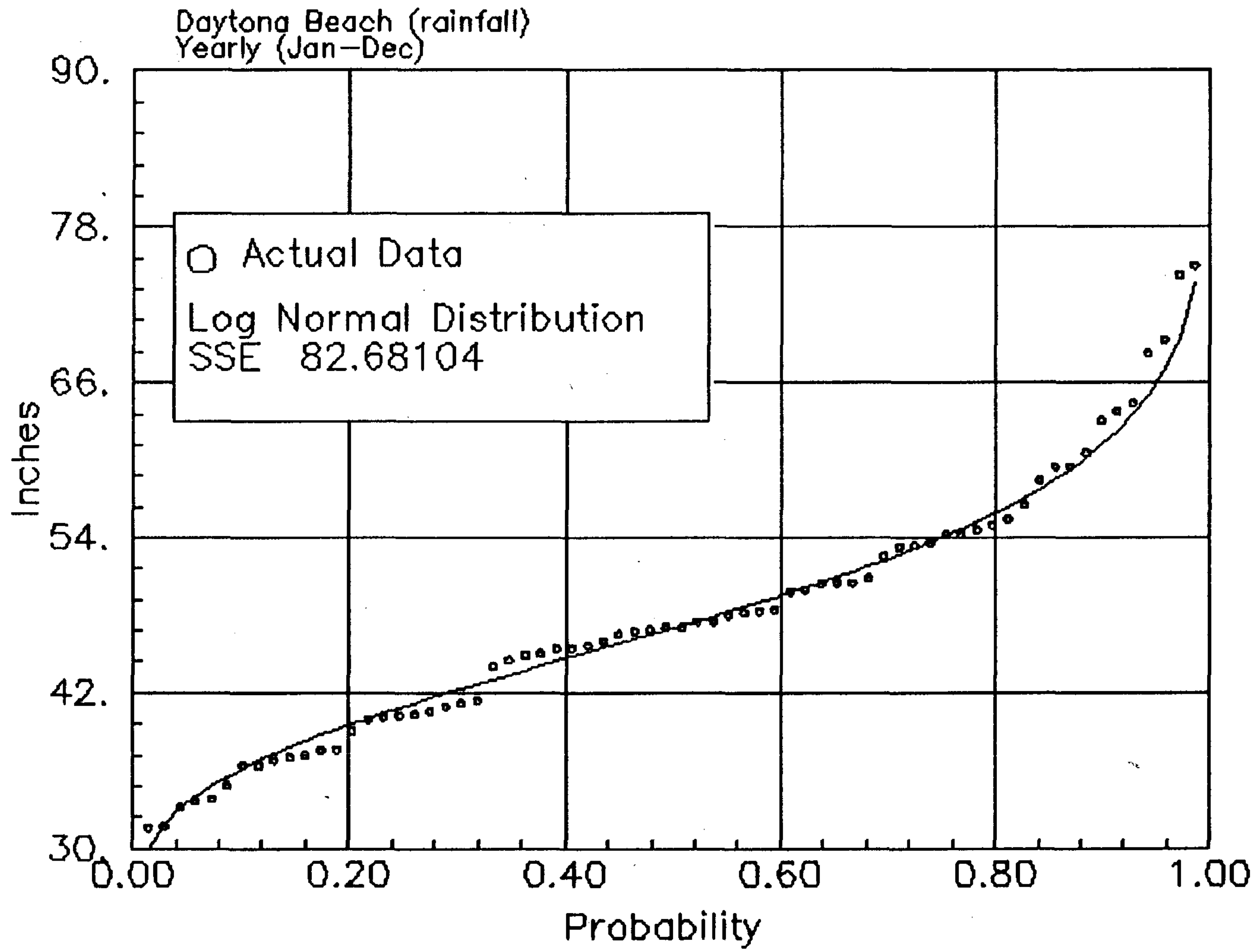


Figure B.1.2 Daytona Beach, Yearly rainfall distribution for the years of (1923—1990)

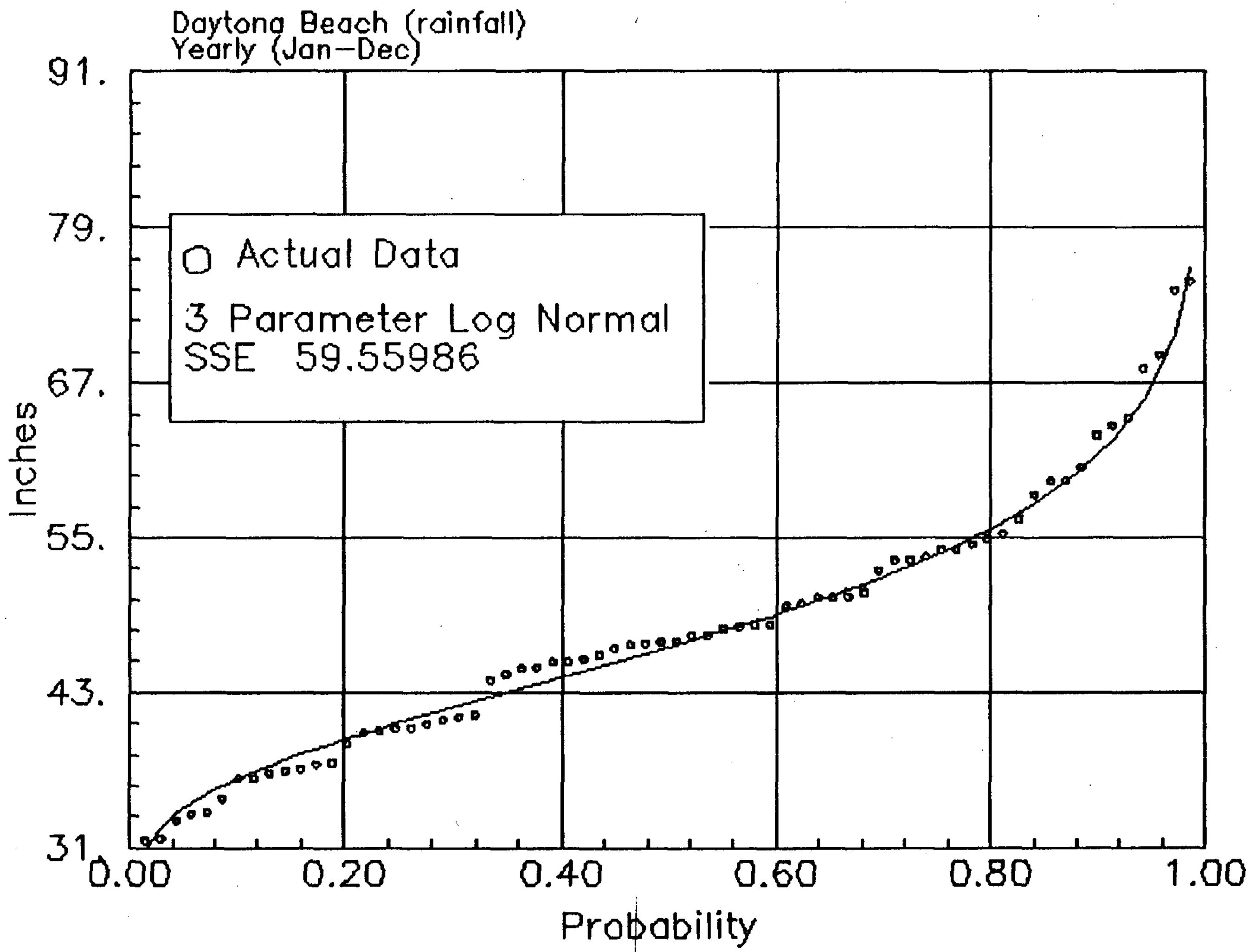


Figure B.1.3 Daytona Beach, Yearly rainfall distribution for the years of (1923–1990)

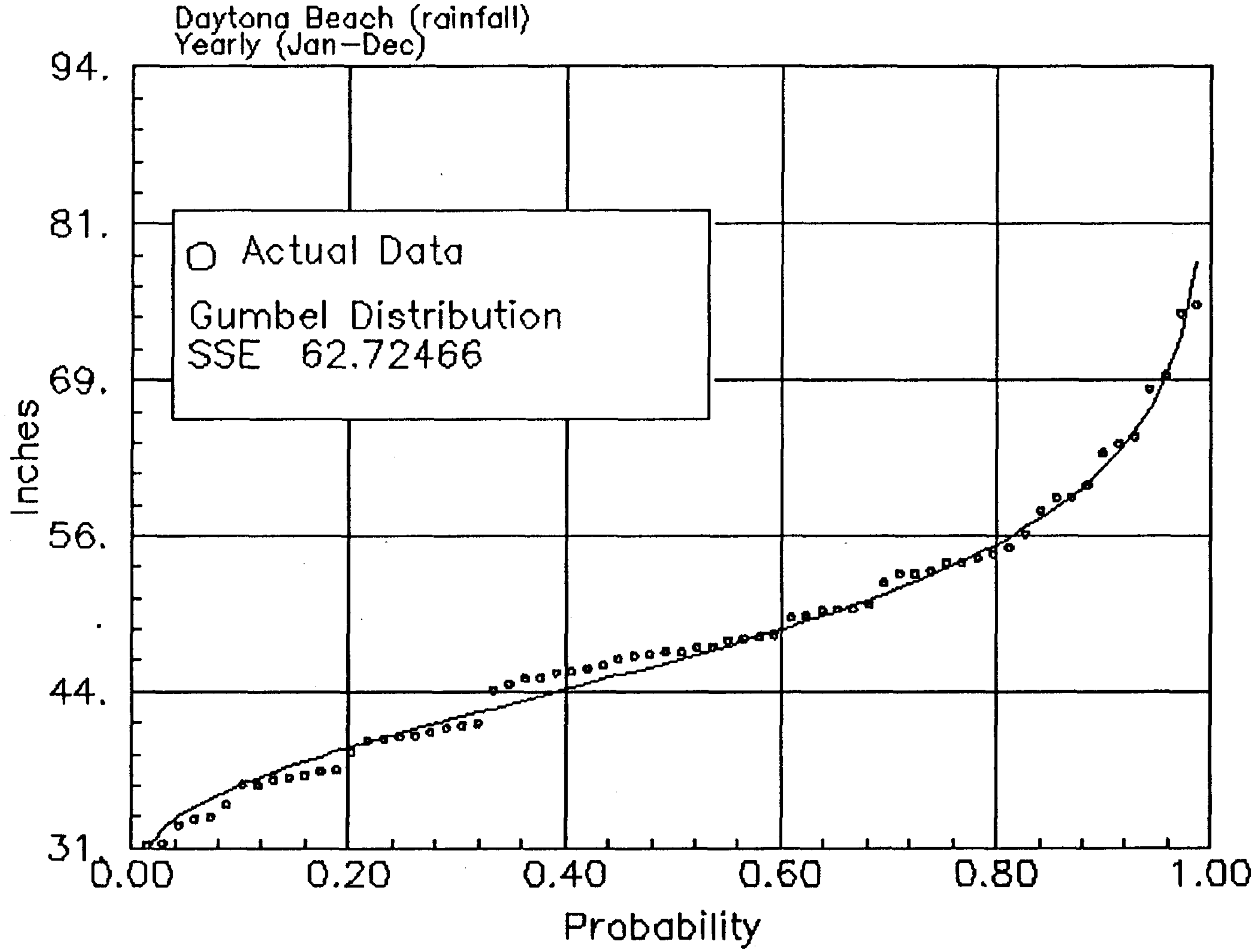


Figure B.1.4 Daytona Beach, Yearly rainfall distribution for the years of (1923–1990)

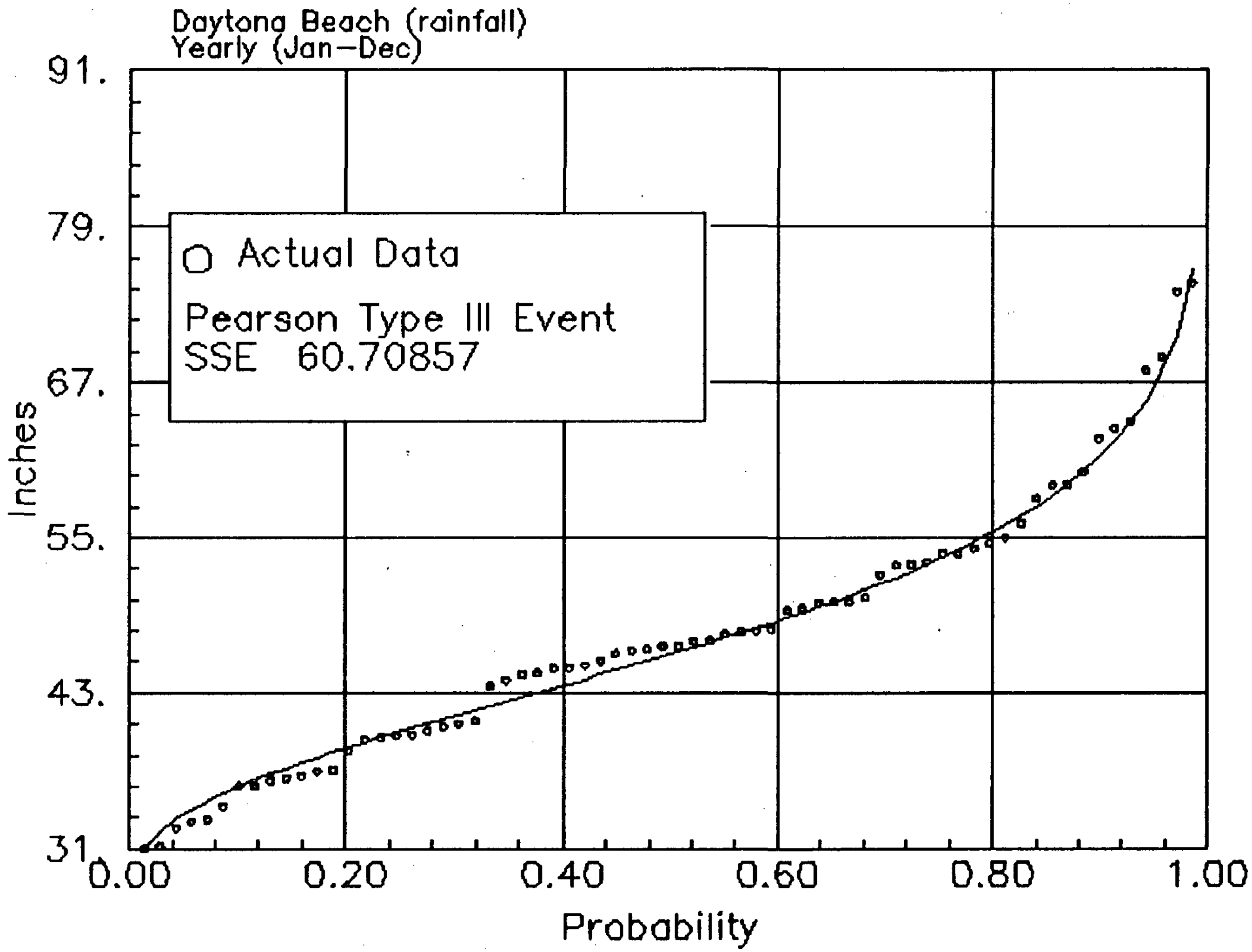


Figure B.1.5 Daytona Beach, Yearly rainfall distribution for the years of (1923-1990)

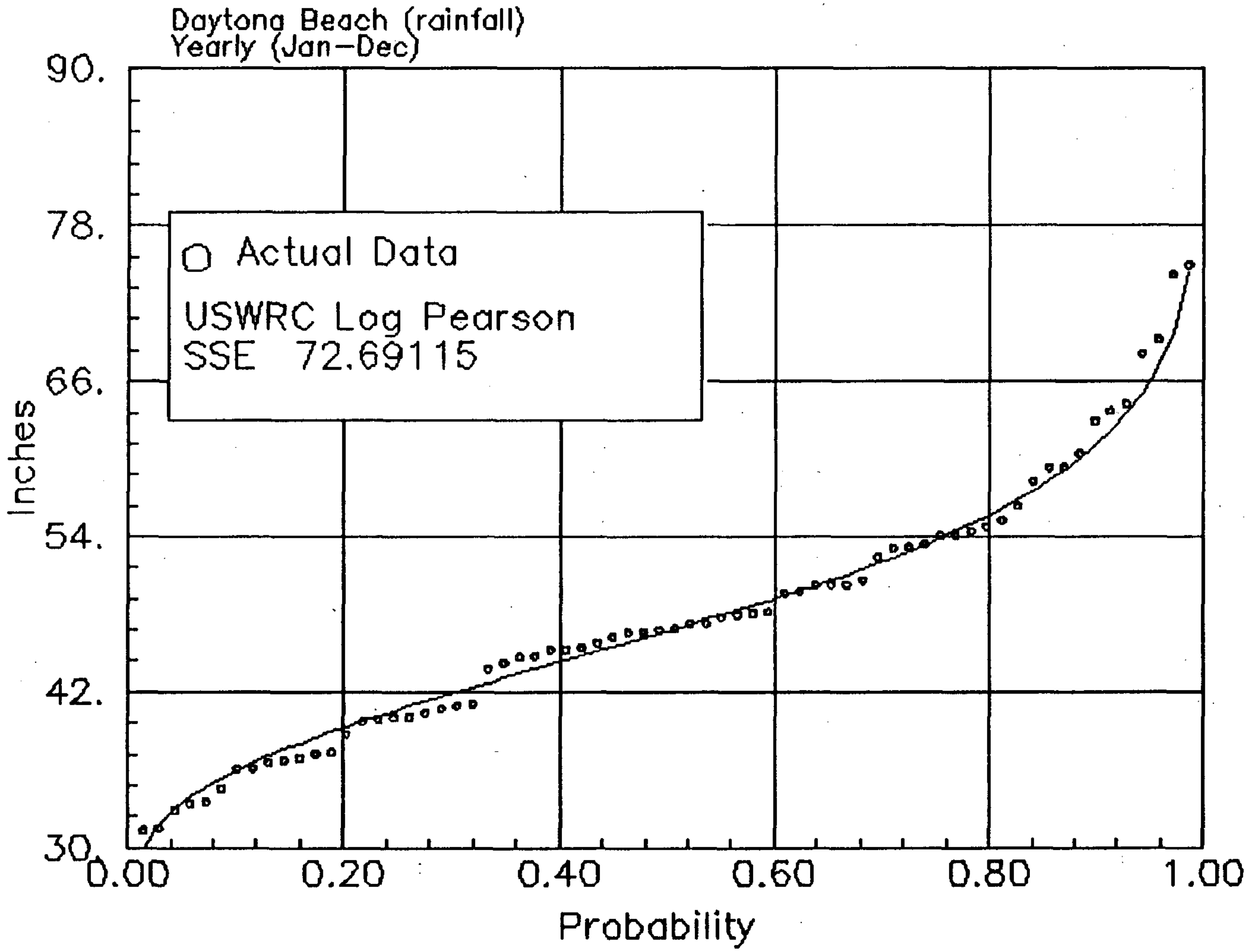


Figure B.1.6 Daytona Beach, Yearly rainfall distribution for the years of (1923–1990)

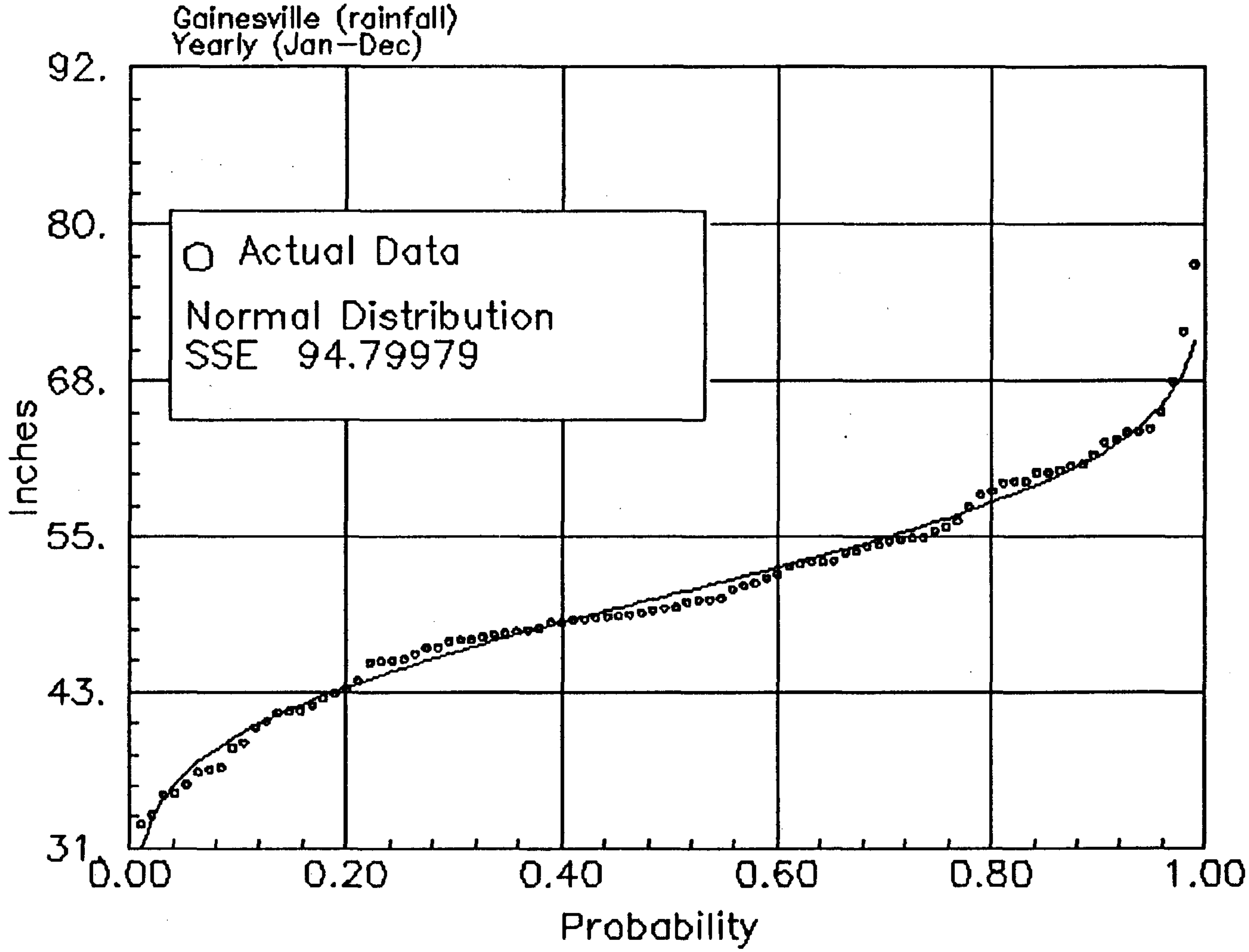


Figure B.2.1 Gainesville, Yearly rainfall distribution for the years of (1897—1990)

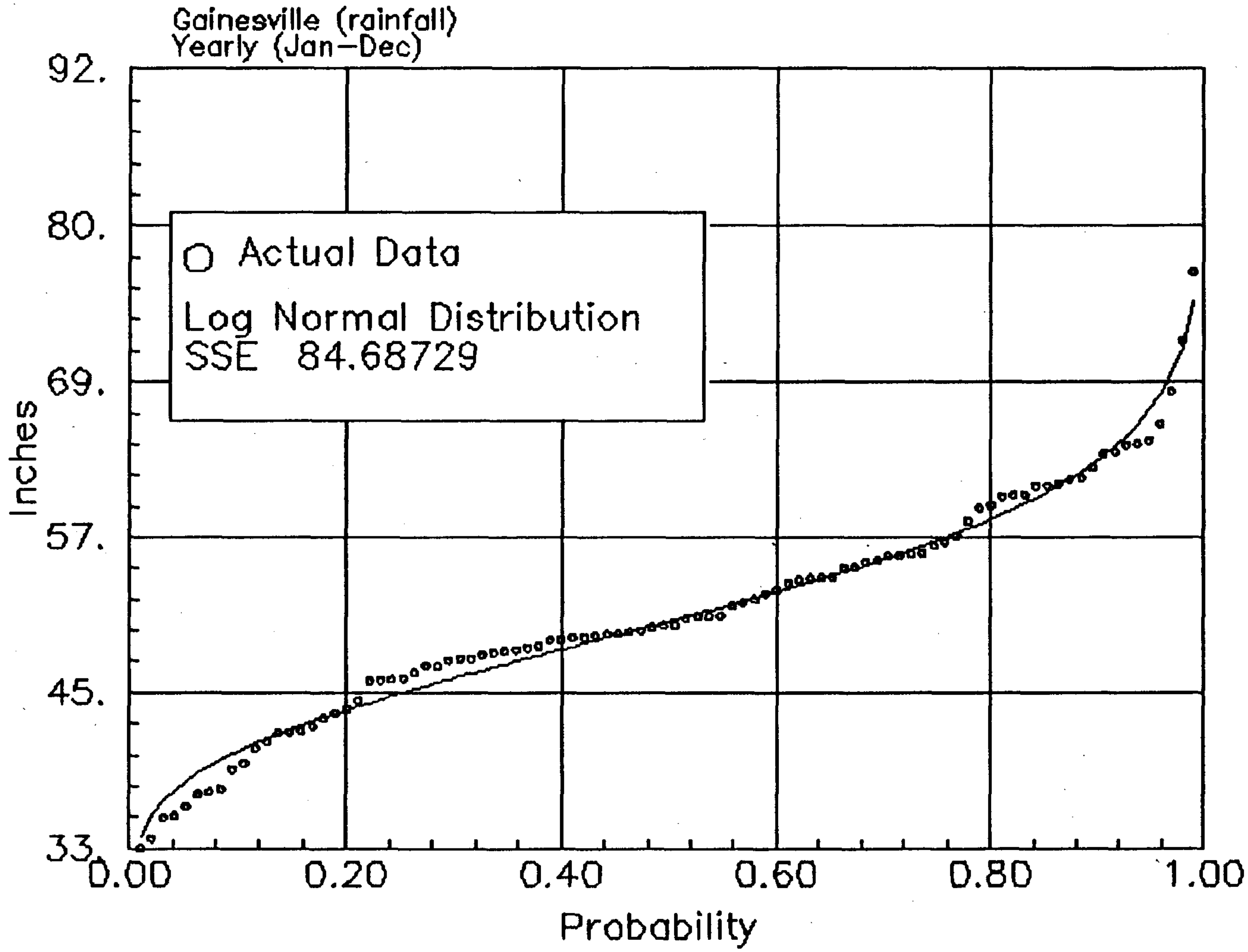


Figure B.2.2 Gainesville, Yearly rainfall distribution for the years of (1897–1990)

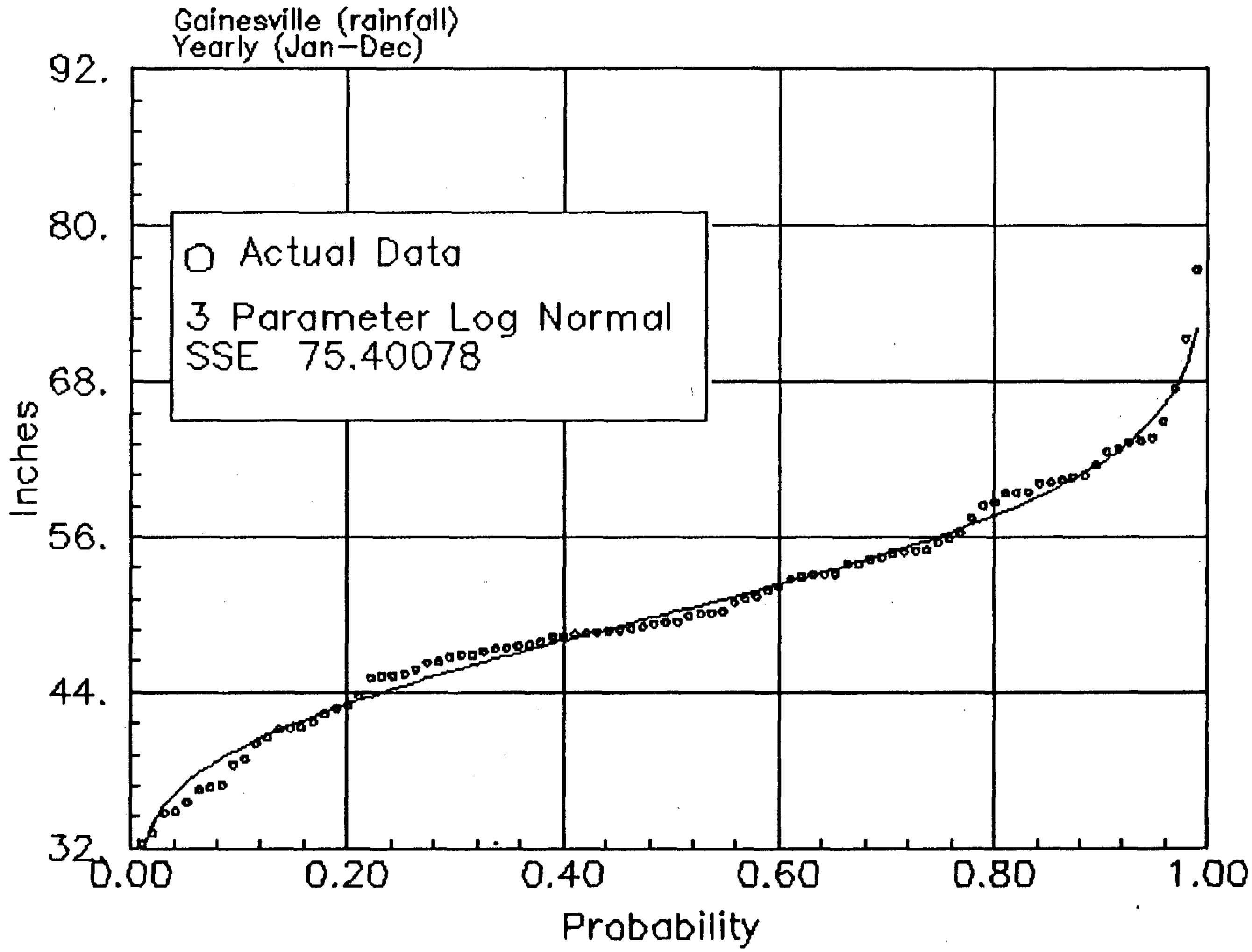


Figure B.2.3 Gainesville, Yearly rainfall distribution for the years of (1897–1990)

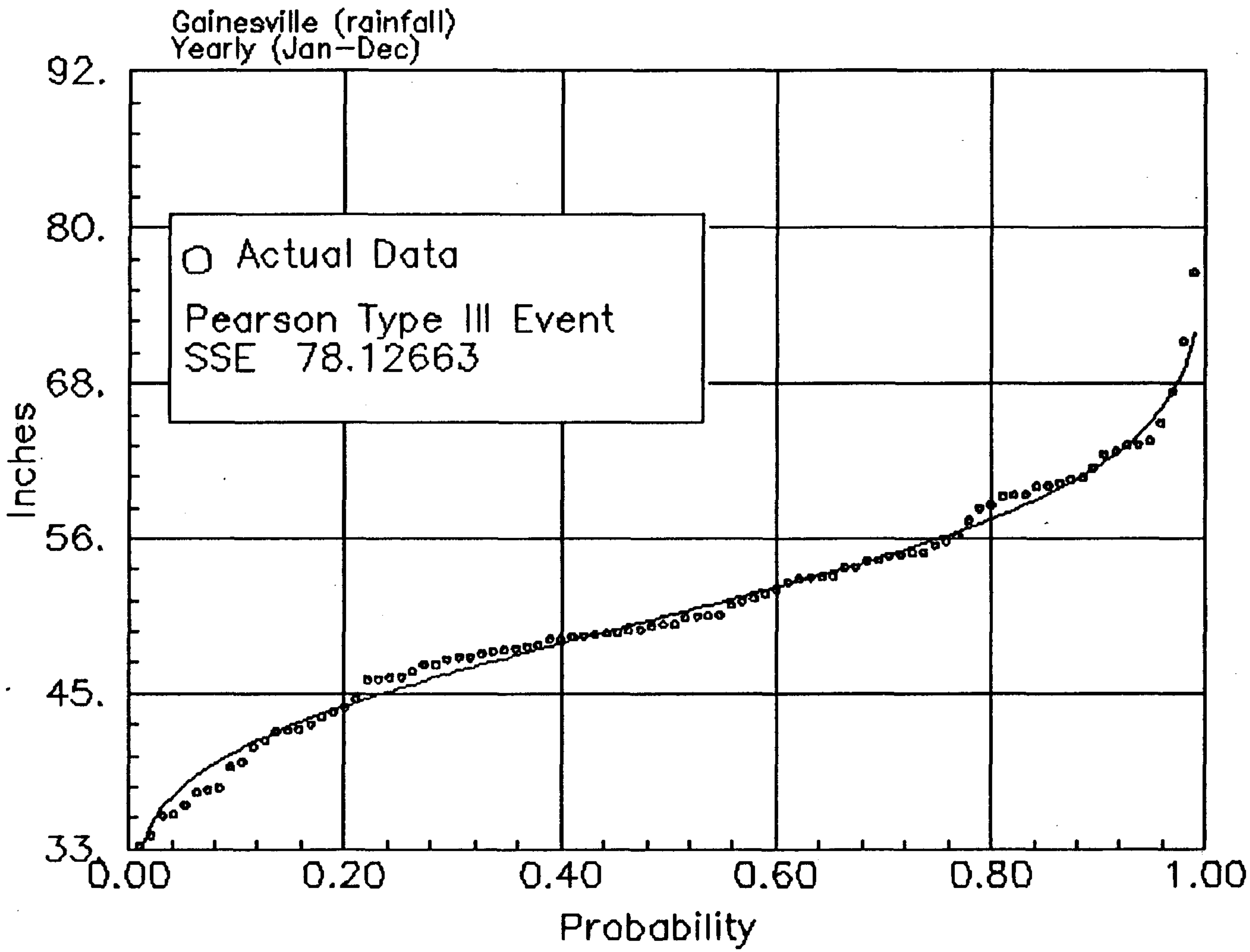


Figure B.2.5 Gainesville, Yearly rainfall distribution for the years of (1897—1990)

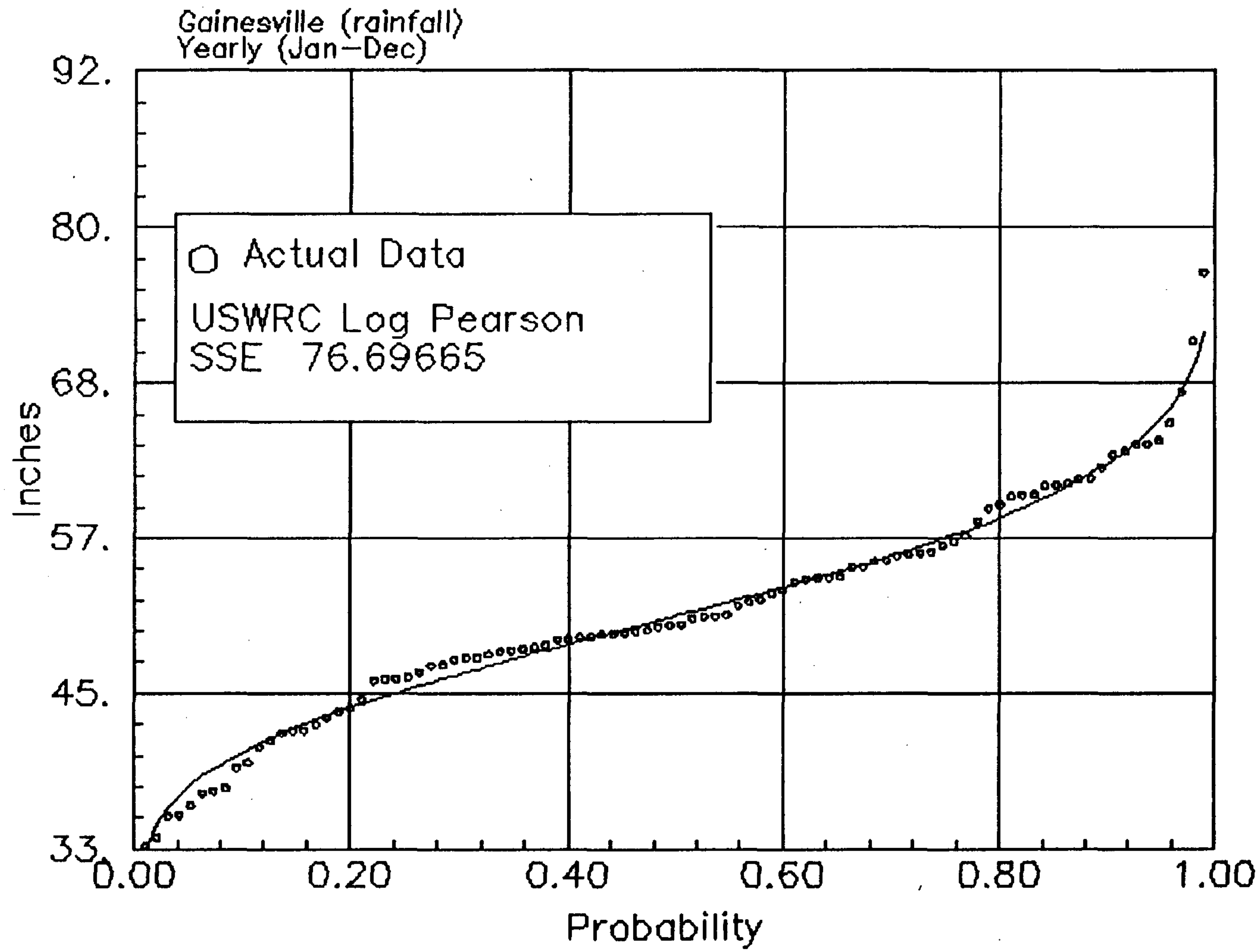


Figure B.2.6 Gainesville, Yearly rainfall distribution for the years of (1897–1990)

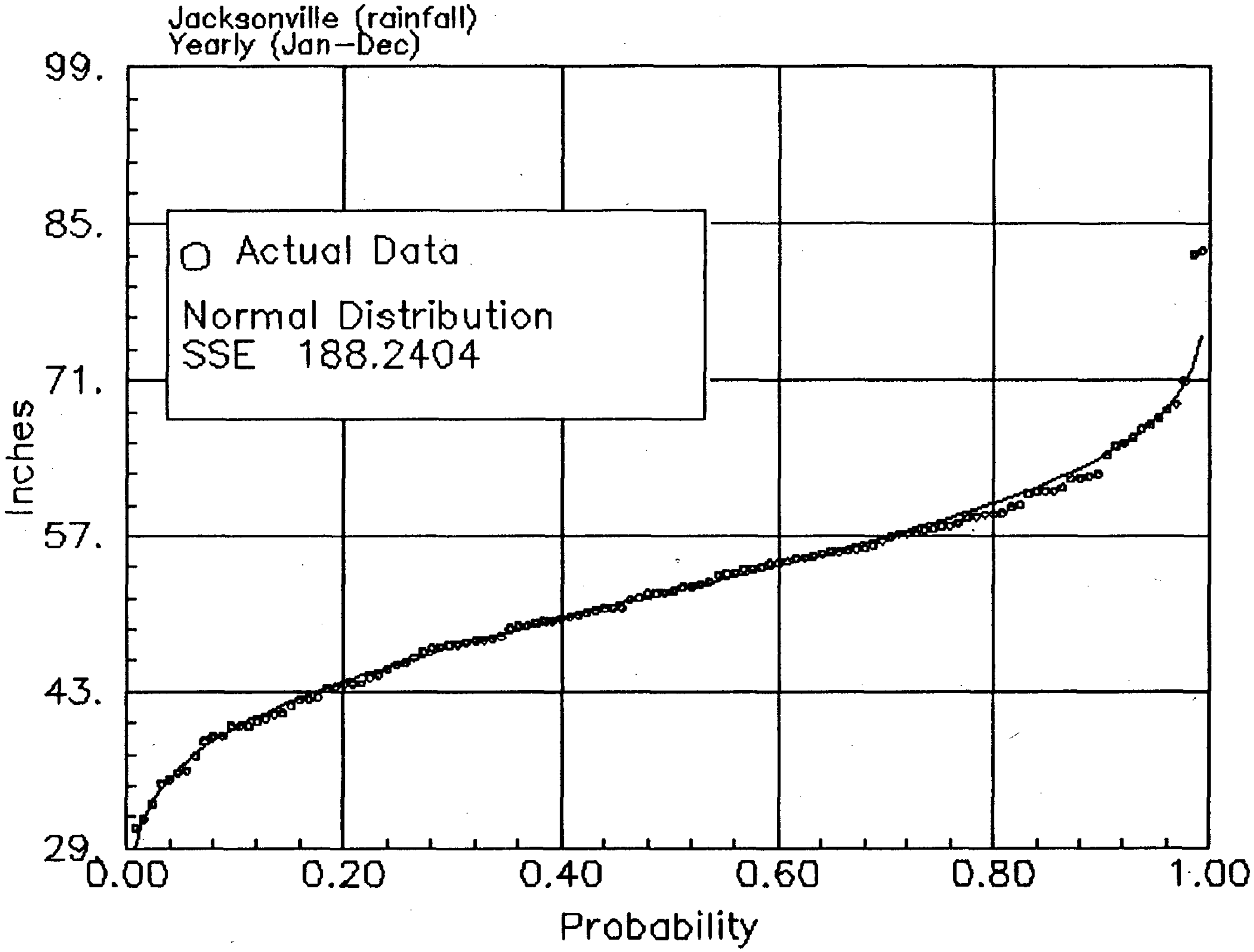


Figure B.3.1 Jacksonville, Yearly rainfall distribution for the years of (1867–1990)

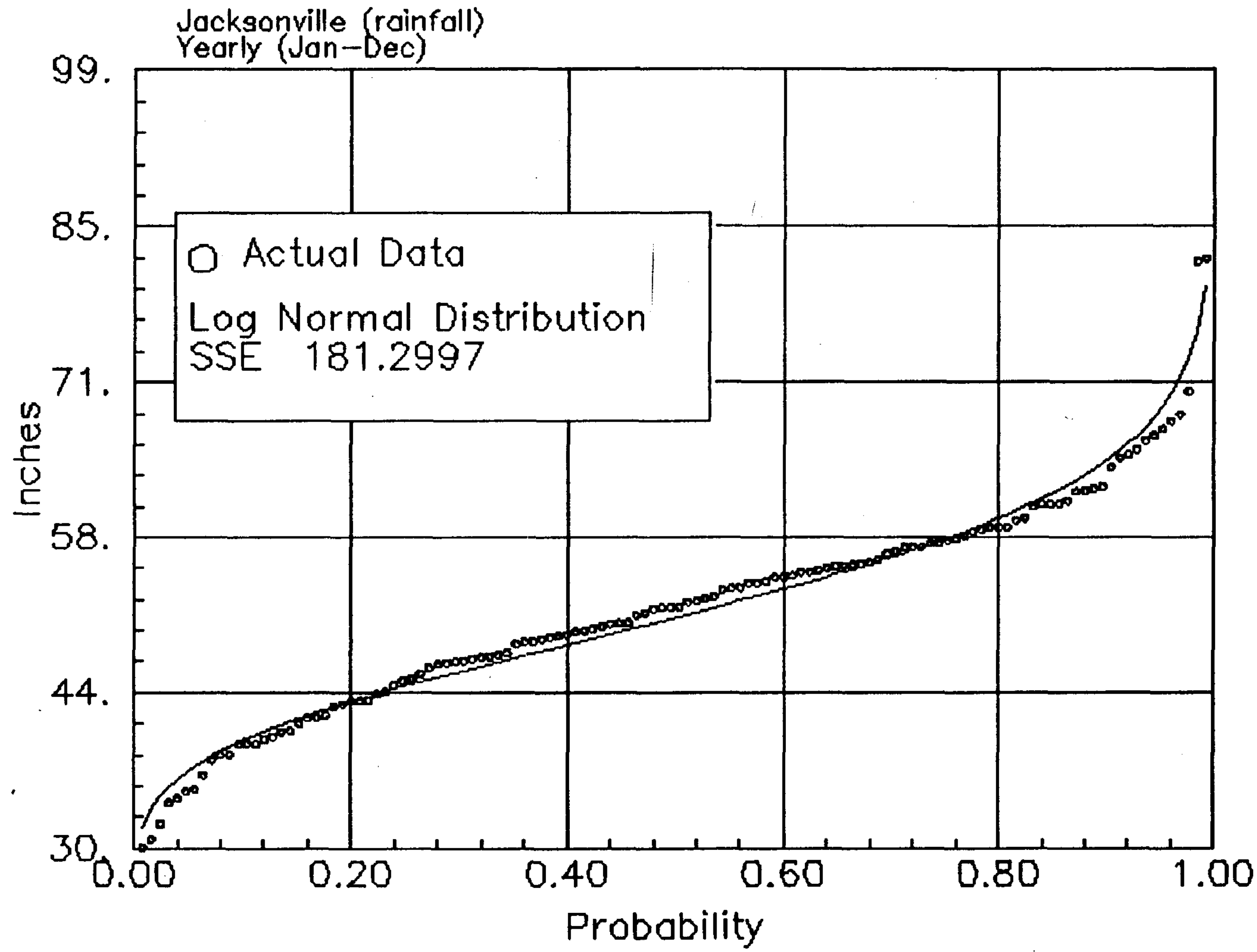


Figure B.3.2 Jacksonville, Yearly rainfall distribution for the years of (1867—1990)

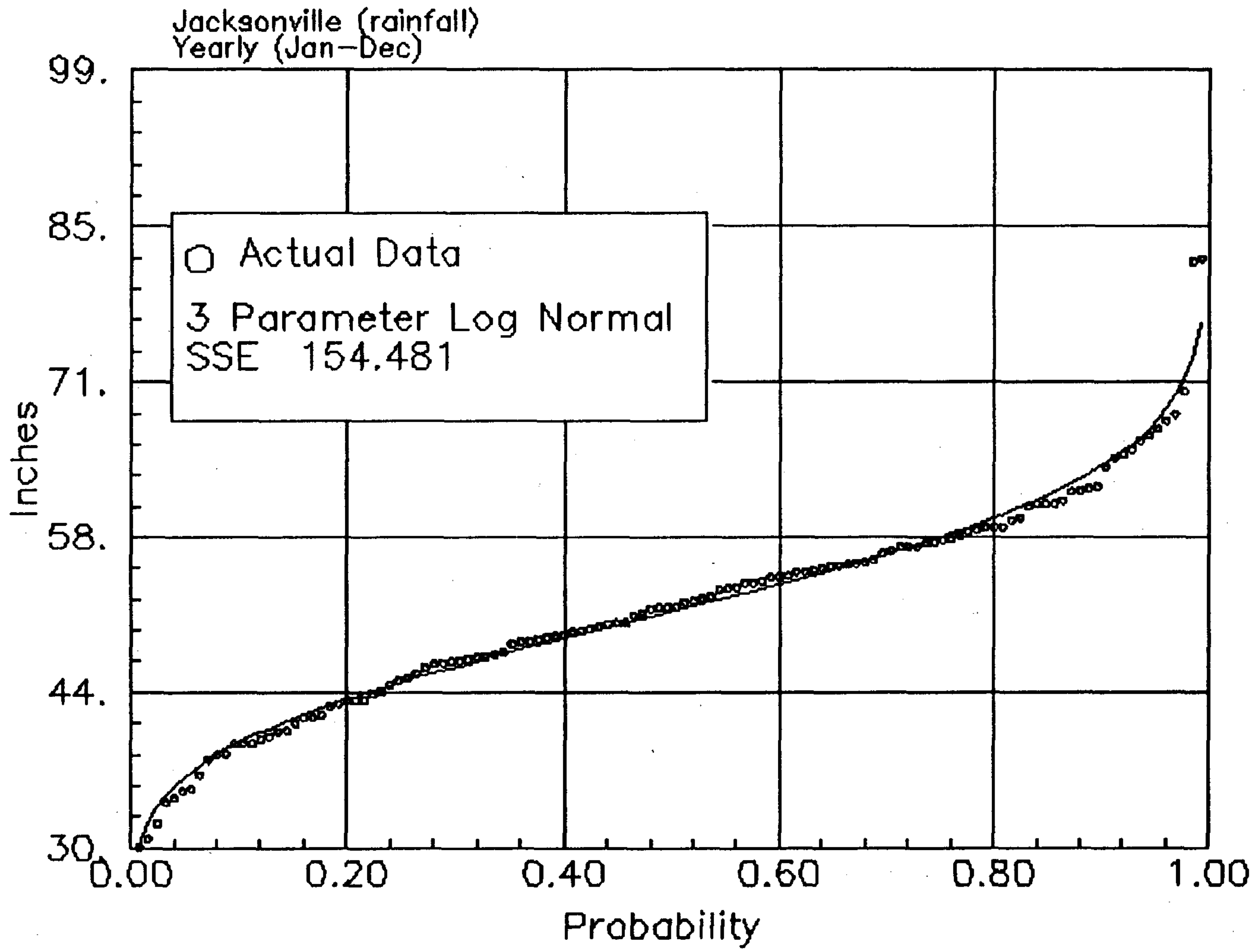


Figure B.3.3 Jacksonville, Yearly rainfall distribution for the years of (1867–1990)

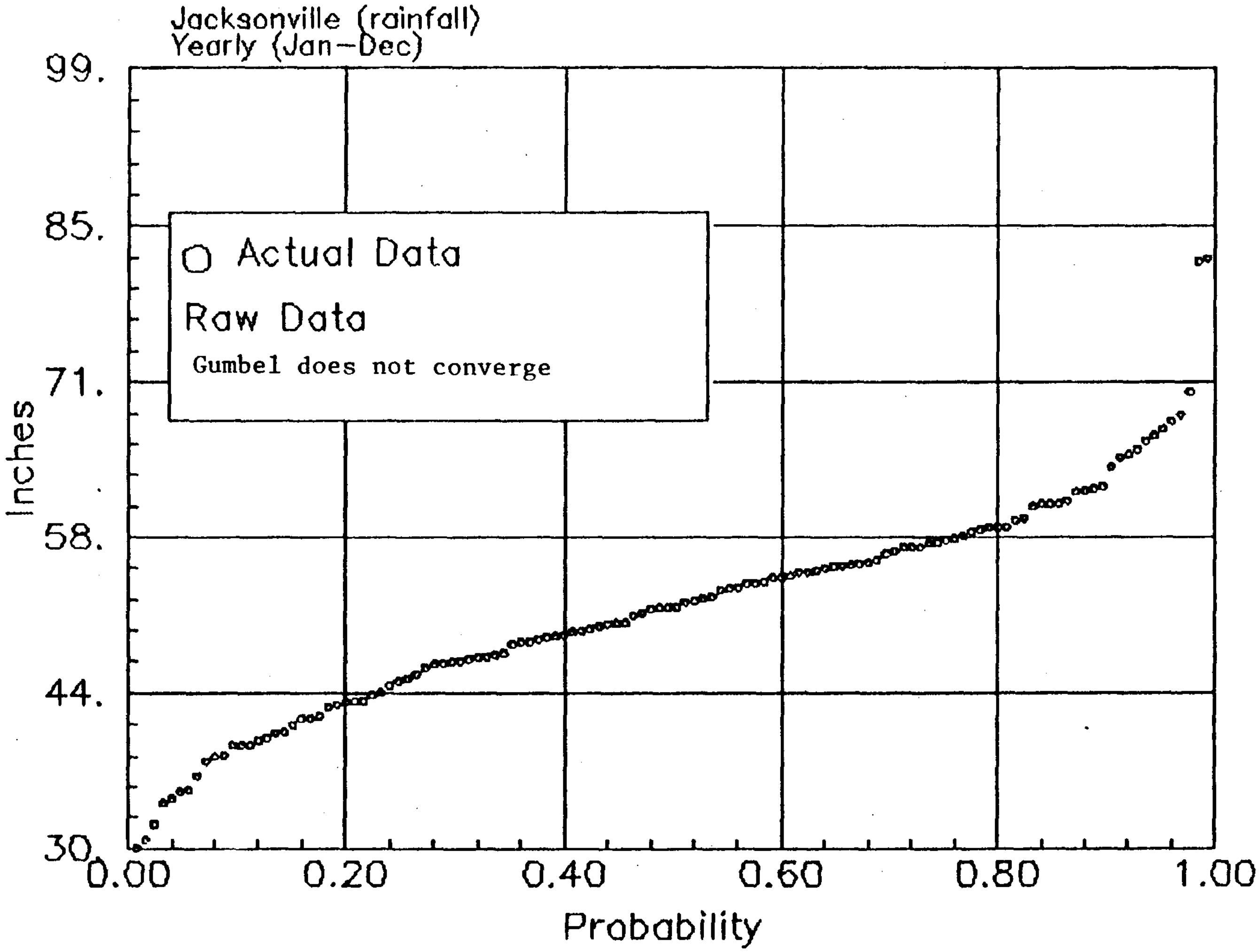


Figure B.3.4 Jacksonville, Yearly rainfall distribution for the years of (1867–1990)

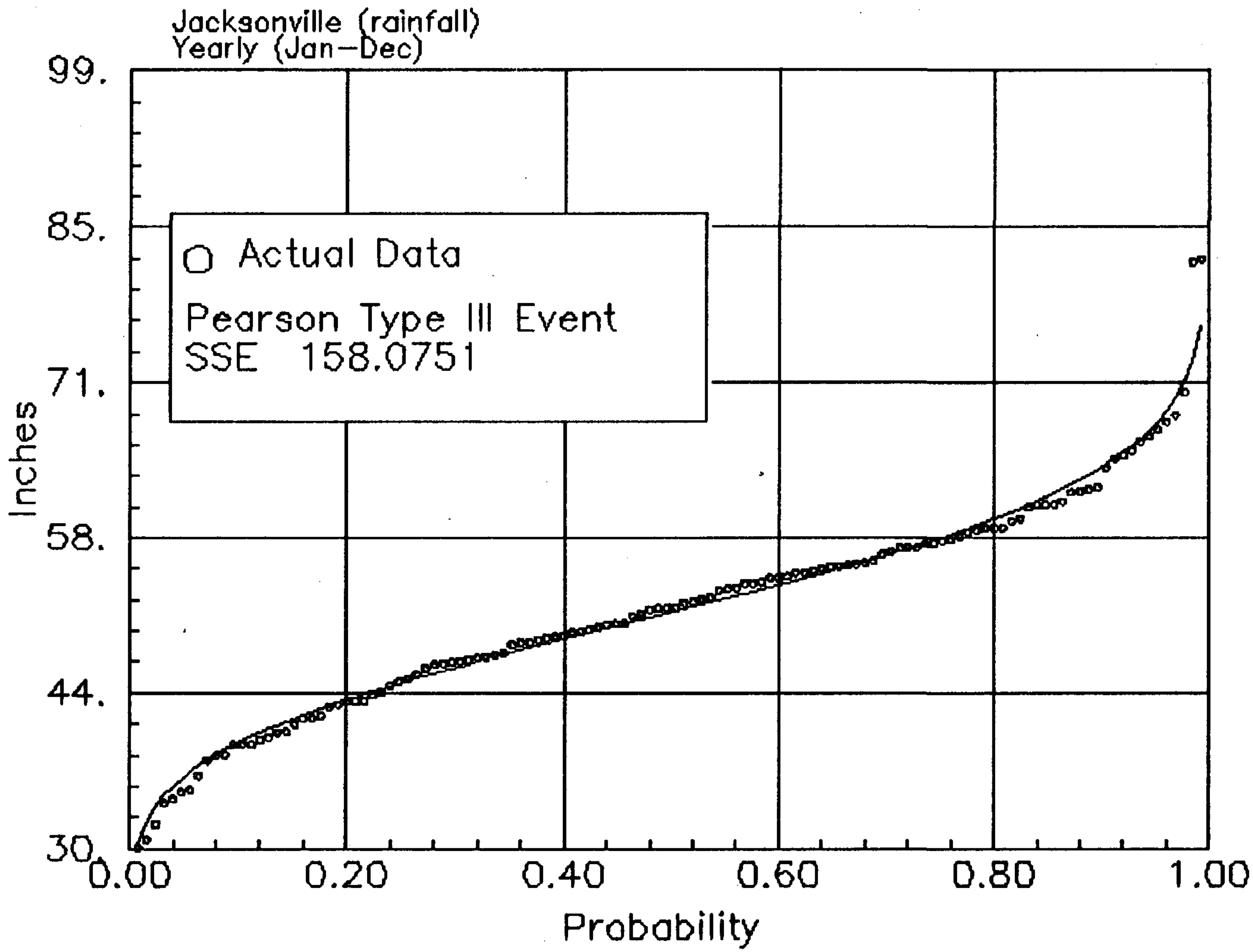


Figure B.3.5 Jacksonville, Yearly rainfall distribution for the years of (1867—1990)

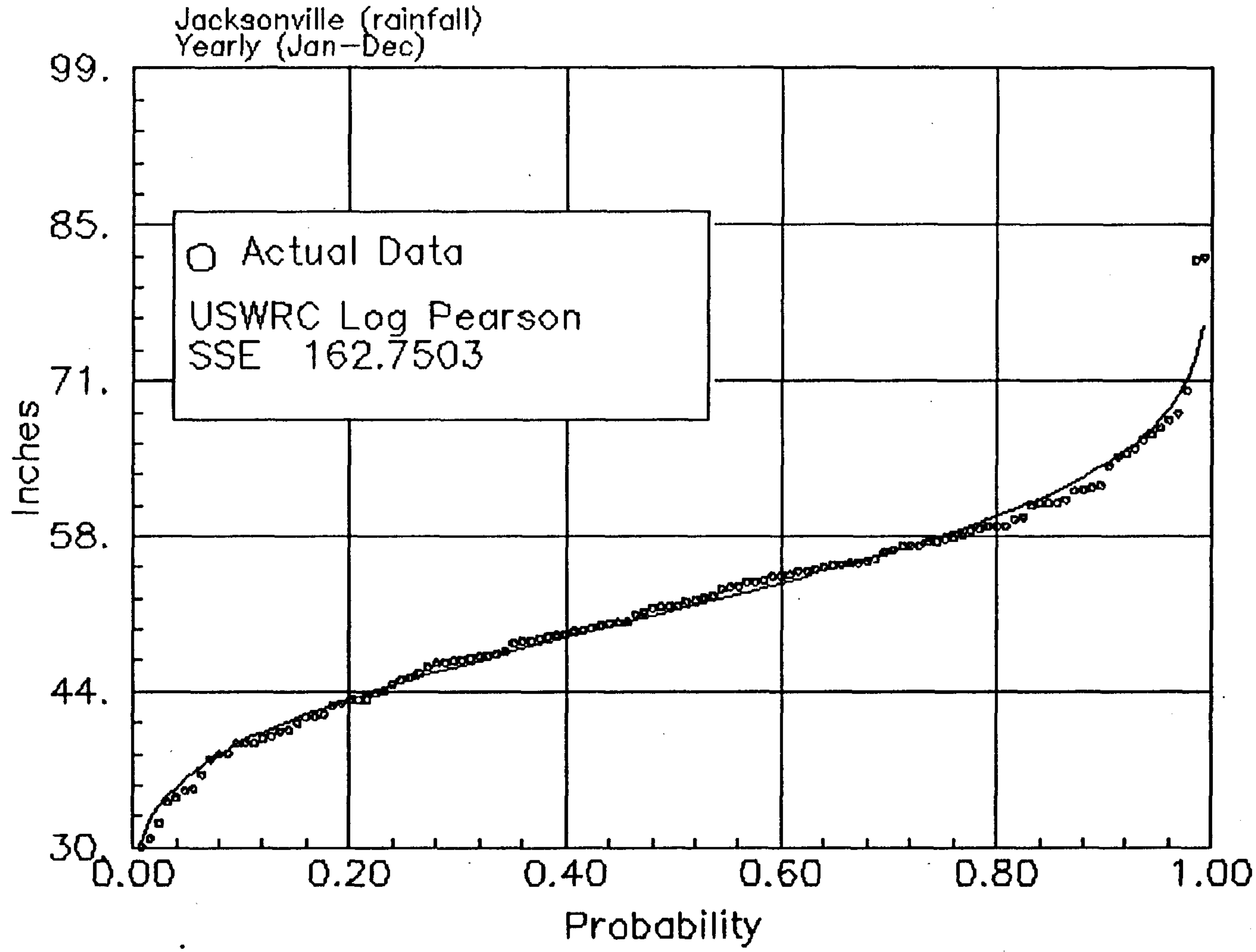


Figure B.3.6 Jacksonville, Yearly rainfall distribution for the years of (1867-1990)

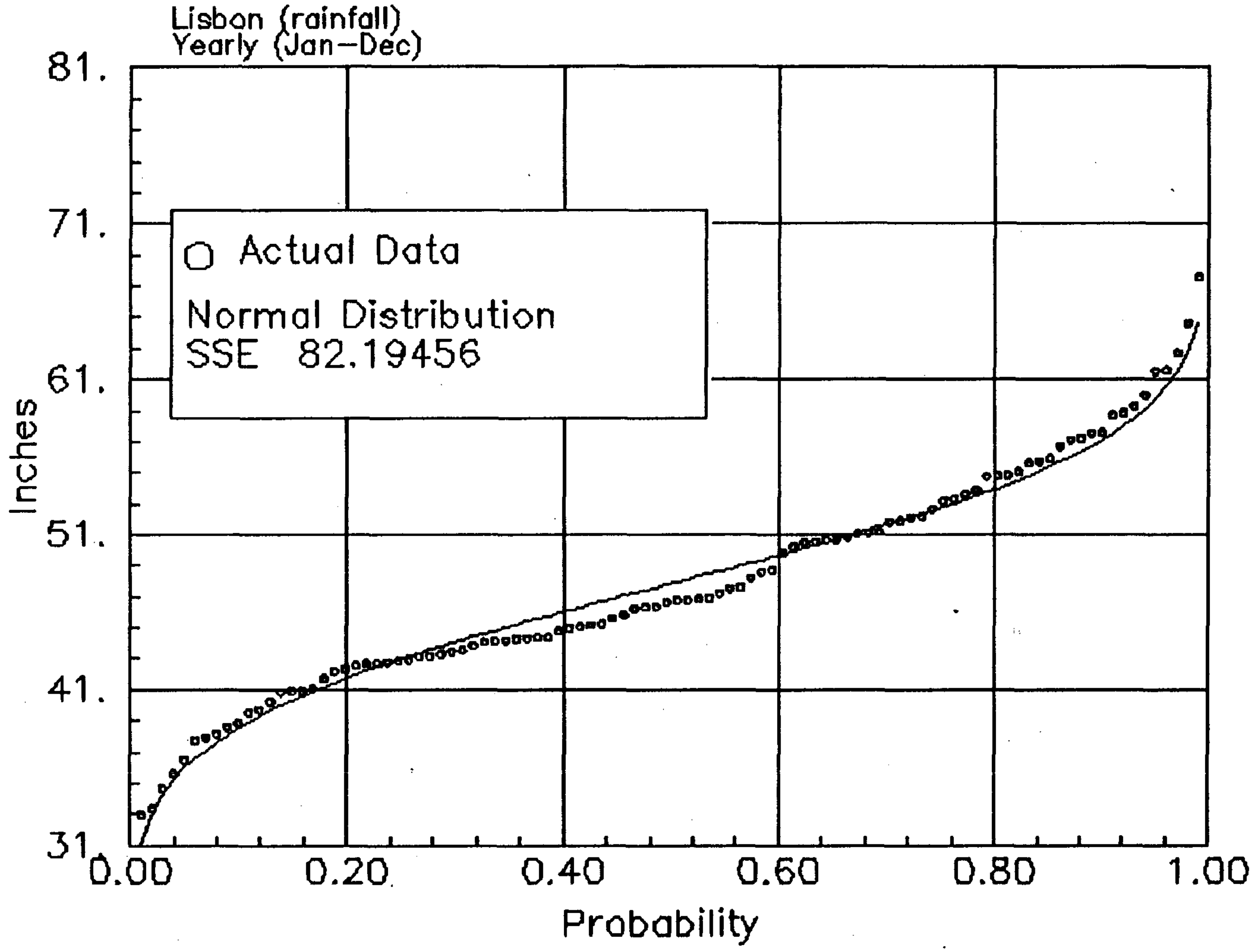


Figure B.4.1 Lisbon, Yearly rainfall distribution for the years of (1891-1990)

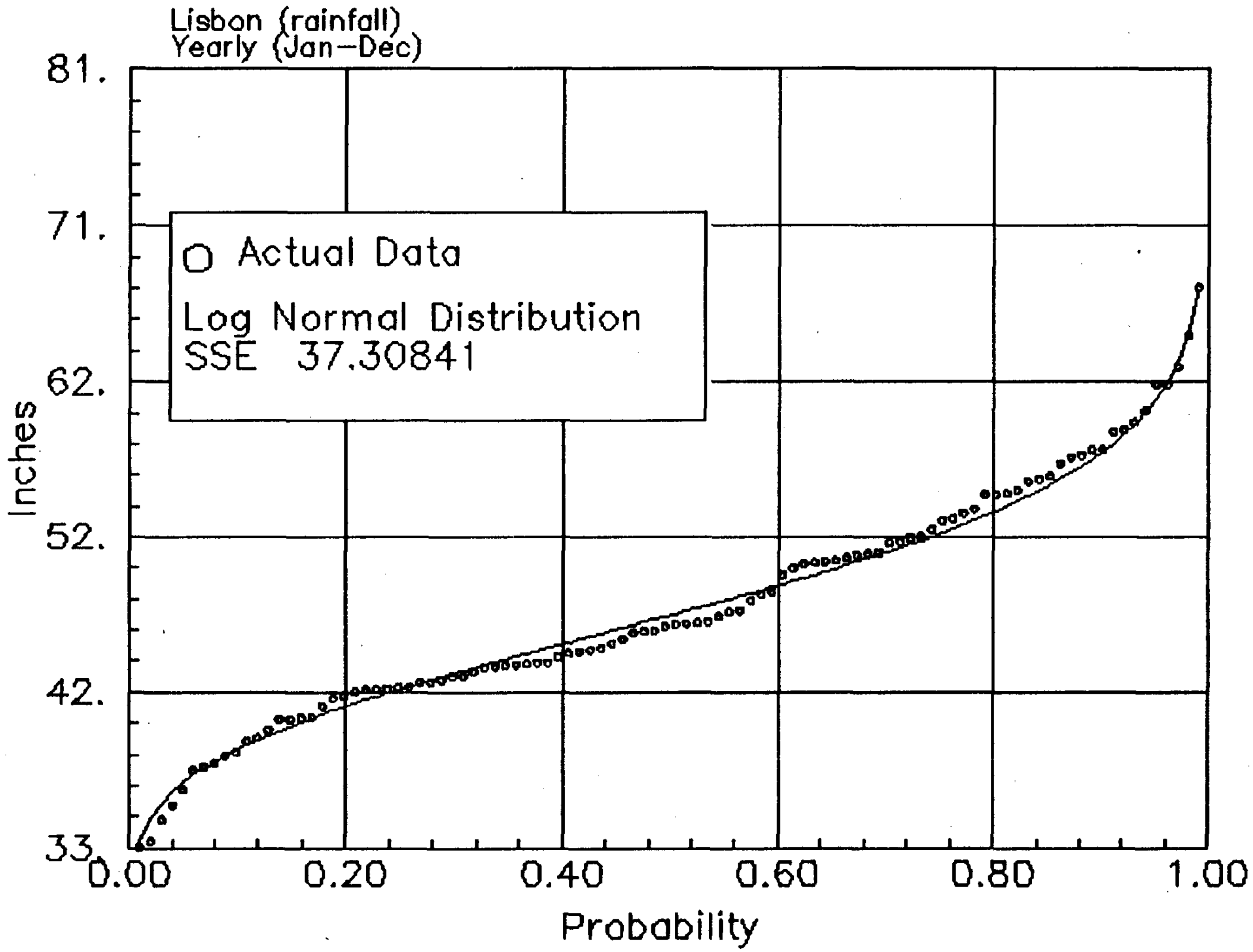


Figure B.4.2 Lisbon, Yearly rainfall distribution for the years of (1891–1990)

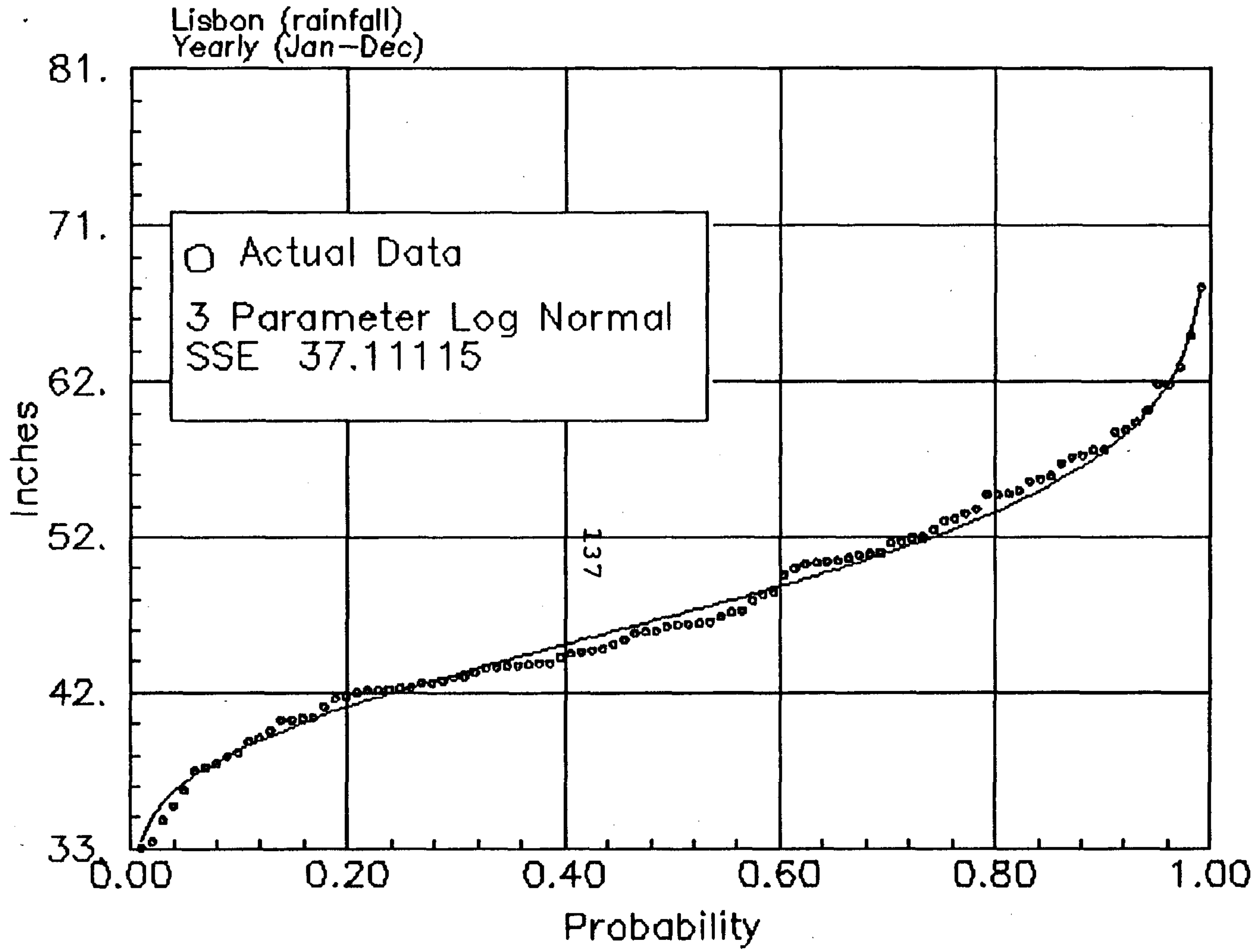


Figure B.4.3 Lisbon, Yearly rainfall distribution for the years of (1891–1990)

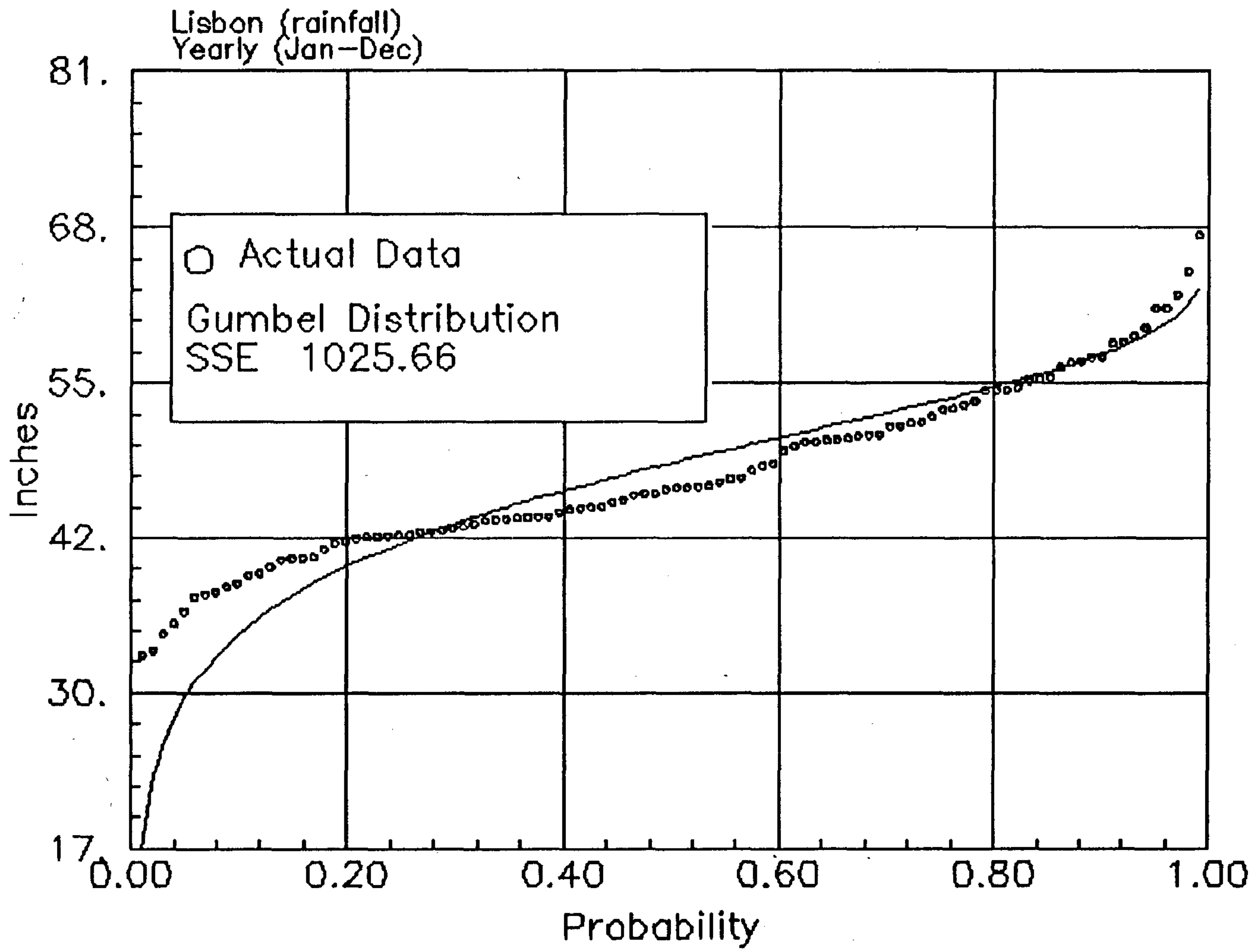


Figure B.4.4 Lisbon, Yearly rainfall distribution for the years of (1891-1990)

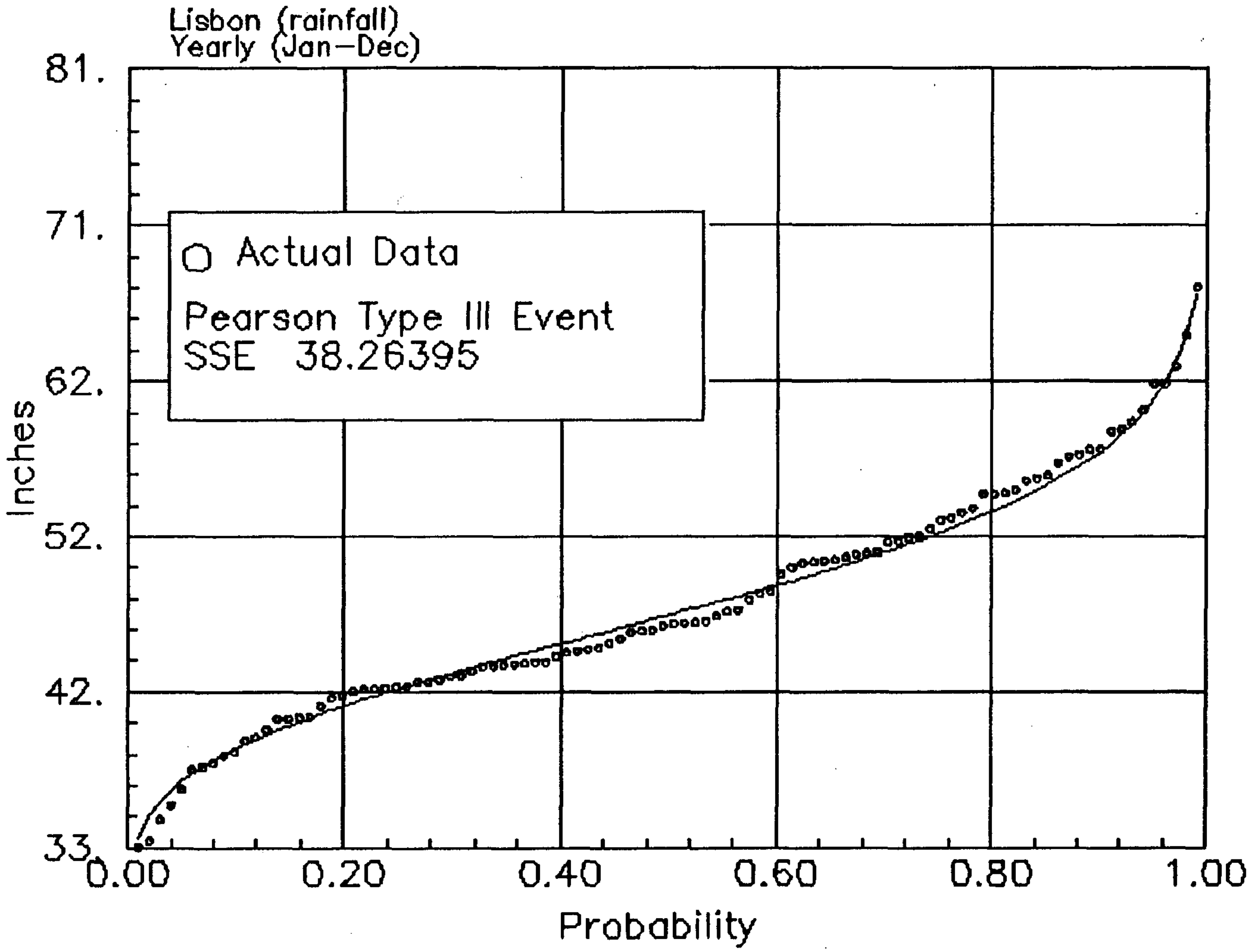


Figure B.4.5 Lisbon, Yearly rainfall distribution for the years of (1891—1990)

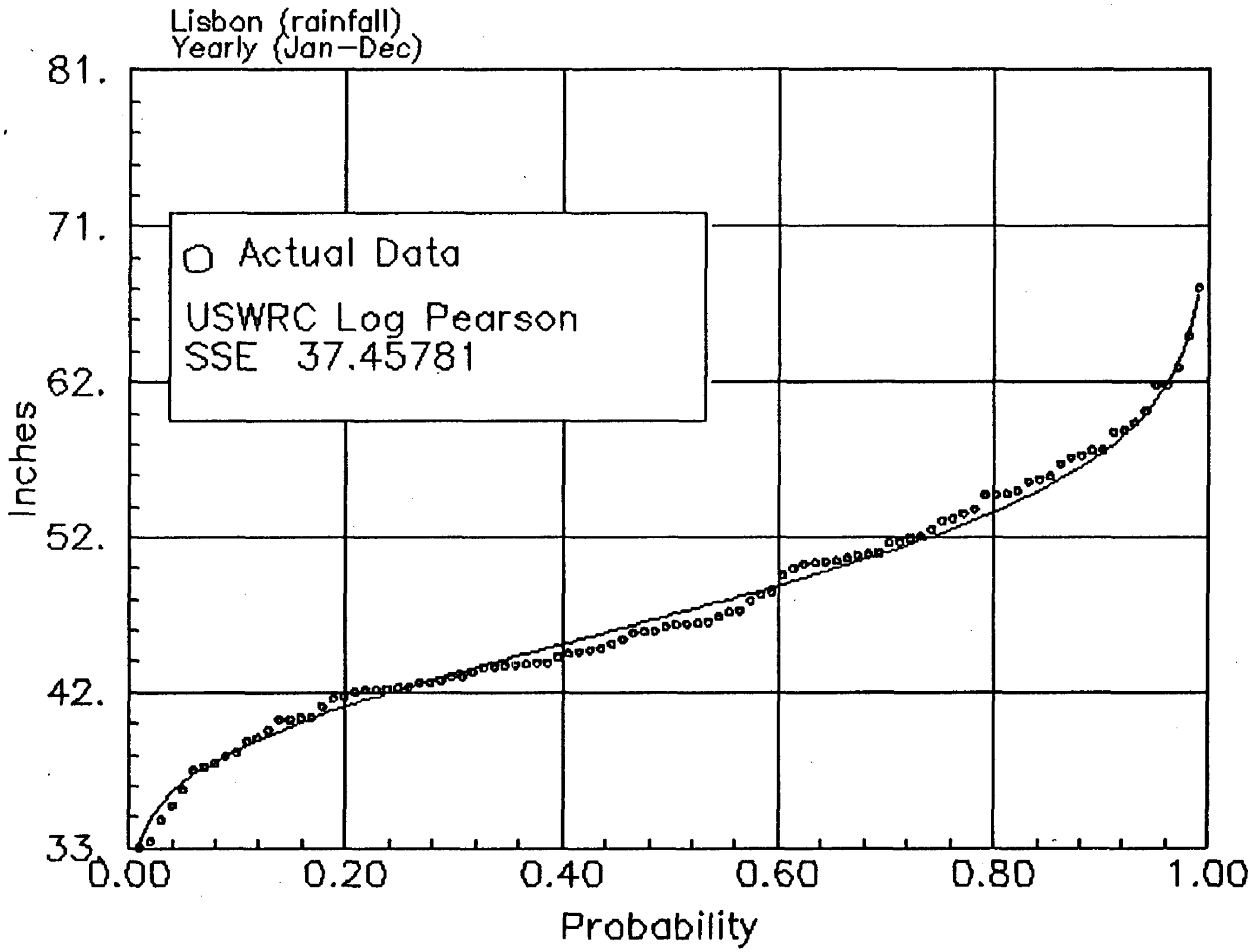


Figure B.4.6 Lisbon, Yearly rainfall distribution for the years of (1891–1990)

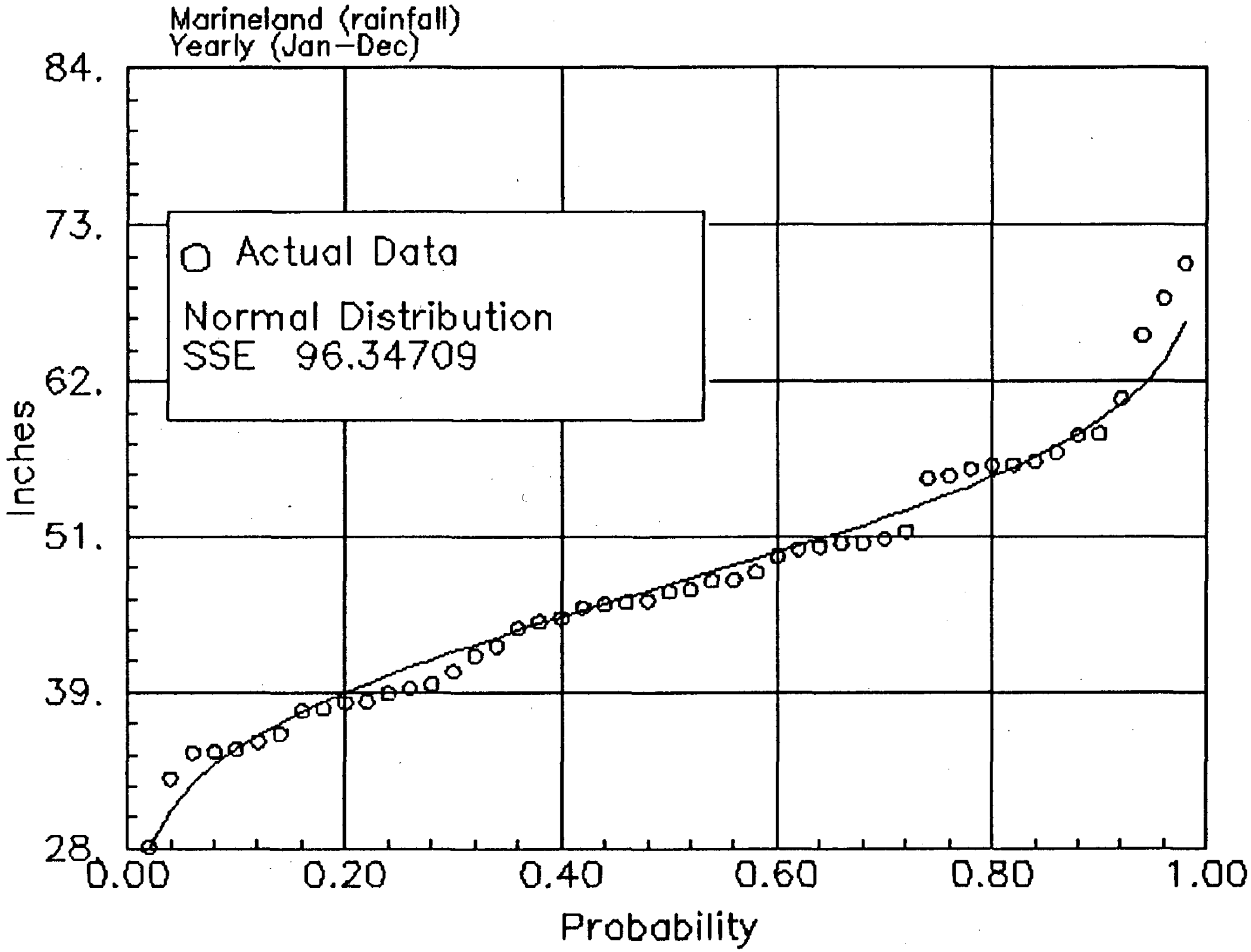


Figure B.5.1 Marineland, Yearly rainfall distribution for the years of (1942-1990)

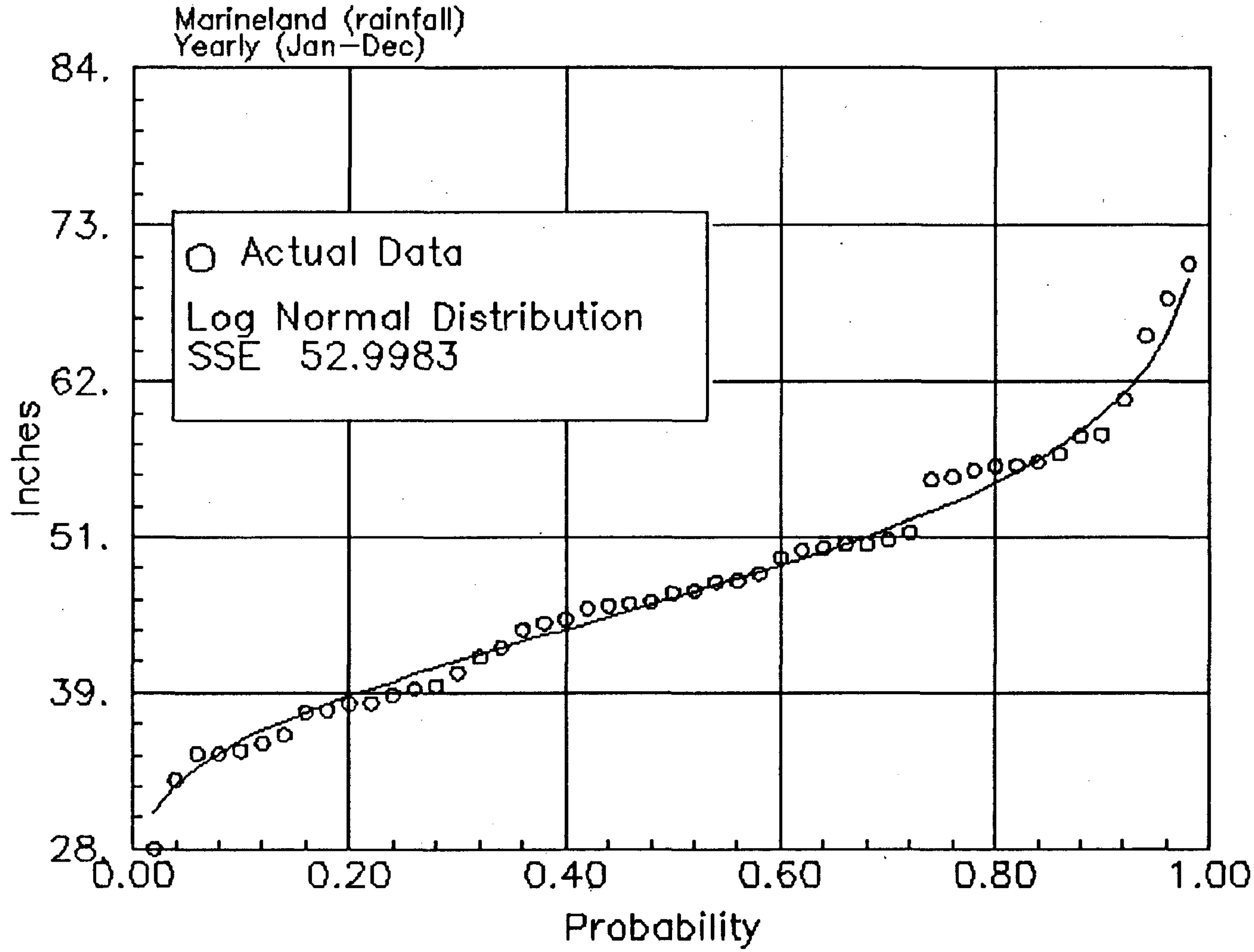


Figure B.5.2 Marineland, Yearly rainfall distribution for the years of (1942–1990)

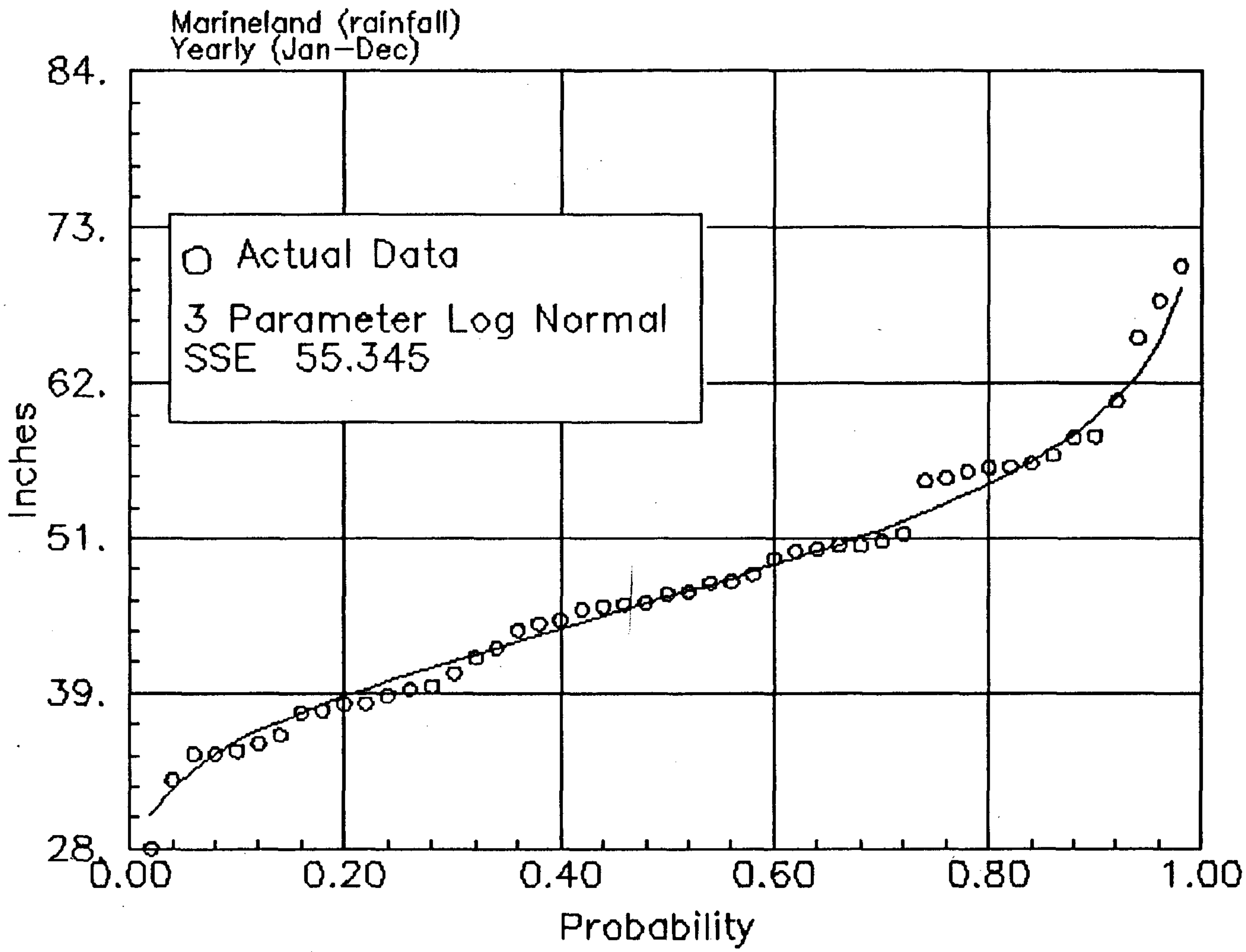


Figure B.5.3 Marineland, Yearly rainfall distribution for the years of (1942—1990)

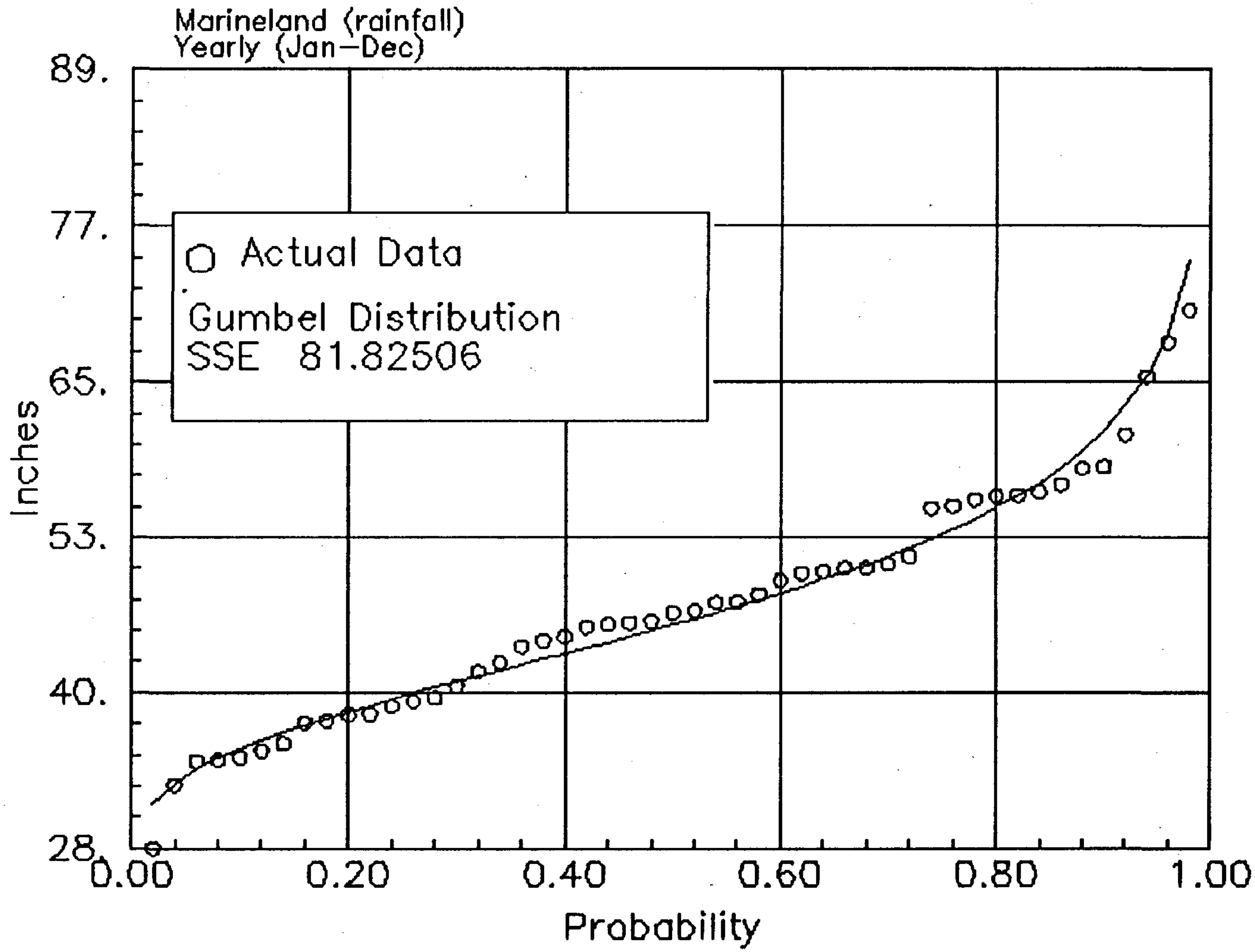


Figure B.5.4 Marineland, Yearly rainfall distribution for the years of (1942–1990)

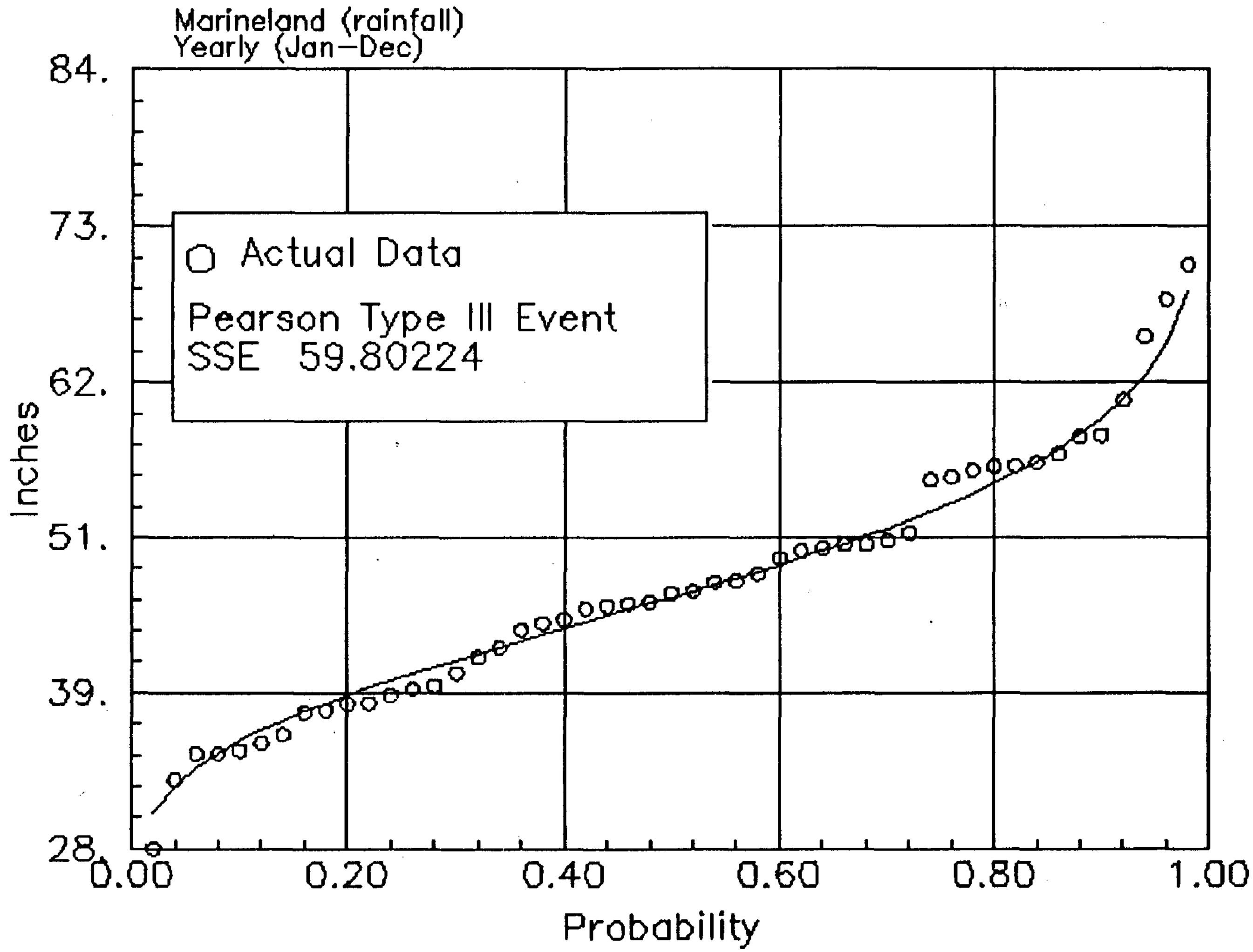


Figure B.5.5 Marineland, Yearly rainfall distribution for the years of (1942–1990)

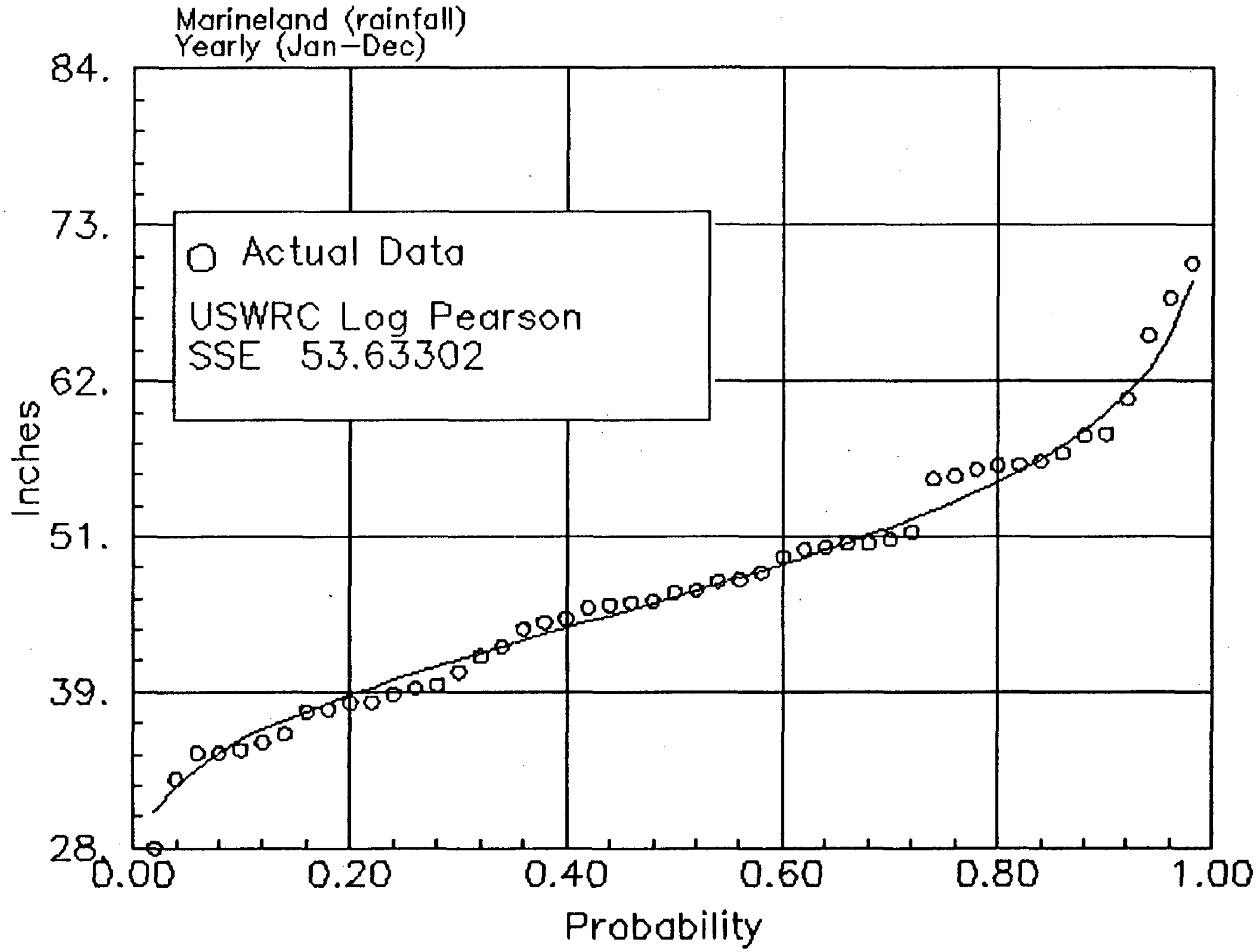


Figure B.5.6 Marineland, Yearly rainfall distribution for the years of (1942–1990)

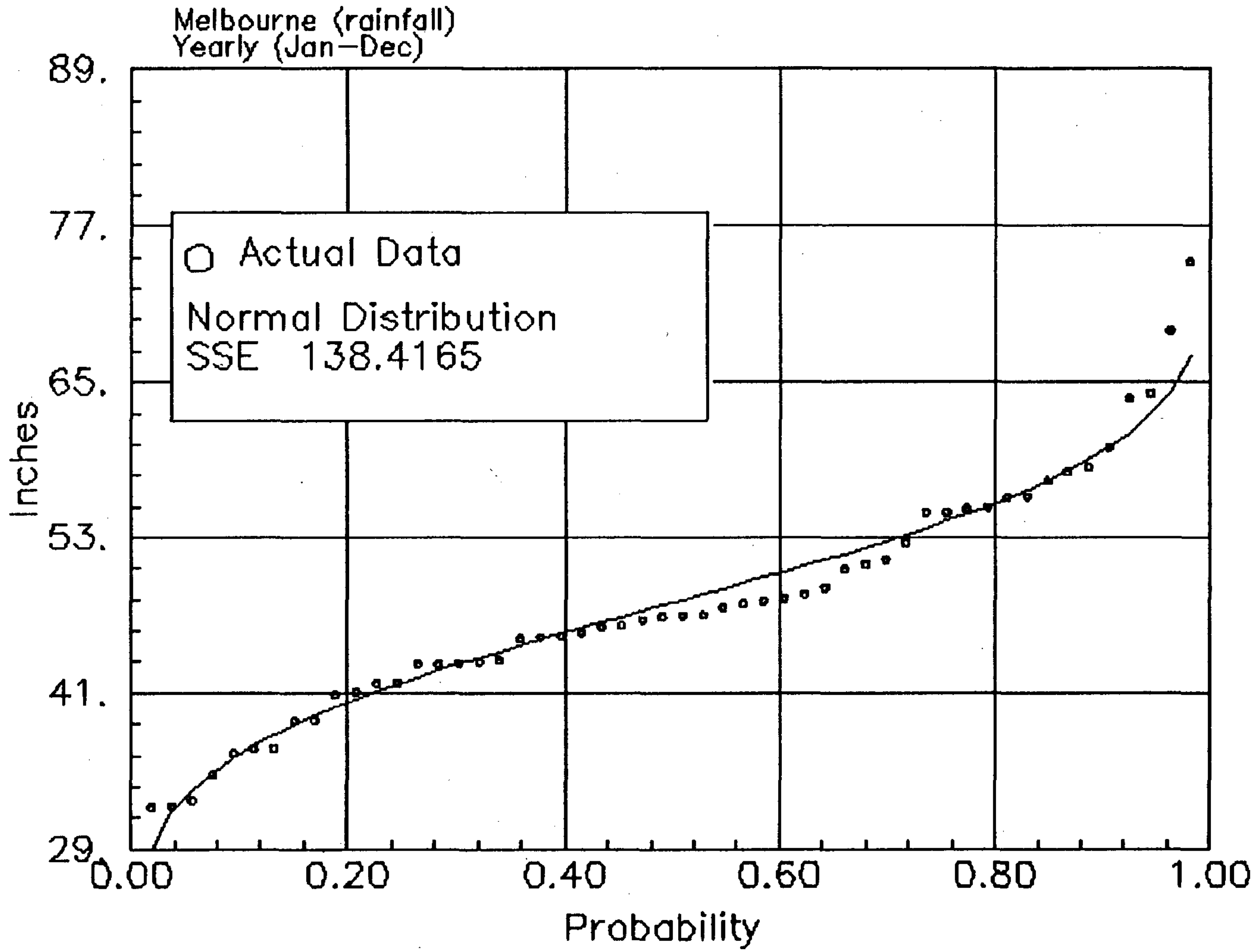


Figure B.6.1 Melbourne, Yearly rainfall distribution for the years of (1939—1990)

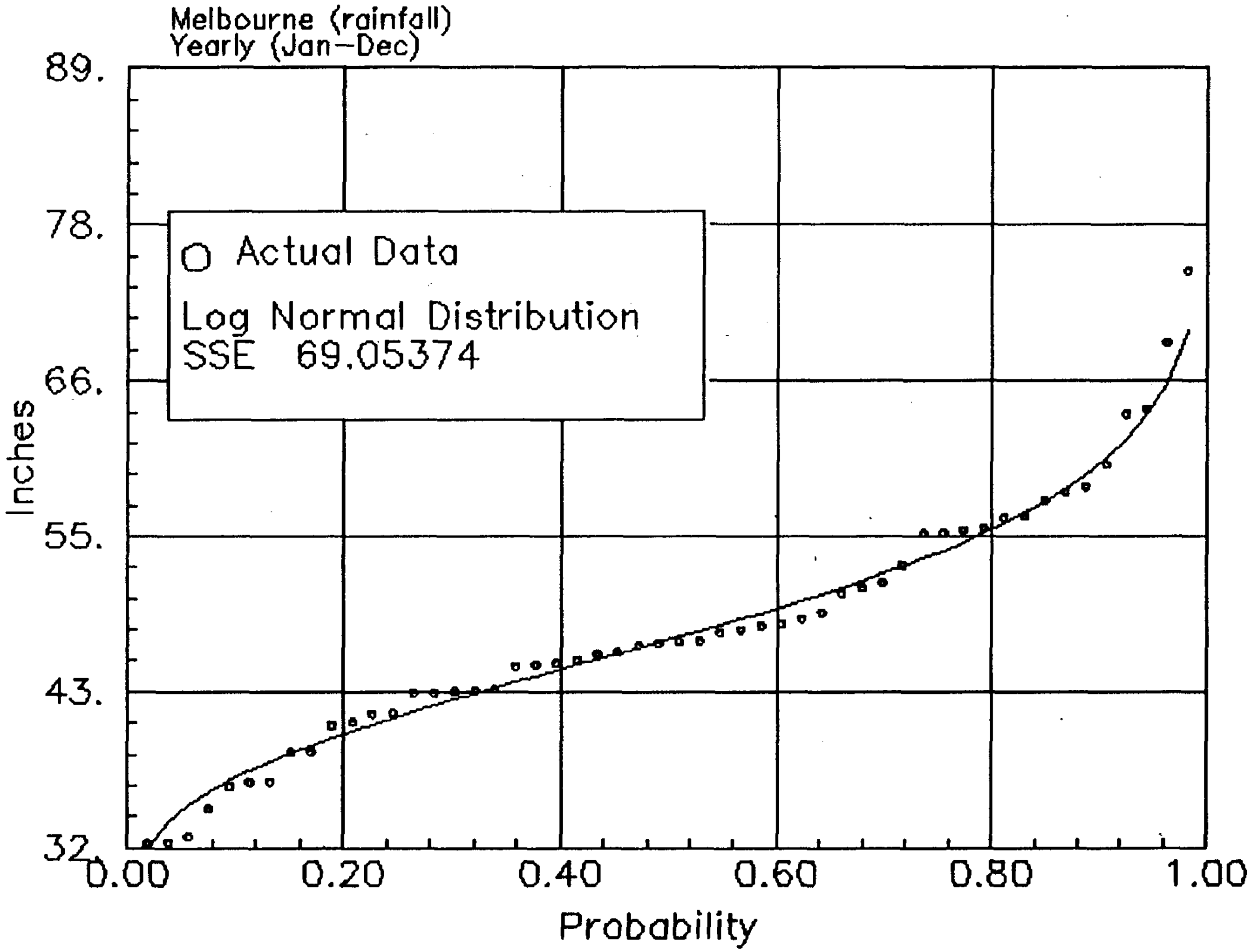


Figure B.6.2 Melbourne, Yearly rainfall distribution for the years of (1939-1990)

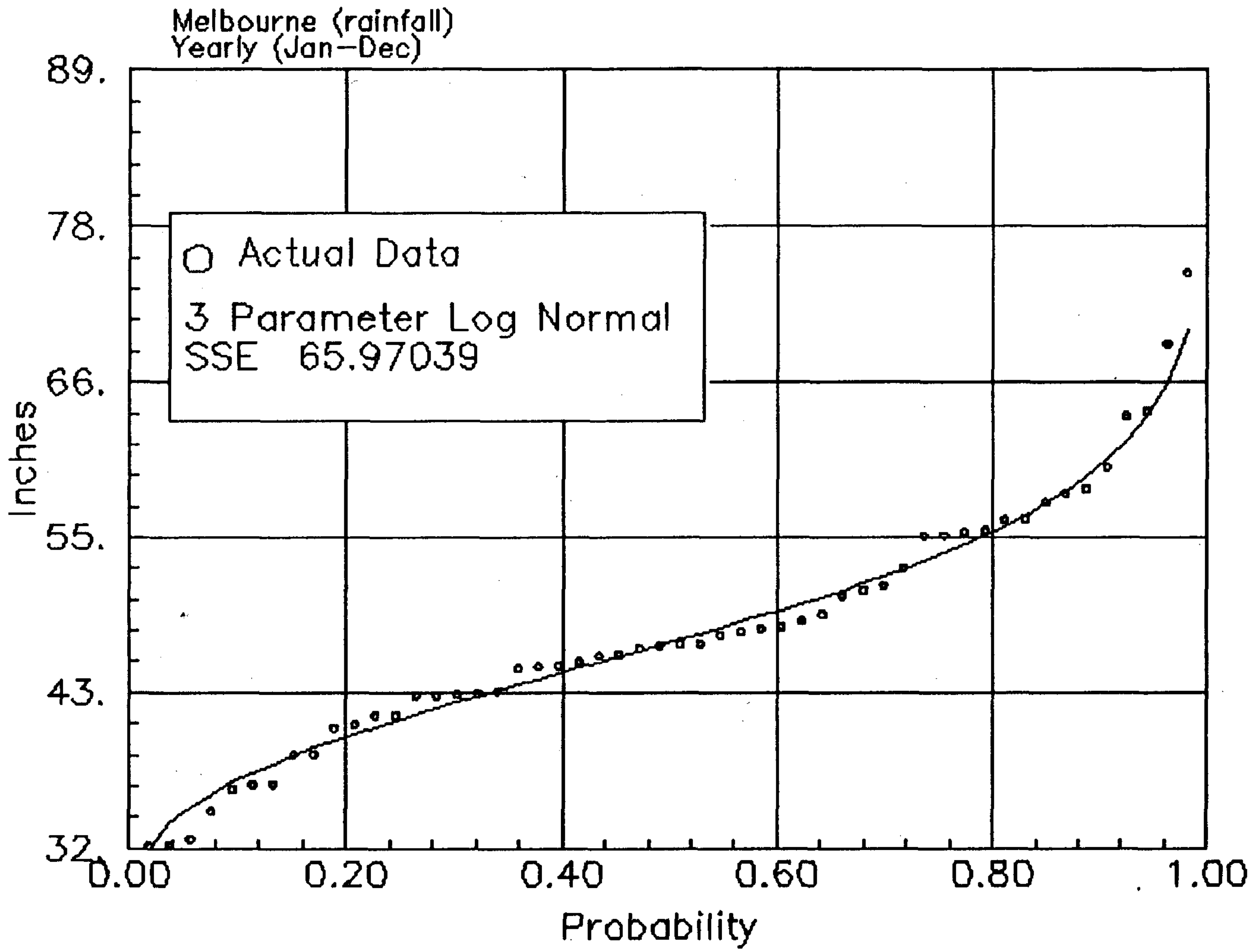


Figure B.6.3 Melbourne, Yearly rainfall distribution for the years of (1939—1990)

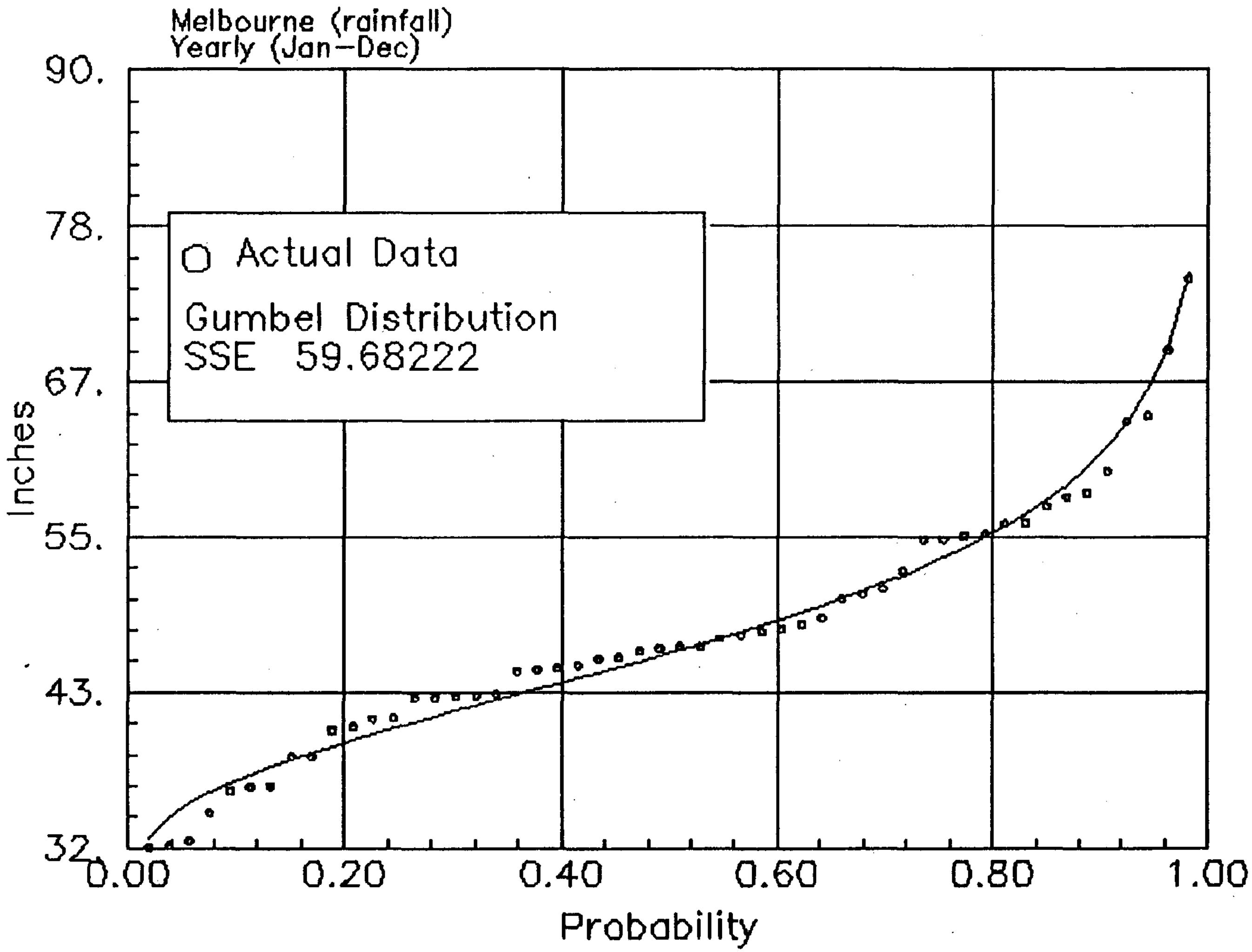


Figure B.6.4 Melbourne, Yearly rainfall distribution for the years of (1939—1990)

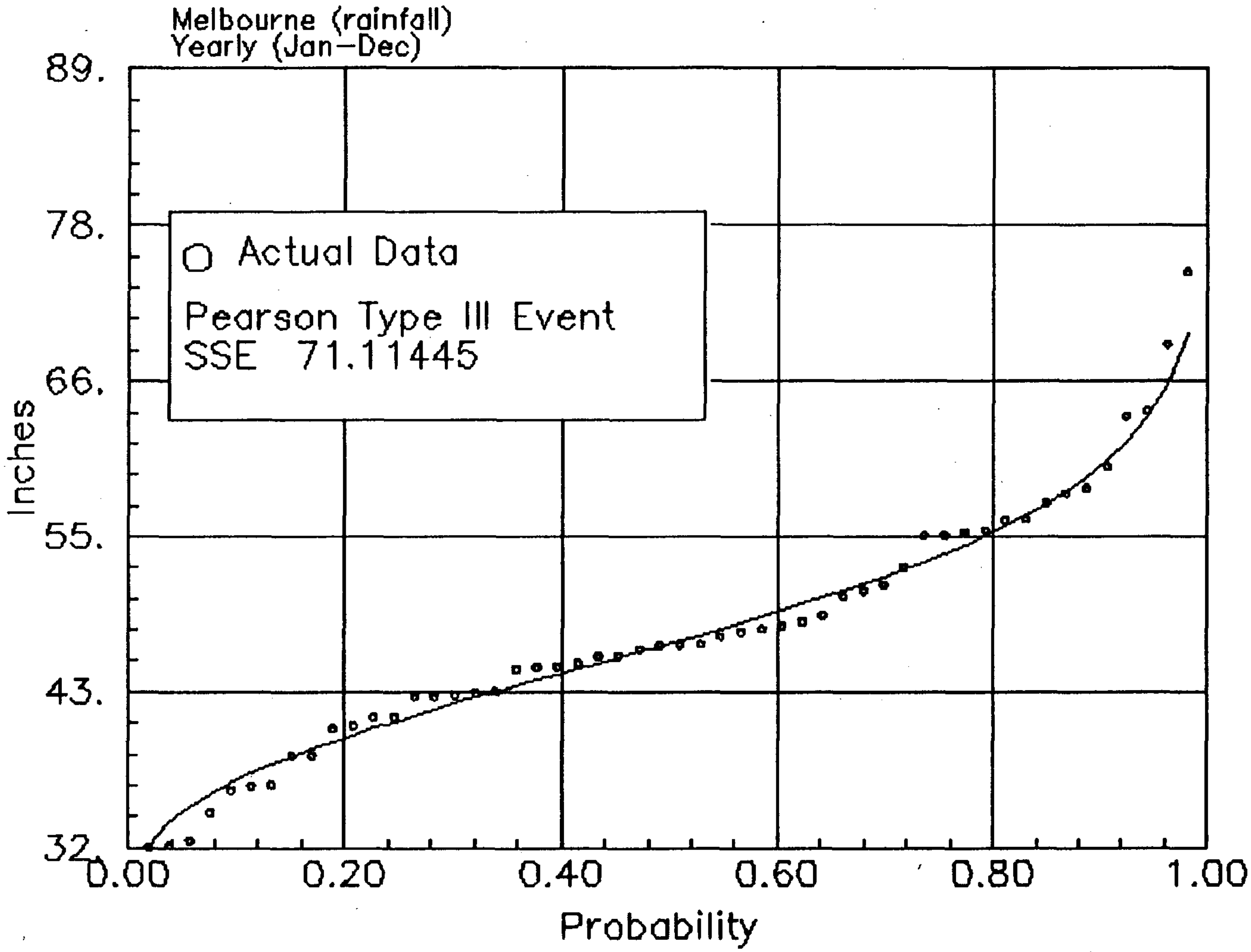


Figure B.6.5 Melbourne, Yearly rainfall distribution for the years of (1939–1990)

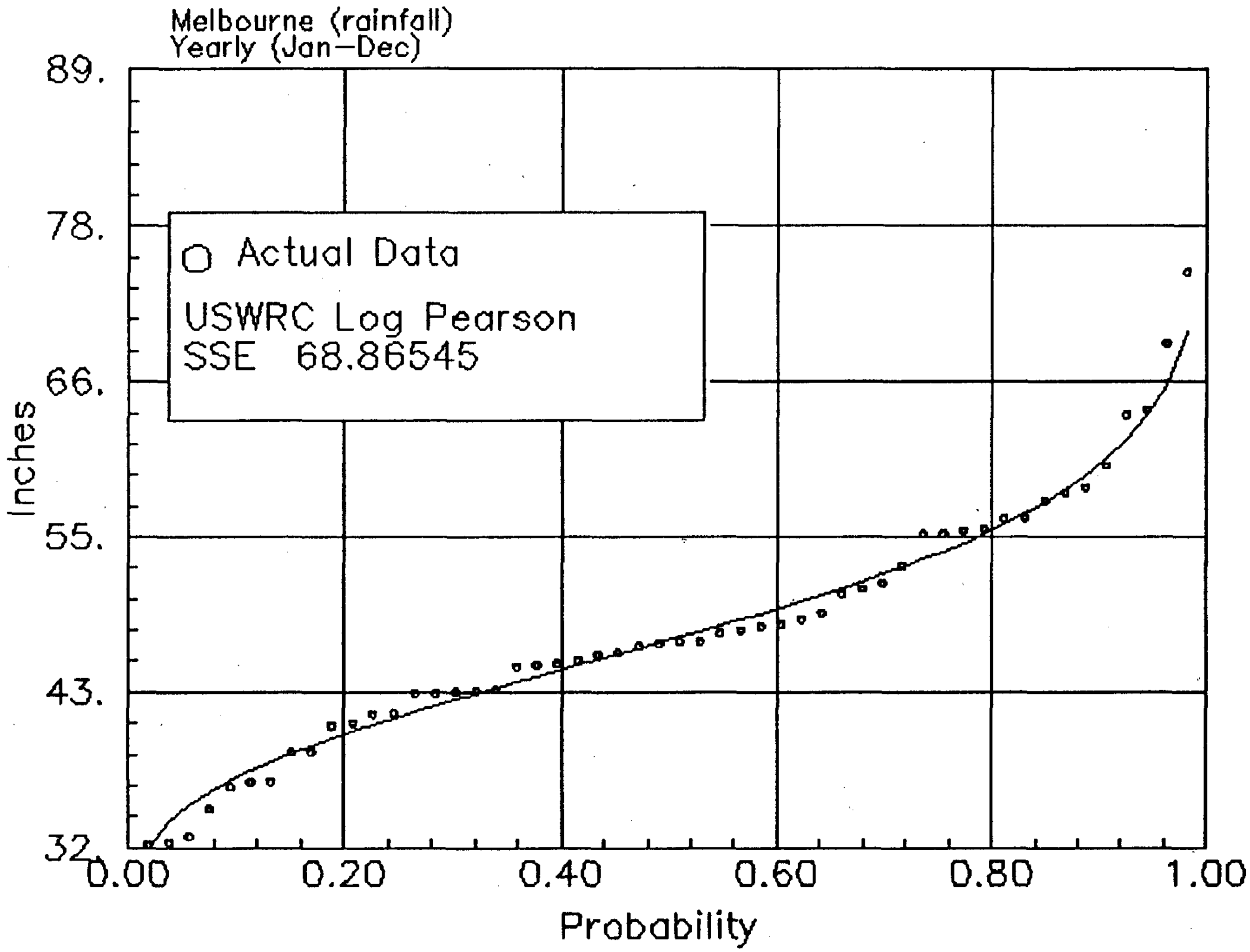


Figure B.6.6 Melbourne, Yearly rainfall distribution for the years of (1939-1990)

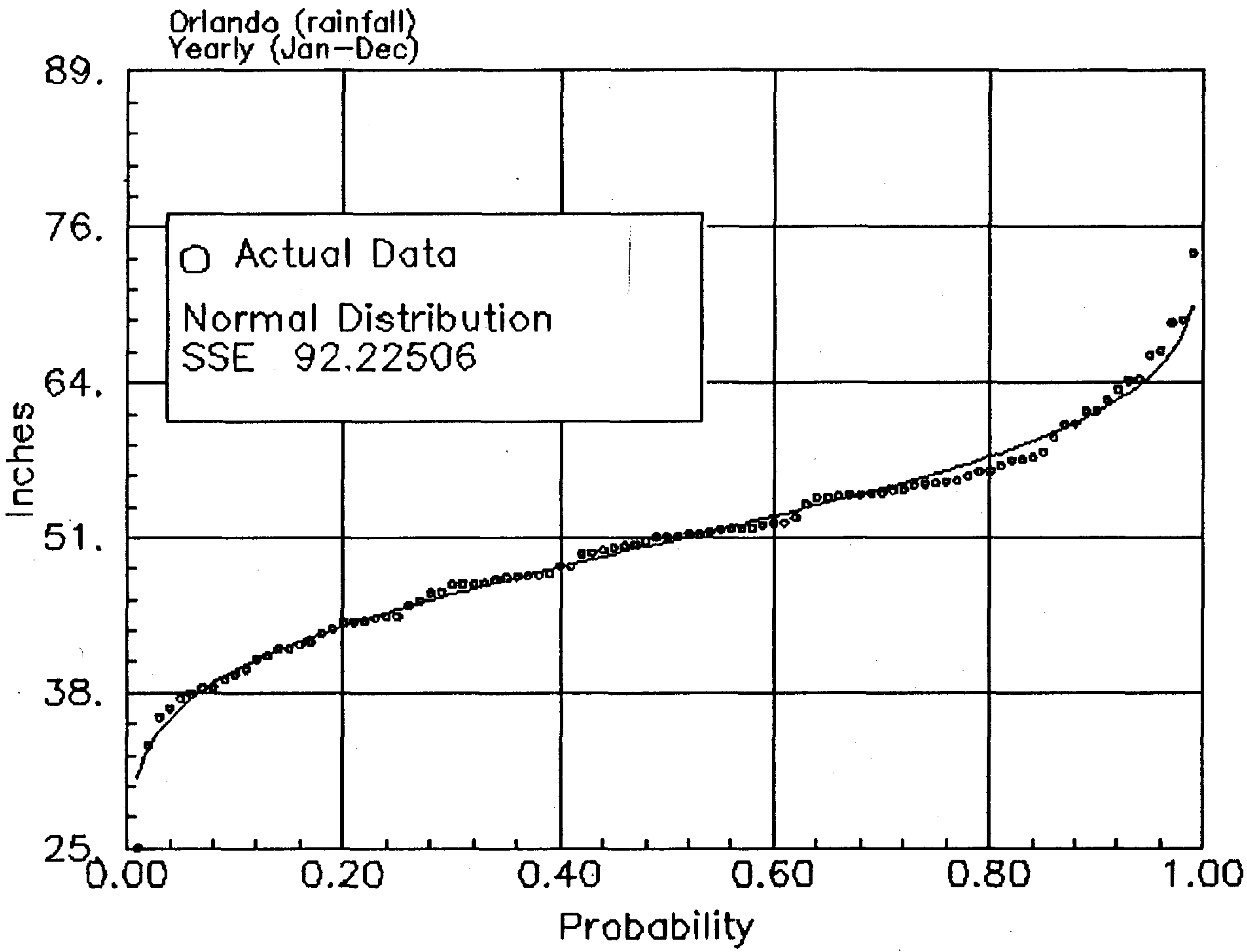


Figure B.7.1 Orlando, Yearly rainfall distribution for the years of (1892–1990)

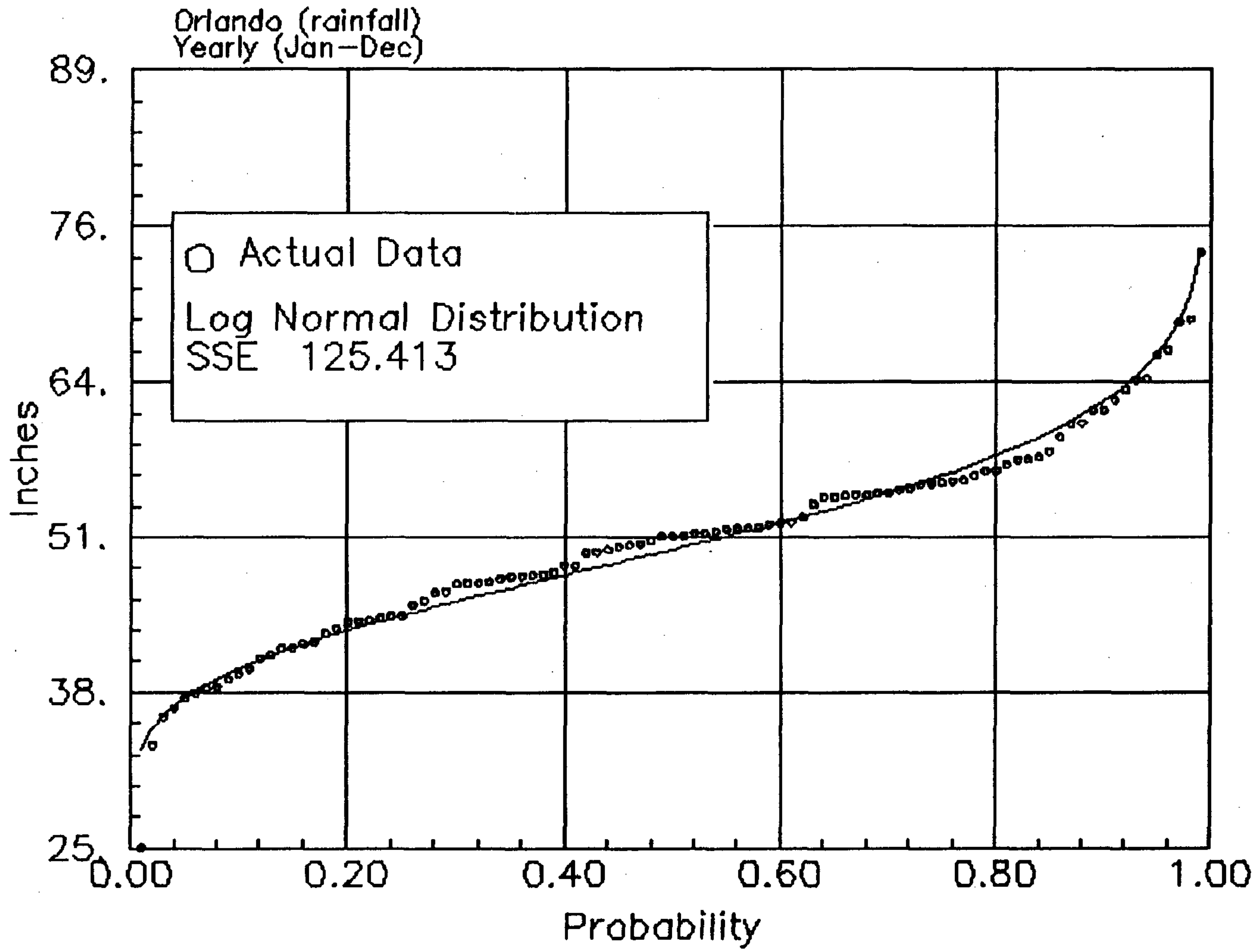


Figure B.7.2 Orlando, Yearly rainfall distribution for the years of (1892-1990)

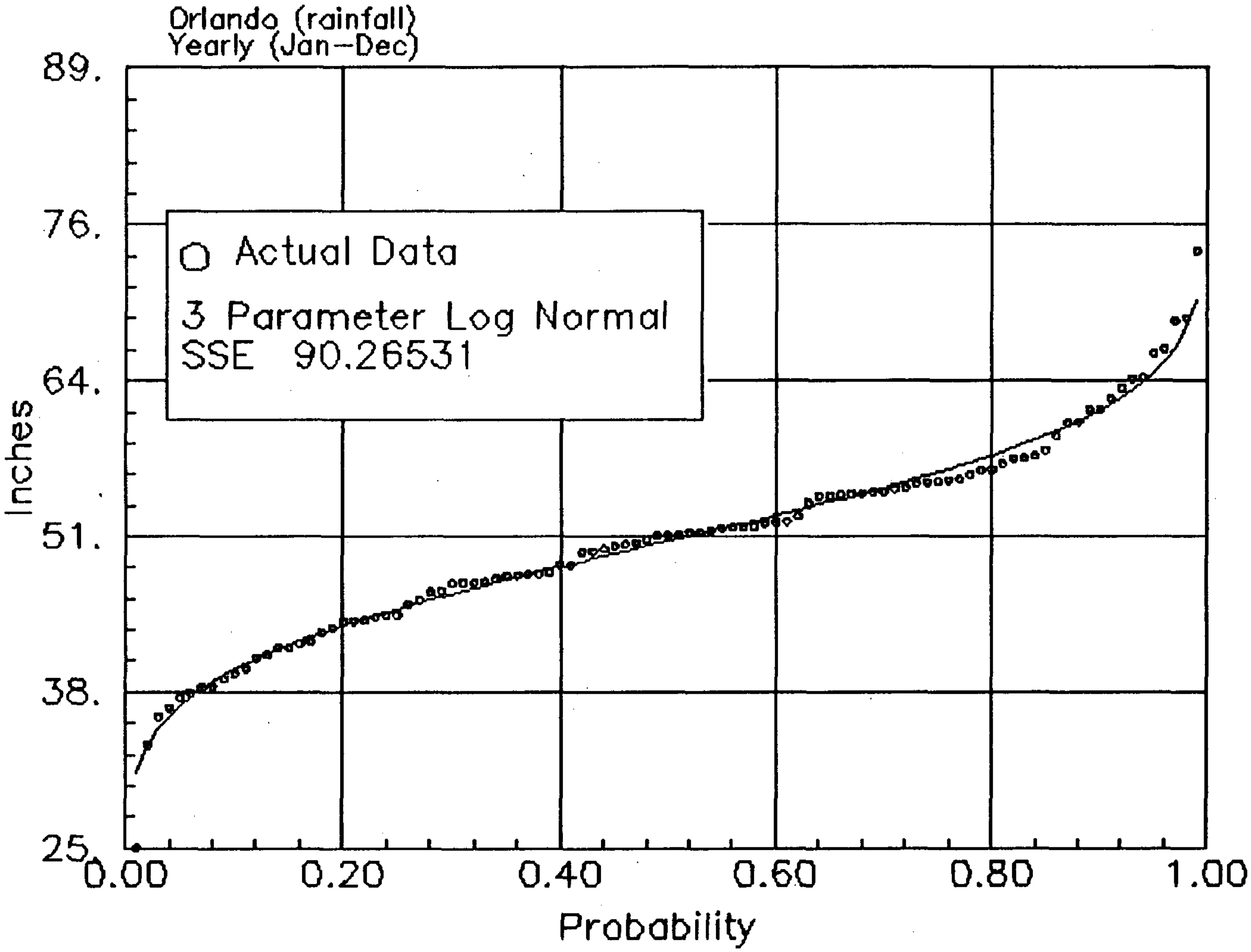


Figure B.7.3 Orlando, Yearly rainfall distribution for the years of (1892—1990)

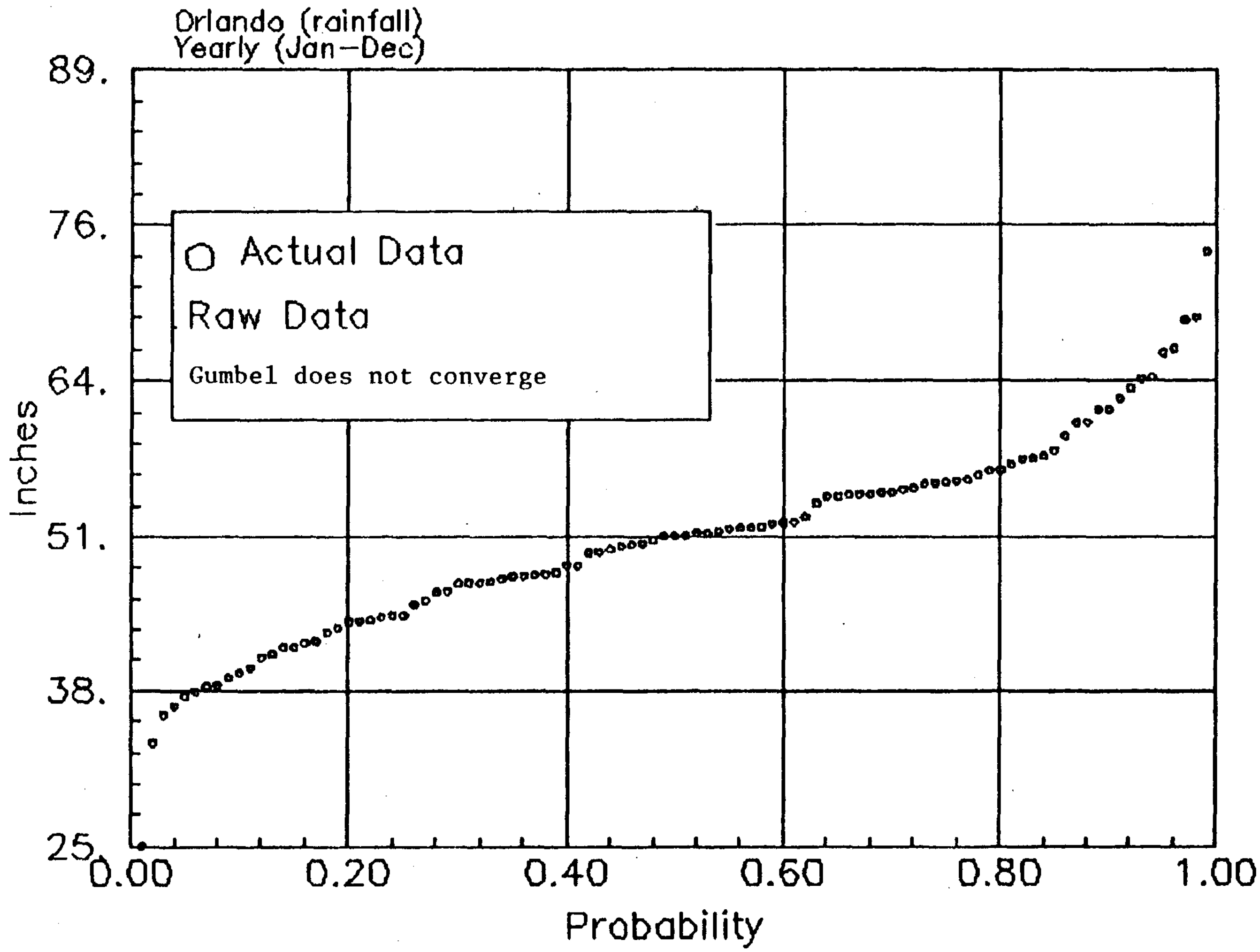


Figure B.7.4 Orlando, Yearly rainfall distribution for the years of (1892–1990)

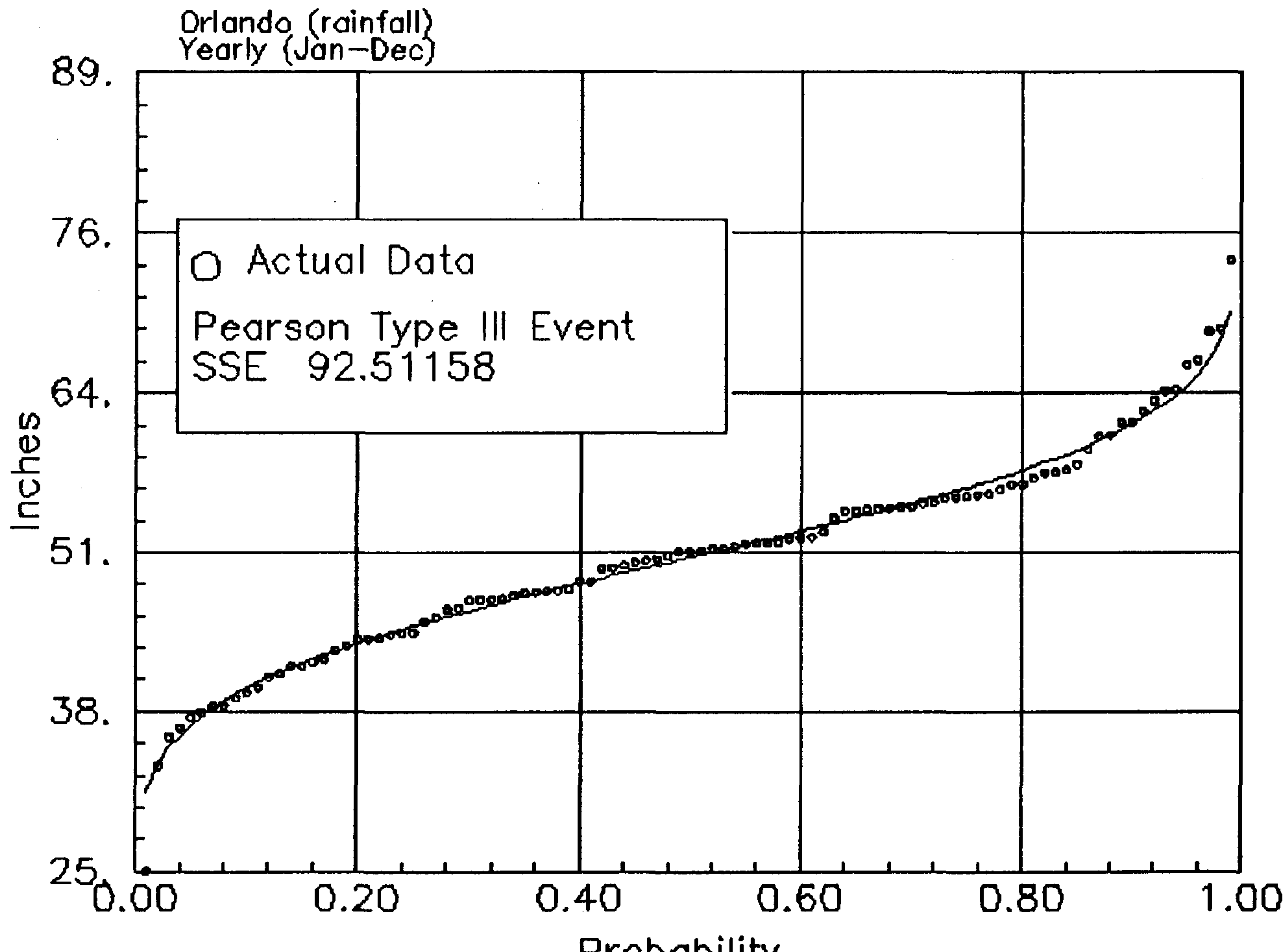


Figure B.7.5 Orlando, Yearly rainfall distribution for the years of (1892—1990)

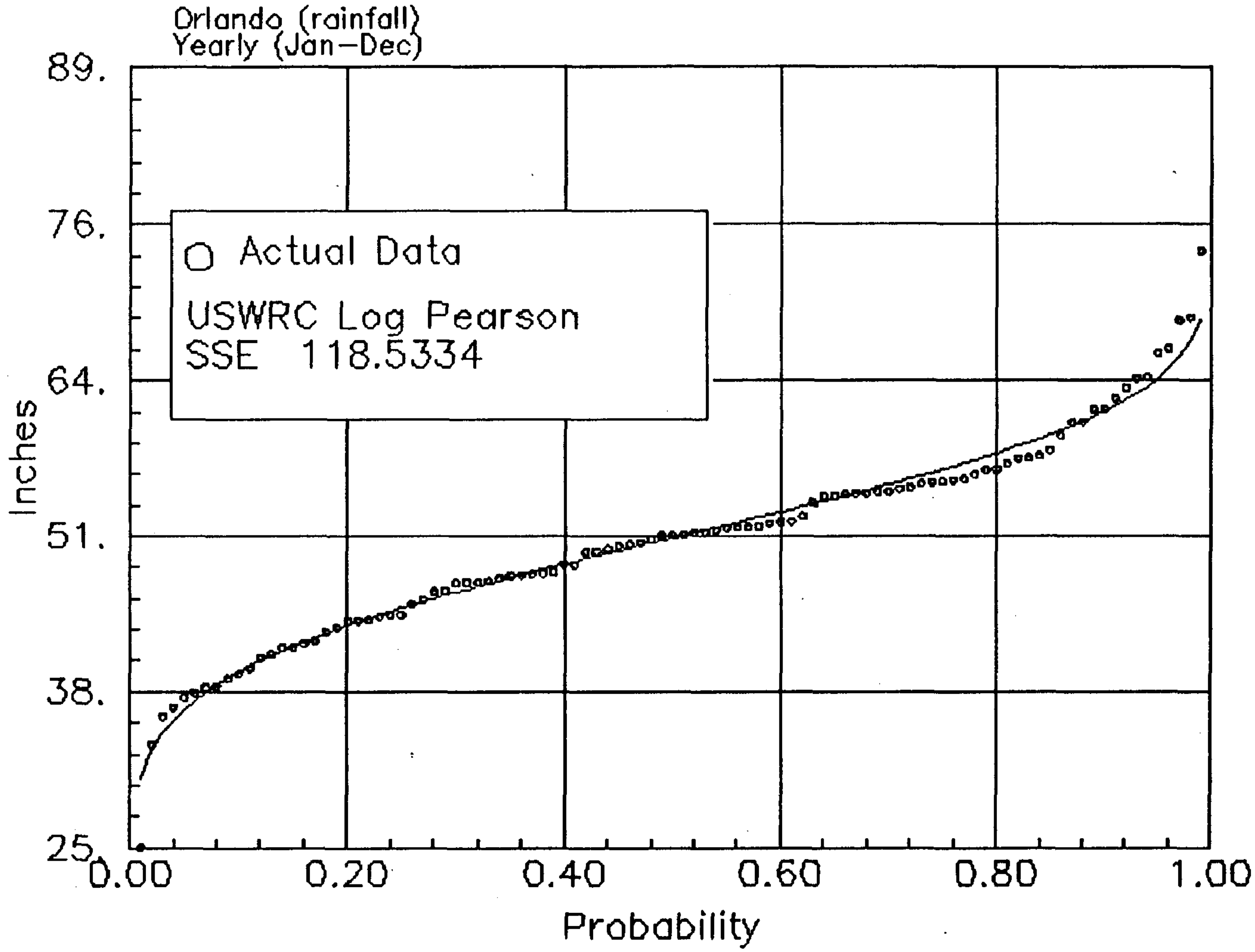


Figure B.7.6 Orlando, Yearly rainfall distribution for the years of (1892-1990)

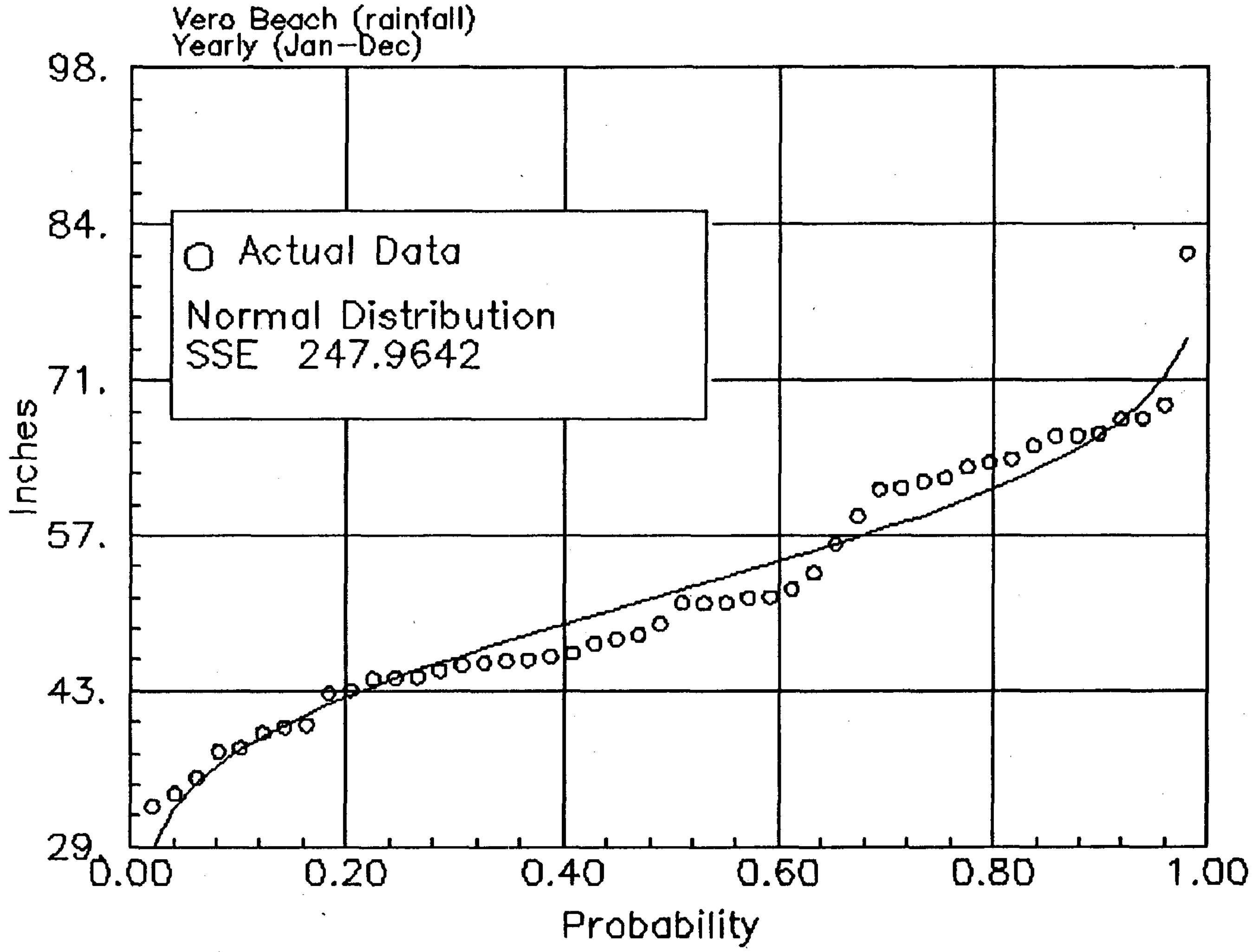


Figure B.8.1 Vero Beach, Yearly rainfall distribution for the years of (1943–1990)

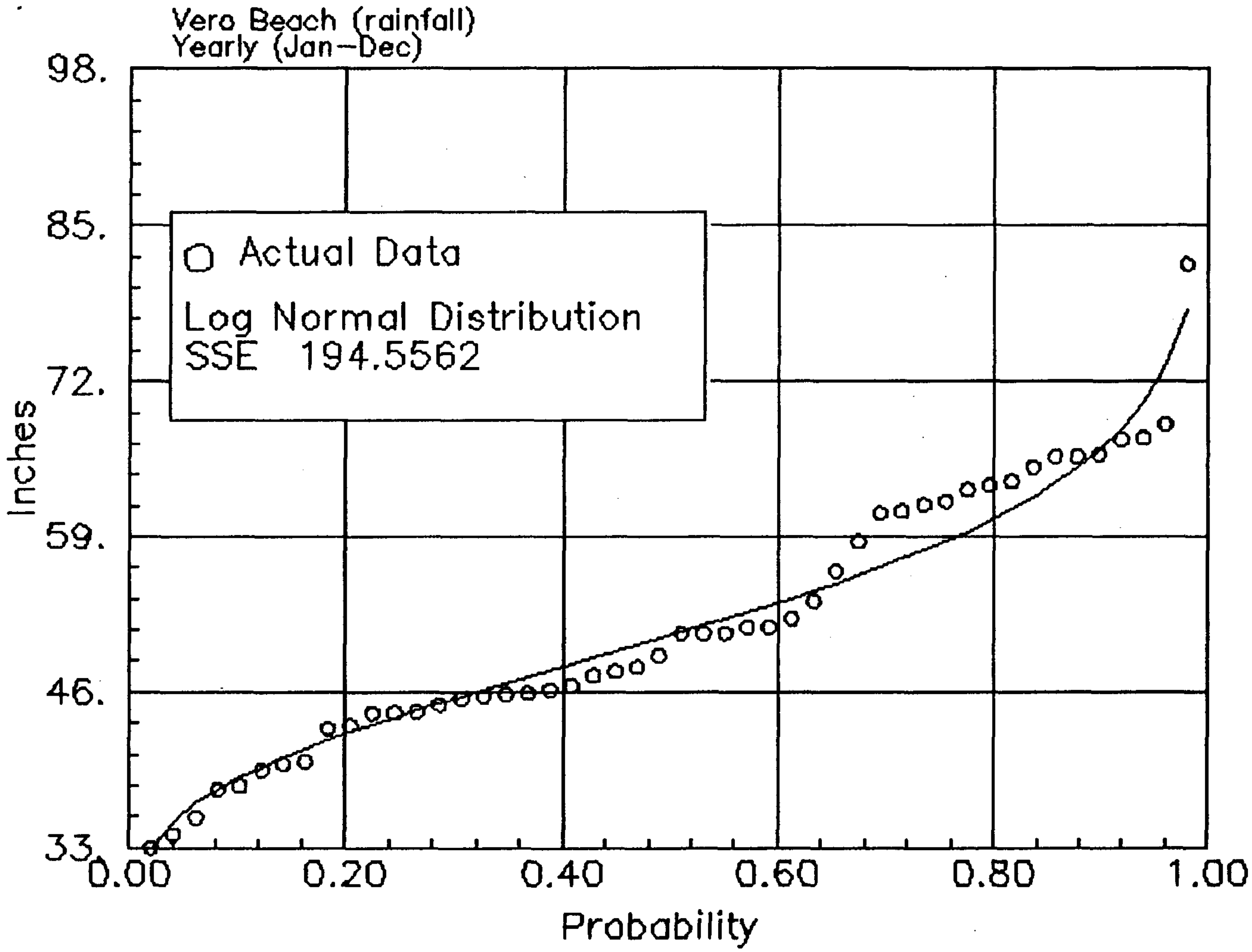


Figure B.8.2 Vero Beach, Yearly rainfall distribution for the years of (1943-1990)

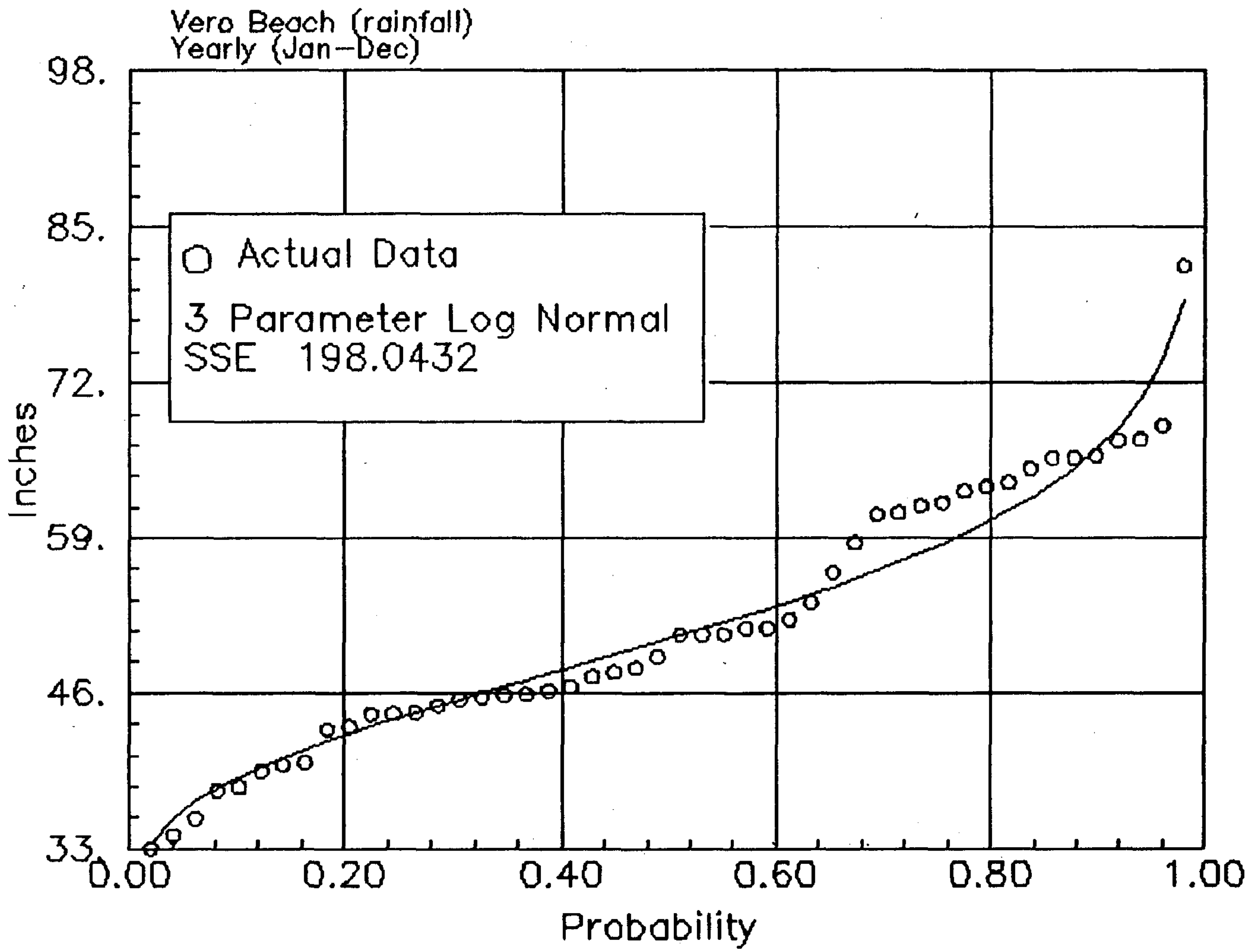


Figure B.8.3 Vero Beach, Yearly rainfall distribution for the years of (1943–1990)

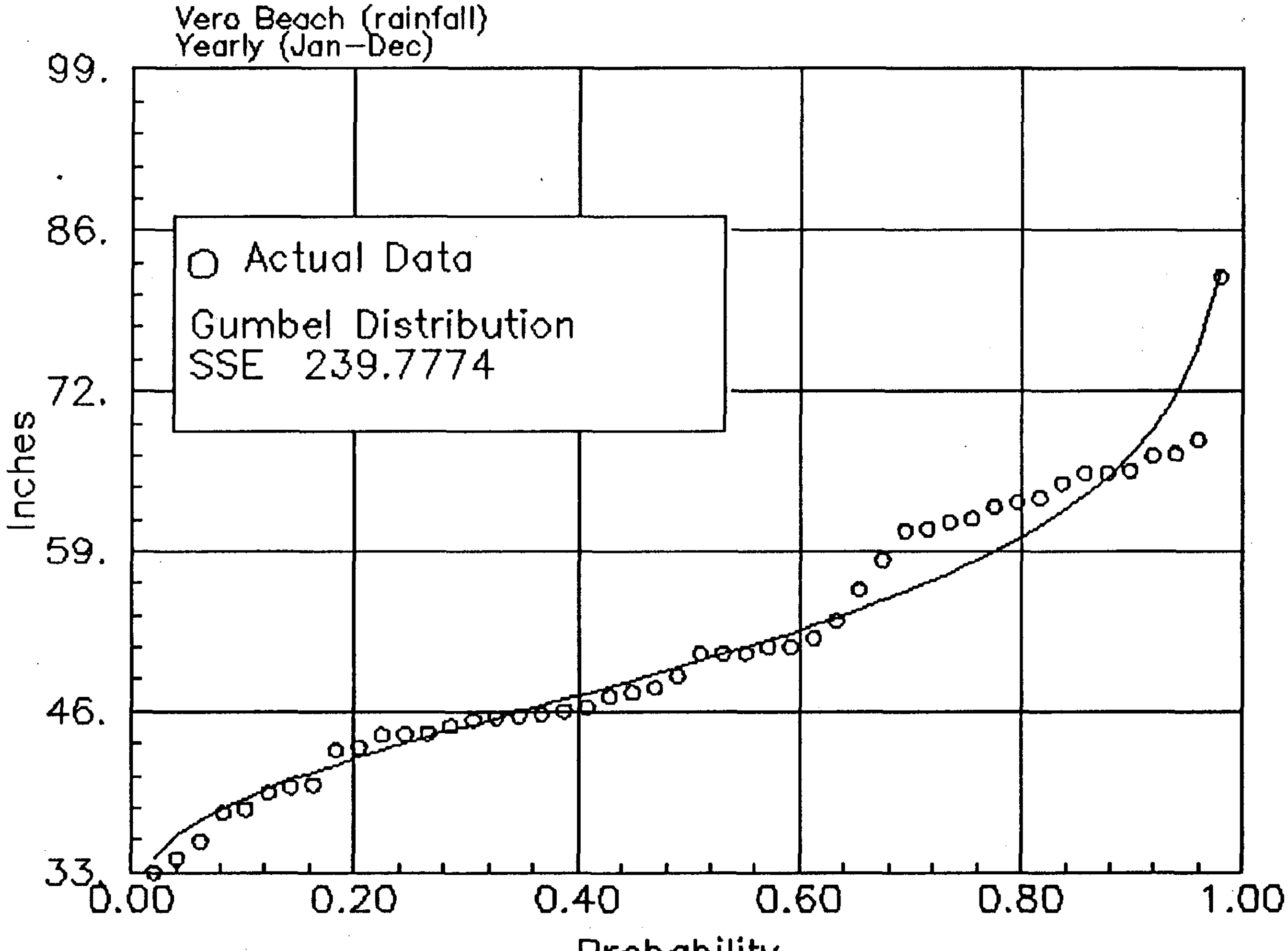


Figure B.8.4 Vero Beach, Yearly rainfall distribution for the years of (1943–1990)

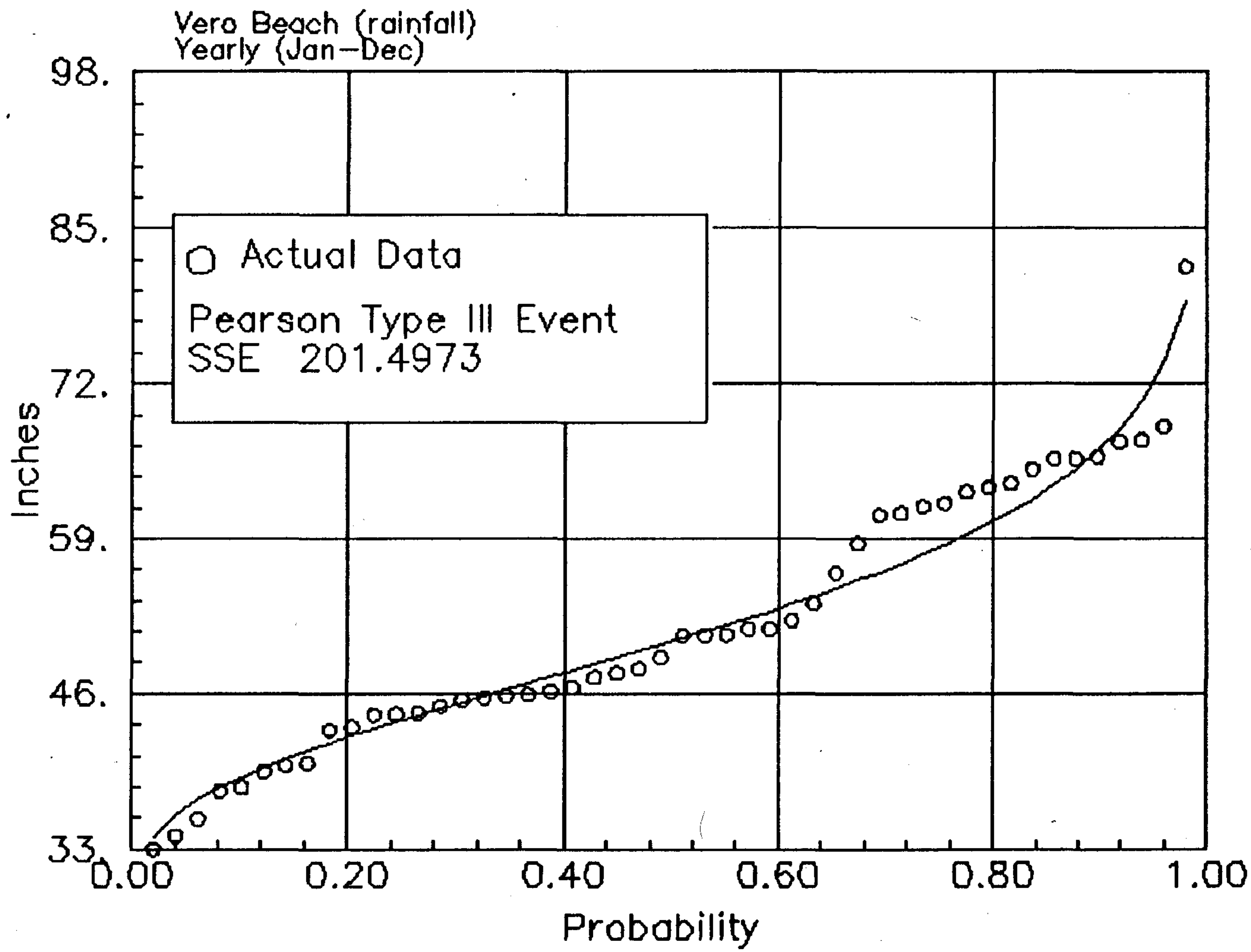


Figure B.8.5 Vero Beach, Yearly rainfall distribution for the years of (1943–1990)

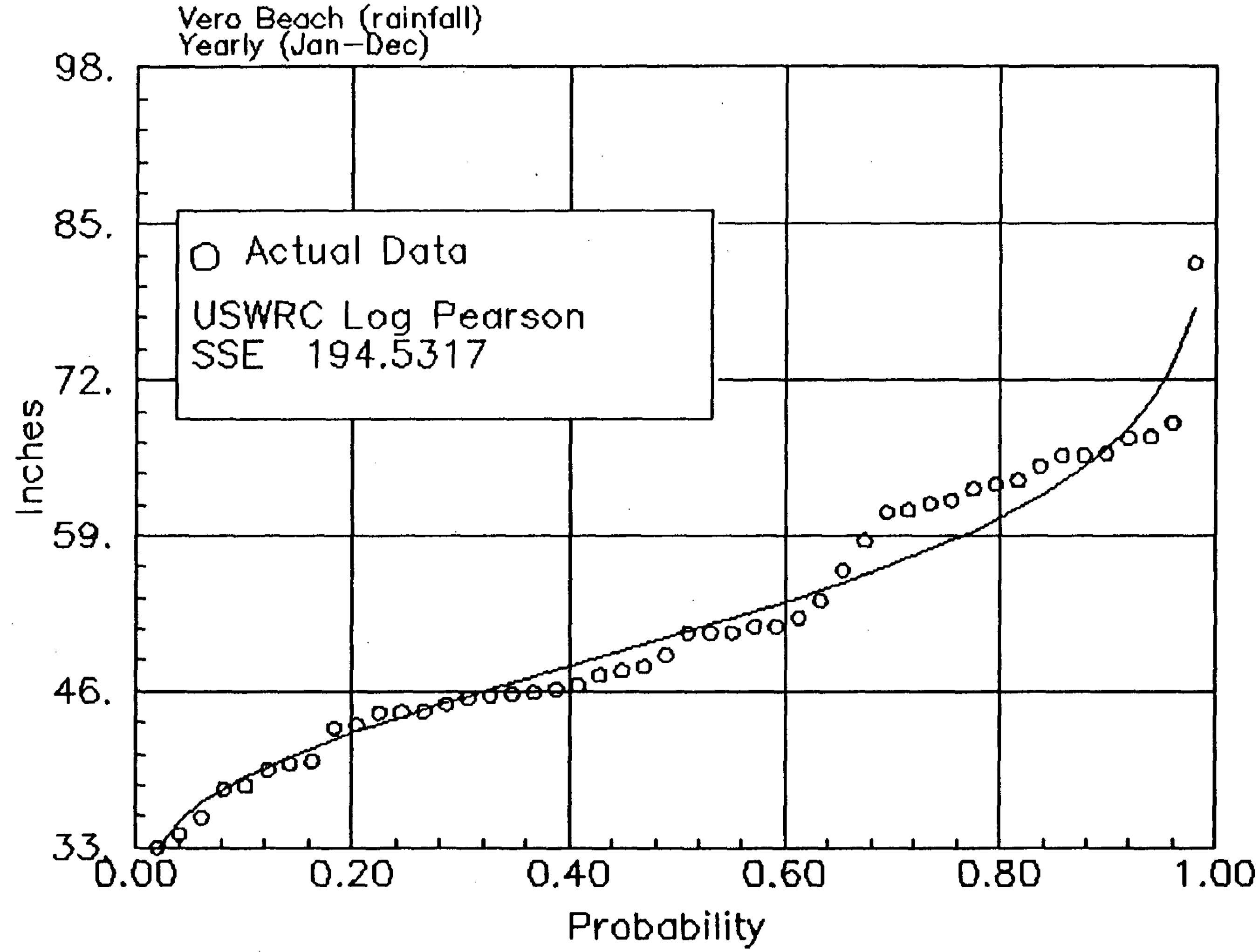


Figure B.8.6 Vero Beach, Yearly rainfall distribution for the years of (1943–1990)

Table B.1 Statistical Comparisons For Yearly Rainfall

Daytona Beach

	SSE	Rank	Standard Error	Rank	Kolmogorov	Rank	Chi-Square	Rank	Graphical Rank
Normal Distribution	233.32	6	1.85	6	0.074	6	2.00	1	6
Log Normal Distribution	82.68	5	1.10	5	0.044	1	8.18	5	5
3 Parameter Log Normal	59.56	1	0.94	1	0.059	3	8.18	5	1
Gumbel Distribution	62.72	3	0.96	3	0.059	3	7.15	2	4
Pearson Type III Event	60.71	2	0.94	1	0.059	3	7.56	3	3
USWRC Log Pearson	72.69	4	1.03	5	0.044	1	7.56	3	1

Gainesville

	SSE	Rank	Standard Error	Rank	Kolmogorov	Rank	Chi-Square	Rank	Graphical Rank
Normal Distribution	94.80	5	1.00	5	0.096	1	5.489	4	5
Log Normal Distribution	84.69	4	0.95	4	0.117	5	6.830	5	1
3 Parameter Log Normal	75.40	1	0.90	1	0.096	1	5.340	3	2
Gumbel Distribution	******METHOD DOES NOT CONVERGE******								
Pearson Type III Event	78.13	3	0.91	3	0.096	1	4.447	1	2
USWRC Log Pearson	76.70	2	0.90	1	0.106	4	4.447	1	2

Jacksonville

	SSE	Rank	Standard Error	Rank	Kolmogorov	Rank	Chi-Square	Rank	Graphical Rank
Normal Distribution	188.24	5	1.23	5	0.081	1	2.565	1	4
Log Normal Distribution	181.30	4	1.21	4	0.113	5	4.484	5	5
3 Parameter Log Normal	154.48	1	1.12	1	0.097	2	2.677	2	1
Gumbel Distribution	******METHOD DOES NOT CONVERGE******								
Pearson Type III Event	158.08	2	1.13	2	0.097	2	3.355	3	1
USWRC Log Pearson	162.75	3	1.15	3	0.097	2	3.355	3	1

Table B.1 (continued)

Lisbon

	SSE	Rank	Standard Error	Rank	Kolmogorov	Rank	Chi-Square	Rank	Graphical Rank
Normal Distribution	82.19	5	0.91	5	0.060	1	5.280	5	5
Log Normal Distribution	37.31	2	0.61	1	0.070	2	2.340	1	4
3 Parameter Log Normal	37.11	1	0.61	1	0.070	2	3.320	4	1
Gumbel Distribution	1025.66	6	3.20	6	0.100	6	11.440	6	6
Pearson Type III Event	38.26	4	0.62	4	0.070	2	2.620	2	1
USWRC Log Pearson	37.46	3	0.61	1	0.070	2	2.620	2	1

Marineland

	SSE	Rank	Standard Error	Rank	Kolmogorov	Rank	Chi-Square	Rank	Graphical Rank
Normal Distribution	96.35	6	1.40	6	0.122	6	1.429	1	6
Log Normal Distribution	53.00	1	1.04	1	0.102	2	2.286	5	1
3 Parameter Log Normal	55.34	3	1.06	3	0.102	2	1.429	1	1
Gumbel Distribution	81.83	5	1.29	5	0.082	1	5.429	6	5
Pearson Type III Event	59.80	4	1.10	4	0.102	3	1.429	1	1
USWRC Log Pearson	53.63	2	1.05	2	0.102	4	1.429	1	1

Melbourne

	SSE	Rank	Standard Error	Rank	Kolmogorov	Rank	Chi-Square	Rank	Graphics Rank
Normal Distribution	138.42	6	1.63	6	0.115	6	4.539	2	6
Log Normal Distribution	69.05	4	1.15	3	0.077	1	4.808	3	2
3 Parameter Log Normal	65.97	2	1.13	2	0.077	1	4.808	3	2
Gumbel Distribution	59.68	1	1.07	1	0.077	1	3.192	1	1
Pearson Type III Event	71.11	5	1.17	5	0.077	1	4.808	3	2
USWRC Log Pearson	68.87	3	1.15	3	0.077	1	4.808	3	2

Table B.1 (continued)

Orlando

	SSE	Rank	Standard Error	Rank	Kolmogorov	Rank	Chi-Square	Rank	Graphical Rank
Normal Distribution	92.23	2	0.97	2	0.061	1	2.040	5	5
Log Normal Distribution	125.41	5	1.13	5	0.091	5	1.475	4	1
3 Parameter Log Normal	90.27	1	0.95	1	0.061	1	1.333	1	2
Gumbel Distribution	******METHOD DOES NOT CONVERGE******								
Pearson Type III Event	92.51	3	0.97	2	0.061	1	1.333	1	3
USWRC Log Pearson	118.53	4	1.09	4	0.061	1	1.333	1	3

Vero Beach

	SSE	Rank	Standard Error	Rank	Kolmogorov	Rank	Chi-Square	Rank	Graphical Rank
Normal Distribution	247.96	6	2.27	6	0.146	6	6.542	6	6
Log Normal Distribution	194.56	2	2.01	1	0.125	4	5.083	1	5
3 Parameter Log Normal	198.04	3	2.03	3	0.104	2	5.958	5	3
Gumbel Distribution	239.78	5	2.24	5	0.083	1	5.667	4	1
Pearson Type III Event	201.50	4	2.05	4	0.104	2	5.083	1	3
USWRC Log Pearson	194.53	1	2.01	1	0.125	4	5.083	1	1

APPENDIX C

WET SEASON RAINFALL DISTRIBUTIONS

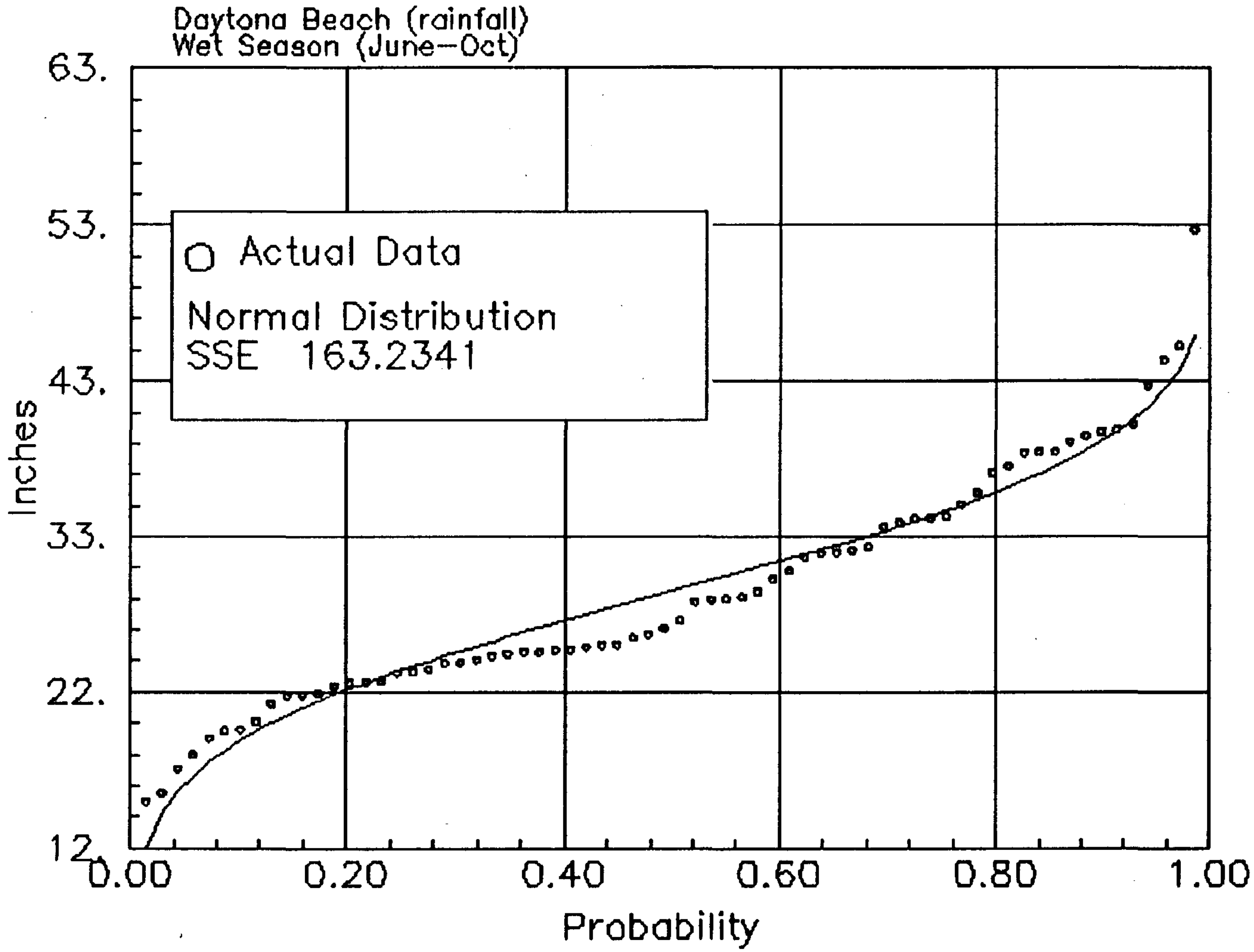


Figure C.1.1 Daytona Beach, Wet Season rainfall distribution for the years of (1923—1990)

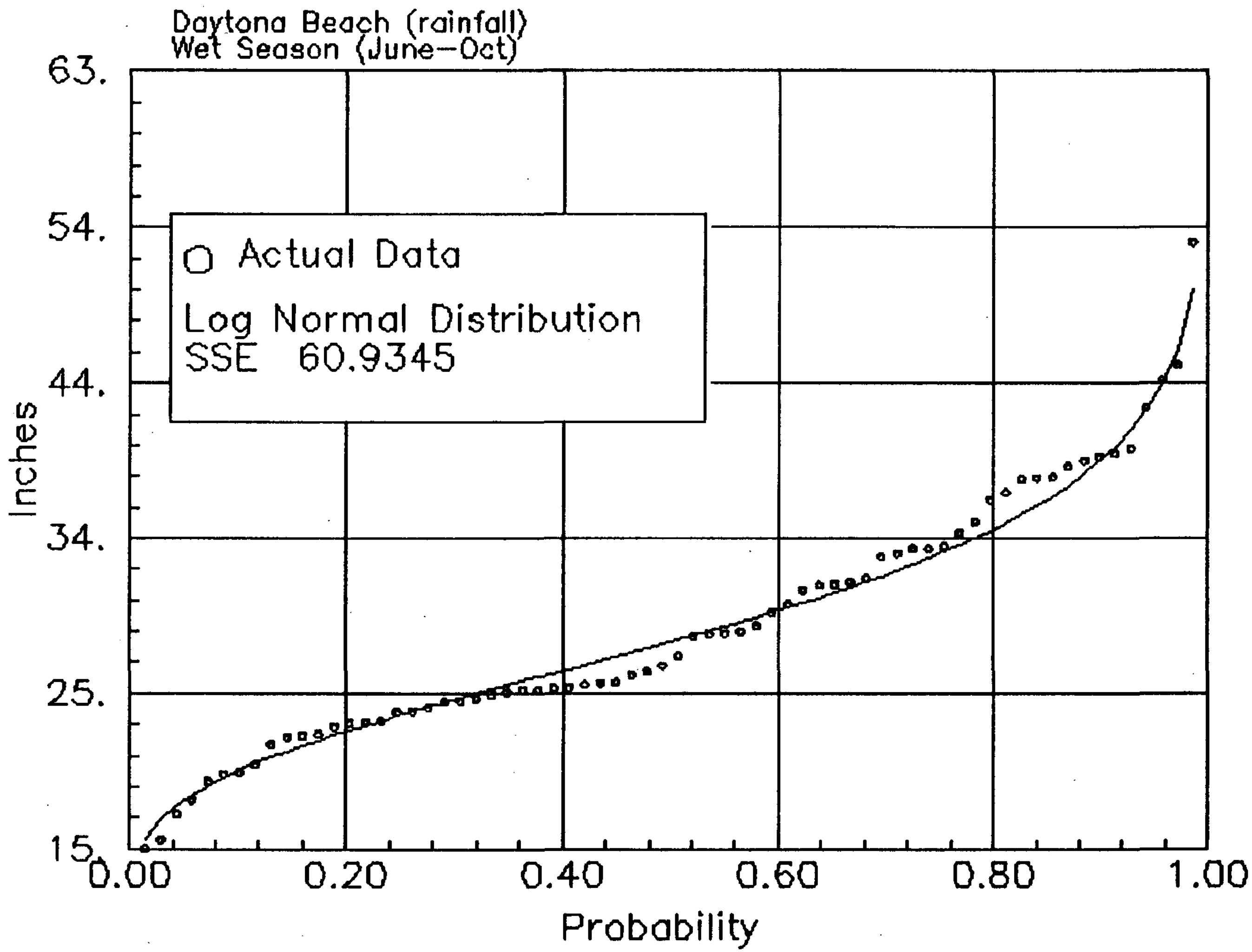


Figure C.1.2 Daytona Beach, Wet Season rainfall distribution for the years of (1923–1990)

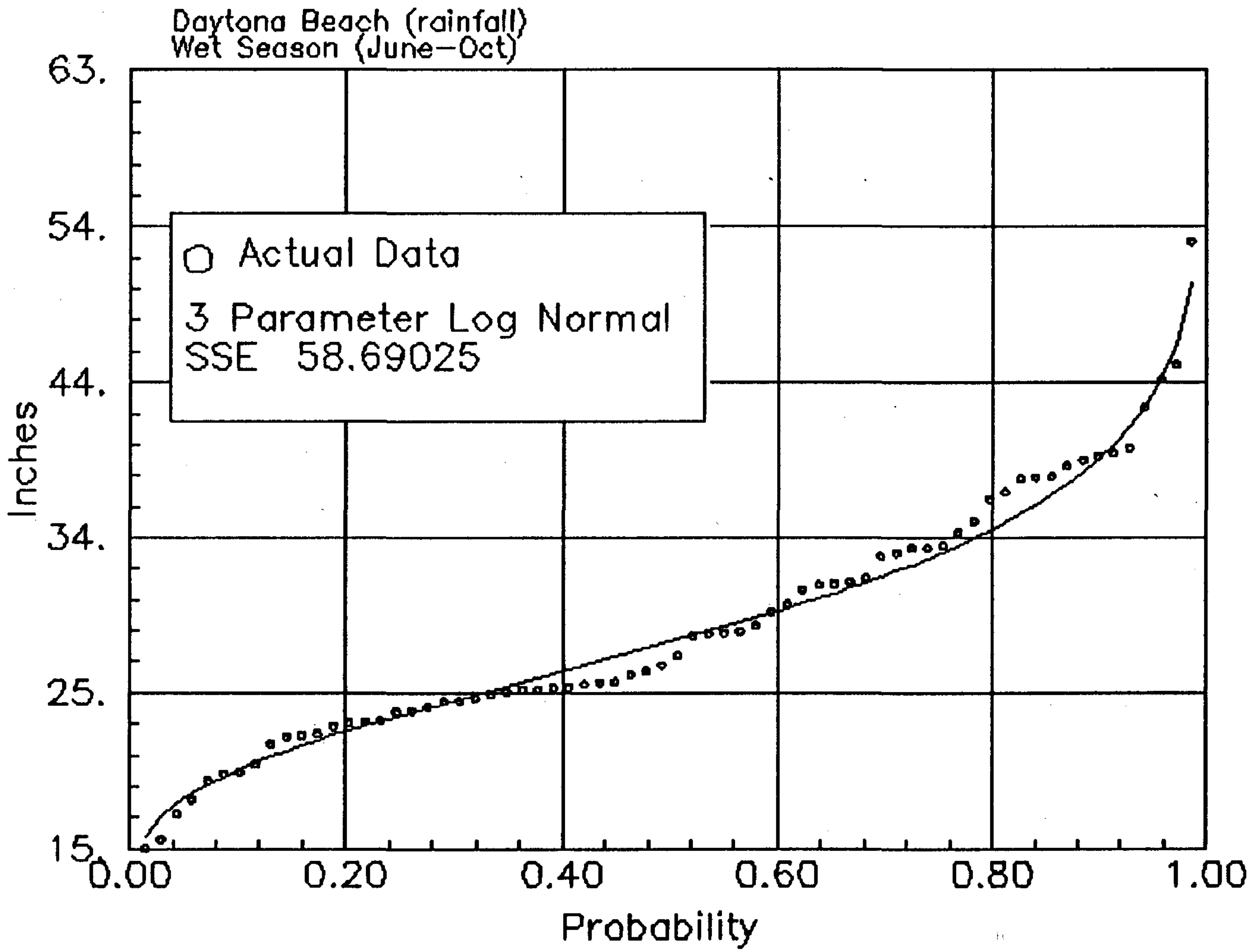


Figure C.1.3 Daytona Beach, Wet Season rainfall distribution for the years of (1923–1990)

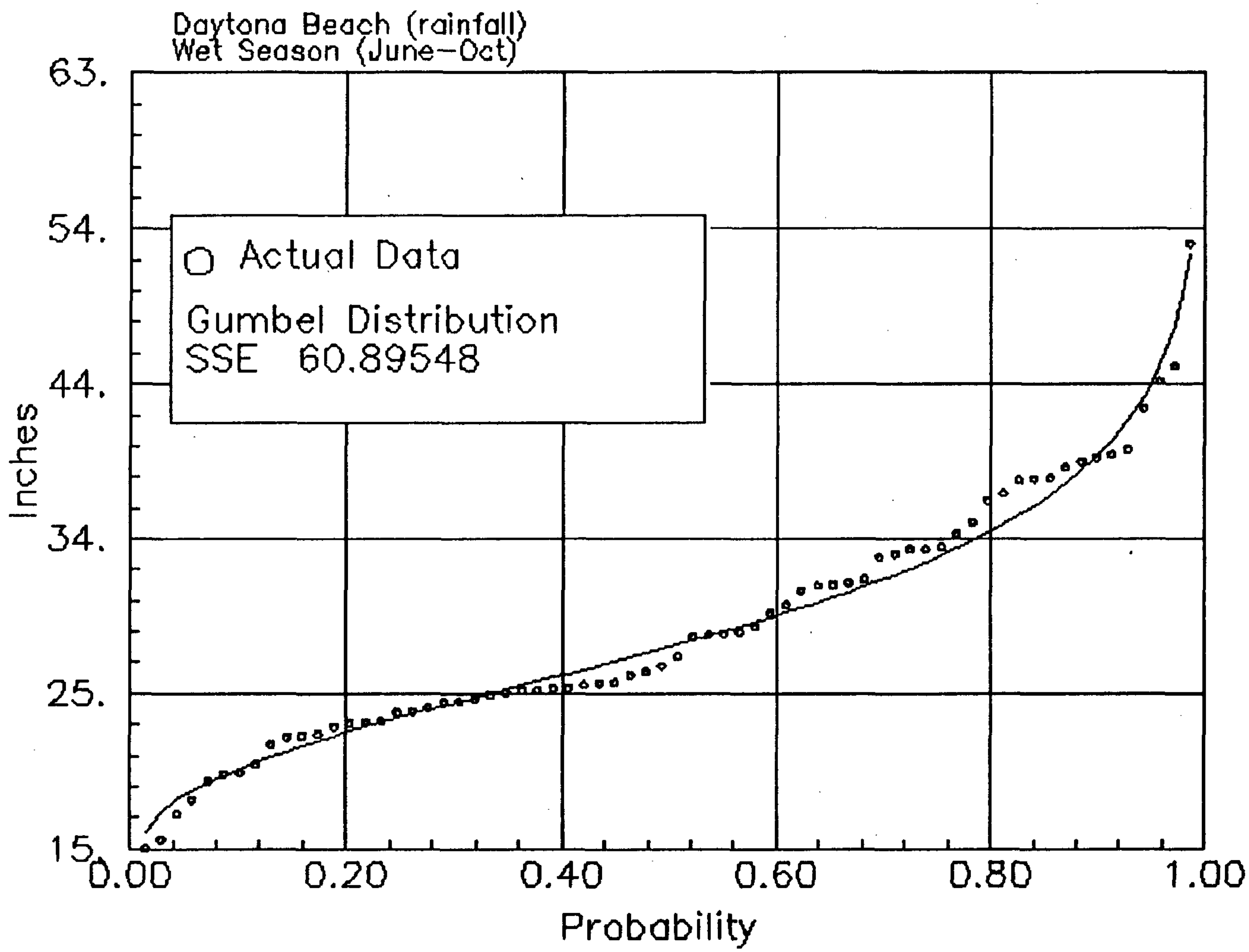


Figure C.1.4 Daytona Beach, Wet Season rainfall distribution for the years of (1923–1990)

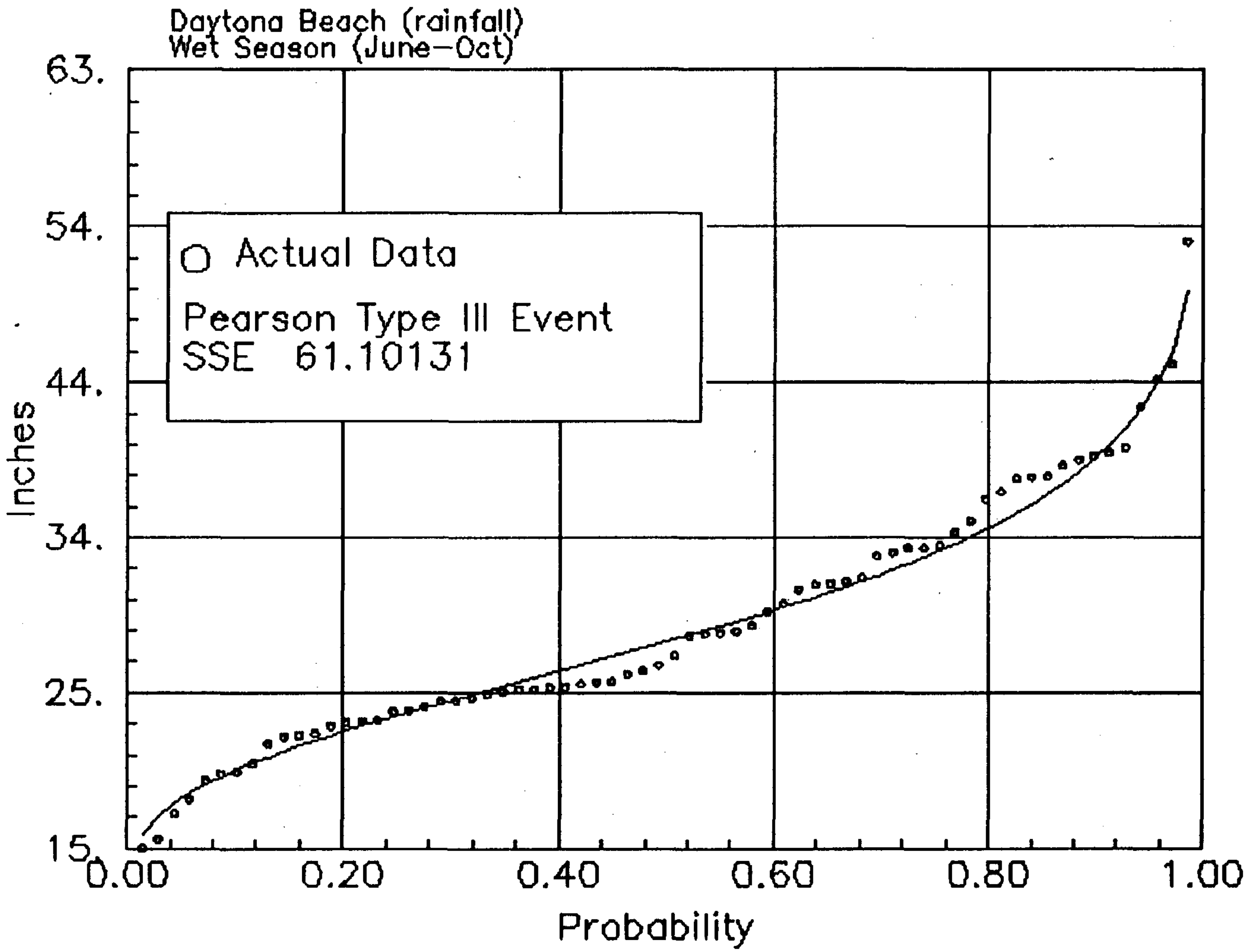


Figure C.1.5 Daytona Beach, Wet Season rainfall distribution for the years of (1923–1990)

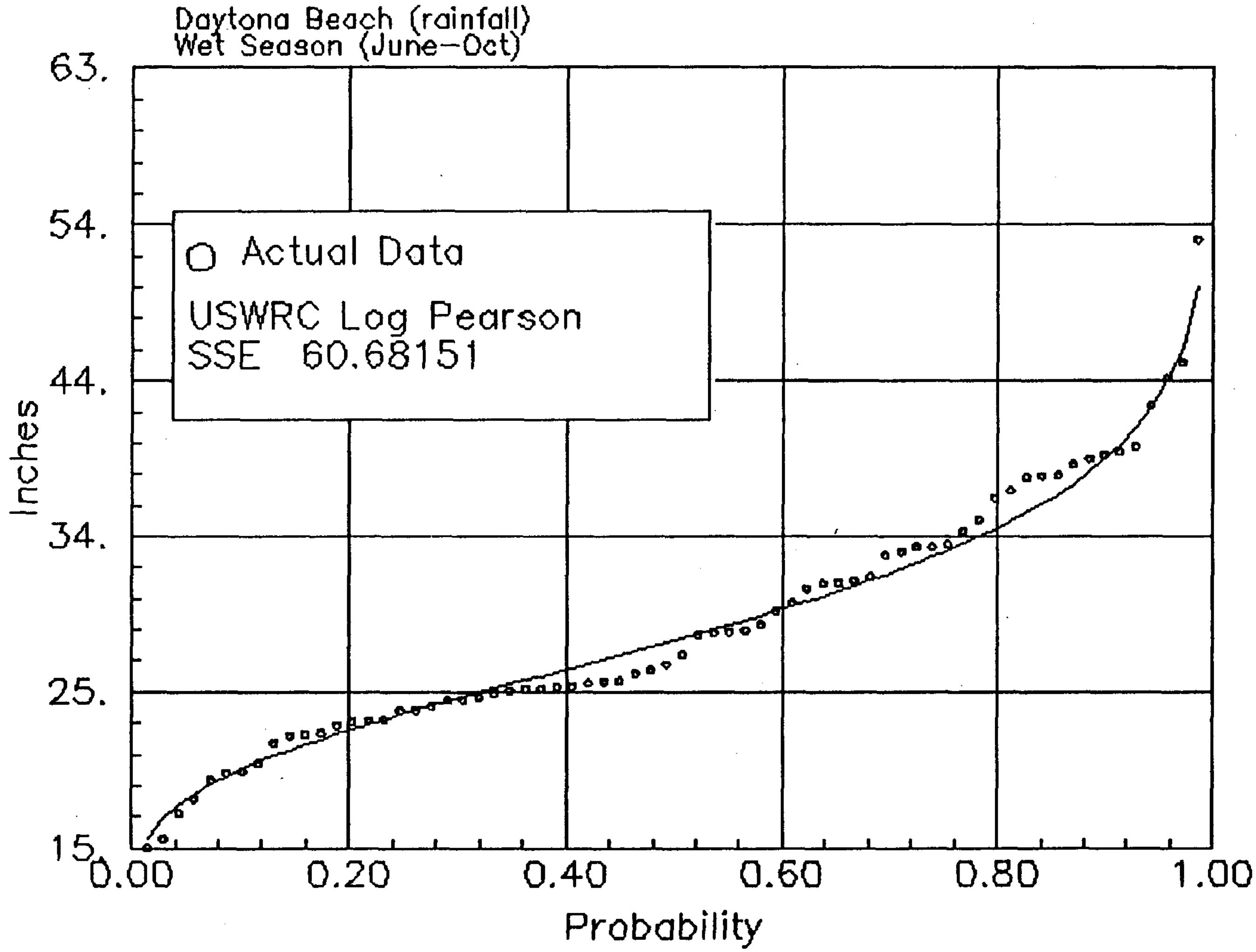


Figure C.1.6 Daytona Beach, Wet Season rainfall distribution for the years of (1923–1990)

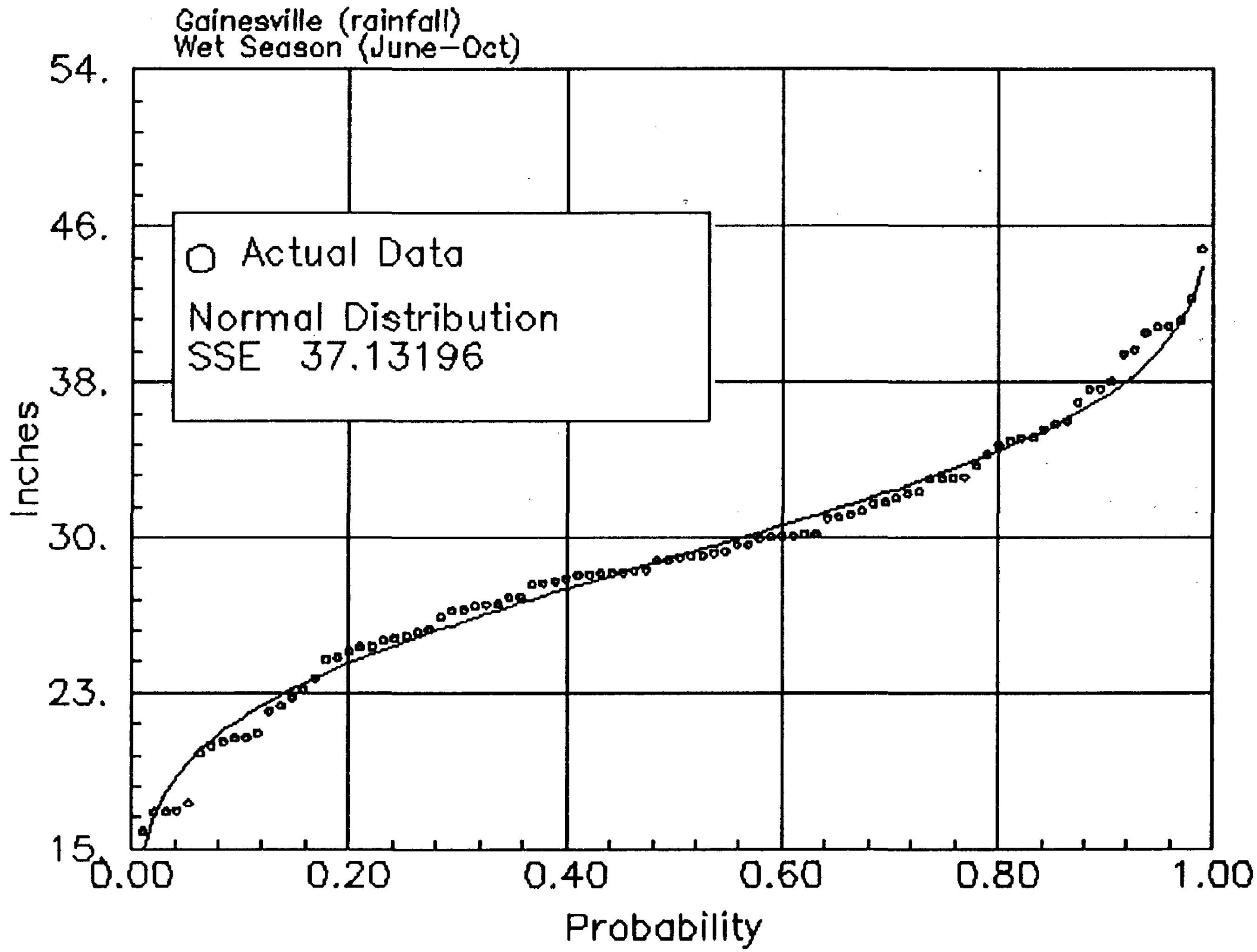


Figure C.2.1 Gainesville, Wet Season rainfall distribution for the years of (1897–1990)

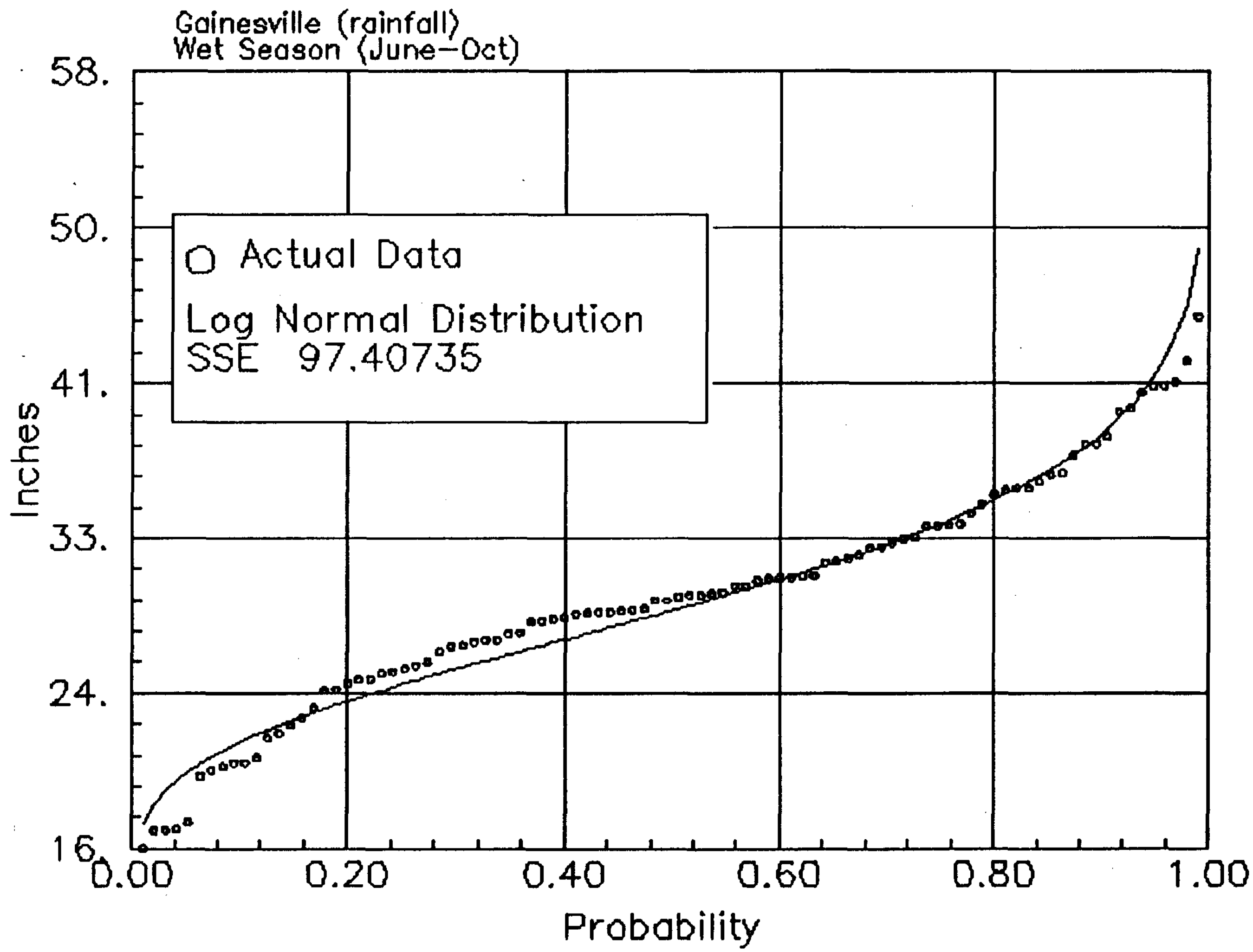


Figure C.2.2 Gainesville, Wet Season rainfall distribution for the years of (1897-1990)

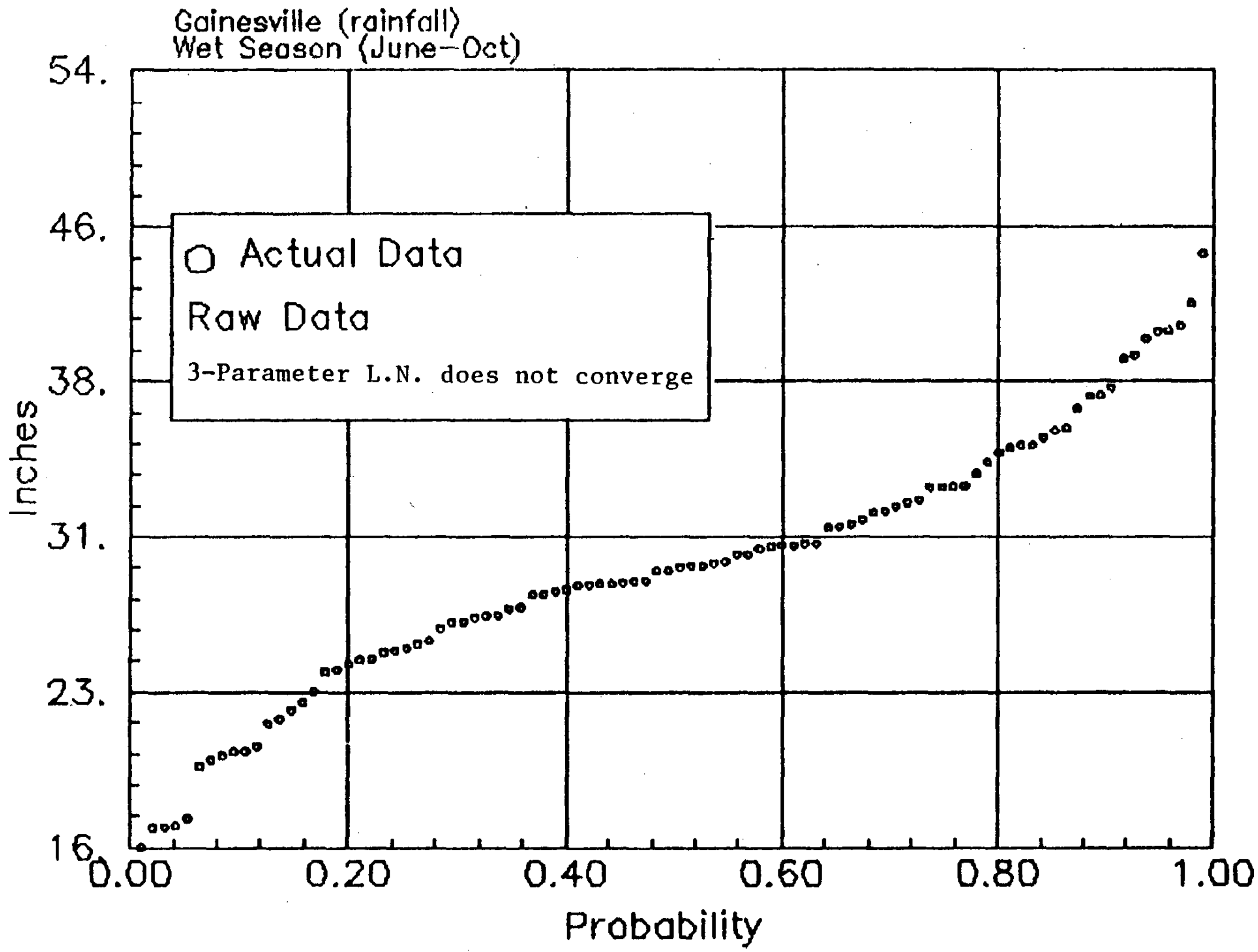


Figure C.2.3 Gainesville, Wet Season rainfall distribution for the years of (1897-1990)

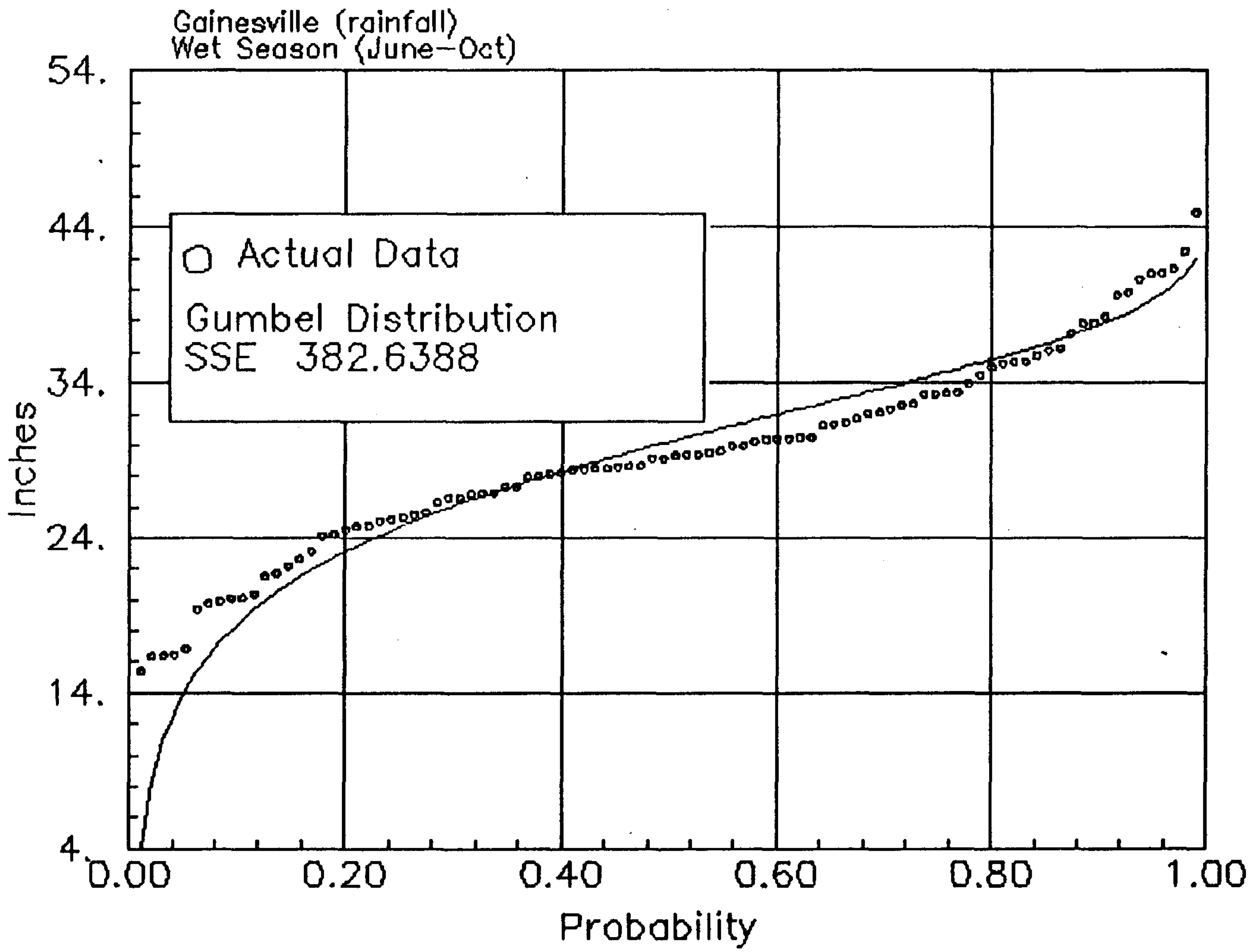


Figure C.2.4 Gainesville, Wet Season rainfall distribution for the years of (1897–1990)

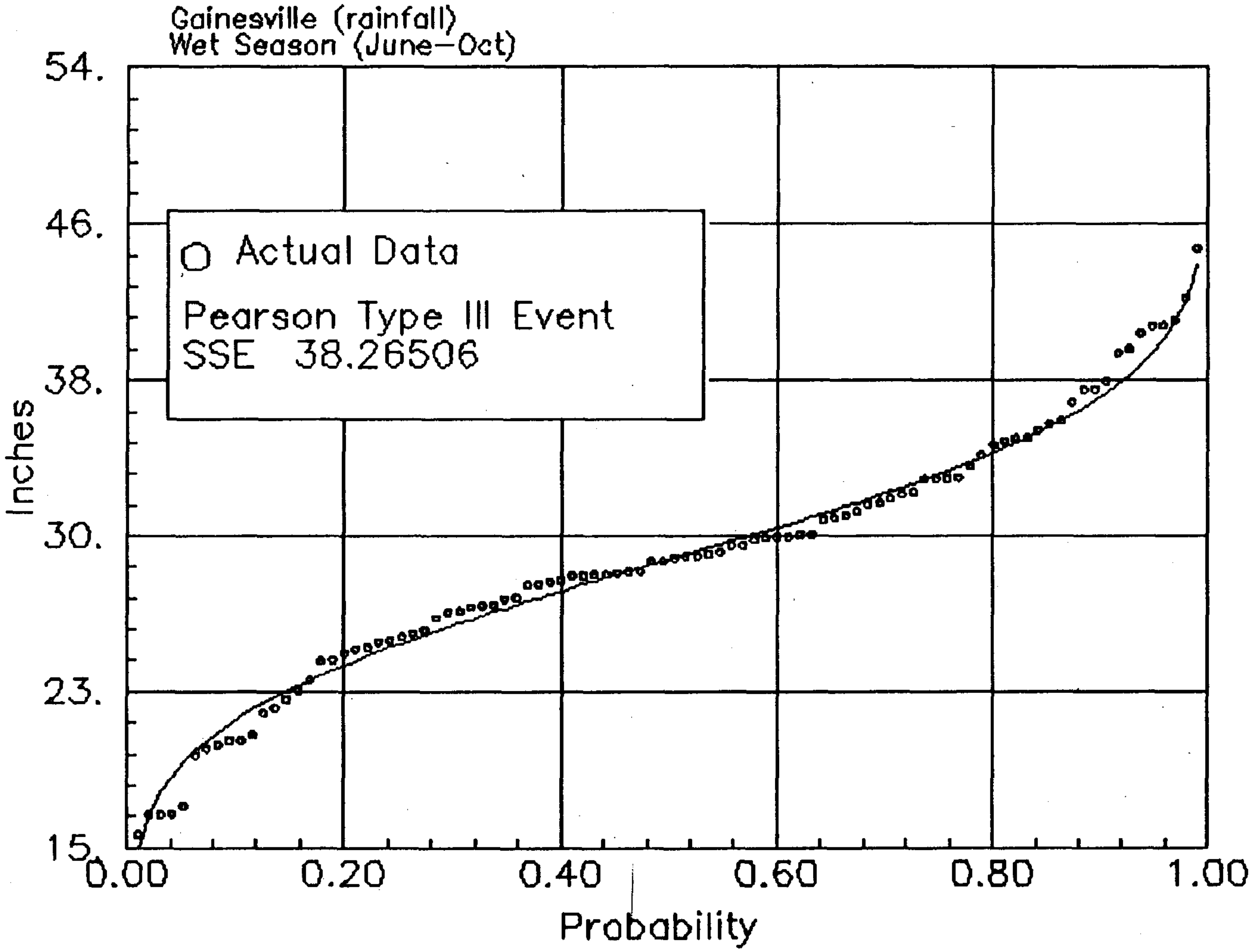


Figure C.2.5 Gainesville, Wet Season rainfall distribution for the years of (1897–1990)

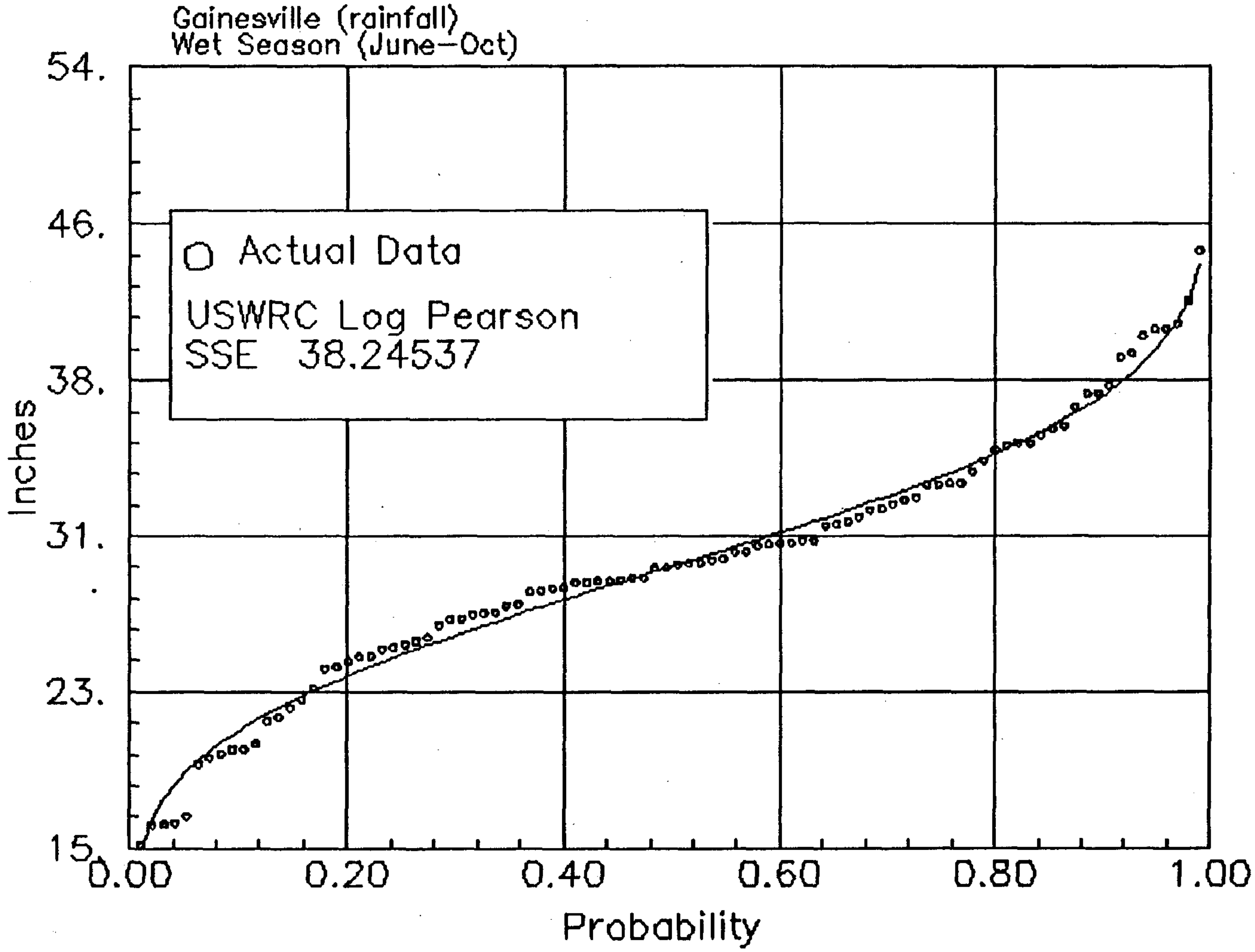


Figure C.2.6 Gainesville, Wet Season rainfall distribution for the years of (1897–1990)

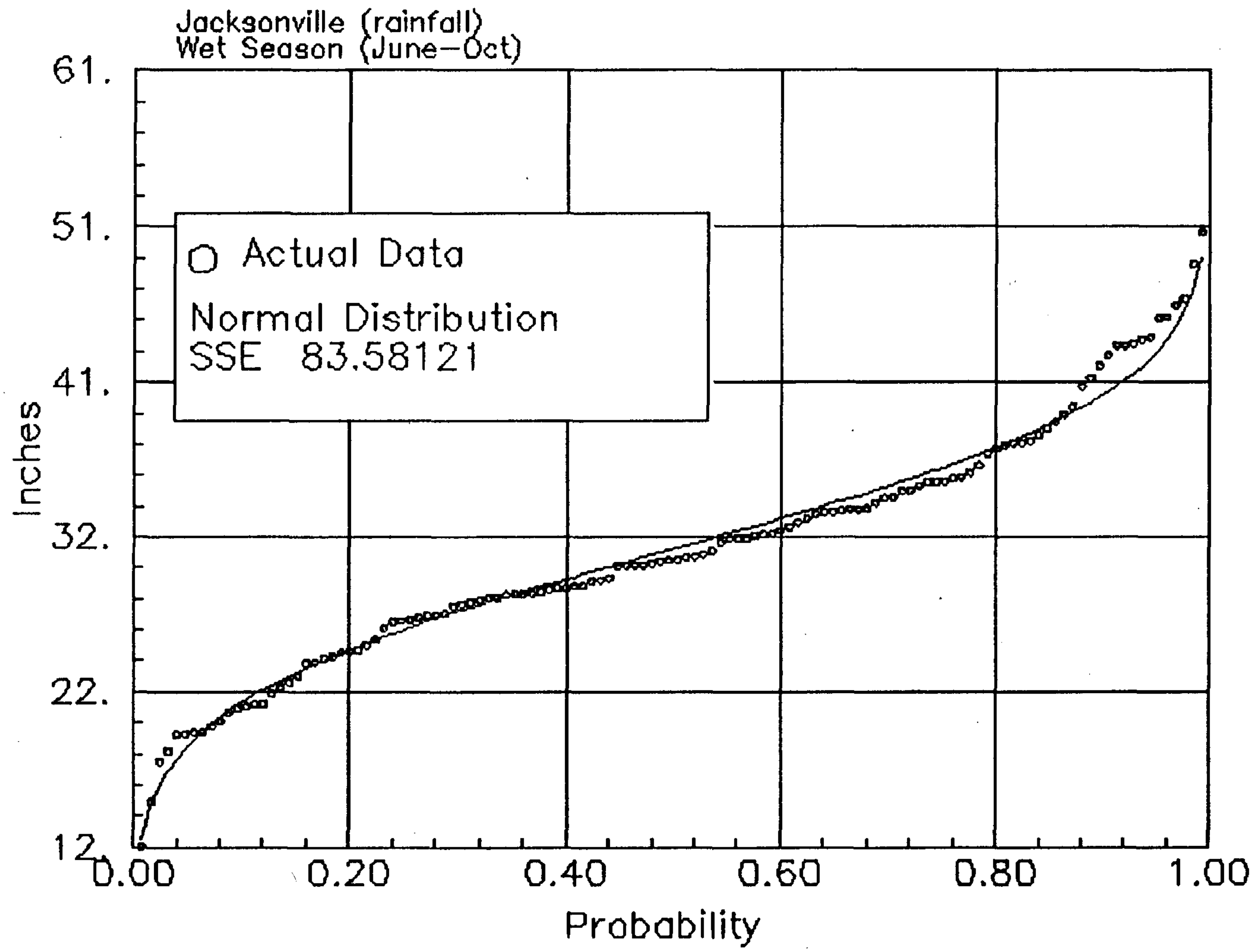


Figure C.3.1 Jacksonville, Wet Season rainfall distribution for the years of (1867–1990)

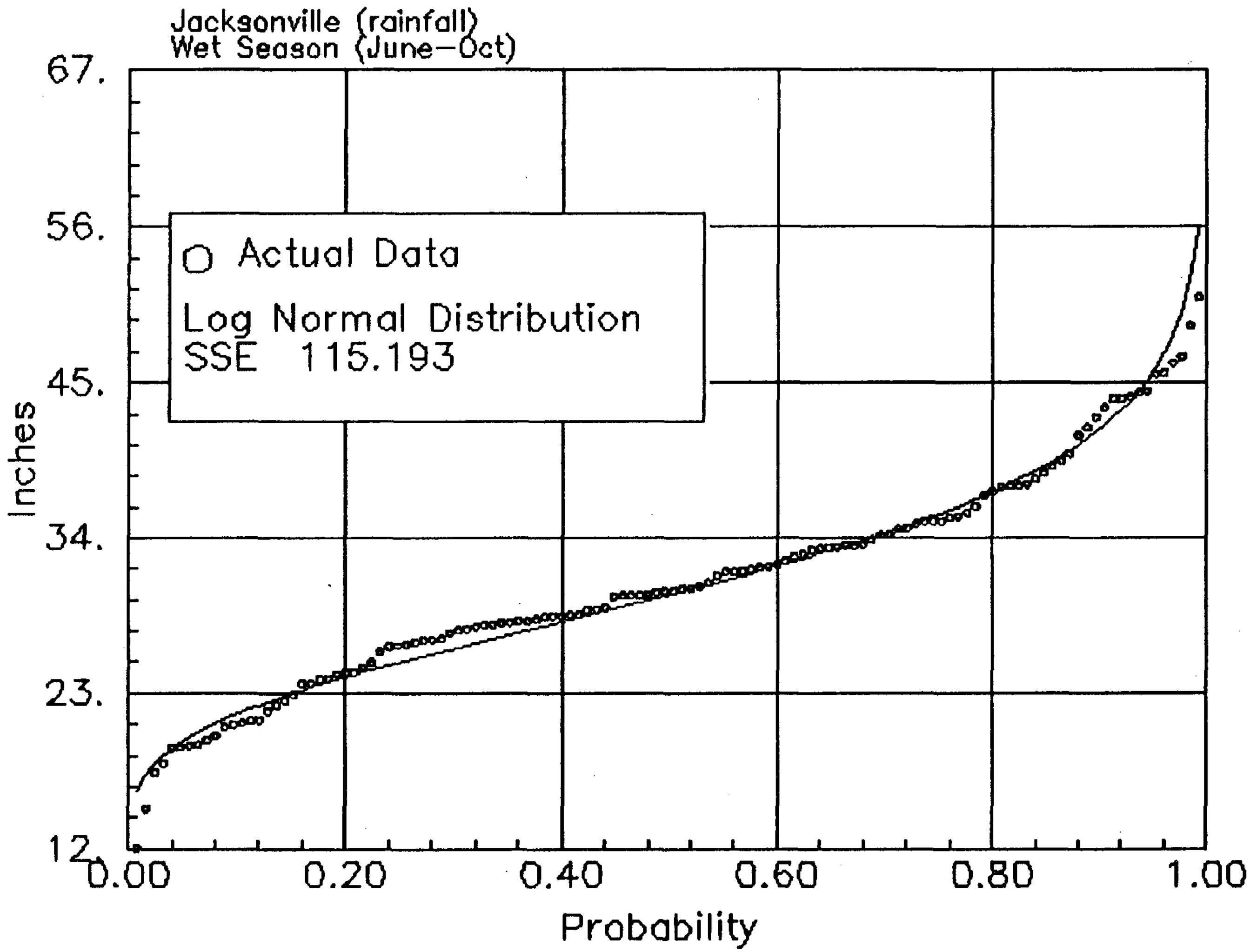


Figure C.3.2 Jacksonville, Wet Season rainfall distribution for the years of (1867–1990)

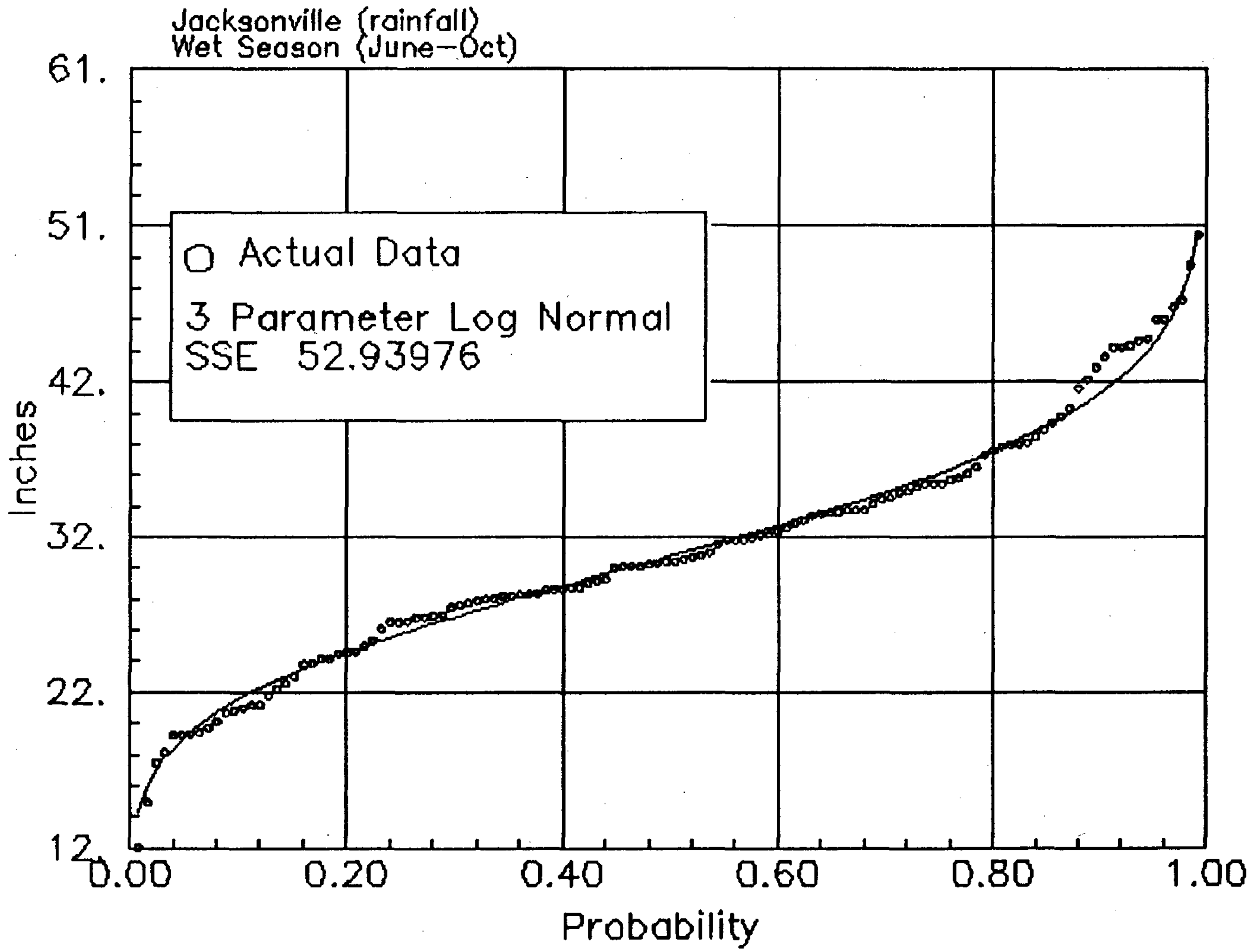


Figure C.3.3 Jacksonville, Wet Season rainfall distribution for the years of (1867-1990)

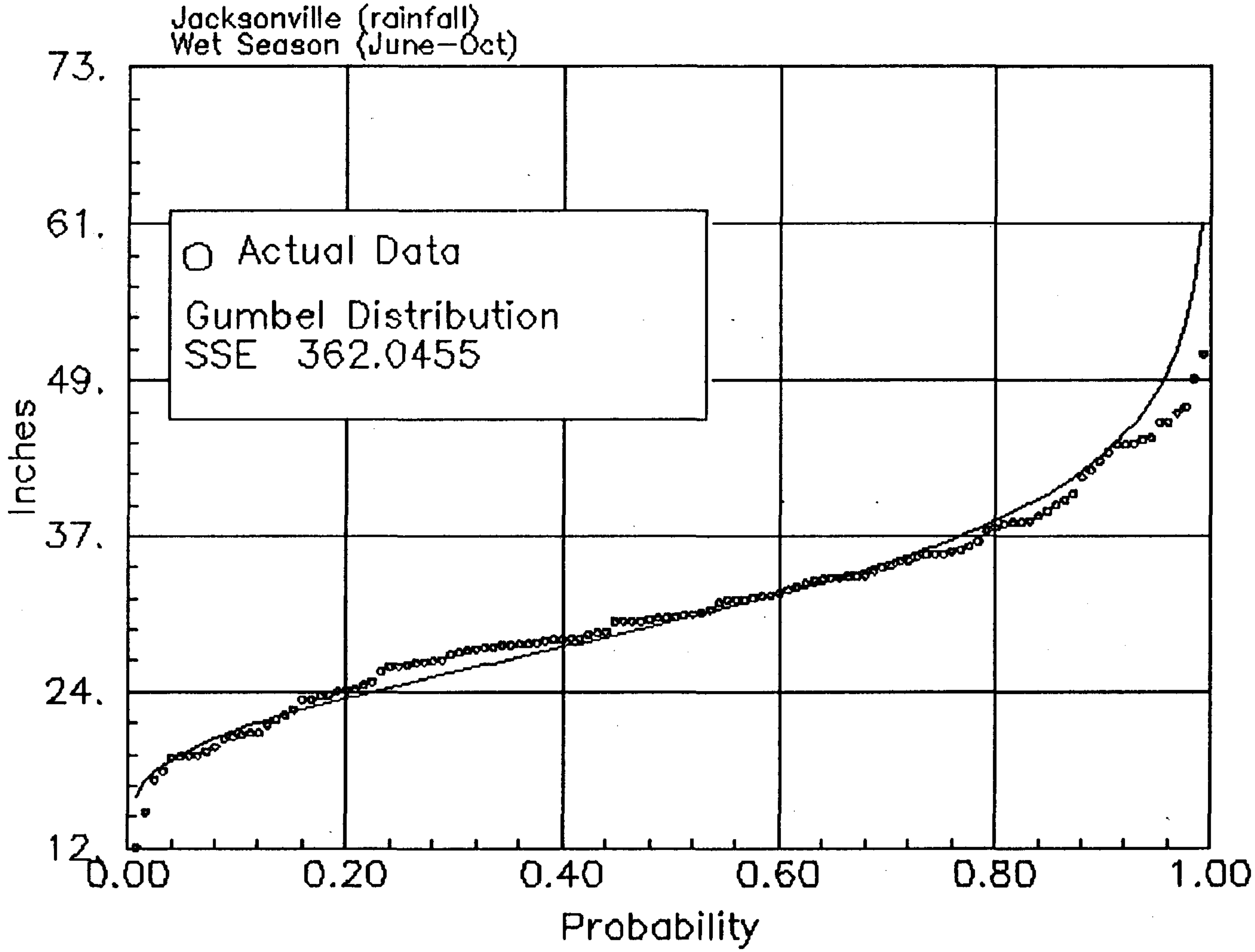


Figure C.3.4 Jacksonville, Wet Season rainfall distribution for the years of (1867–1990)

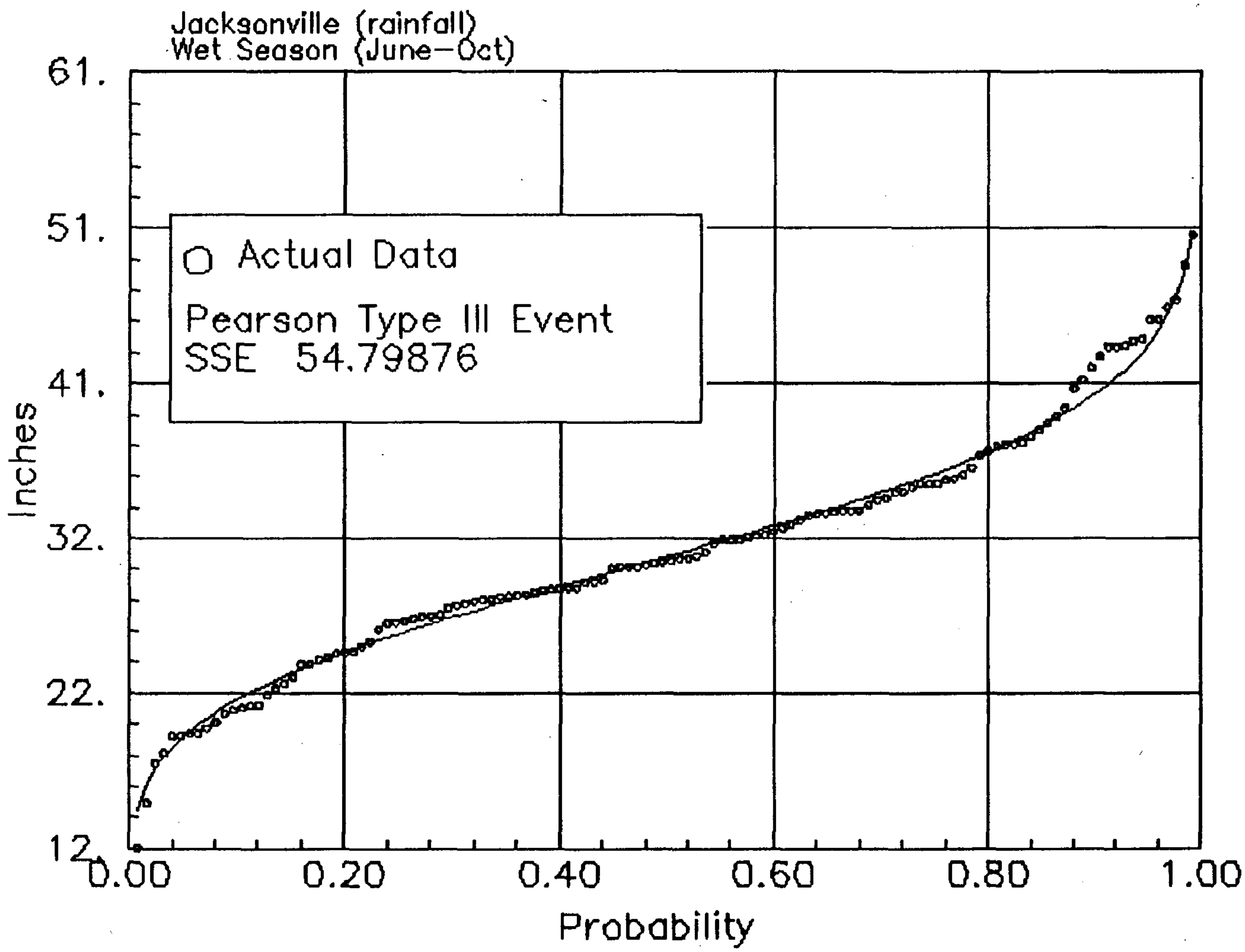


Figure C.3.5 Jacksonville, Wet Season rainfall distribution for the years of (1867–1990)

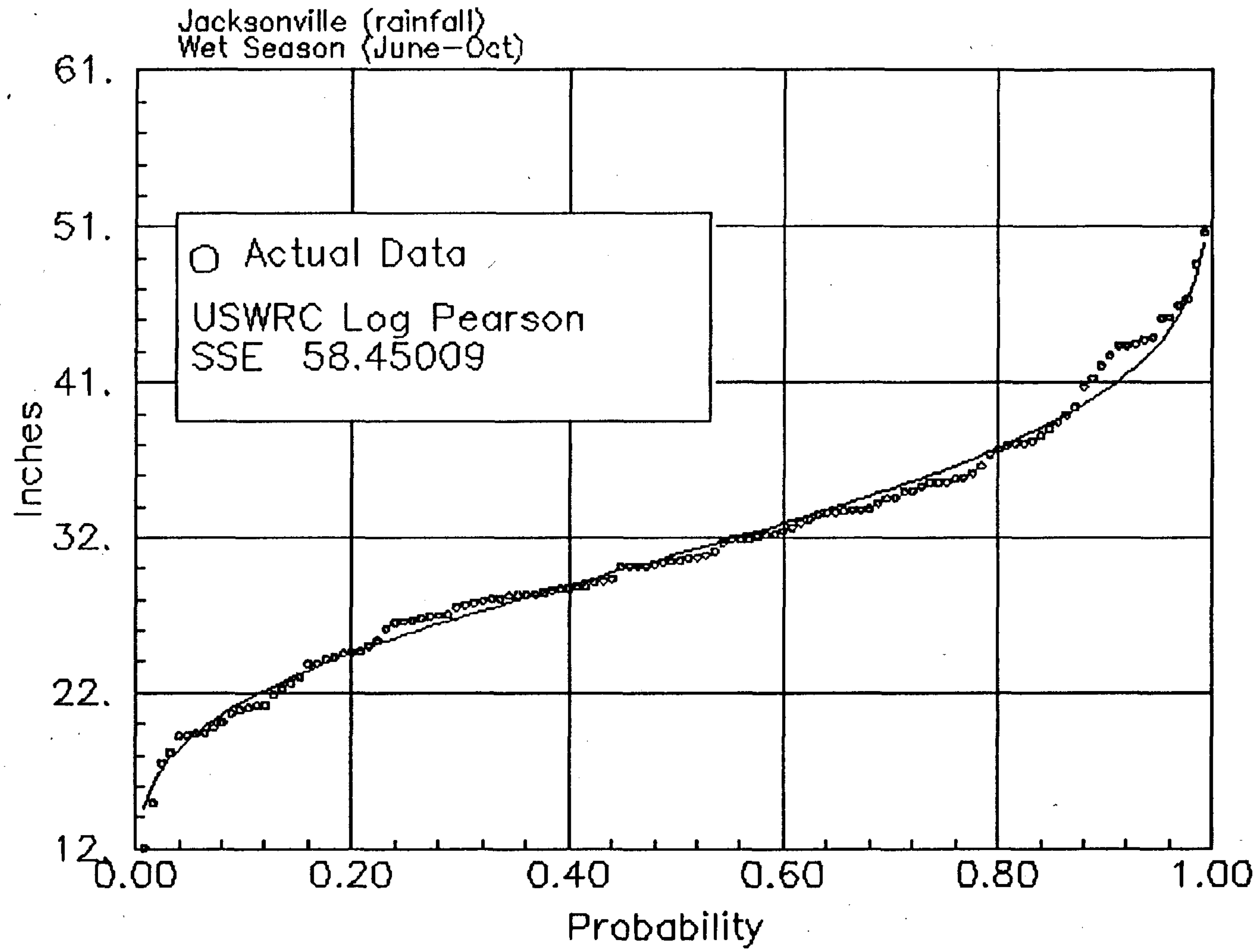


Figure C.3.6 Jacksonville, Wet Season rainfall distribution for the years of (1867–1990)

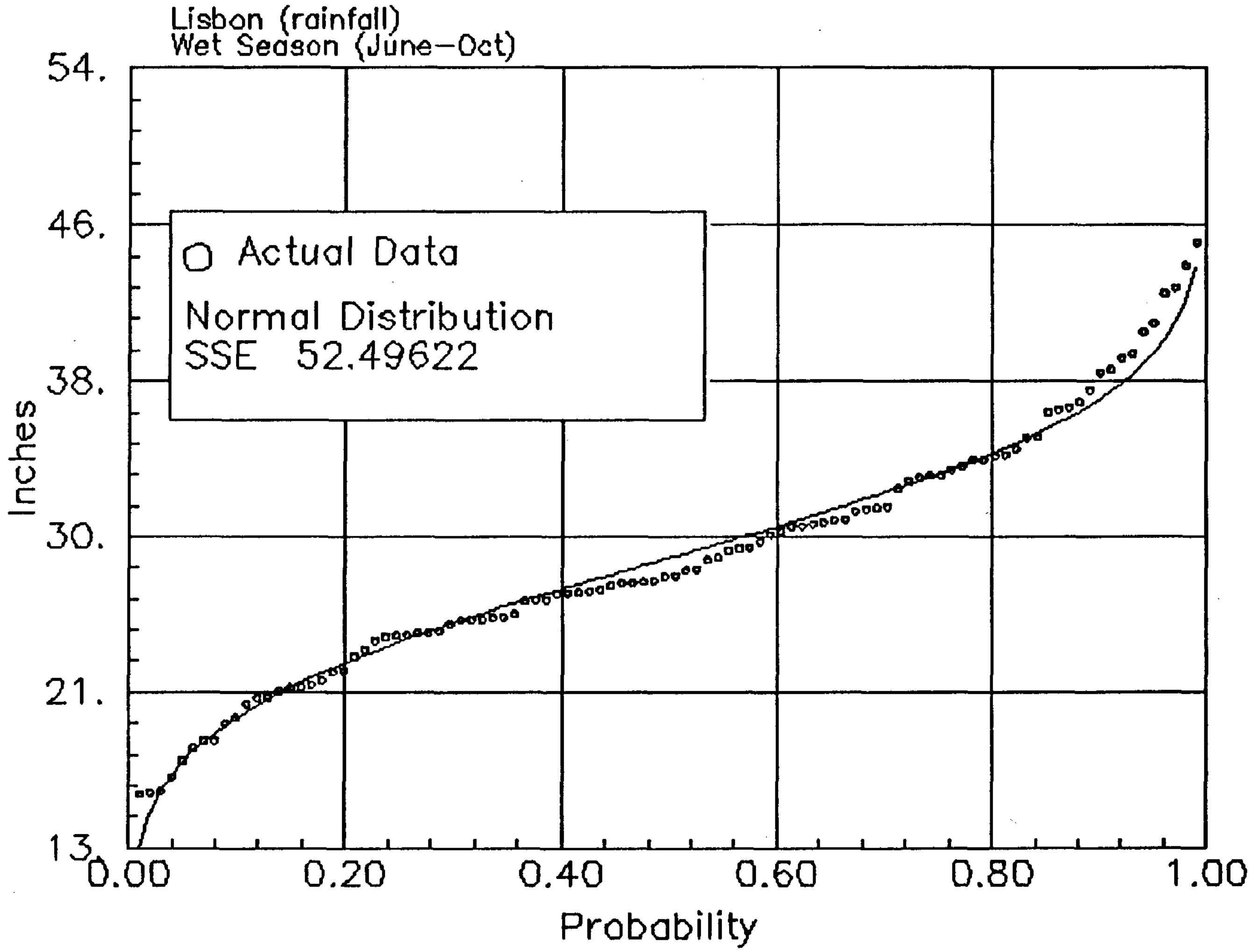


Figure C.4.1 Lisbon, Wet Season rainfall distribution for the years of (1891—1990)

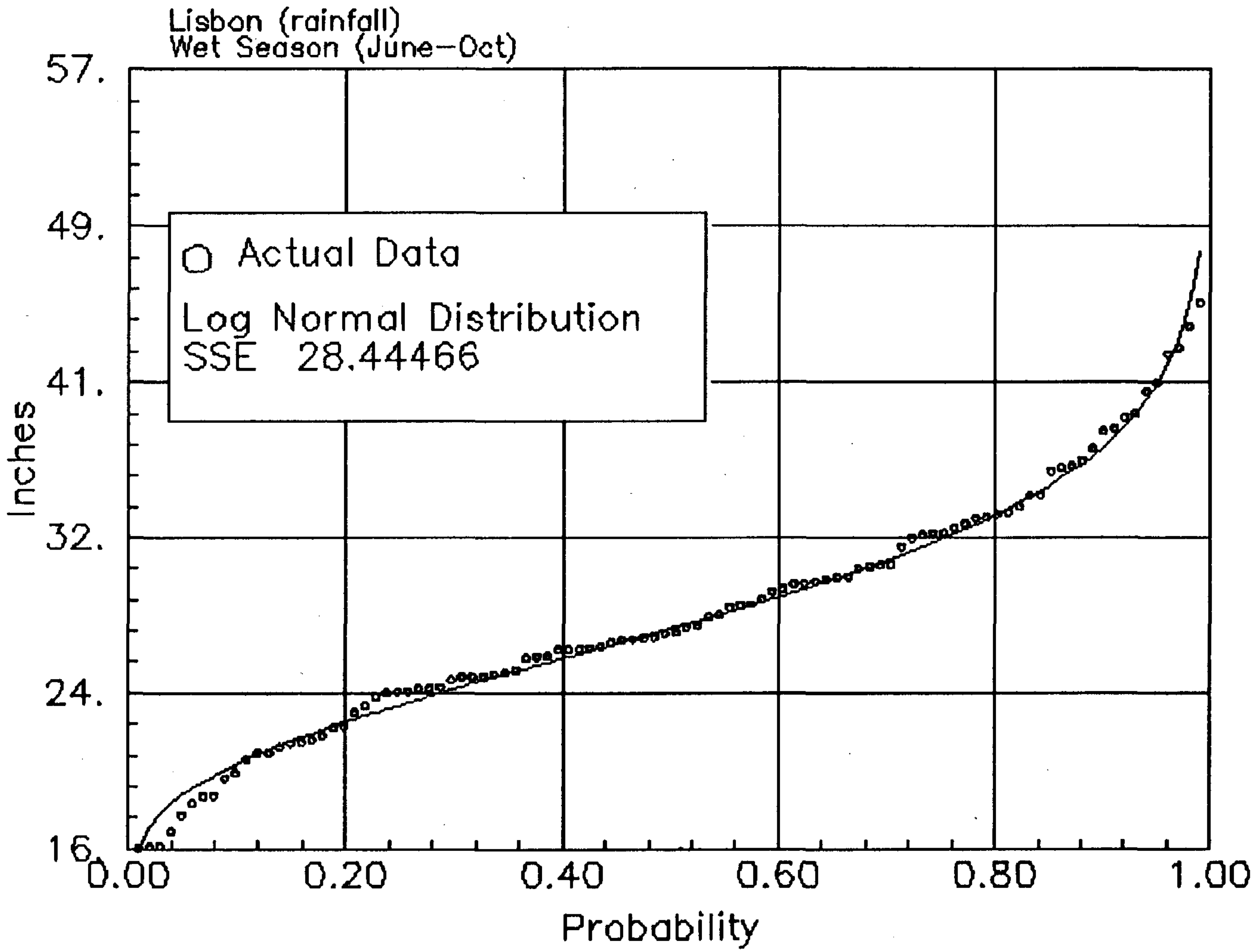


Figure C.4.2 Lisbon, Wet Season rainfall distribution for the years of (1891—1990)

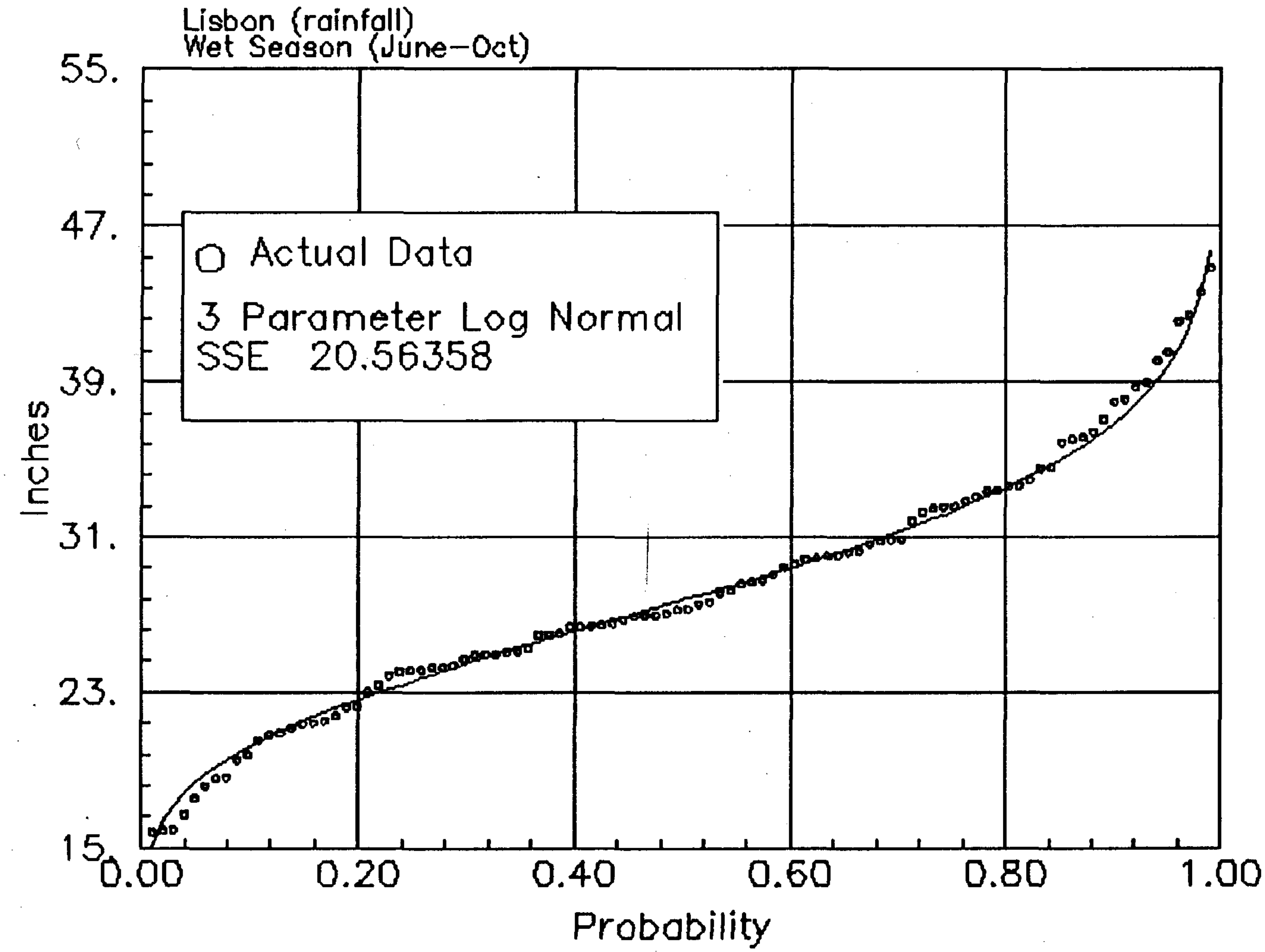


Figure C.4.3 Lisbon, Wet Season rainfall distribution for the years of (1891–1990)

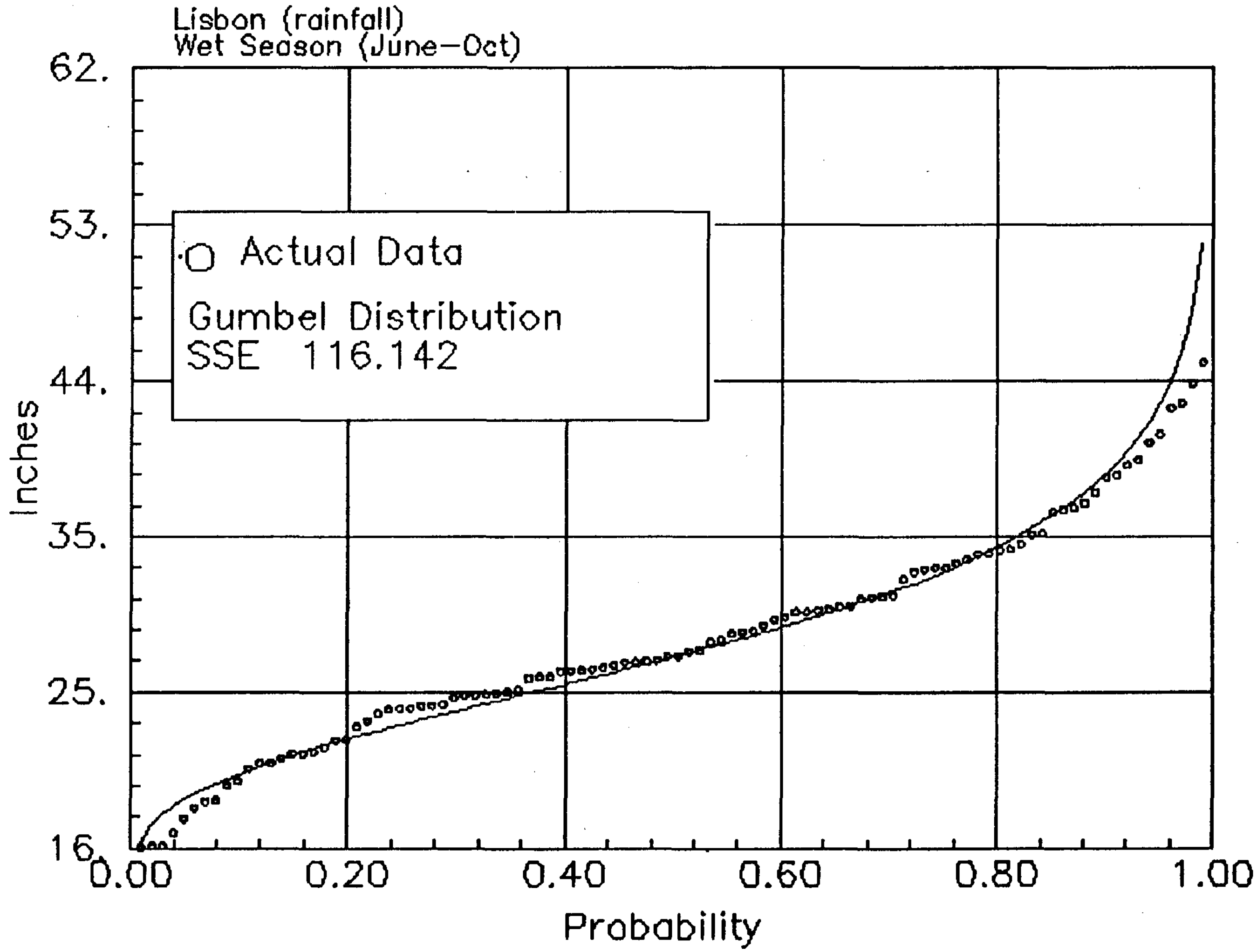


Figure C.4.4 Lisbon, Wet Season rainfall distribution for the years of (1891–1990)

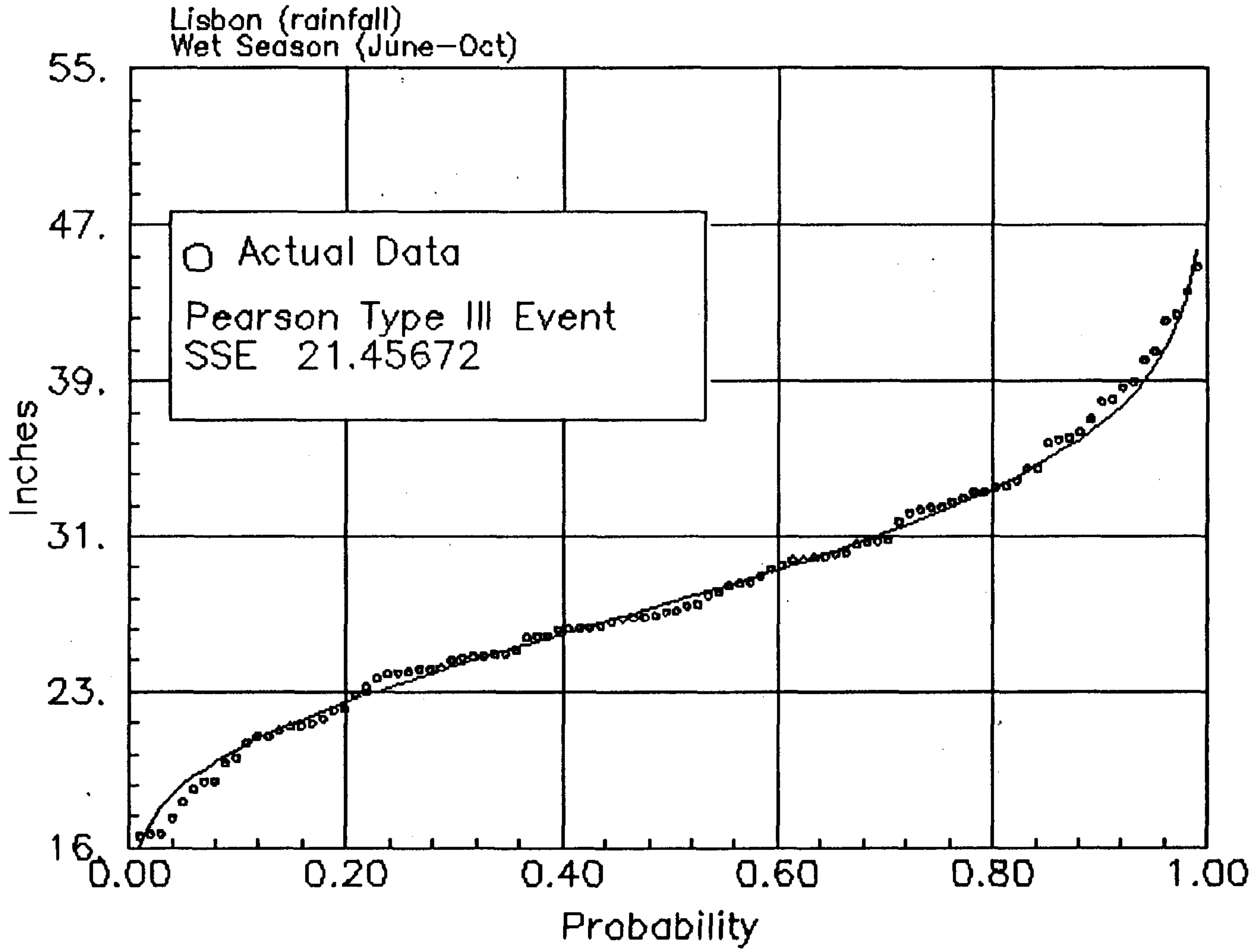


Figure C.4.5 Lisbon, Wet Season rainfall distribution for the years of (1891–1990)

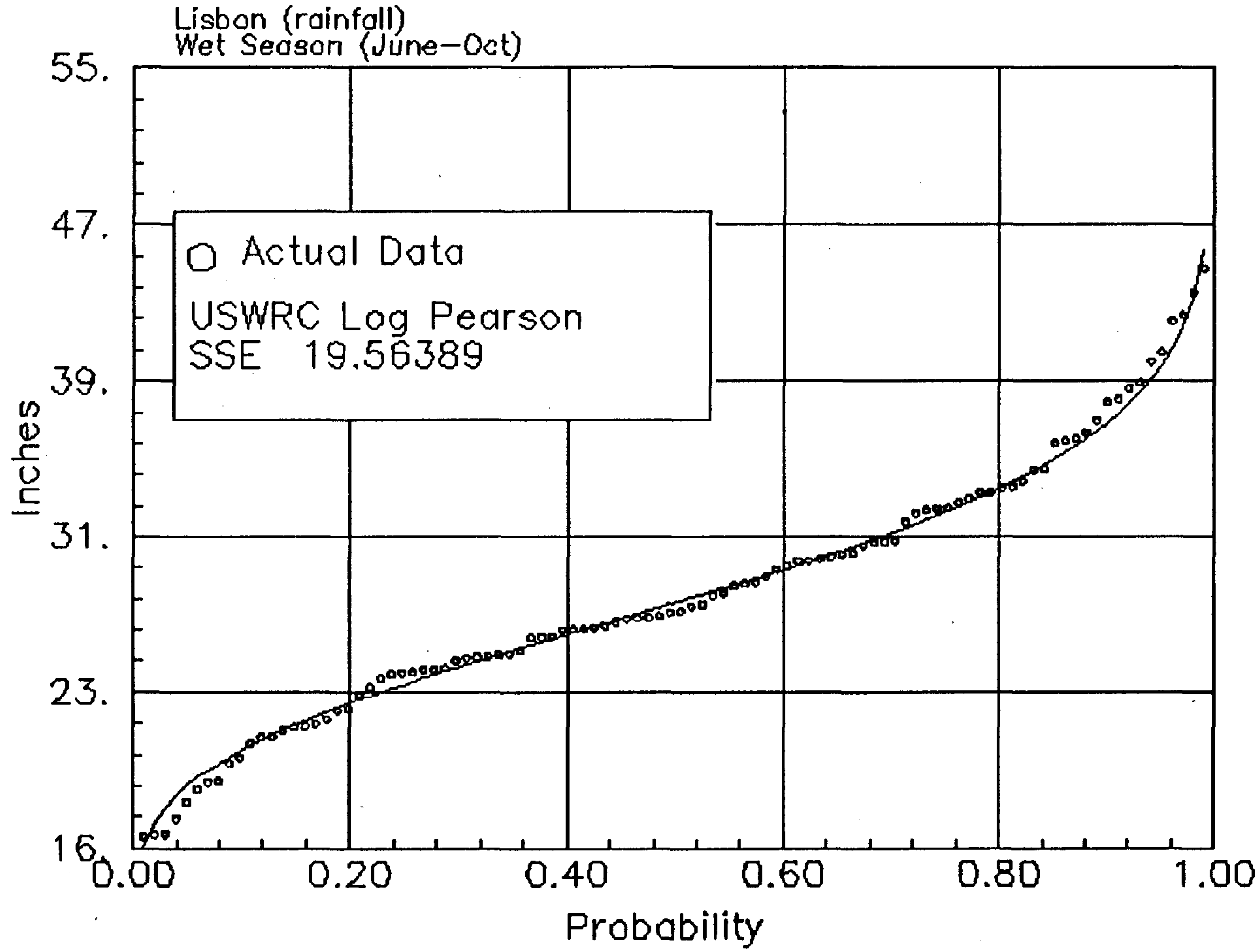


Figure C.4.6 Lisbon, Wet Season rainfall distribution for the years of (1891-1990)

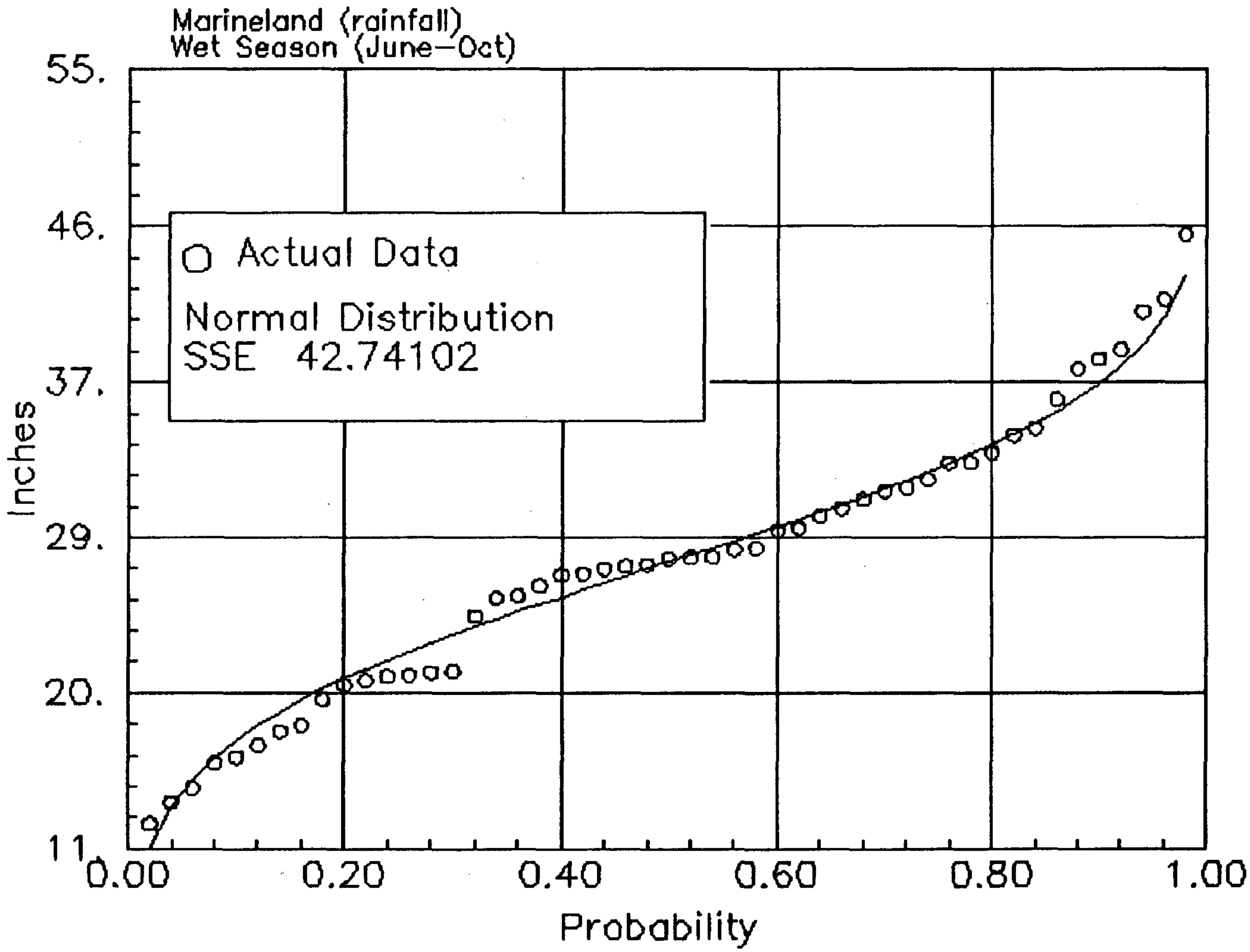


Figure C.5.1 Marineland, Wet Season rainfall distribution for the years of (1942–1990)

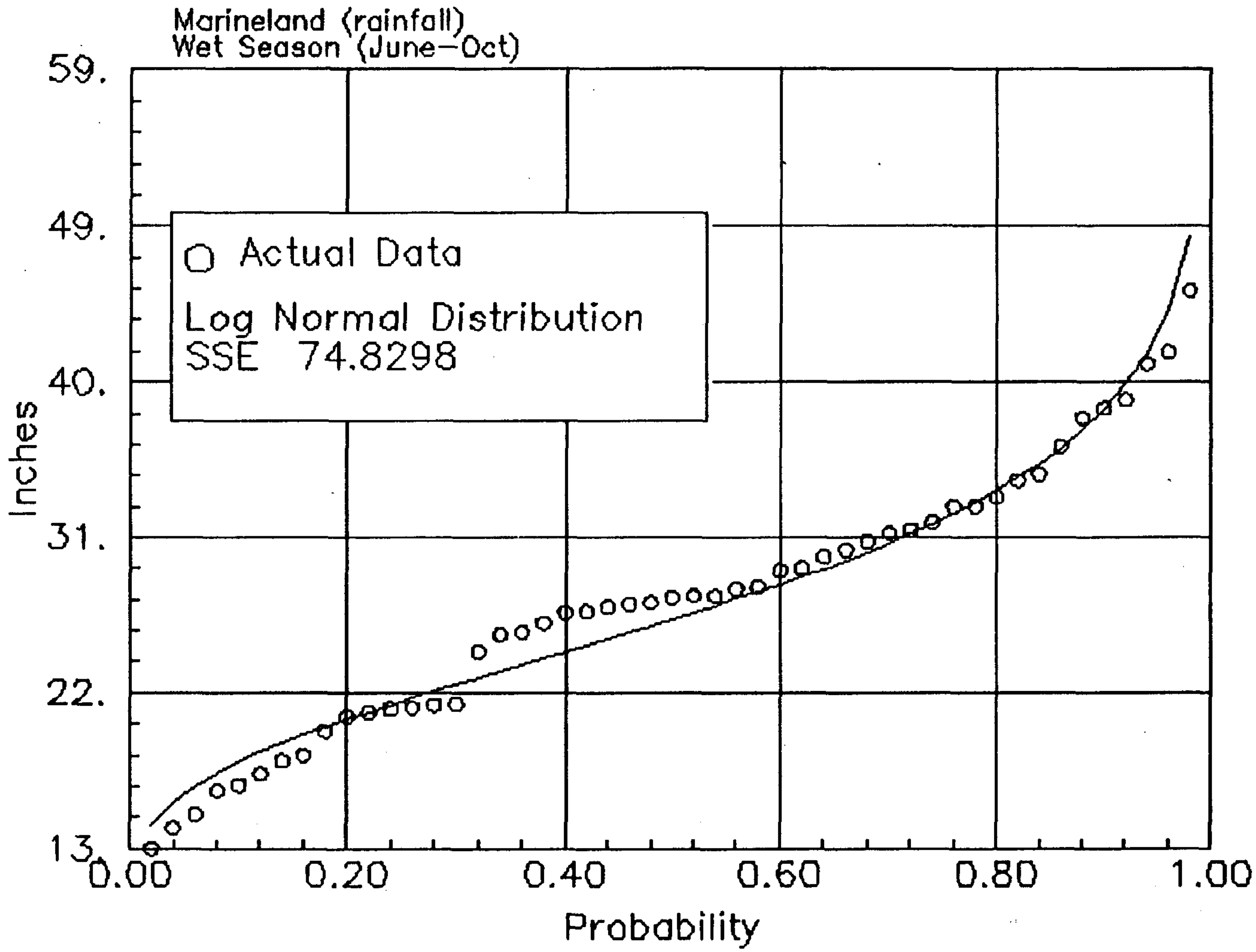


Figure C.5.2 Marineland, Wet Season rainfall distribution for the years of (1942–1990)

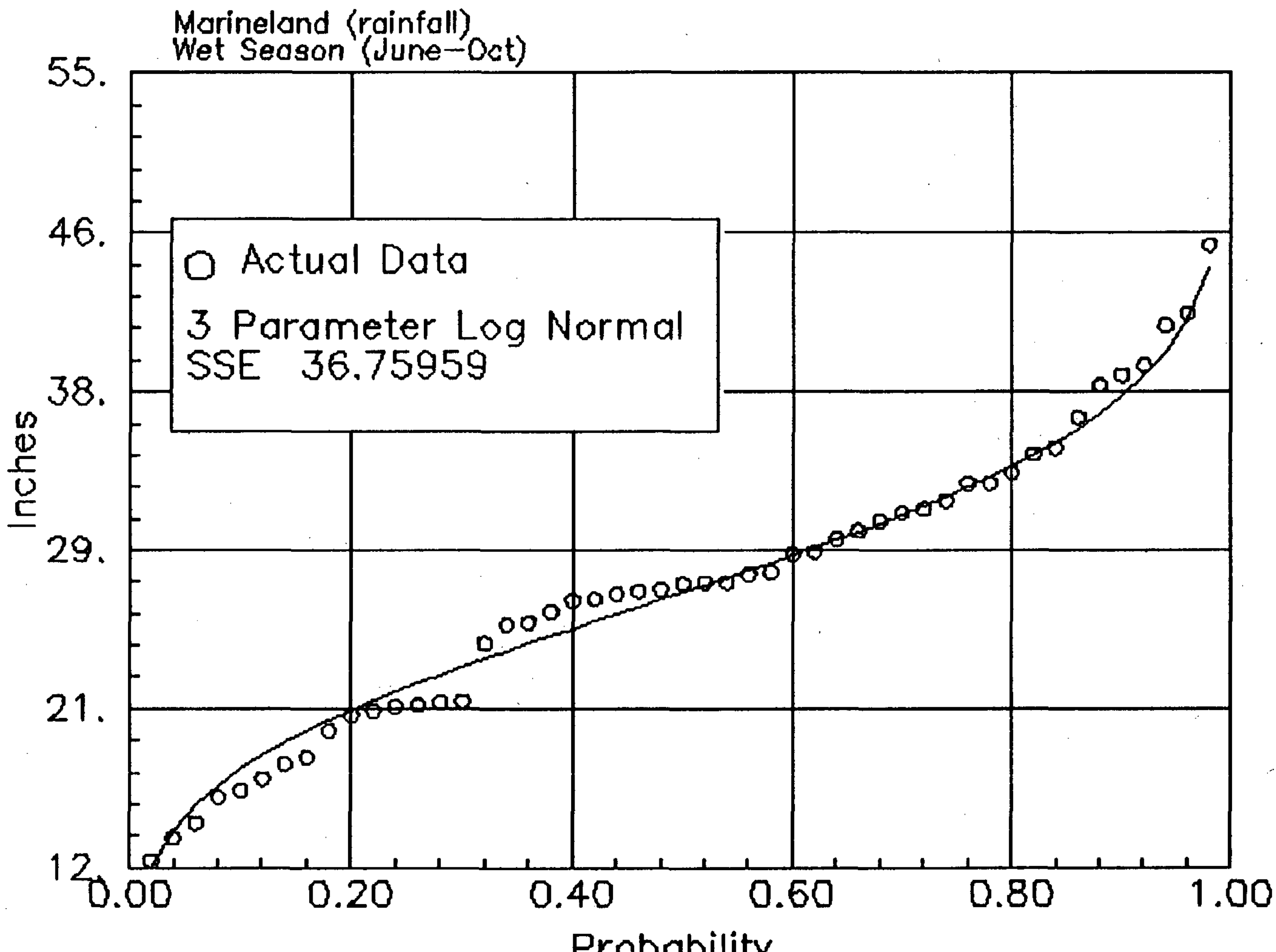


Figure C.5.3 Marineland, Wet Season rainfall distribution for the years of (1942–1990)

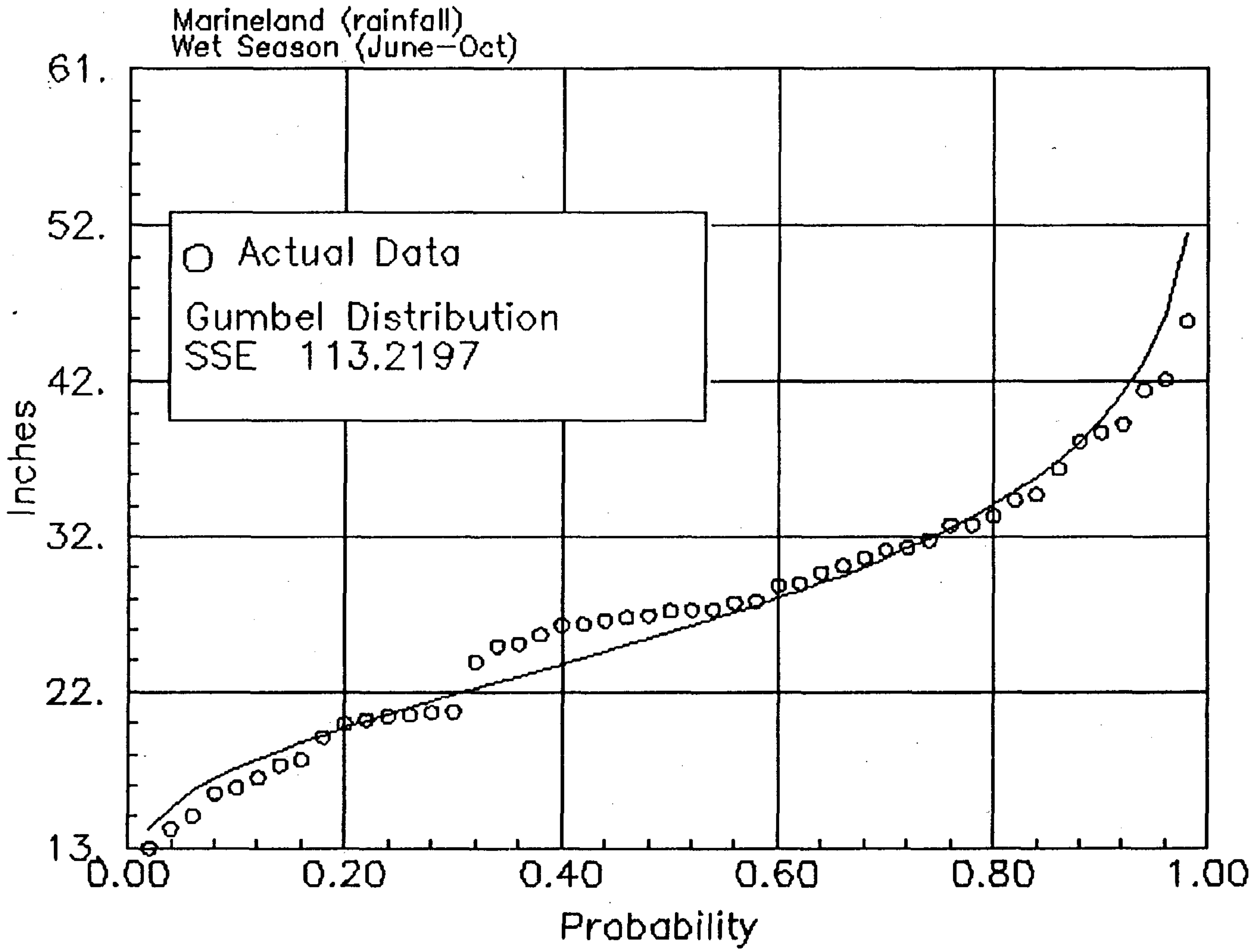


Figure C.5.4 Marineland, Wet Season rainfall distribution for the years of (1942–1990)

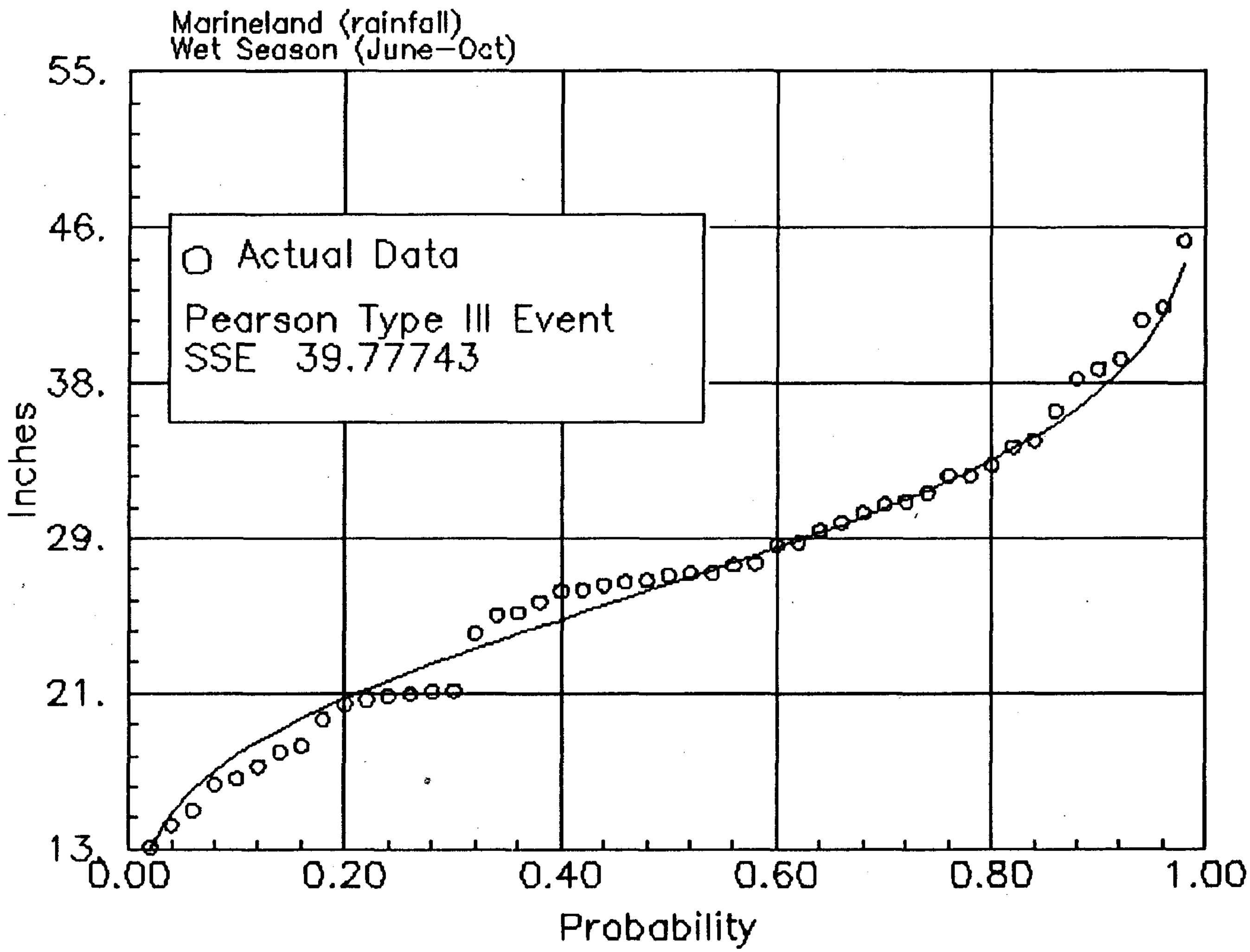


Figure C.5.5 Marineland, Wet Season rainfall distribution for the years of (1942–1990)

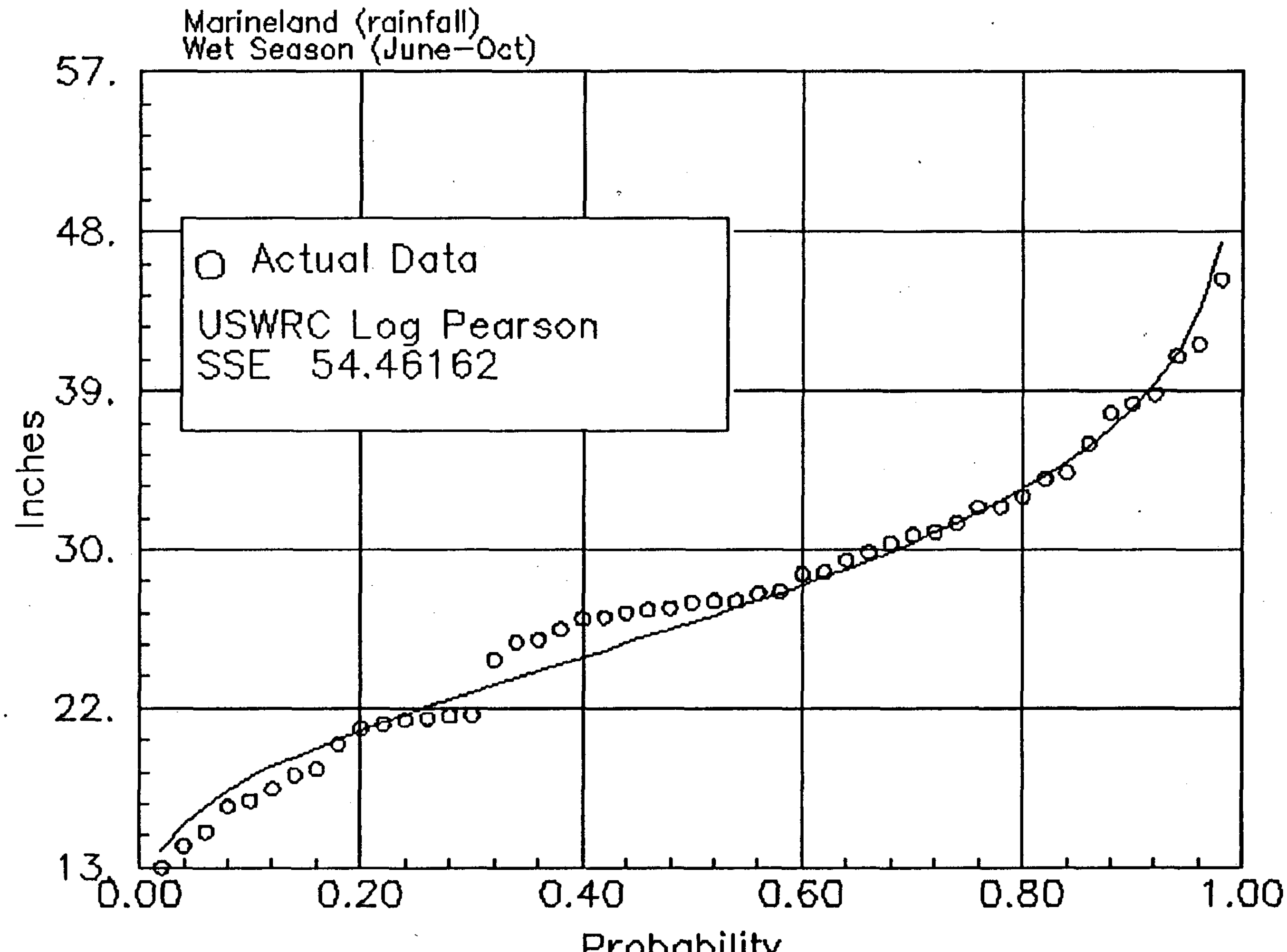


Figure C.5.6 Marineland, Wet Season rainfall distribution for the years of (1942-1990)

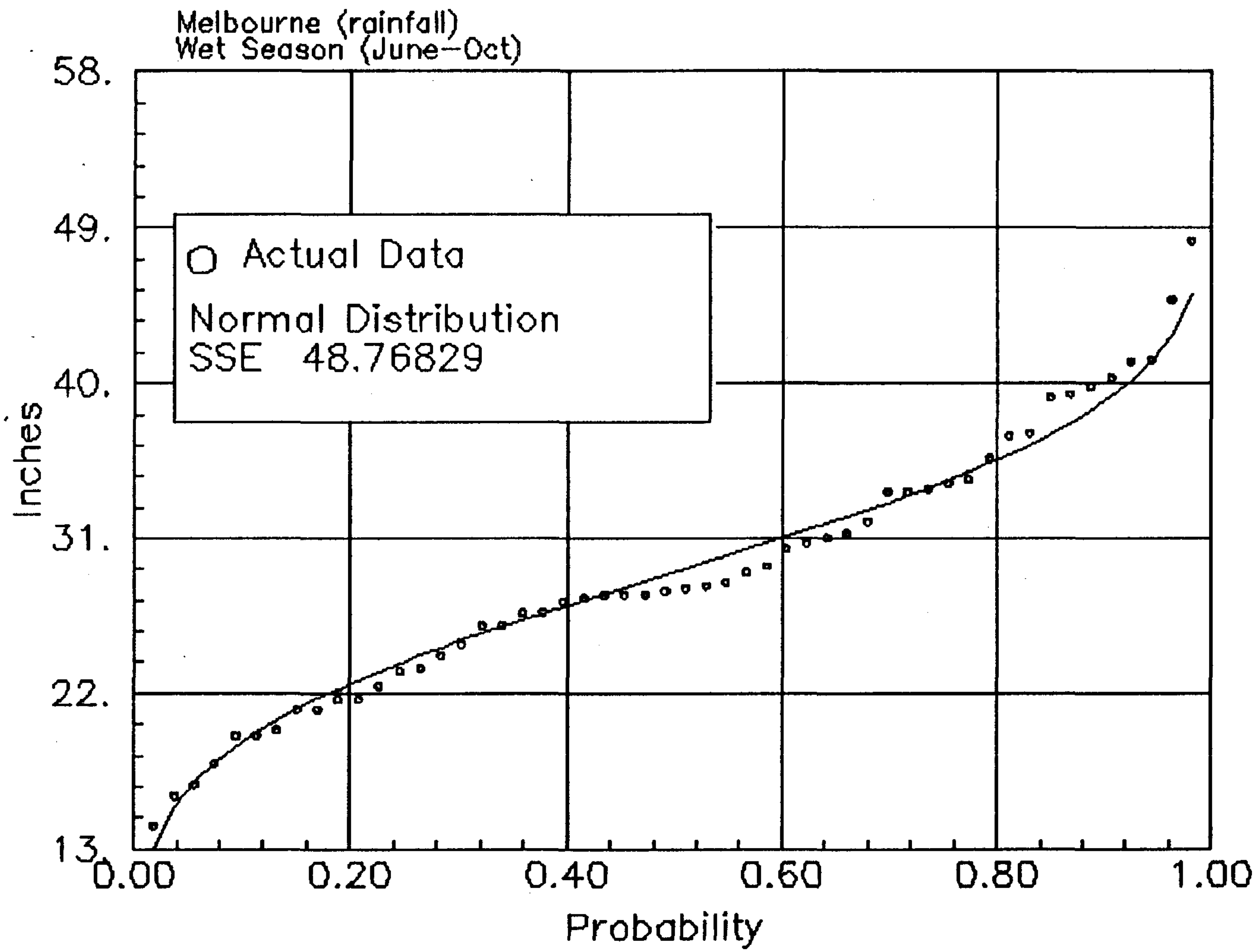


Figure C.6.1 Melbourne, Wet Season rainfall distribution for the years of (1939–1990)

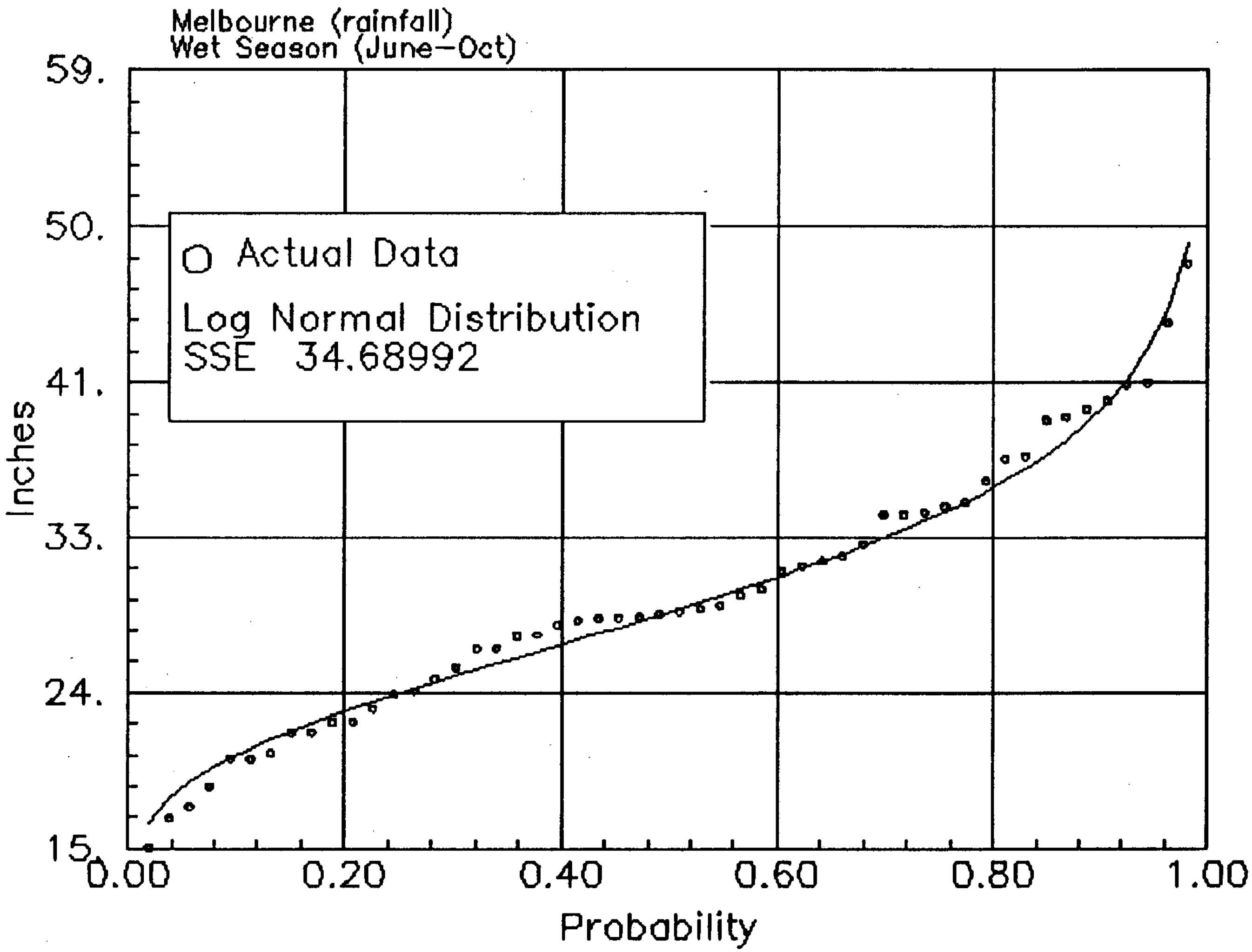


Figure C.6.2 Melbourne, Wet Season rainfall distribution for the years of (1939–1990)

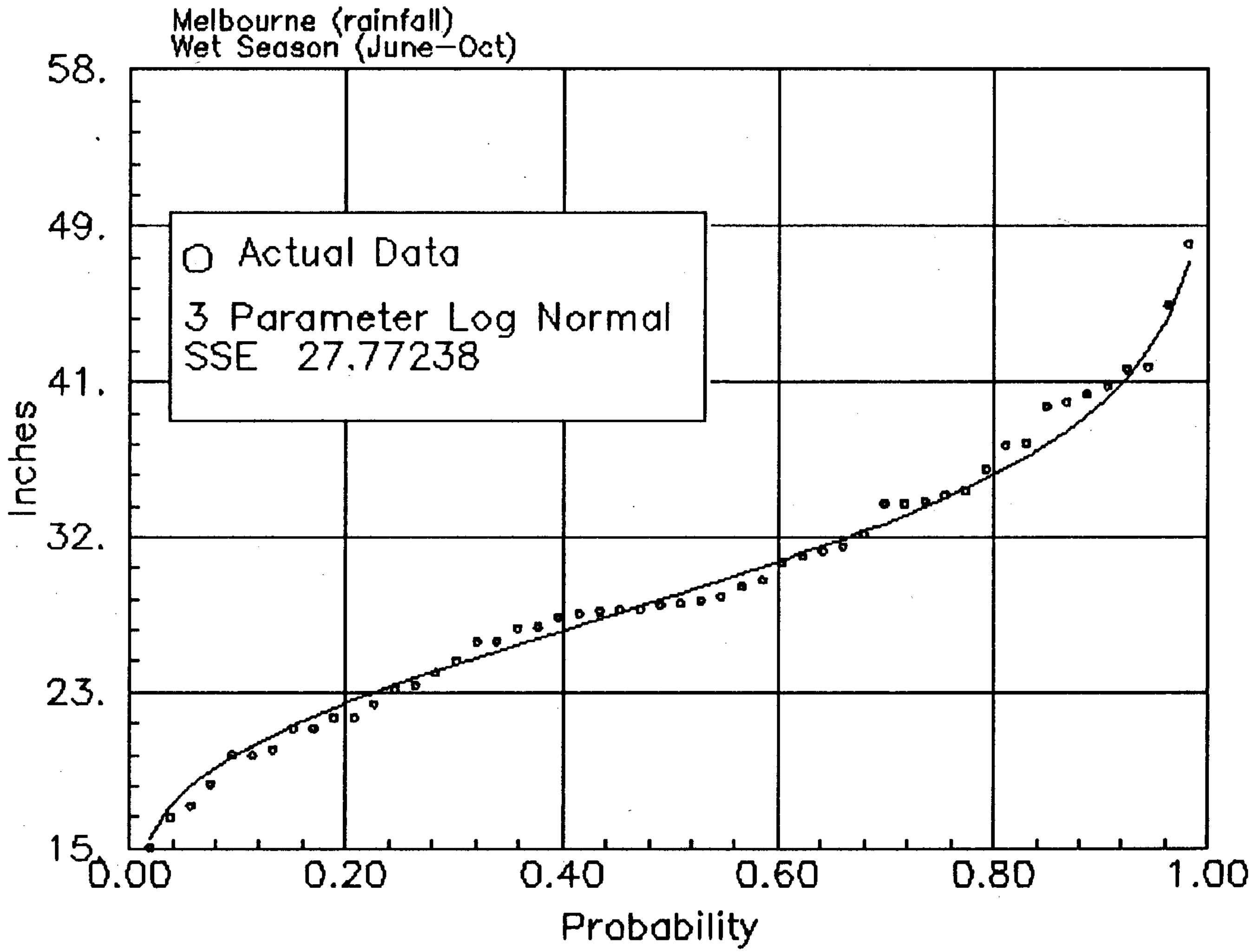


Figure C.6.3 Melbourne, Wet Season rainfall distribution for the years of (1939–1990)

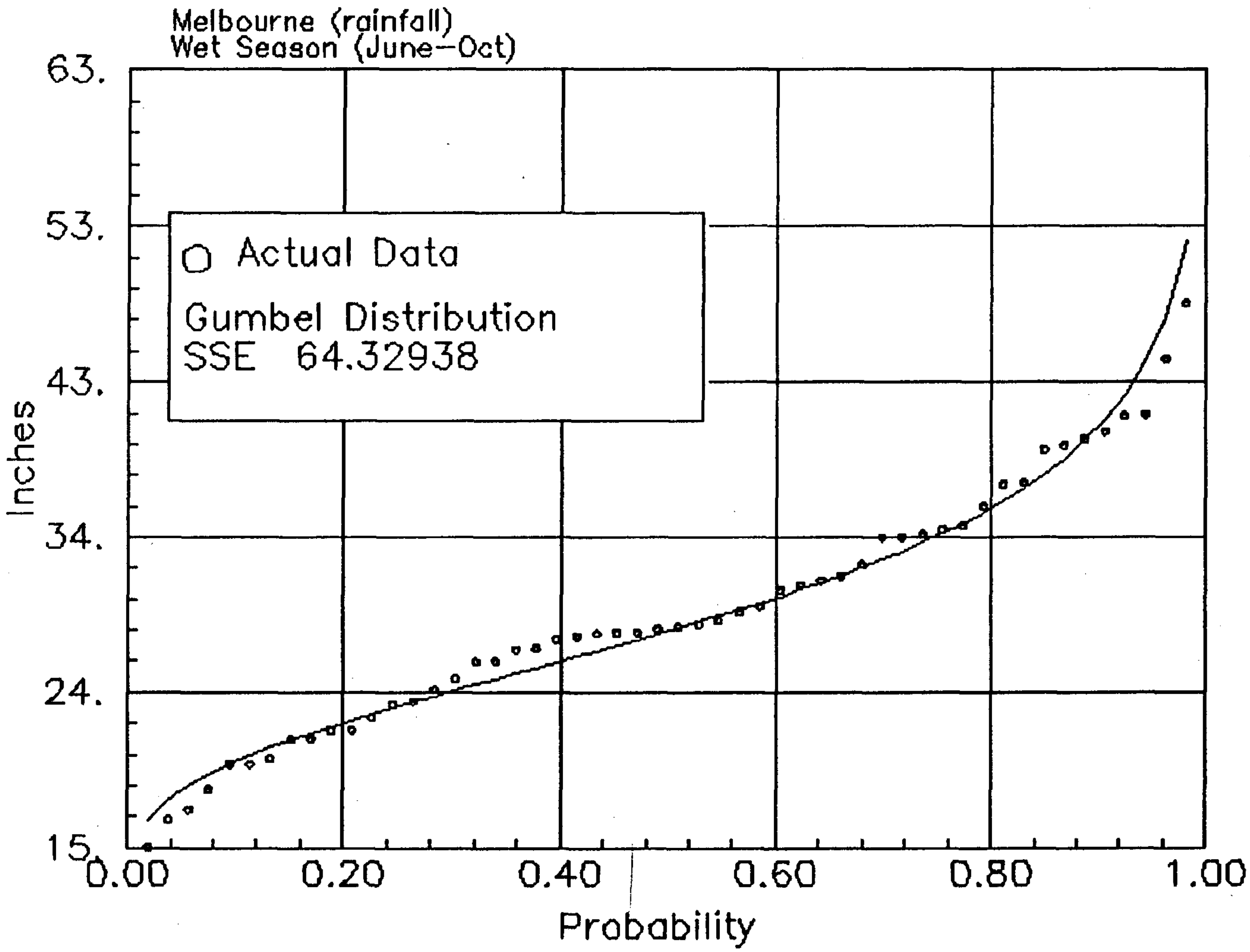


Figure C.6.4 Melbourne, Wet Season rainfall distribution for the years of (1939–1990)

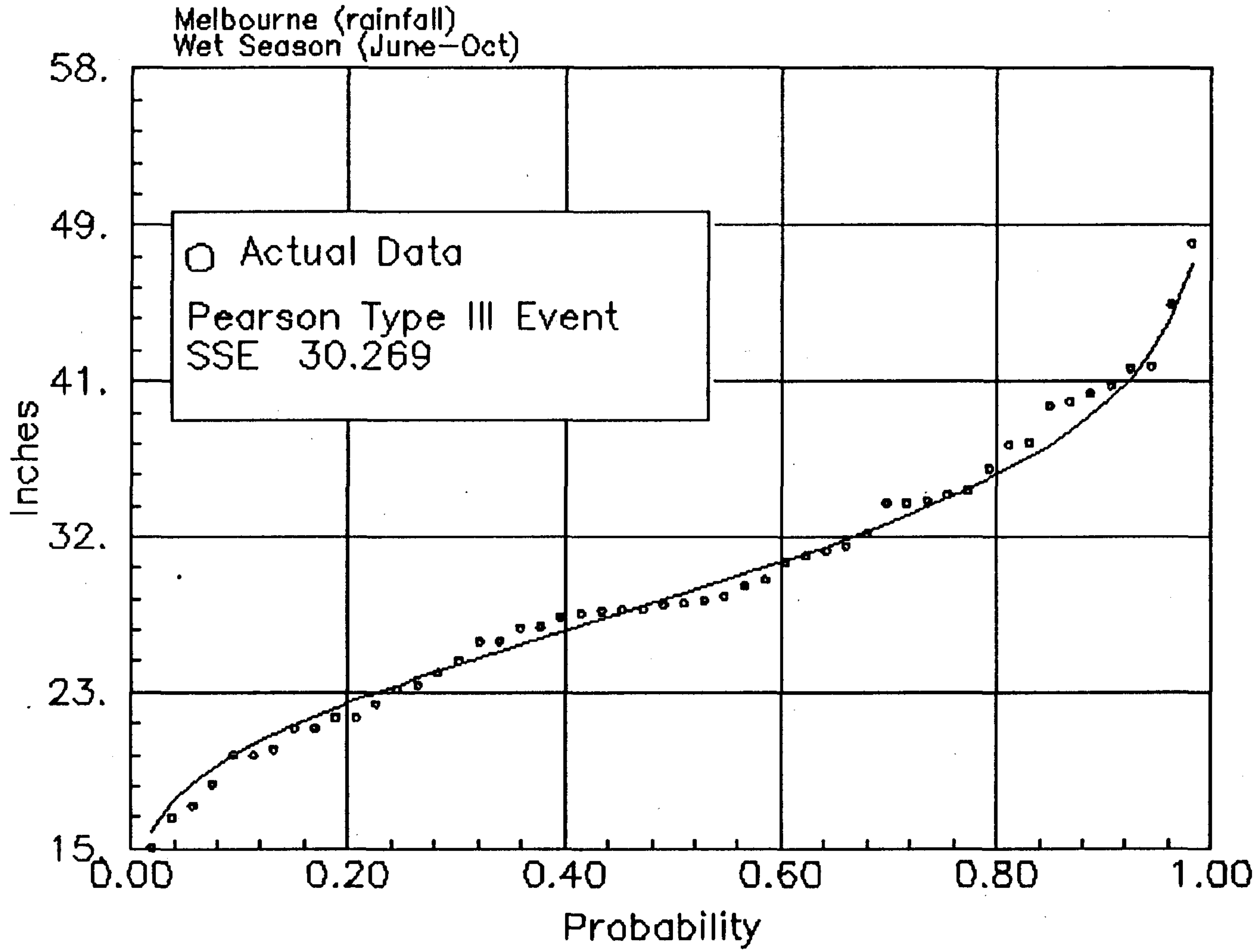


Figure C.6.5 Melbourne, Wet Season rainfall distribution for the years of (1939–1990)

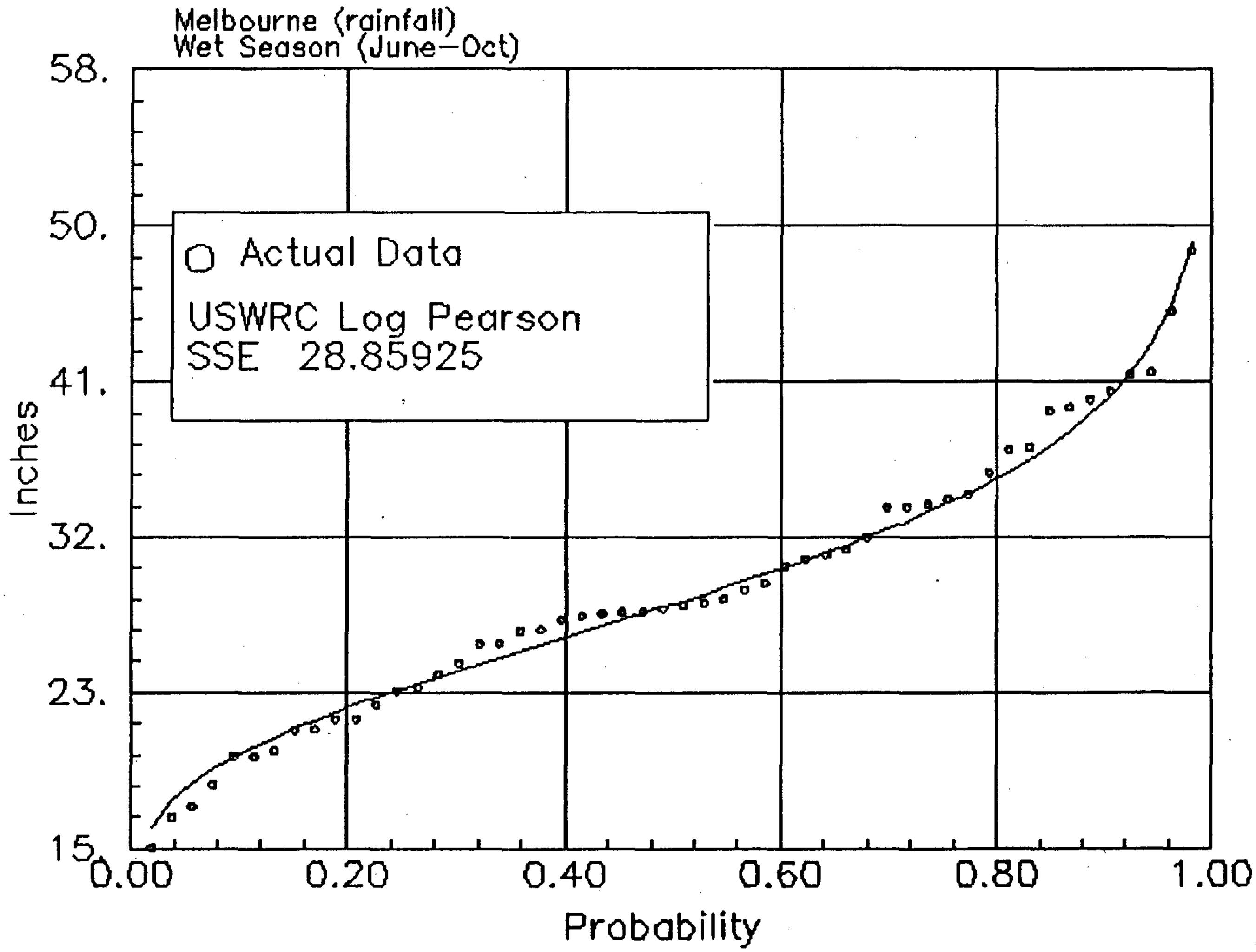


Figure C.6.6 Melbourne, Wet Season rainfall distribution for the years of (1939–1990)

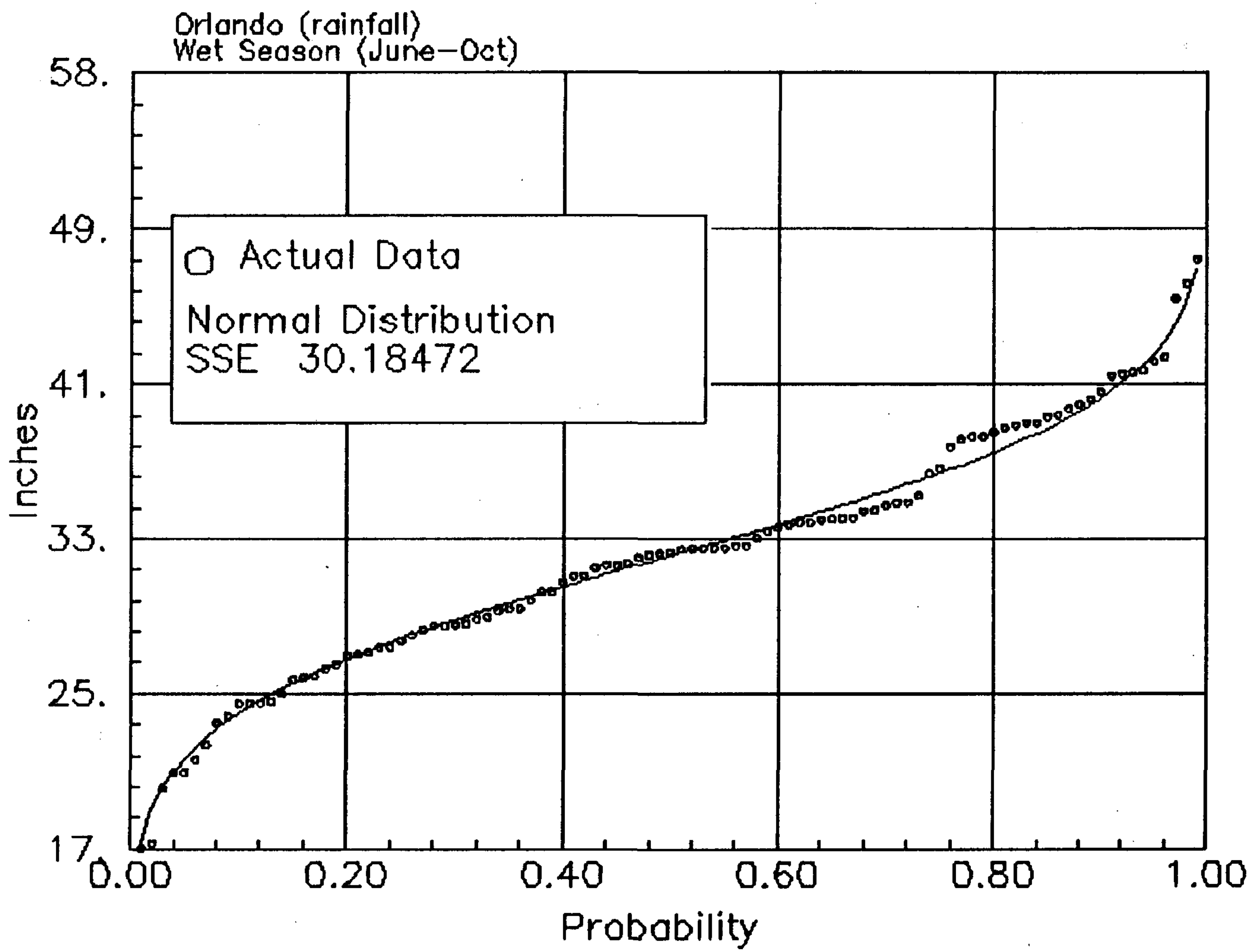


Figure C.7.1 Orlando, Wet Season rainfall distribution for the years of (1892–1990)

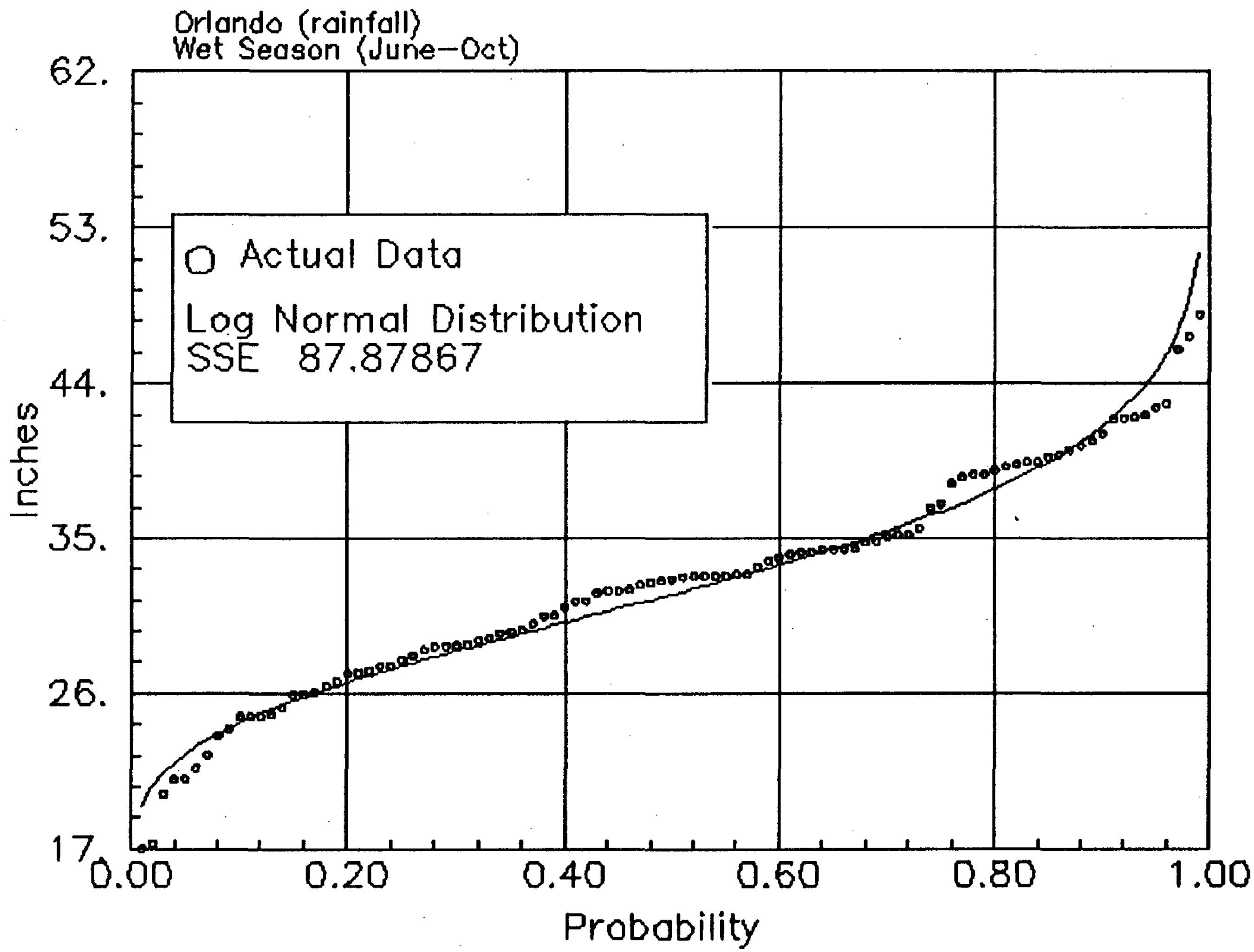


Figure C.7.2 Orlando, Wet Season rainfall distribution for the years of (1892–1990)

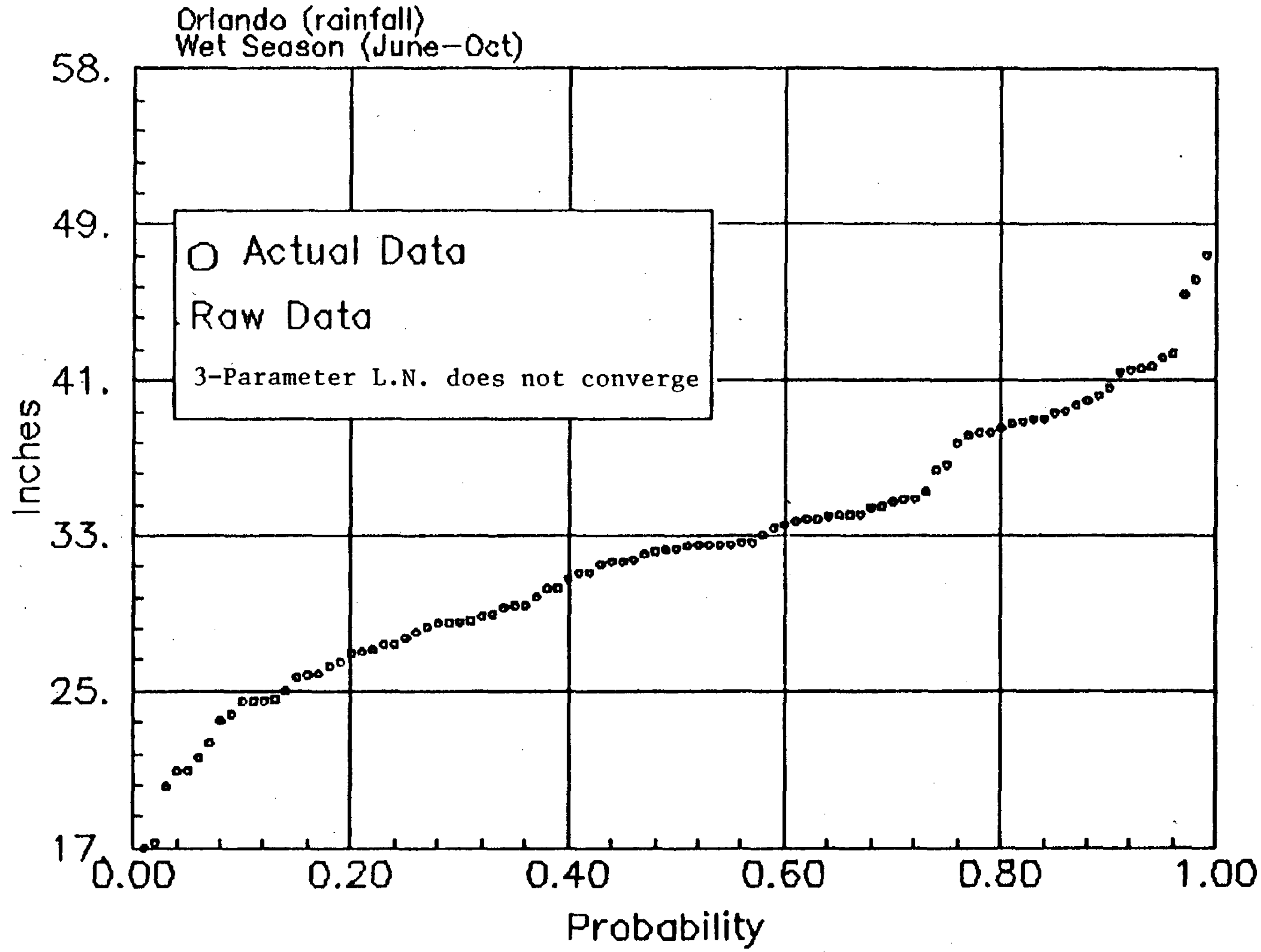


Figure C.7.3 Orlando, Wet Season rainfall distribution for the years of (1892–1990)

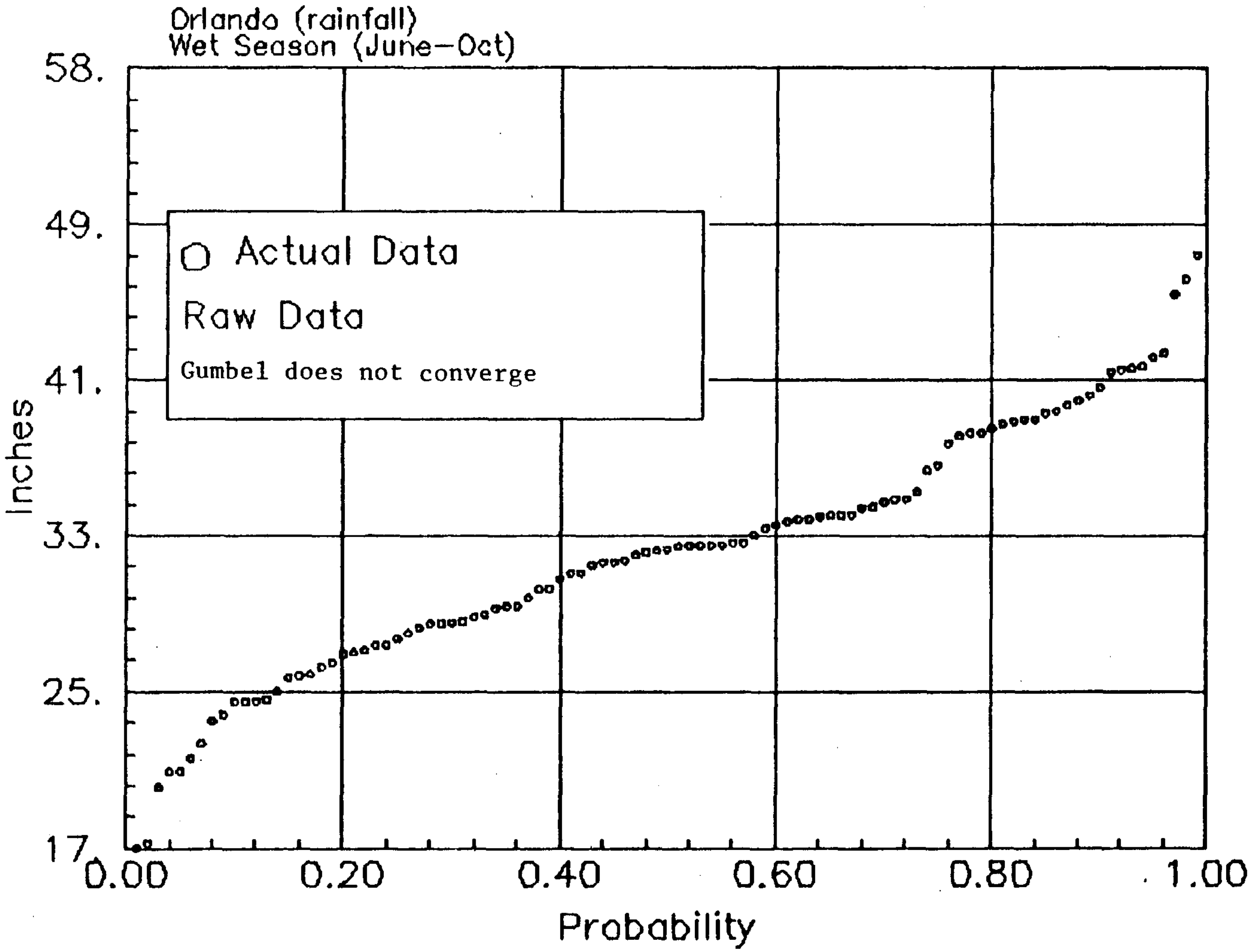


Figure C.7.4 Orlando, Wet Season rainfall distribution for the years of (1892-1990)

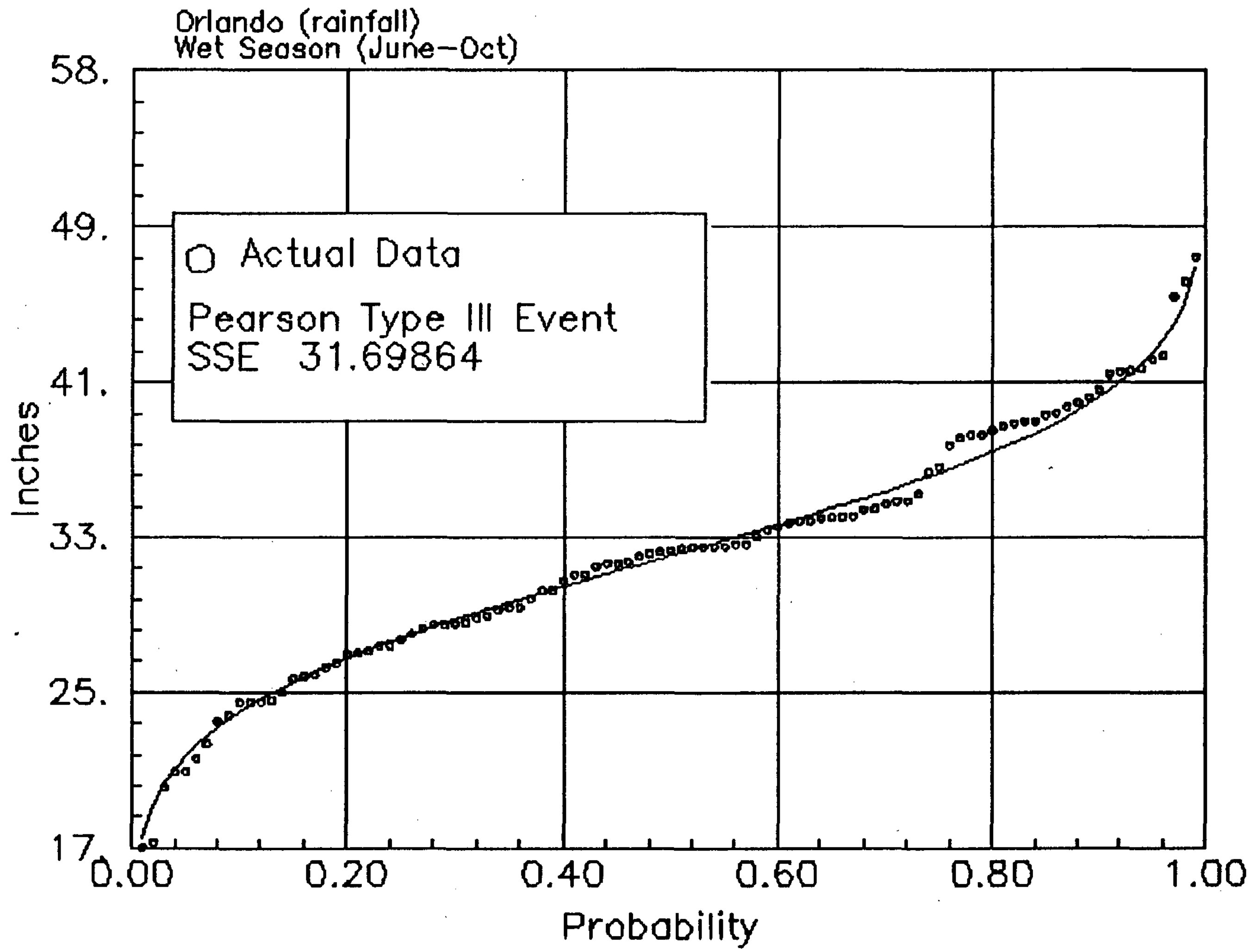


Figure C.7.5 Orlando, Wet Season rainfall distribution for the years of (1892–1990)

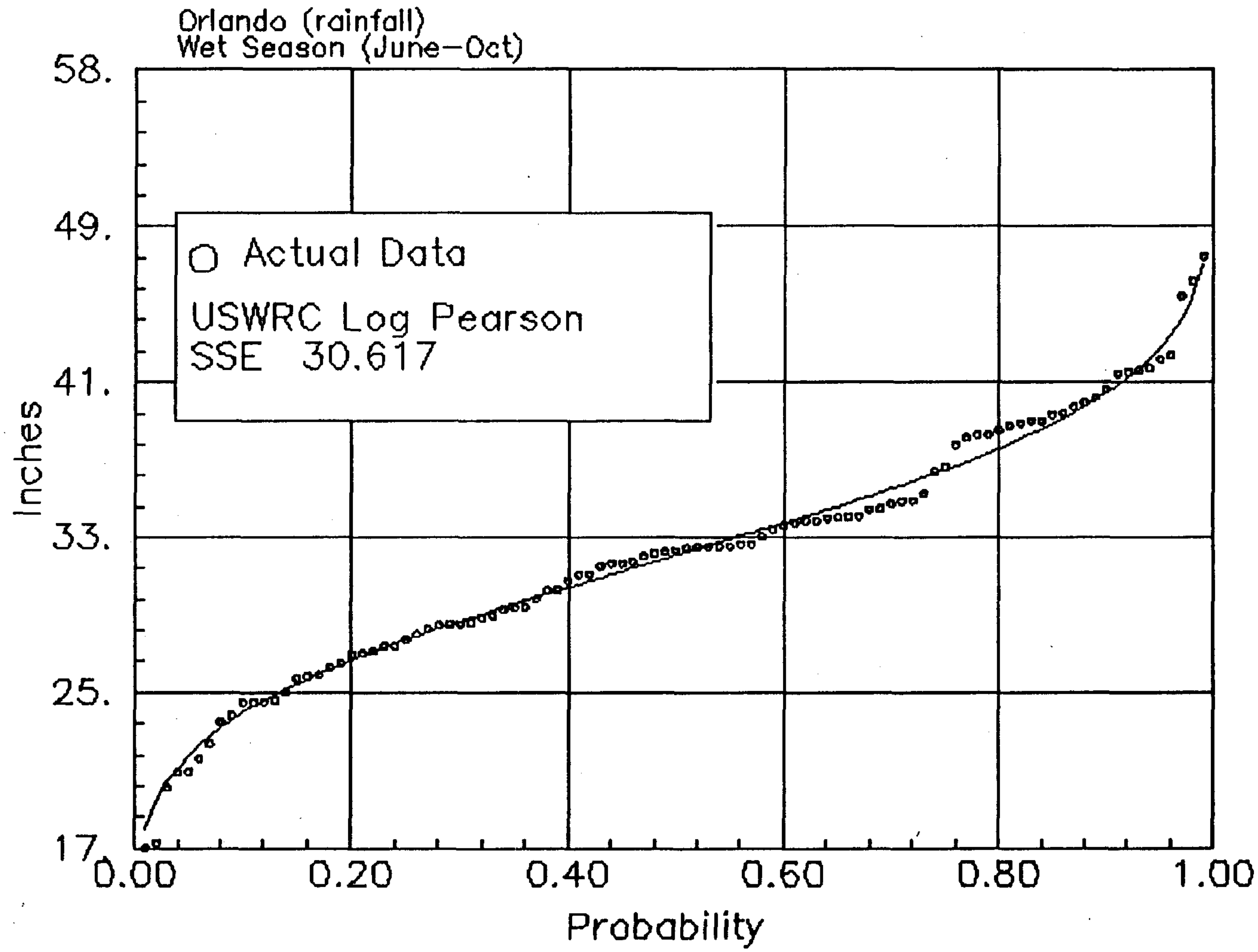


Figure C.7.6 Orlando, Wet Season rainfall distribution for the years of (1892-1990)

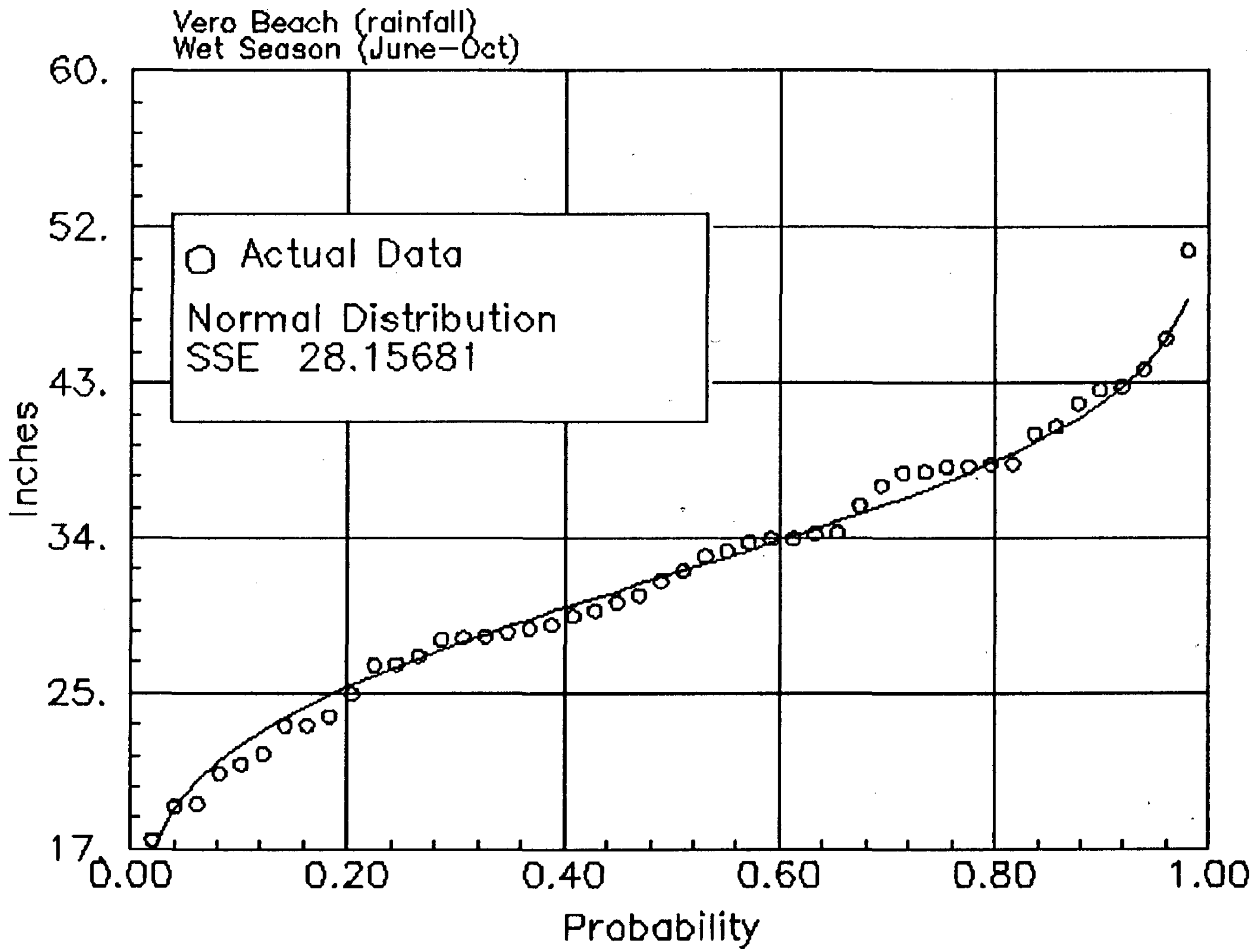


Figure C.8.1 Vero Beach, Wet Season rainfall distribution for the years of (1943–1990)

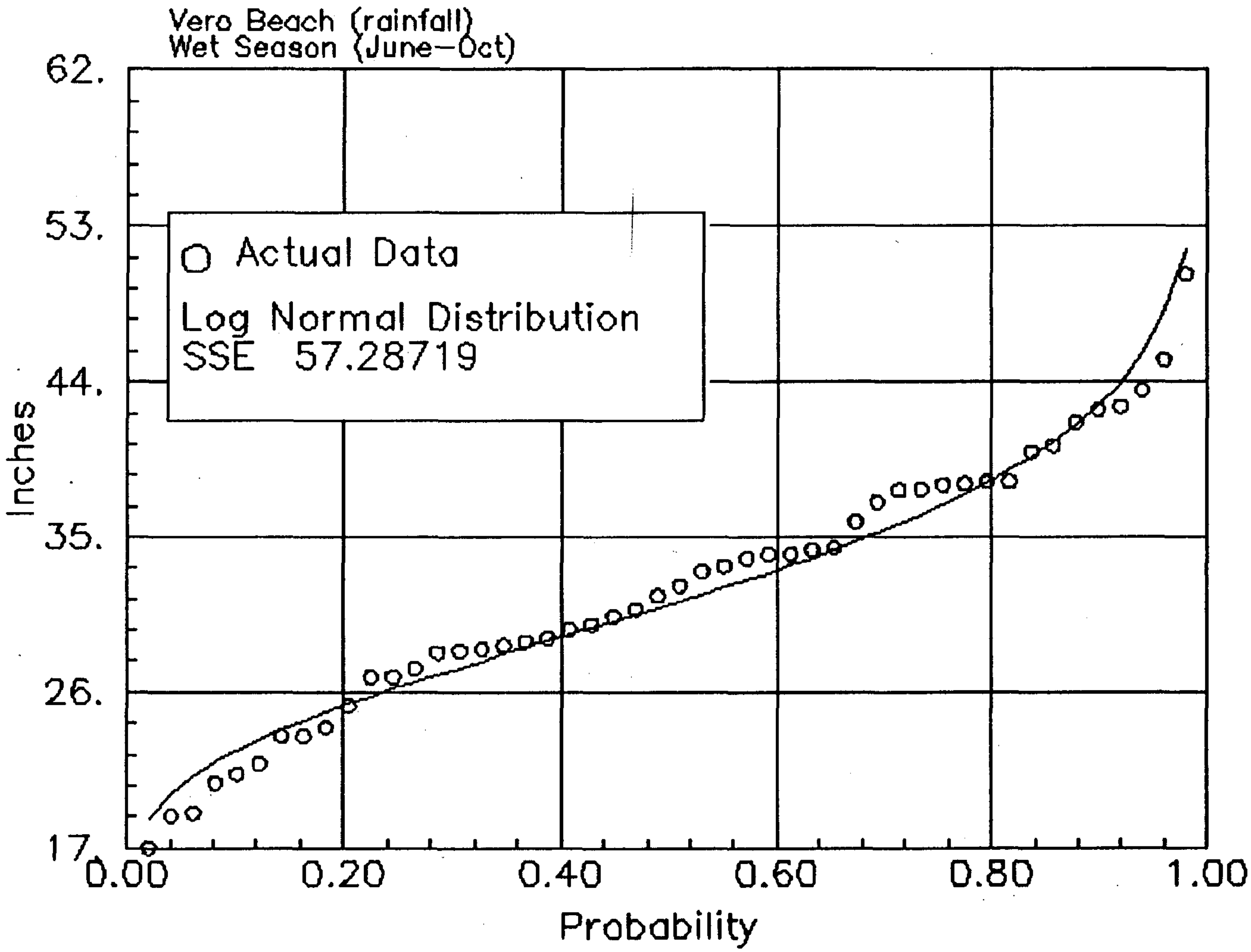


Figure C.8.2 Vero Beach, Wet Season rainfall distribution for the years of (1943–1990)

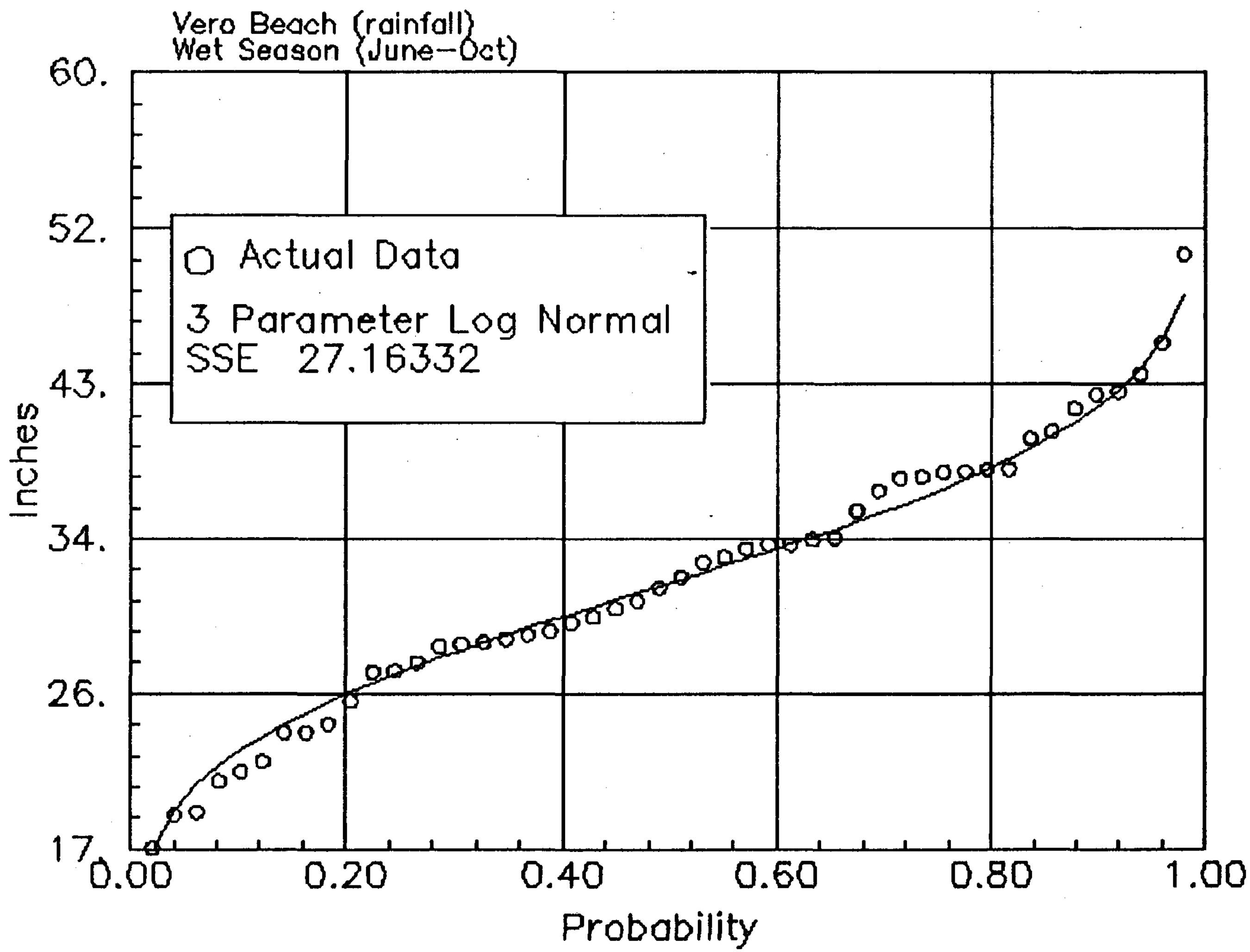


Figure C.8.3 Vero Beach, Wet Season rainfall distribution for the years of (1943–1990)

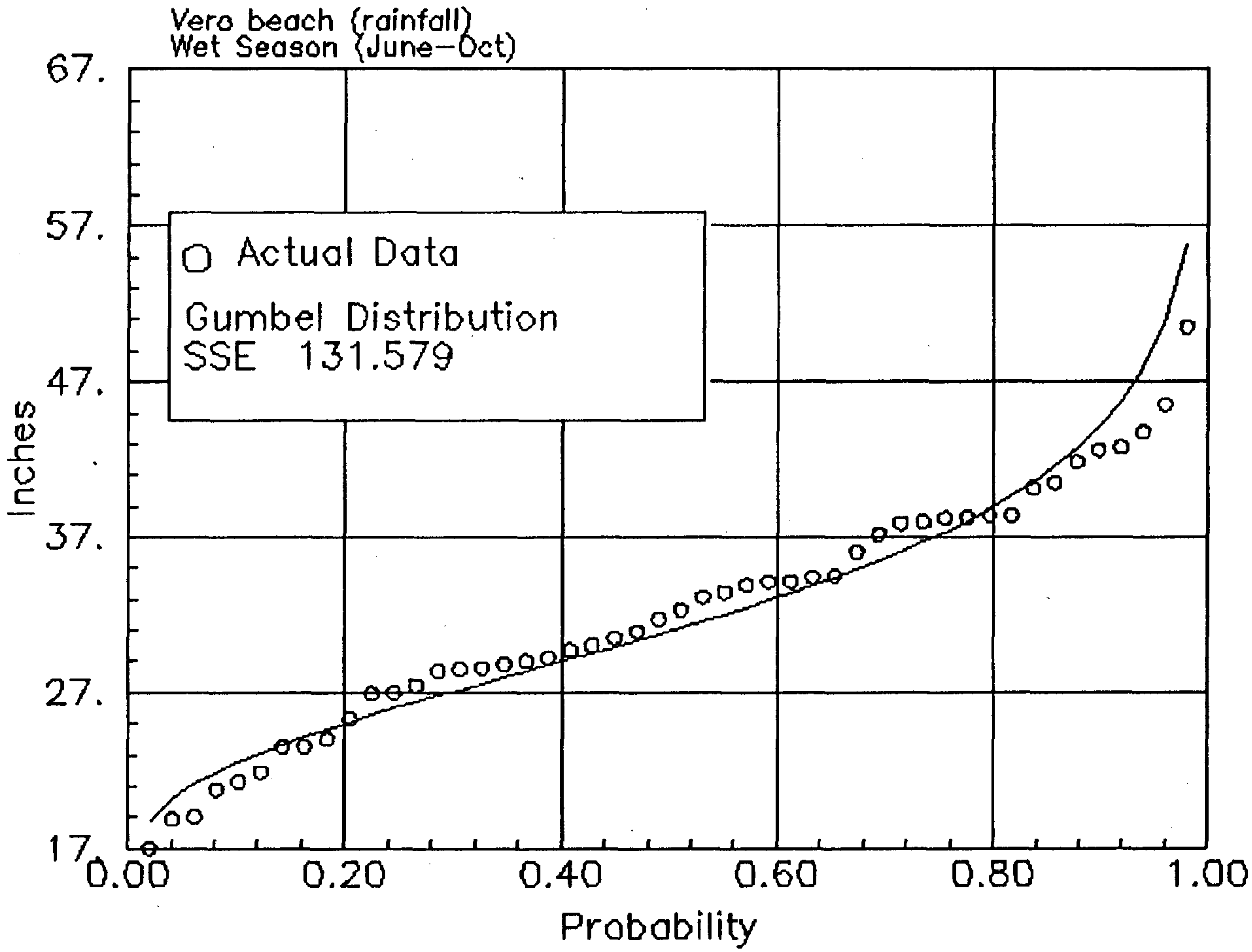


Figure C.8.4 Vero Beach, Wet Season rainfall distribution for the years of (1943–1990)

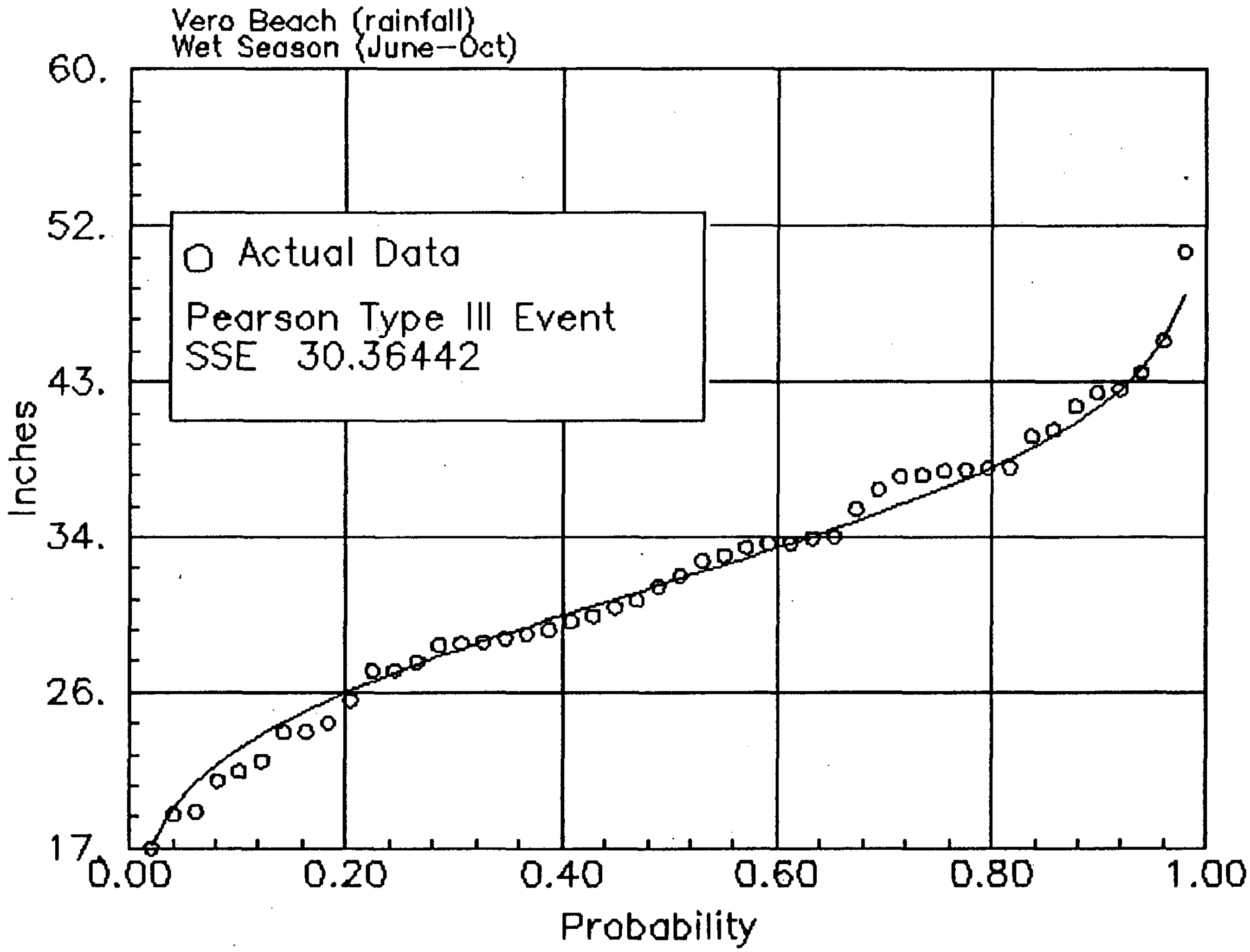


Figure C.8.5 Vero Beach, Wet Season rainfall distribution for the years of (1943–1990)

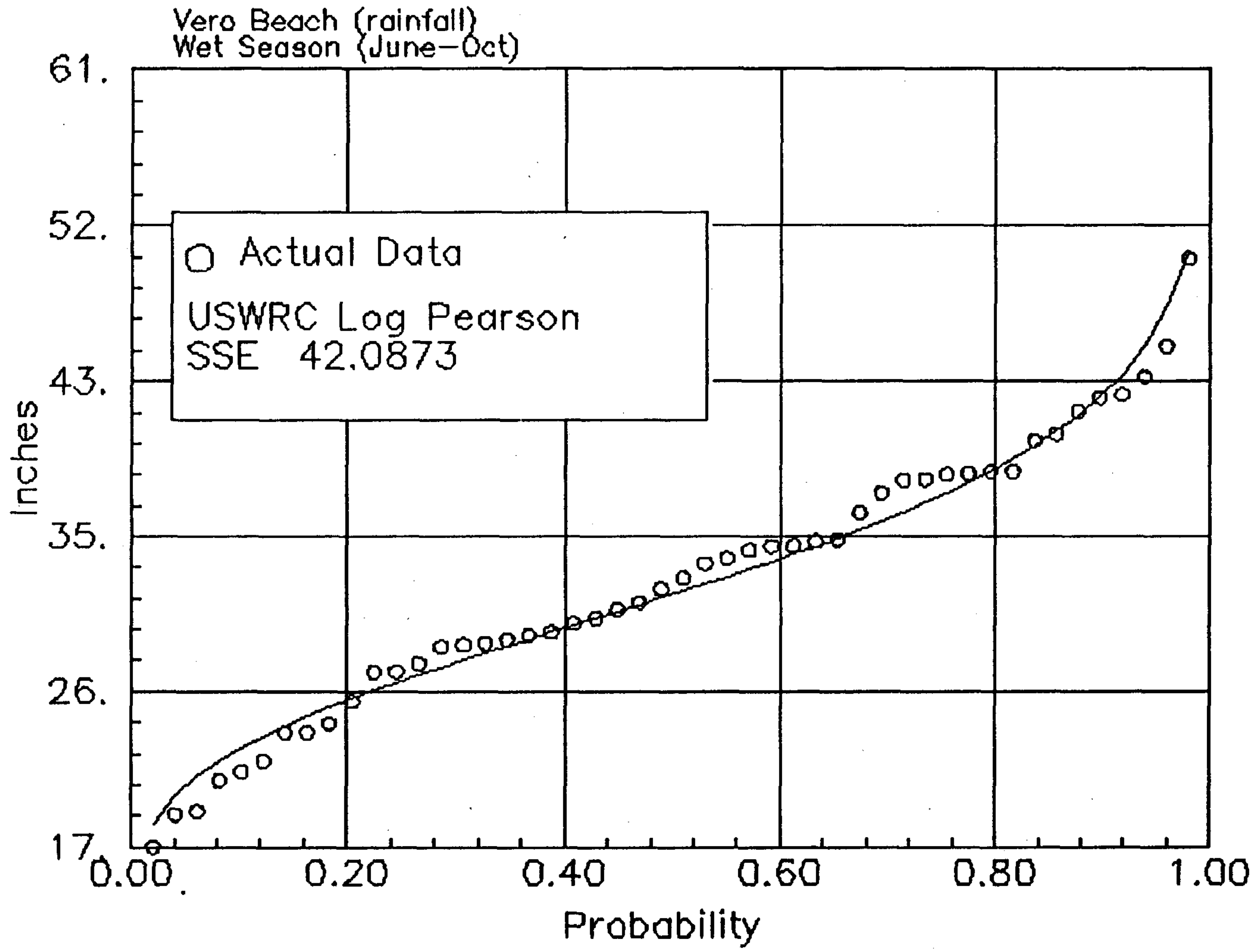


Figure C.8.6 Vero Beach, Wet Season rainfall distribution for the years of (1943–1990)

Table C.1 Statistical Comparison For Wet Season Rainfall

Daytona Beach

	SSE	Rank	Standard Error	Rank	Kolmogorov	Rank	Chi-Square	Rank	Graphical Rank
Normal Distribution	163.23	6	1.55	6	0.132	6	7.353	6	6
Log Normal Distribution	60.93	4	0.95	3	0.088	2	6.941	3	2
3 Parameter Log Normal	58.69	1	0.93	1	0.088	2	6.324	2	2
Gumbel Distribution	60.90	3	0.95	3	0.074	1	5.912	1	1
Pearson Type III Event	61.10	5	0.95	3	0.088	2	6.941	3	2
USWRC Log Pearson	60.68	2	0.94	2	0.088	2	6.941	3	2

Gainesville

	SSE	Rank	Standard Error	Rank	Kolmogorov	Rank	Chi-Square	Rank	Graphical Rank
Normal Distribution	37.13	1	0.63	1	0.096	1	5.489	2	3
Log Normal Distribution	97.41	3	1.02	3	0.117	4	4.596	1	5
3 Parameter Log Normal	97.41	4	1.02	3	0.117	4	5.489	2	1
Gumbel Distribution	382.64	5	2.02	5	0.096	1	5.638	5	6
Pearson Type III Event	******METHOD DOES NOT CONVERGE******								
USWRC Log Pearson	38.25	2	0.64	2	0.096	1	5.489	2	1

Jacksonville

	SSE	Rank	Standard Error	Rank	Kolmogorov	Rank	Chi-Square	Rank	Graphical Rank
Normal Distribution	83.58	4	0.82	4	0.113	1	3.129	1	4
Log Normal Distribution	115.19	5	0.96	5	0.137	5	6.403	5	5
3 Parameter Log Normal	52.94	1	0.65	1	0.113	2	3.807	2	1
Gumbel Distribution	362.05	6	1.71	6	0.153	6	9.790	6	6
Pearson Type III Event	54.80	2	0.66	2	0.113	2	3.807	2	1
USWRC Log Pearson	58.45	3	0.69	3	0.113	2	3.807	2	1

Table C.1 (continued)

Lisbon

	SSE	Rank	Standard Error	Rank	Kolmogorov	Rank	Chi-Square	Rank	Graphical Rank
Normal Distribution	52.50	5	0.72	5	0.060	4	3.880	5	5
Log Normal Distribution	28.44	4	0.53	4	0.060	4	2.760	4	4
3 Parameter Log Normal	20.56	2	0.45	2	0.050	1	0.380	1	1
Gumbel Distribution	116.14	6	1.08	6	0.080	6	5.560	6	6
Pearson Type III Event	21.46	3	0.46	3	0.050	1	1.500	2	1
USWRC Log Pearson	19.56	1	0.44	1	0.050	1	1.500	2	1

Marineland

	SSE	Rank	Standard Error	Rank	Kolmogorov	Rank	Chi-Square	Rank	Graphical Rank
Normal Distribution	42.74	3	0.93	3	0.122	4	4.857	1	4
Log Normal Distribution	74.83	5	1.24	5	0.102	2	7.714	6	5
3 Parameter Log Normal	36.76	1	0.87	1	0.122	4	4.857	1	1
Gumbel Distribution	113.22	6	1.52	6	0.082	1	7.143	5	6
Pearson Type III Event	39.78	2	0.90	2	0.122	4	4.857	1	1
USWRC Log Pearson	54.46	4	1.05	4	0.102	2	4.857	1	1

Melbourne

	SSE	Rank	Standard Error	Rank	Kolmogorov	Rank	Chi-Square	Rank	Graphics Rank
Normal Distribution	48.77	5	0.97	5	0.115	6	2.115	1	6
Log Normal Distribution	34.69	4	0.82	4	0.077	2	4.539	5	3
3 Parameter Log Normal	27.77	1	0.73	1	0.077	2	2.115	1	2
Gumbel Distribution	64.33	6	1.11	6	0.058	1	6.423	6	5
Pearson Type III Event	30.27	3	0.76	3	0.077	2	3.462	3	3
USWRC Log Pearson	28.86	2	0.74	2	0.077	2	3.462	3	1

Table C.1 (continued)

Orlando

	SSE	Rank	Standard Error	Rank	Kolmogorov	Rank	Chi-Square	Rank	Graphical Rank
Normal Distribution	30.18	1	0.55	1	0.091	2	5.010	4	1
Log Normal Distribution	87.88	3	0.94	3	0.111	3	2.465	1	4
3 Parameter Log Normal	87.88	3	0.94	3	0.111	3	4.303	2	1
Gumbel Distribution	******METHOD DOES NOT CONVERGE******								
Pearson Type III Event	******METHOD DOES NOT CONVERGE******								
USWRC Log Pearson	30.62	2	0.56	2	0.081	1	4.303	2	1

Vero Beach

	SSE	Rank	Standard Error	Rank	Kolmogorov	Rank	Chi-Square	Rank	Graphical Rank
Normal Distribution	28.16	2	0.77	2	0.083	1	2.167	1	4
Log Normal Distribution	57.29	5	1.09	5	0.104	4	3.625	6	5
3 Parameter Log Normal	27.16	1	0.75	1	0.083	1	2.750	2	2
Gumbel Distribution	131.58	6	1.66	6	0.104	4	2.750	2	6
Pearson Type III Event	30.36	3	0.80	3	0.083	1	2.750	2	2
USWRC Log Pearson	42.09	4	0.94	4	0.104	4	2.750	2	1

APPENDIX D

DRY SEASON RAINFALL DISTRIBUTIONS

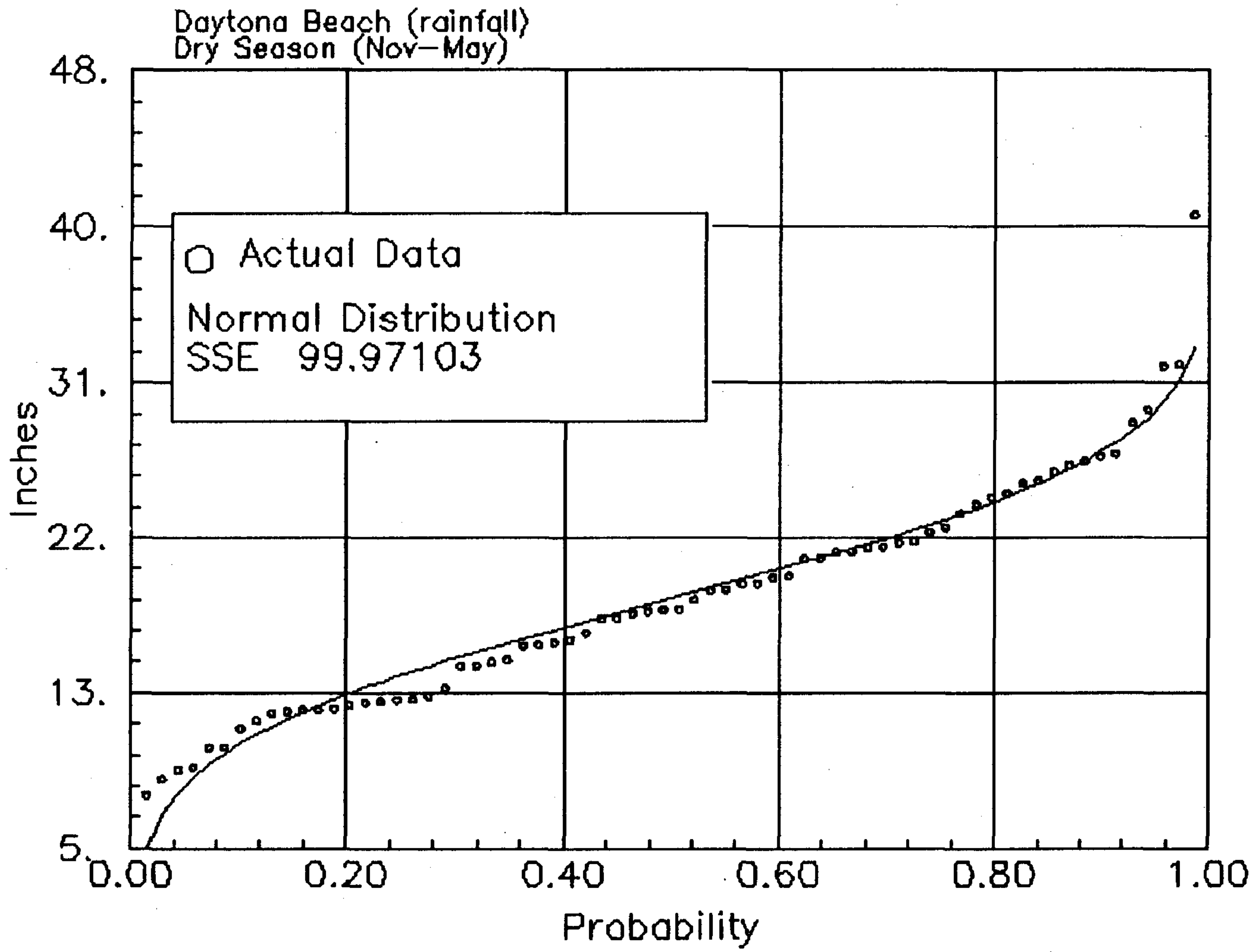


Figure D.1.1 Daytona Beach, Dry Season rainfall distribution for the years of (1923–1990)

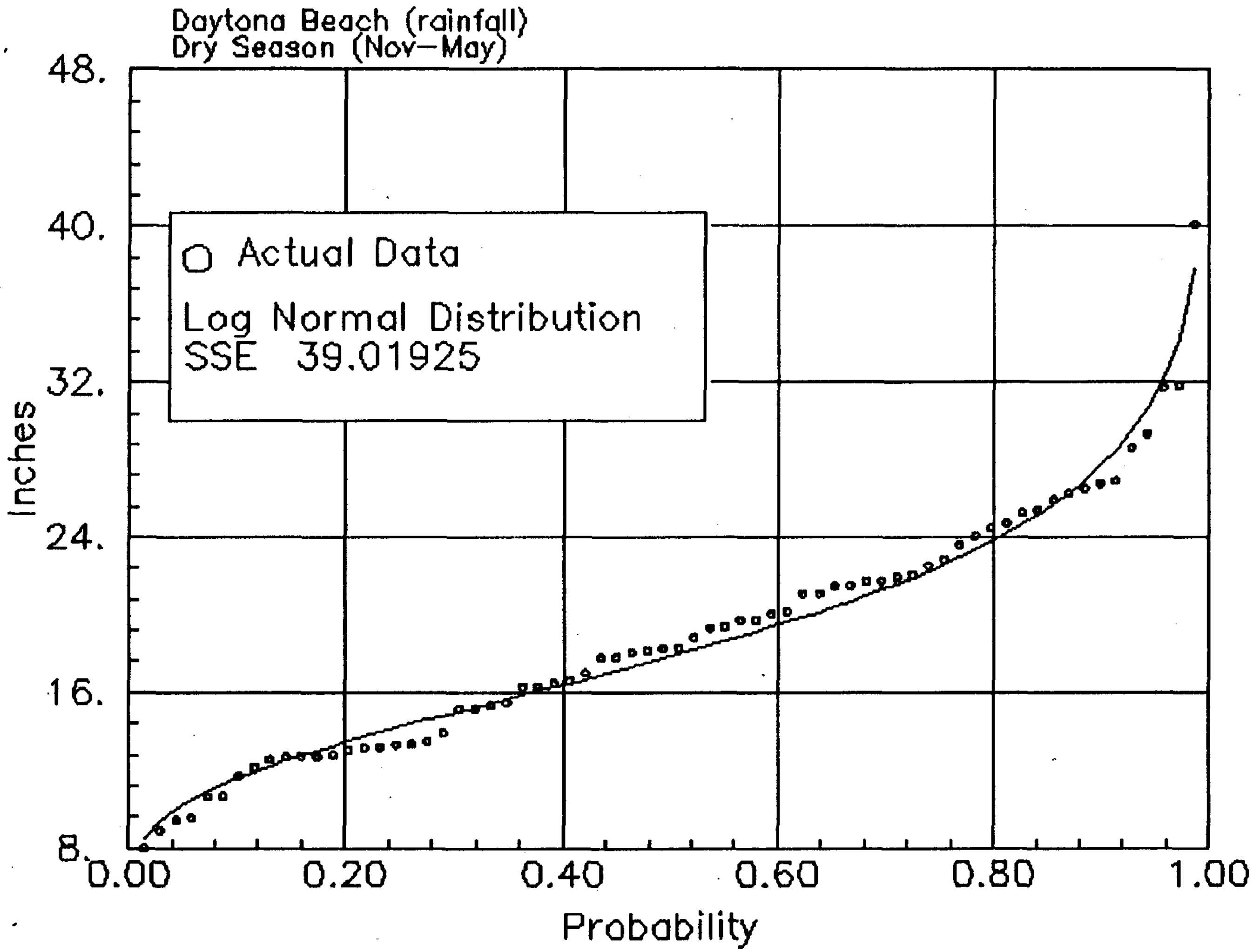
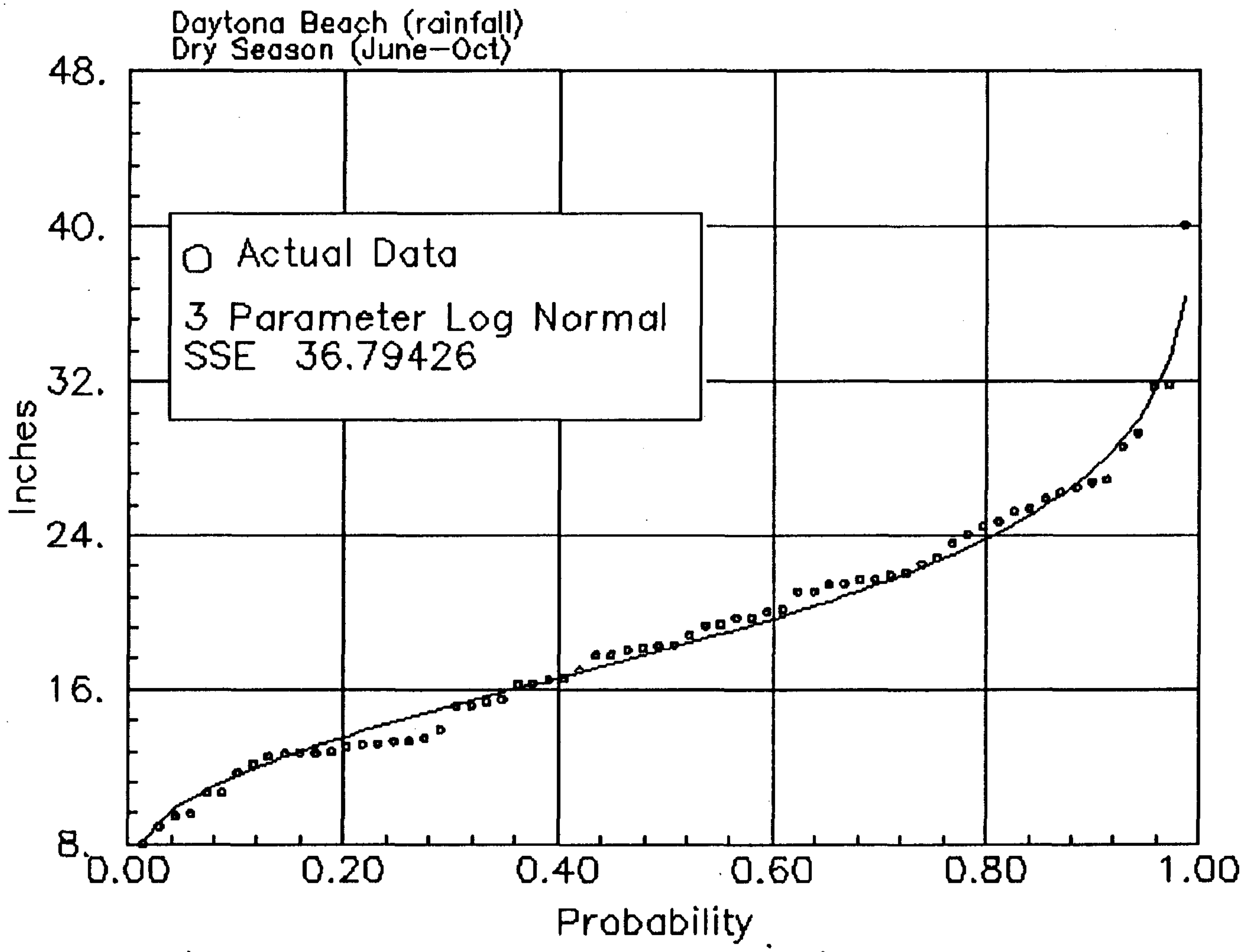


Figure D.1.2 Daytona Beach, Dry Season rainfall distribution for the years of (1923-1990)



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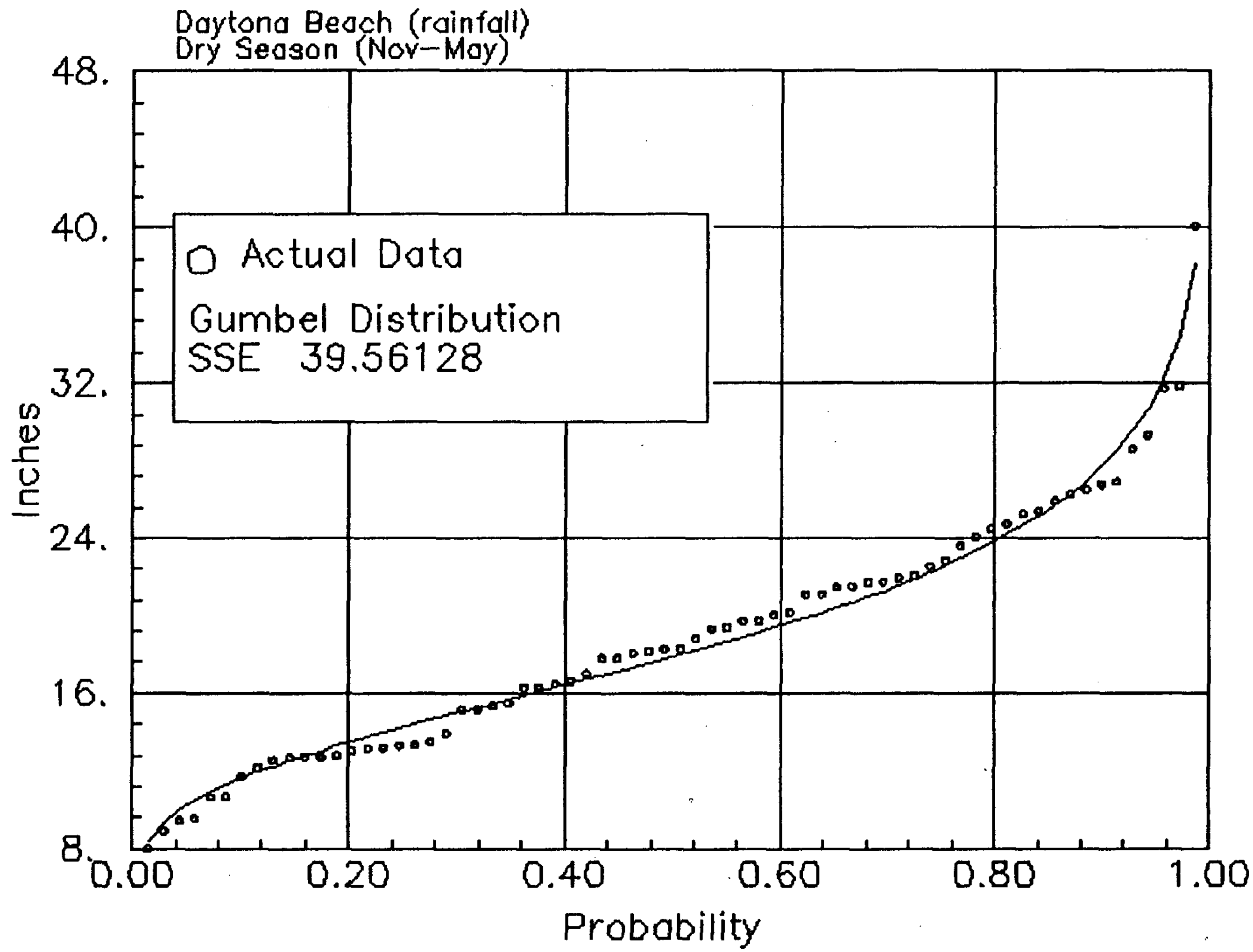


Figure D.1.4 Daytona Beach, Dry Season rainfall distribution for the years of (1923–1990)

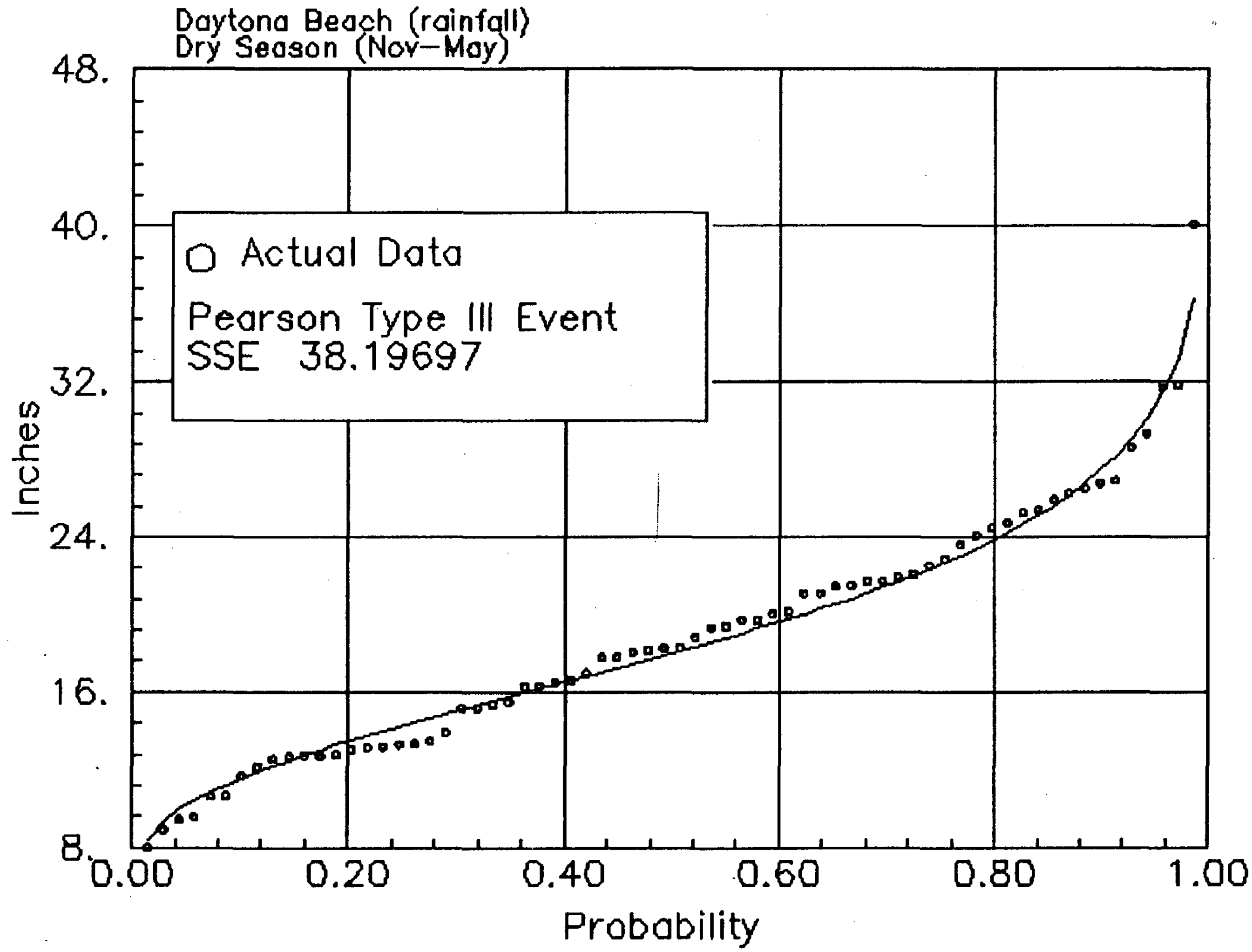


Figure D.1.5 Daytona Beach, Dry Season rainfall distribution for the years of (1923–1990)

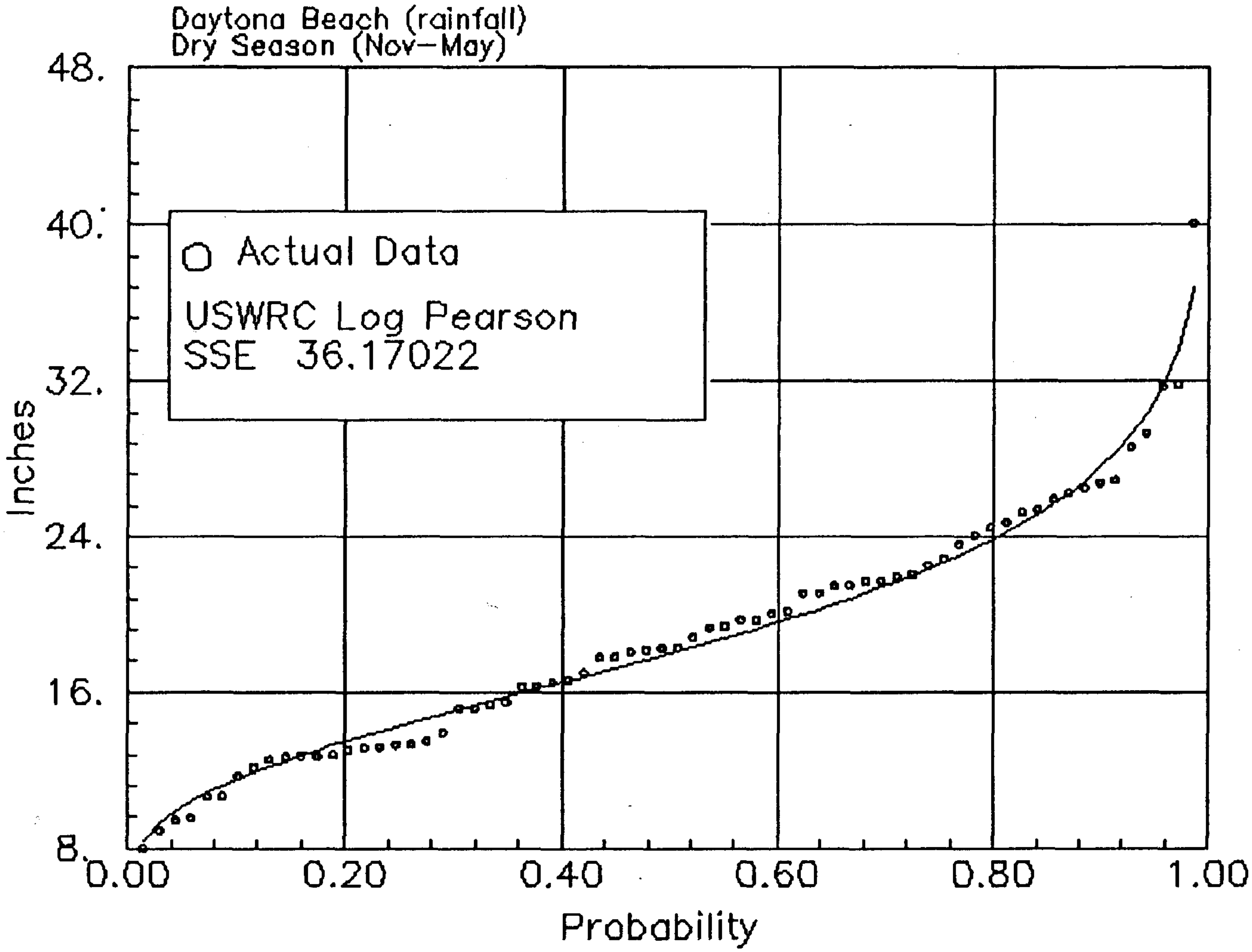


Figure D.1.6 Daytona Beach, Dry Season rainfall distribution for the years of (1923–1990)

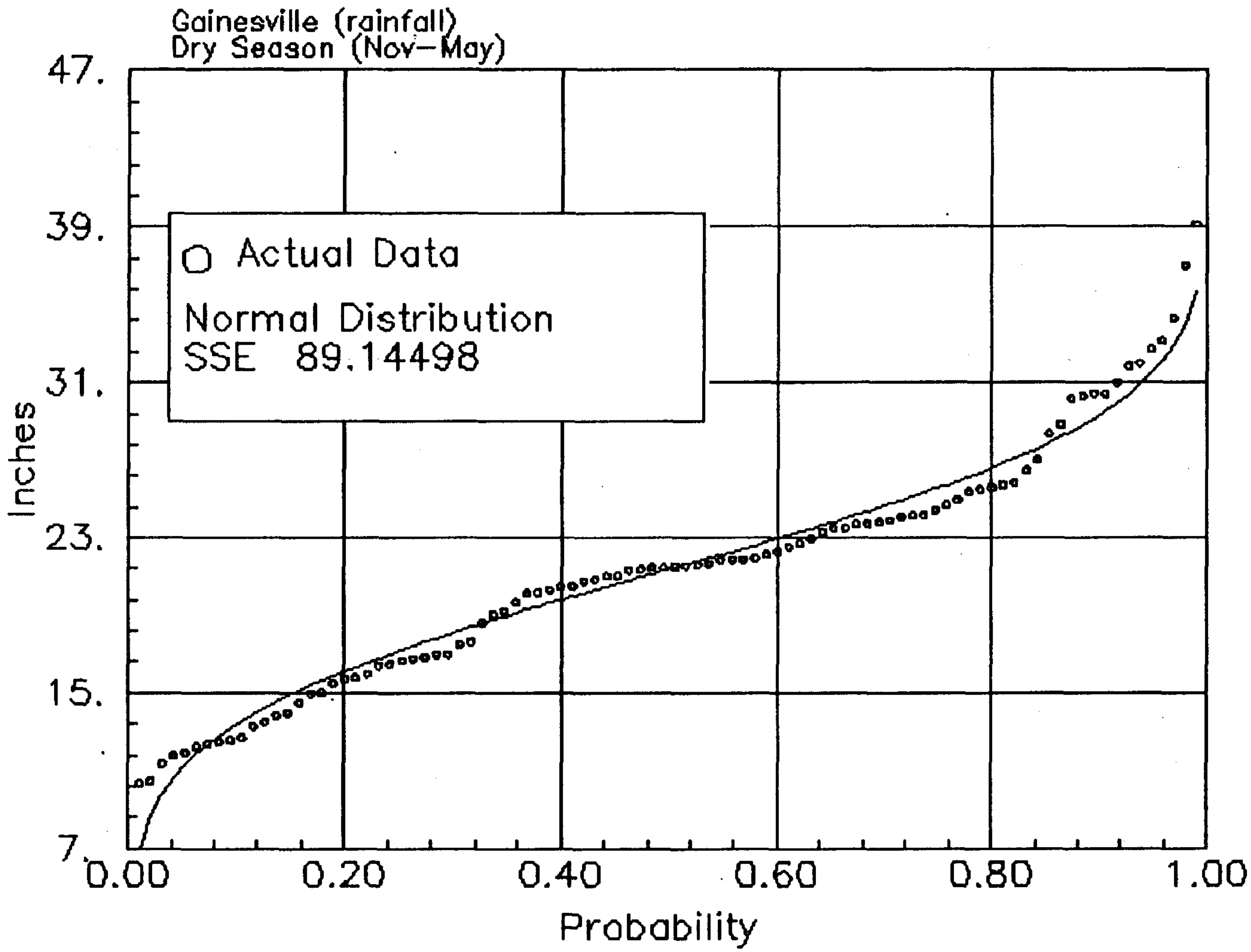


Figure D.2.1 Gainesville, Dry Season rainfall distribution for the years of (1897–1990)

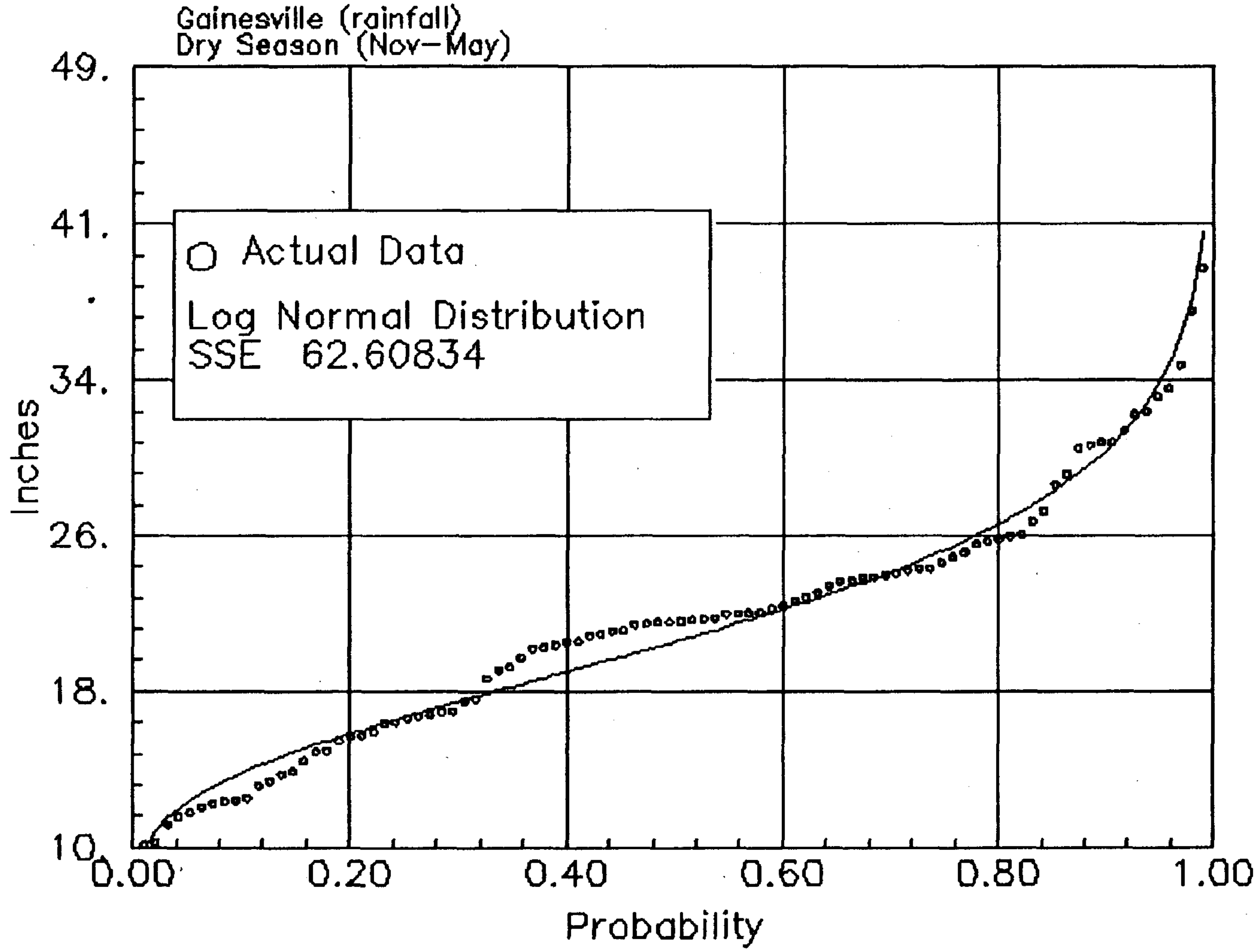


Figure D.2.2 Gainesville, Dry Season rainfall distribution for the years of (1897–1990)

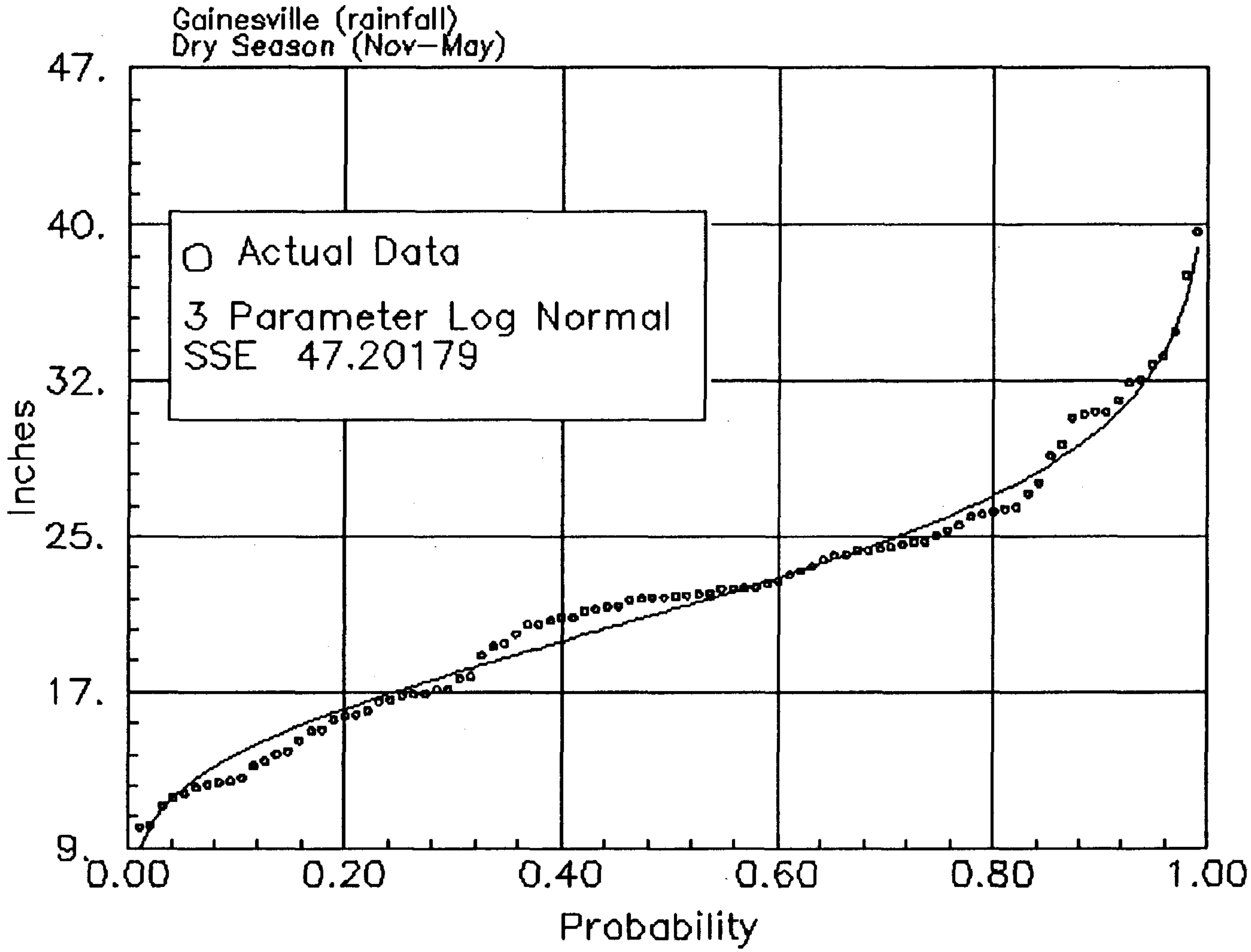


Figure D.2.3 Gainesville, Dry Season rainfall distribution for the years of (1897–1990)

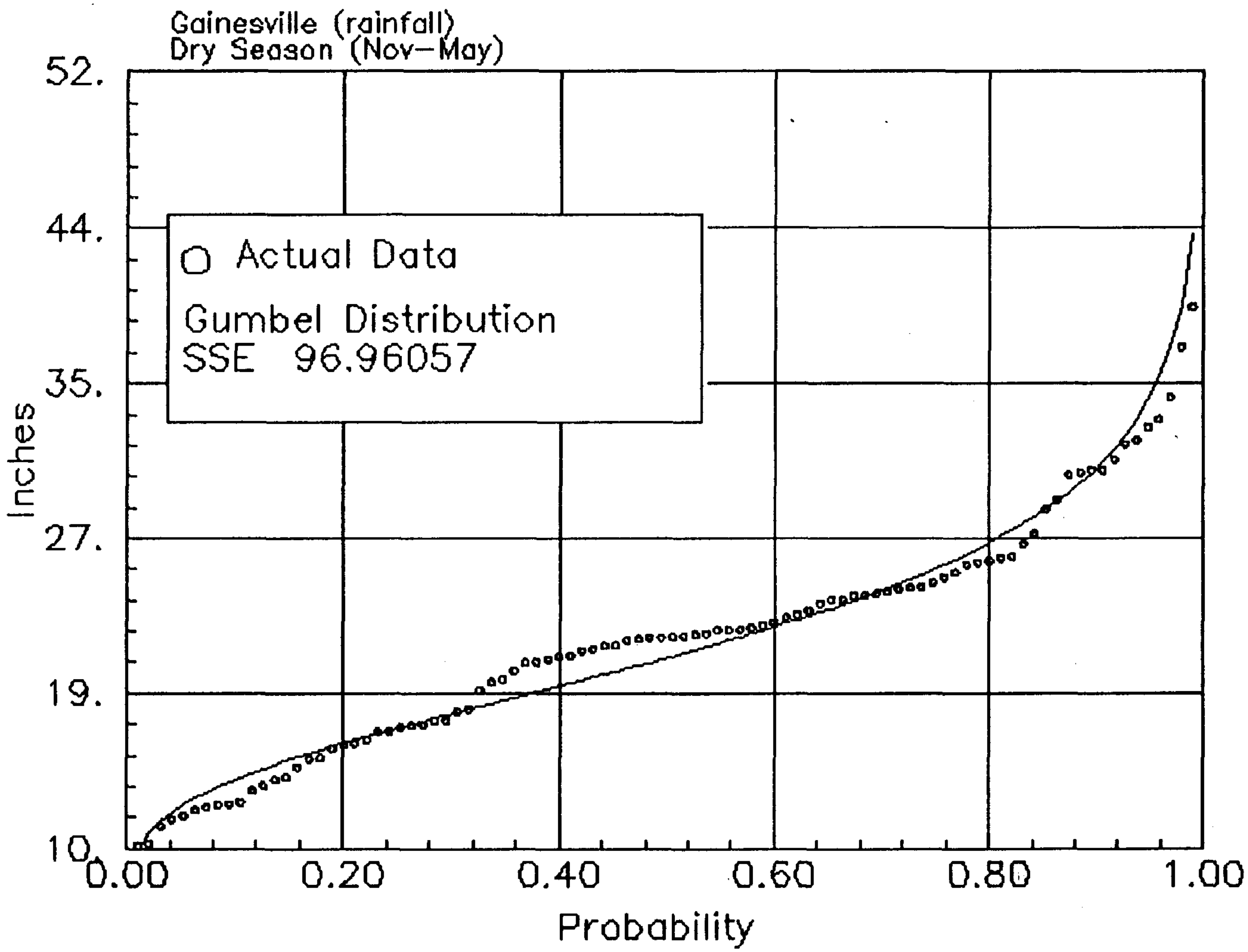


Figure D.2.4 Gainesville, Dry Season rainfall distribution for the years of (1897–1990)

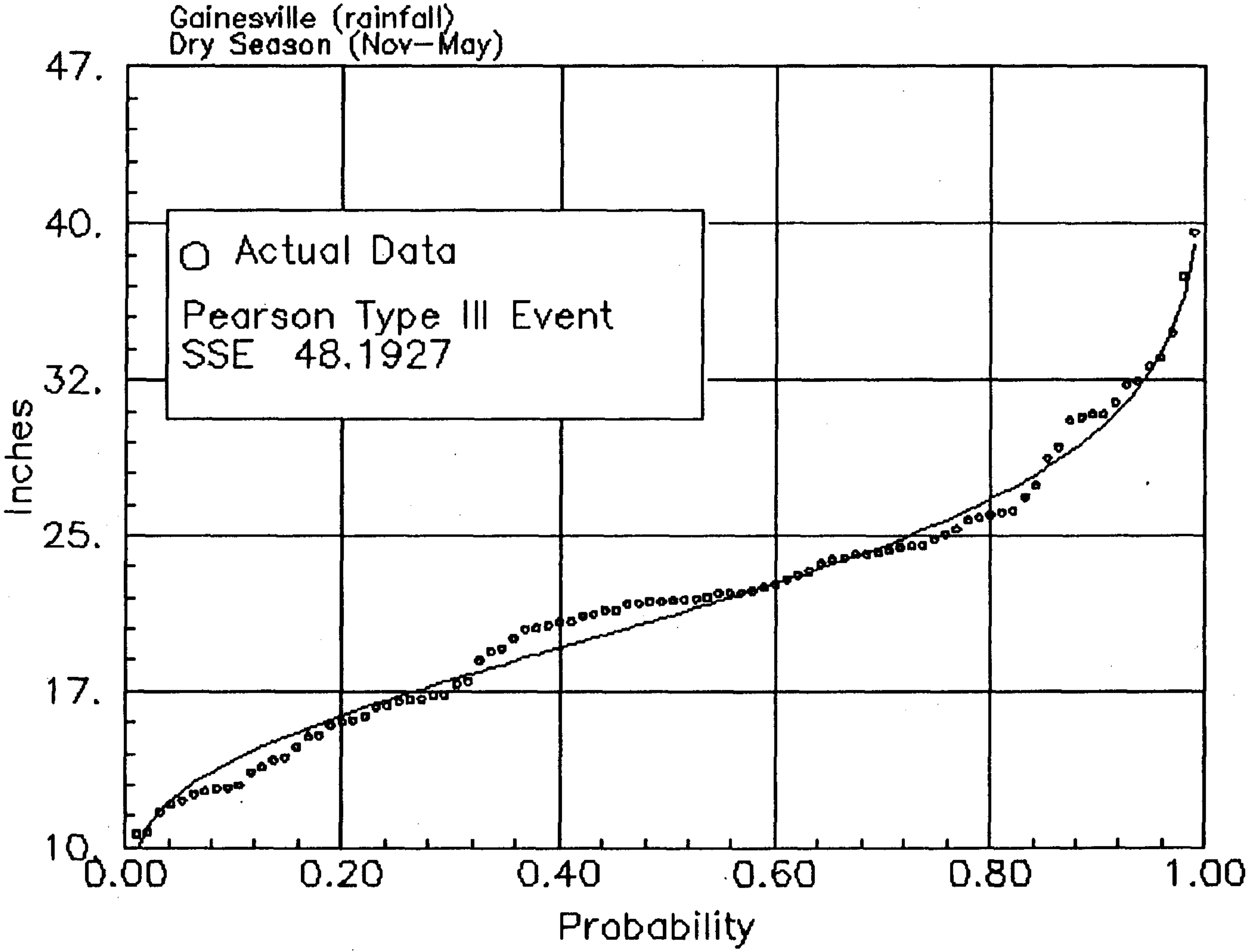


Figure D.2.5 Gainesville, Dry Season rainfall distribution for the years of (1897–1990)

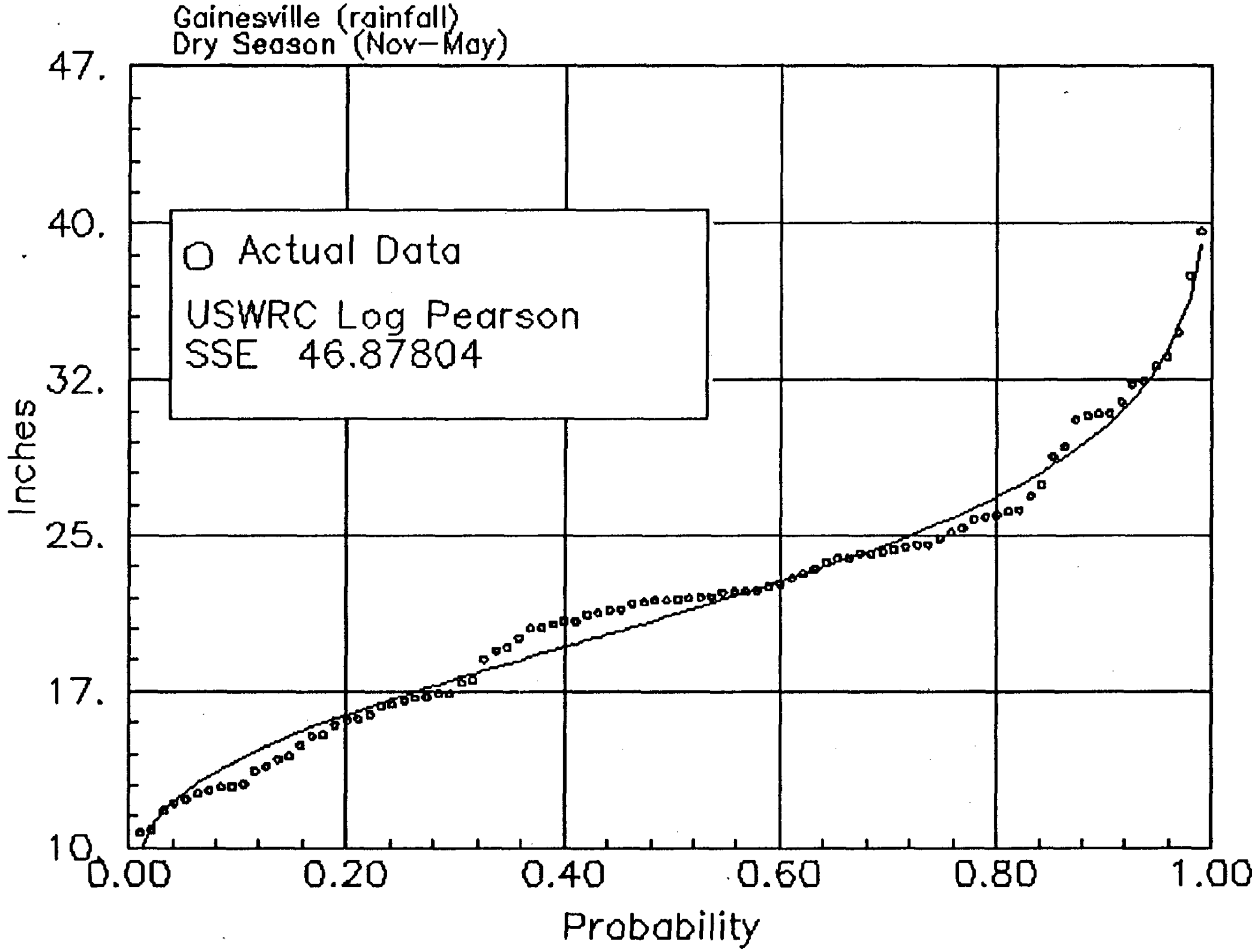


Figure D.2.6 Gainesville, Dry Season rainfall distribution for the years of (1897-1990)

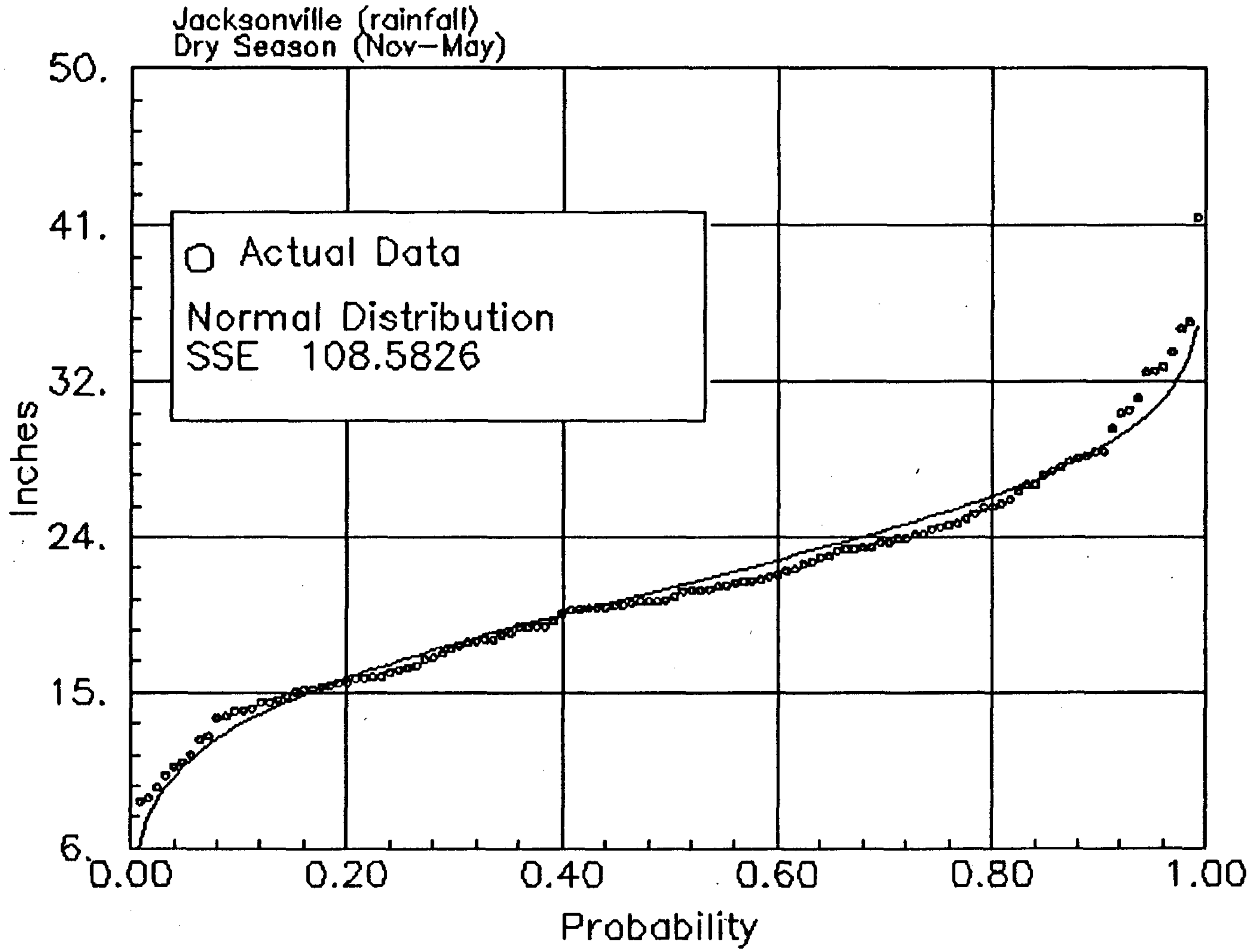


Figure D.3.1 Jacksonville, Dry Season rainfall distribution for the years of (1867–1990)

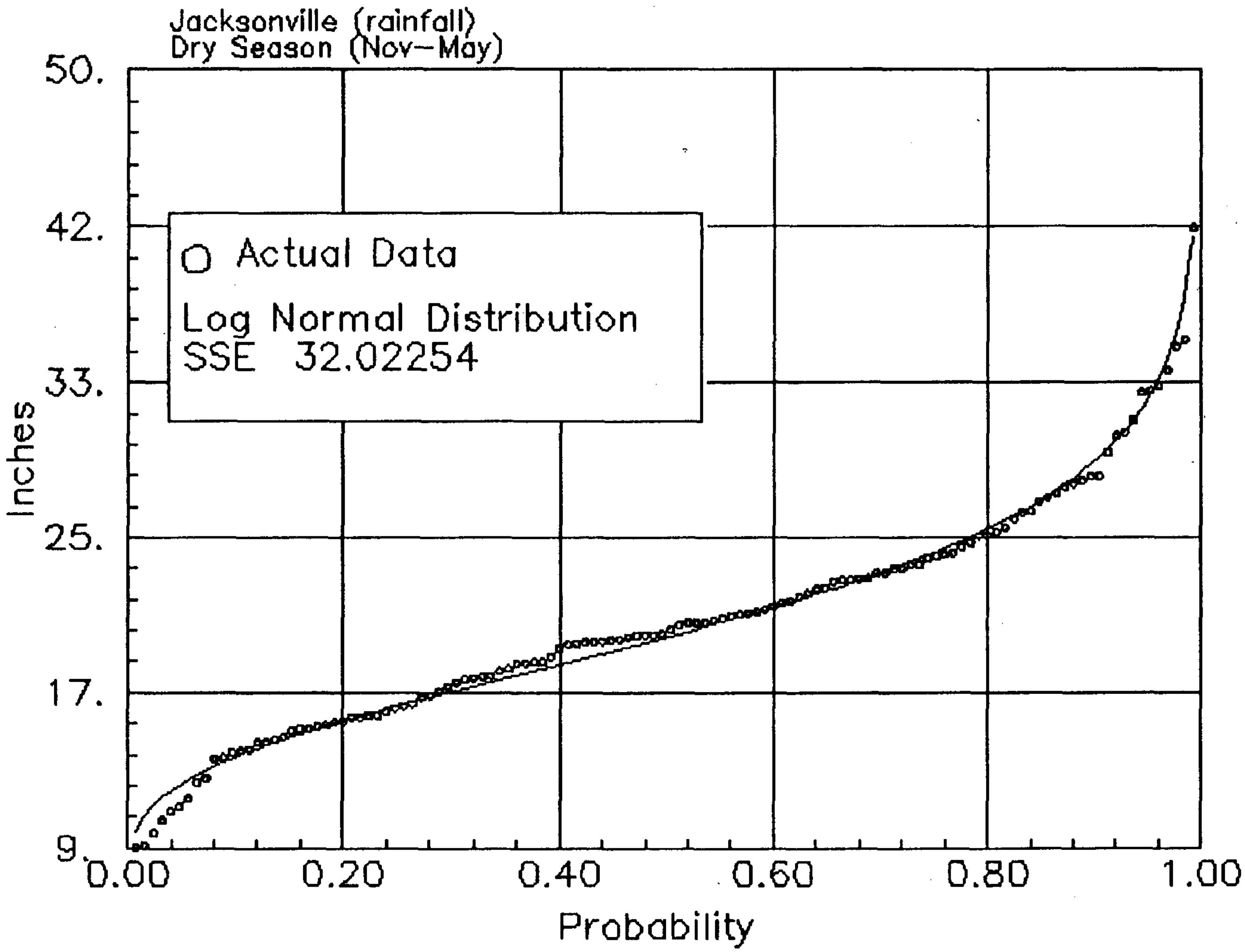


Figure D.3.2 Jacksonville, Dry Season rainfall distribution for the years of (1867−1990)

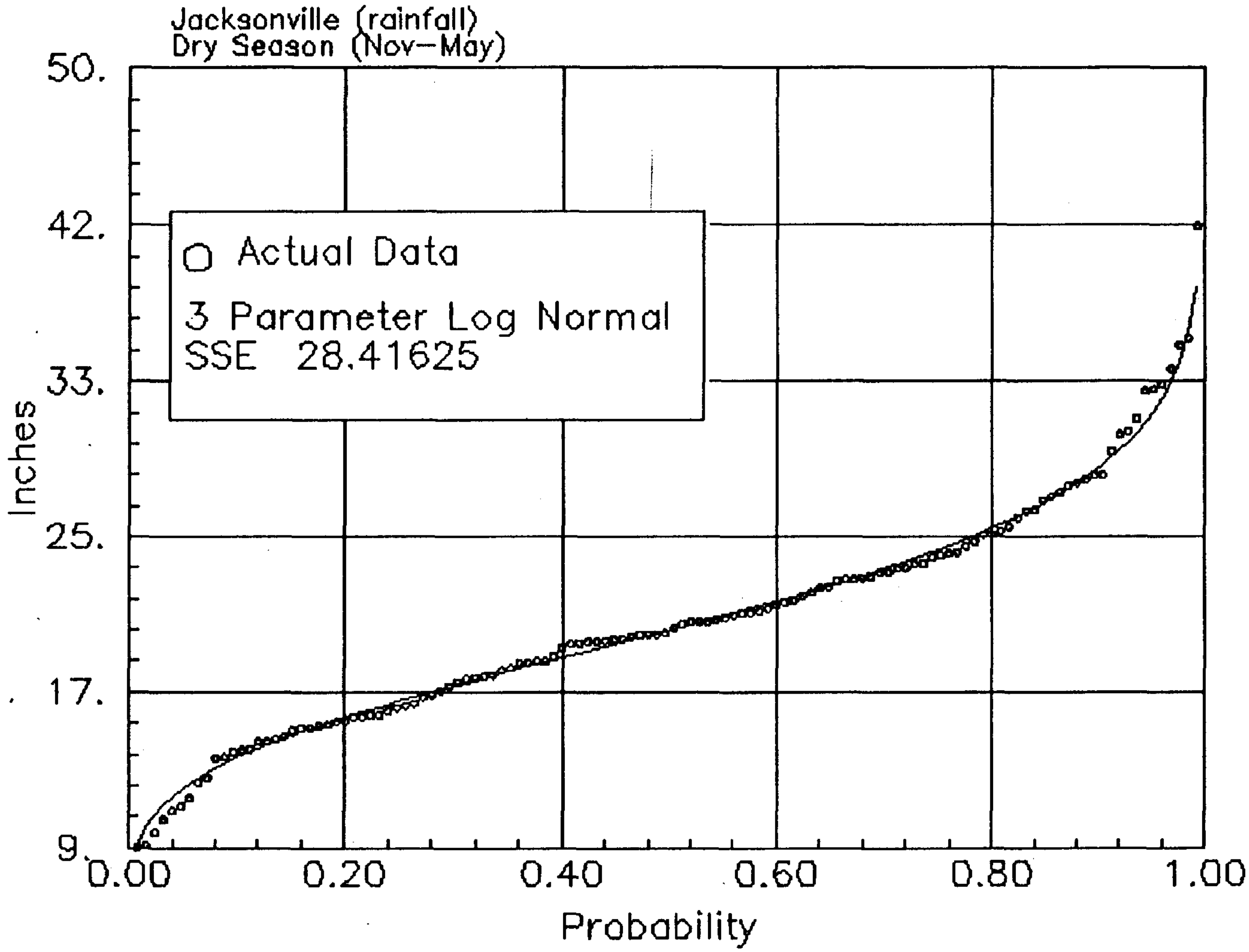


Figure D.3.3 Jacksonville, Dry Season rainfall distribution for the years of (1867-1990)

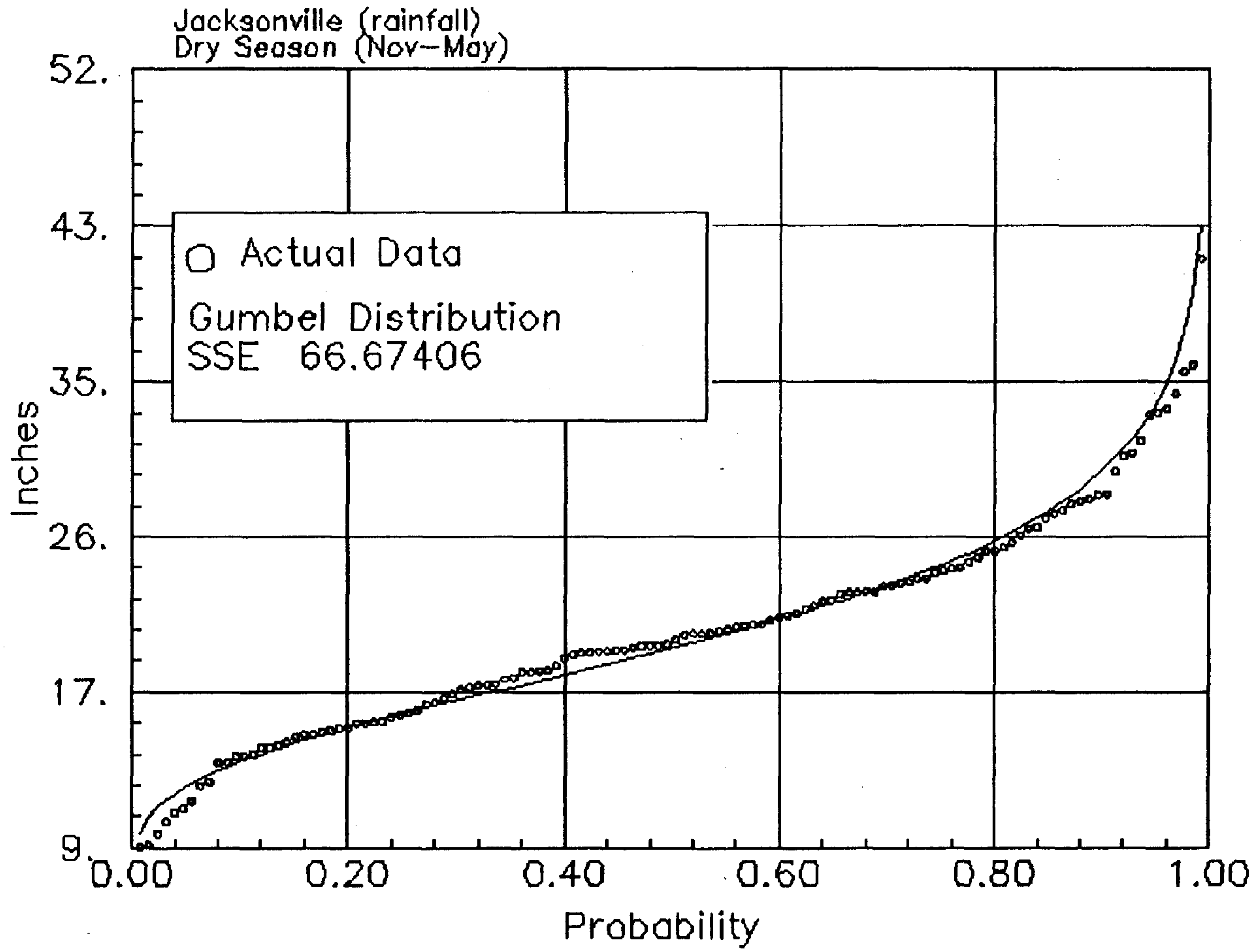


Figure D.3.4 Jacksonville, Dry Season rainfall distribution for the years of (1867–1990)

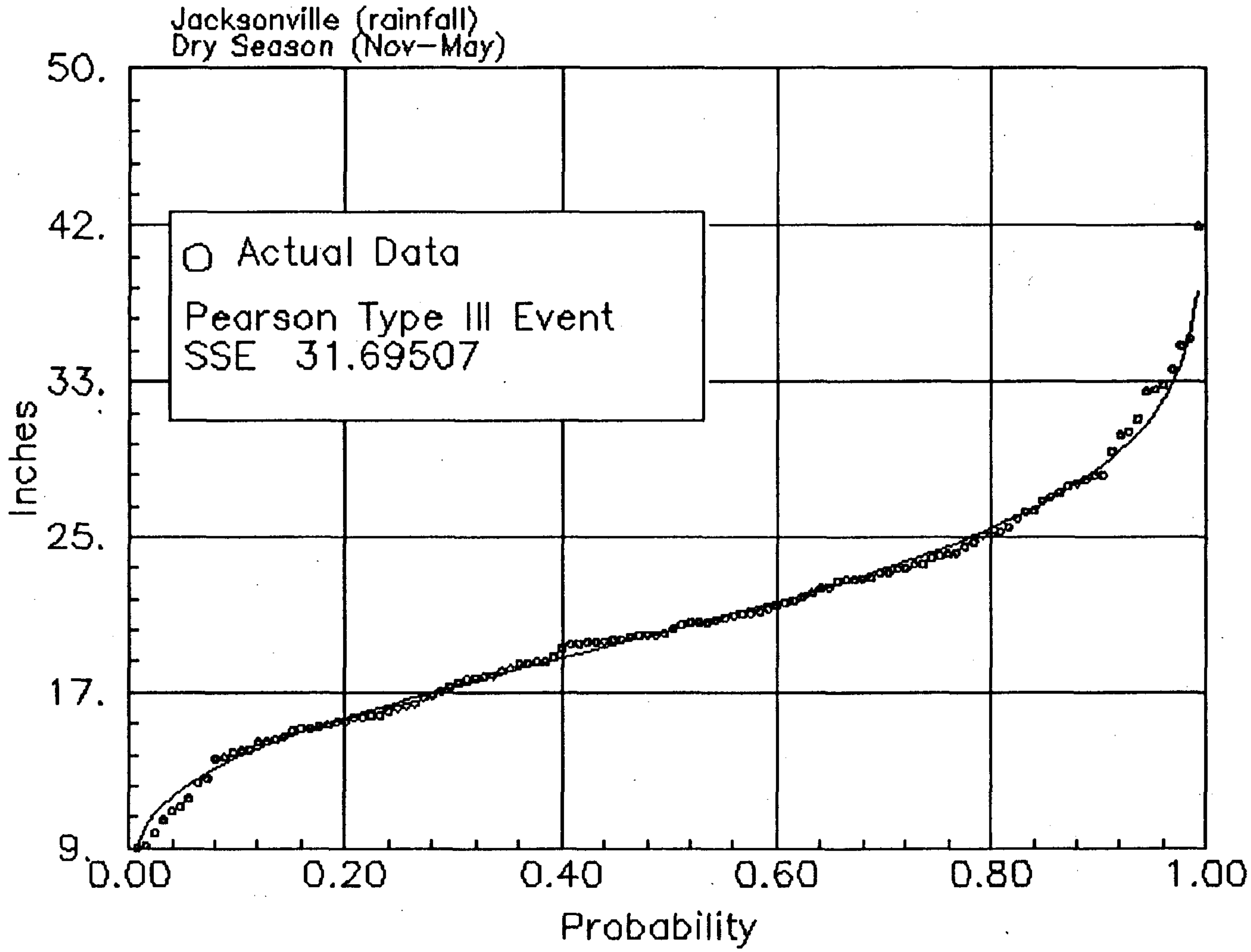


Figure D.3.5 Jacksonville, Dry Season rainfall distribution for the years of (1867–1990)

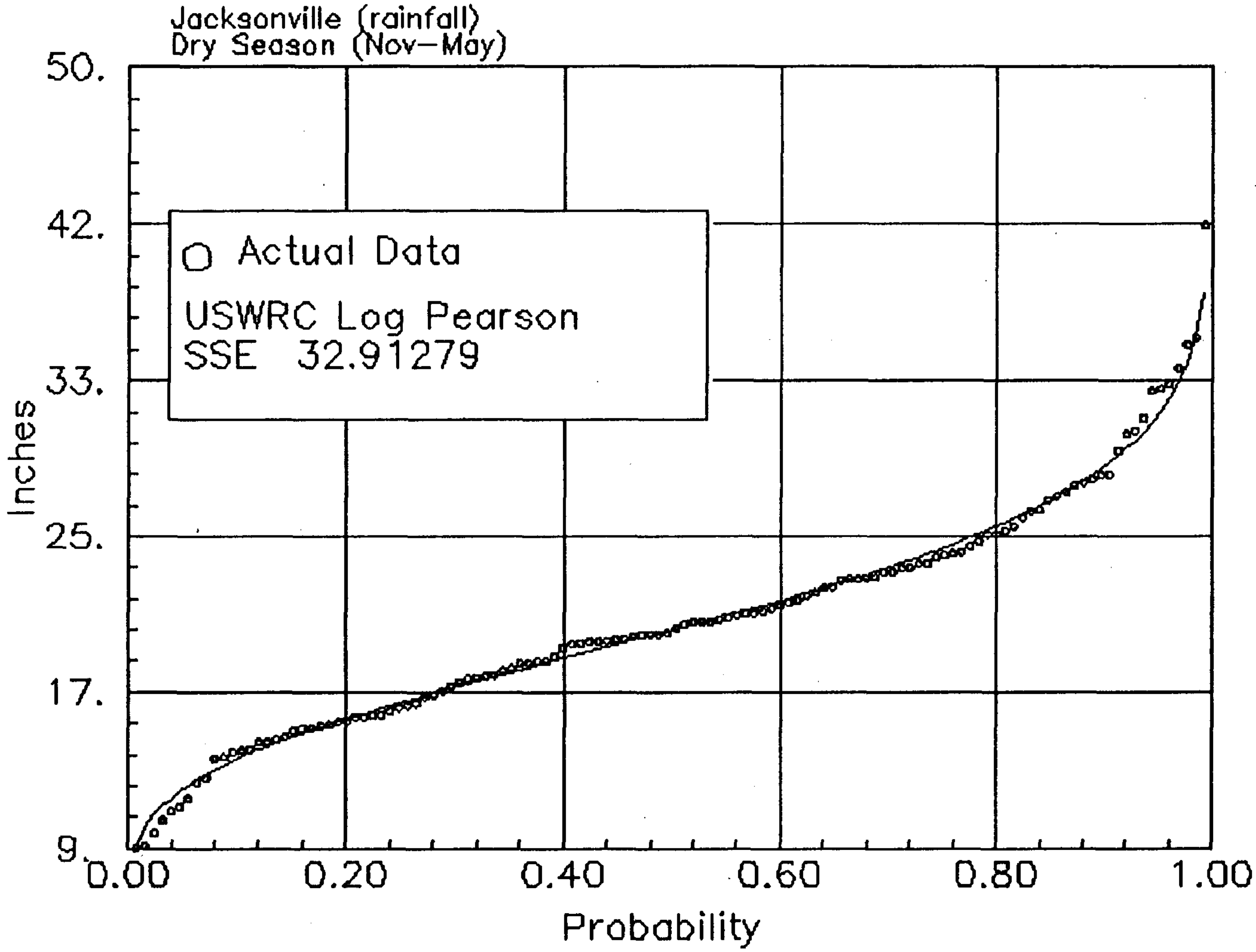


Figure D.3.6 Jacksonville, Dry Season rainfall distribution for the years of (1867–1990)

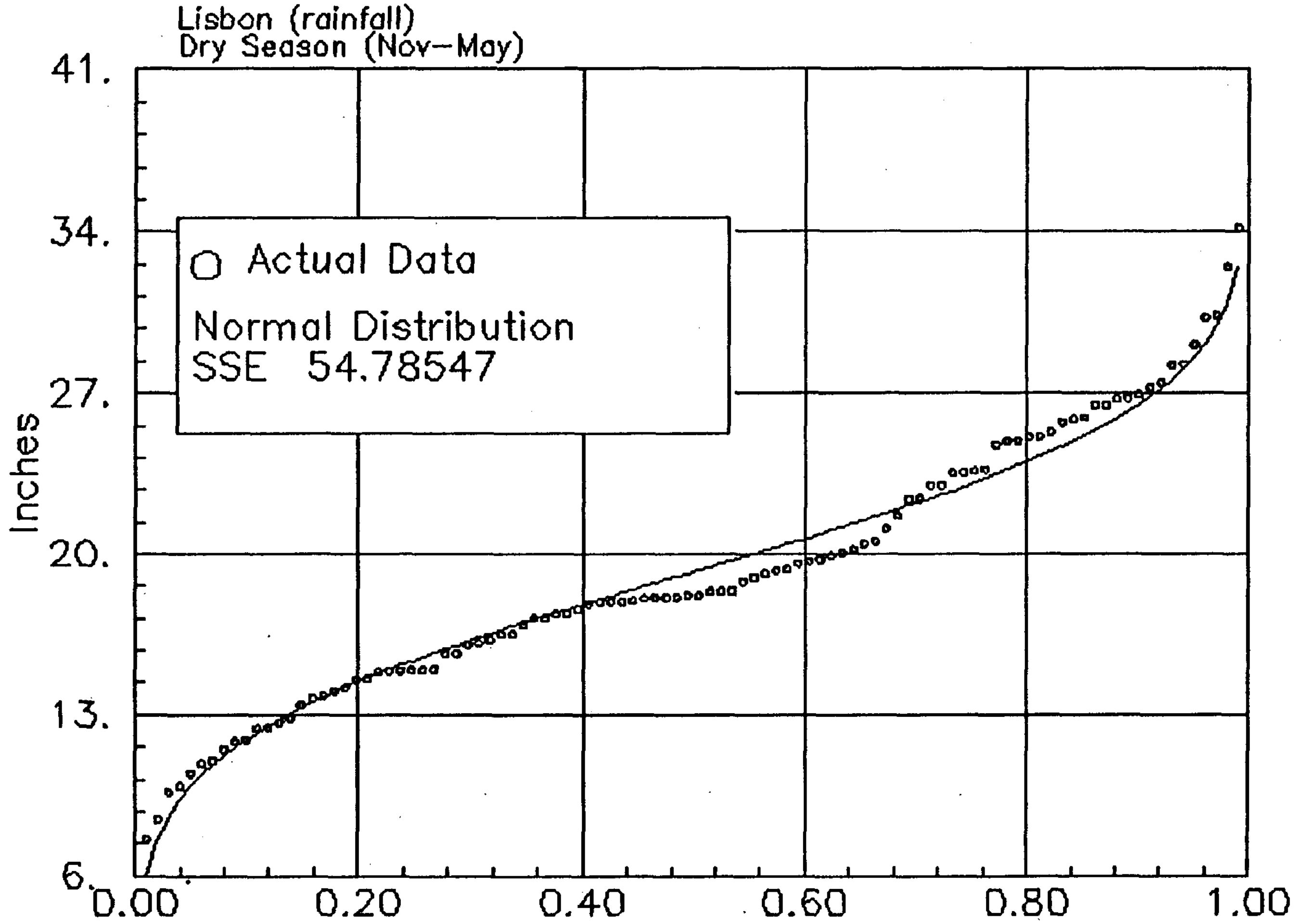


Figure D.4.1 Lisbon, Dry Season rainfall distribution for the years of (1891-1990)

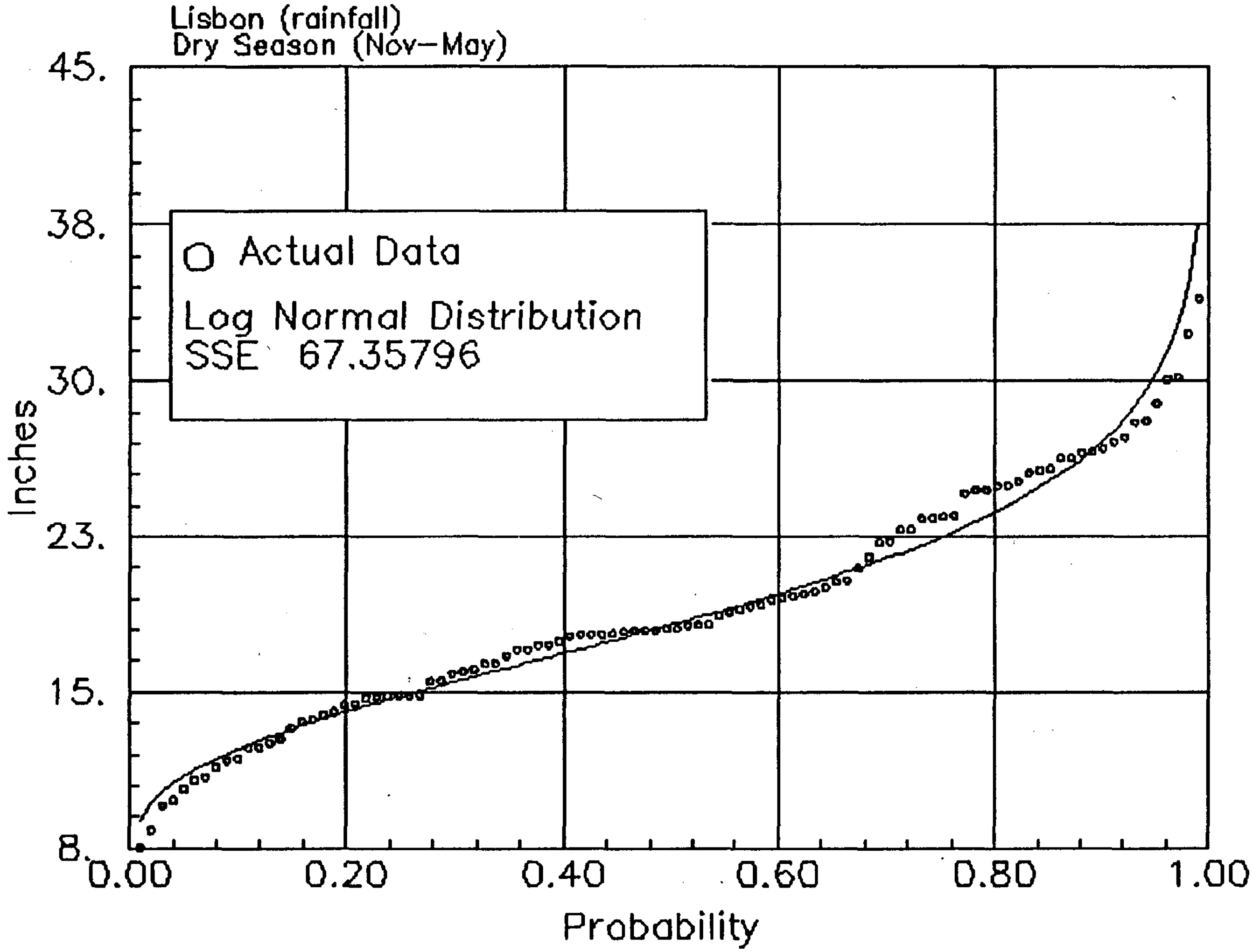


Figure D.4.2 Lisbon, Dry Season rainfall distribution for the years of (1891–1990)

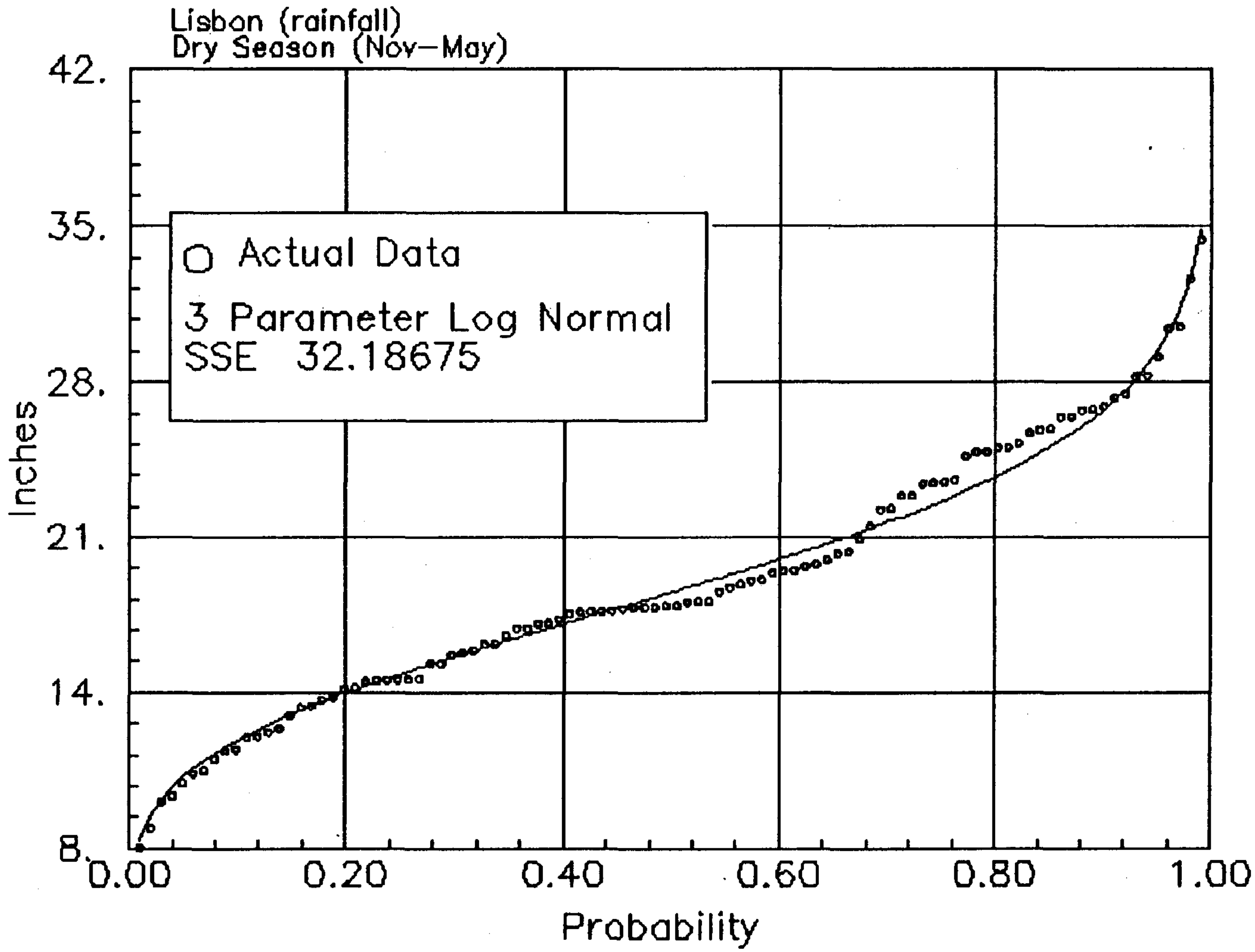


Figure D.4.3 Lisbon, Dry Season rainfall distribution for the years of (1891-1990)

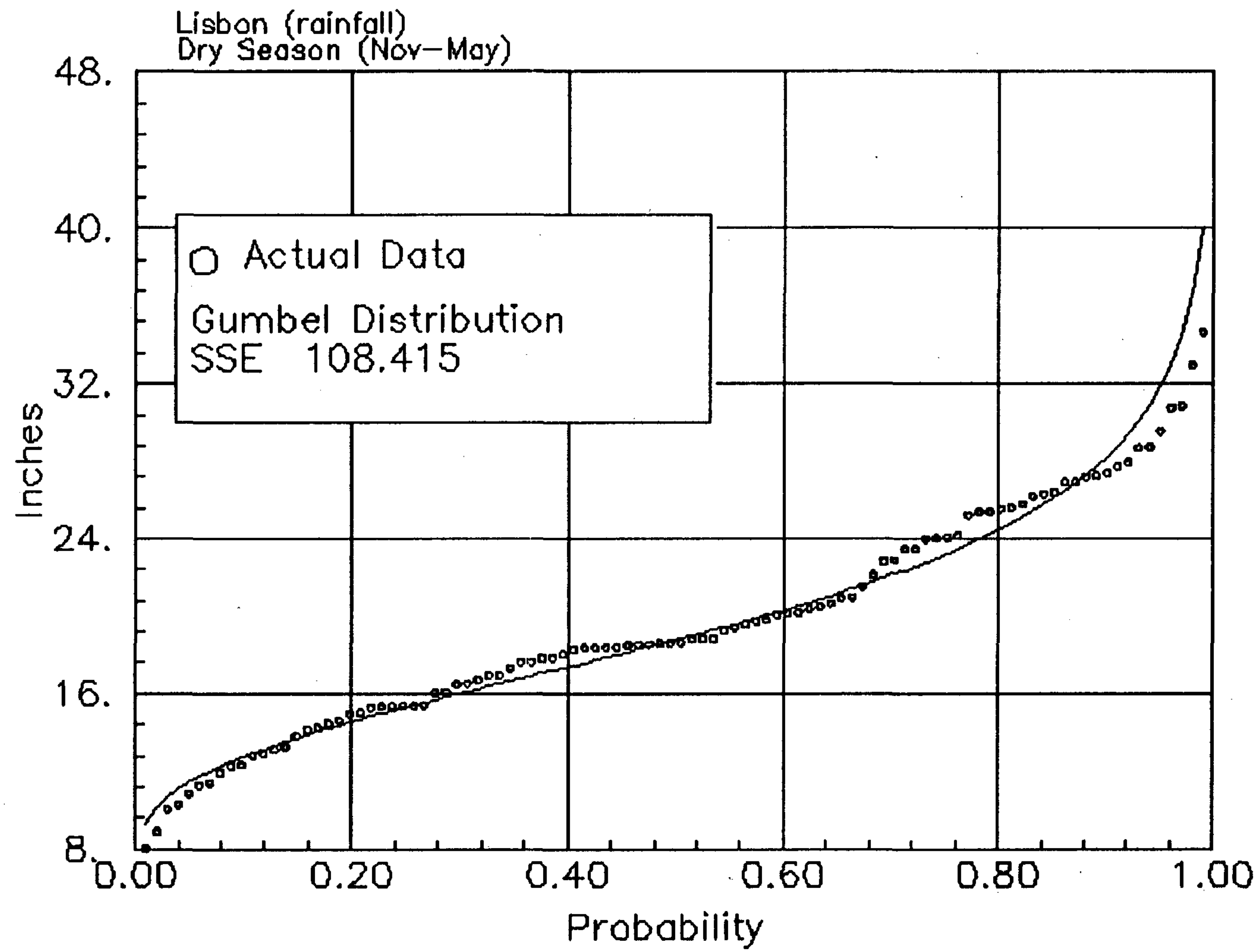


Figure D.4.4 Lisbon, Dry Season rainfall distribution for the years of (1891–1990)

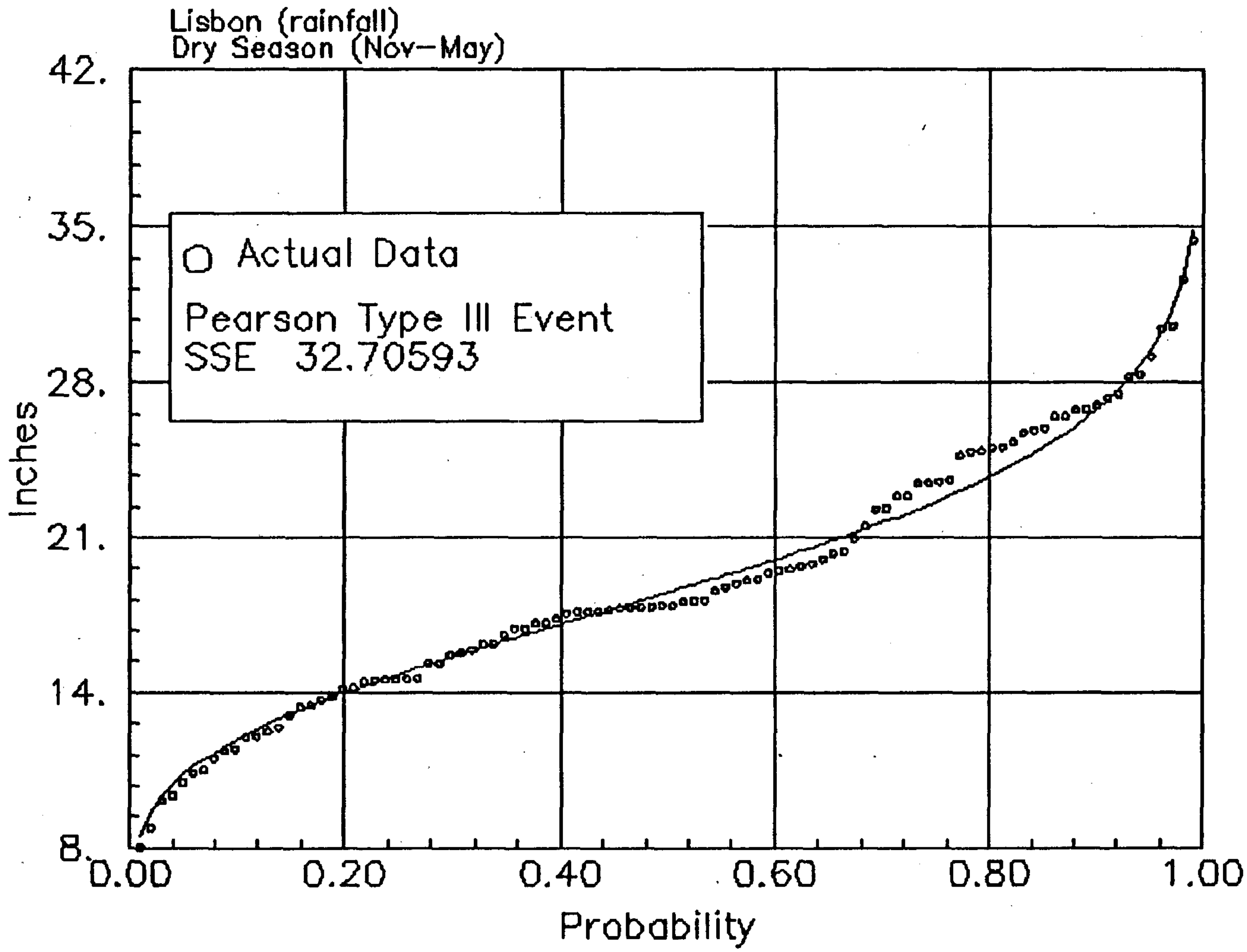


Figure D.4.5 Lisbon, Dry Season rainfall distribution for the years of (1891–1990)

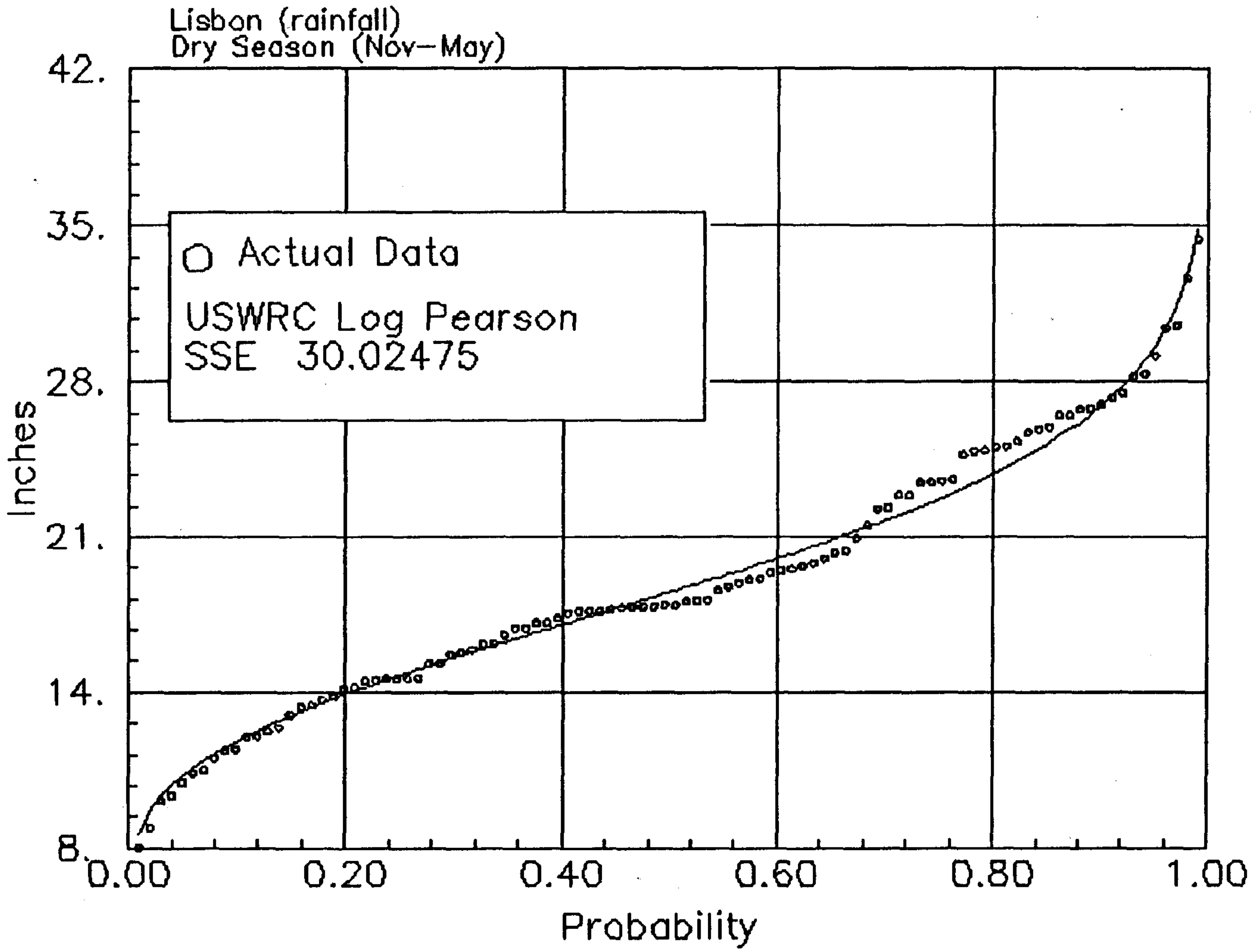


Figure D.4.6 Lisbon, Dry Season rainfall distribution for the years of (1891-1990)

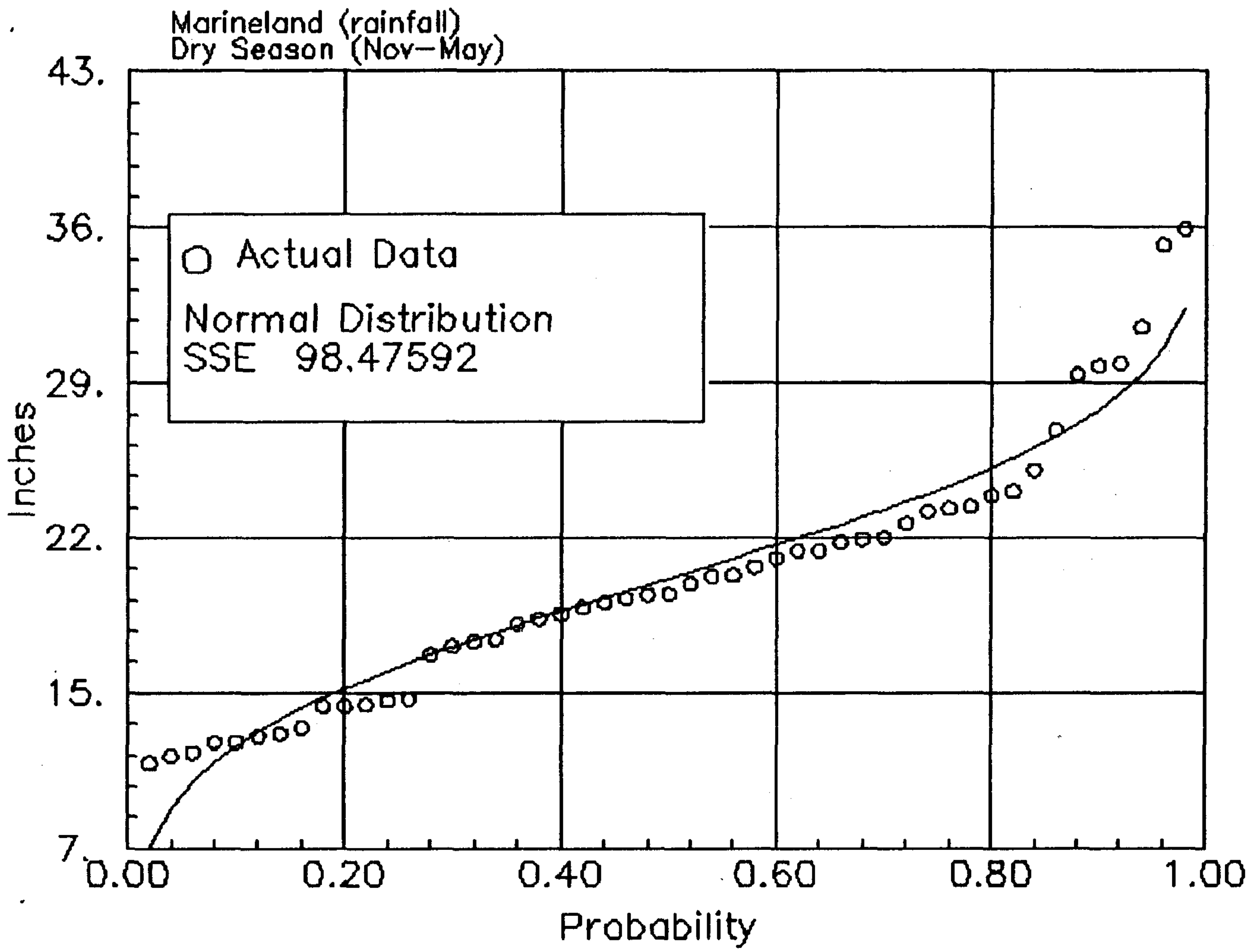


Figure D.5.1 Marineland, Dry Season rainfall distribution for the years of (1942–1990)

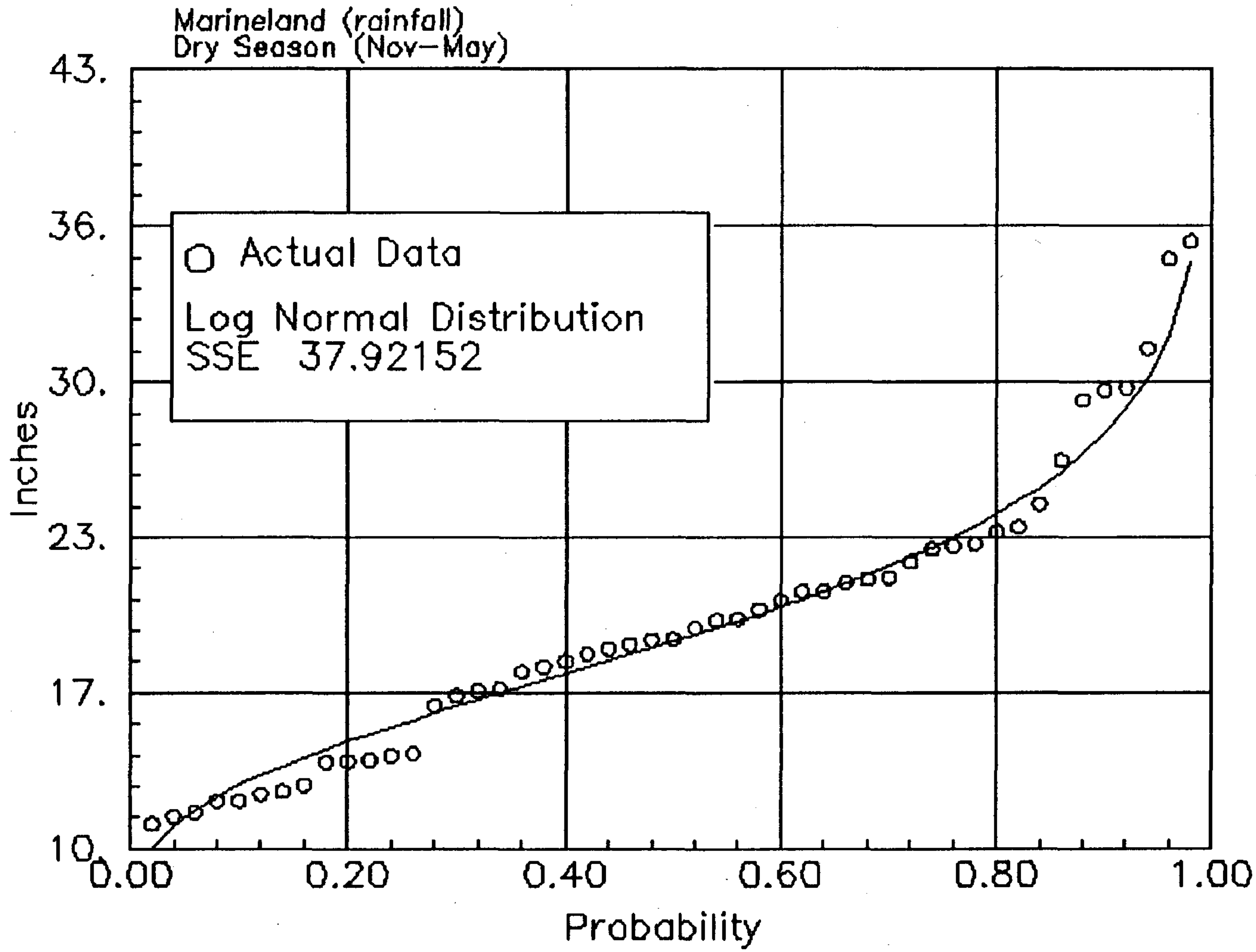


Figure D.5.2 Marineland, Dry Season rainfall distribution for the years of (1942–1990)

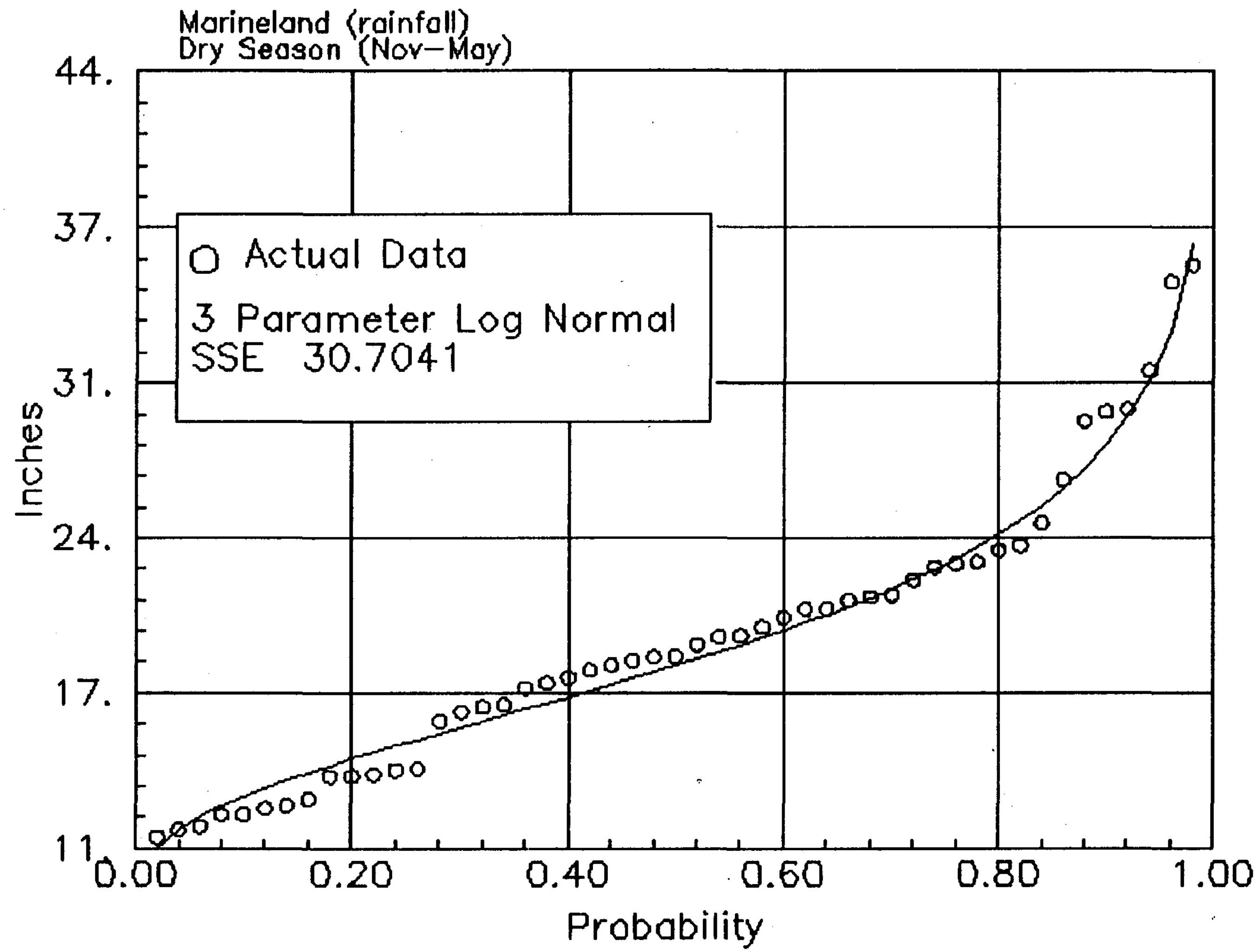


Figure D.5.3 Marineland, Dry Season rainfall distribution for the years of (1942–1990)

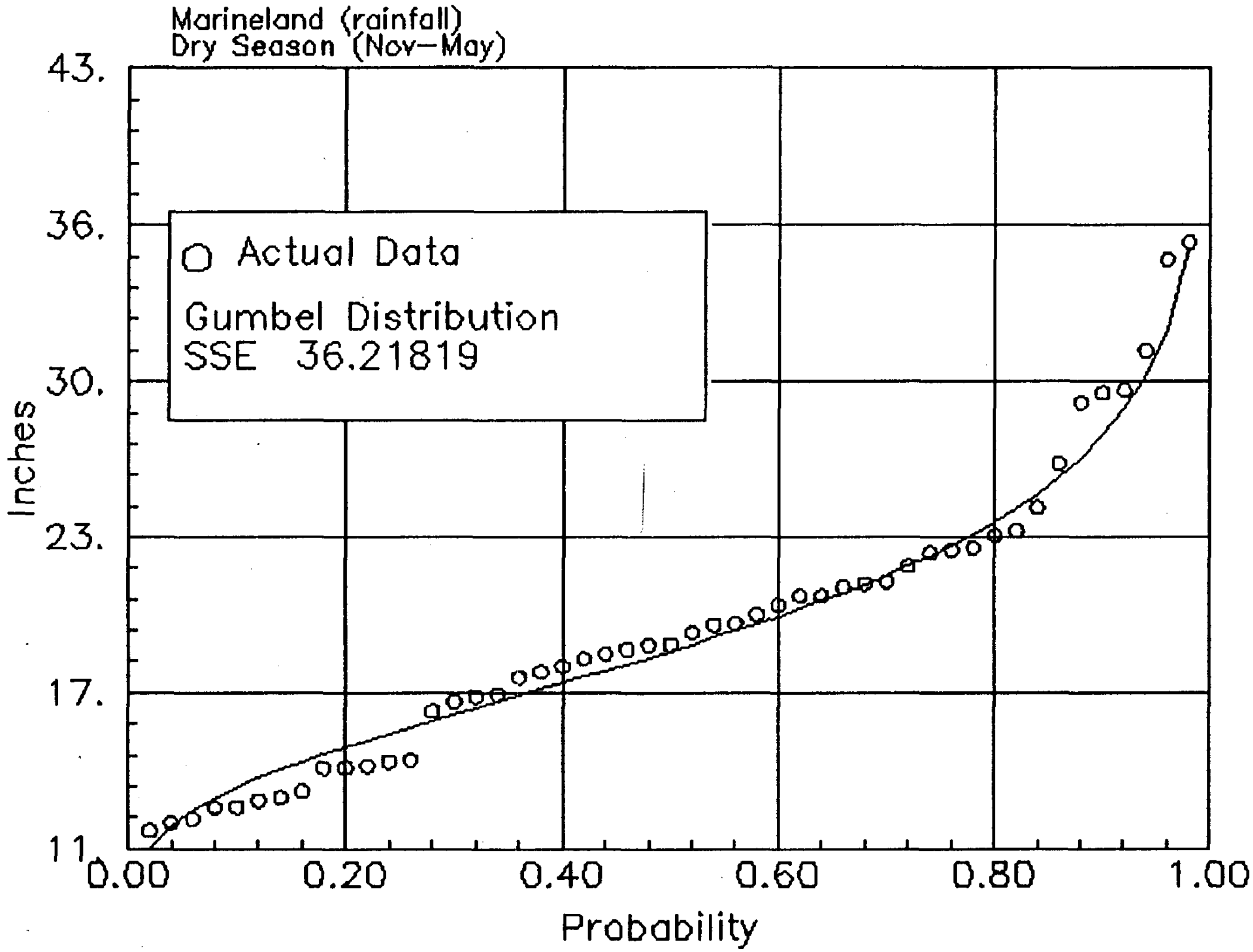


Figure D.5.4 Marineland, Dry Season rainfall distribution for the years of (1942–1990)

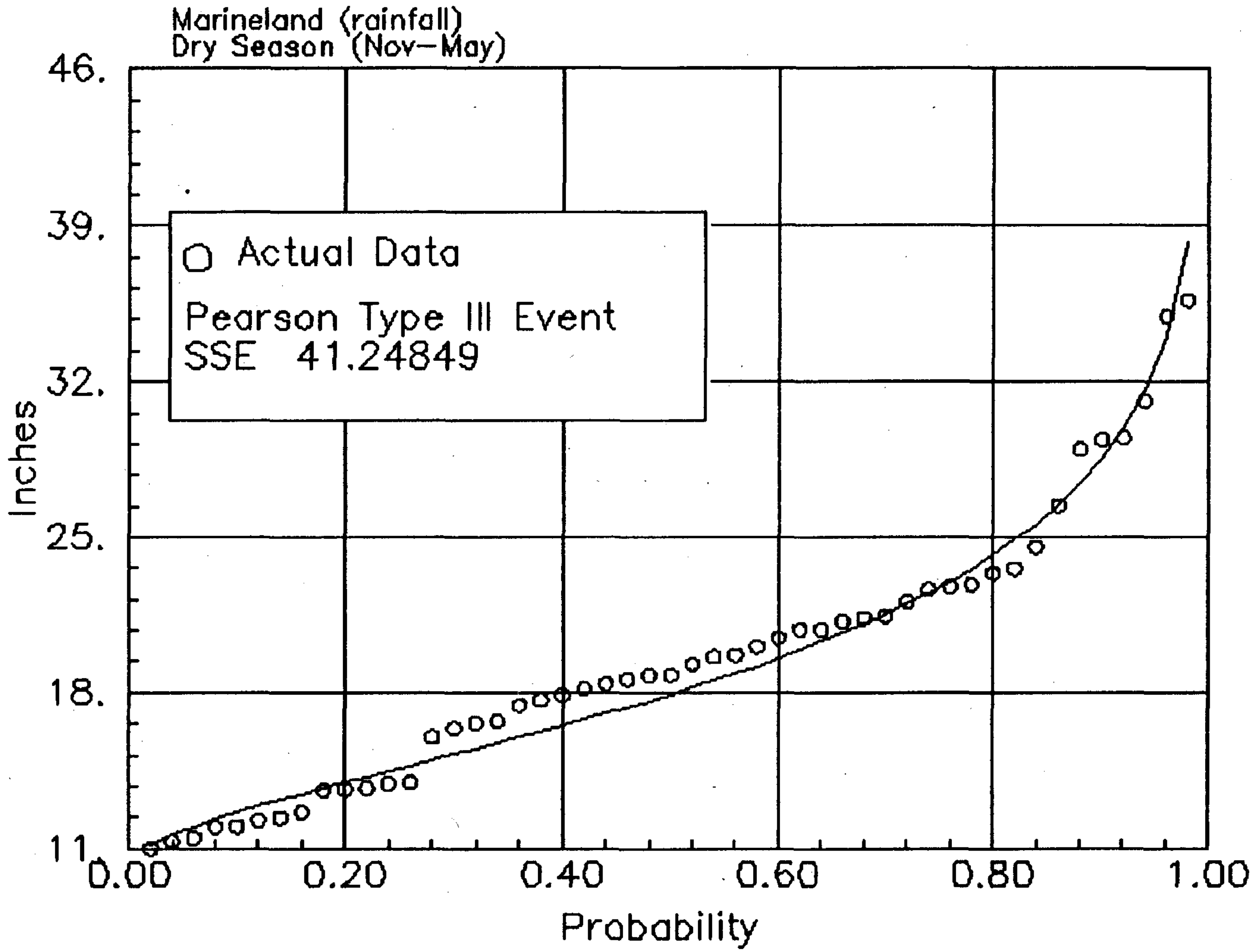


Figure D.5.5 Marineland, Dry Season rainfall distribution for the years of (1942–1990)

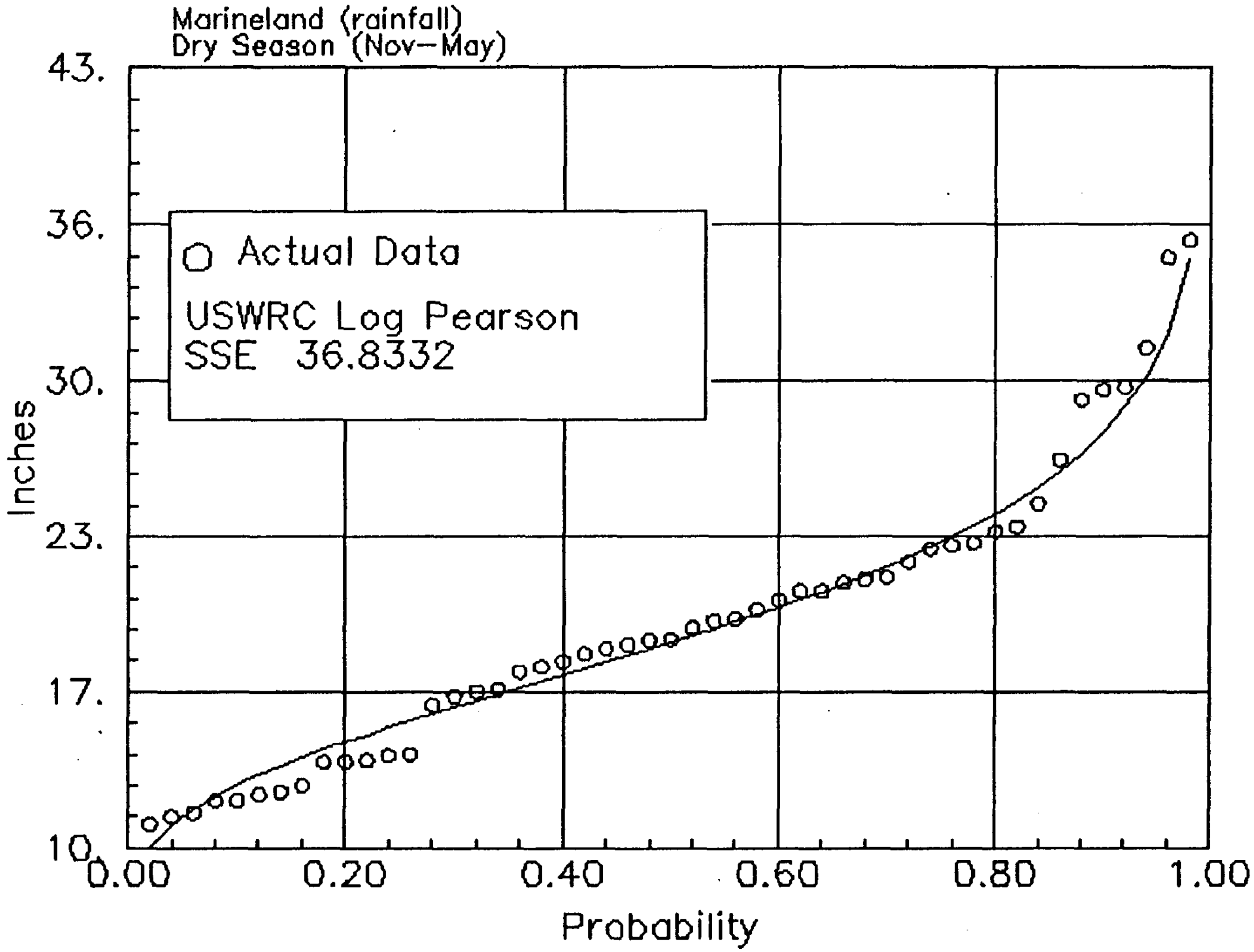


Figure D.5.6 Marineland, Dry Season rainfall distribution for the years of (1942–1990)

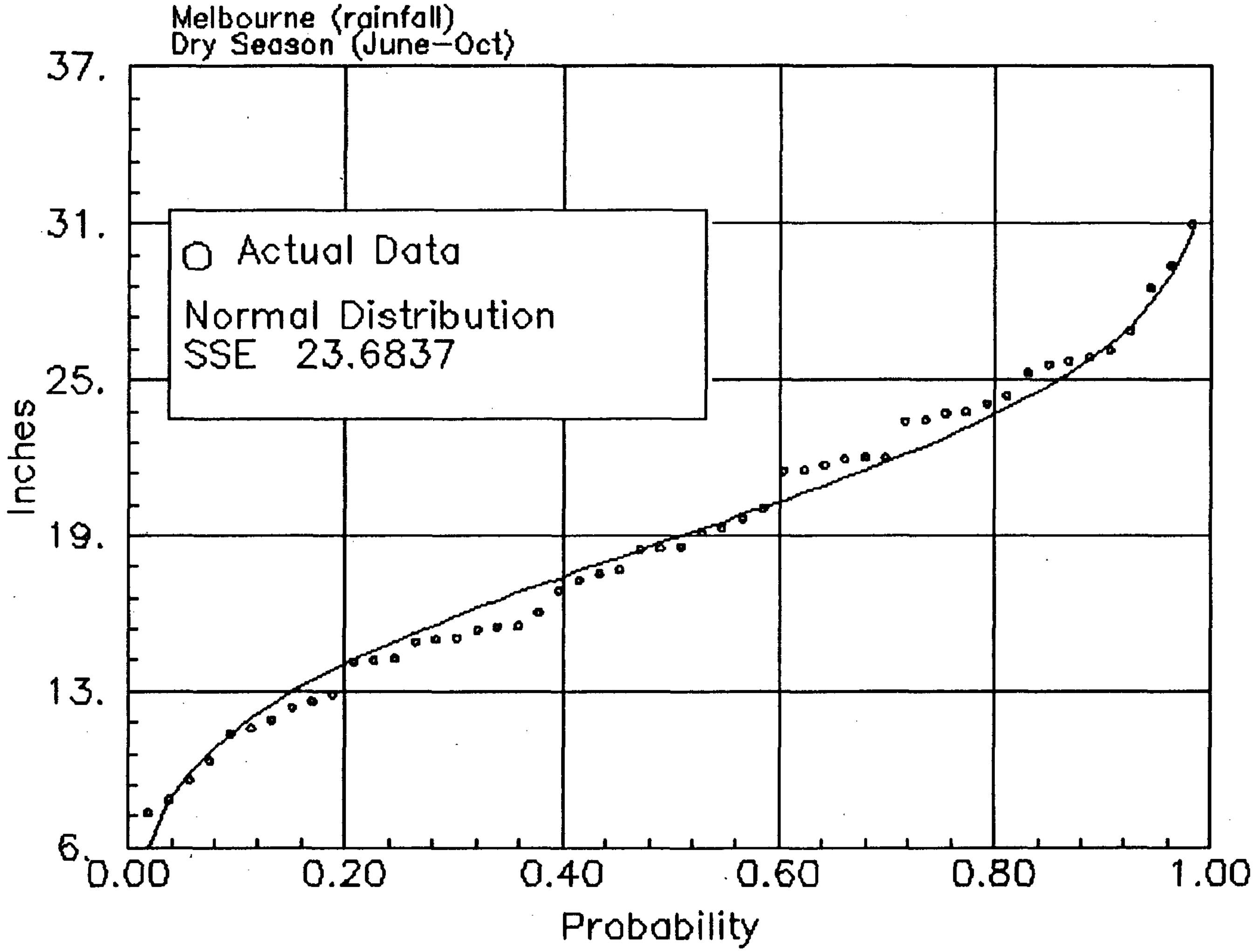


Figure D.6.1 Melbourne, Dry Season rainfall distribution for the years of (1939–1990)

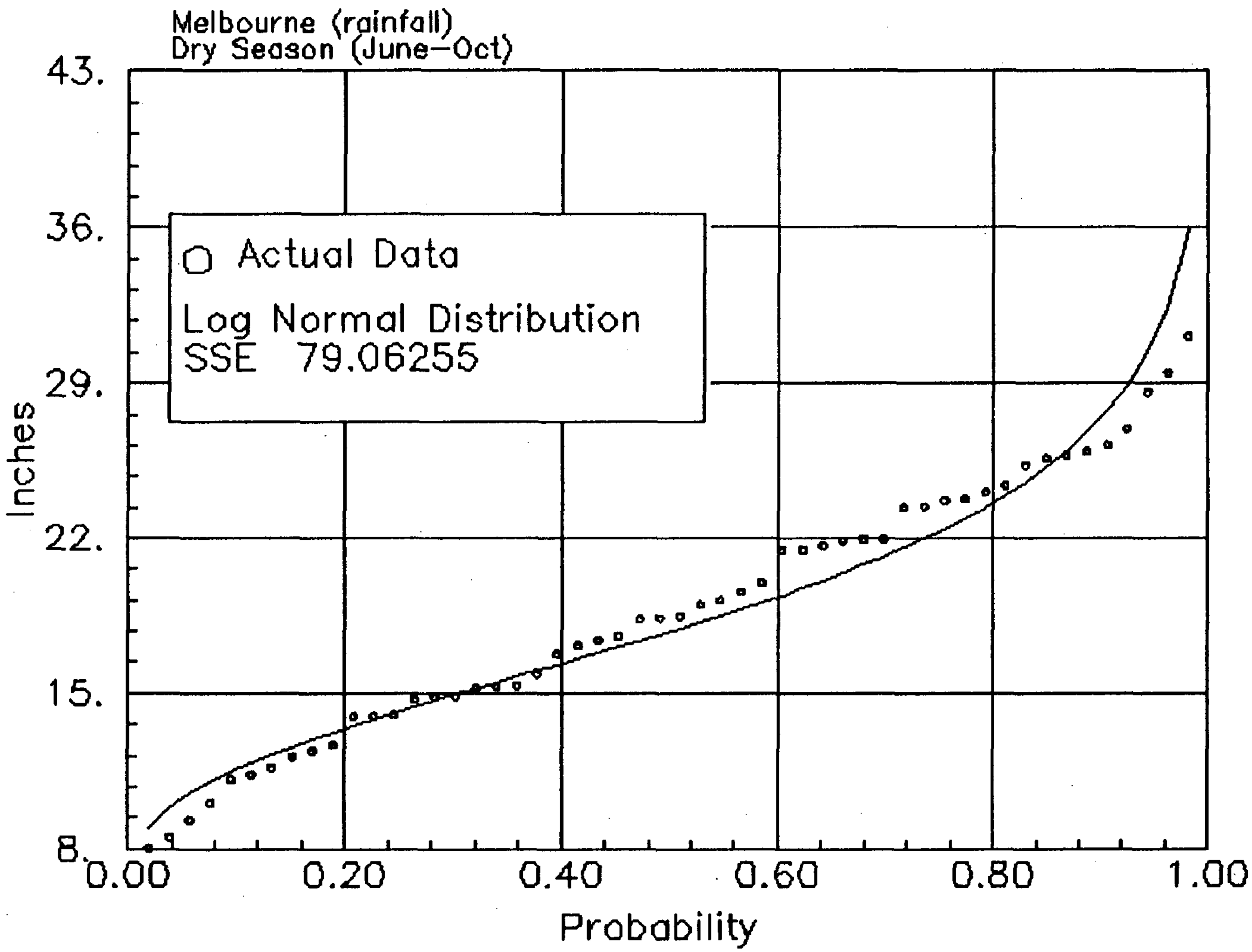


Figure D.6.2 Melbourne, Dry Season rainfall distribution for the years of (1939–1990)

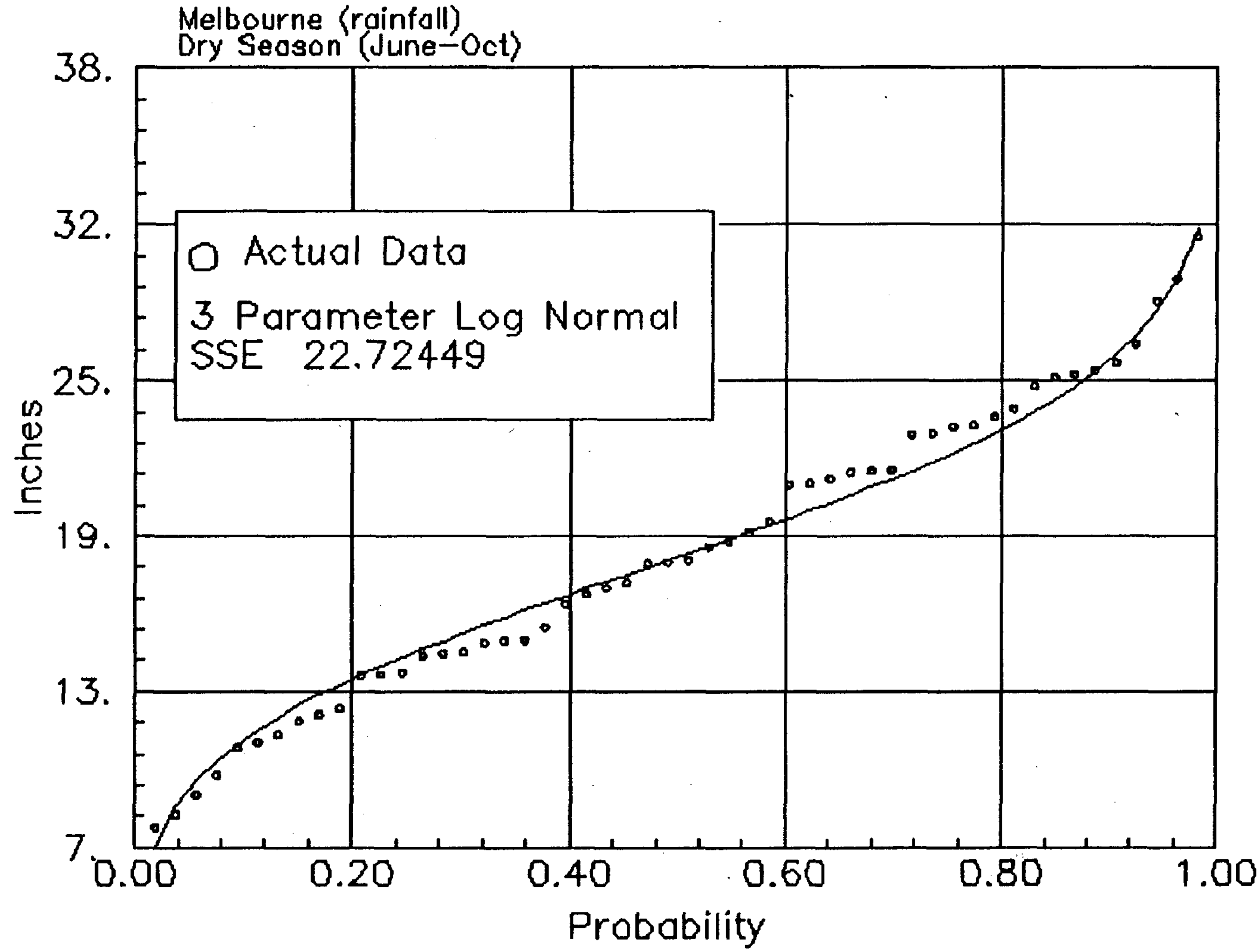


Figure D.6.3 Melbourne, Dry Season rainfall distribution for the years of (1939-1990)

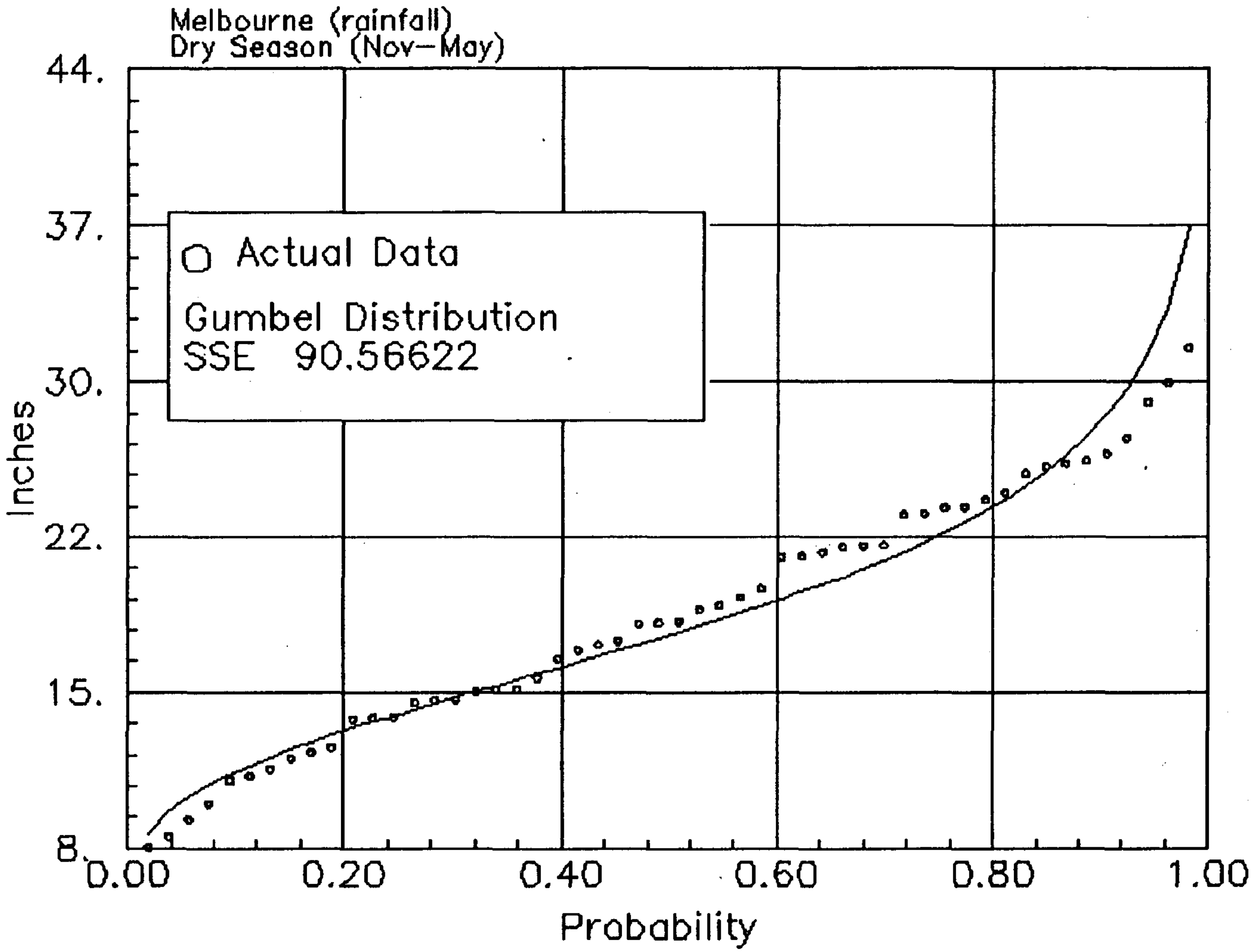


Figure D.6.4 Melbourne, Dry Season rainfall distribution for the years of (1939–1990)

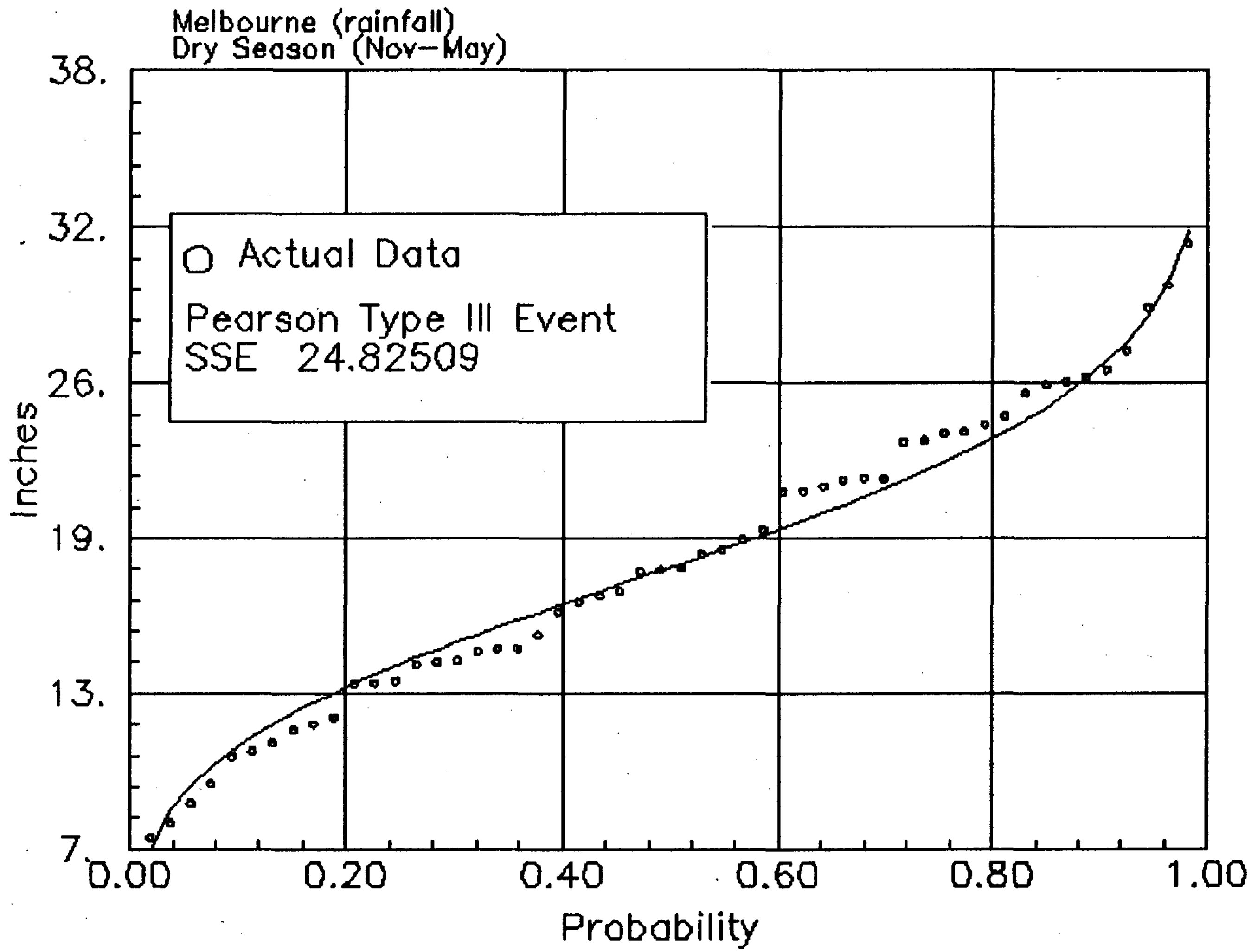


Figure D.6.5 Melbourne, Dry Season rainfall distribution for the years of (1939–1990)

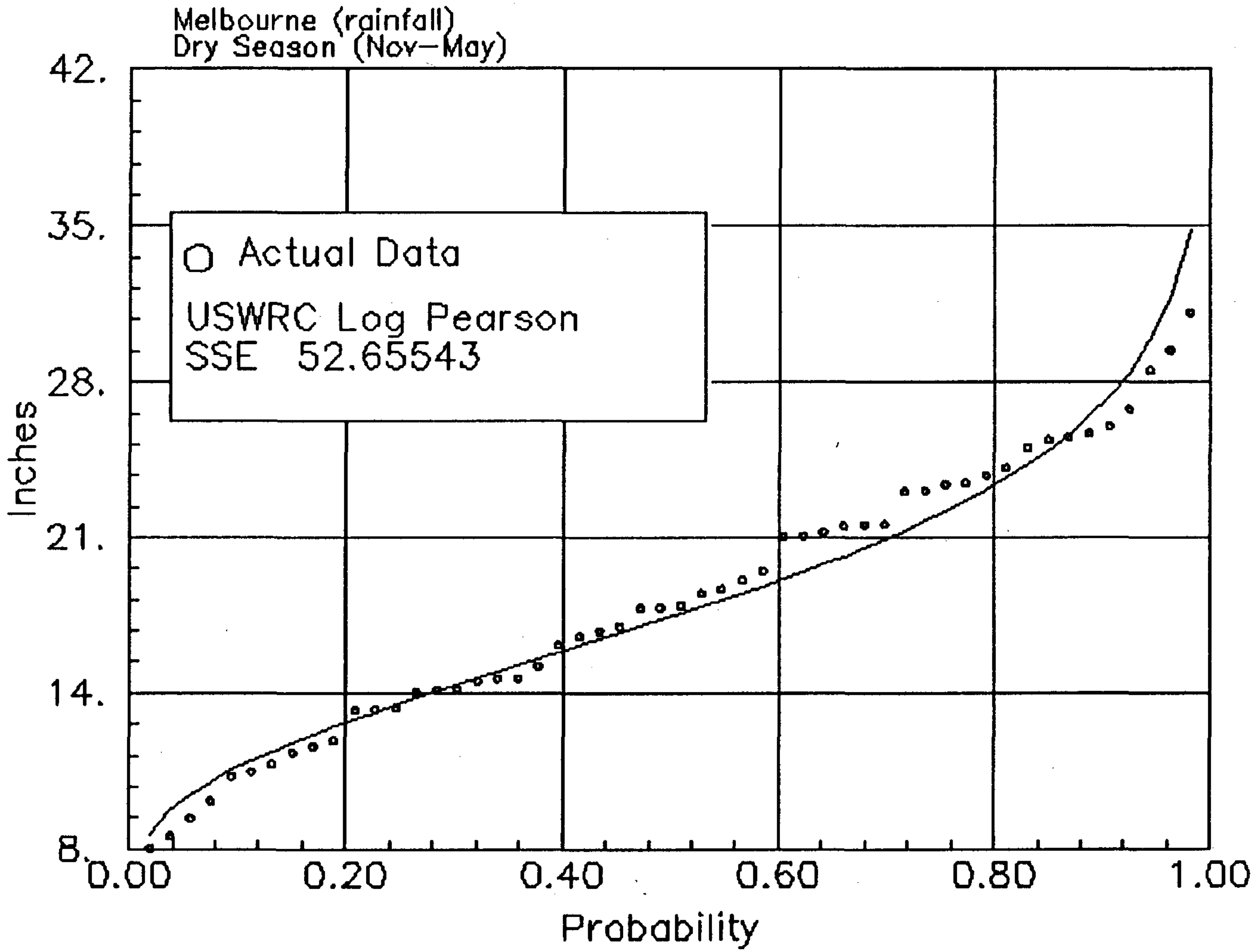


Figure D.6.6 Melbourne, Dry Season rainfall distribution for the years of (1939–1990)

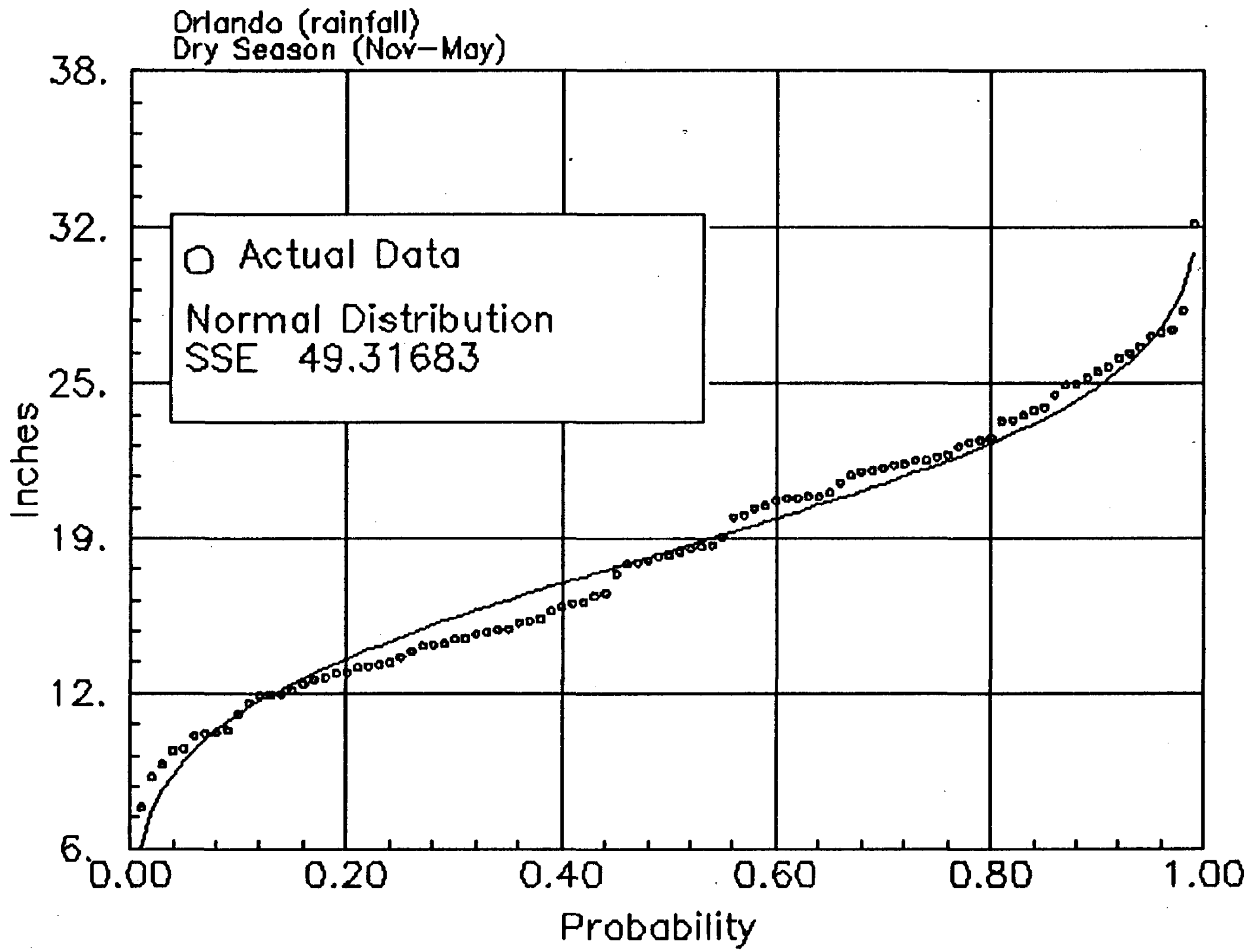


Figure D.7.1 Orlando, Dry Season rainfall distribution for the years of (1892–1990)

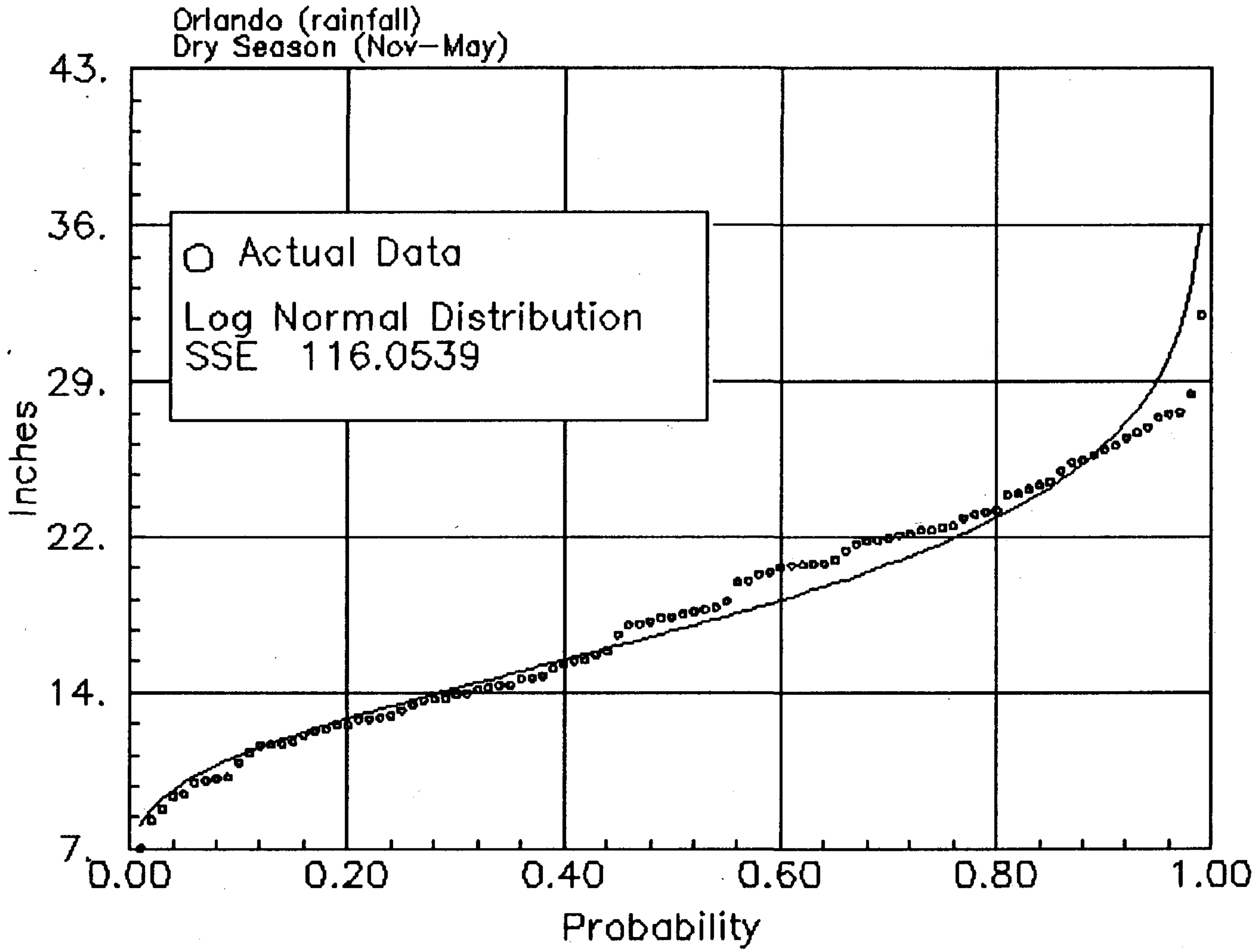


Figure D.7.2 Orlando, Dry Season rainfall distribution for the years of (1892–1990)

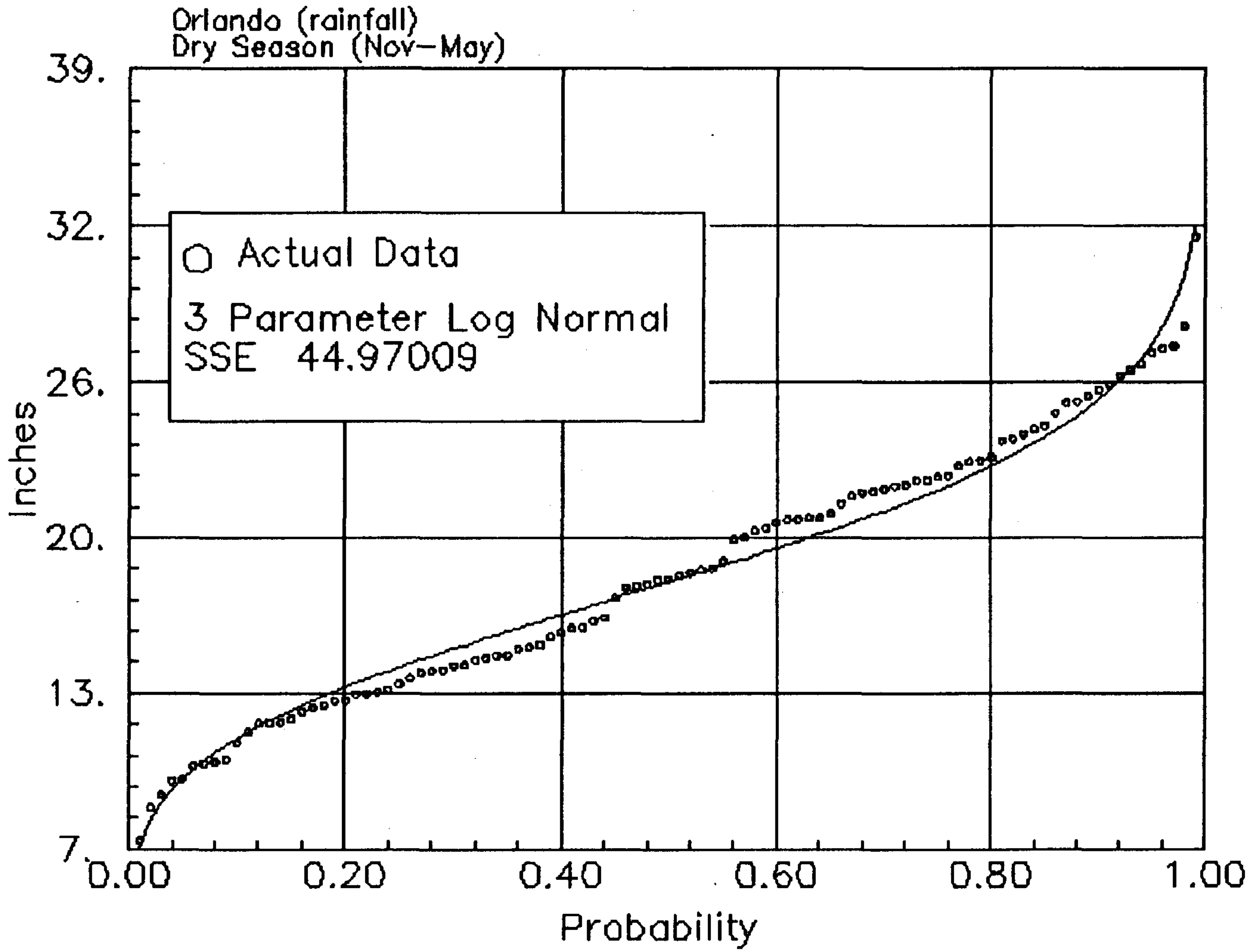


Figure D.7.3 Orlando, Dry Season rainfall distribution for the years of (1892–1990)

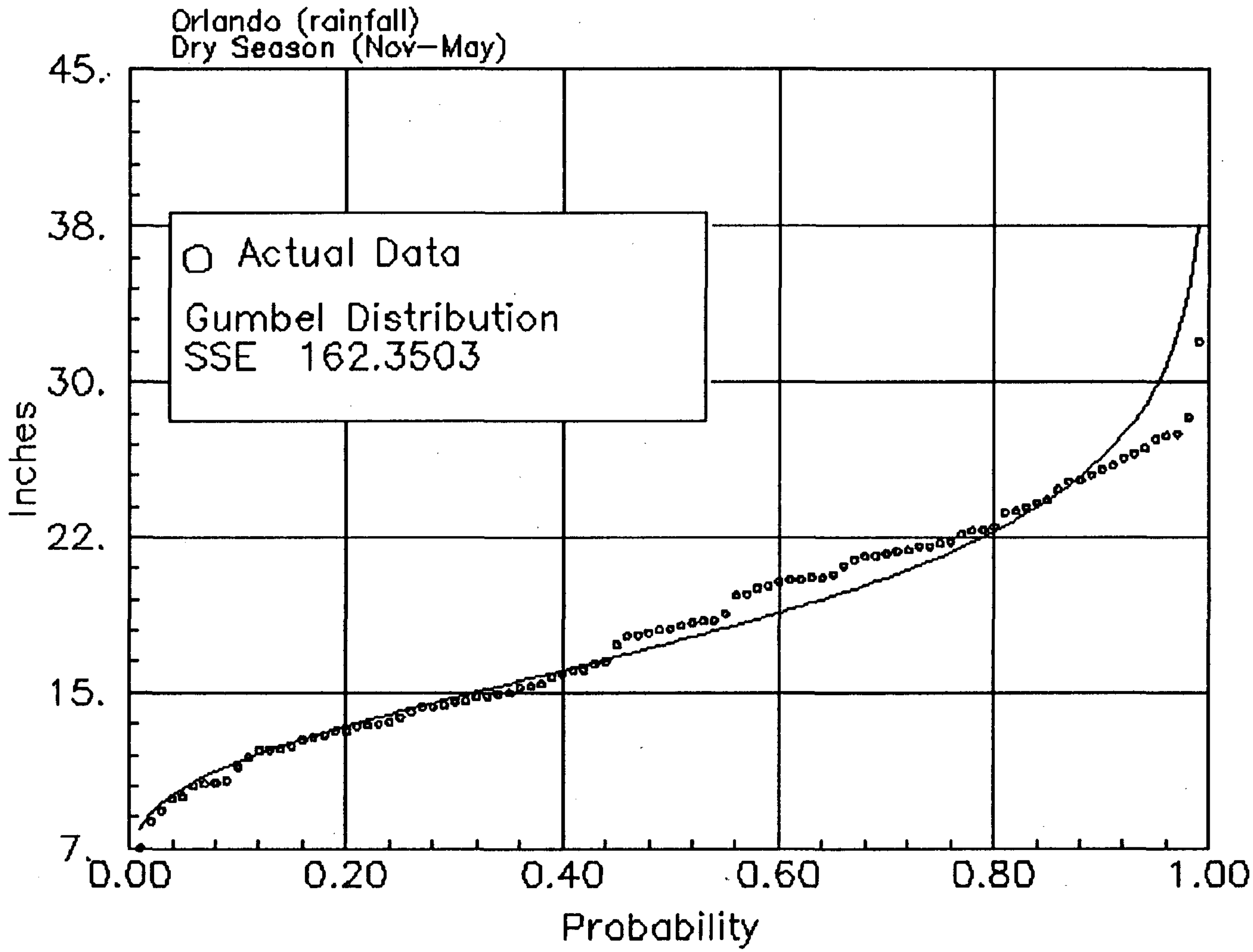


Figure D.7.4 Orlando, Dry Season rainfall distribution for the years of (1892–1990)

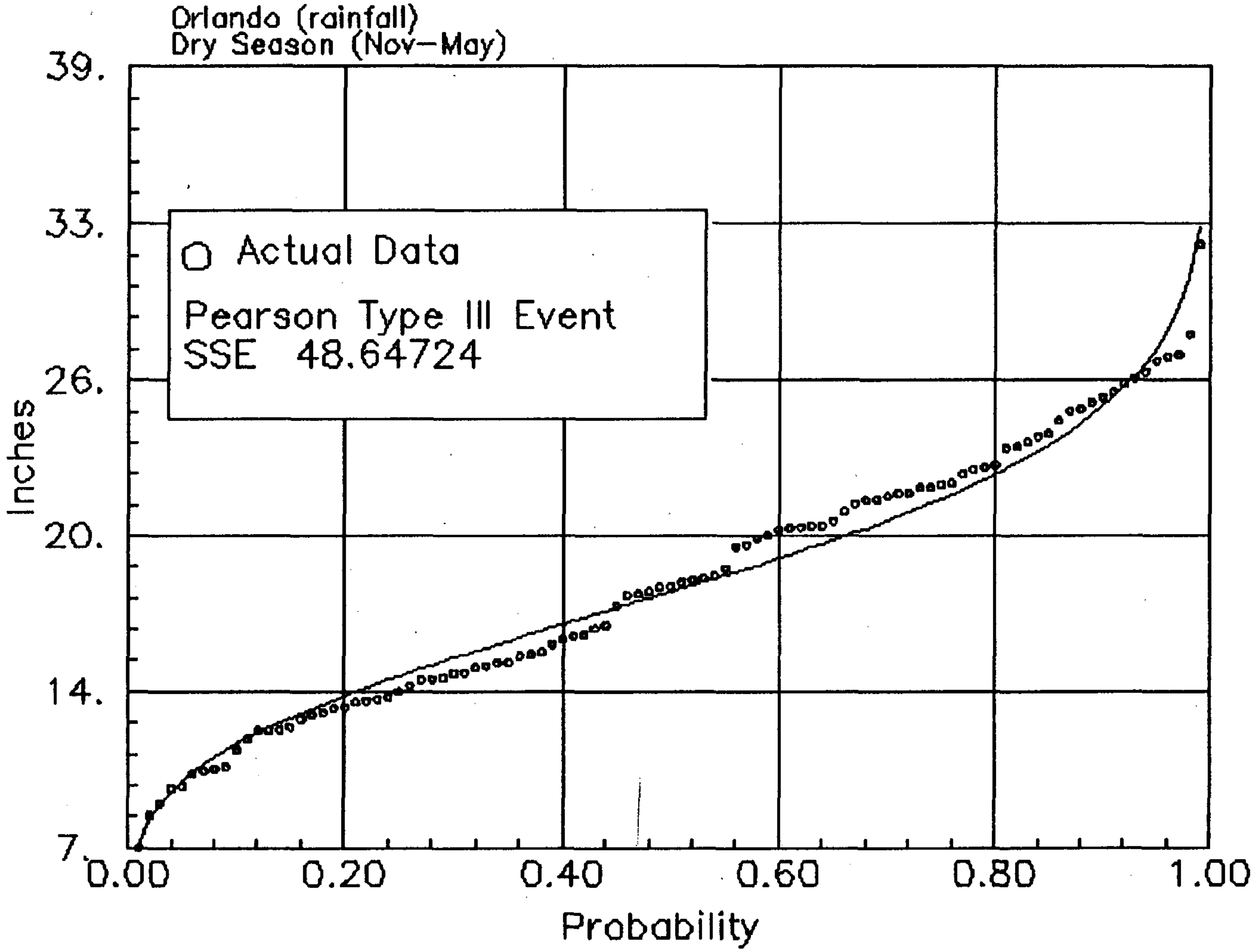


Figure D.7.5 Orlando, Dry Season rainfall distribution for the years of (1892–1990)

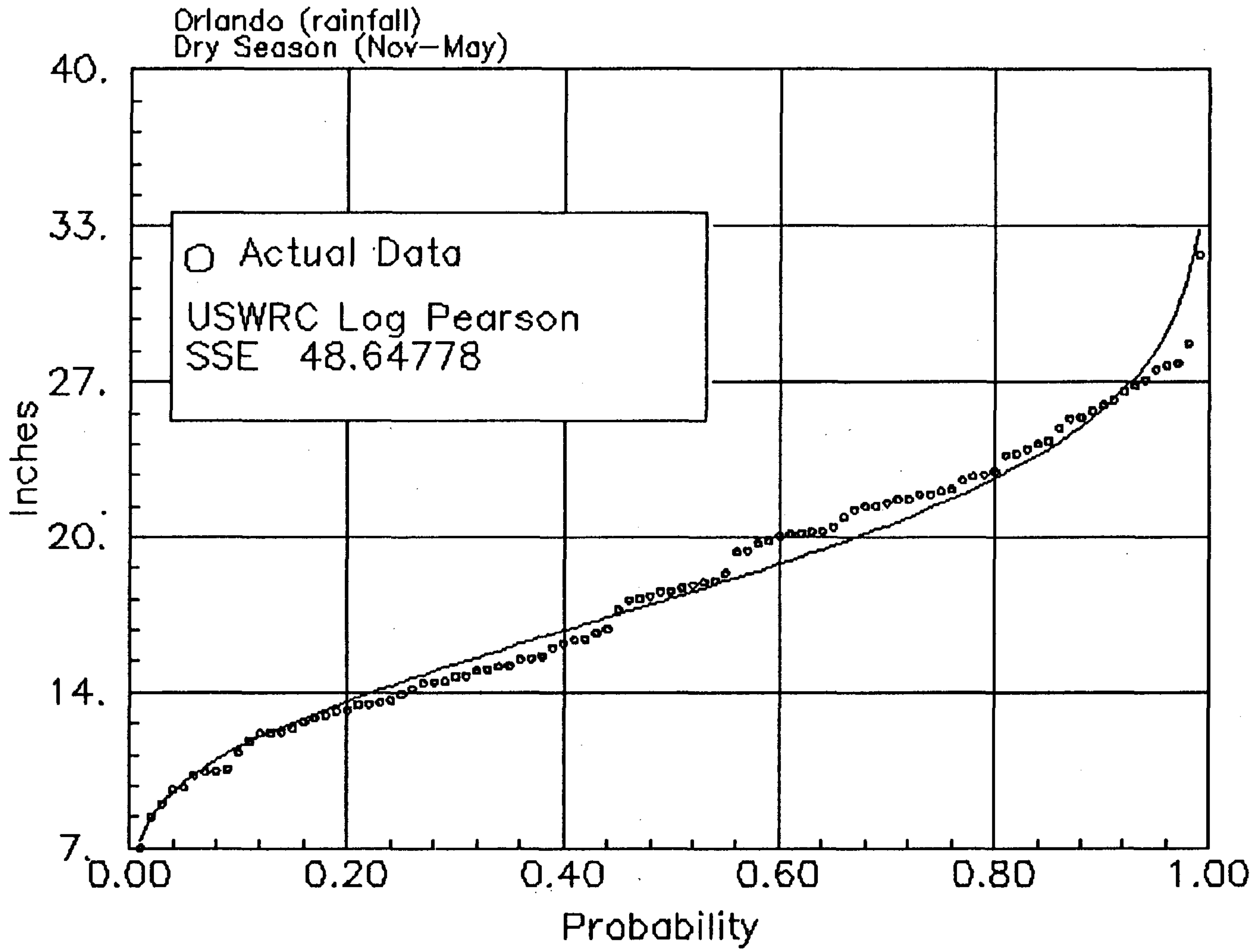


Figure D.7.6 Orlando, Dry Season rainfall distribution for the years of (1892-1990)

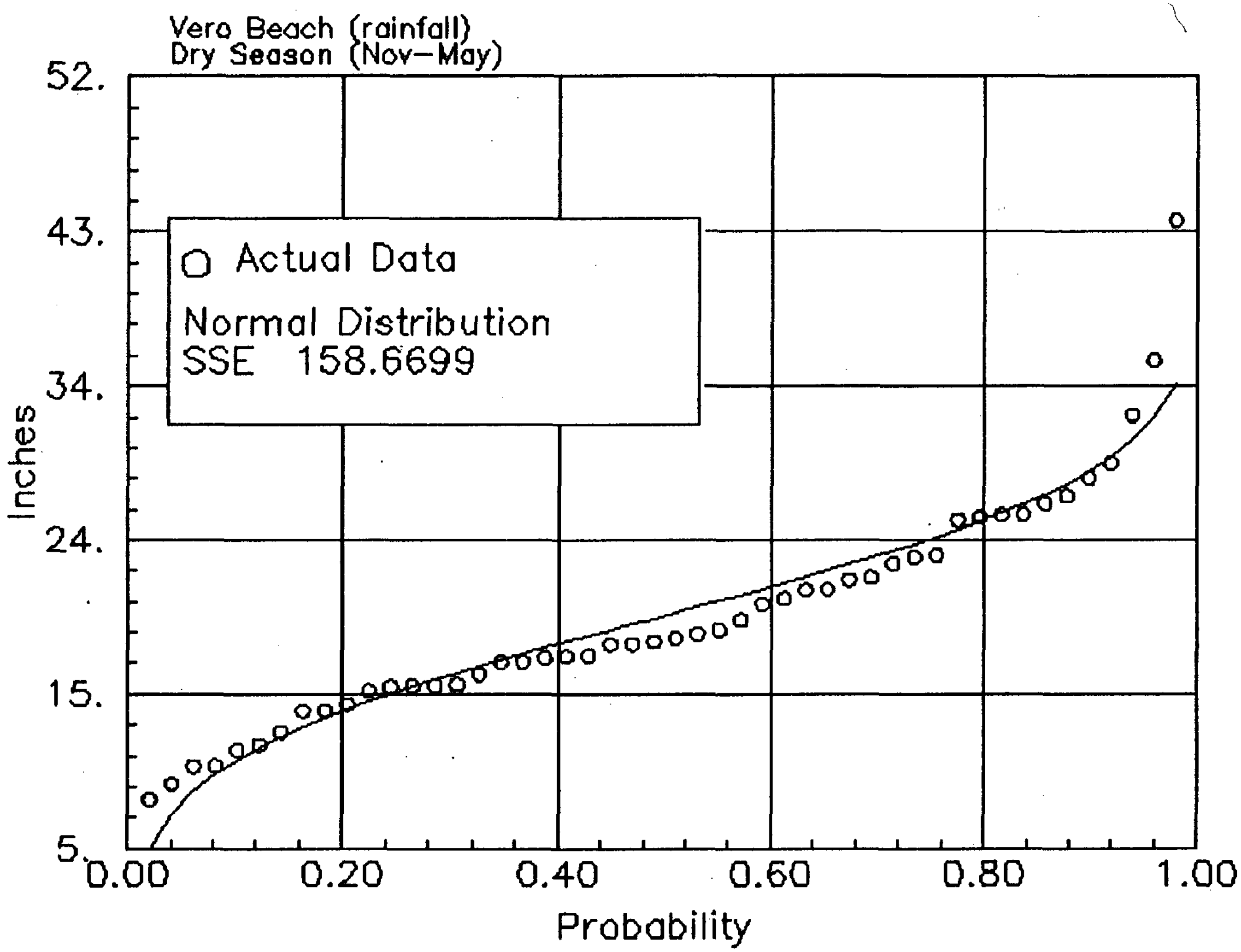


Figure D.8.1 Vero Beach, Dry Season rainfall distribution for the years of (1943-1990)

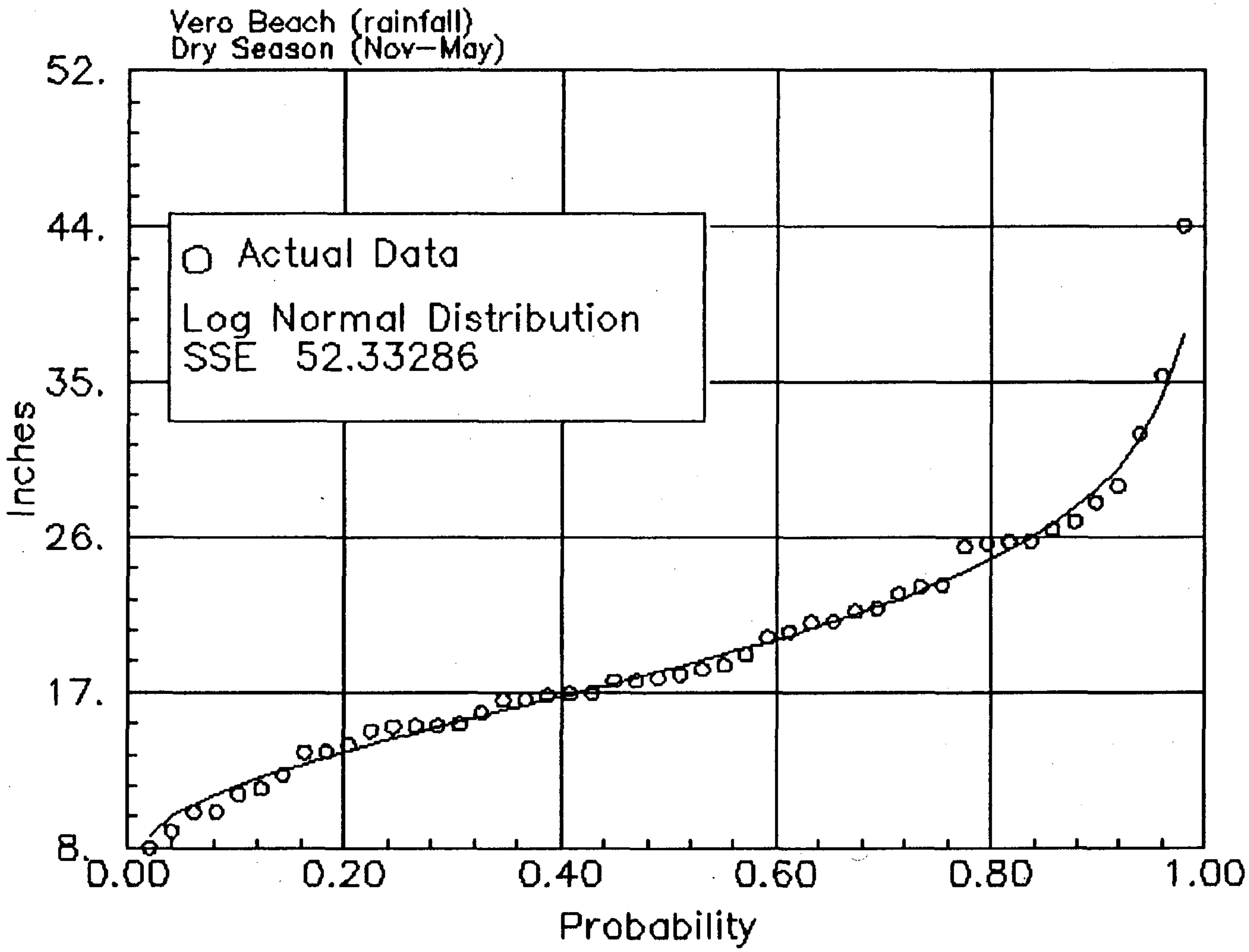


Figure D.8.2 Vero Beach, Dry Season rainfall distribution for the years of (1943–1990)

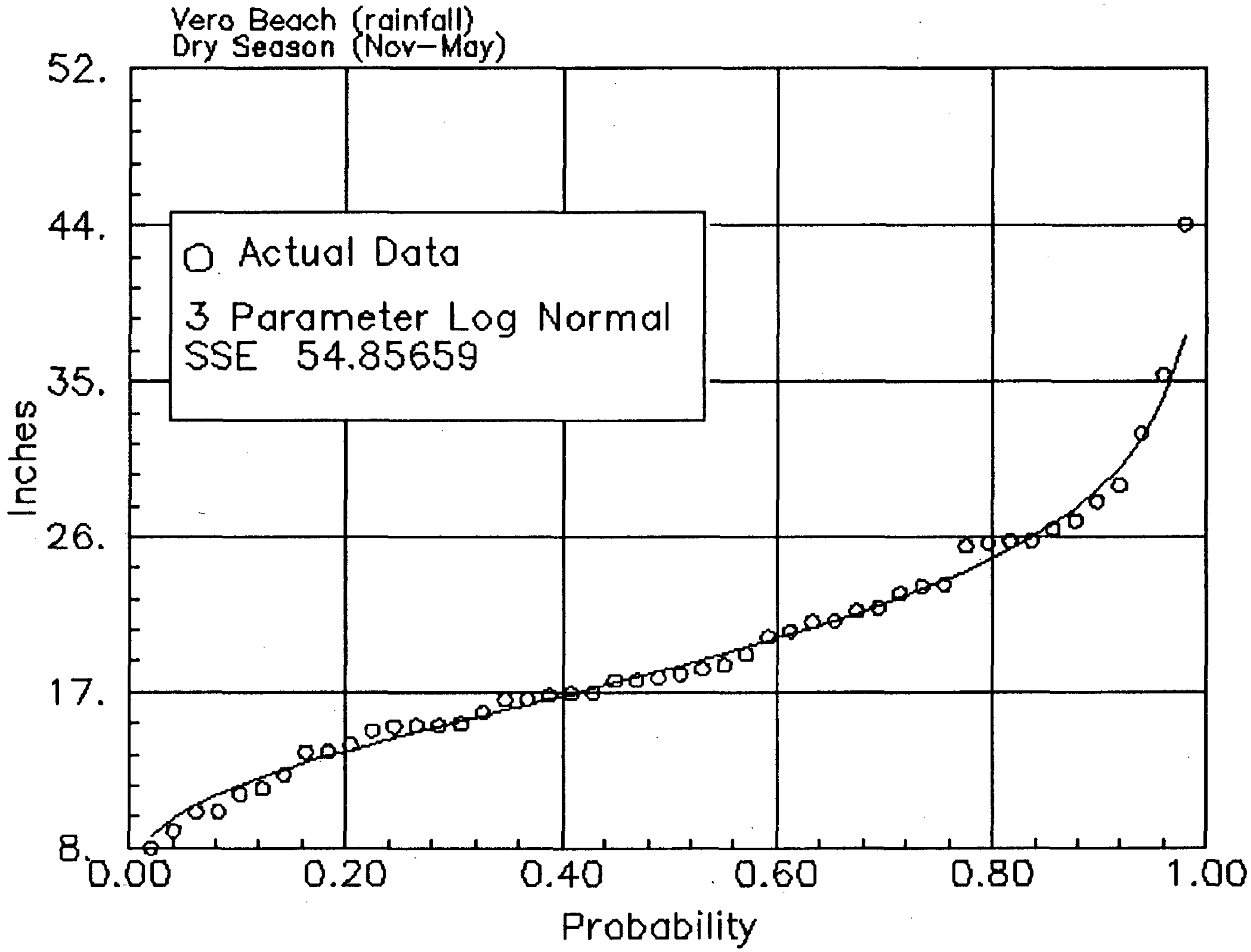


Figure D.8.3 Vero Beach, Dry Season rainfall distribution for the years of (1943–1990)

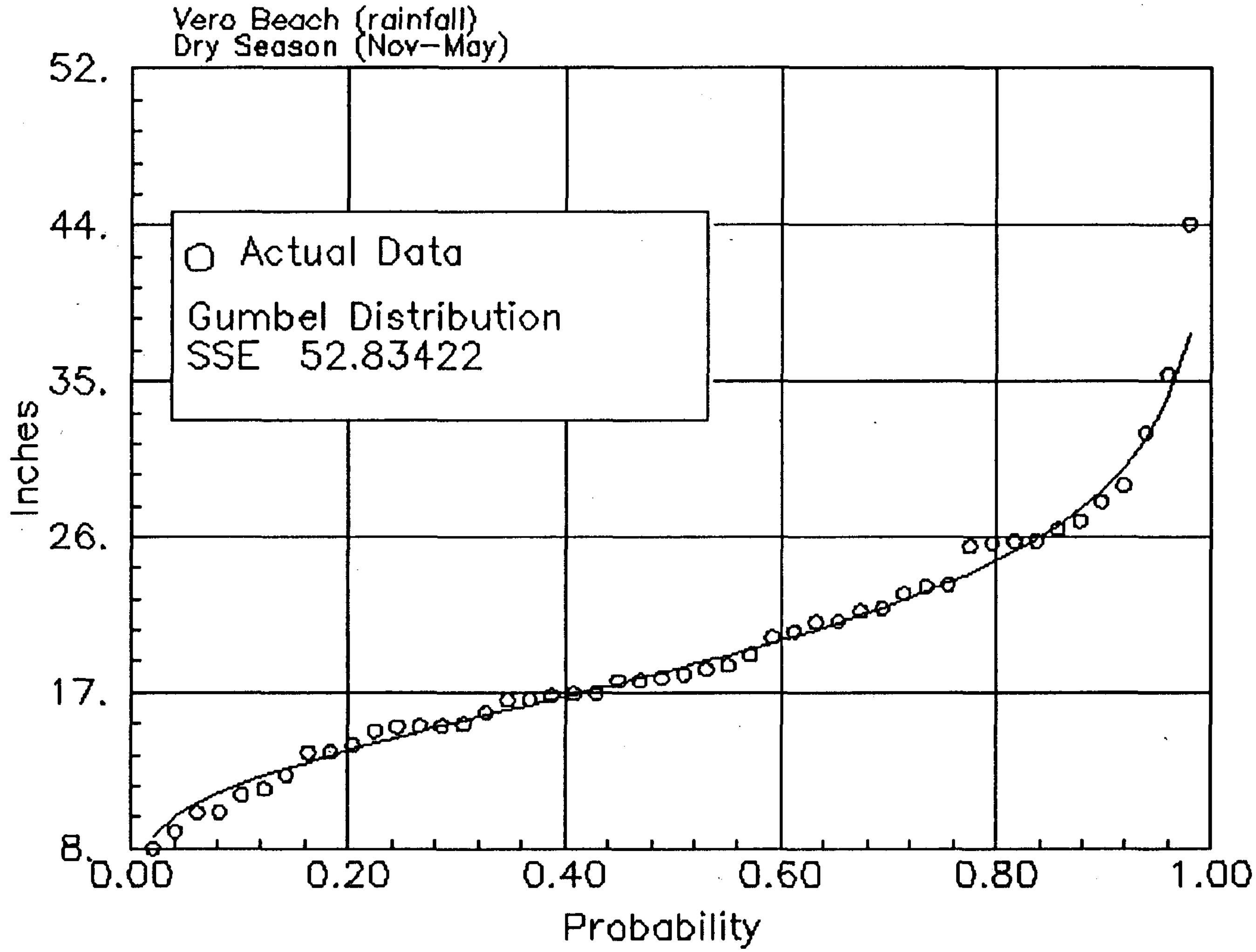


Figure D.8.4 Vero Beach, Dry Season rainfall distribution for the years of (1943–1990)

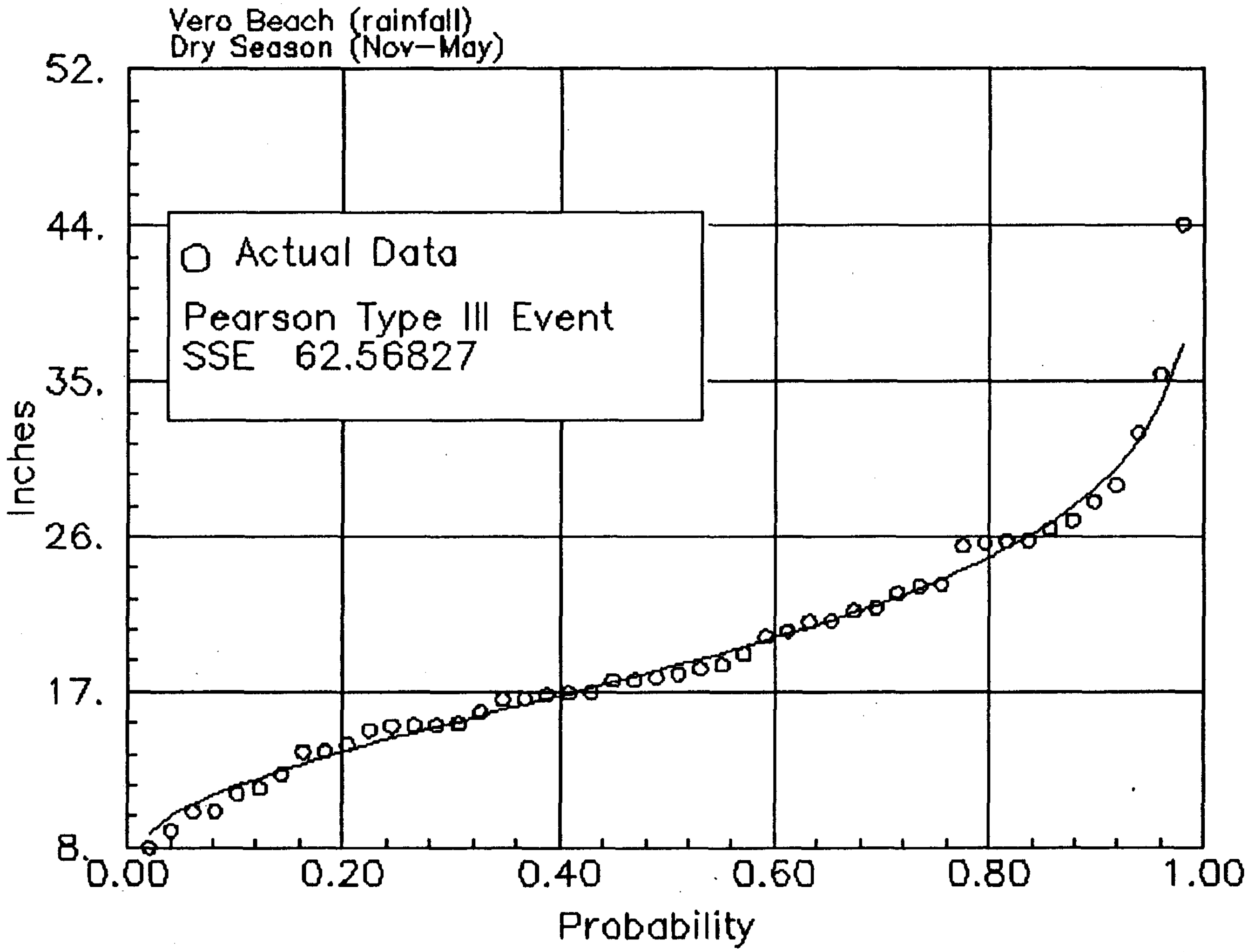


Figure D.8.5 Vero Beach, Dry Season rainfall distribution for the years of (1943–1990)

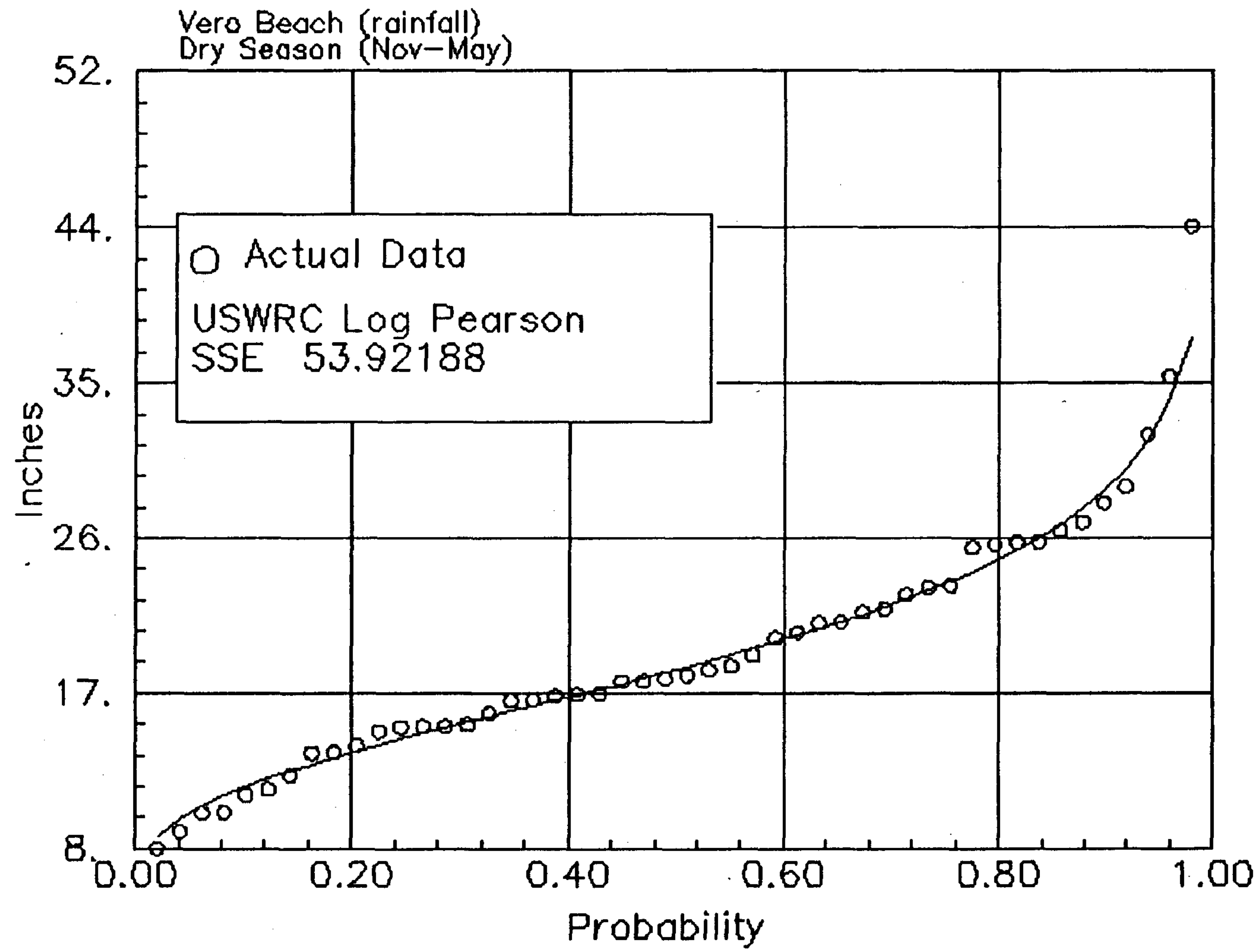


Figure D.8.6 Vero Beach, Dry Season rainfall distribution for the years of (1943—1990)

Table D.1 Statistical Comparison For Dry Season Rainfall

Daytona Beach

	SSE	Rank	Standard Error	Rank	Kolmogorov	Rank	Chi-Square	Rank	Graphical Rank
Normal Distribution	99.97	6	1.21	5	0.059	1	3.03	5	6
Log Normal Distribution	39.02	4	0.76	4	0.059	1	2.00	2	1
3 Parameter Log Normal	36.79	2	0.74	2	0.059	1	0.97	1	1
Gumbel Distribution	39.56	5	0.76	4	0.059	1	12.91	6	1
Pearson Type III Event	38.20	3	0.75	3	0.059	1	2.21	3	1
USWRC Log Pearson	36.17	1	0.73	1	0.059	1	2.21	3	1

Gainesville

	SSE	Rank	Standard Error	Rank	Kolmogorov	Rank	Chi-Square	Rank	Graphical Rank
Normal Distribution	89.14	5	0.97	5	0.096	1	11.149	2	6
Log Normal Distribution	62.61	4	0.82	4	0.149	5	10.553	1	1
3 Parameter Log Normal	47.20	2	0.71	1	0.128	2	13.234	5	1
Gumbel Distribution	96.96	6	1.02	6	0.149	6	13.532	6	5
Pearson Type III Event	48.19	3	0.72	3	0.128	2	11.745	3	1
USWRC Log Pearson	46.88	1	0.71	1	0.128	2	11.745	3	1

Jacksonville

	SSE	Rank	Standard Error	Rank	Kolmogorov	Rank	Chi-Square	Rank	Graphical Rank
Normal Distribution	108.58	6	0.94	6	0.089	1	5.2742	5	6
Log Normal Distribution	32.02	3	0.51	2	0.137	5	2.2258	1	1
3 Parameter Log Normal	28.42	1	0.48	1	0.113	2	4.4839	4	1
Gumbel Distribution	66.67	5	0.73	5	0.137	5	11.2581	6	5
Pearson Type III Event	31.70	2	0.51	2	0.113	2	3.6935	2	1
USWRC Log Pearson	32.91	4	0.52	4	0.113	2	3.6935	2	1

Table D.1 (continued)

Lisbon

	SSE	Rank	Standard Error	Rank	Kolmogorov	Rank	Chi-Square	Rank	Graphical Rank
Normal Distribution	54.79	4	0.74	4	0.080	4	10.74	5	4
Log Normal Distribution	67.36	5	0.82	5	0.090	5	5.84	1	5
3 Parameter Log Normal	32.19	2	0.57	2	0.070	1	7.52	2	1
Gumbel Distribution	108.42	6	1.04	6	0.100	6	13.40	6	6
Pearson Type III Event	32.71	3	0.57	3	0.070	1	9.90	3	1
USWRC Log Pearson	30.02	1	0.55	1	0.070	1	9.90	3	1

Marineland

	SSE	Rank	Standard Error	Rank	Kolmogorov	Rank	Chi-Square	Rank	Graphical Rank
Normal Distribution	98.48	6	1.42	6	0.102	3	3.4286	5	6
Log Normal Distribution	37.92	5	0.88	5	0.082	1	1.7143	1	1
3 Parameter Log Normal	30.70	1	0.79	1	0.102	3	1.7143	1	1
Gumbel Distribution	36.22	3	0.86	3	0.102	3	11.4286	6	1
Pearson Type III Event	41.25	6	0.92	6	0.102	3	2.8571	3	1
USWRC Log Pearson	36.83	4	0.87	4	0.082	2	2.8571	3	1

Melbourne

	SSE	Rank	Standard Error	Rank	Kolmogorov	Rank	Chi-Square	Rank	Graphics Rank
Normal Distribution	23.68	2	0.67	2	0.077	2	2.923	1	1
Log Normal Distribution	79.06	5	1.23	5	0.077	2	4.000	5	5
3 Parameter Log Normal	22.72	1	0.66	1	0.058	1	2.923	1	1
Gumbel Distribution	90.57	6	1.32	6	0.077	2	10.192	6	6
Pearson Type III Event	24.83	3	0.69	3	0.077	2	2.923	1	1
USWRC Log Pearson	52.66	4	1.01	4	0.077	2	2.923	1	4

Table D.1 (continued)

Orlando

	SSE	Rank	Standard Error	Rank	Kolmogorov	Rank	Chi-Square	Rank	
Normal Distribution	49.32	4	0.71	4	0.091	1	6.424	2	1
Log Normal Distribution	116.05	5	1.08	5	0.131	2	5.010	1	6
3 Parameter Log Normal	44.97	1	0.67	1	0.111	2	6.566	3	1
Gumbel Distribution	162.35	6	1.28	6	0.121	5	21.838	6	5
Pearson Type III Event	48.65	2	0.70	2	0.111	2	6.566	3	1
USWRC Log Pearson	48.65	2	0.70	2	0.111	2	6.566	3	1

Vero Beach

	SSE	Rank	Standard Error	Rank	Kolmogorov	Rank	Chi-Square	Rank	Graphical Rank
Normal Distribution	158.67	6	1.82	6	0.104	6	3.333	4	6
Log Normal Distribution	52.33	1	1.04	1	0.083	1	3.042	3	1
3 Parameter Log Normal	54.86	4	1.07	4	0.083	1	1.583	2	1
Gumbel Distribution	52.83	2	1.05	2	0.083	1	0.708	1	1
Pearson Type III Event	62.57	5	1.14	5	0.083	1	4.208	5	1
USWRC Log Pearson	53.92	3	1.06	3	0.083	1	4.208	5	1

APPENDIX E

STREAM FLOW DATA

TABLE E.1 Econlockhatchee Streamflow data at Chuluota, Wet Season, Dry Season and Yearly

CHULUOTA 1936-1990 (inches)

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEARLY	WET SEASON (JUNE-OCT)	DRY SEASON (NOV-MAY)
1936	0.99	3.07	2.61	0.37	0.10	1.90	1.05	1.26	0.77	2.99	0.52	0.28	15.91	7.97	7.94
1937	0.21	0.41	0.33	0.68	0.68	0.13	0.10	0.81	1.08	3.91	1.22	2.20	11.76	6.03	5.73
1938	0.48	0.20	0.11	0.06	0.05	0.45	2.80	0.79	0.24	0.40	0.27	0.10	5.95	4.68	1.27
1939	0.09	0.08	0.06	0.10	0.49	2.87	2.90	3.05	2.17	0.87	0.26	0.10	13.04	11.86	1.18
1940	0.17	0.35	0.30	0.94	0.09	0.75	1.86	1.90	1.87	0.59	0.09	0.55	9.46	6.97	2.49
1941	2.33	1.15	1.44	2.26	0.19	0.30	5.51	2.00	2.79	2.47	2.86	0.82	24.12	13.07	11.05
1942	0.60	0.40	2.23	0.64	0.12	1.10	2.90	0.48	1.10	0.22	0.06	0.10	9.95	5.80	4.15
1943	0.09	0.09	0.24	0.11	0.40	0.32	2.58	3.04	3.66	1.36	0.16	0.19	12.24	10.96	1.28
1944	0.29	0.11	0.20	0.52	0.29	0.48	1.86	3.74	2.33	4.56	0.61	0.18	15.17	12.97	2.20
1945	0.62	0.17	0.09	0.06	0.04	1.47	3.09	2.04	8.36	1.44	0.35	0.22	17.95	16.40	1.55
1946	0.52	0.22	0.31	0.08	0.10	0.15	1.07	3.18	2.06	0.96	0.27	0.19	9.11	7.42	1.69
1947	0.12	0.69	1.71	1.62	0.37	4.00	3.34	3.14	4.15	3.03	1.20	0.61	23.98	17.66	6.32
1948	2.60	2.12	1.20	0.12	0.07	0.07	1.08	4.73	8.40	5.73	0.34	0.24	26.70	20.01	6.69
1949	0.15	0.11	0.08	0.09	0.07	0.89	2.09	2.05	4.15	3.69	0.65	0.92	14.94	12.87	2.07
1950	0.88	0.16	0.15	0.28	0.13	0.07	0.19	0.15	1.11	5.88	0.82	0.97	10.79	7.40	3.39
1951	0.51	0.71	0.18	0.35	0.16	0.13	2.36	2.36	2.44	2.92	1.62	0.81	14.55	10.21	4.34
1952	0.44	0.97	1.84	0.88	0.26	0.18	0.25	0.41	1.14	4.13	1.09	0.30	11.89	6.11	5.78
1953	0.29	0.57	0.74	1.75	0.33	0.20	0.73	5.20	8.84	4.58	1.83	2.37	27.43	19.55	7.88
1954	0.92	0.26	0.21	0.15	0.13	2.38	1.01	0.58	0.48	1.54	0.98	0.40	9.04	5.99	3.05
1955	0.33	0.30	0.17	0.15	0.12	0.10	0.48	1.36	2.82	1.24	0.43	0.32	7.82	6.00	1.82
1956	0.34	0.32	0.12	0.09	0.10	0.11	0.22	0.48	3.04	7.98	0.93	0.25	13.98	11.83	2.15
1957	0.19	0.16	0.43	0.70	1.23	1.39	0.99	3.22	4.57	1.81	0.22	0.32	15.23	11.98	3.25
1958	1.57	0.80	3.84	1.85	0.57	0.15	1.72	1.19	0.36	0.36	1.38	0.38	14.17	3.78	10.39
1959	1.28	0.85	5.69	2.09	0.68	2.74	1.68	1.60	4.56	3.74	0.91	0.48	26.30	14.32	11.98
1960	0.38	1.09	9.10	1.11	0.22	0.87	9.96	3.95	10.11	3.21	0.58	0.34	40.92	28.10	12.82
1961	0.31	0.54	0.39	0.20	0.13	0.17	0.39	0.65	3.63	0.45	0.26	0.20	7.32	5.29	2.03
1962	0.22	0.26	0.27	0.16	0.11	0.12	0.32	1.60	4.01	1.42	0.65	0.37	9.51	7.47	2.04
1963	0.66	1.94	2.06	0.24	0.14	0.29	0.79	0.83	3.37	1.36	3.27	1.42	16.37	6.64	9.73
1964	3.40	2.41	1.05	0.73	0.36	0.18	1.48	5.97	7.76	0.81	0.25	0.28	24.68	16.20	8.48
1965	0.28	0.45	0.83	0.32	0.13	0.18	2.38	3.29	0.58	1.57	0.57	0.49	11.07	8.00	3.07
1966	0.80	1.68	3.50	0.51	0.47	2.15	3.03	3.30	3.39	1.65	0.24	0.24	20.96	13.52	7.44
1967	0.25	0.60	0.38	0.15	0.10	0.22	1.70	3.38	3.74	0.49	0.17	0.22	11.40	9.53	1.87
1968	0.18	0.21	0.34	0.14	0.13	6.99	3.60	1.89	0.62	1.91	0.86	0.43	17.30	15.01	2.29
1969	0.80	0.77	2.04	0.51	0.23	0.24	0.35	4.32	3.73	6.67	1.98	2.80	24.44	15.31	9.13
1970	2.71	2.58	1.50	0.60	0.19	0.25	0.29	0.92	0.33	0.25	0.20	0.18	10.00	2.04	7.96
1971	0.21	0.35	0.27	0.23	0.27	0.17	0.97	0.64	0.68	2.09	0.66	0.56	7.10	4.55	2.55
1972	0.25	0.76	0.29	0.82	0.47	1.18	0.63	1.68	1.82	0.35	0.39	0.51	9.15	5.66	3.49
1973	1.24	1.84	0.60	0.55	0.25	0.28	0.79	2.18	2.29	1.57	0.43	0.38	12.40	7.11	5.29
1974	0.33	0.23	0.28	0.19	0.18	1.55	5.11	4.62	2.49	2.00	0.35	0.36	17.69	15.77	1.92
1975	0.30	0.22	0.21	0.17	0.37	0.49	1.52	1.97	1.30	1.41	0.65	0.35	8.96	6.69	2.27
1976	0.29	0.22	0.22	0.23	0.67	1.91	2.56	2.41	2.07	0.76	0.40	0.54	12.28	9.71	2.57
1977	0.66	0.52	0.39	0.18	0.14	0.15	0.31	0.85	1.44	0.63	0.35	0.74	6.36	3.38	2.98
1978	0.88	2.02	1.53	0.31	0.29	0.73	2.97	3.31	0.73	0.34	0.27	0.31	13.69	8.08	5.61
1979	1.55	0.68	0.98	0.25	0.81	0.55	1.44	1.34	4.42	2.06	0.64	0.40	15.12	9.81	5.31

TABLE E.1 (Continued)

CHULUOTA 1936-1990 (inches)

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEARLY	WET SEASON (JUNE-OCT)	DRY SEASON (NOV-MAY)
1980 ------------	0.39	0.38	0.50	0.43	0.46	0.32	0.33	0.47	0.54	0.23	0.32	0.42	4.79	1.89	2.90
1981 ------------	0.23	0.63	0.37	0.21	0.23	0.24	0.23	0.34	1.02	0.34	0.68	0.33	4.85	2.17	2.68
1982 ------------	0.59	0.31	0.50	2.31	0.64	4.80	2.79	2.33	3.52	1.93	0.58	0.48	20.78	15.37	5.41
1983 ------------	0.45	3.28	2.14	2.23	0.46	0.72	1.55	2.80	2.21	1.43	0.77	1.01	19.05	8.71	10.34
1984 ------------	2.06	1.06	0.74	3.79	0.86	0.42	2.55	2.73	1.57	0.73	0.52	0.48	17.51	8.00	9.51
1985 ------------	0.34	0.29	0.40	0.29	0.33	0.83	1.44	3.74	6.32	1.74	0.94	1.08	17.74	14.07	3.67
1986 ------------	4.54	1.36	0.93	0.40	0.26	0.79	0.82	1.01	1.81	1.08	0.50	0.49	13.99	5.51	8.48
1987 ------------	1.10	0.62	1.85	4.45	0.73	0.33	1.70	0.95	2.61	1.28	4.24	1.94	21.80	6.87	14.93
1988 ------------	1.34	1.06	2.60	0.49	0.34	0.55	1.31	2.54	3.98	1.23	2.00	1.32	18.76	9.61	9.15
1989 ------------	1.77	0.76	0.41	0.22	0.20	0.35	0.60	2.23	1.26	0.81	0.41	1.29	10.31	5.25	5.06
1990 ------------	0.77	0.65	0.54	0.41	0.22	0.63	0.79	0.72	0.27	0.38	0.21	0.20	5.79	2.79	3.00
MEAN	0.82	0.80	1.12	0.70	0.31	0.93	1.76	2.14	2.84	1.97	0.79	0.61	14.79	9.64	5.16
STD Deviation	0.88	0.77	1.54	0.90	0.24	1.28	1.64	1.38	2.32	1.74	0.80	0.58	6.89	5.20	3.43

TABLE E.2 Econlockhatchee Streamflow data at Magnolia Ranch, Wet Season, Dry Season and Yearly

MAGNOLIA RANCH 1973-1990 (inches)

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEARLY	WET SEASON (JUN-OCT)	DRY SEASON (NOV-MAY)
1973 ----------	0.52	1.25	0.52	0.35	0.03	0.00	0.20	1.33	1.78	1.56	0.56	0.17	8.27	4.87	3.40
1974 ----------	0.07	0.02	0.01	0.00	0.00	0.19	2.98	3.04	2.32	1.75	0.18	0.17	10.73	10.28	0.45
1975 ----------	0.05	0.00	0.00	0.00	0.00	0.01	0.16	1.15	1.56	1.27	0.42	0.05	4.67	4.15	0.52
1976 ----------	0.01	0.00	0.00	0.00	0.00	0.80	1.69	1.16	1.32	0.73	0.12	0.33	6.16	5.70	0.46
1977 ----------	0.53	0.25	0.10	0.01	0.00	0.00	0.01	0.09	0.40	0.89	0.25	0.62	3.15	1.39	1.76
1978 ----------	0.94	1.42	1.38	0.08	0.03	0.35	2.69	2.88	0.31	0.27	0.04	0.04	10.43	6.50	3.93
1979 ----------	1.32	0.53	0.40	0.04	0.77	0.01	0.09	0.62	5.69	4.99	0.84	0.40	15.70	11.40	4.30
1980 ----------	0.22	0.21	0.48	0.34	0.31	0.08	0.00	0.01	0.00	0.00	0.00	0.00	1.65	0.09	1.56
1981 ----------	0.00	0.02	0.03	0.01	0.00	0.00	0.00	0.00	0.18	0.03	0.06	0.03	0.36	0.21	0.15
1982 ----------	0.04	0.02	0.09	1.60	0.83	6.14	2.77	2.45	2.62	1.59	0.37	0.24	18.76	15.57	3.19
1983 ----------	0.19	2.56	3.21	3.11	0.25	0.67	1.71	2.79	3.76	1.08	0.76	1.02	21.11	10.01	11.10
1984 ----------	1.83	0.86	0.53	2.64	0.53	0.10	2.85	1.23	0.52	0.11	0.07	0.04	11.31	4.81	6.50
1985 ----------	0.00	0.00	0.04	0.00	0.00	0.29	0.19	1.26	4.18	1.54	0.74	0.84	9.08	7.46	1.62
1986 ----------	2.81	1.35	0.73	0.07	0.00	0.28	0.16	0.27	2.50	2.11	0.35	0.59	11.22	5.32	5.90
1987 ----------	1.78	0.46	1.54	3.10	0.12	0.00	0.17	0.01	0.89	1.15	4.17	2.27	15.66	2.22	13.44
1988 ----------	0.98	0.85	2.07	0.40	0.01	0.12	0.00	1.65	1.74	0.93	0.75	0.76	10.26	4.44	5.82
1989 ----------	1.00	0.63	0.18	0.02	0.00	0.00	0.05	3.58	2.29	1.33	0.46	1.30	10.84	7.25	3.59
1990 ----------	0.83	0.48	0.50	0.18	0.00	0.00	0.01	0.00	0.00	0.00	0.02	0.05	2.07	0.01	2.06
MEAN	0.73	0.61	0.66	0.66	0.16	0.50	0.87	1.31	1.78	1.19	0.56	0.50	9.52	5.65	3.88
STD DEVIATION	0.77	0.67	0.85	1.09	0.27	1.39	1.16	1.16	1.53	1.12	0.92	0.57	5.70	4.12	3.54

TABLE E.3 Econlockhatchee Streamflow at Union Park, Wet Season, Dry Season and Yearly

UNION PARK 1960-1990 (inches)

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEARLY	WET SEASON (JUNE-OCT)	DRY SEASON (NOV-MAY)
1960 ----------	0.16	0.71	8.20	0.28	0.04	0.30	5.93	1.84	7.05	1.08	0.14	0.09	25.82	16.20	9.62
1961 ----------	0.14	0.34	0.15	0.07	0.03	0.06	0.23	0.35	1.29	0.26	0.17	0.12	3.21	2.19	1.02
1962 ----------	0.14	0.31	0.19	0.08	0.03	0.05	0.59	1.36	4.94	0.55	0.47	0.21	8.92	7.49	1.43
1963 ----------	0.37	1.29	1.32	0.13	0.09	0.15	0.58	0.89	2.80	0.71	2.17	0.84	11.34	5.13	6.21
1964 ----------	2.78	1.72	0.92	0.42	0.20	0.06	0.59	4.70	5.90	0.47	0.13	0.18	18.07	11.72	6.35
1965 ----------	0.18	0.43	0.82	0.29	0.07	0.17	2.37	3.03	0.45	0.74	0.31	0.32	9.18	6.76	2.42
1966 ----------	0.74	2.15	2.98	0.42	0.58	1.11	1.79	3.98	3.31	1.05	0.20	0.17	18.48	11.24	7.24
1967 ----------	0.12	0.61	0.28	0.08	0.04	0.20	1.50	3.12	2.89	0.25	0.12	0.17	9.38	7.96	1.42
1968 ----------	0.12	0.14	0.28	0.09	0.13	5.64	2.51	1.34	1.00	2.30	0.67	0.28	14.50	12.79	1.71
1969 ----------	0.59	0.72	2.16	0.30	0.16	0.15	0.37	1.47	2.93	4.83	1.26	2.25	17.19	9.75	7.44
1970 ----------	2.33	2.25	1.03	0.26	0.15	0.15	0.25	0.32	0.17	0.13	0.11	0.12	7.27	1.02	6.25
1971 ----------	0.12	0.29	0.17	0.11	0.27	0.17	0.41	0.60	1.20	0.96	0.52	0.63	5.45	3.34	2.11
1972 ----------	0.25	0.99	0.34	0.52	0.15	0.45	0.34	2.40	1.63	0.72	1.04	0.94	9.77	5.54	4.23
1973 ----------	2.05	2.20	0.78	0.61	0.33	0.35	0.61	0.92	3.95	1.91	0.61	0.43	14.75	7.74	7.01
1974 ----------	0.36	0.23	0.45	0.30	0.54	3.63	4.94	4.79	3.41	1.20	0.42	0.46	20.73	17.97	2.76
1975 ----------	0.35	0.27	0.27	0.17	0.53	0.88	1.48	1.43	0.83	1.37	0.76	0.47	8.81	5.99	2.82
1976 ----------	0.40	0.29	0.22	0.30	0.61	1.30	3.49	2.57	2.11	0.84	0.51	1.18	13.82	10.31	3.51
1977 ----------	0.92	0.77	0.56	0.25	0.21	0.26	0.35	0.41	0.83	0.47	0.38	0.72	6.13	2.32	3.81
1978 ----------	0.65	1.39	0.80	0.43	0.33	0.85	2.07	2.15	0.49	0.42	0.30	0.38	10.26	5.98	4.28
1979 ----------	1.26	0.77	0.98	0.35	0.59	0.83	2.90	3.50	3.73	1.14	0.83	0.63	17.51	12.10	5.41
1980 ----------	0.55	0.57	0.58	0.41	0.60	0.39	0.22	0.25	0.27	0.22	0.48	0.47	5.01	1.35	3.66
1981 ----------	0.32	0.63	0.39	0.25	0.19	0.82	0.54	0.64	2.03	0.84	1.14	0.83	8.62	4.87	3.75
1982 ----------	1.09	0.65	0.89	1.41	0.79	4.11	2.63	2.70	2.83	1.90	0.78	0.69	20.47	14.17	6.30
1983 ----------	0.60	2.68	2.07	1.97	0.72	1.52	1.47	3.46	2.21	1.51	0.80	1.23	20.24	10.17	10.07
1984 ----------	1.94	1.54	0.88	3.27	0.73	0.58	1.34	2.12	0.82	0.49	0.39	0.40	14.50	5.35	9.15
1985 ----------	0.28	0.27	0.48	0.36	0.25	0.34	0.71	1.97	3.49	1.17	0.63	0.90	10.85	7.68	3.17
1986 ----------	3.50	1.14	0.83	0.38	0.28	0.99	1.00	1.57	1.83	0.87	0.83	0.53	13.75	6.26	7.49
1987 ----------	0.80	0.60	3.39	3.15	0.57	0.46	1.60	2.13	2.66	1.91	5.30	1.85	24.42	8.76	15.66
1988 ----------	1.14	0.78	2.64	0.54	0.73	0.83	1.48	2.16	3.86	1.10	2.25	1.29	18.80	9.43	9.37
1989 ----------	2.03	0.89	0.55	0.34	0.31	0.58	0.75	1.00	1.58	0.91	0.39	1.32	10.65	4.82	5.83
1990 ----------	0.91	0.89	0.64	0.52	0.21	0.72	0.74	0.84	0.30	1.07	0.26	0.28	7.38	3.67	3.71
MEAN	0.88	0.92	1.17	0.58	0.34	0.91	1.48	1.94	2.35	1.08	0.79	0.66	13.07	7.74	5.33
STD Deviation	0.86	0.67	1.53	0.78	0.24	1.25	1.36	1.24	1.66	0.87	0.97	0.51	5.79	4.16	3.17

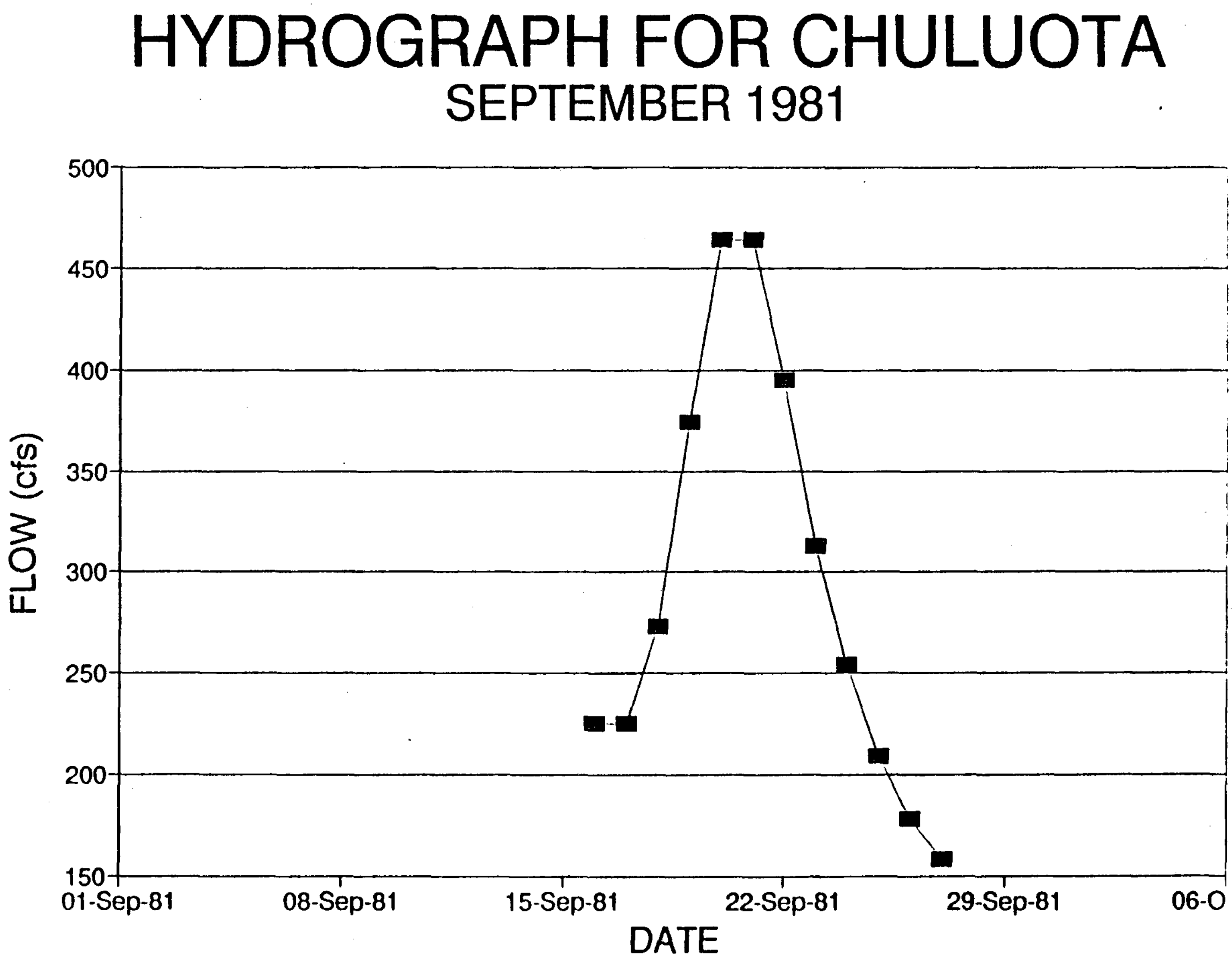


Figure E.1.1 Hydrograph For Estimating Attenuation at Chuluota (September 1981)

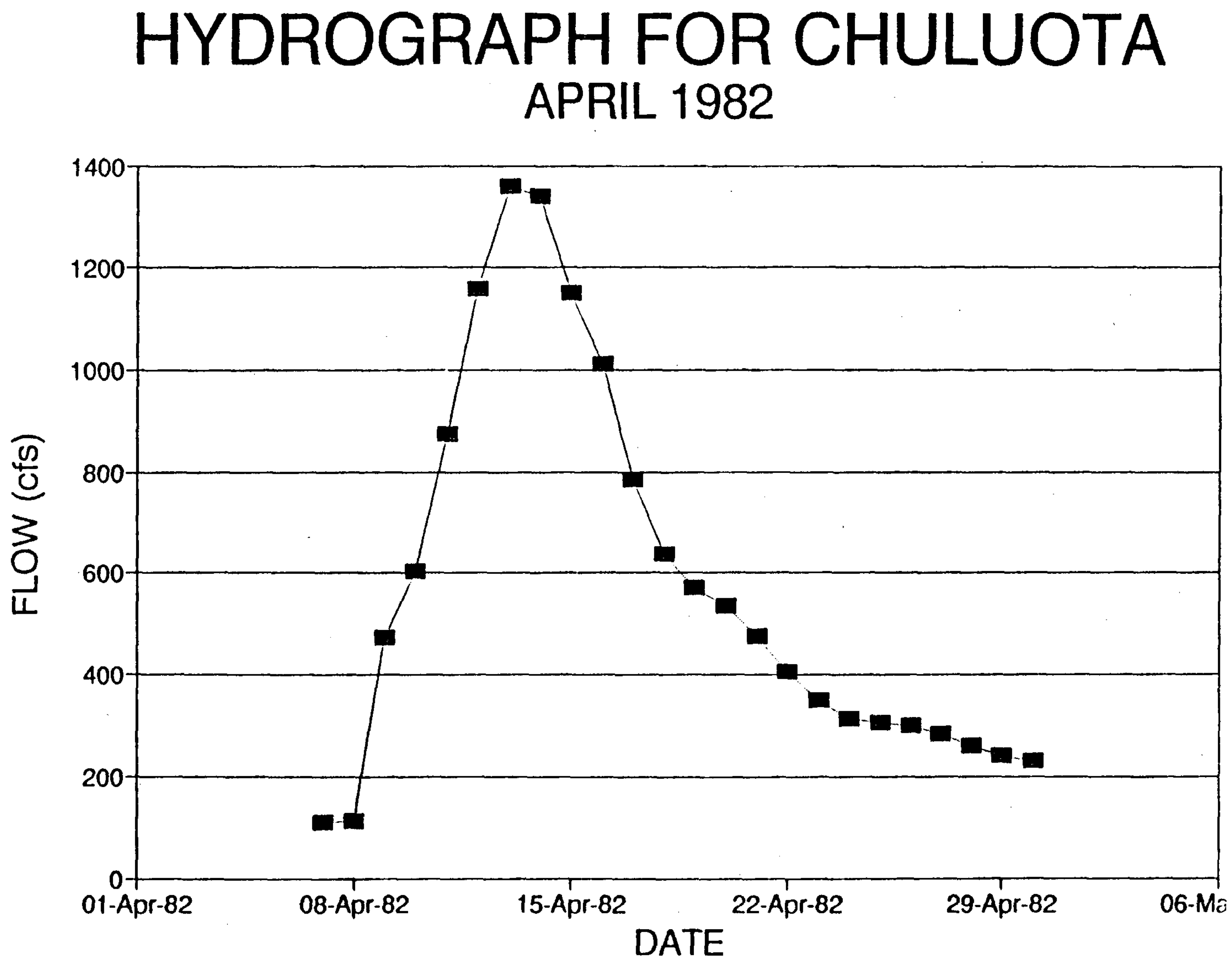


Figure E.1.2 Hydrograph For Estimating Attenuation at Chuluota (April 1982)

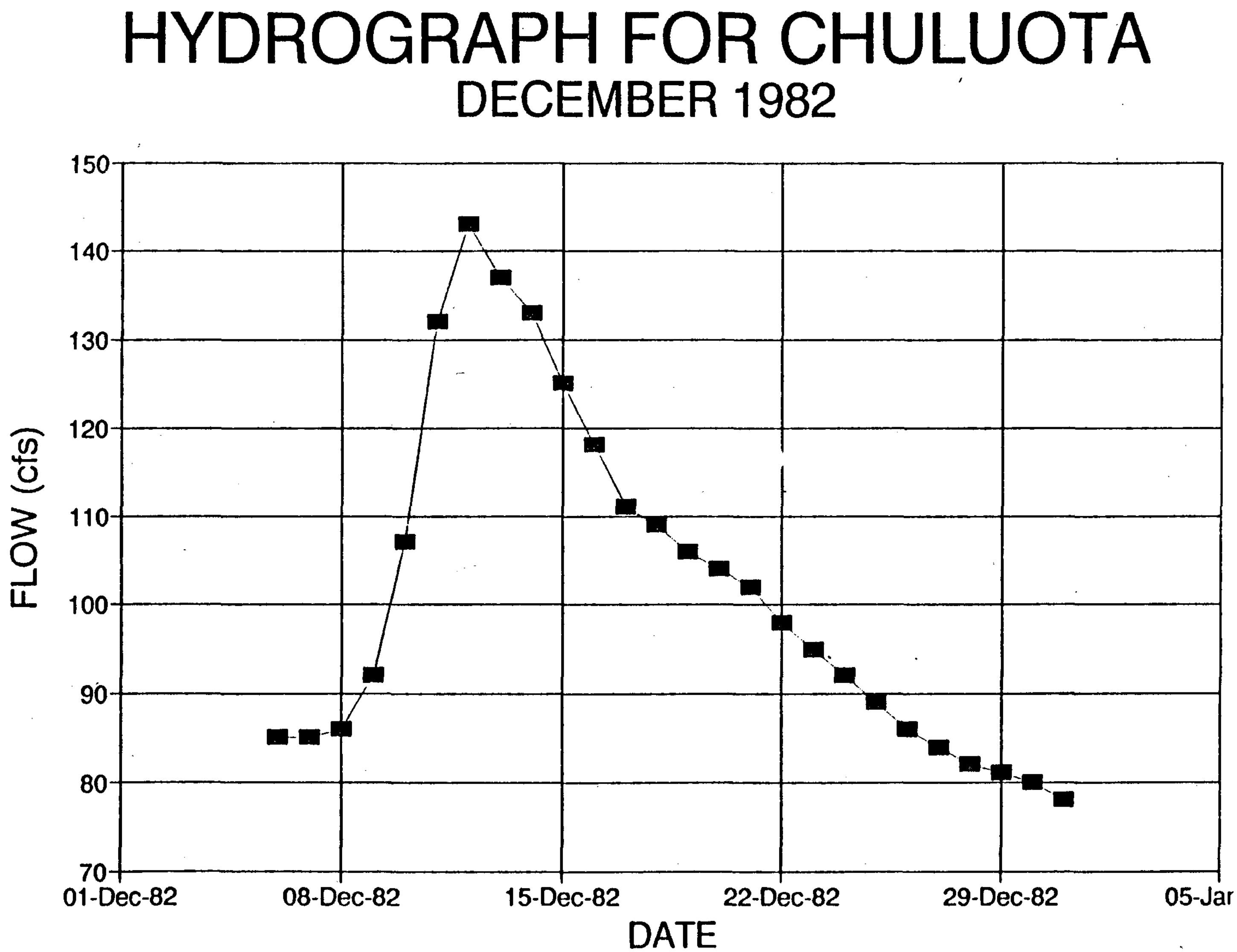


Figure E.1.3 Hydrograph For Estimating Attenuation at Chuluota (December 1982)

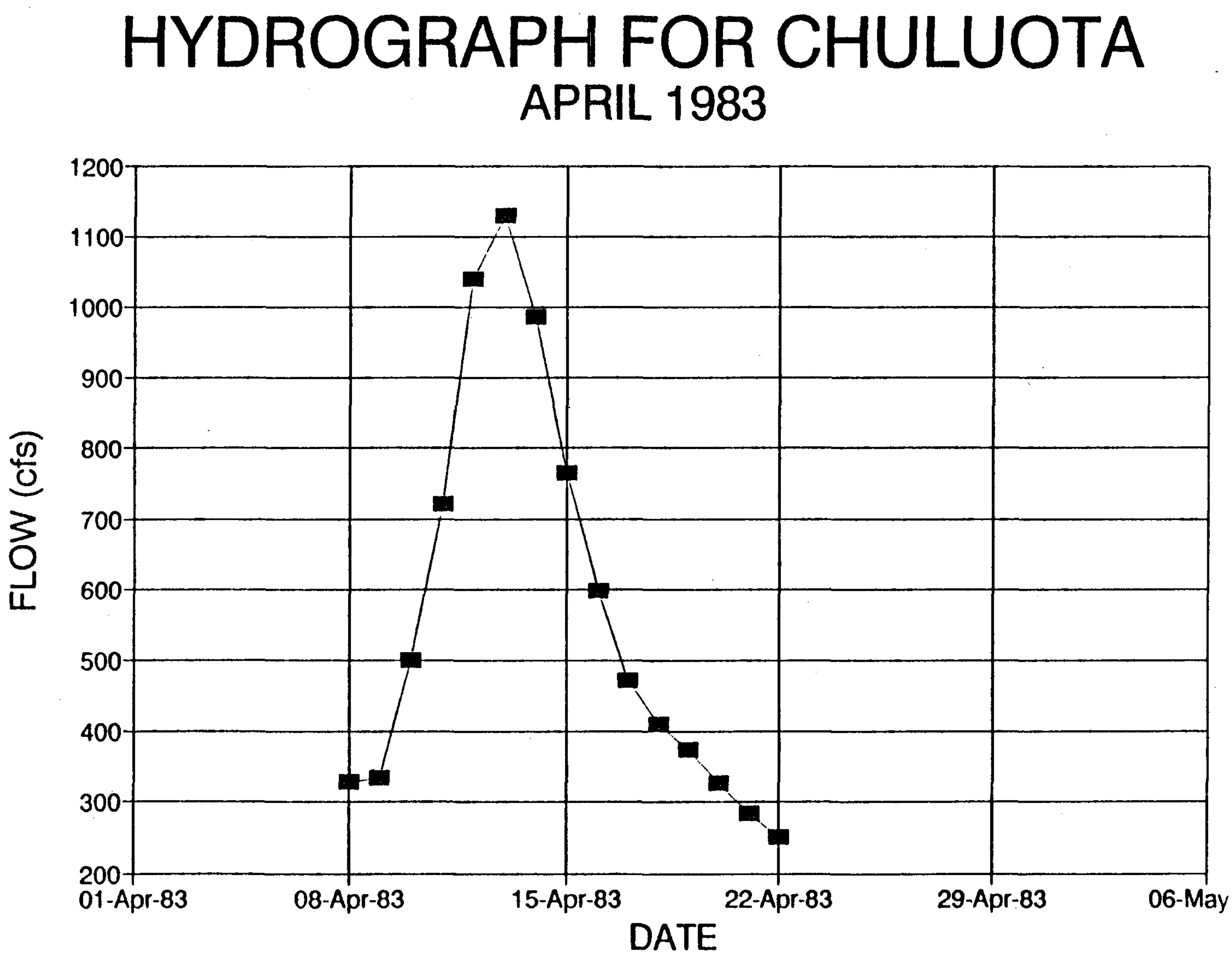


Figure E.1.4 Hydrograph For Estimating Attenuation at Chuluota (April 1983)

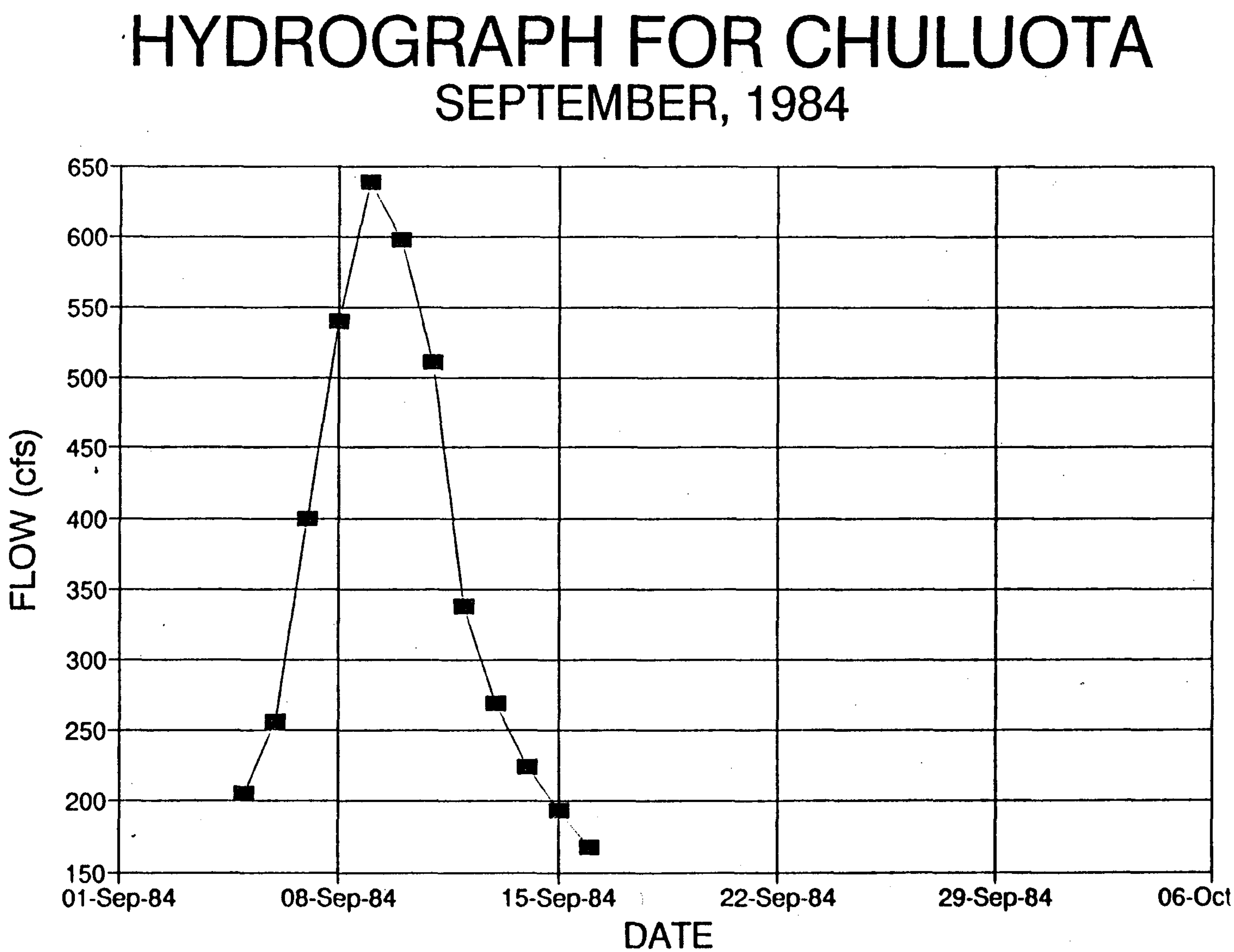


Figure E.1.5 Hydrograph For Estimating Attenuation at Chuluota (September 1984)

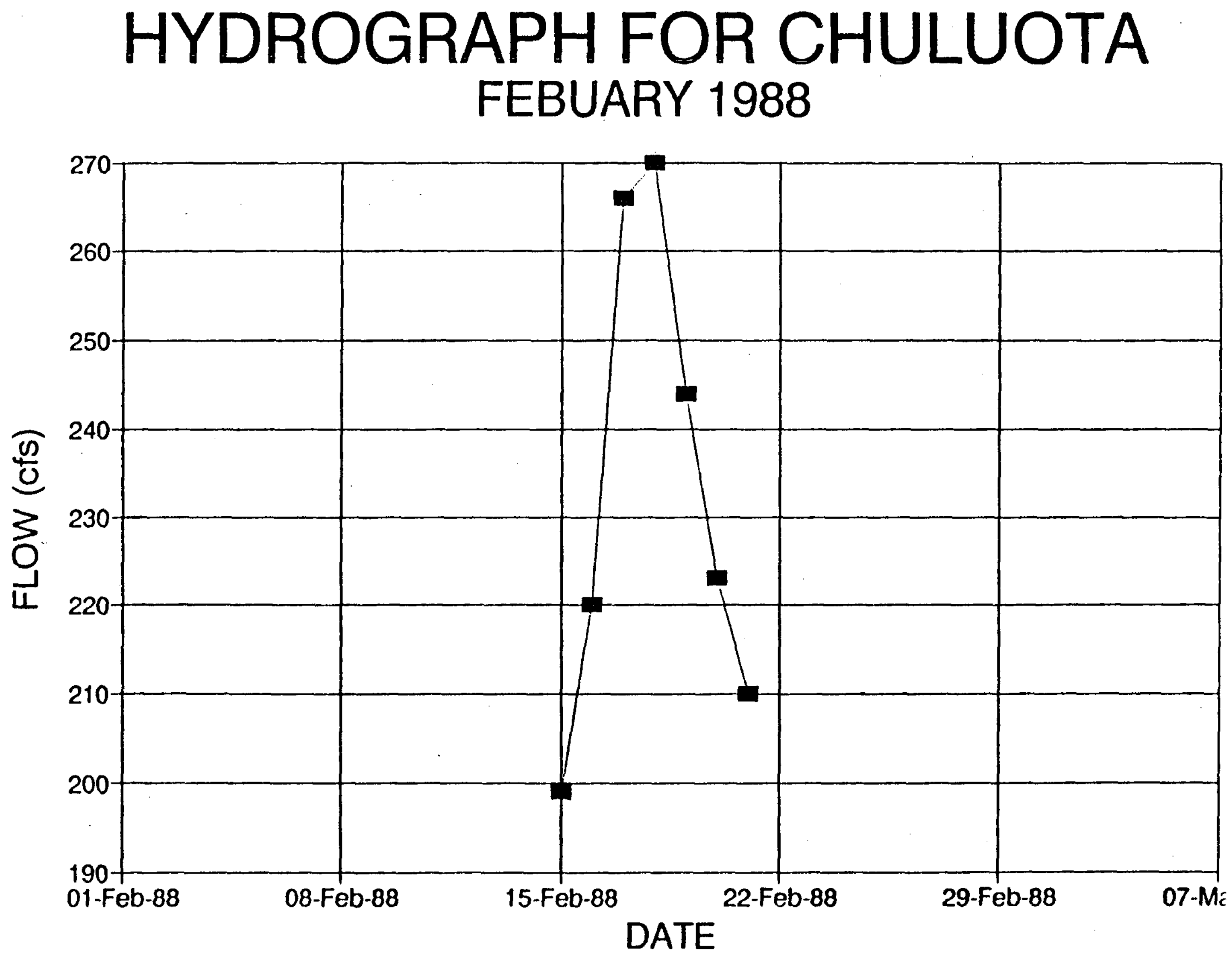


Figure E.1.6 Hydrograph For Estimating Attenuation at Chuluota (Febuary 1988)

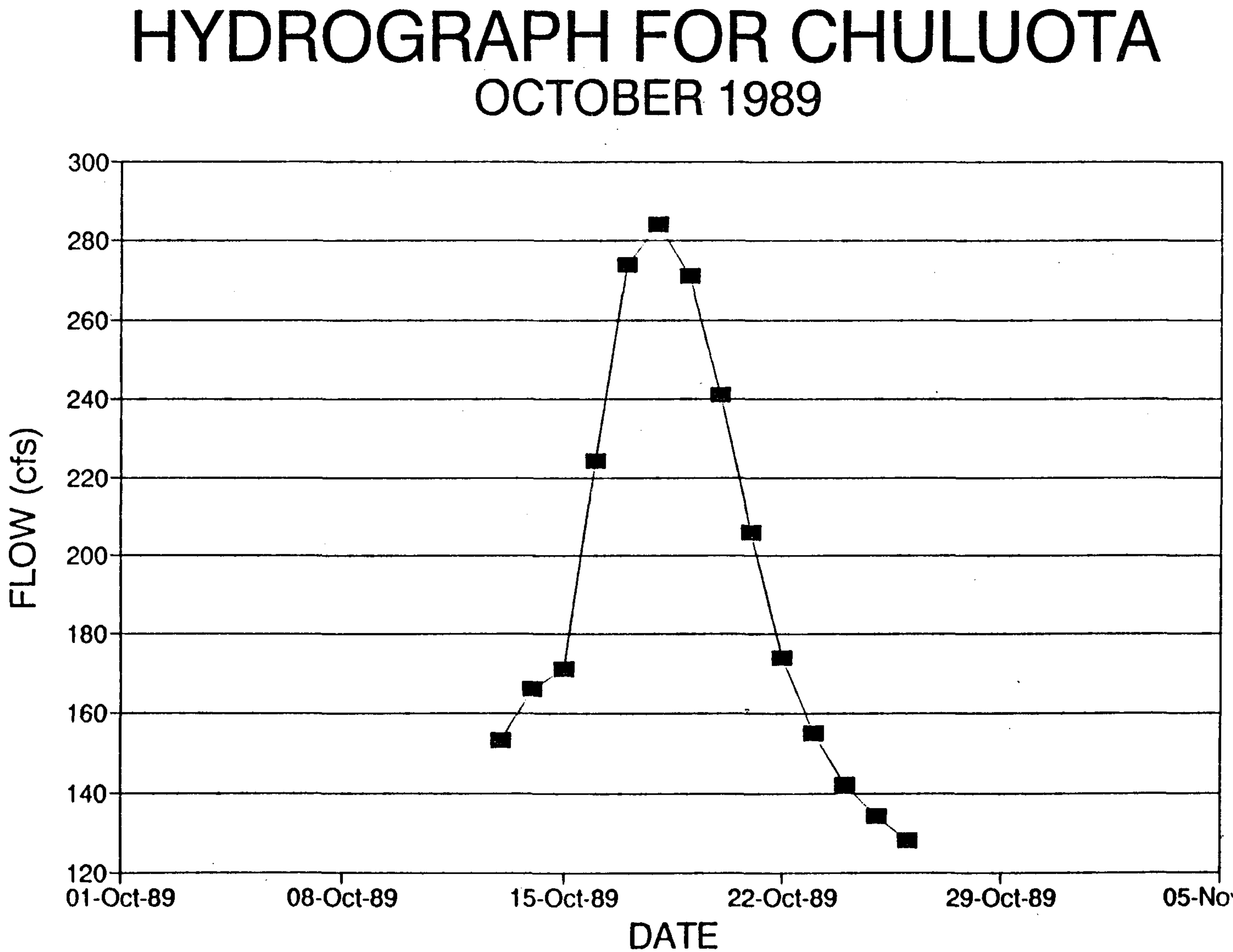


Figure E.1.7 Hydrograph For Estimating Attenuation at Chuluota (October 1989)

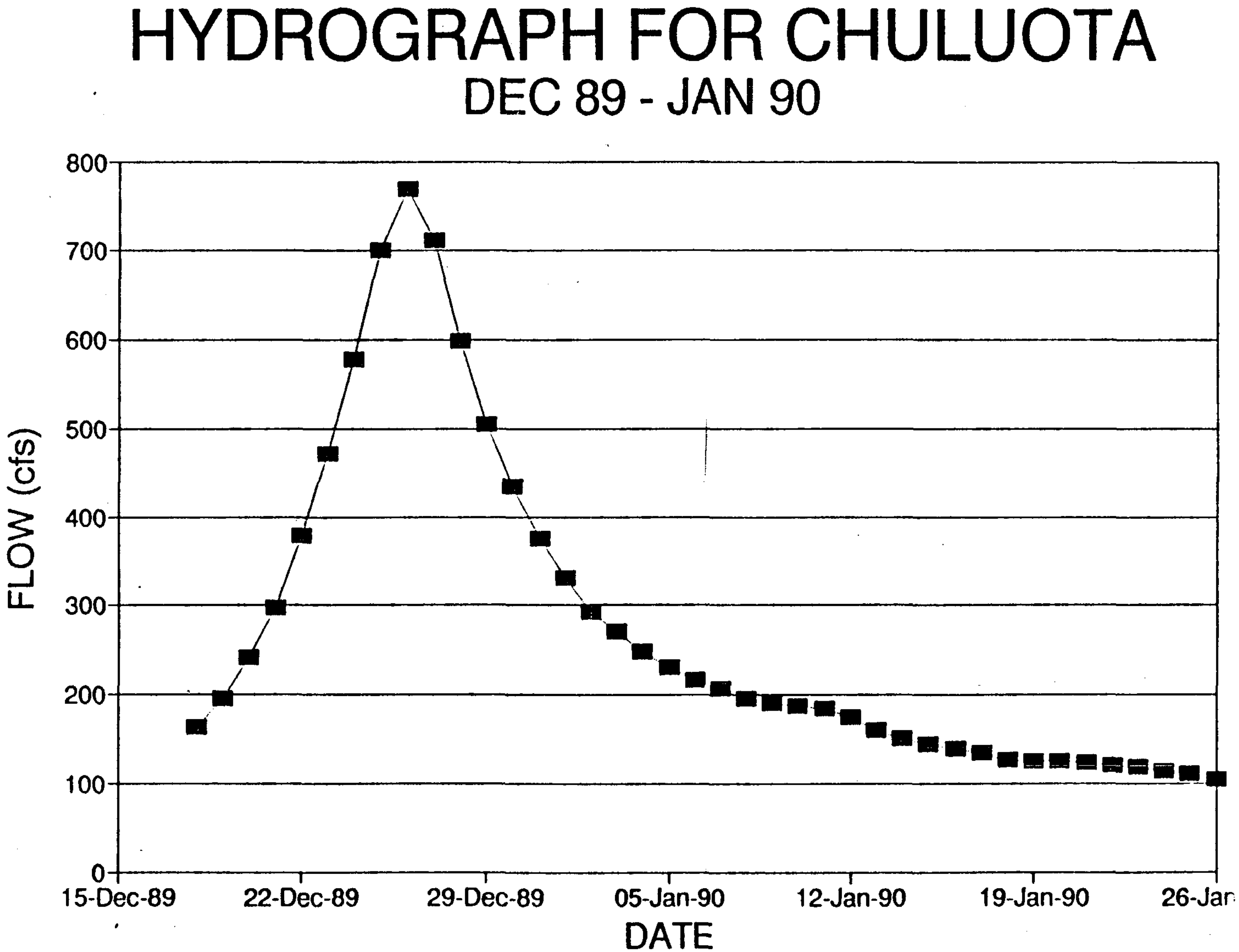


Figure E.1.8 Hydrograph For Estimating Attenuation at Chuluota (December 1989)

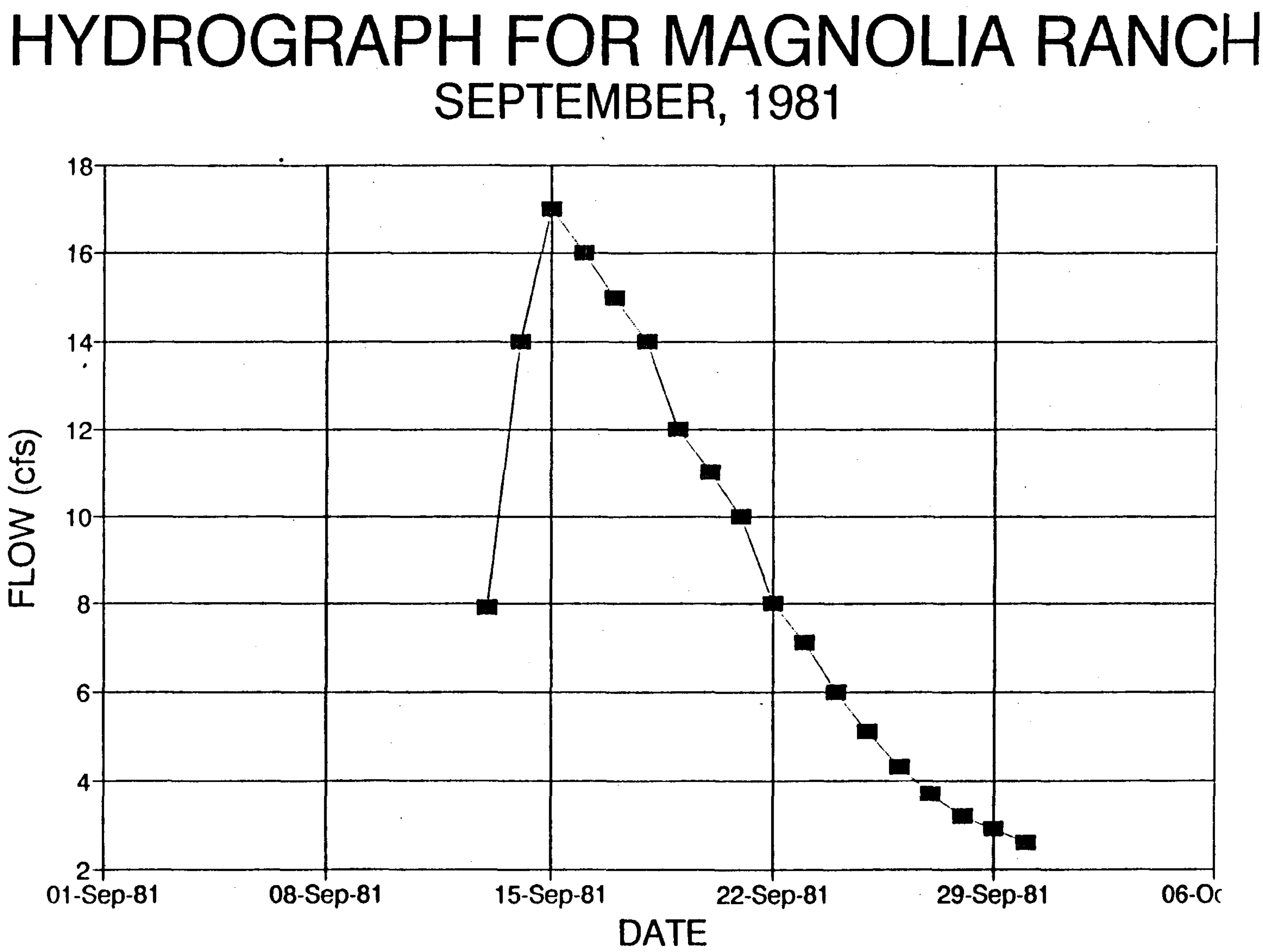


Figure E.2.1 Hydrograph For Estimating Attenuation at Magnolia Ranch (September 1981)

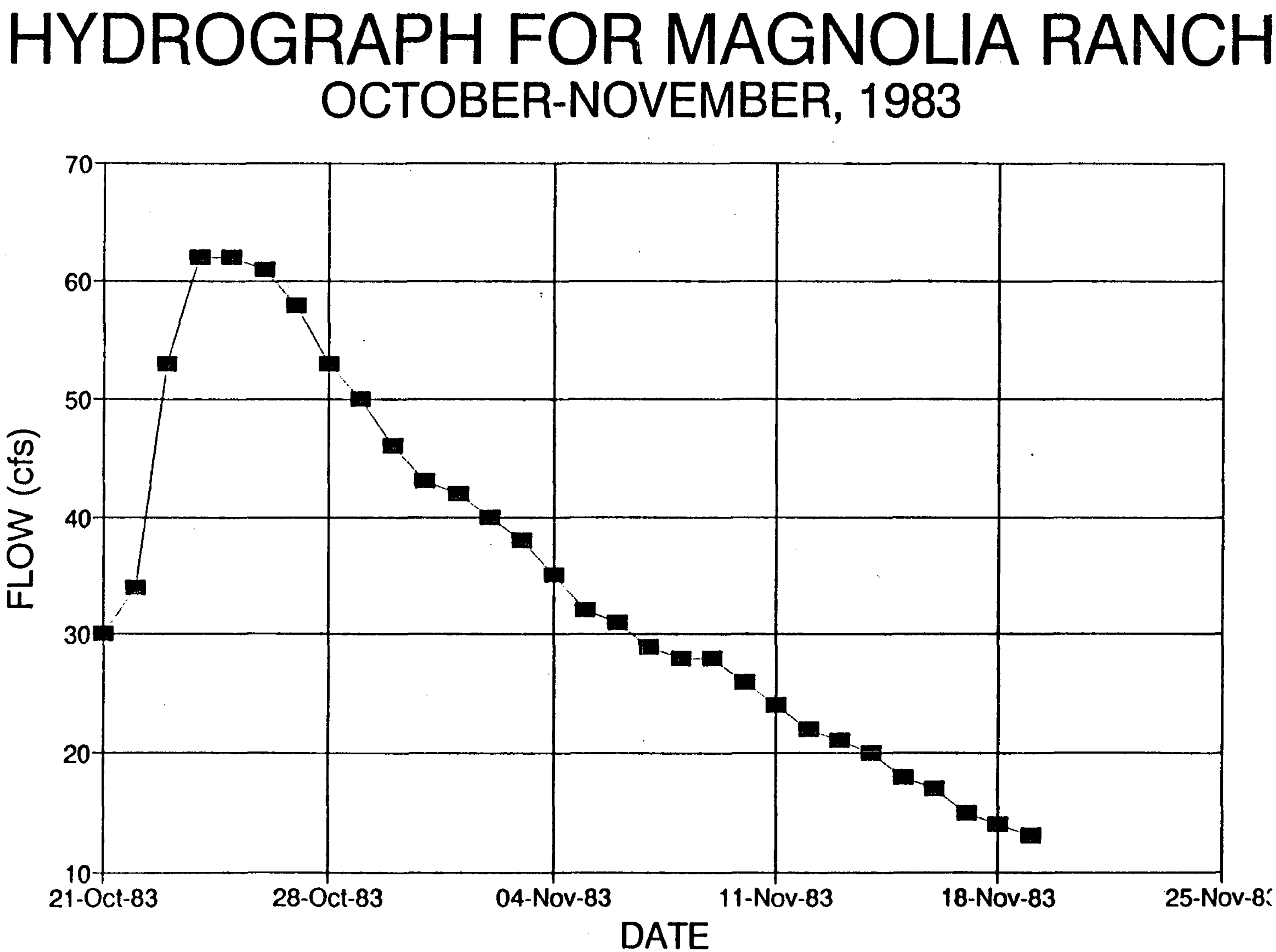


Figure E.2.2 Hydrograph For Estimating Attenuation at Magnolia Ranch (October 1983)

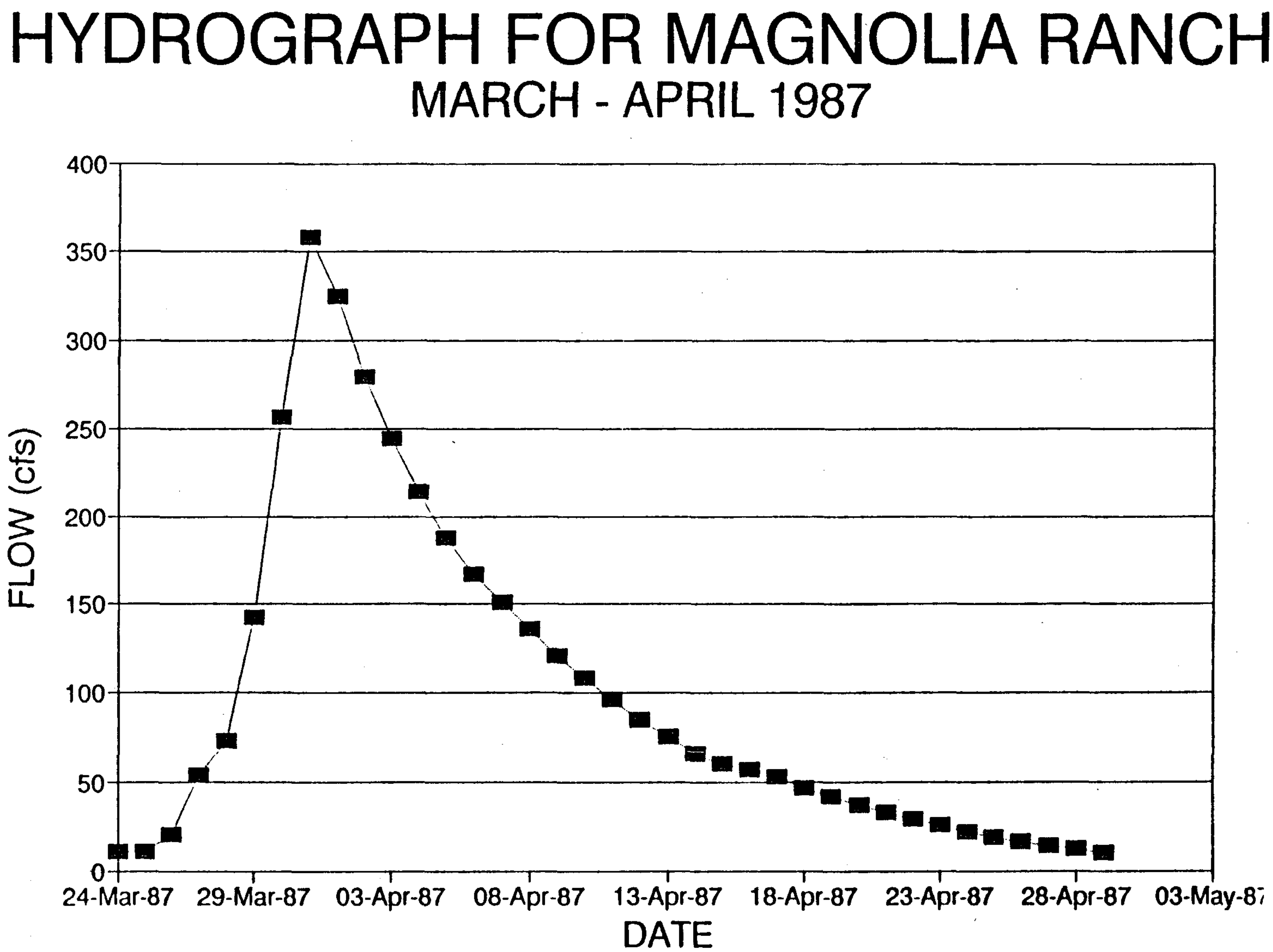


Figure E.2.3 Hydrograph For Estimating Attenuation at Magnolia Ranch (March 1987)

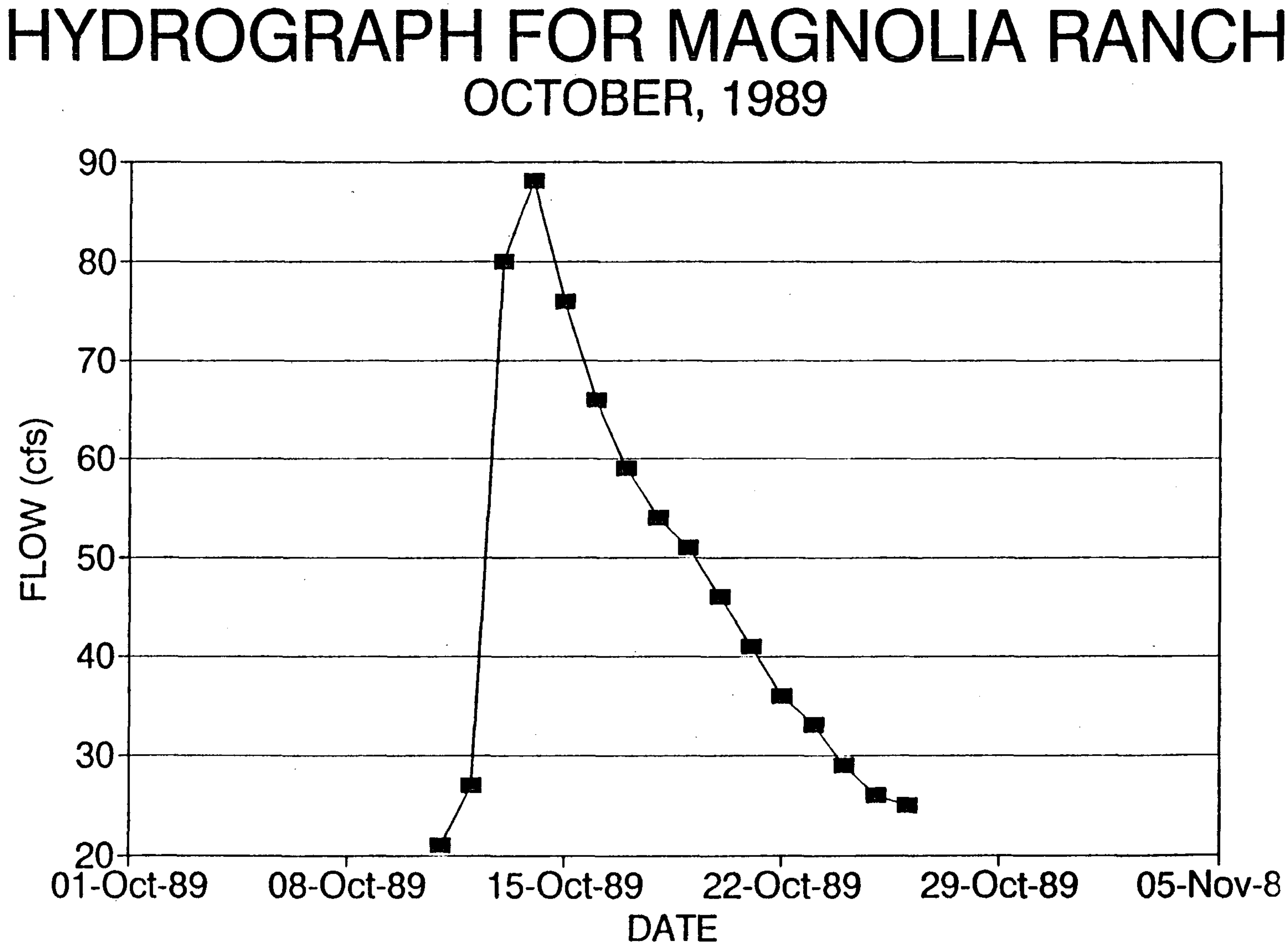


Figure E.2.4 Hydrograph For Estimating Attenuation at Magnolia Ranch (October 1989)

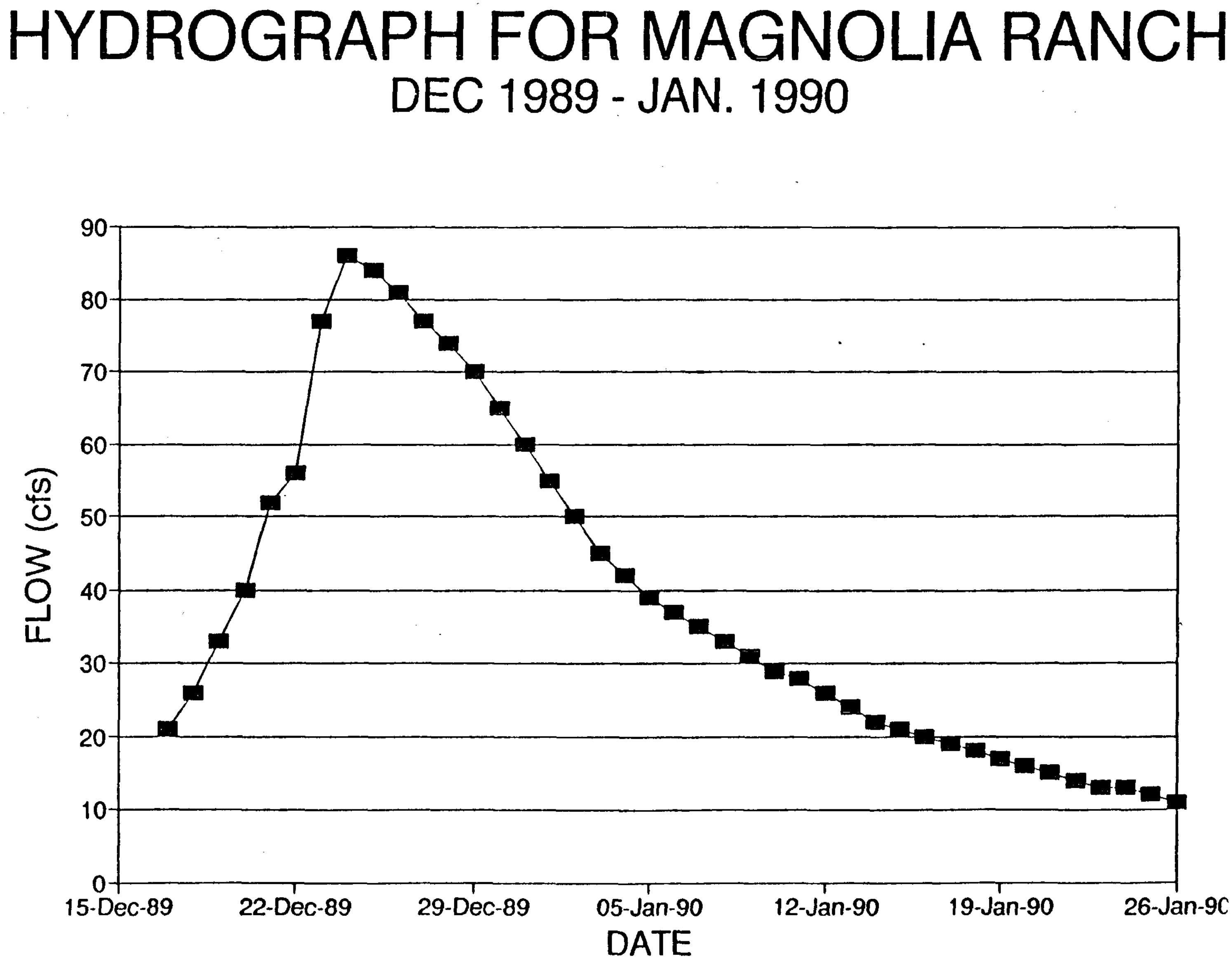


Figure E.2.5 Hydrograph For Estimating Attenuation at Magnolia Ranch (December 1989)

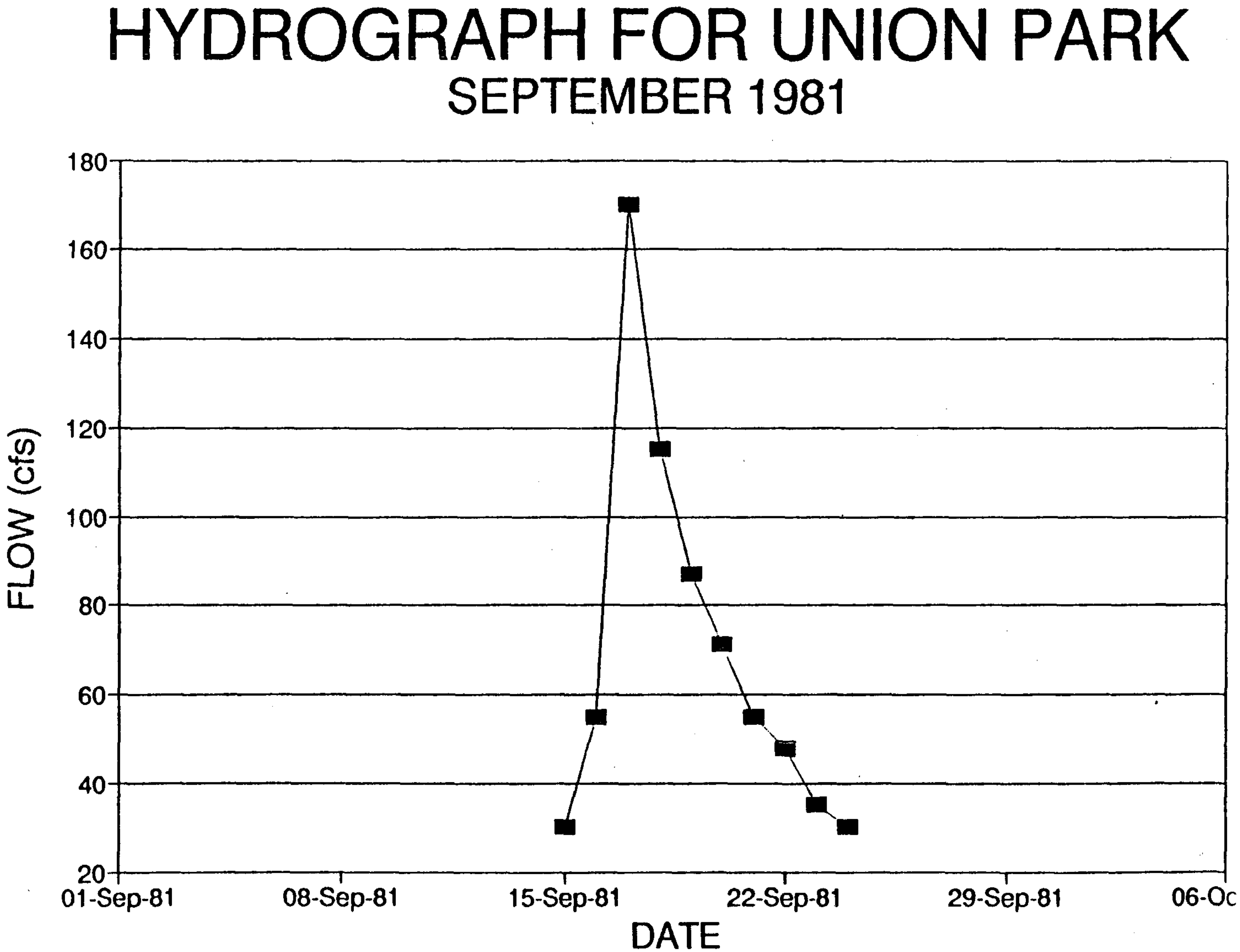


Figure E.3.1 Hydrograph For Estimating Attenuation at Union Park (September 1981)

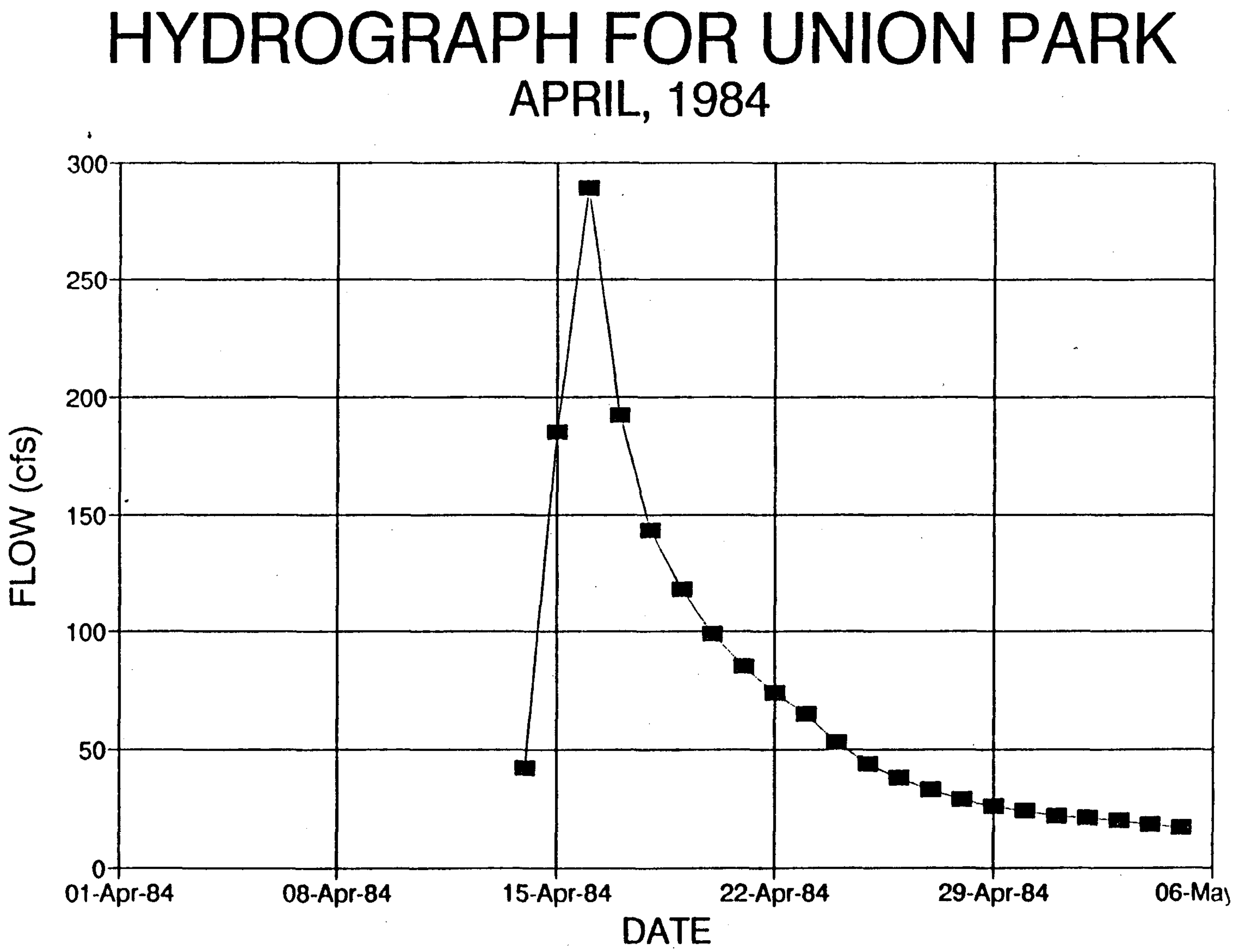


Figure E.3.2 Hydrograph For Estimating Attenuation at Union Park (April 1984)

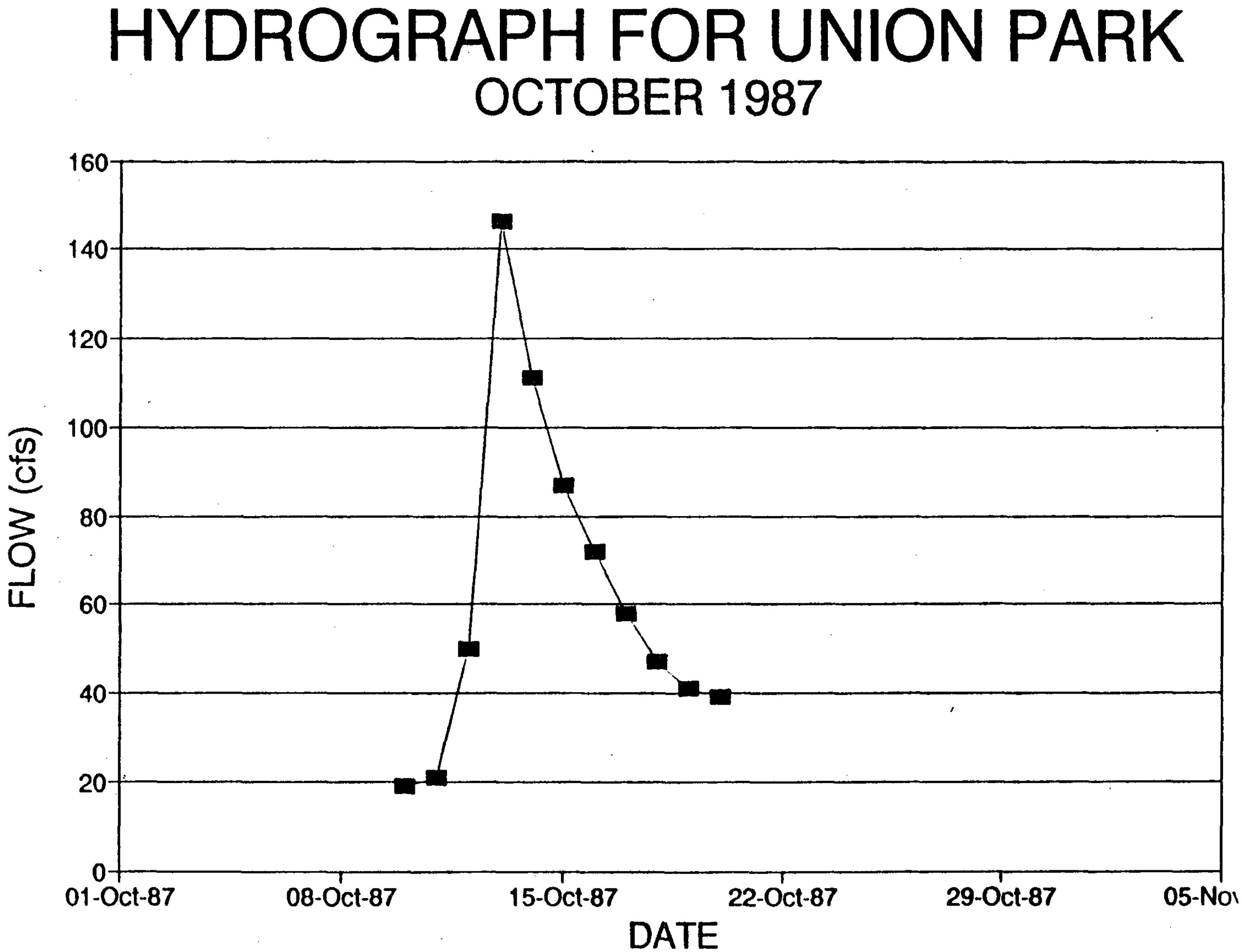


Figure E.3.3 Hydrograph For Estimating Attenuation at Union Park (October 1987)

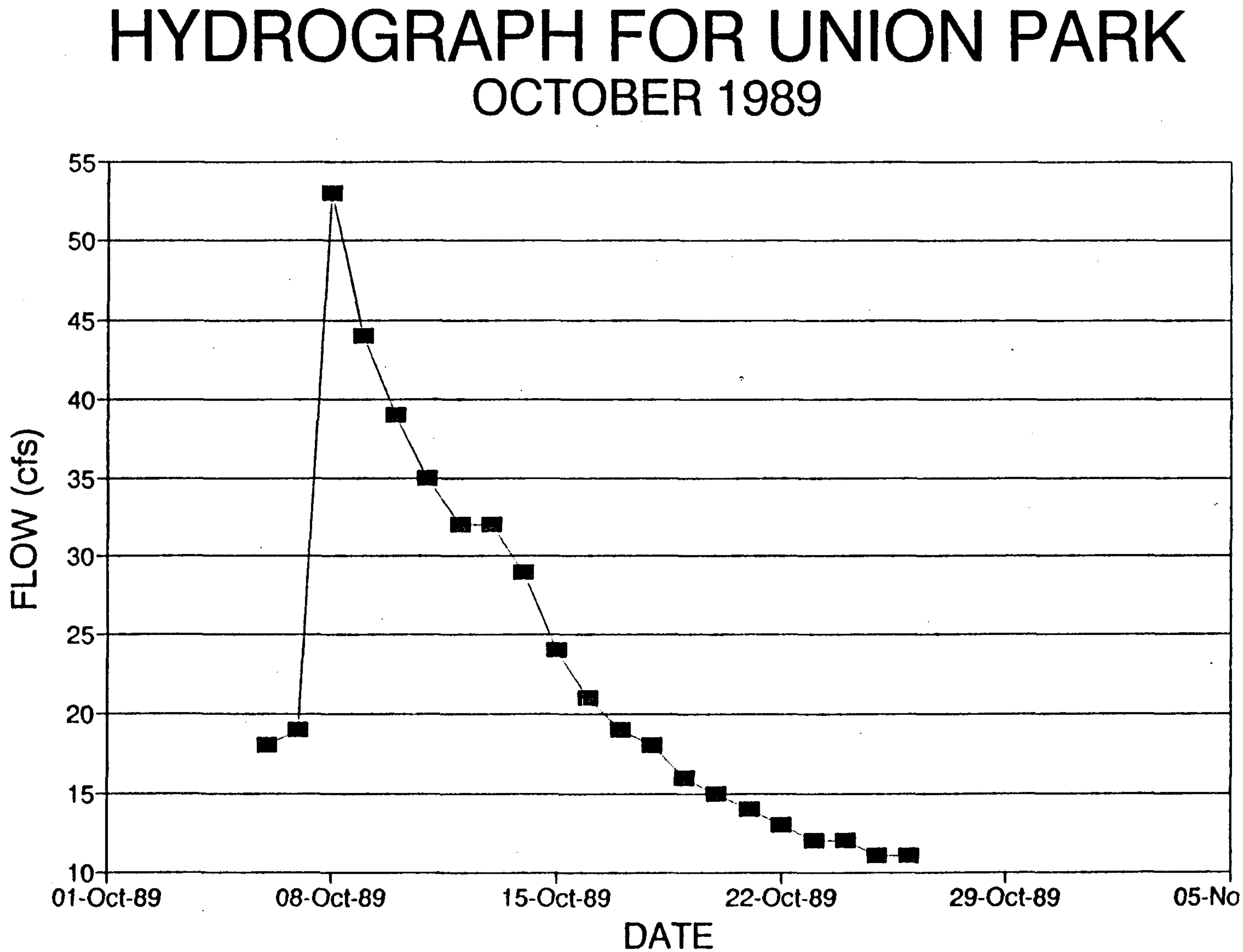


Figure E.3.4 Hydrograph For Estimating Attenuation at Union Park (October 1989)

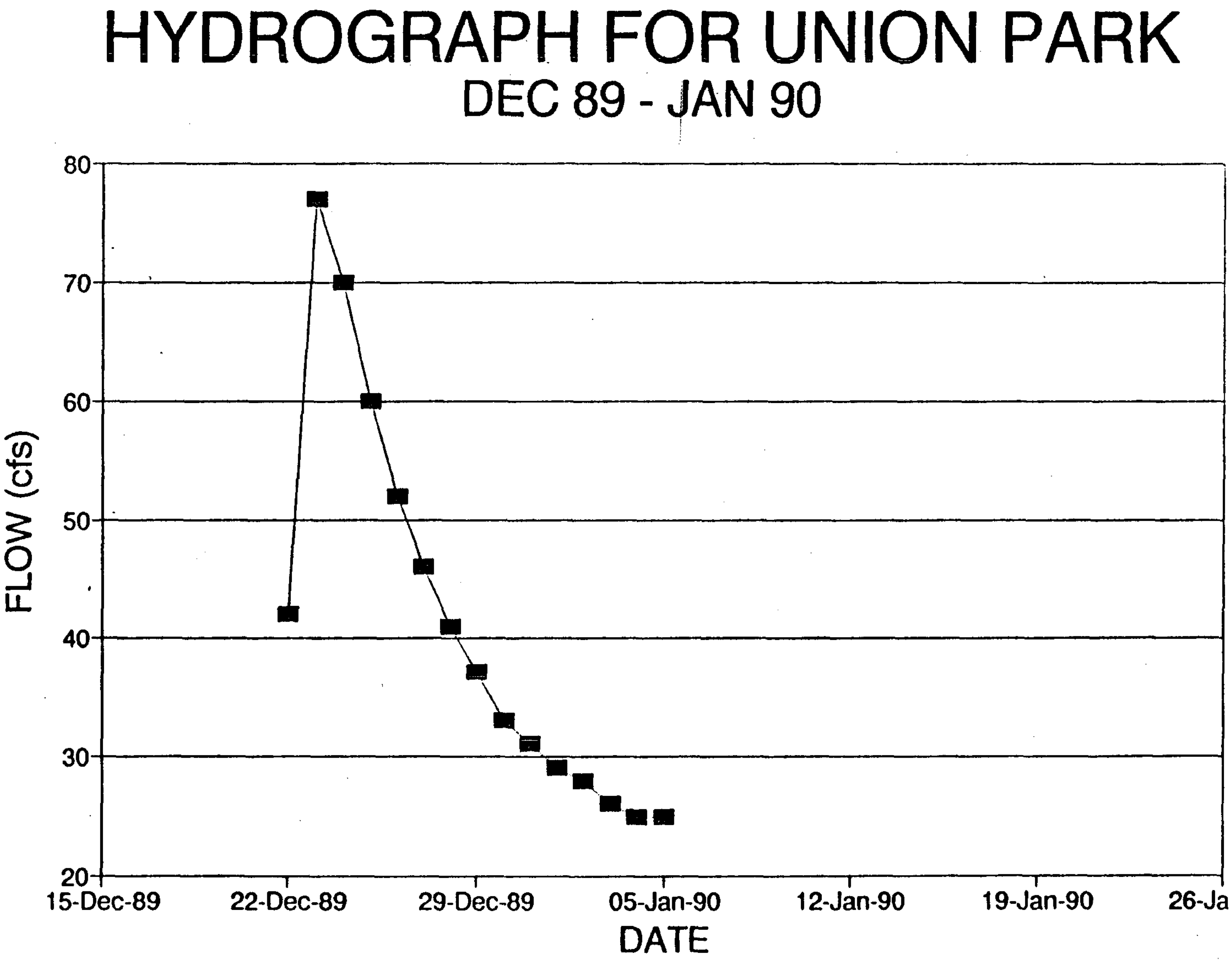


Figure E.3.5 Hydrograph For Estimating Attenuation at Union Park (December 1989)

APPENDIX F

YEARLY STREAM FLOW DISTRIBUTIONS

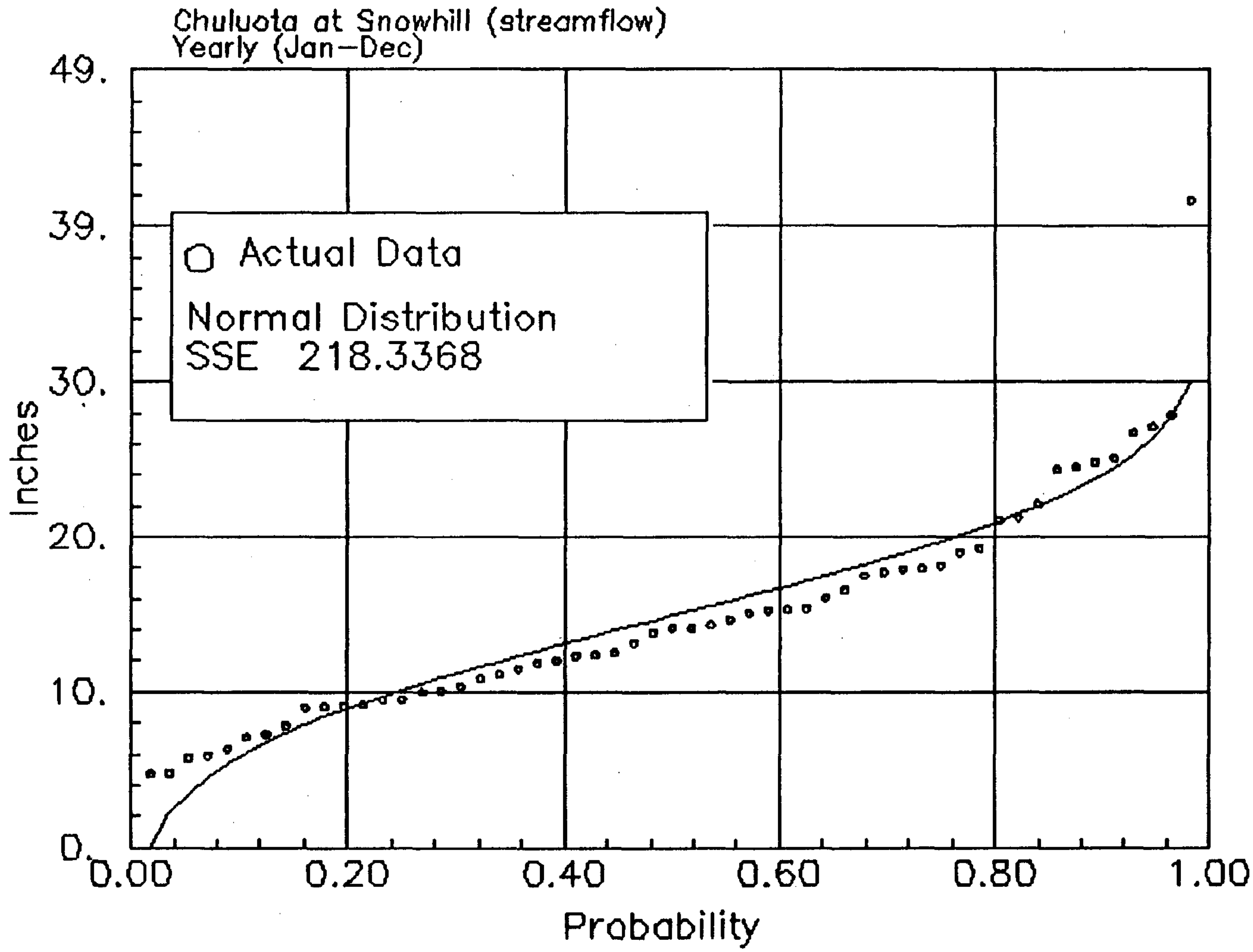


Figure F.1.1 Chuluota at Snowhill, Yearly streamflow distribution for the years of (1936−1990)

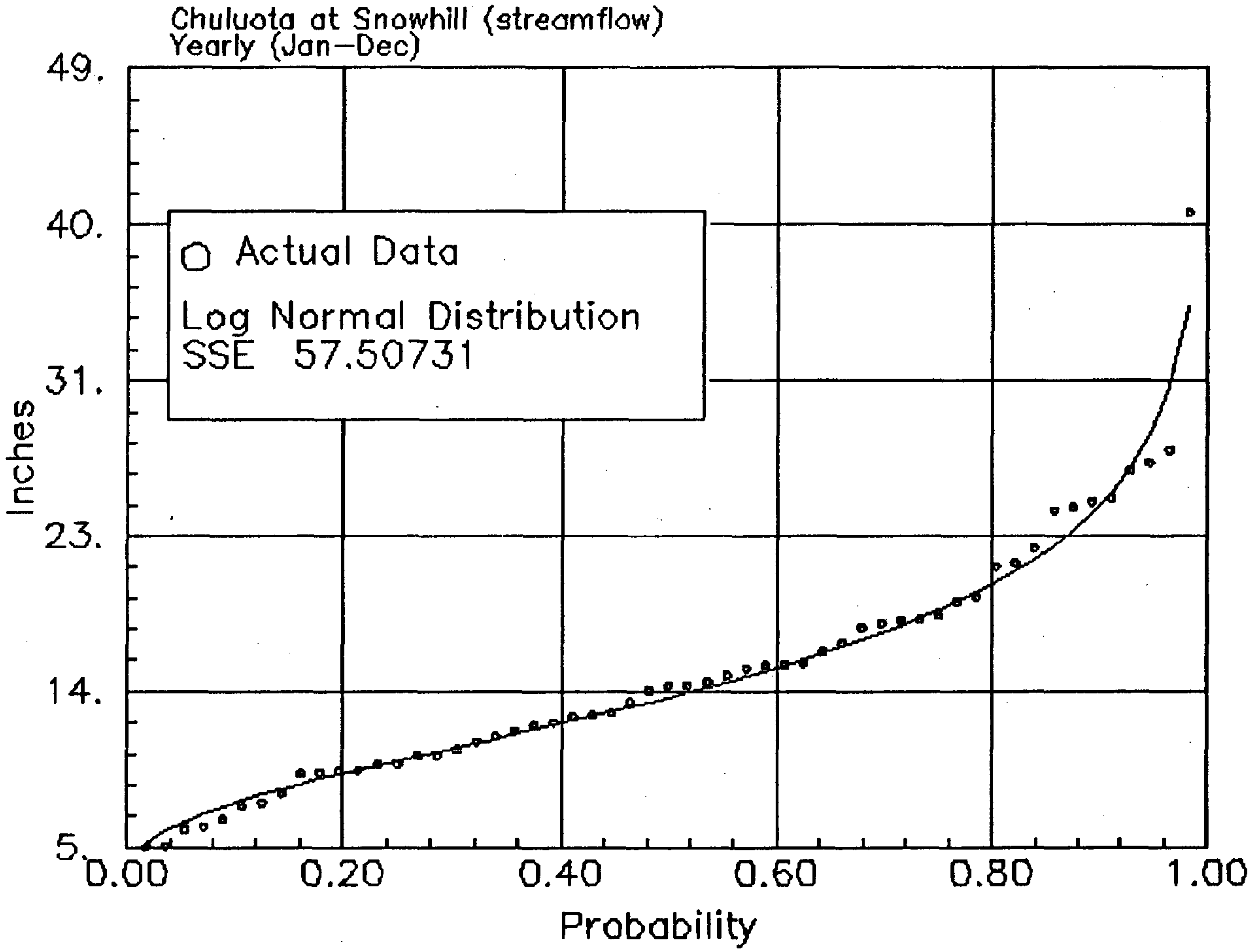


Figure F.1.2 Chuluota at Snowhill, Yearly streamflow distribution for the years of (1936–1990)

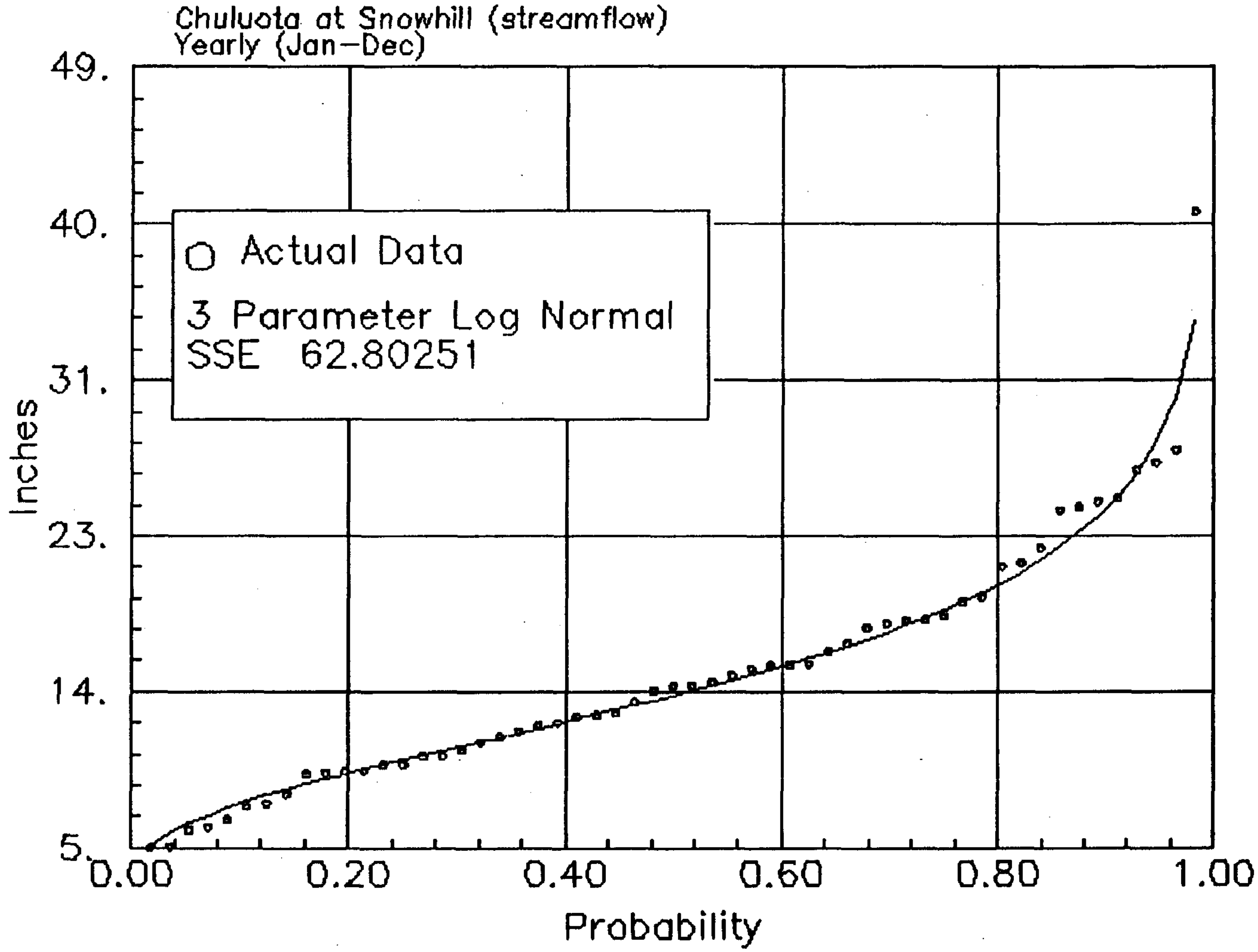


Figure F.1.3 Chuluota at Snowhill, Yearly streamflow distribution for the years of (1936-1990)

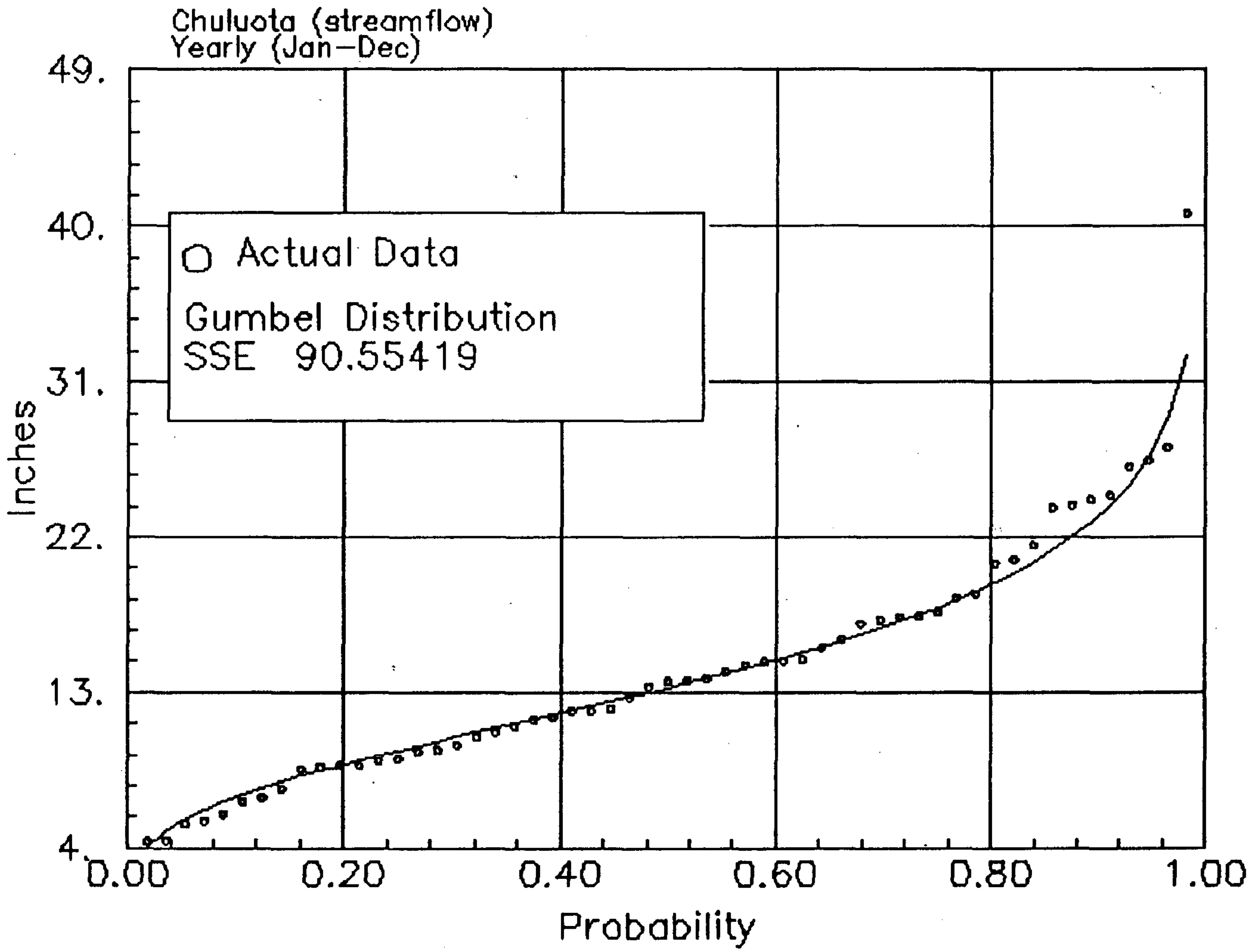


Figure F.1.4 Chuluota, Yearly streamflow distribution for the years of (1936–1990)

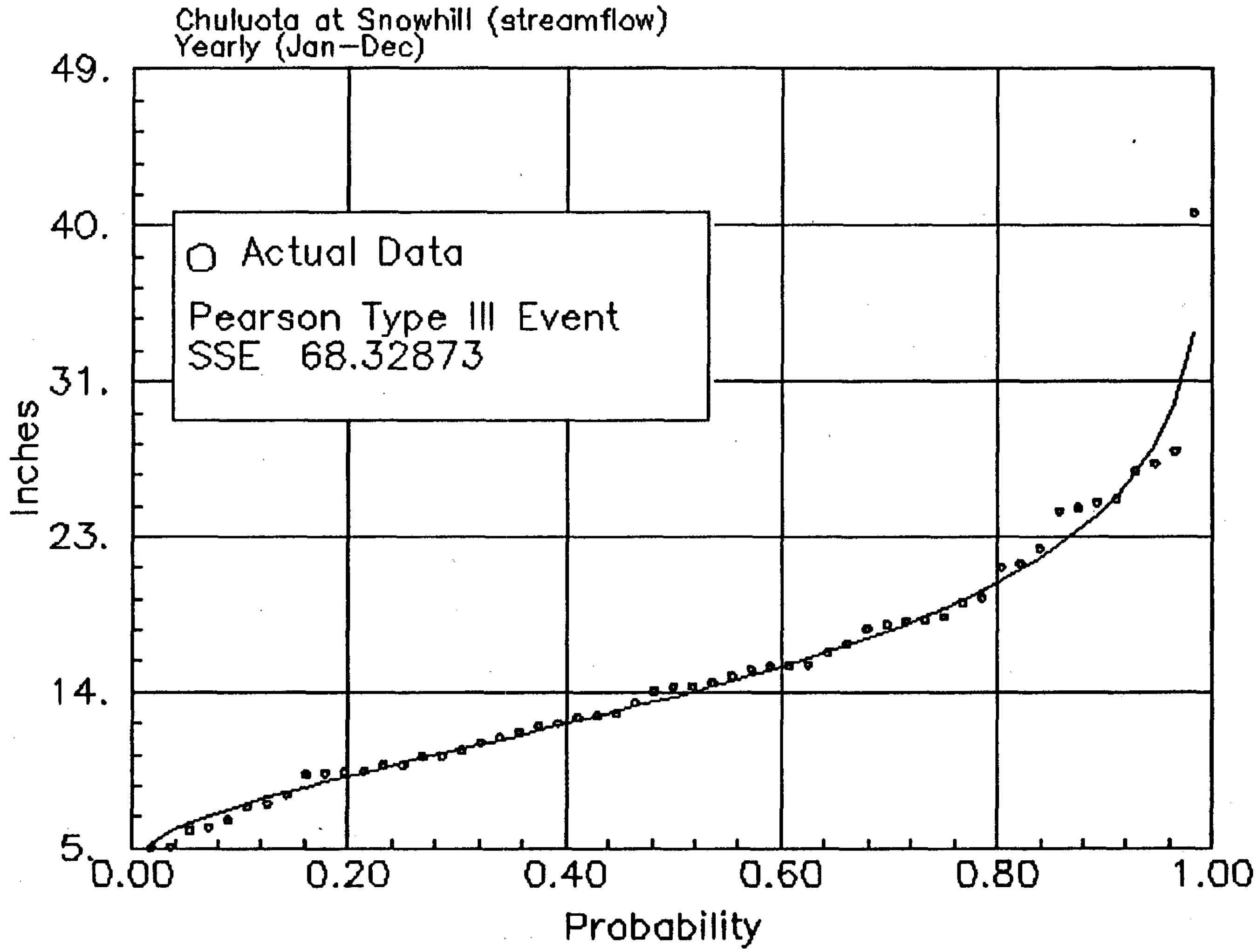


Figure F.1.5 Chuluota at Snowhill, Yearly streamflow distribution for the years of (1936-1990)

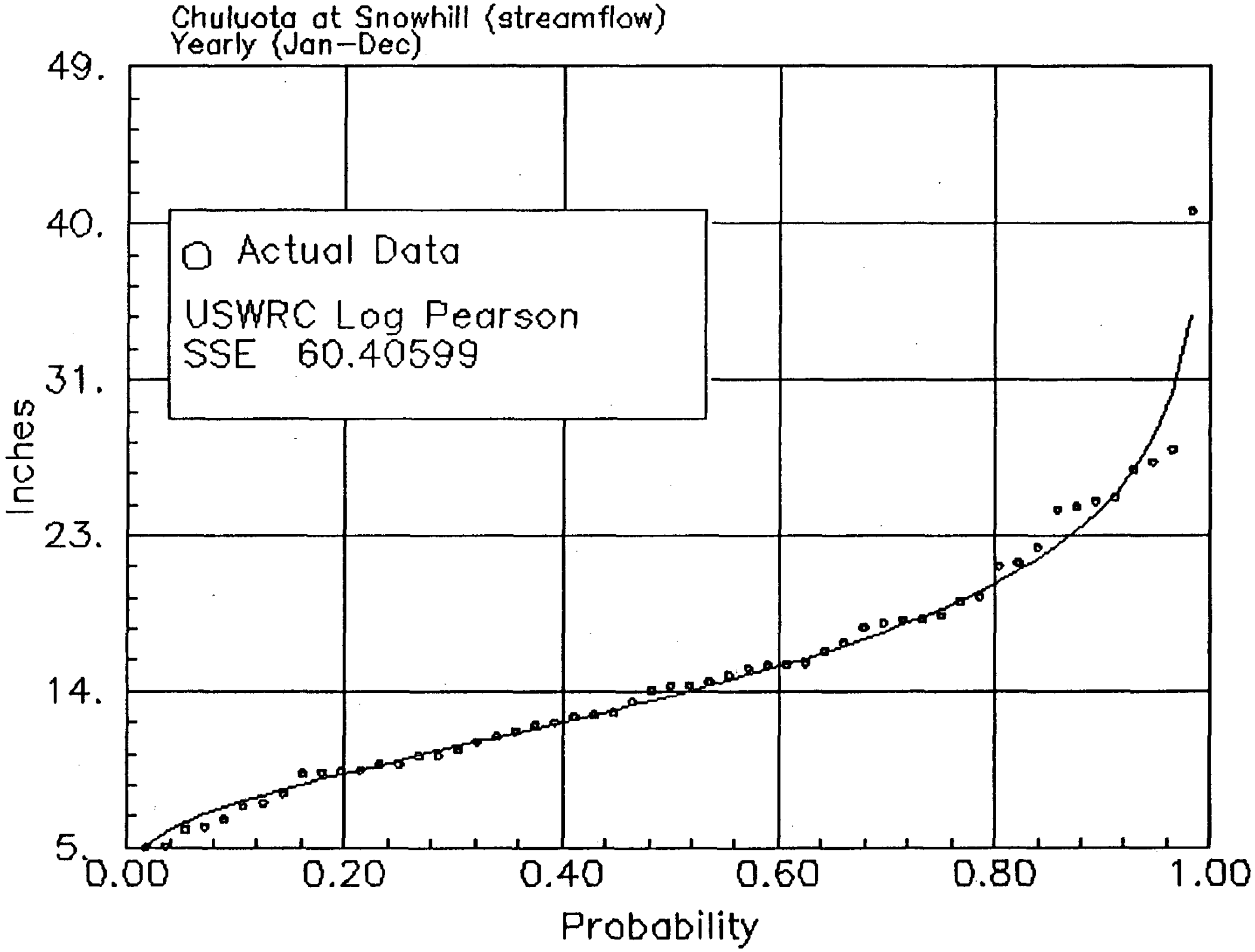


Figure F.1.6 Chuluota at Snowhill, Yearly streamflow distribution for the years of (1936-1990)

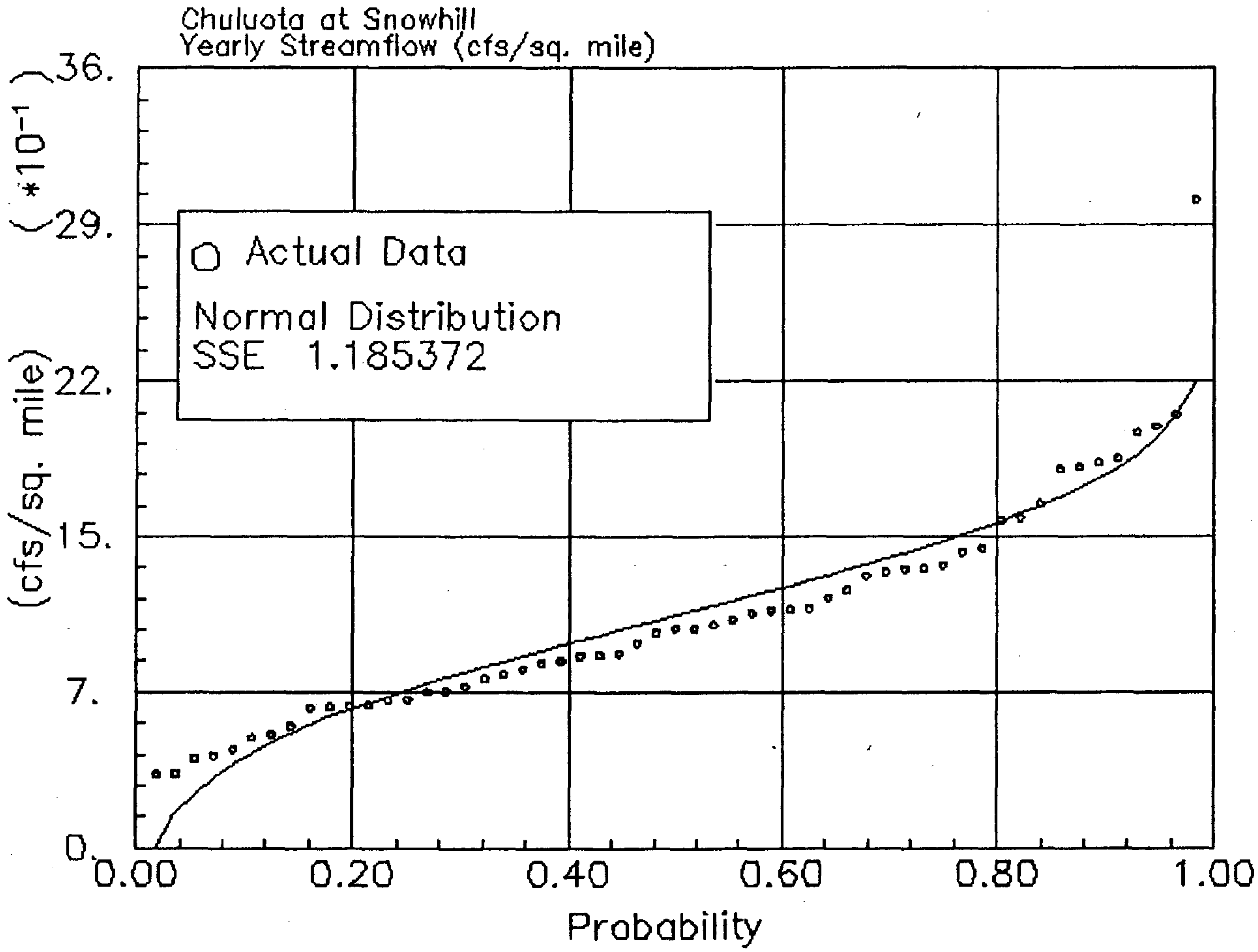


Figure F.1.7 Chuluota at Snowhill, yearly stream flow distribution (cfs/square mile) (1936–1990).

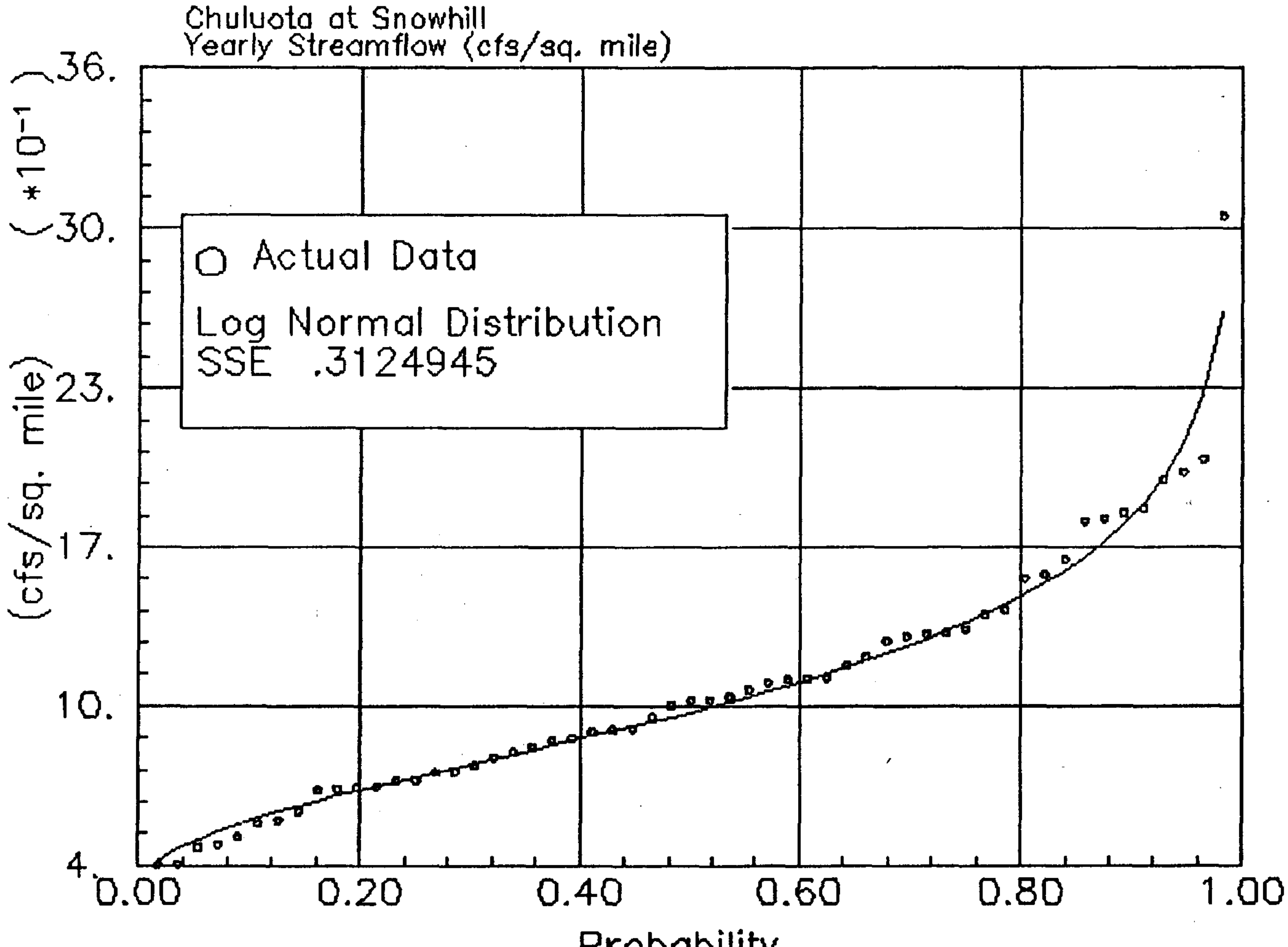


Figure F.1.8 Chuluota at Snowhill, yearly stream flow distribution (cfs/square mile) (1936–1990).

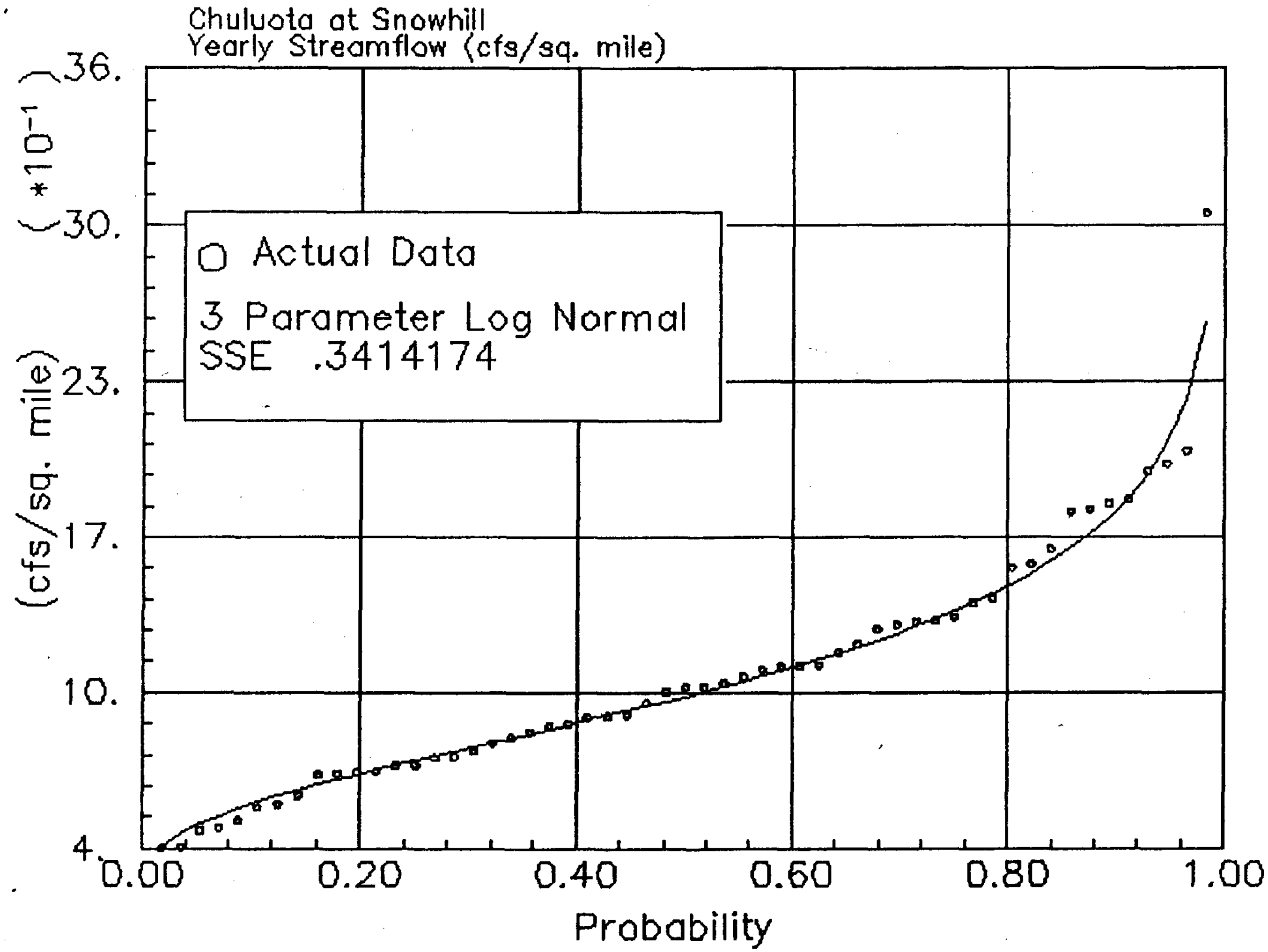


Figure F.1.9 Chuluota at Snowhill, yearly stream flow distribution (cfs/square mile) (1936–1990).

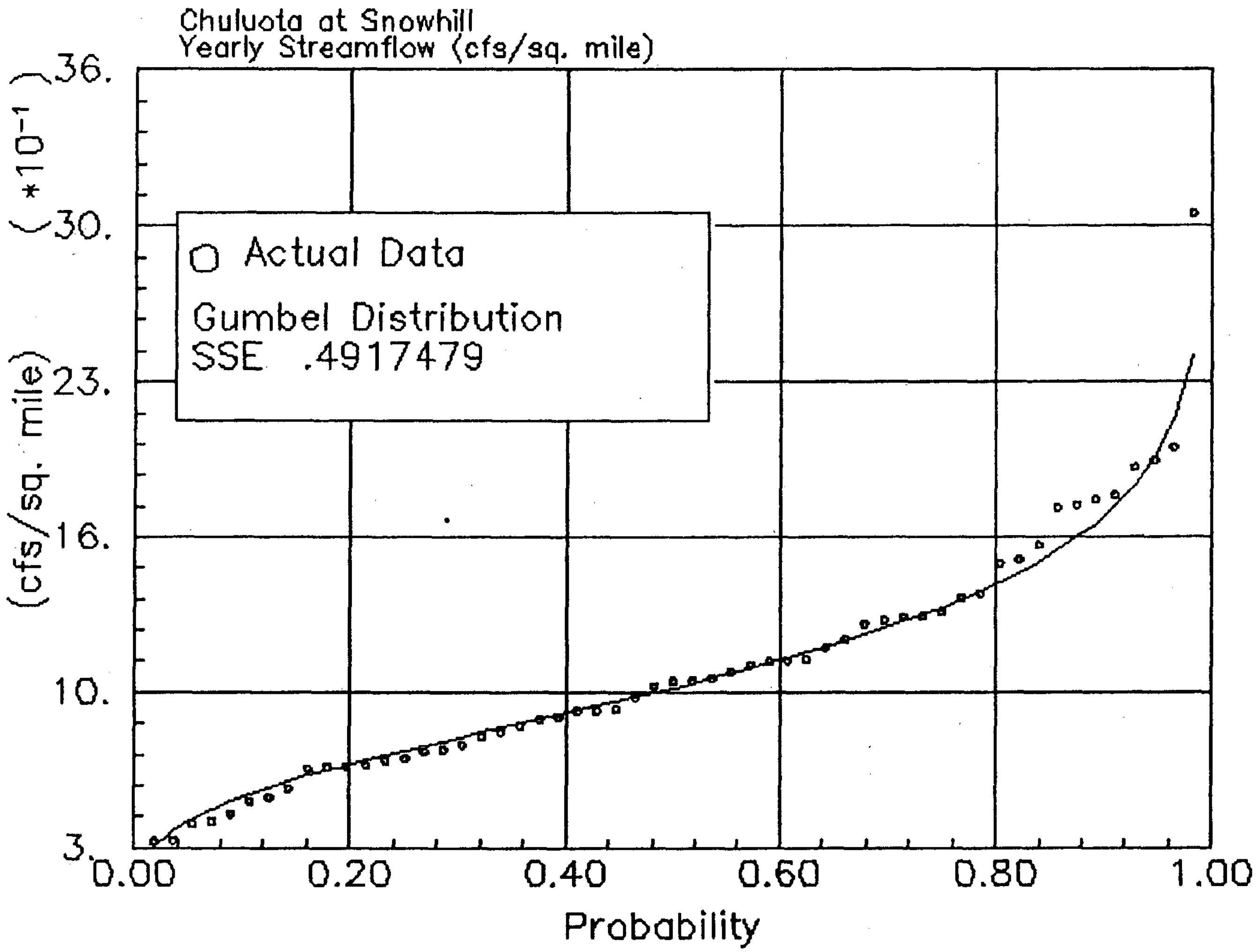


Figure F.1.10 Chuluota at Snowhill, yearly stream flow distribution (cfs/square mile) (1936–1990).

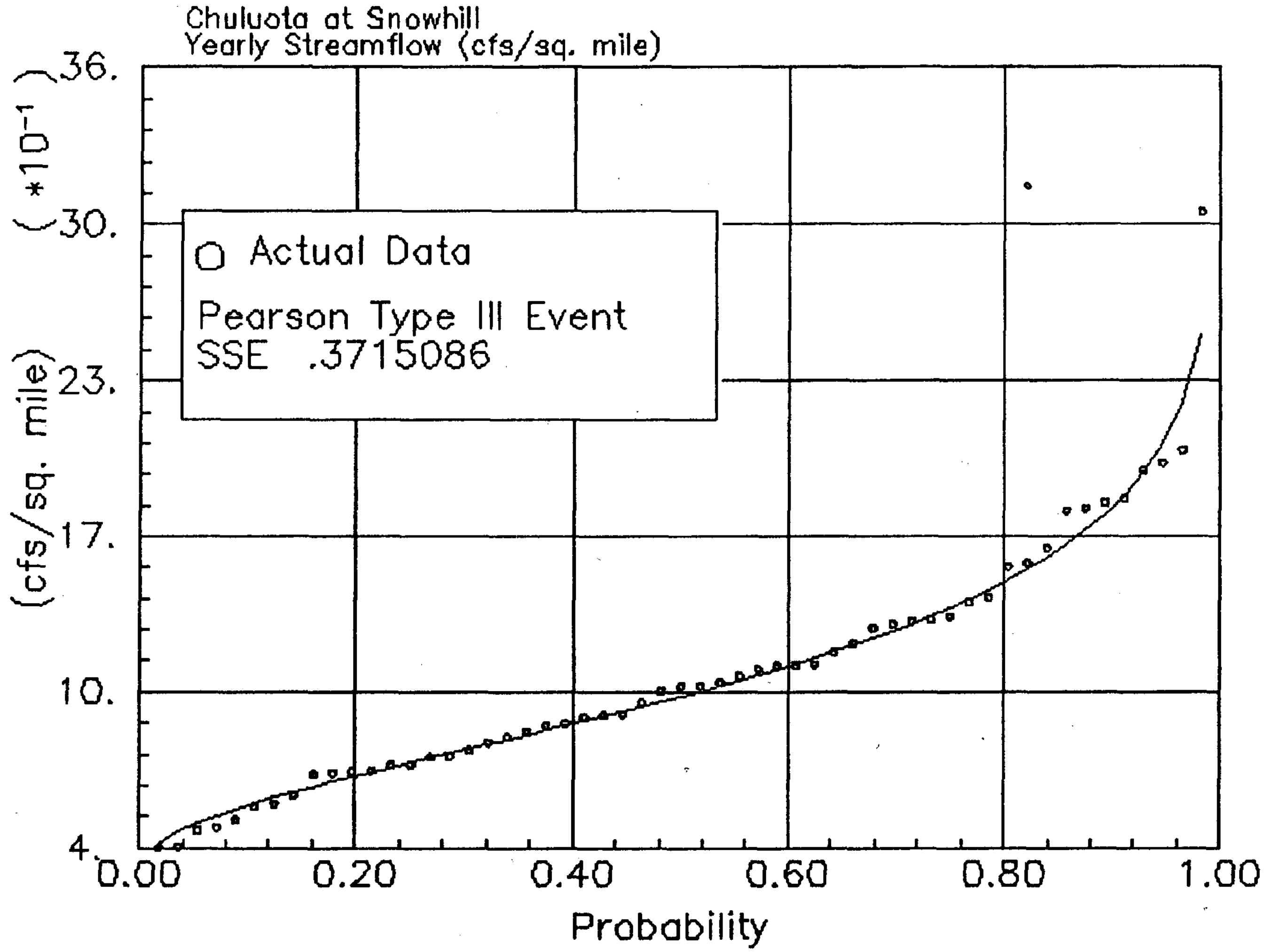


Figure F.1.11 Chuluota at Snowhill, yearly stream flow distribution (cfs/square mile) (1936–1990).

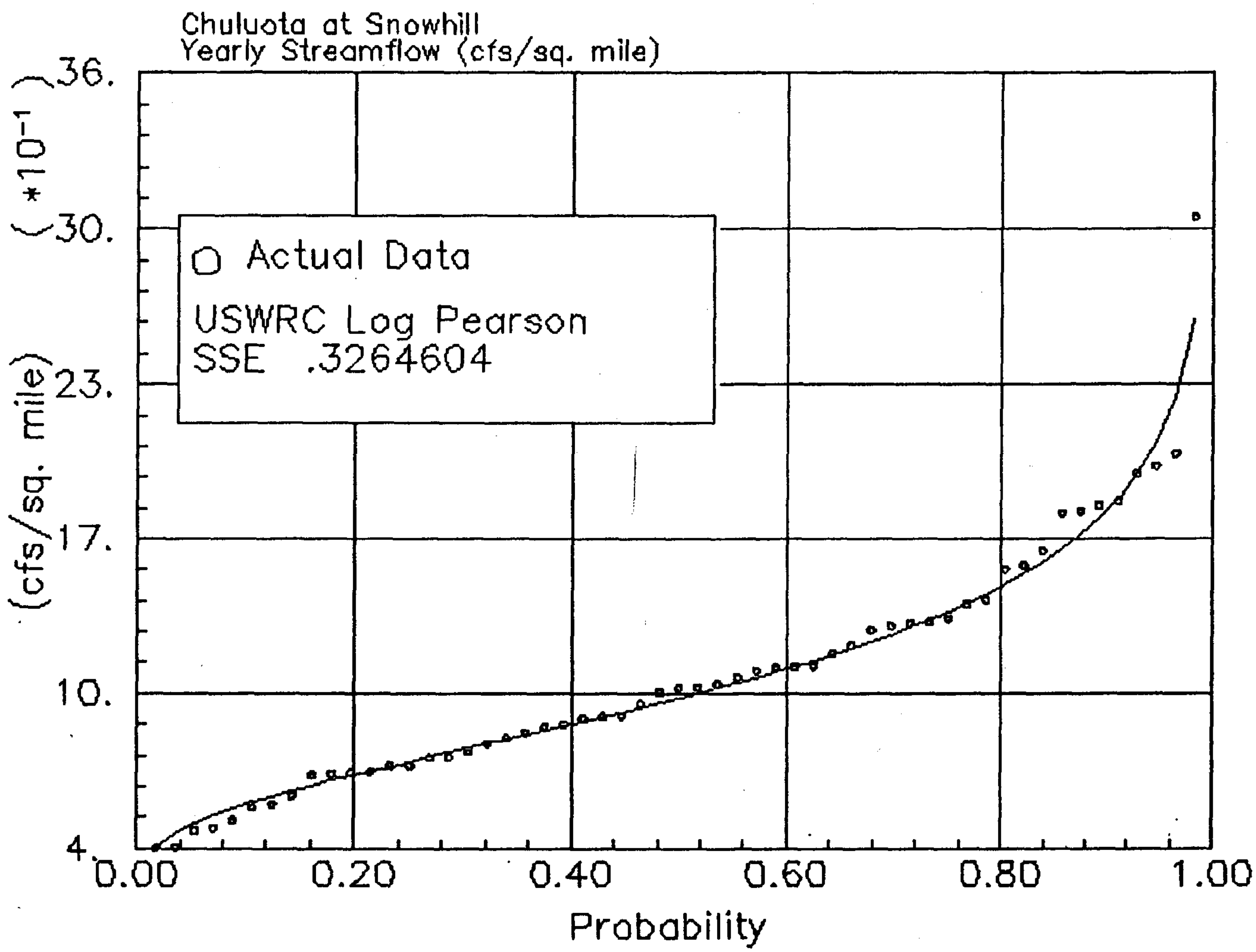


Figure F.1.12 Chuluota at Snowhill, yearly stream flow distribution (cfs/square mile) (1936–1990).

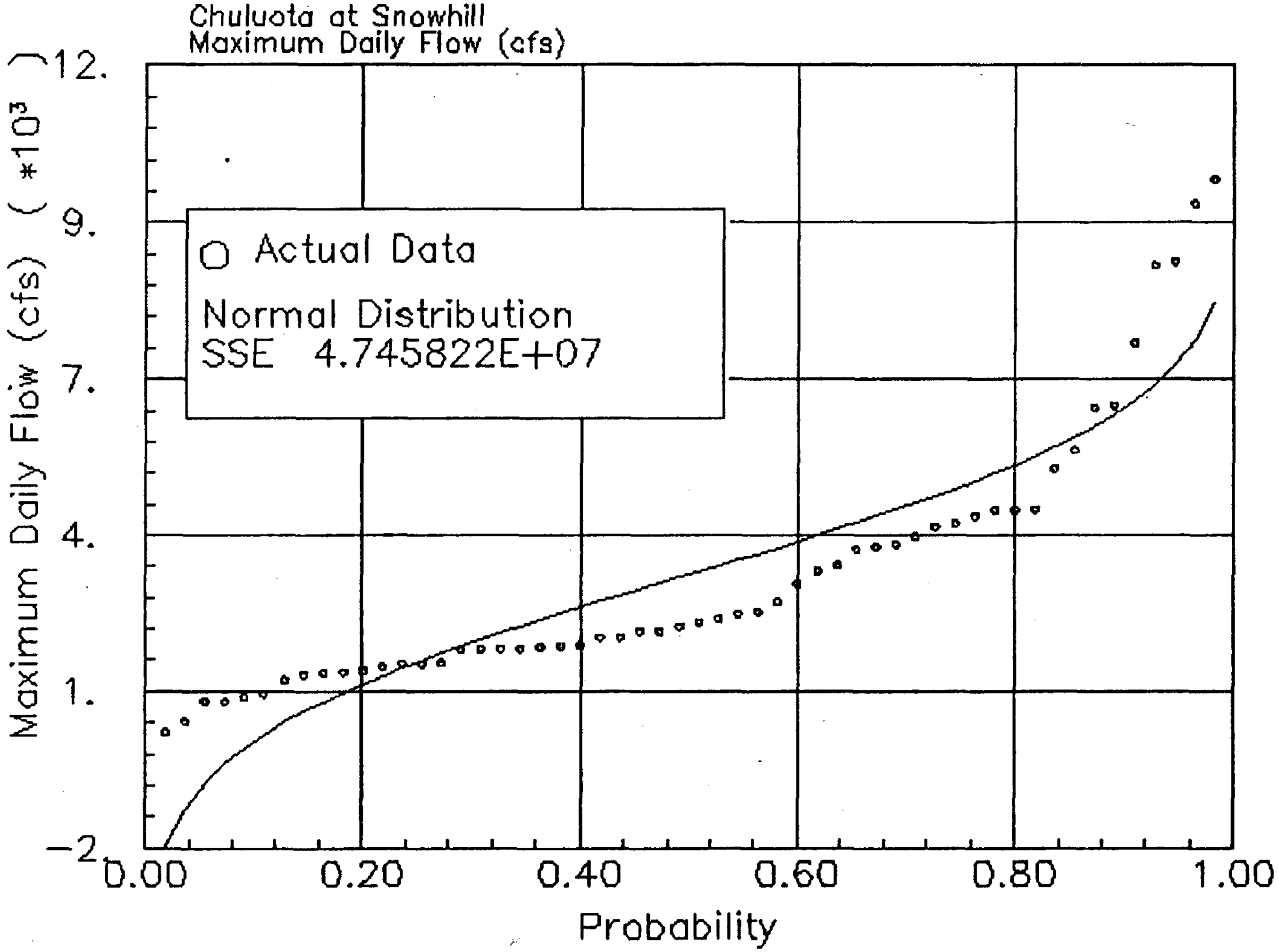


Figure F.1.13 Chuluota at Snowhill, Maximum Daily Flow (cfs) for the Years of 1936−1989.

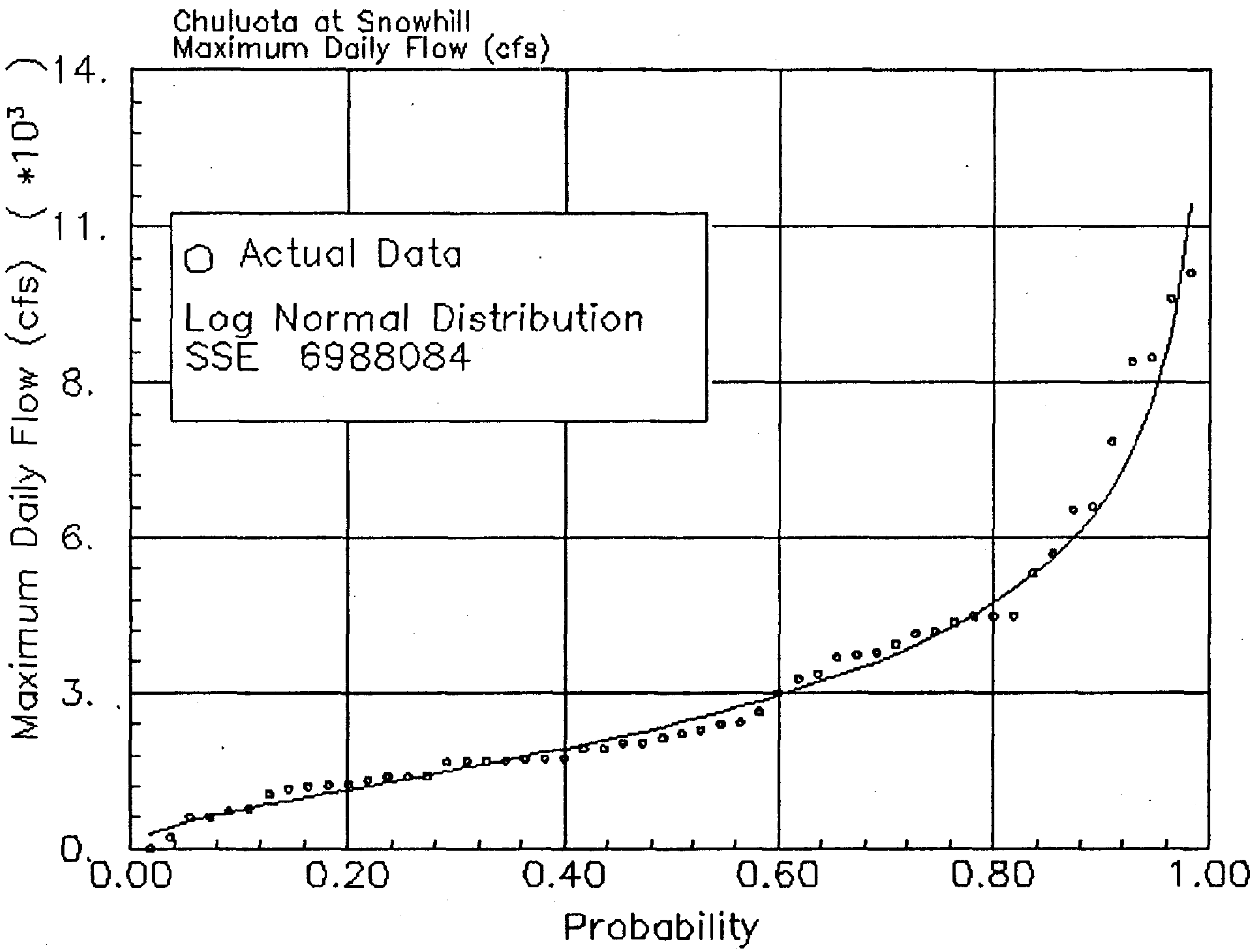


Figure F.1.14 Chuluota at Snowhill, Maximum Daily Flow (cfs) for the Years of 1936–1989.

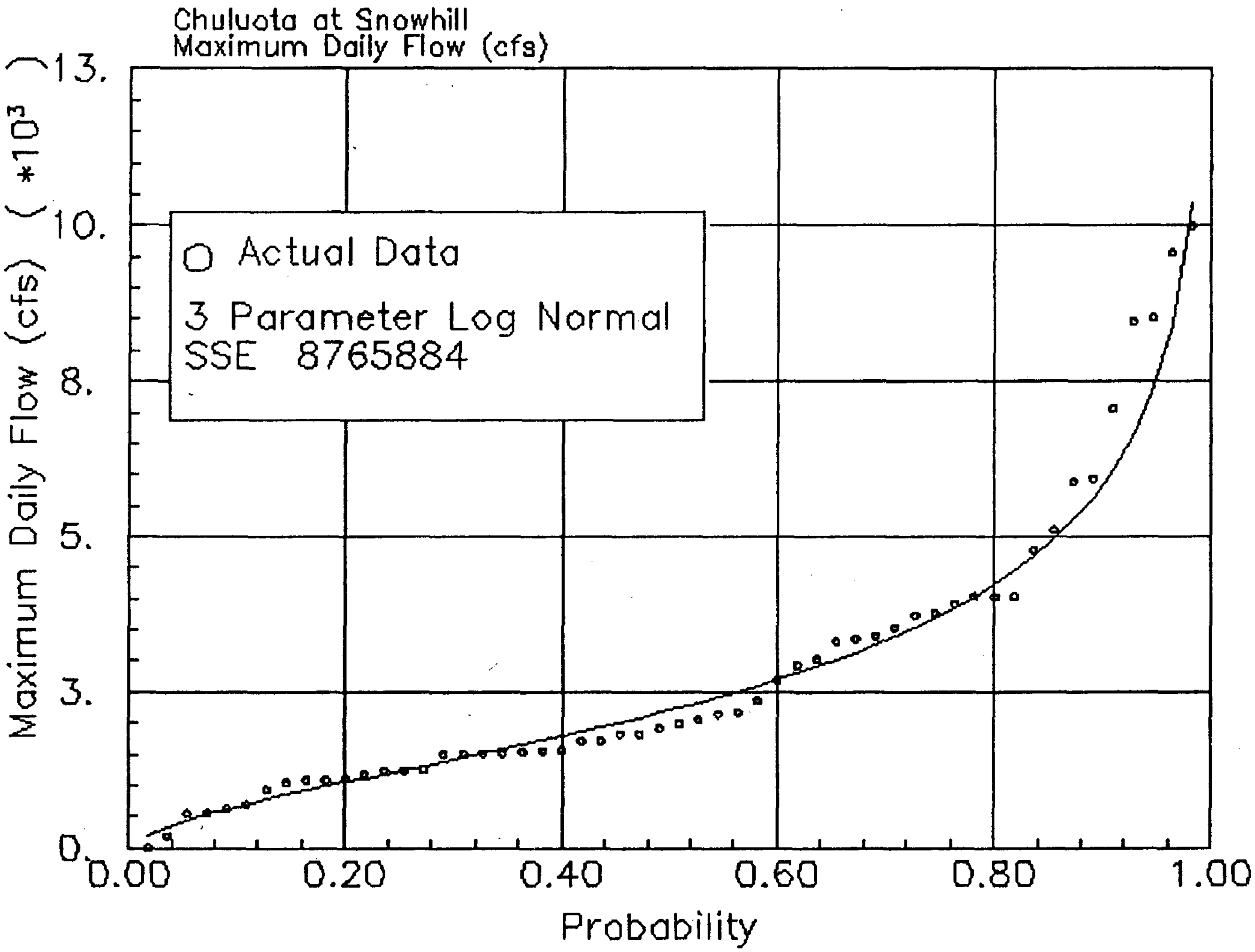


Figure F.1.15 Chuluota at Snowhill, Maximum Daily Flow (cfs) for the Years of 1936–1989.

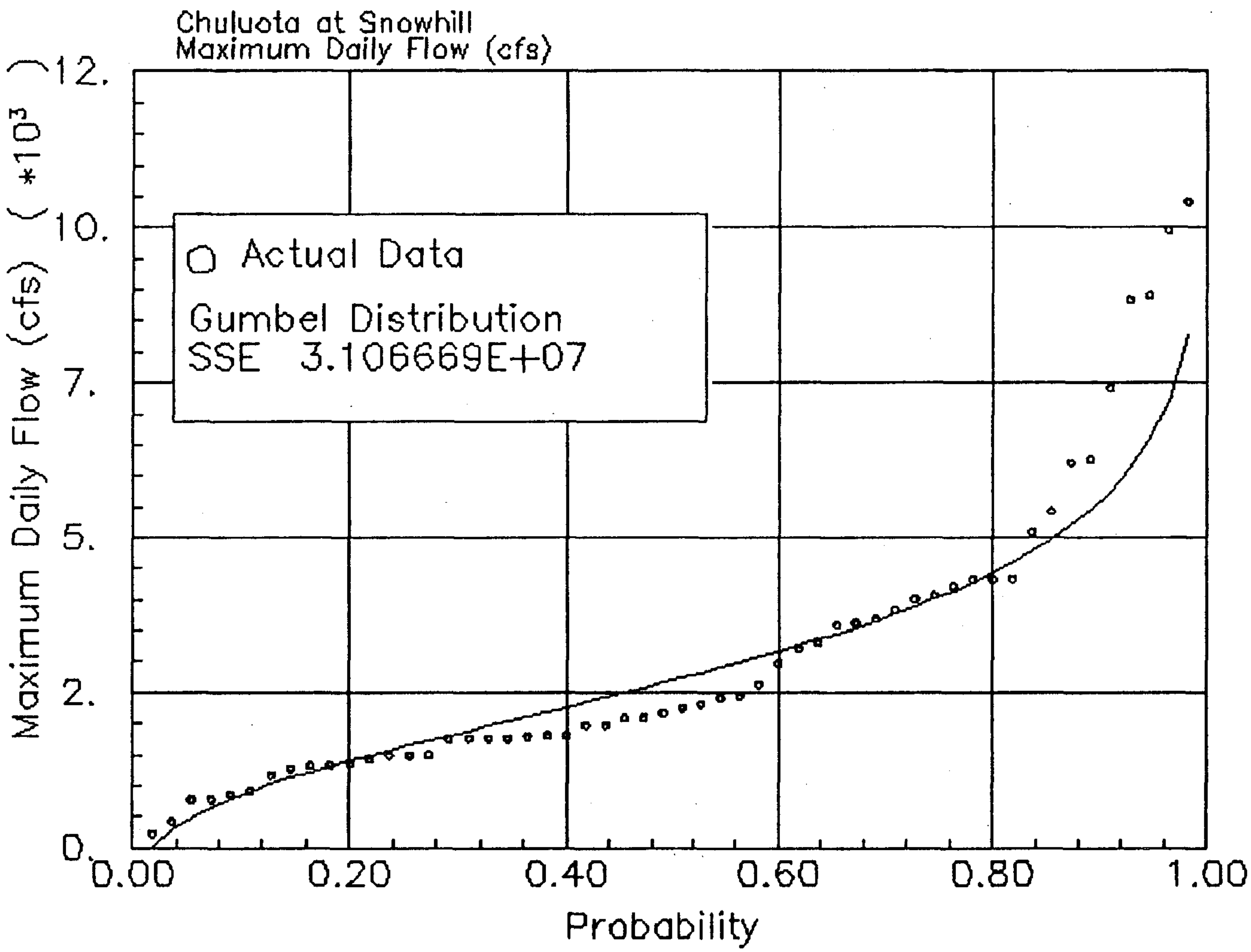


Figure F.1.16 Chuluota at Snowhill, Maximum Daily Flow (cfs) for the Years of 1936–1989.

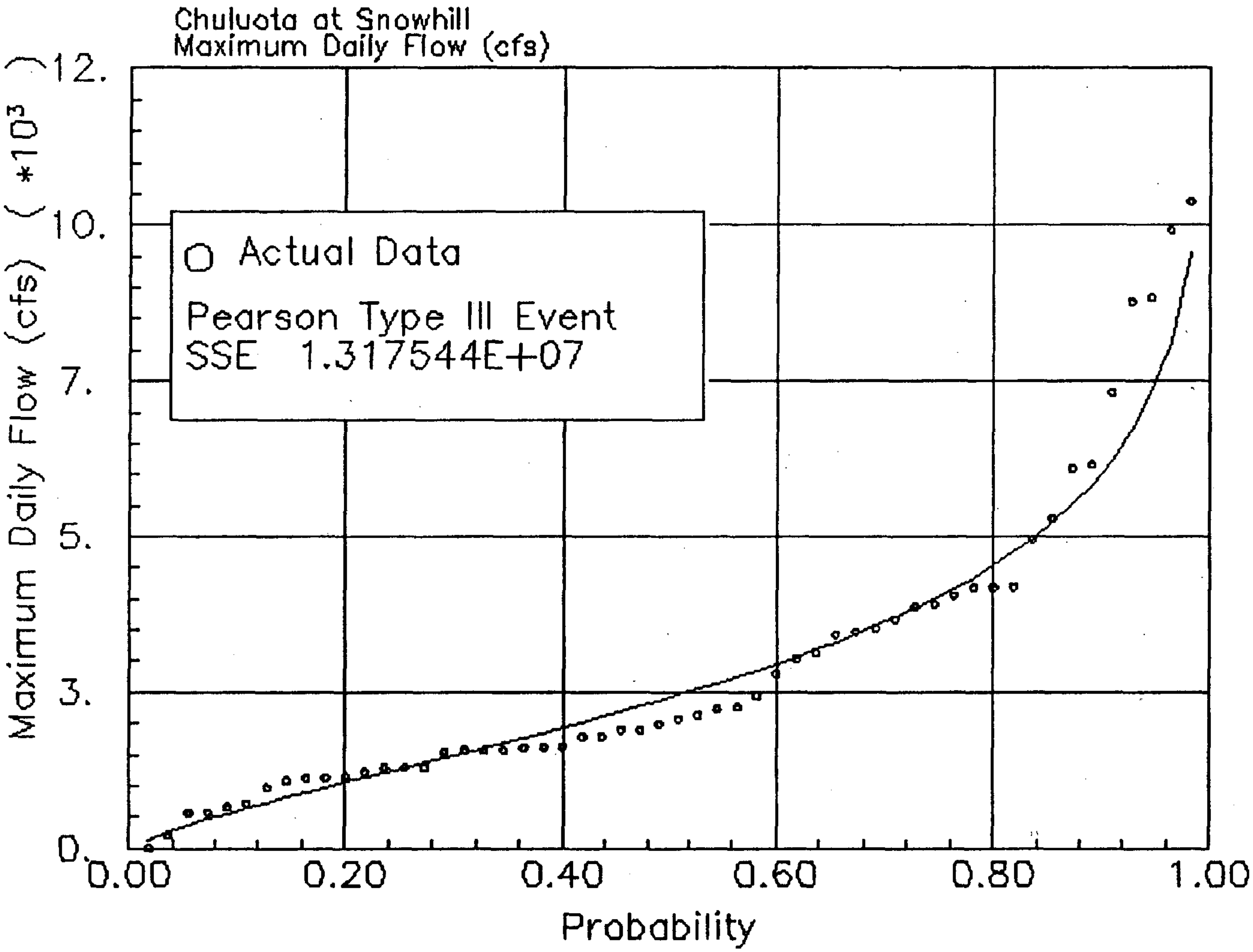


Figure F.1.17 Chuluota at Snowhill, Maximum Daily Flow (cfs) for the Years of 1936–1989.

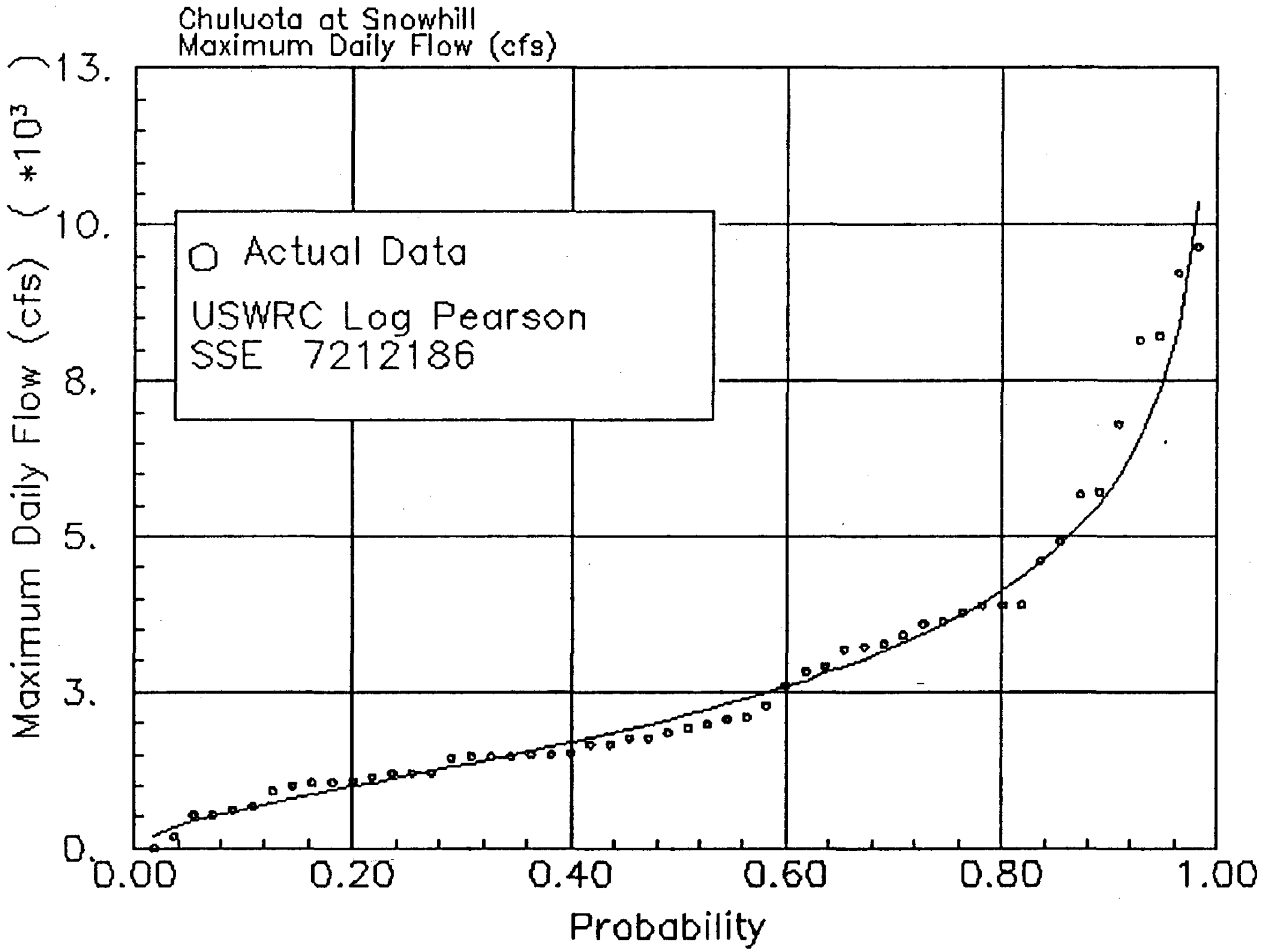


Figure F.1.18 Chuluota at Snowhill, Maximum Daily Flow (cfs) for the Years of 1936–1989.

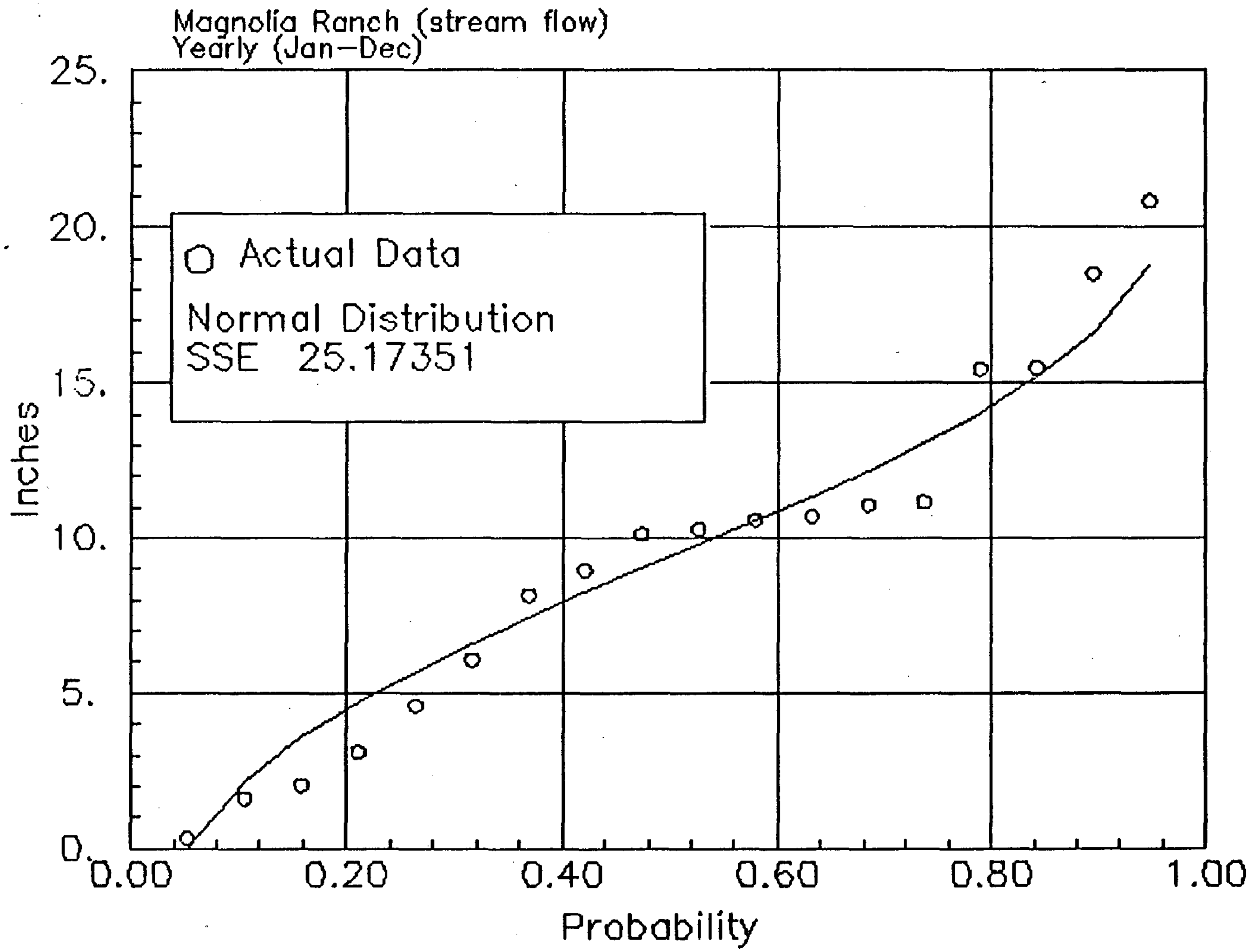


Figure F.2.1 Magnolia Ranch, Yearly stream flow distribution for the years of (1923–1990)

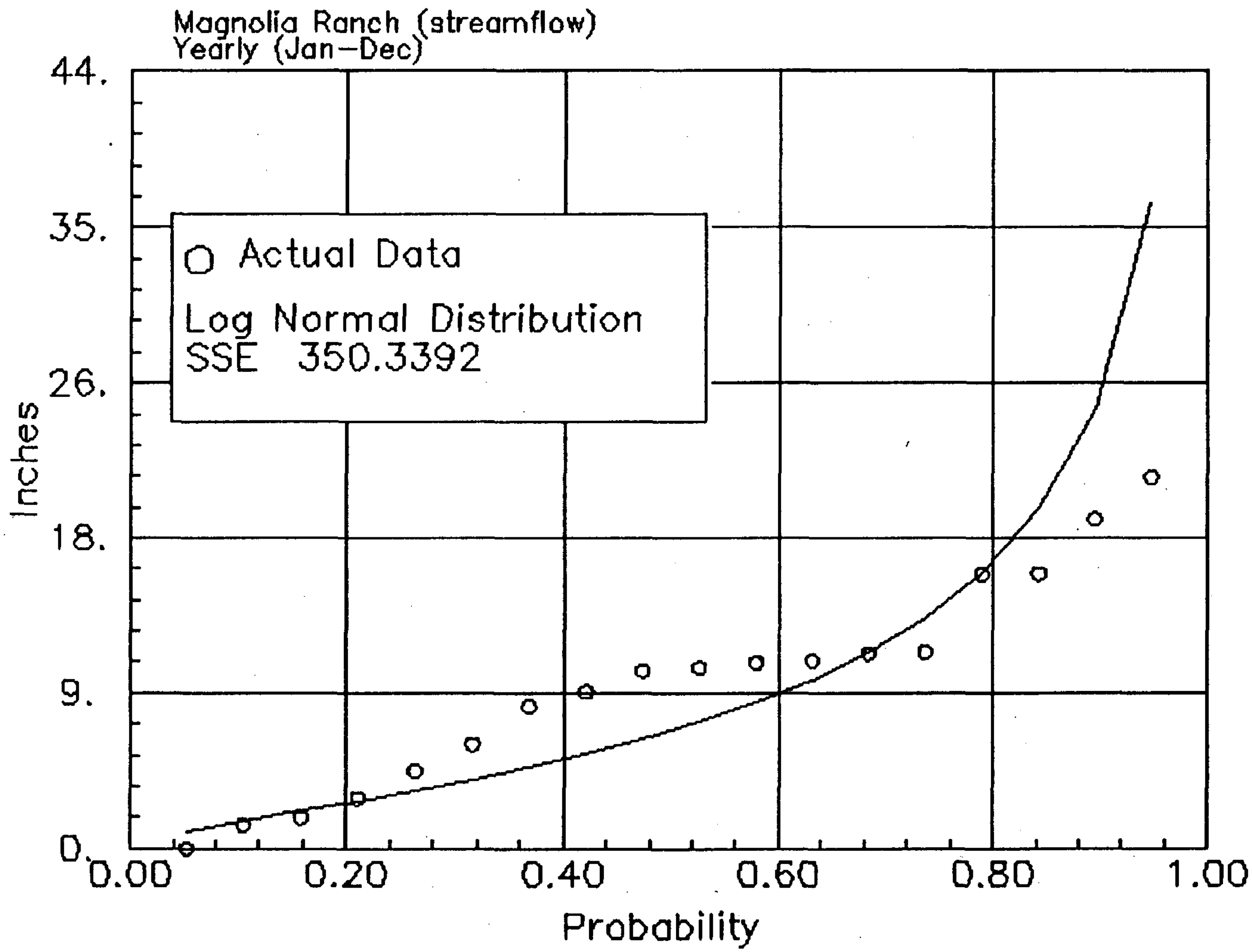


Figure F.2.2 Magnolia Ranch, Yearly streamflow distribution for the years of (1973–1990)

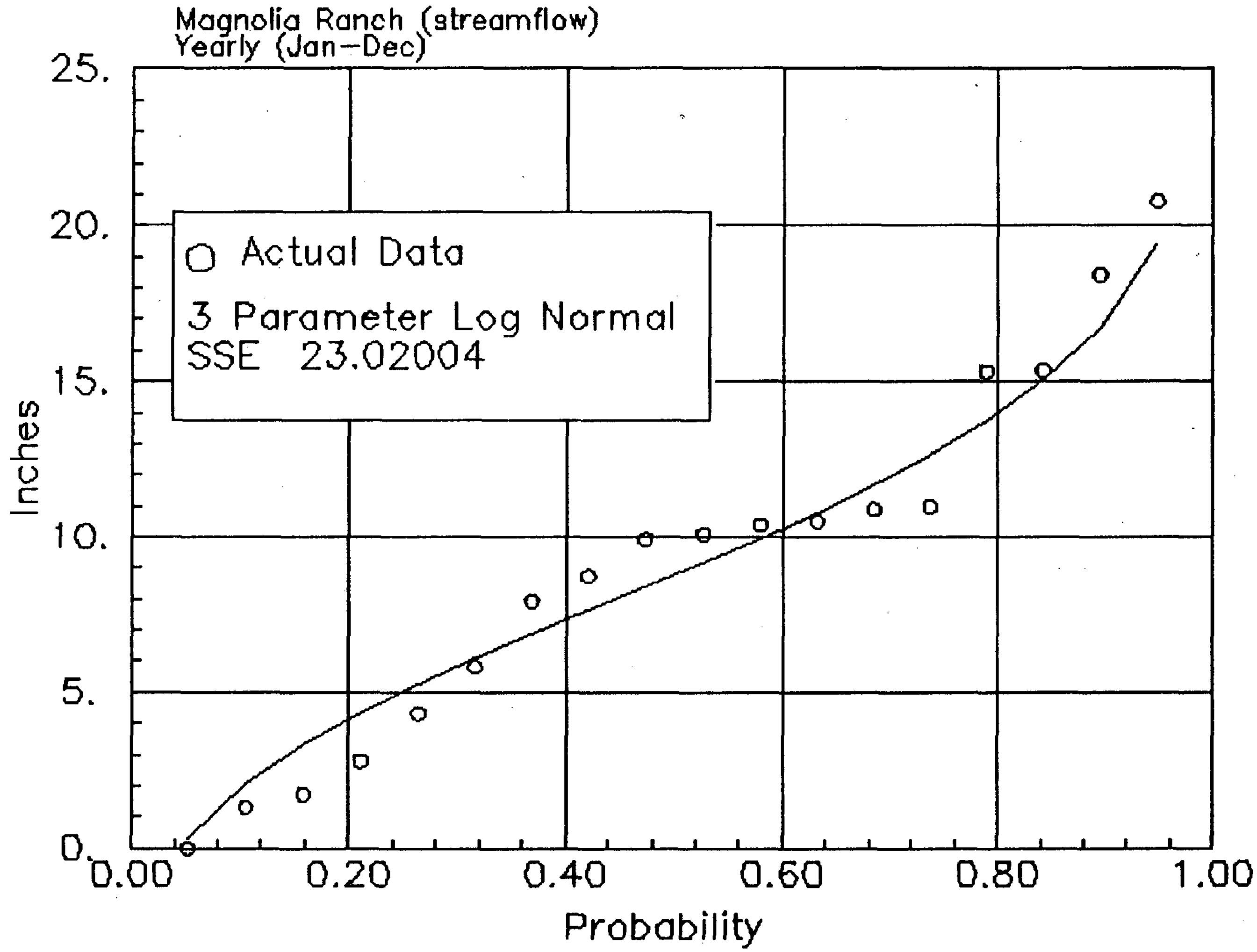


Figure F.2.3 Magnolia Ranch, Yearly streamflow distribution for the years of (1973–1990)

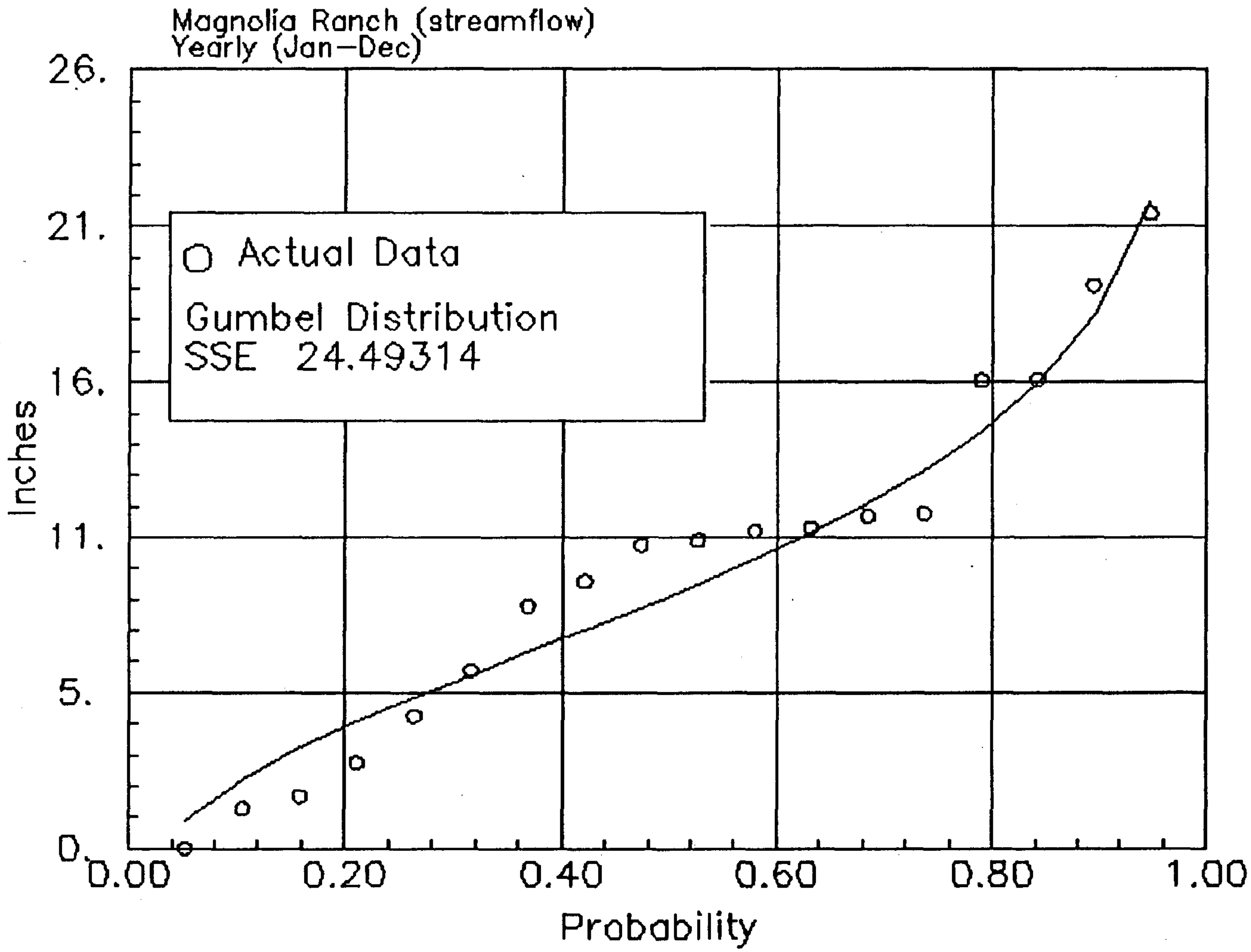


Figure F.2.4 Magnolia Ranch, Yearly streamflow distribution for the years of (1973—1990)

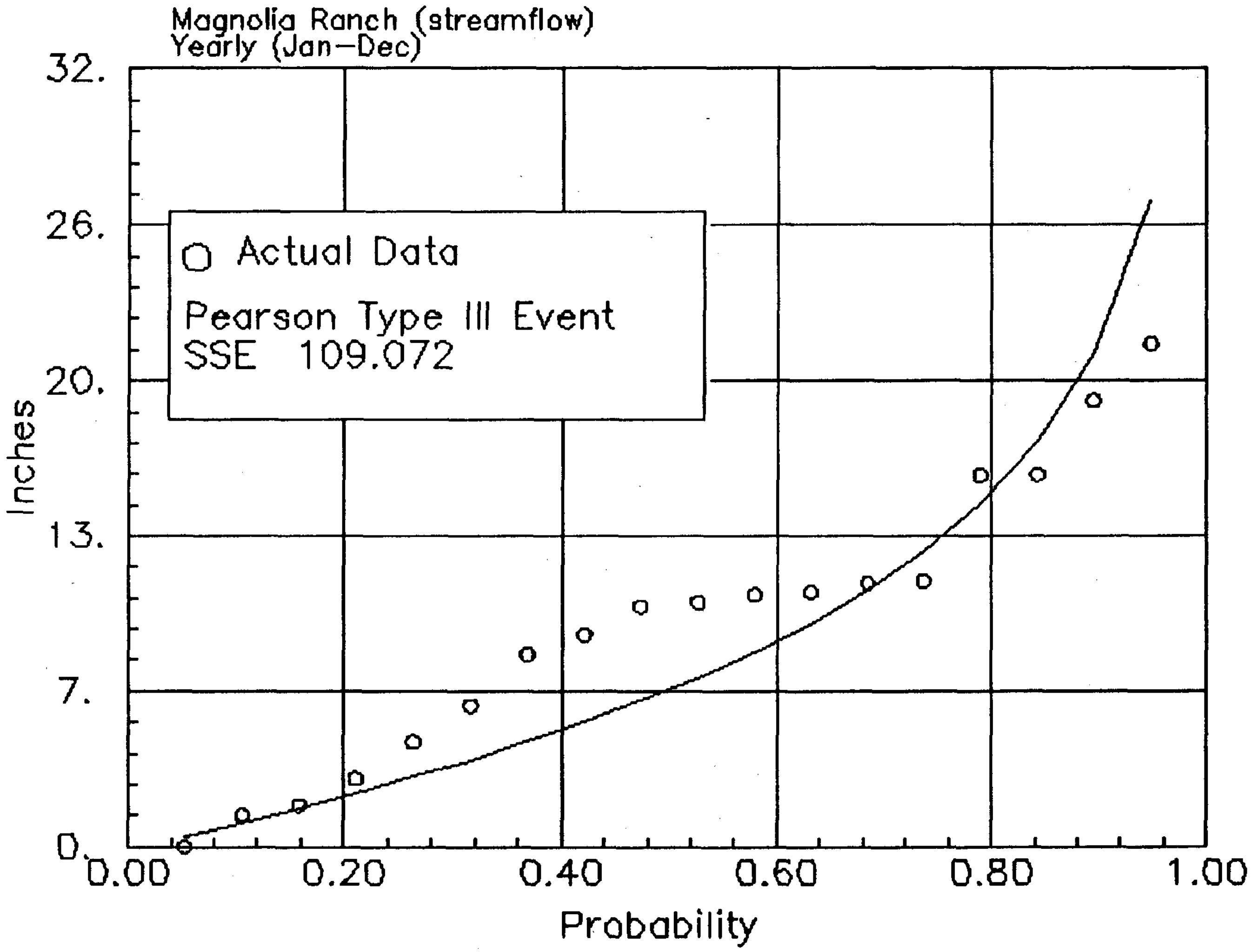


Figure F.2.5 Magnolia Ranch, Yearly streamflow distribution for the years of (1973–1990)

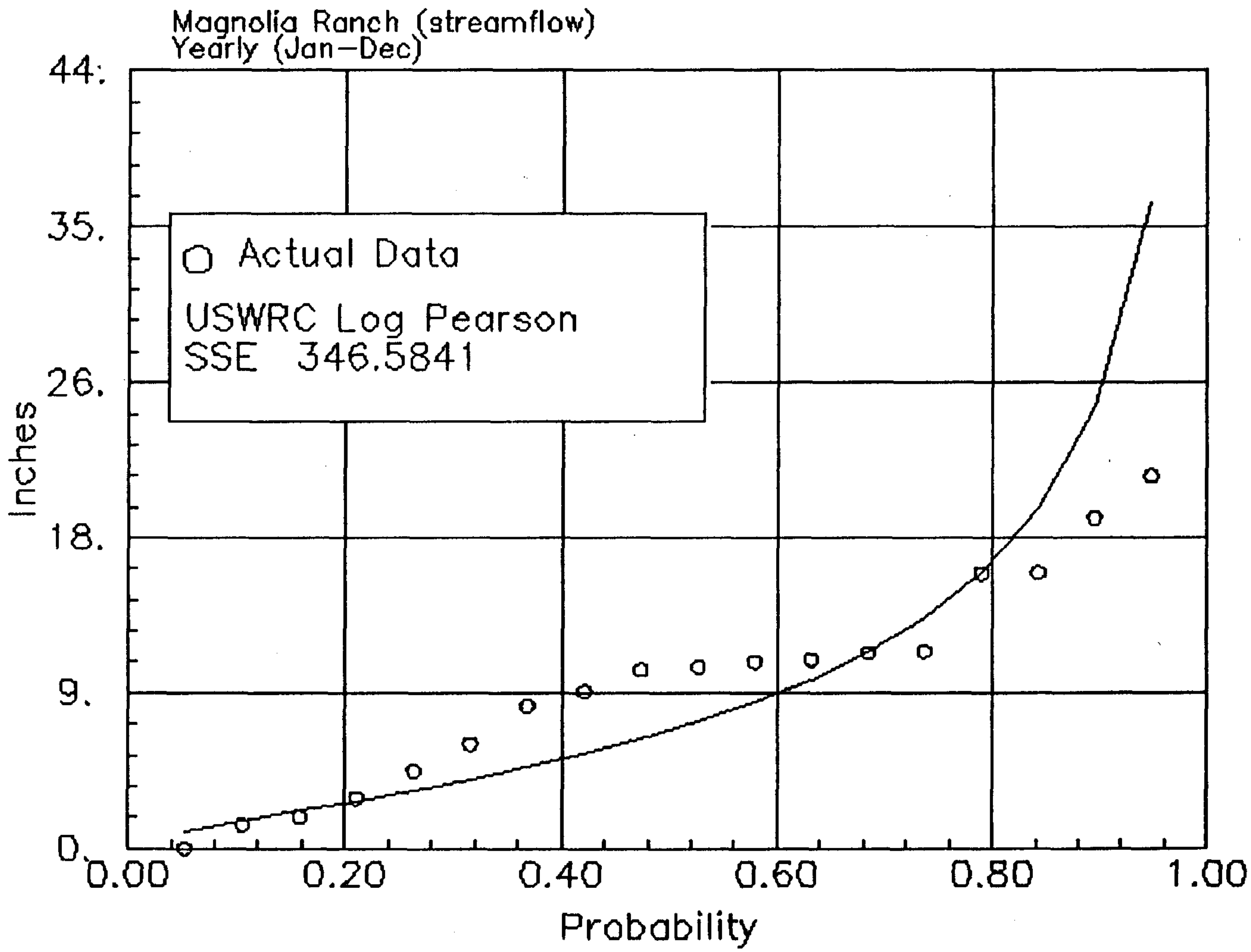


Figure F.2.6 Magnolia Ranch, Yearly streamflow distribution for the years of (1973–1990)

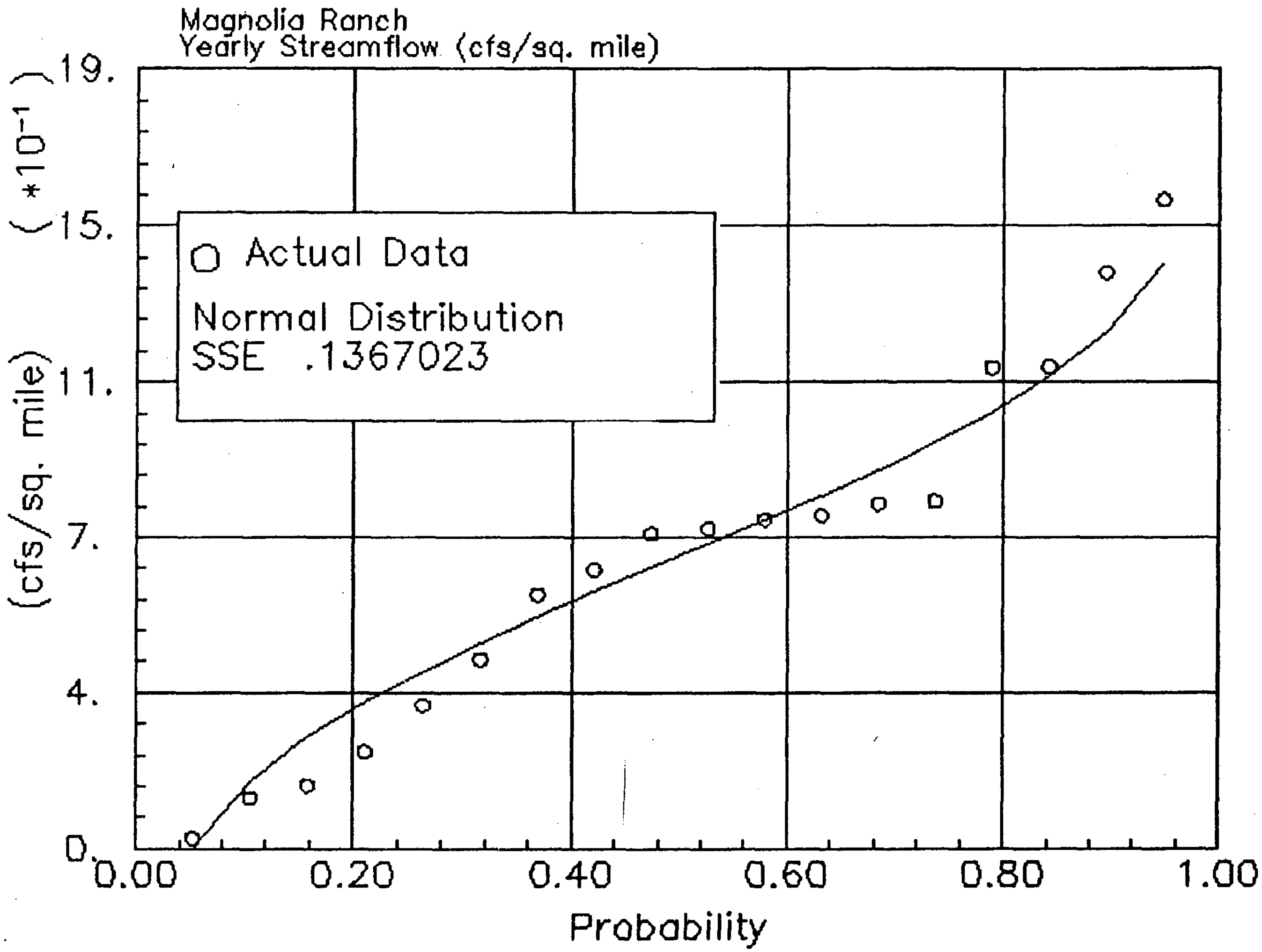


Figure F.2.7 Magnolia Ranch, yearly stream flow distribution (cfs/square mile) (1973–1990).

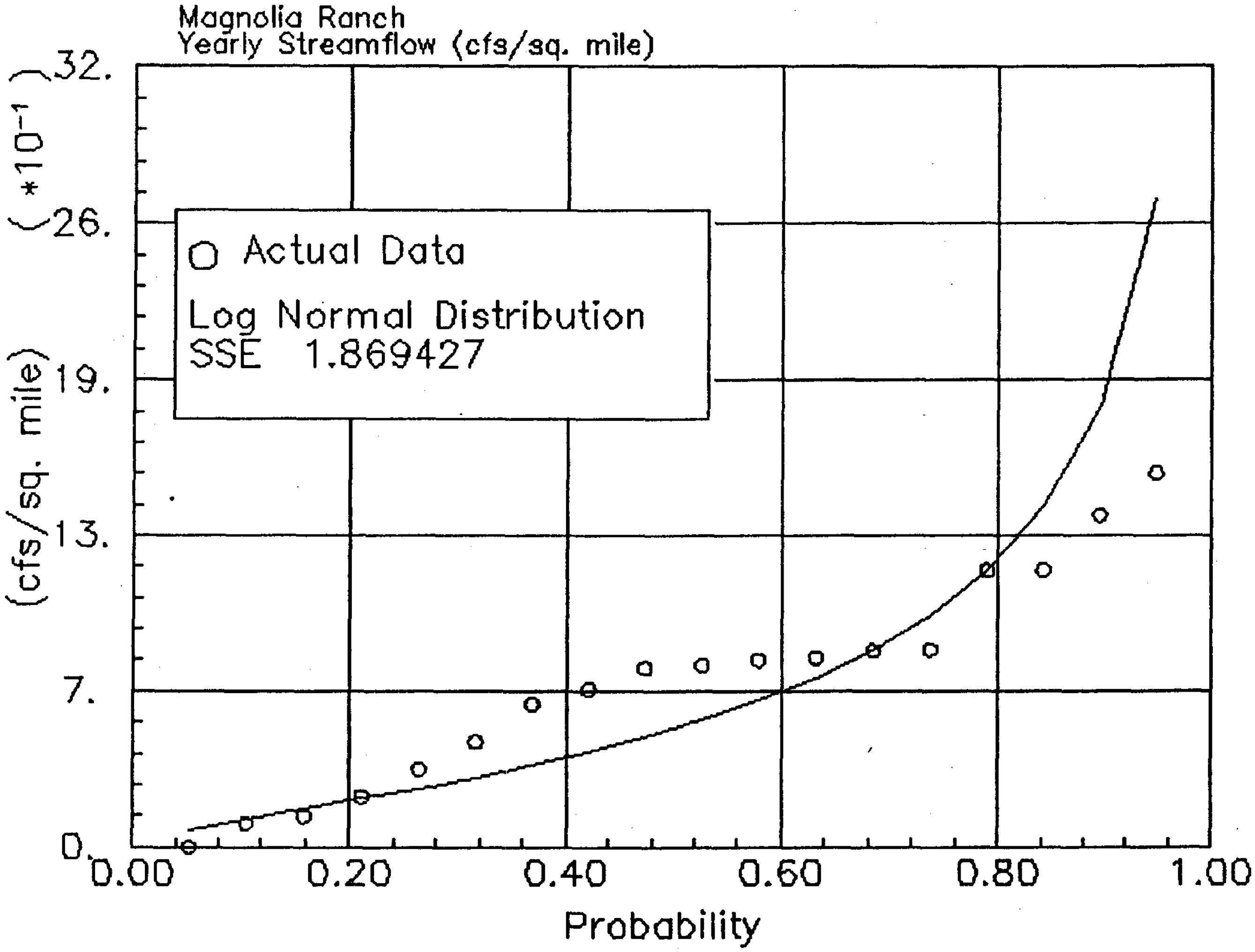


Figure F.2.8 Magnolia Ranch, yearly stream flow distribution (cfs/square mile) (1973–1990).

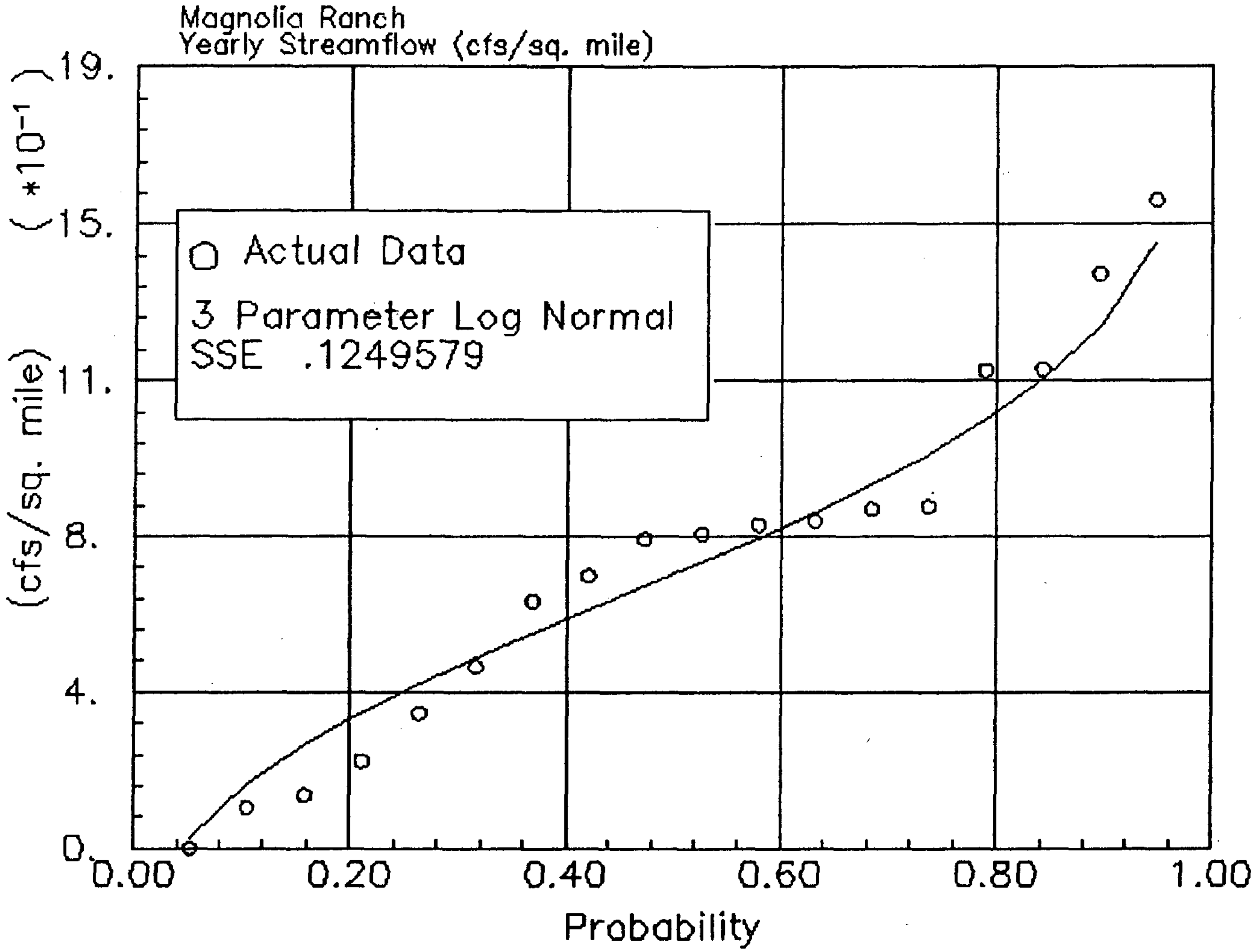


Figure F.2.9 Magnolia Ranch, yearly stream flow distribution (cfs/square mile) (1973–1990).

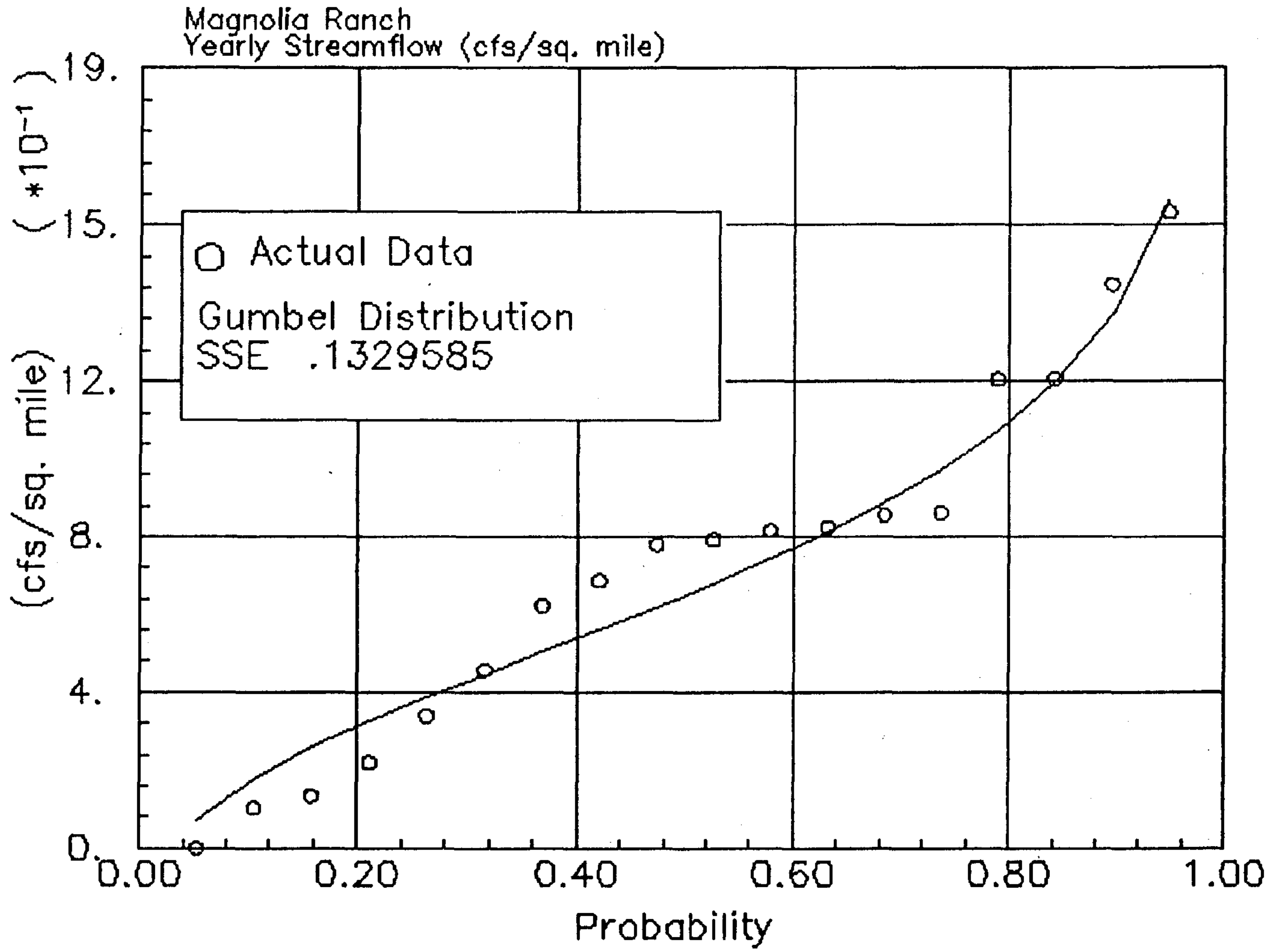


Figure F.2.10 Magnolia Ranch, yearly stream flow distribution (cfs/square mile) (1973–1990).

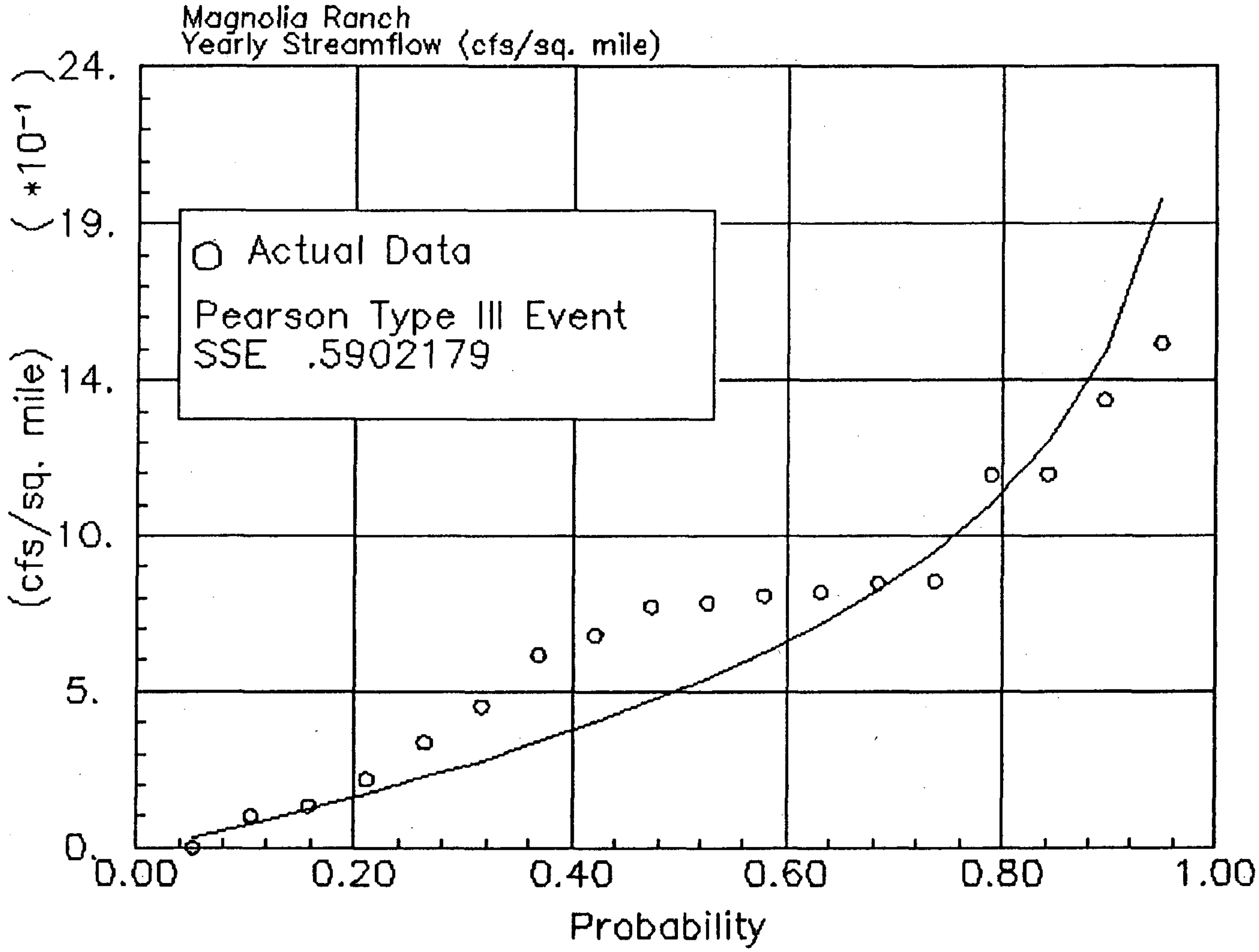


Figure F.2.11 Magnolia Ranch, yearly stream flow distribution (cfs/square mile) (1973–1990).

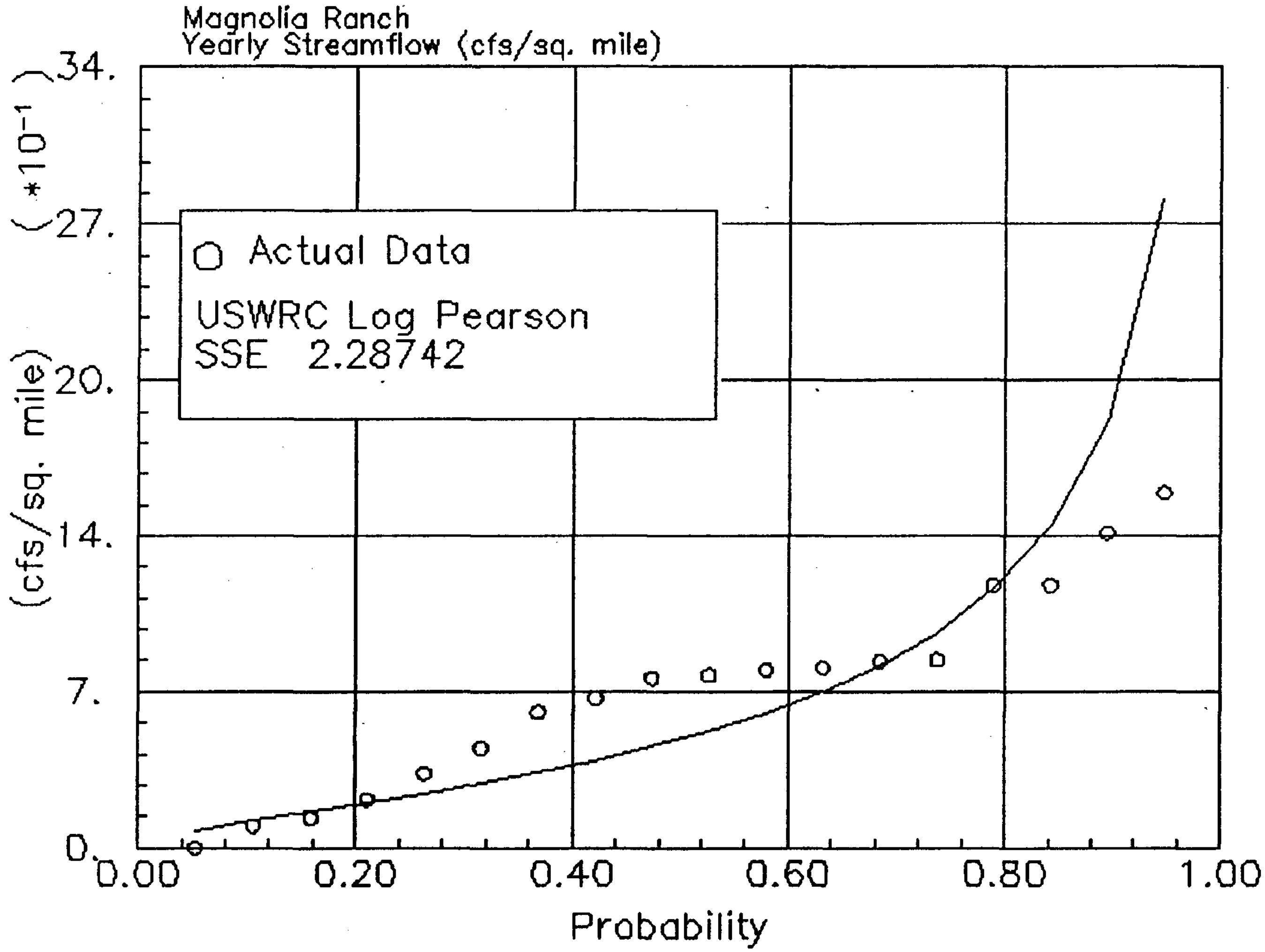


Figure F.2.12 Magnolia Ranch, yearly stram flow distribution (cfs/square mile) (1973–1990)

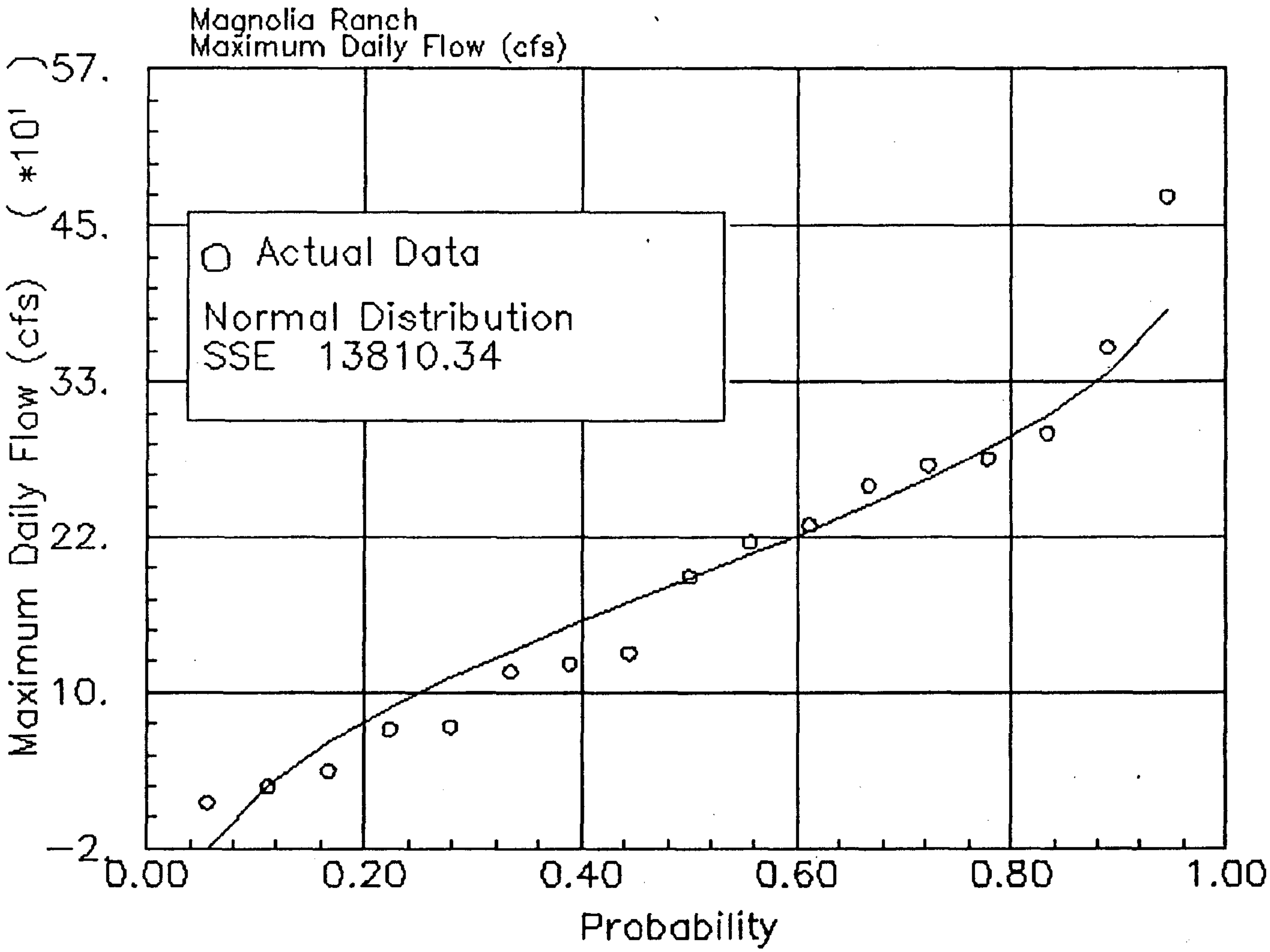


Figure F.2.13 Magnolia Ranch, Maximum Daily Flow (cfs) for the Years of 1973–1989.

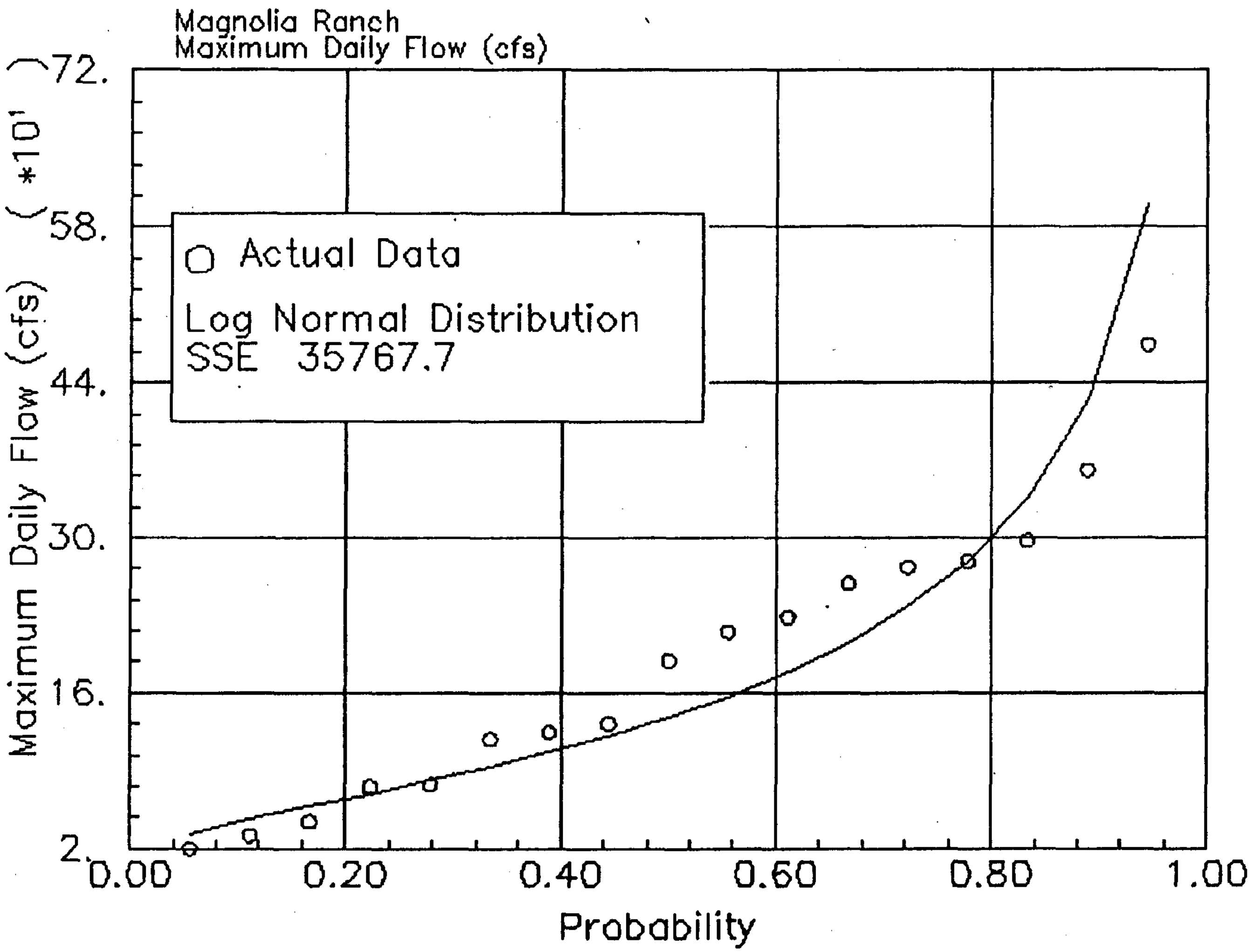


Figure F.2.14 Magnolia Ranch, Maximum Daily Flow (cfs) for the Years of 1973–1989.

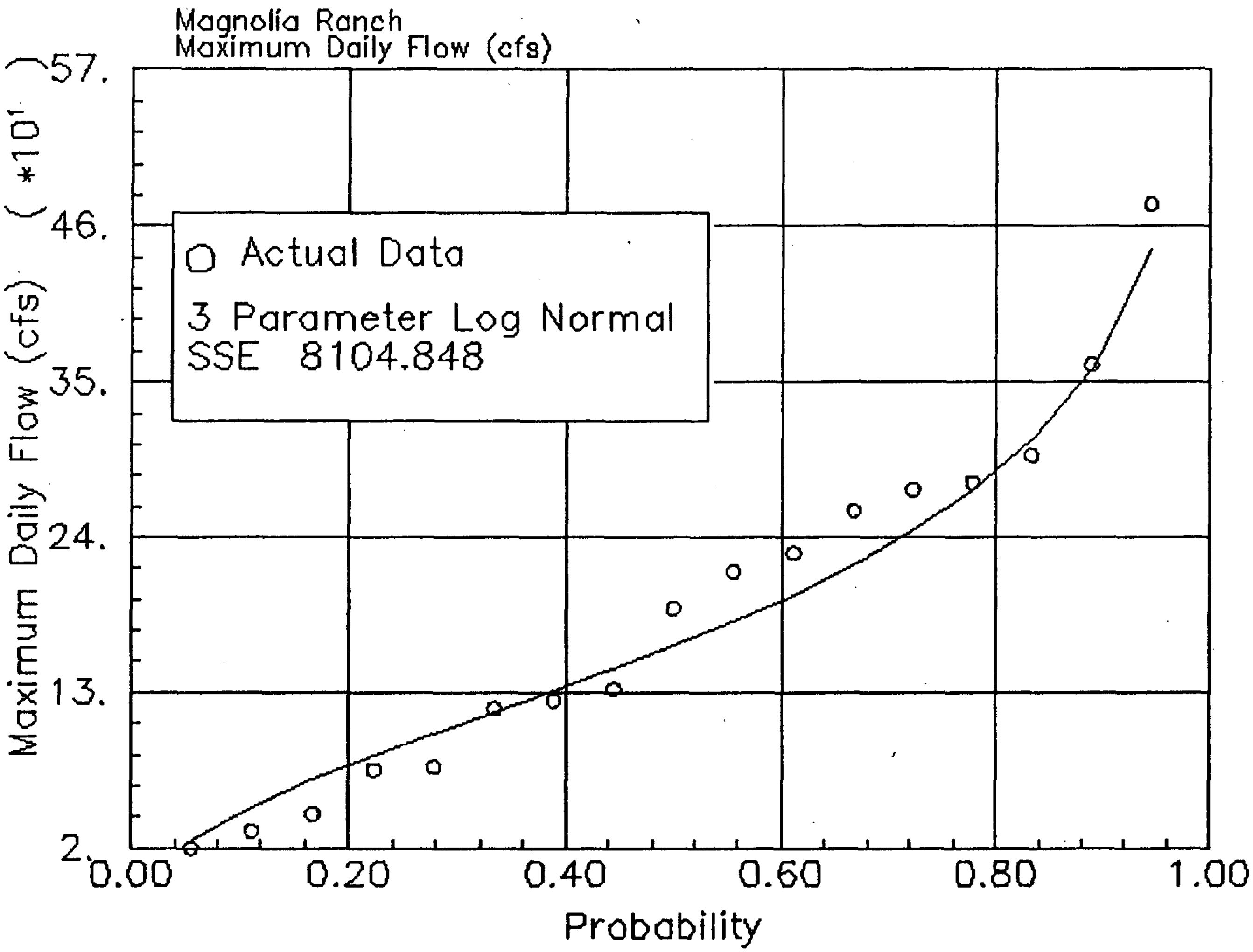


Figure F.2.15 Magnolia Ranch, Maximum Daily Flow (cfs) for the Years of 1973–1989.

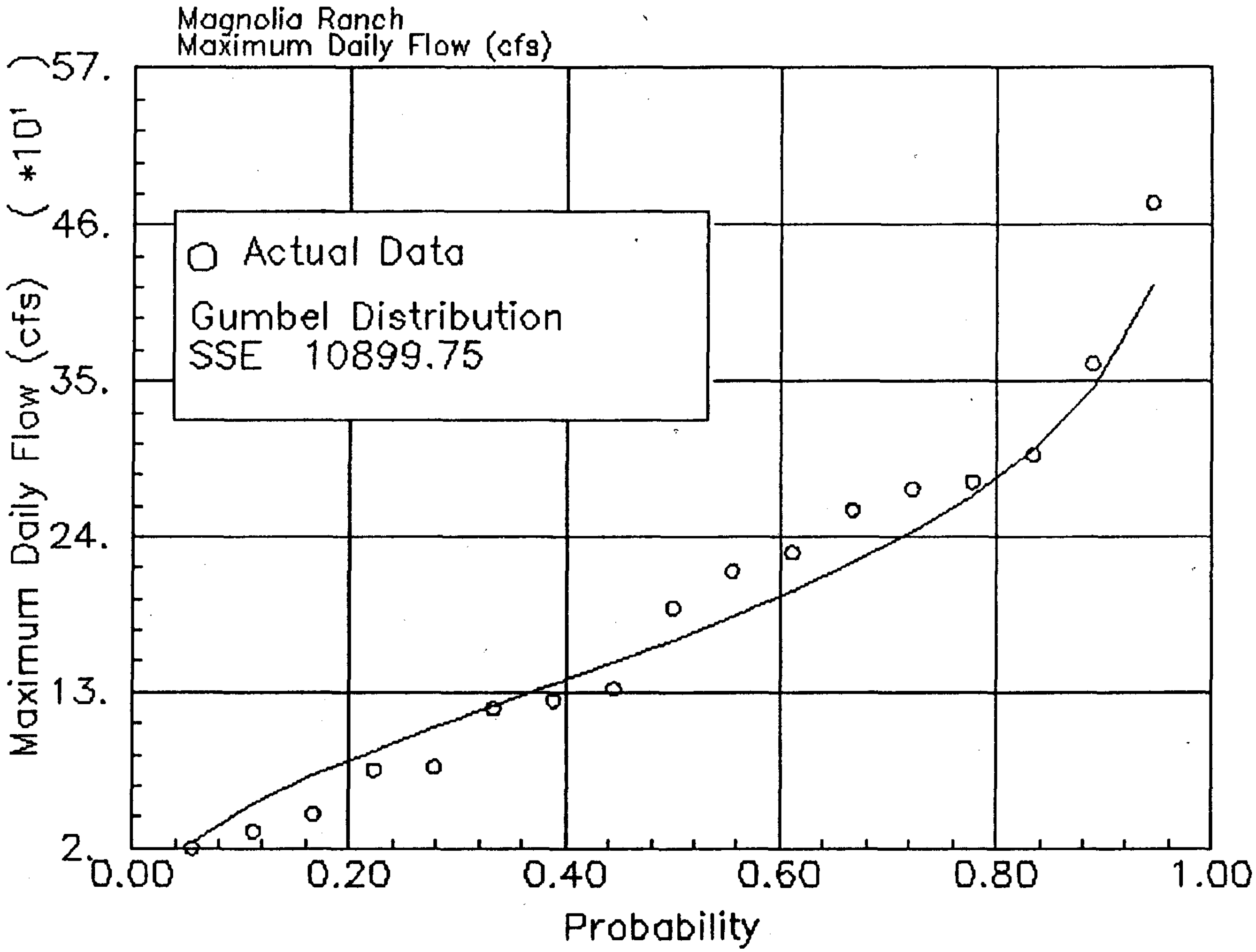


Figure F.2.16 Magnolia Ranch, Maximum Daily Flow (cfs) for the Years of 1973–1989.

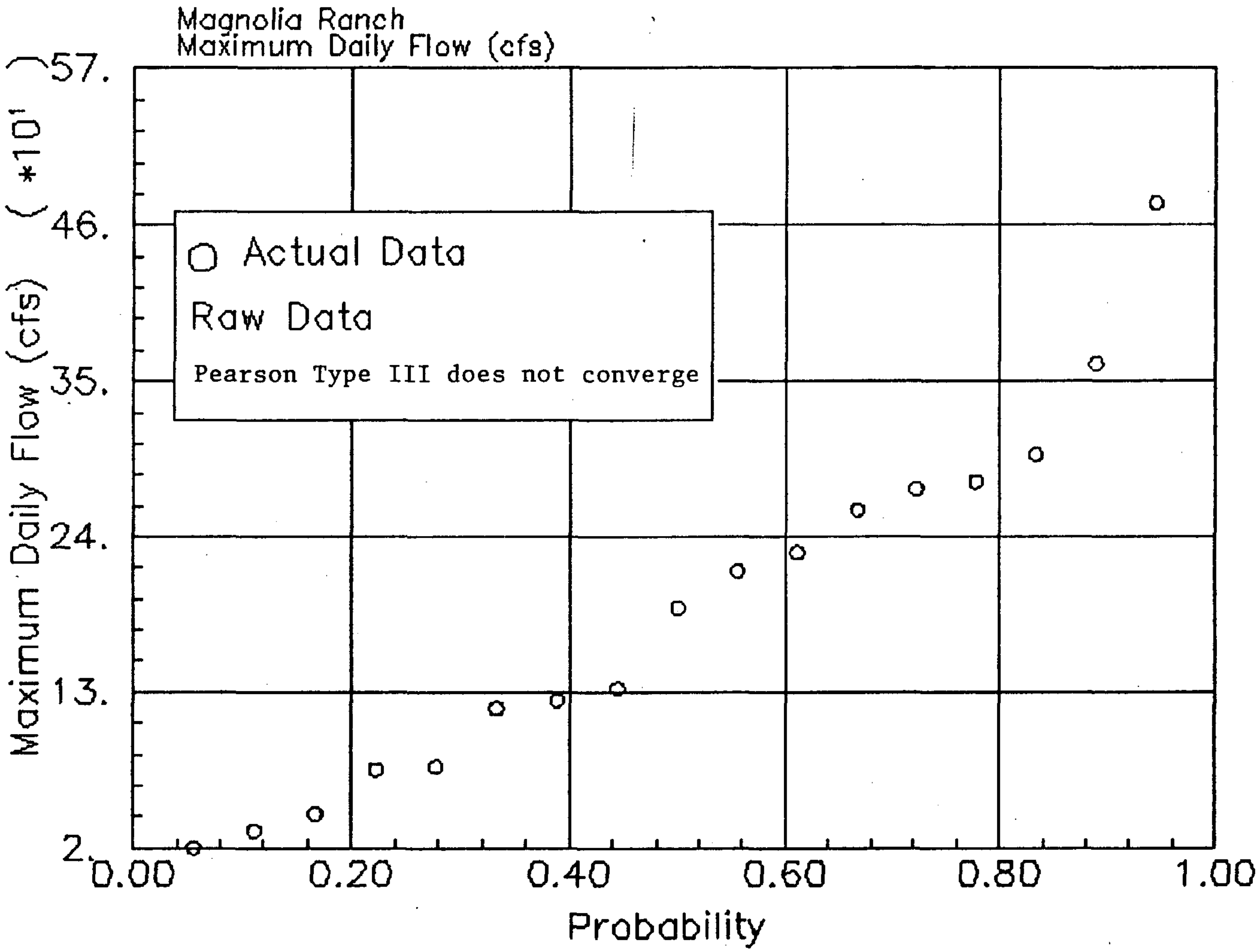


Figure F.2.17 Magnolia Ranch, Maximum Daily Flow (cfs) for the Years of 1973–1989.

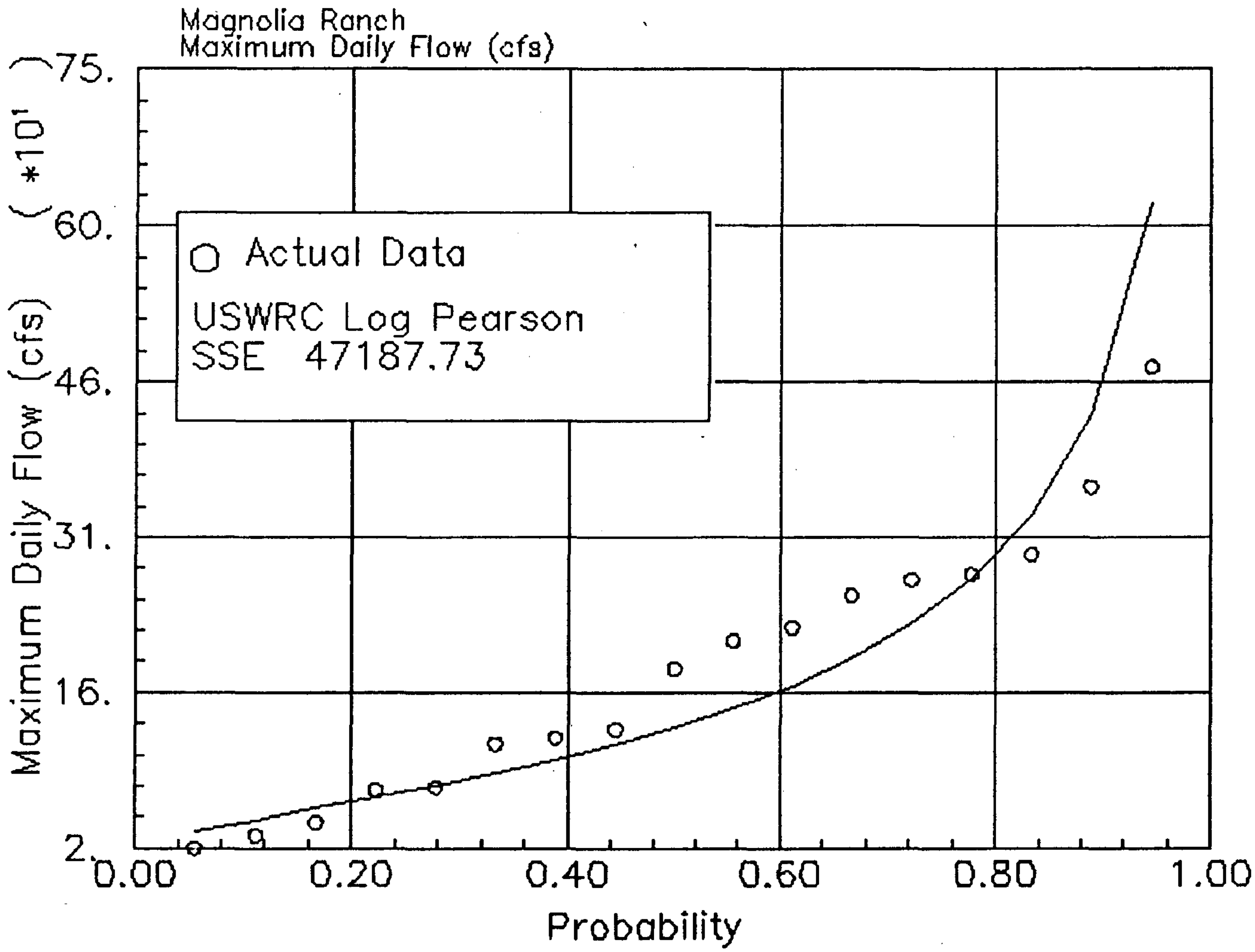


Figure F.2.18 Magnolia Ranch, Maximum Daily Flow (cfs) for the Years of 1973–1989.

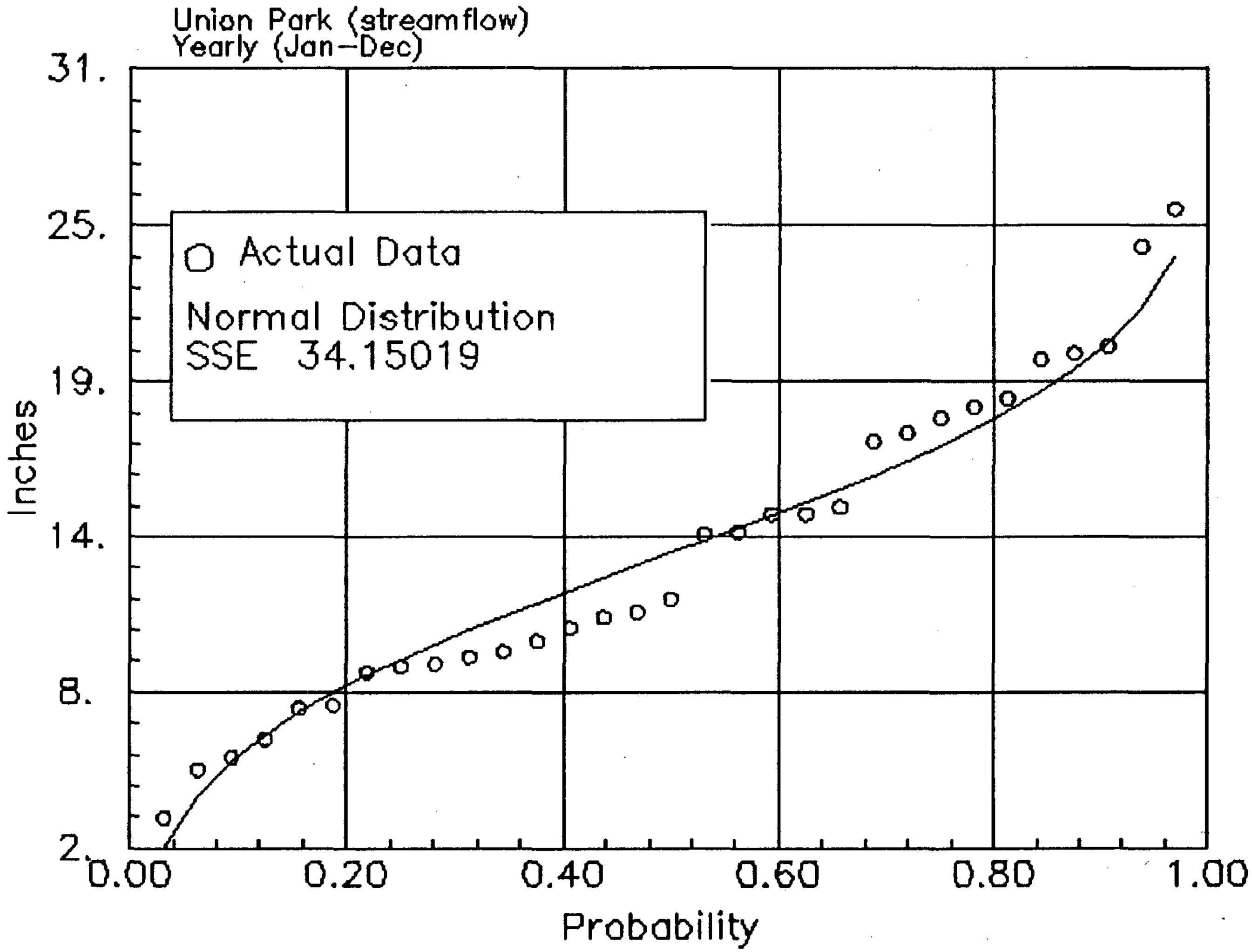


Figure F.3.1 Union Park, Yearly streamflow distribution for the years of (1960-1990)

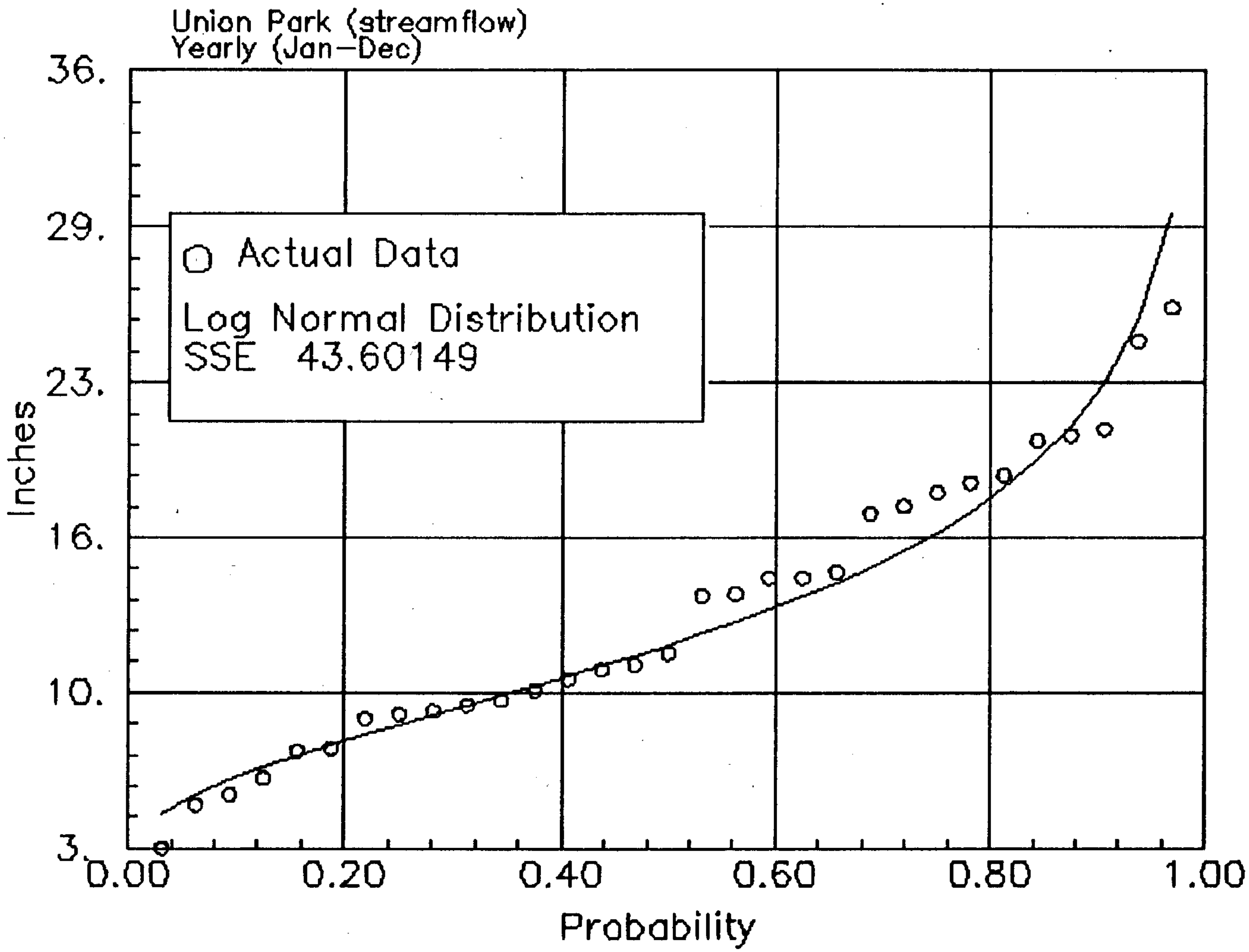


Figure F.3.2 Union Park, Yearly streamflow distribution for the years of (1960–1990)

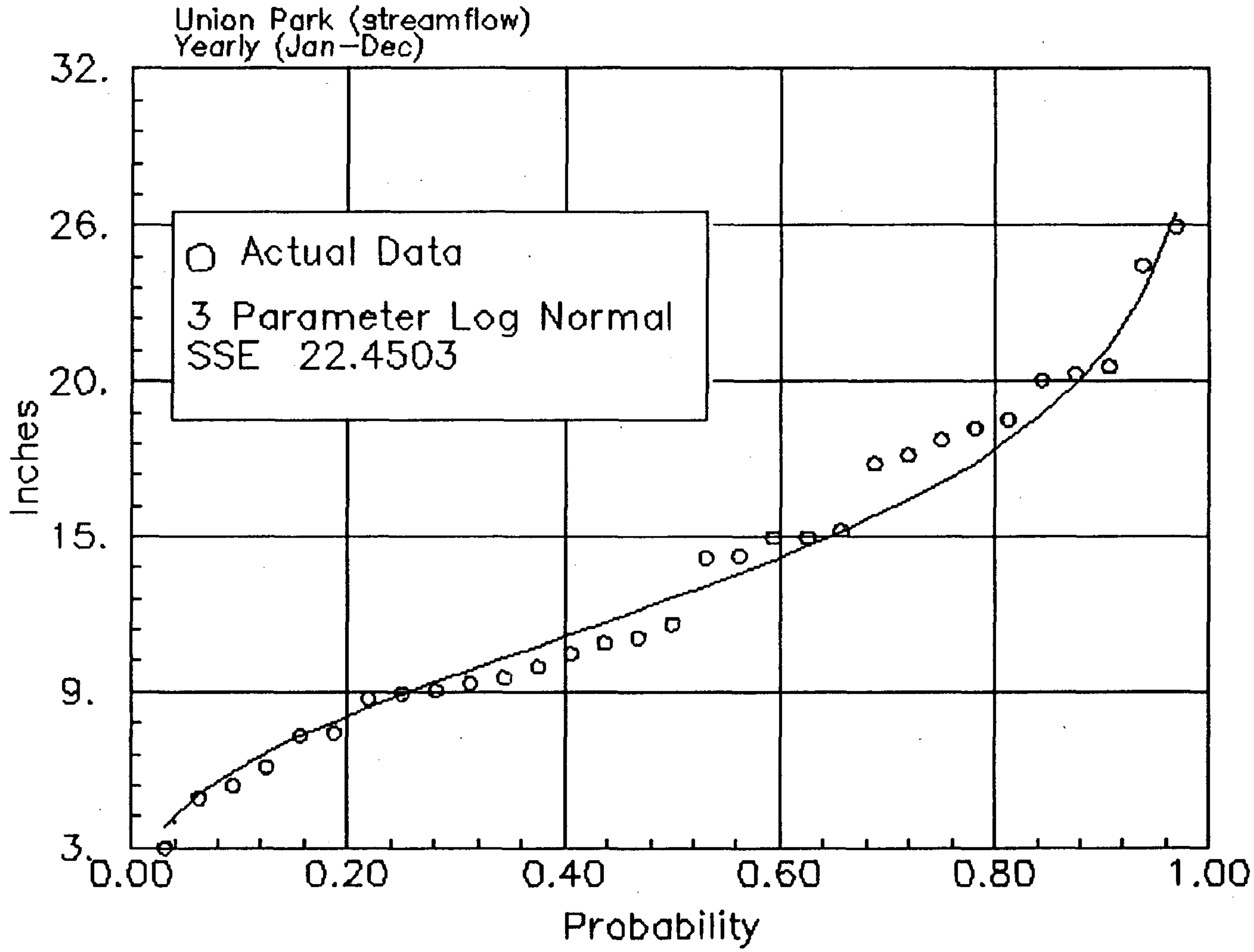


Figure F.3.3 Union Park, Yearly streamflow distribution for the years of (1960-1990)

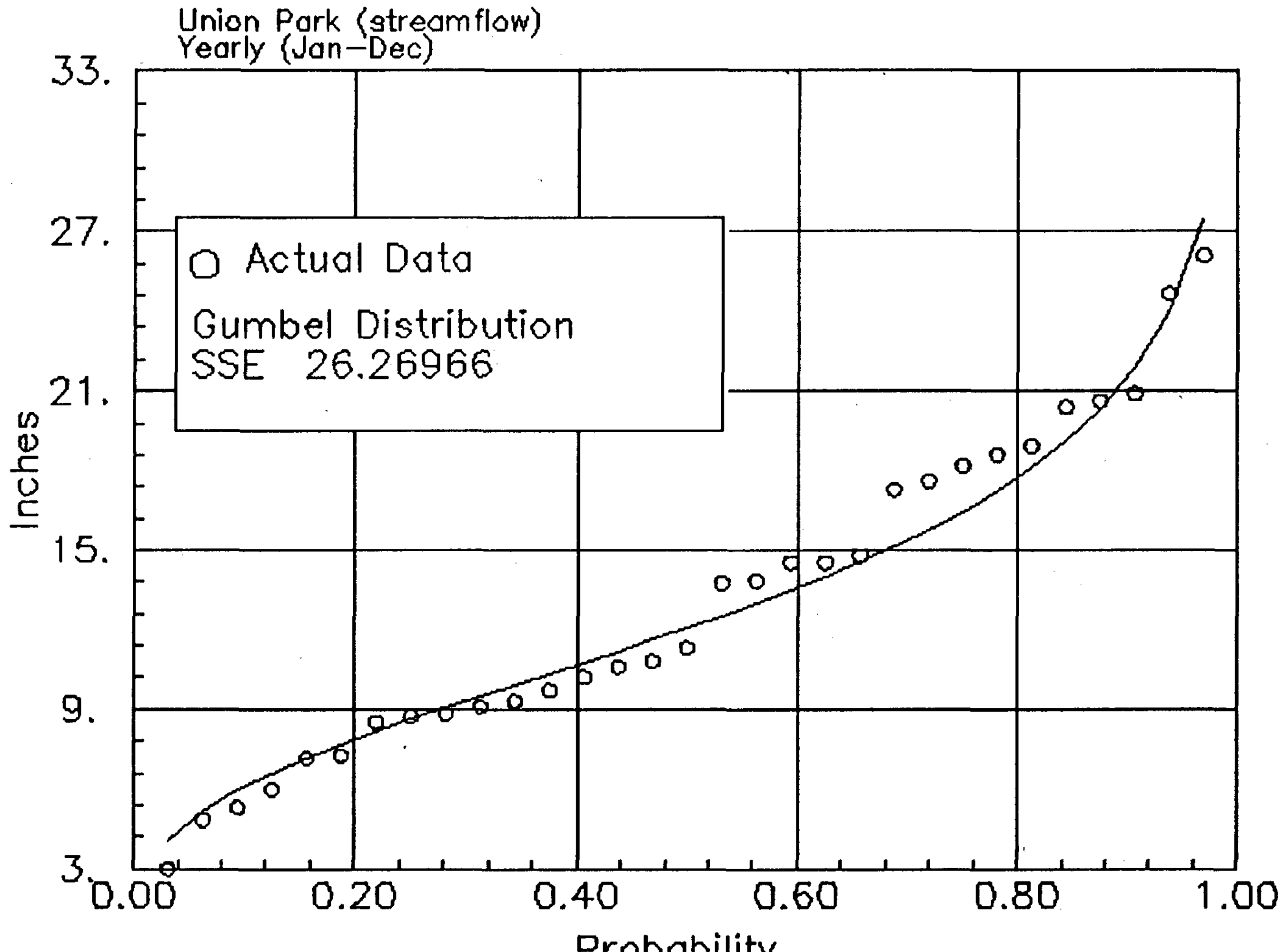


Figure F.3.4 Union Park, Yearly streamflow distribution for the years of (1960–1990)

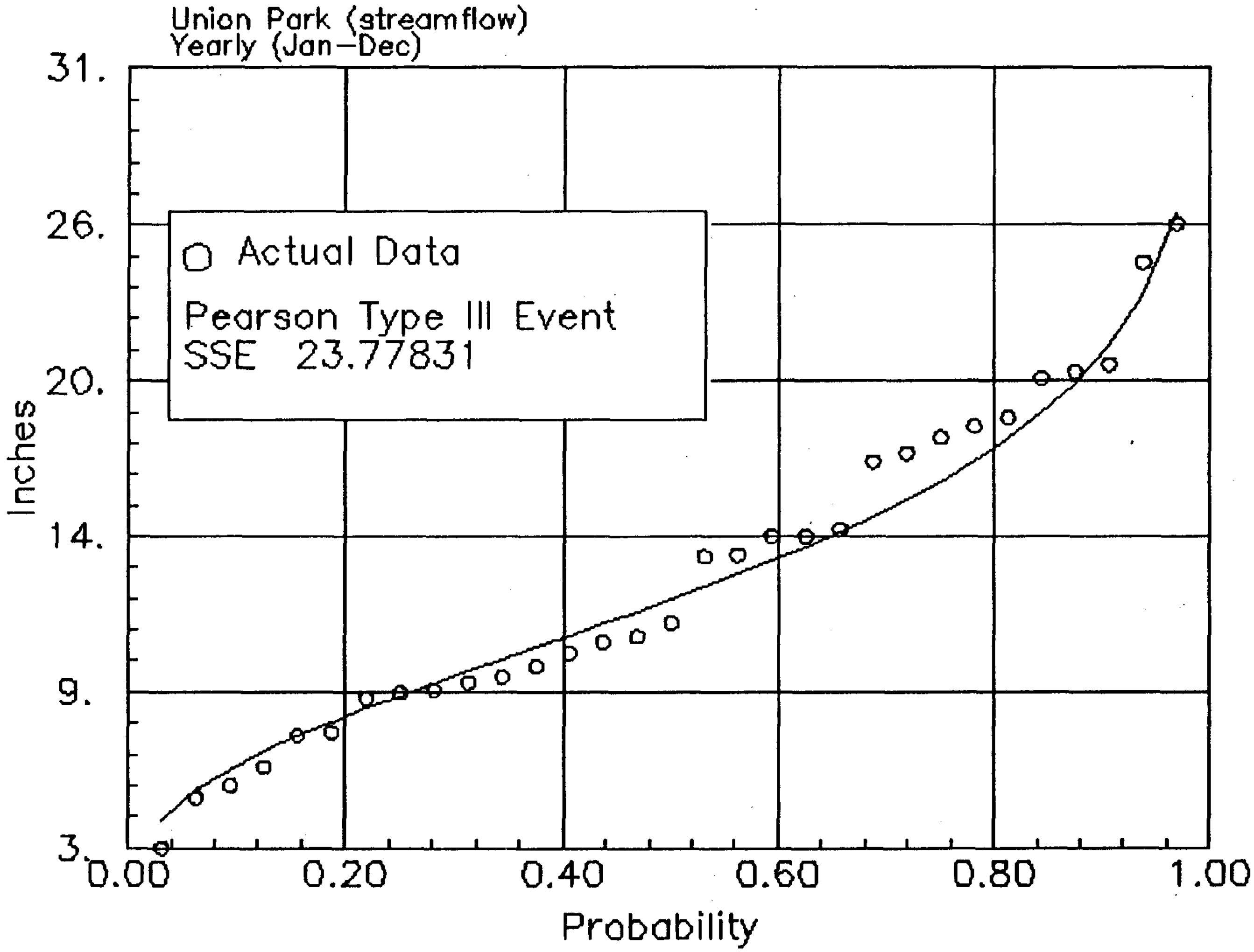


Figure F.3.5 Union Park, Yearly streamflow distribution for the years of (1960–1990)

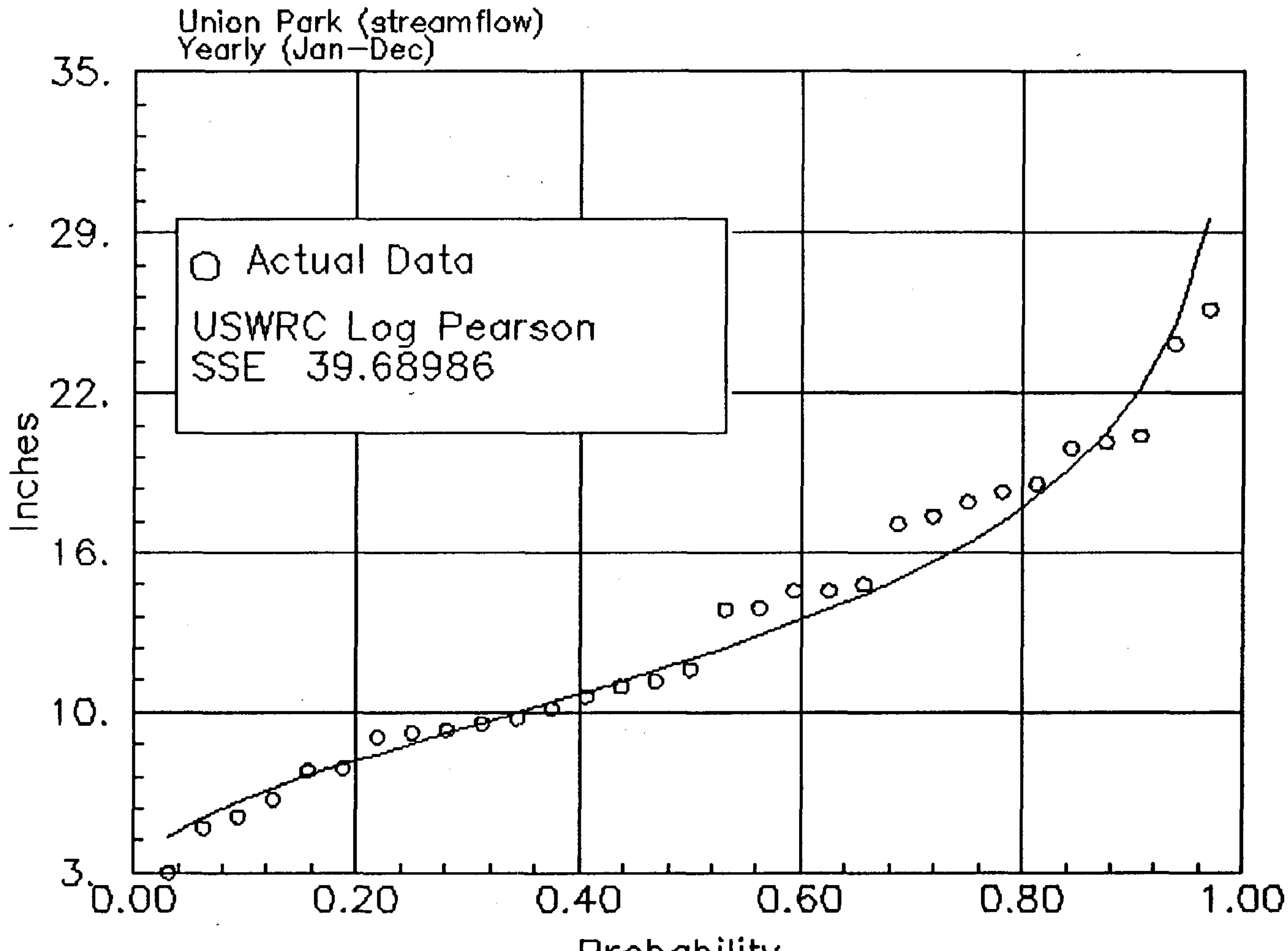


Figure F.3.6 Union Park, Yearly streamflow distribution for the years of (1960–1990)

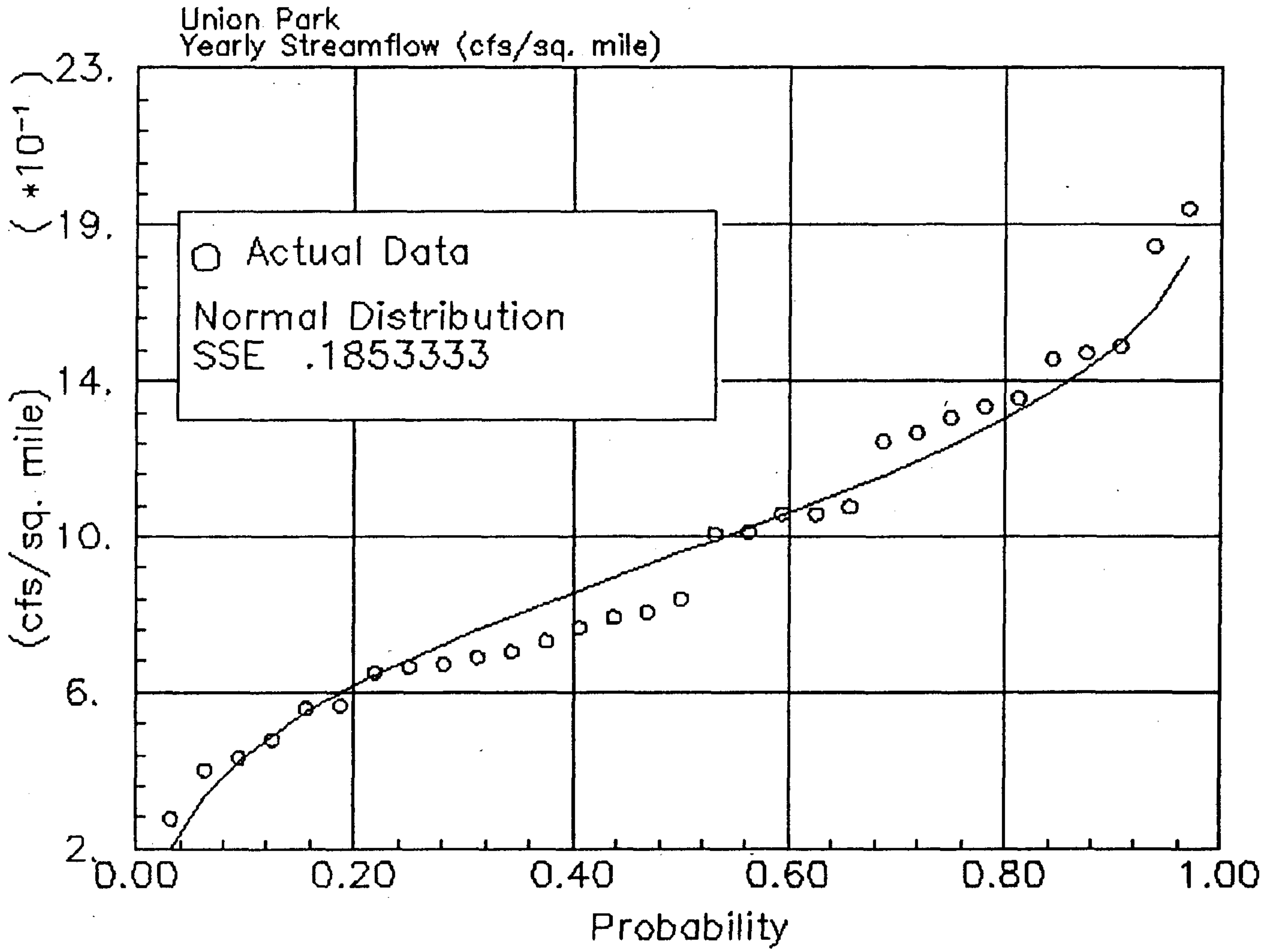


Figure F.3.7 Union Park, yearly stream
flow distribution (cfs/square mile) (1960–1990)

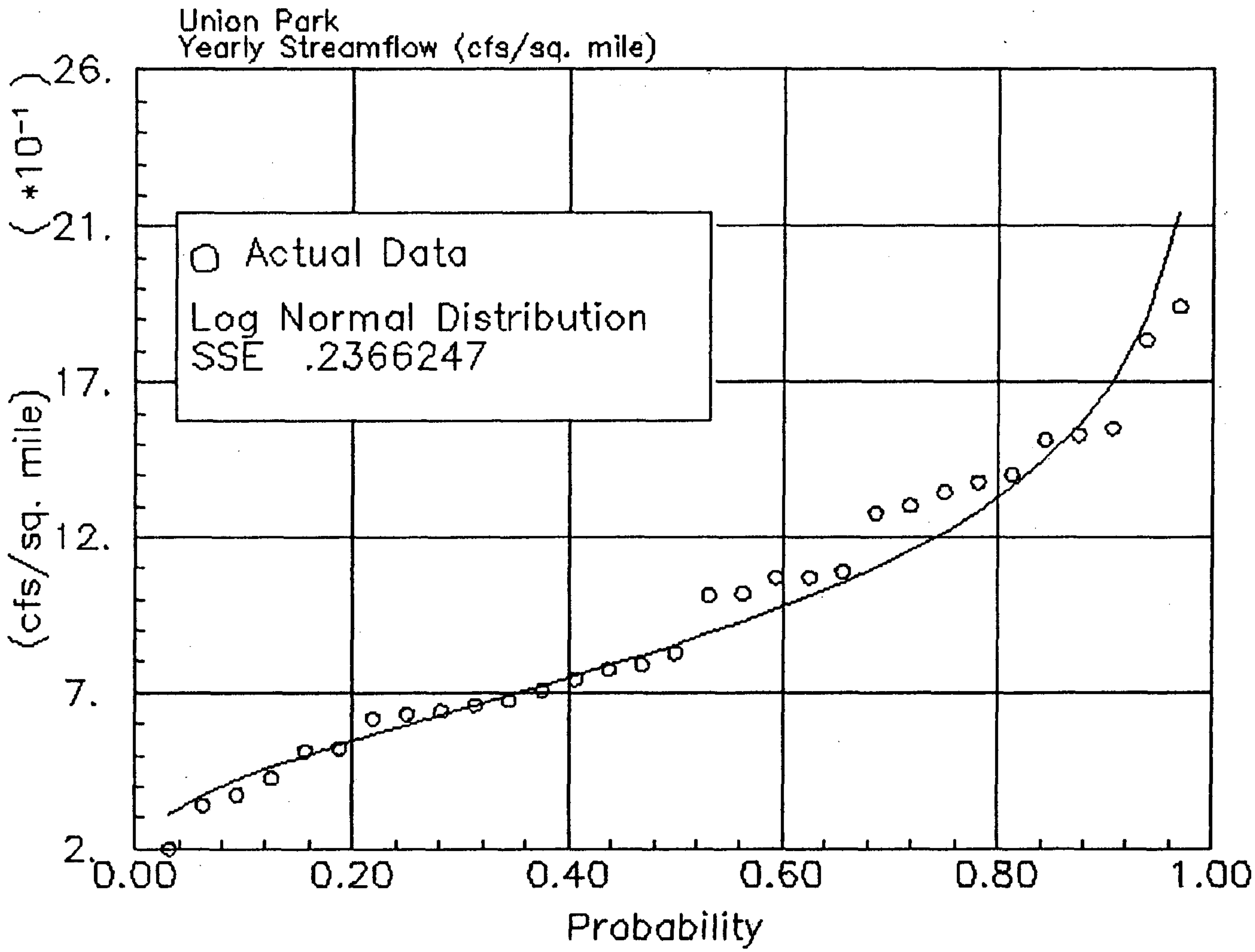


Figure F.3.8 Union Park, yearly stream flow distribution (cfs/square mile) (1960–1990)

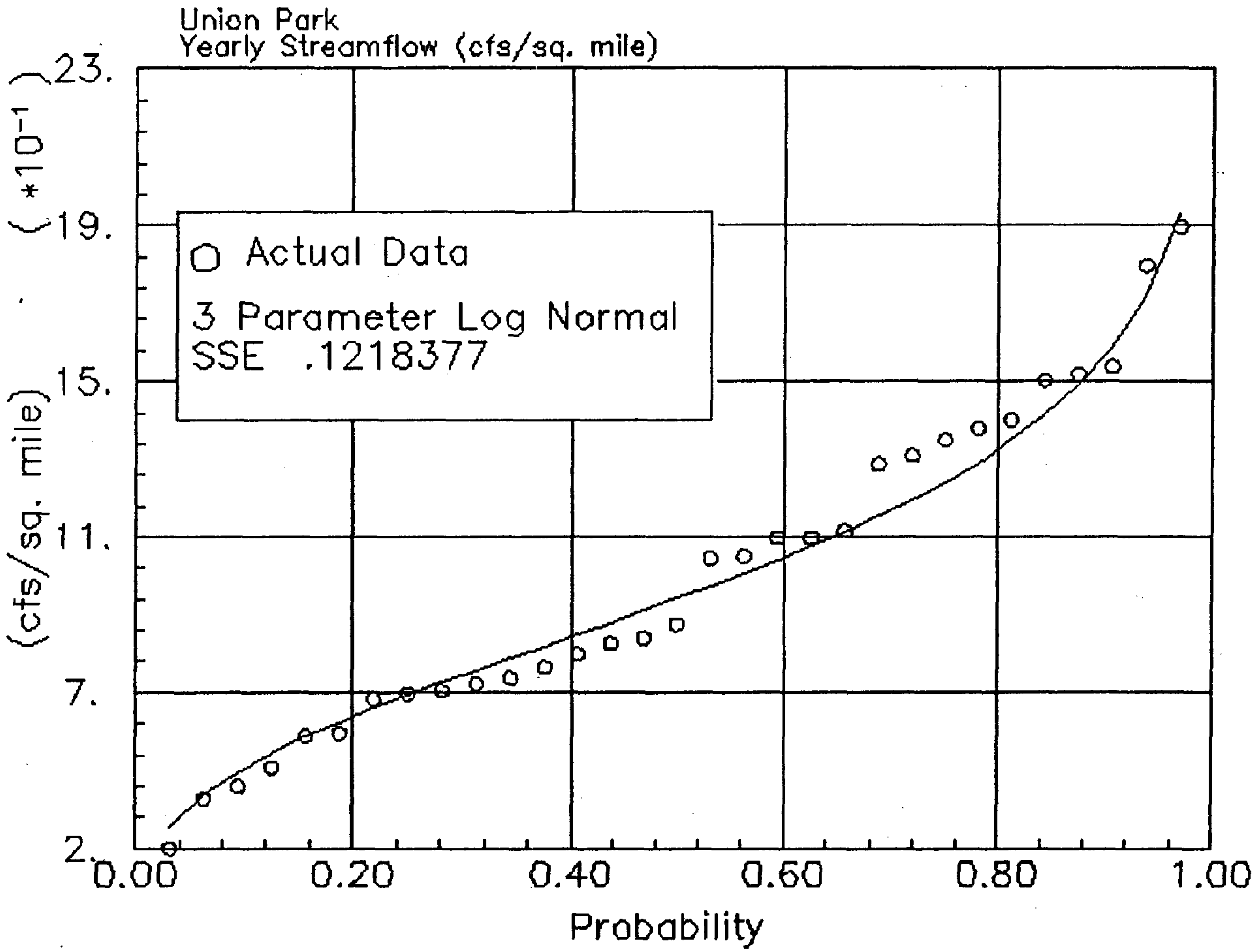


Figure F.3.9 Union Park, yearly stream flow distribution (cfs/square mile) (1960–1990)

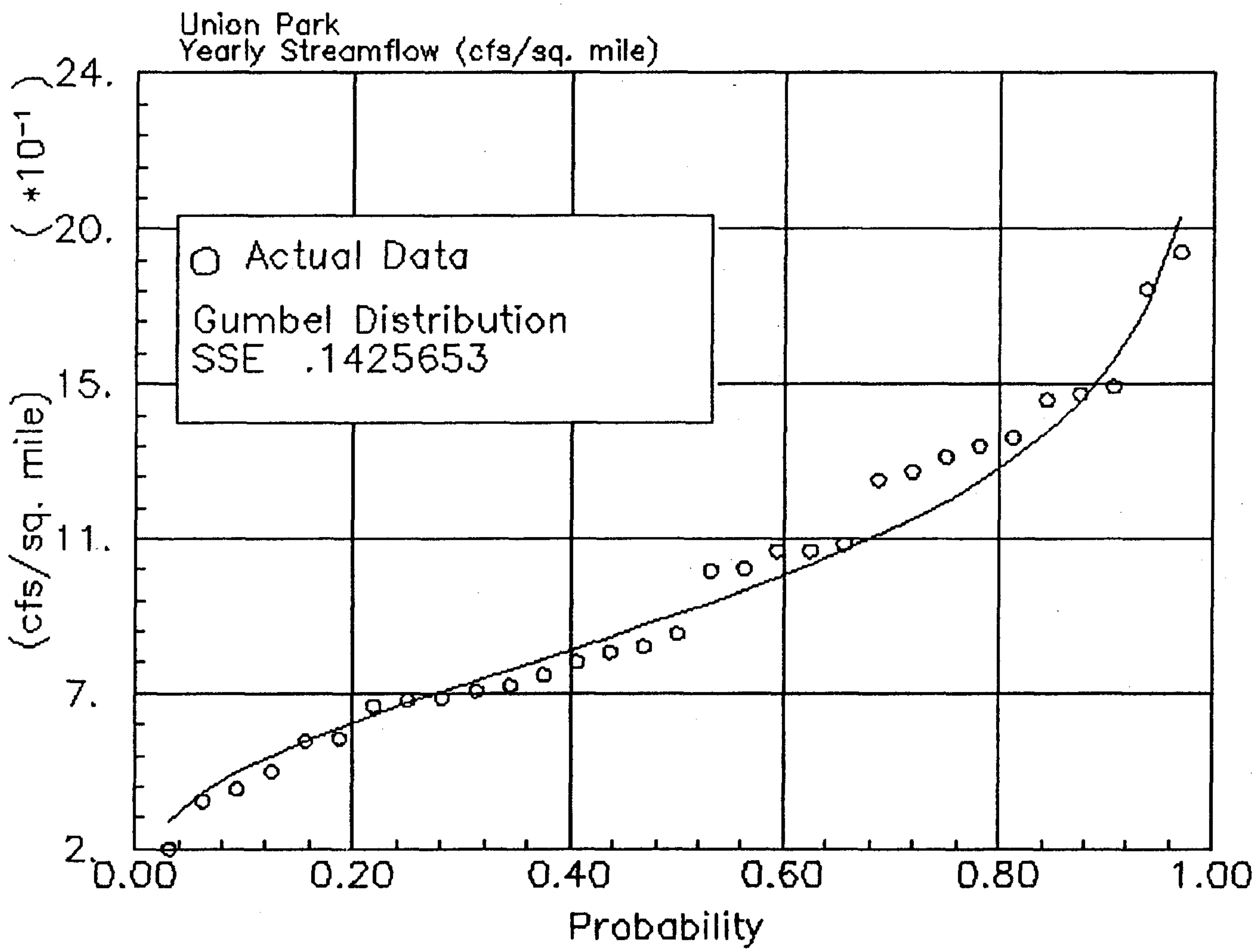


Figure F.3.10 Union Park, yearly stream flow distribution (cfs/square mile) (1960–1990)

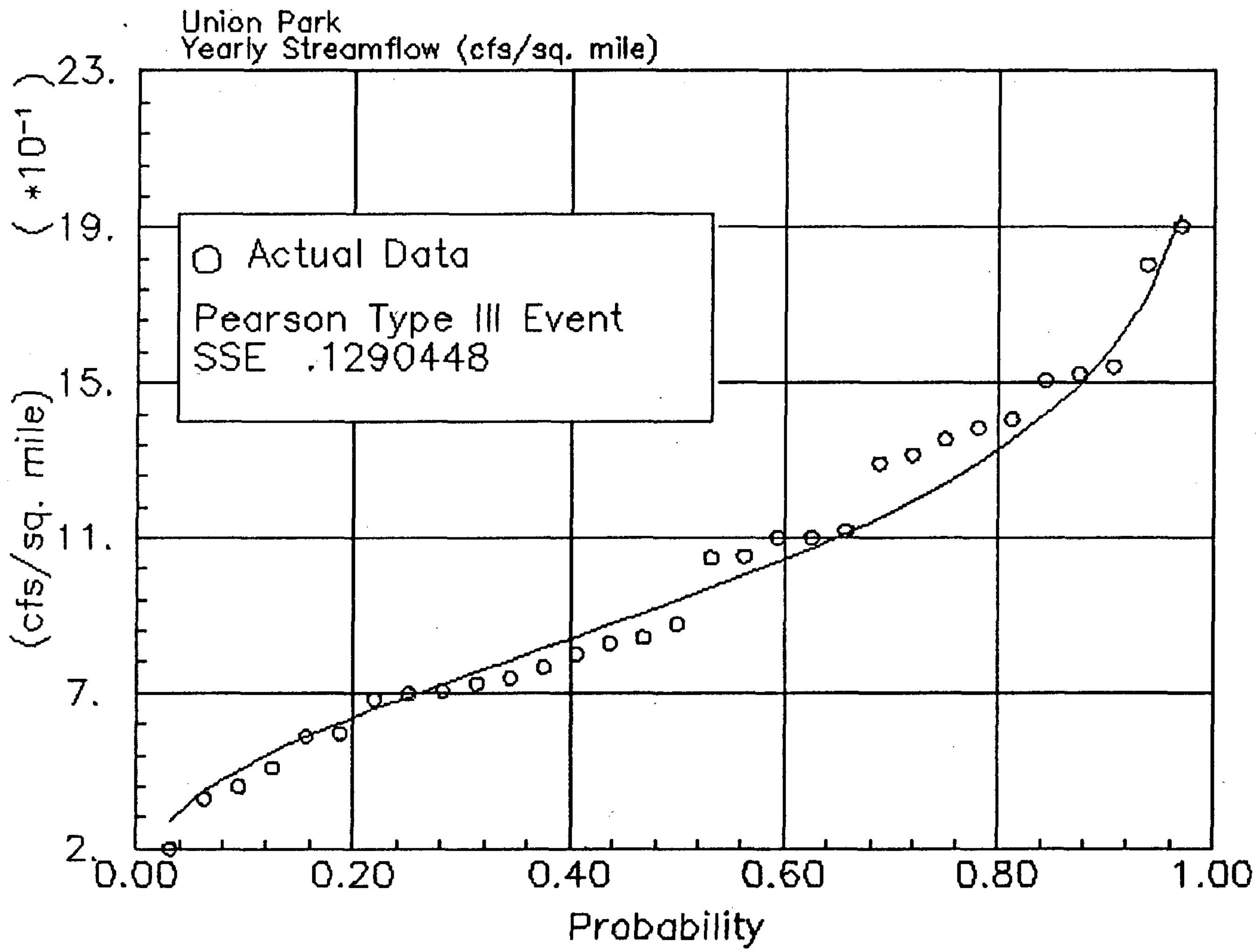


Figure F.3.11 Union Park, yearly stream flow distribution (cfs/square mile) (1960–1990)

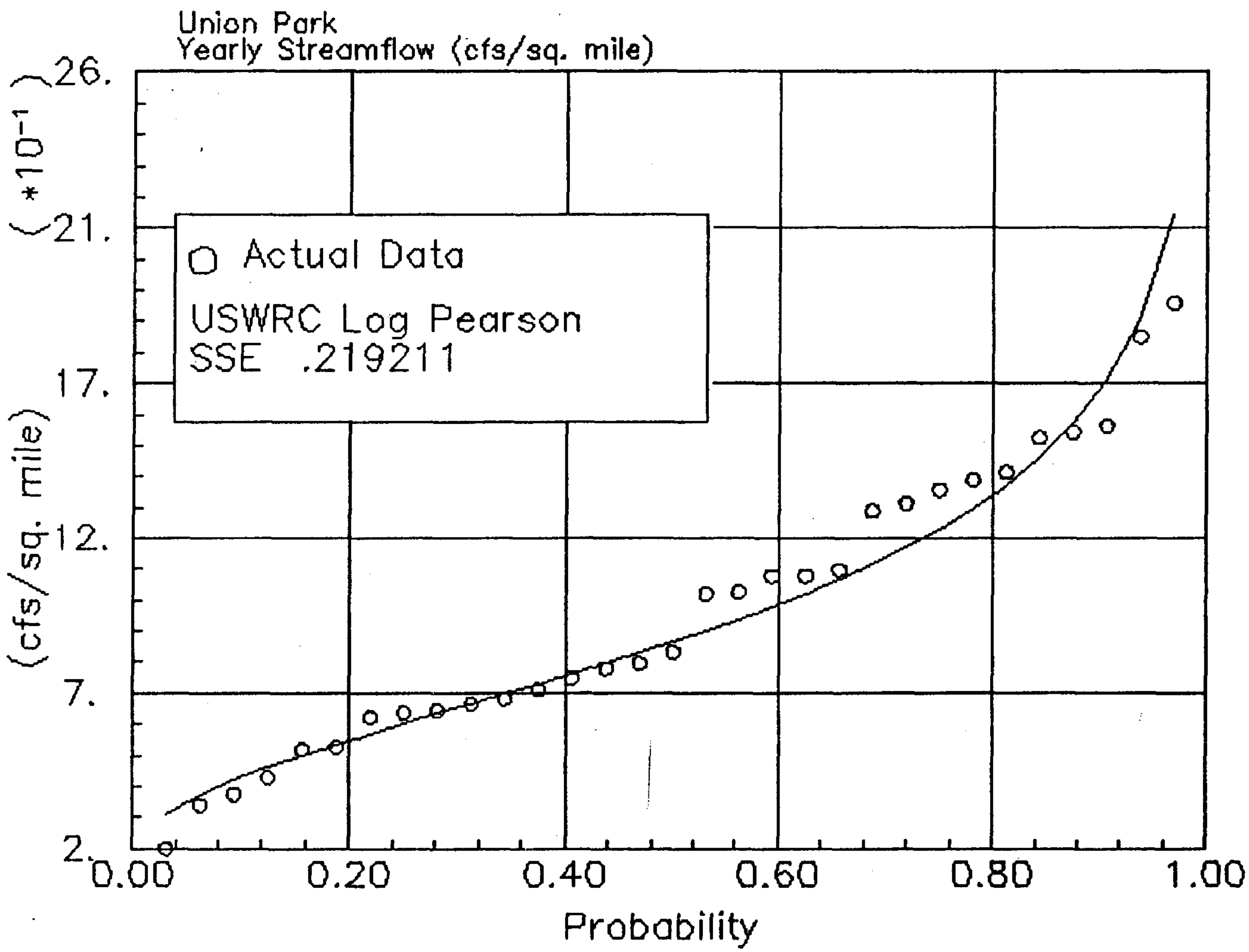


Figure F.3.12 Union Park, yearly stream flow distribution (cfs/square mile) (1960–1990)

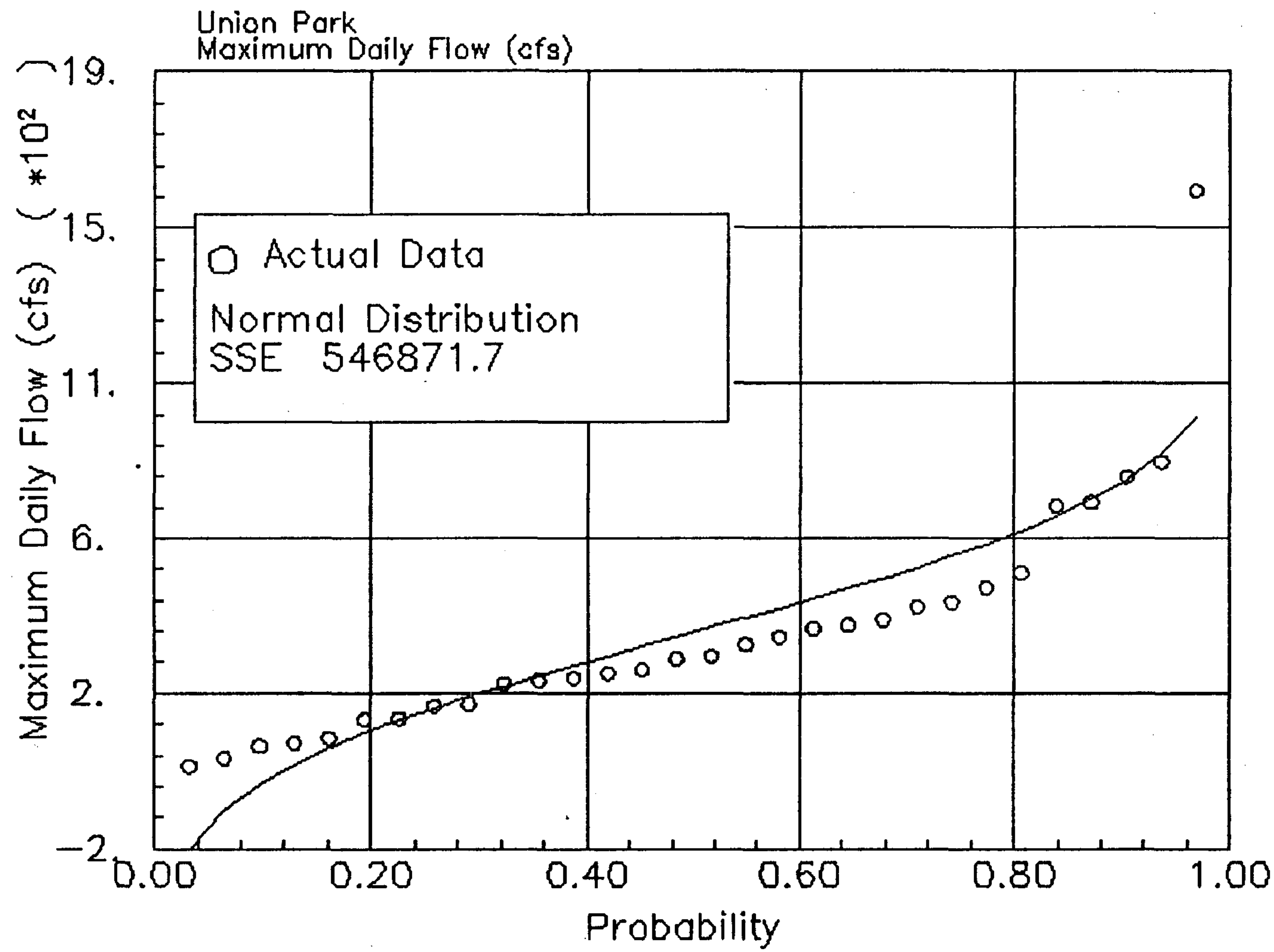


Figure F.3.13 Union Park, Maximum Daily Flow (cfs) for the Years of 1960–1989.

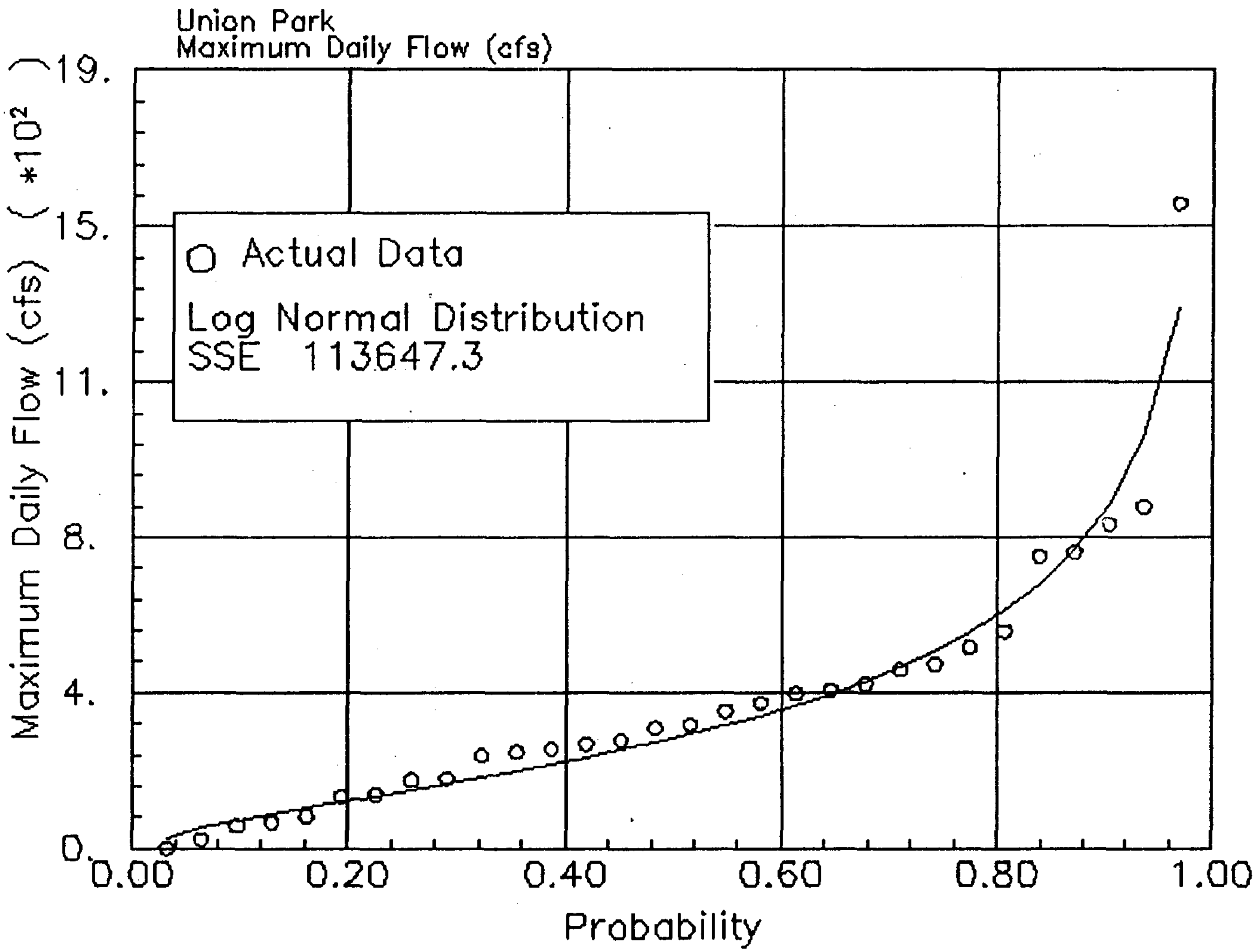


Figure F.3.14 Union Park, Maximum Daily Flow (cfs) for the Years of 1960–1989.

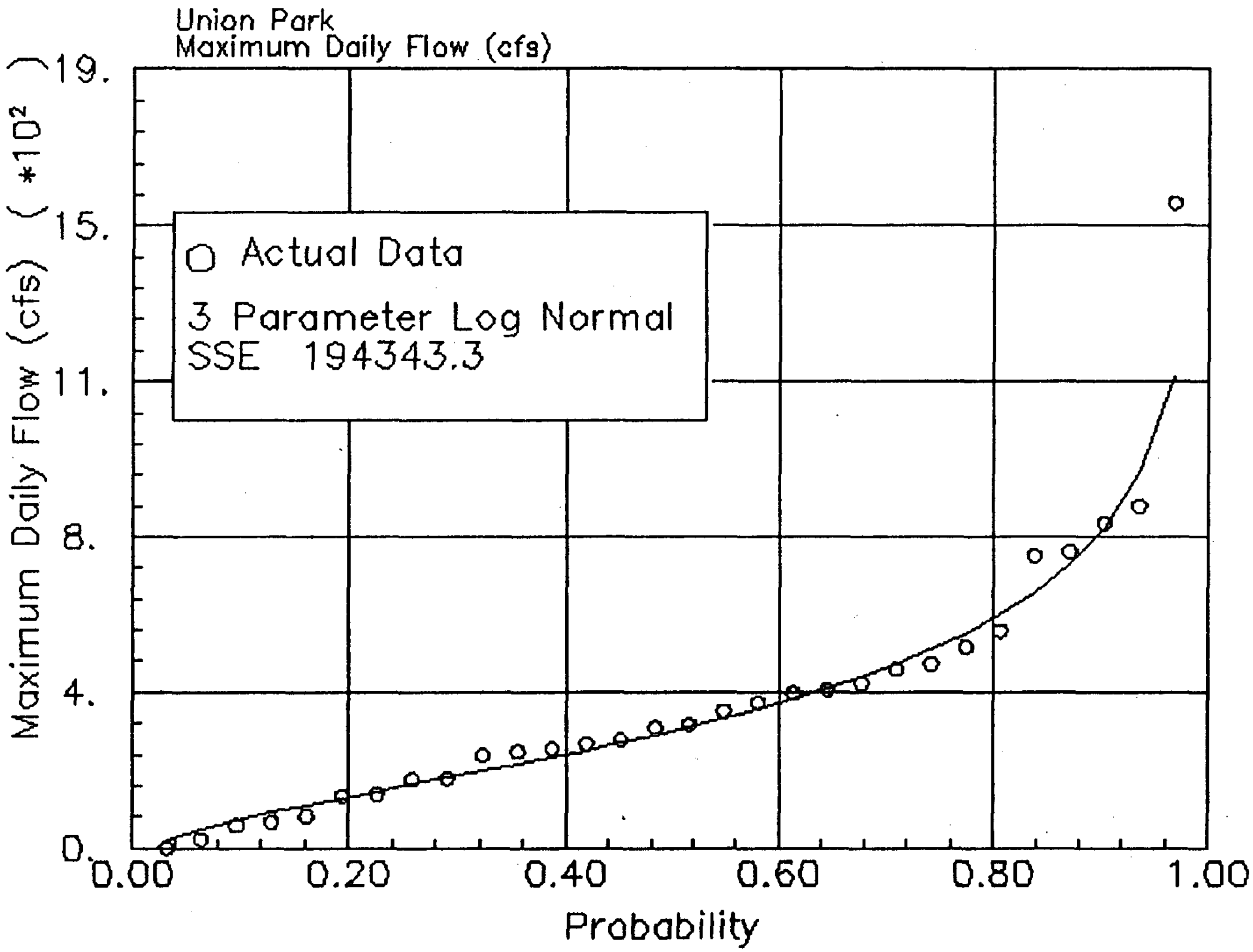


Figure F.3.15 Union Park, Maximum Daily Flow (cfs) for the Years of 1960–1989.

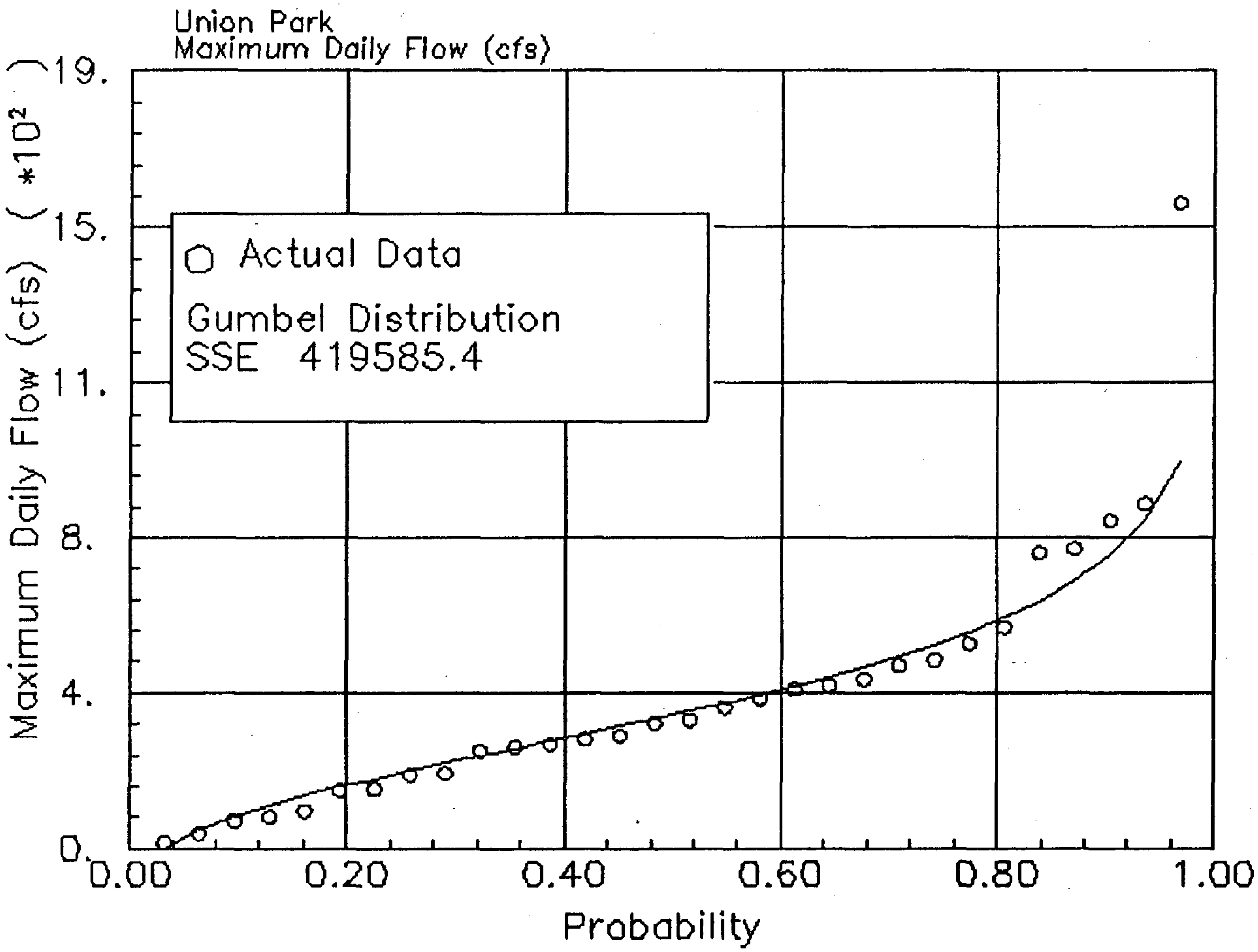


Figure F.3.16 Union Park, Maximum Daily Flow (cfs) for the Years of 1960–1989.

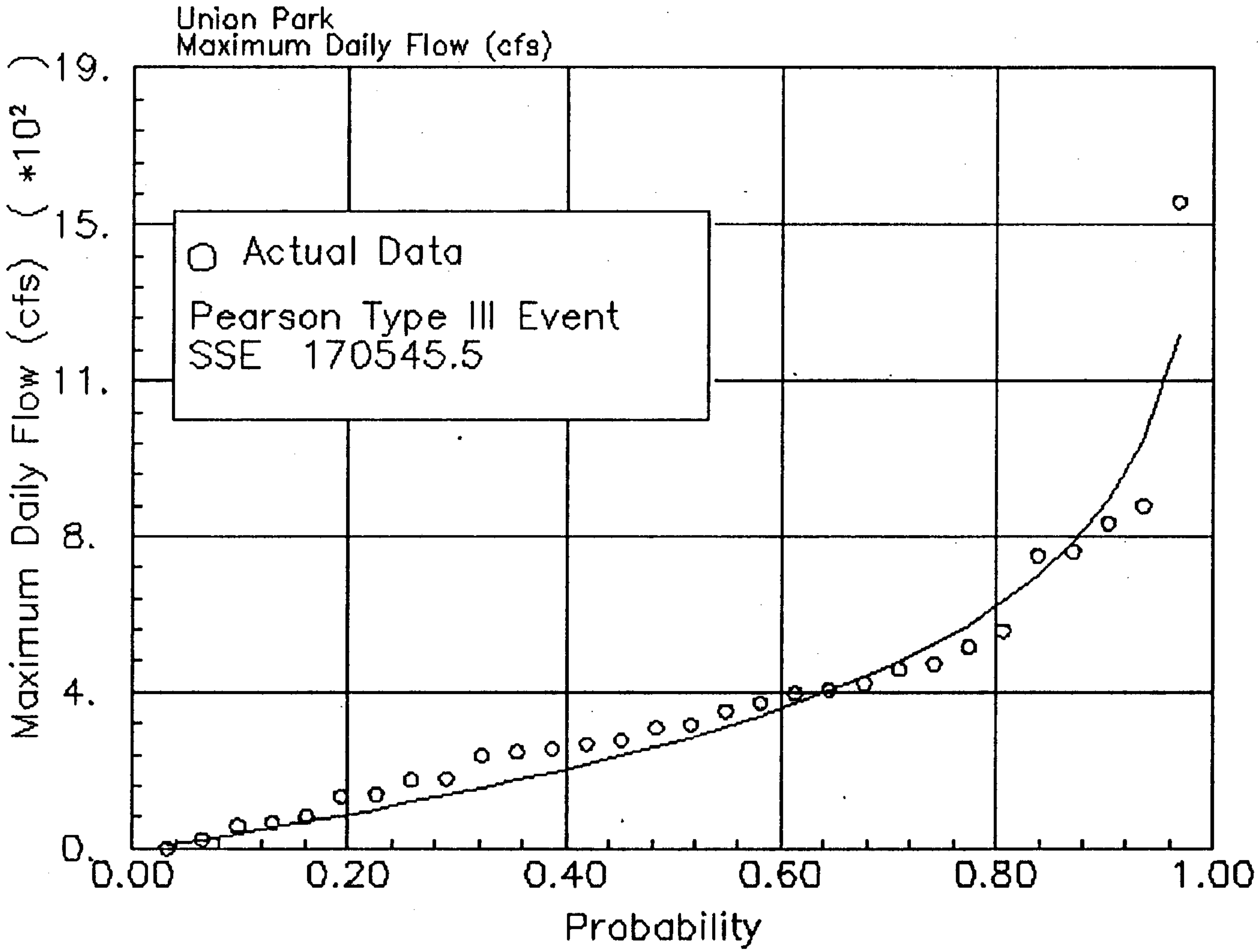


Figure F.3.17 Union Park, Maximum Daily Flow (cfs) for the Years of 1960–1989.

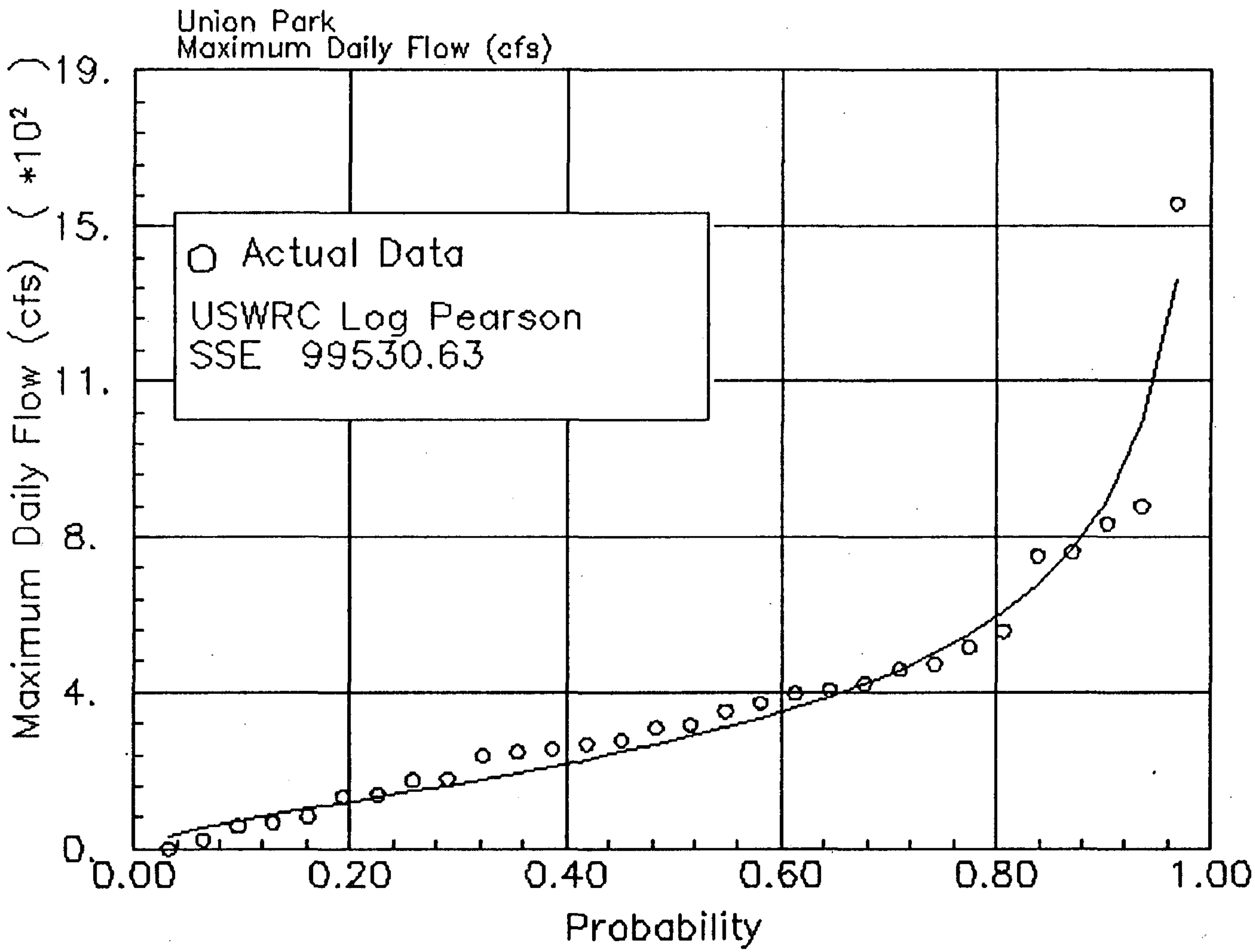


Figure F.3.18 Union Park, Maximum Daily Flow (cfs) for the Years of 1960–1989.

Table F.1 Statistical Comparisons For Yearly Streamflow

Chuluota at Snowhill

Distribution	SSE	Rank	Standard Error	Rank	Kolmorgorv	Rank	Chi-Square	Rank	Graphical Rank
Normal Distribution	218.33	6	1.99	6	0.109	6	3.418	6	6
2 Parameter Log Normal	57.51	1	1.02	1	0.091	1	0.364	1	1
3 Parameter Log Normal	62.80	3	1.07	3	0.091	1	0.873	4	1
Gumbel	90.55	5	1.28	5	0.091	1	1.127	5	1
Pearson Type III	68.33	4	1.11	4	0.091	1	0.618	2	1
USWRC Log Pearson	60.41	2	1.05	2	0.091	1	0.618	2	1

Magnolia Ranch

Distribution	SSE	Rank	Standard Error	Rank	Kolmorgorv	Rank	Chi-Square	Rank	Graphical Rank
Normal Distribution	25.17	3	1.18	3	0.444	2	3.000	1	1
2 Parameter Log Normal	350.34	6	4.41	6	0.444	2	10.778	6	5
3 Parameter Log Normal	23.02	1	1.13	1	0.444	2	4.556	2	1
Gumbel	24.49	2	1.17	2	0.444	2	7.667	5	1
Pearson Type III	109.07	4	2.46	4	0.389	1	5.333	3	4
USWRC Log Pearson	346.58	5	4.39	5	0.444	2	5.333	3	5

Union Park

Distribution	SSE	Rank	Standard Error	Rank	Kolmorgorv	Rank	Chi-Square	Rank	Graphical Rank
Normal Distribution	34.15	4	1.05	4	0.070	1	3.548	2	4
2 Parameter Log Normal	43.60	6	1.19	6	0.110	5	2.194	1	6
3 Parameter Log Normal	22.45	1	0.85	1	0.081	2	4.452	4	1
Gumbel	26.27	3	0.92	3	0.081	2	3.548	2	1
Pearson Type III	23.78	2	0.88	2	0.081	2	6.258	5	1
USWRC Log Pearson	39.69	5	1.13	5	0.129	6	6.258	5	5

APPENDIX G

WET SEASON STREAM FLOW DISTRIBUTIONS

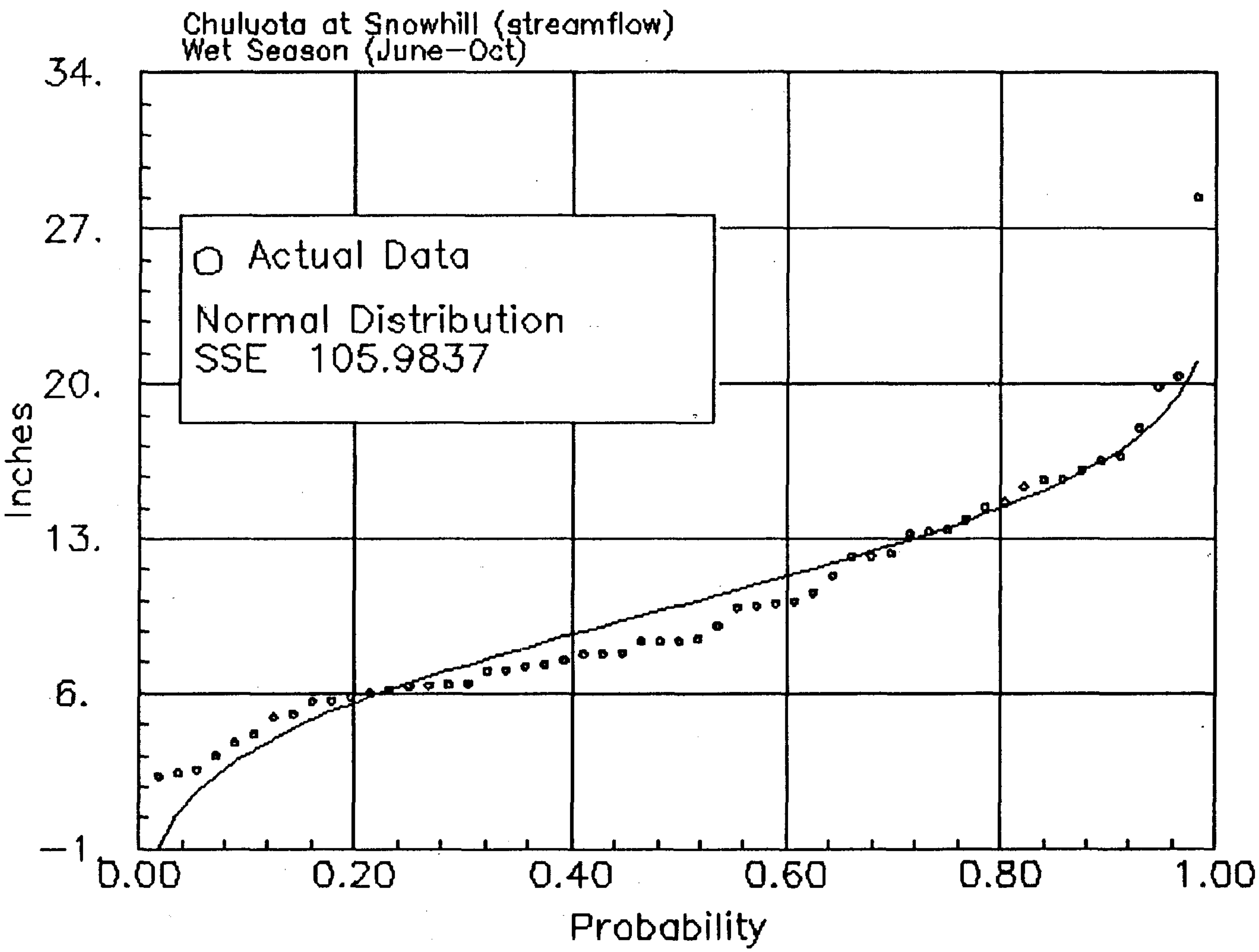


Figure G.1.1 Chuluota at Snowhill, Wet Season streamflow distribution for the years of (1936–1990)

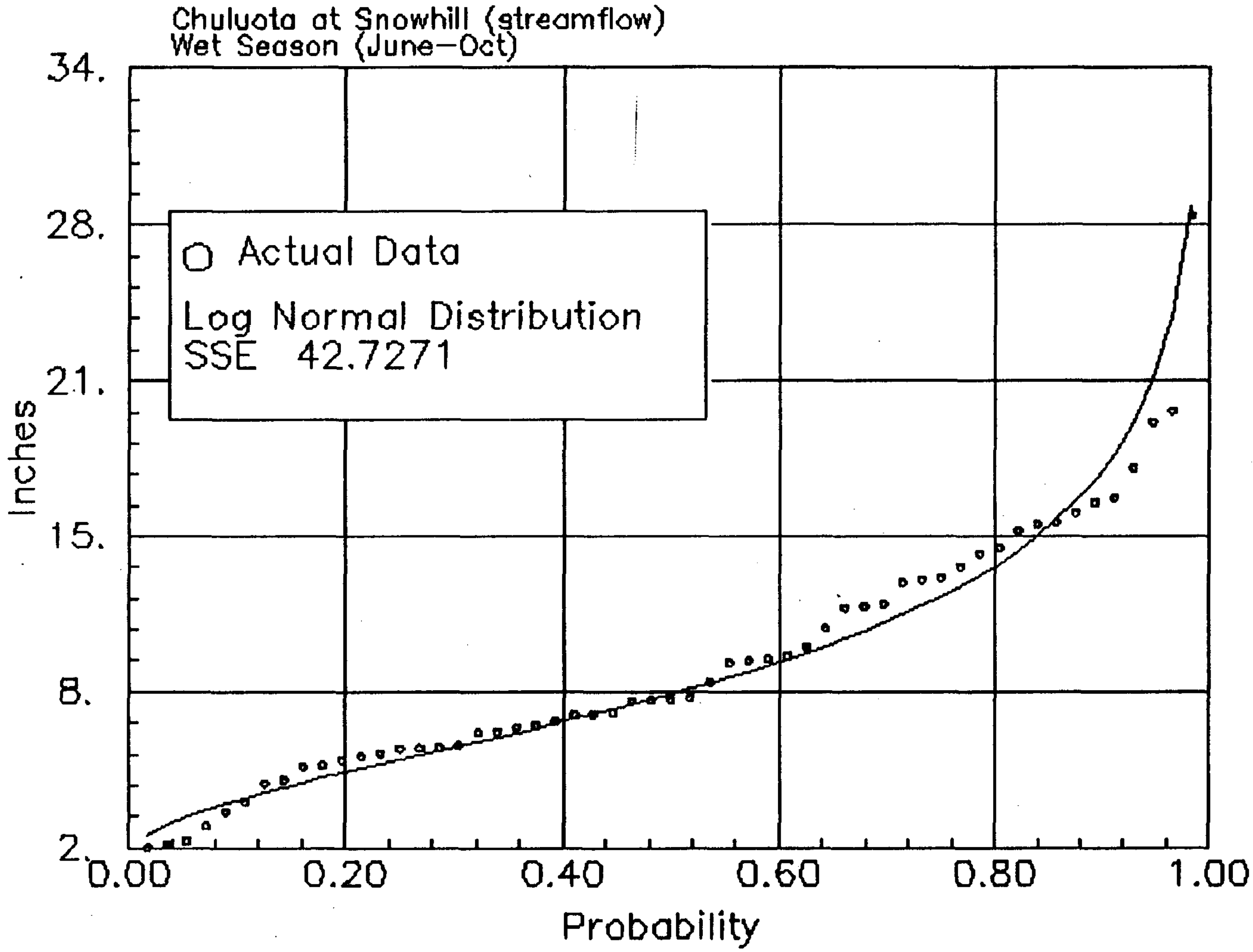


Figure G.1.2 Chuluota at Snowhill, Wet Season streamflow distribution for the years of (1936–1990)

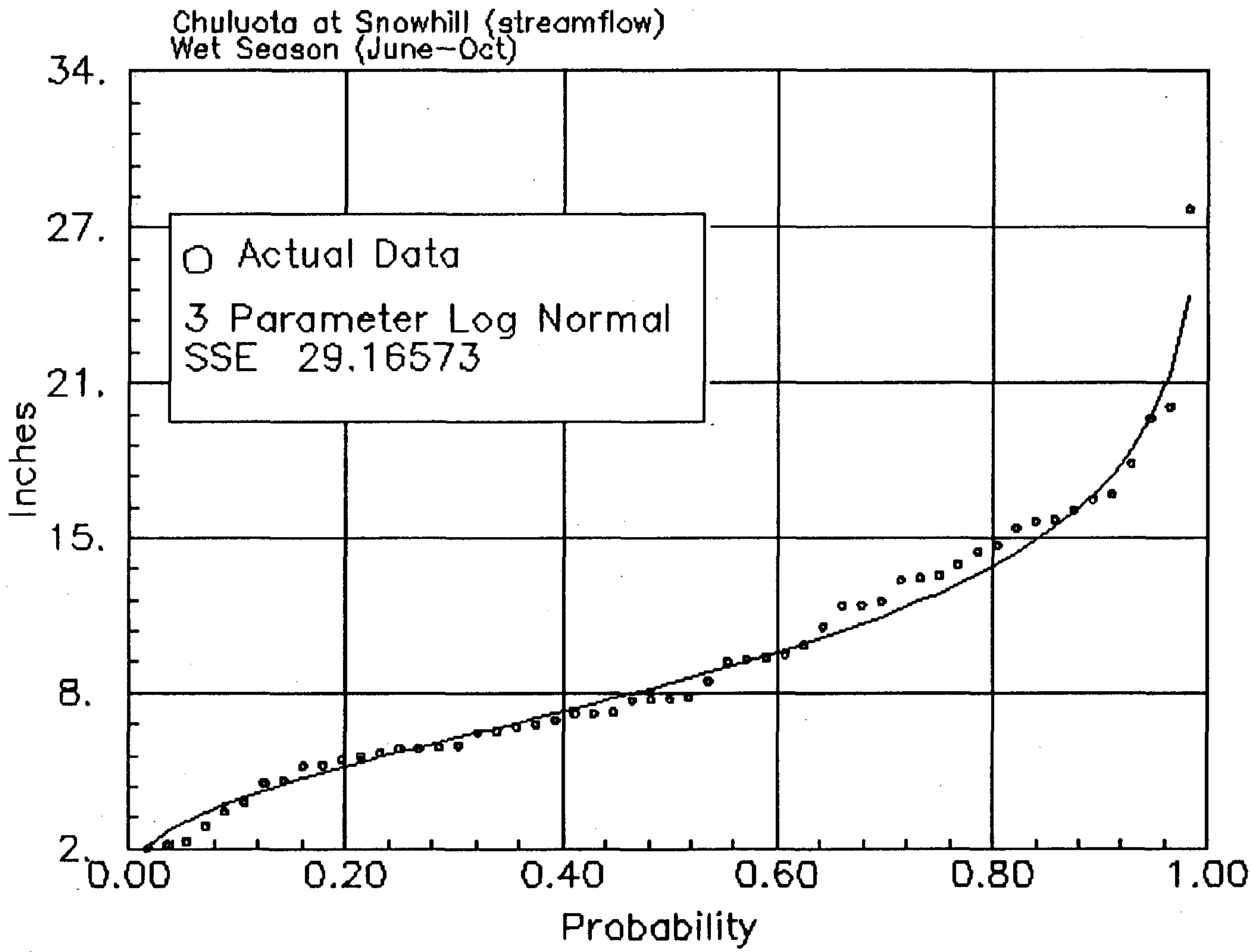


Figure G.1.3 Chuluota at Snowhill, Wet Season streamflow distribution for the years of (1936–1990)

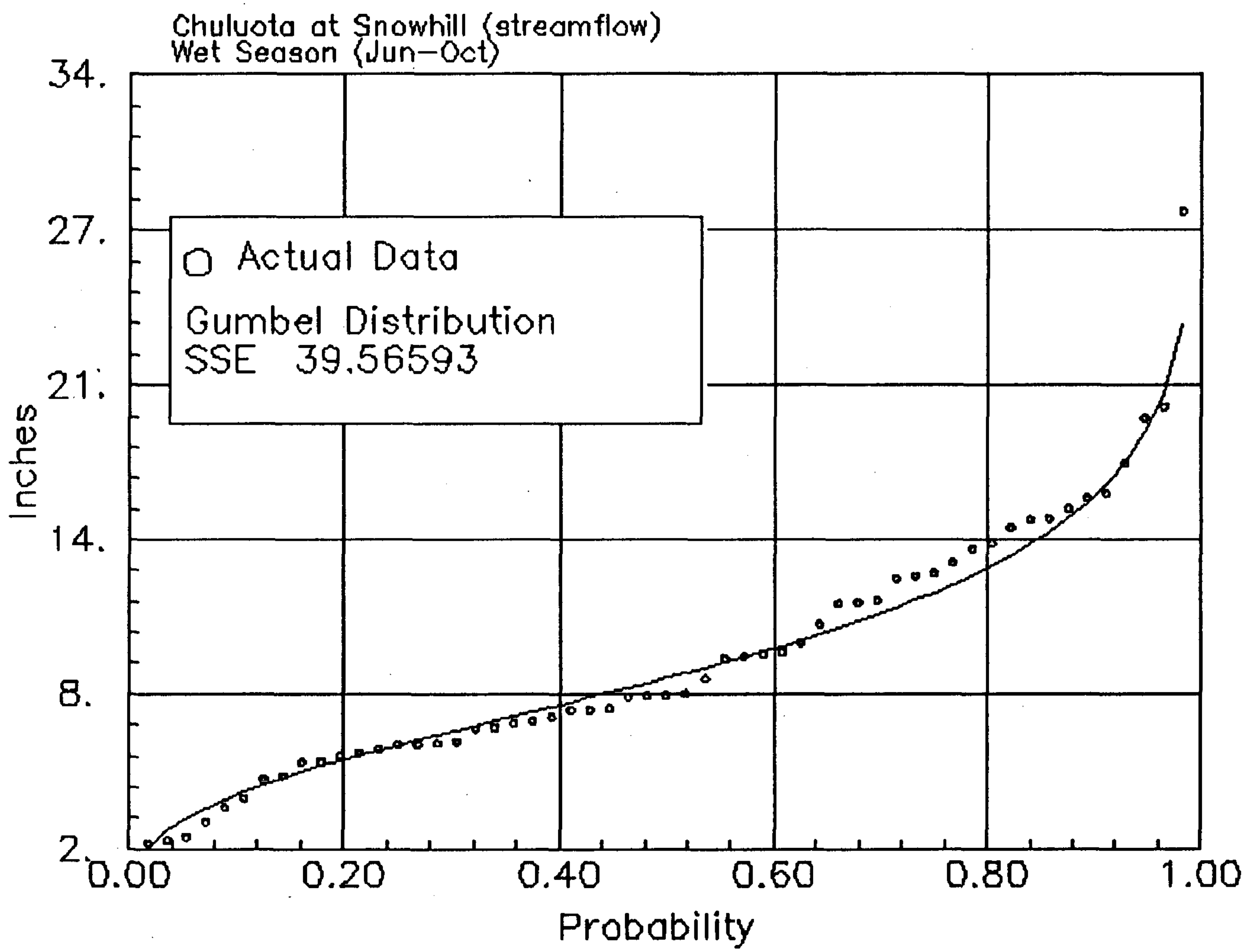


Figure G.1.4 Culuota at Snowhill, Wet Season streamflow distribution for the years of (1936–1990)

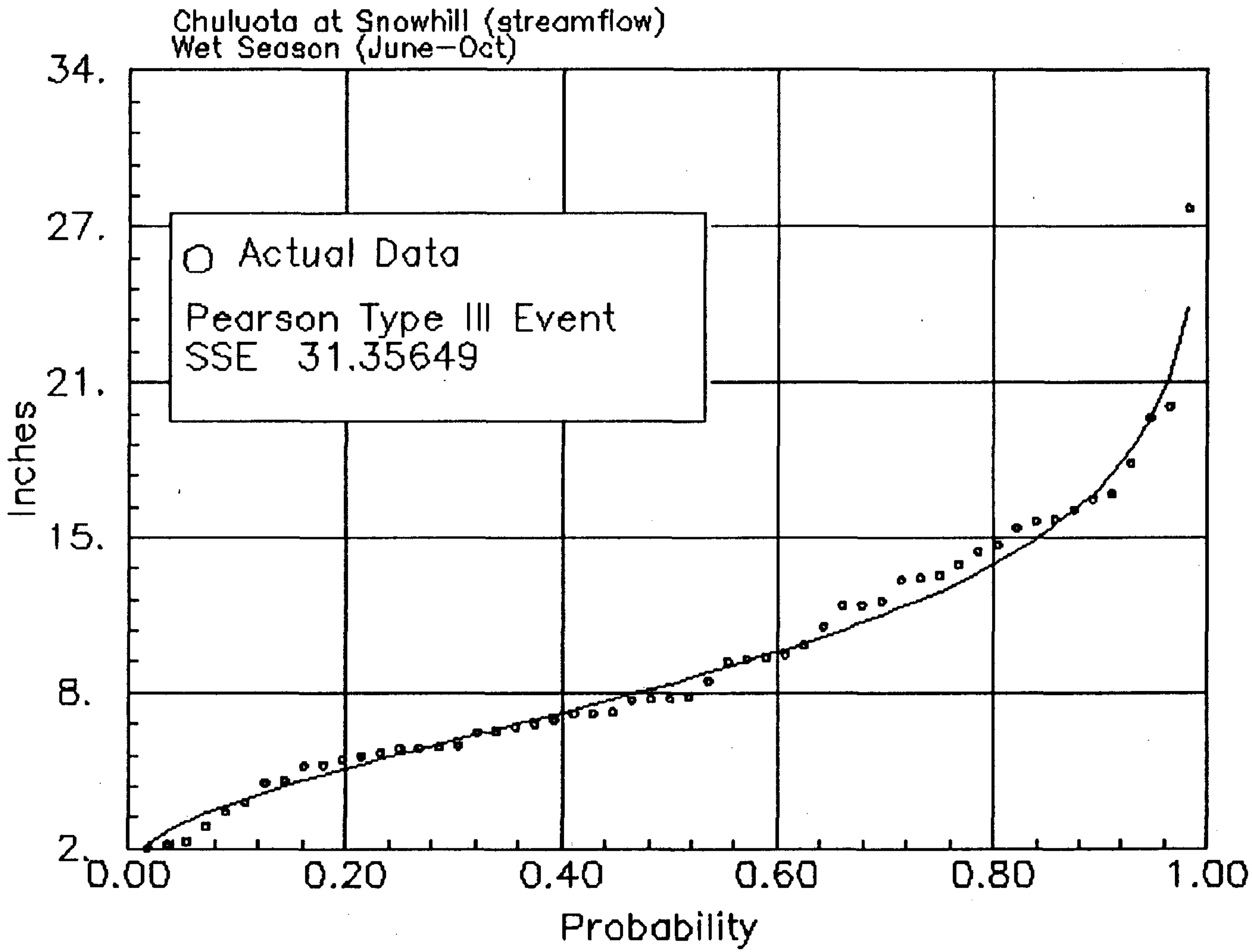


Figure G.1.5 Chuluota at Snowhill, Wet Season streamflow distribution for the years of (1936–1990)

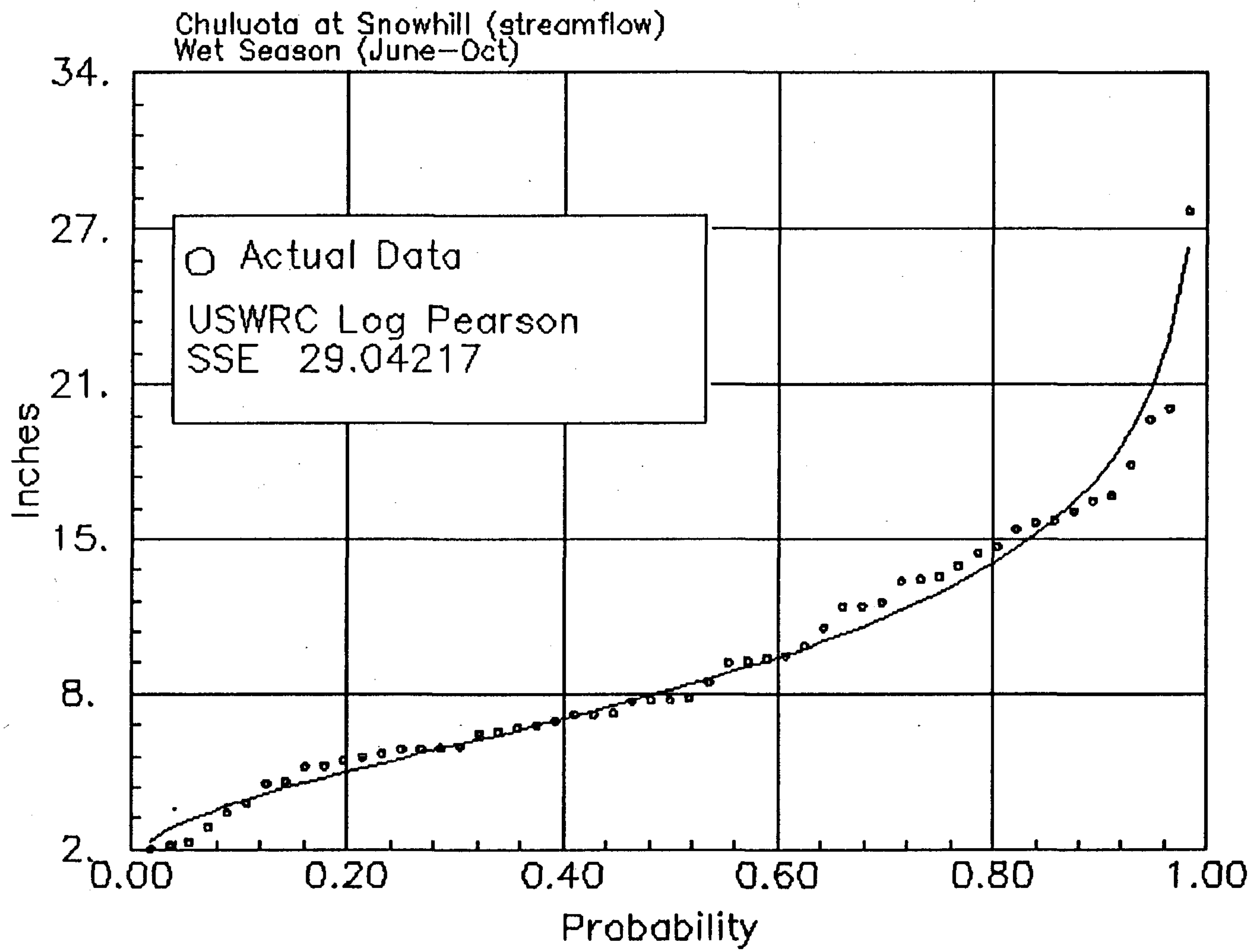


Figure G.1.6 Chuluota at Snowhill, Wet Season streamflow distribution for the years of (1960–1990)

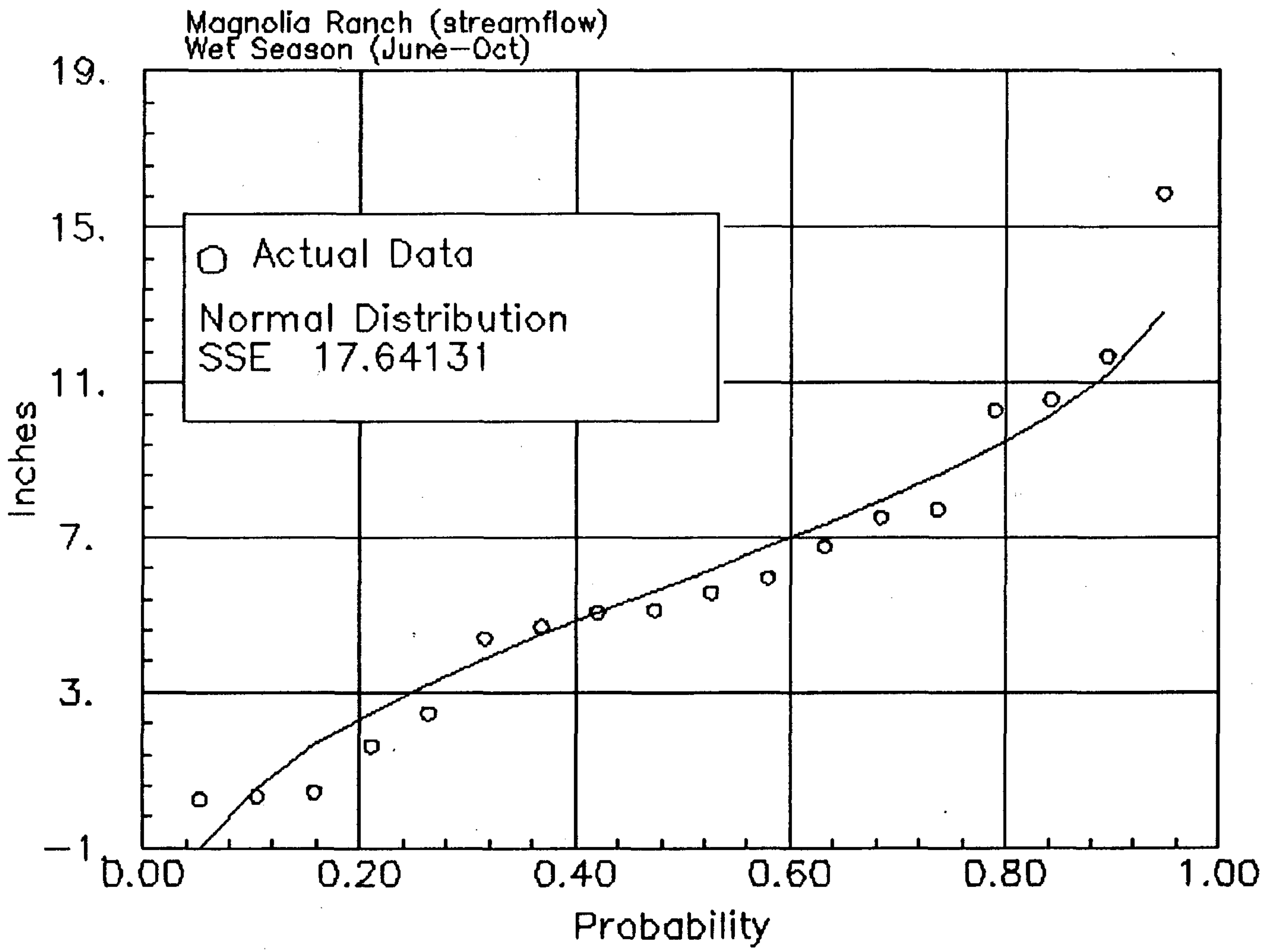


Figure G.2.1 Magnolia Ranch, Wet Season streamflow distribution for the years of (1973–1990)

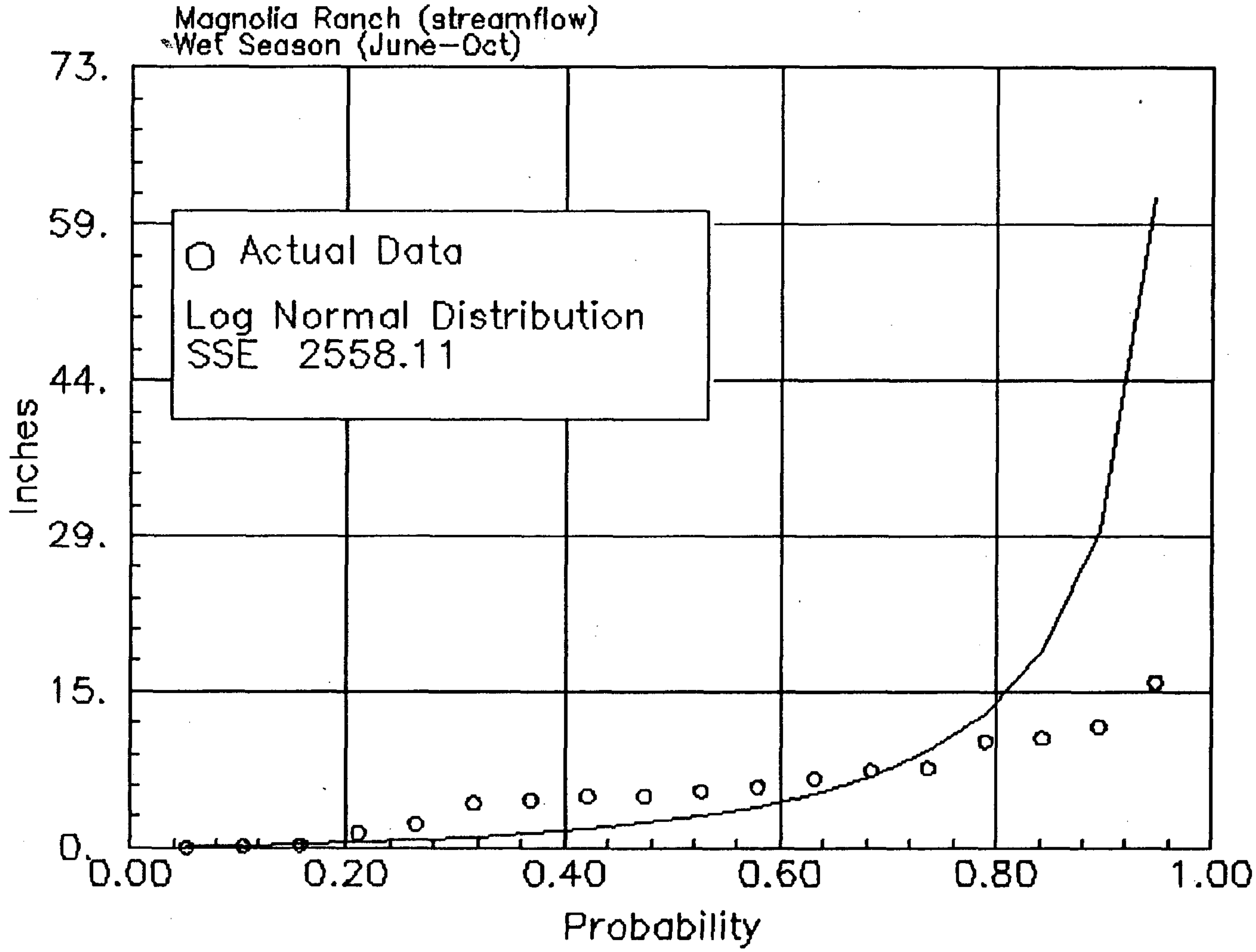


Figure G.2.2 Magnolia Ranch, Wet Season streamflow distribution for the years of (1973–1990)

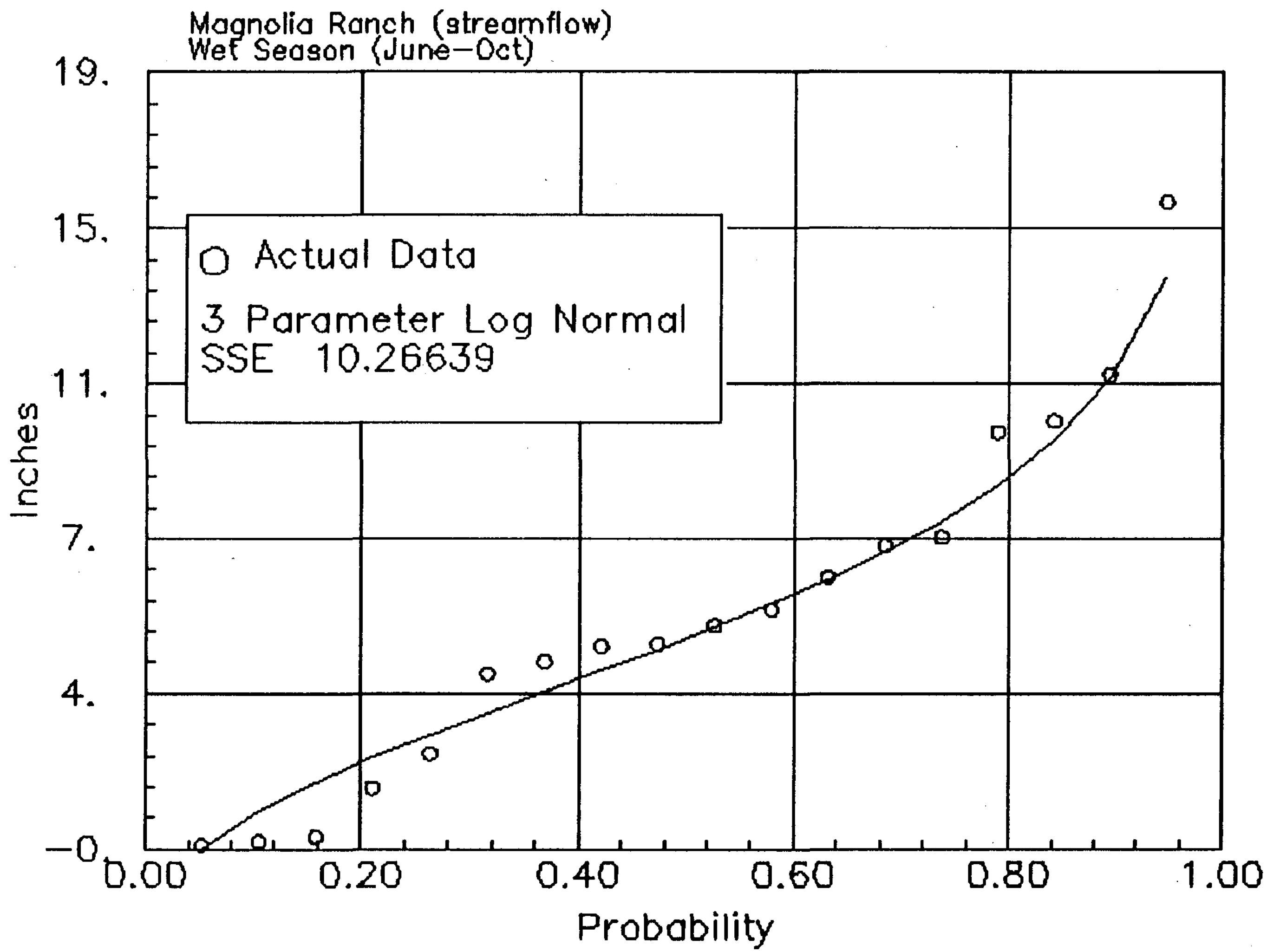


Figure G.2.3 Magnolia Ranch, Wet Season streamflow distribution for the years of (1973-1990)

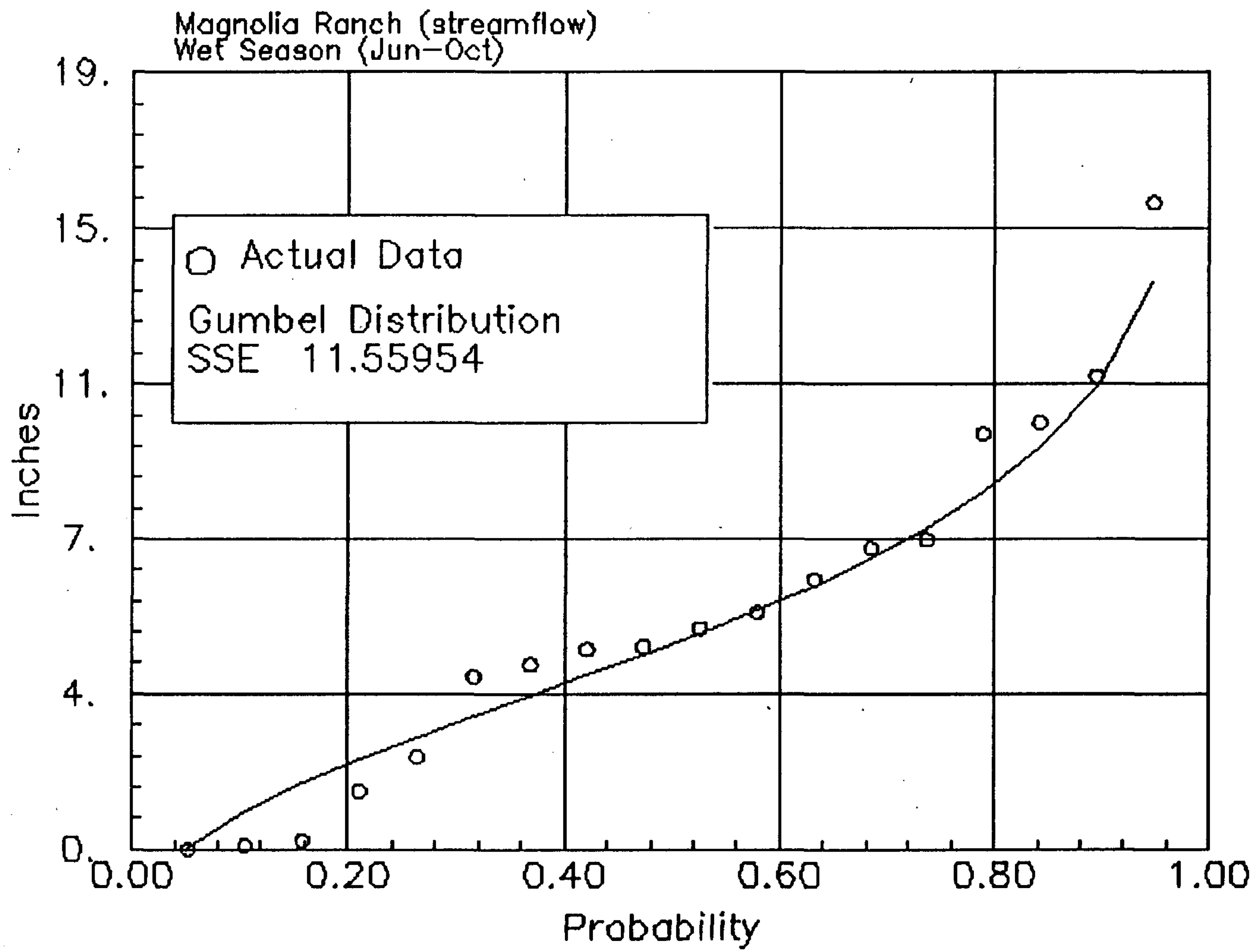


Figure G.2.4 Magnolia Ranch, Wet Season streamflow distribution for the years of (1973–1990)

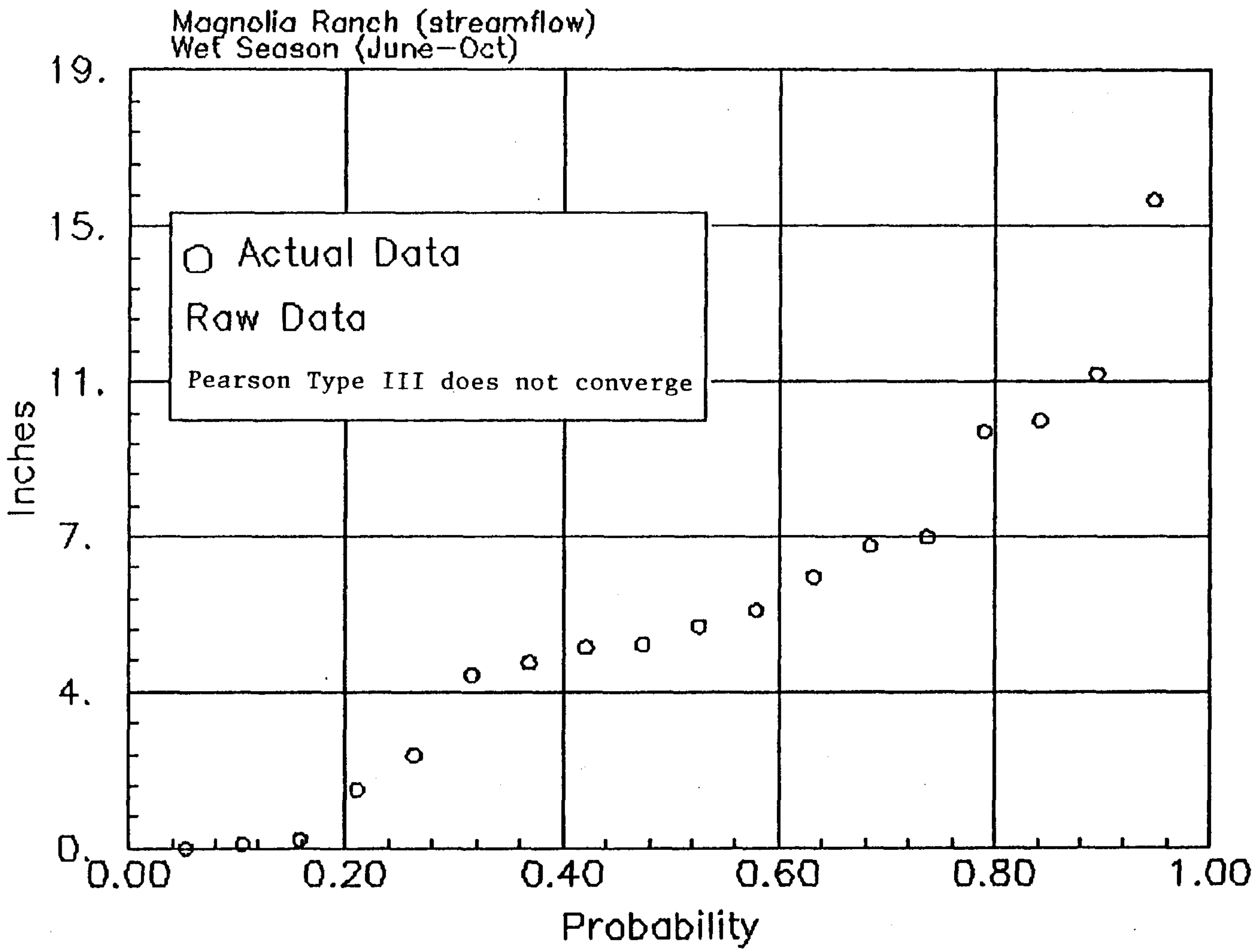


Figure G.2.5 Magnolia Ranch, Wet Season streamflow distribution for the years of (1973-1990)

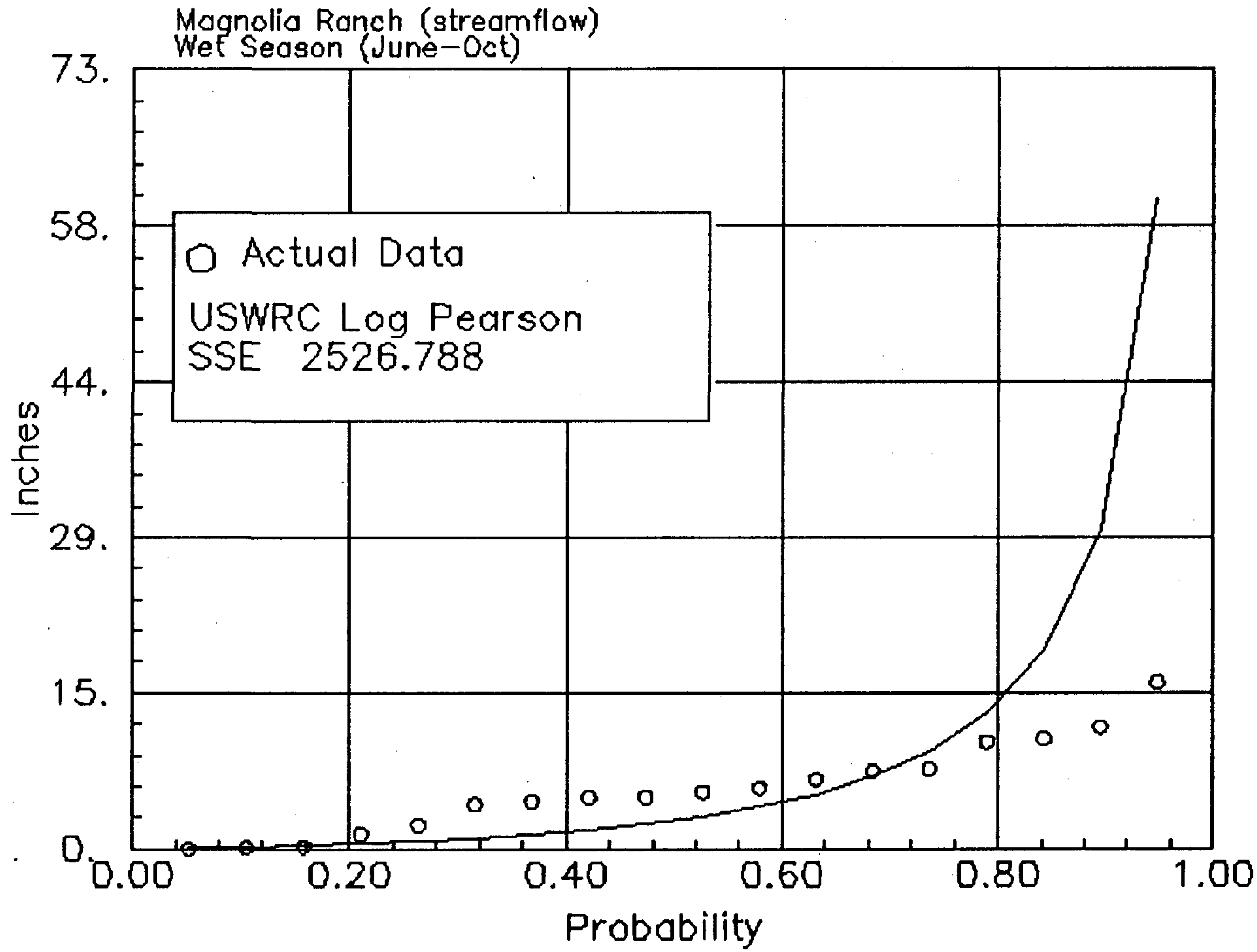


Figure G.2.6 Magnolia Ranch, Wet Season streamflow distribution for the years of (1973–1990)

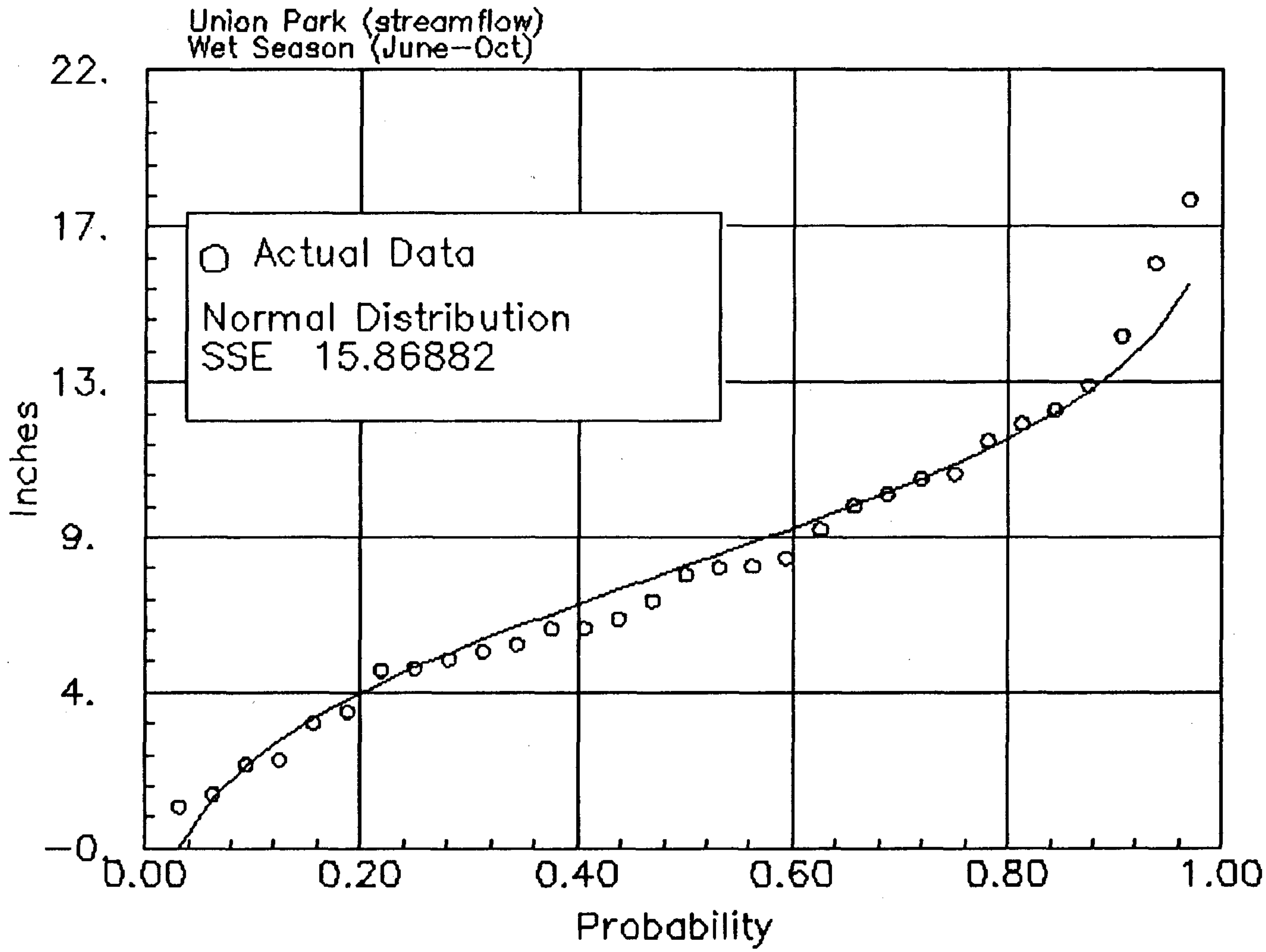


Figure G.3.1 Union Park, Wet Season streamflow distribution for the years of (1960–1990)

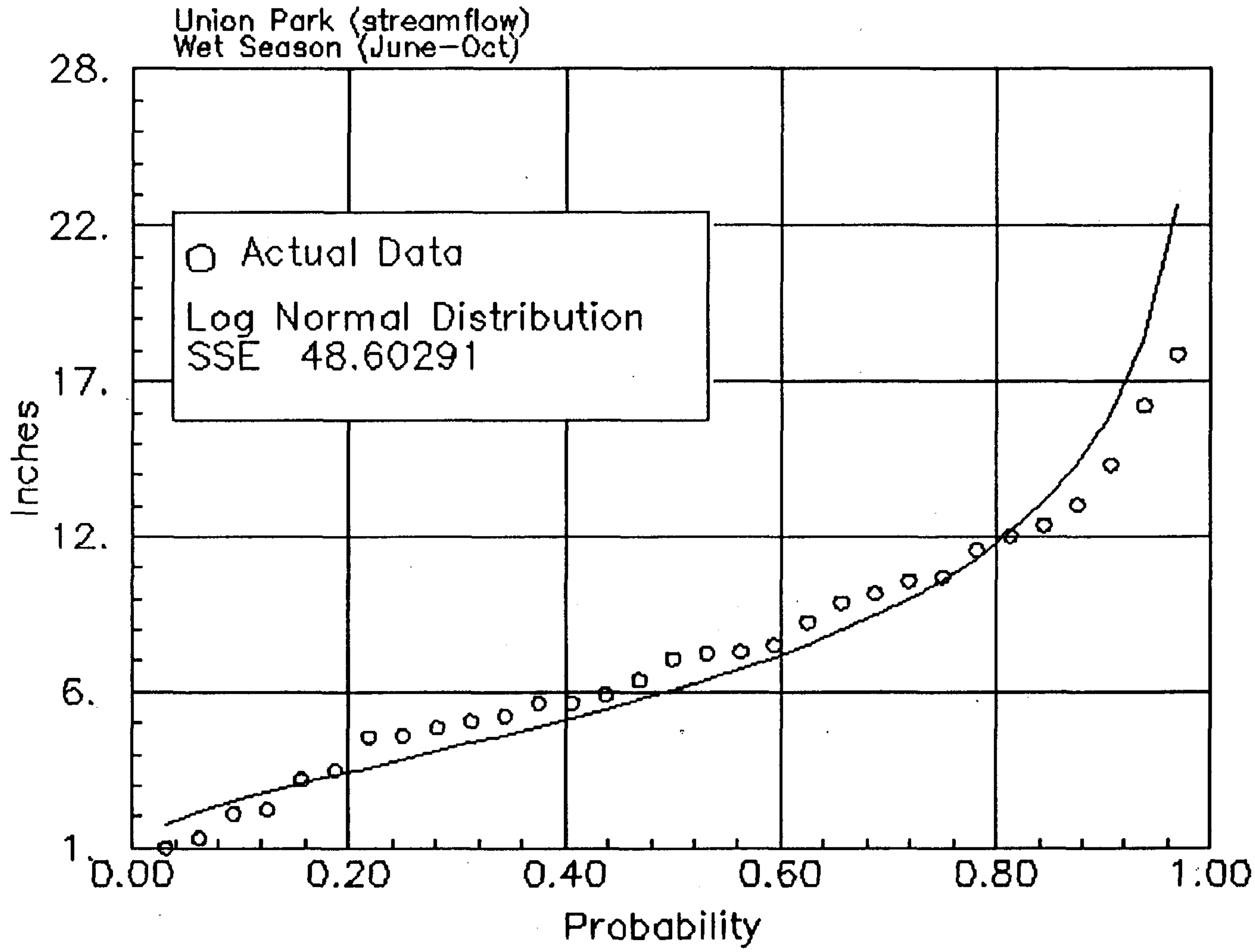


Figure G.3.2 Union Park, Wet Season streamflow distribution for the years of (1960–1990)

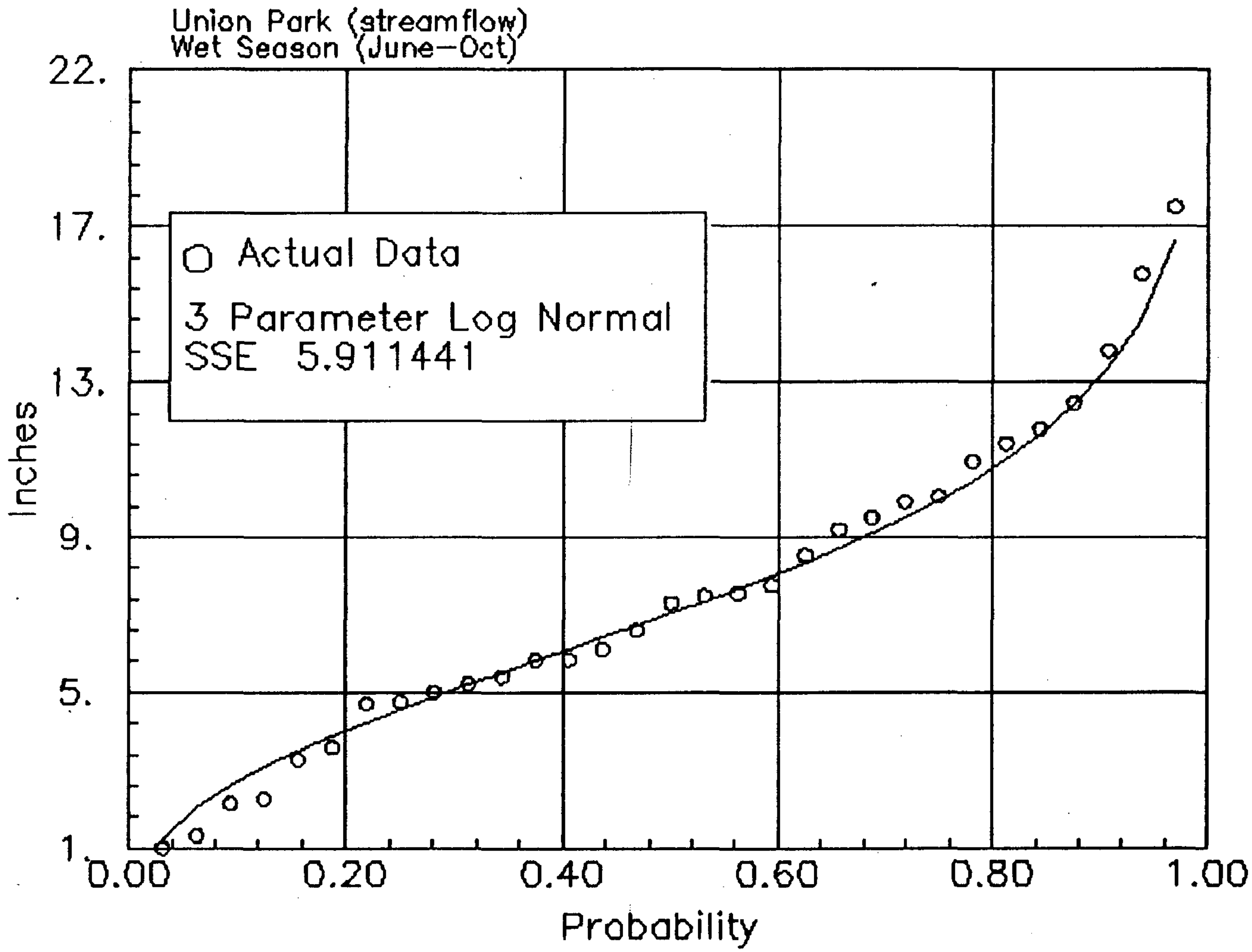


Figure G.3.3 Union Park, Wet Season streamflow distribution for the years of (1960–1990)

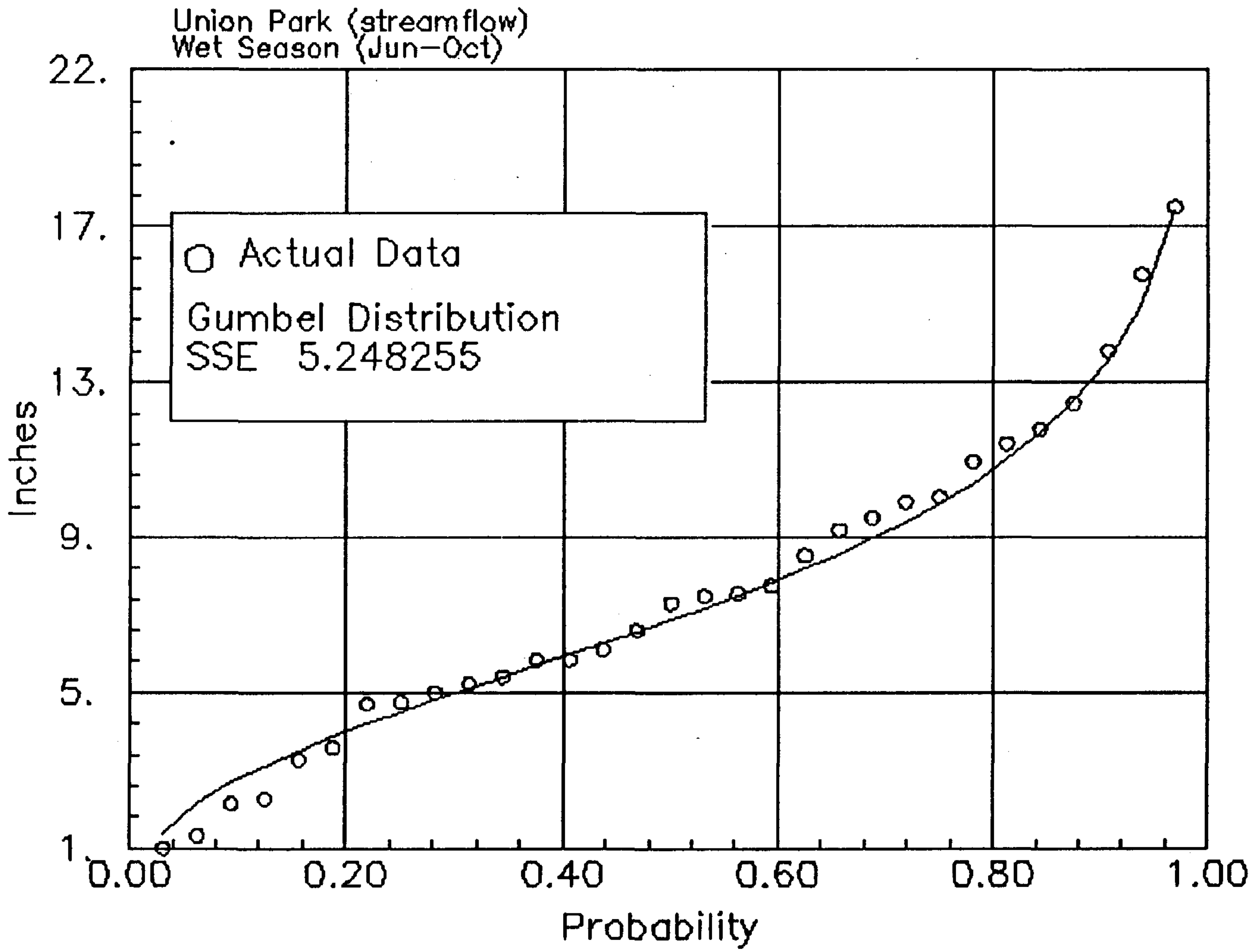


Figure G.3.4 Union Park, Wet Season streamflow distribution for the years of (1960–1990)

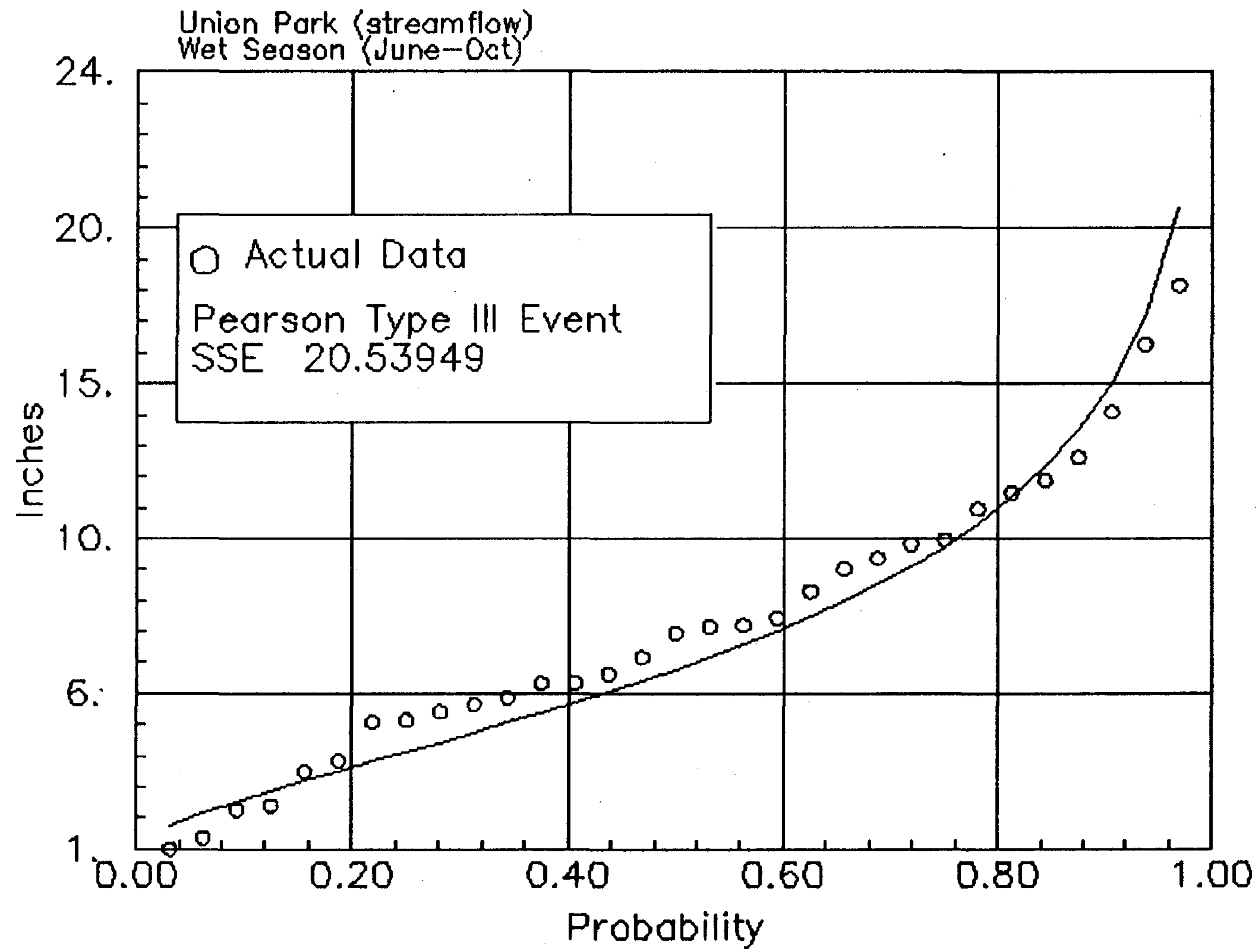


Figure G.3.5 Union Park, Wet Season streamflow distribution for the years of (1960–1990)

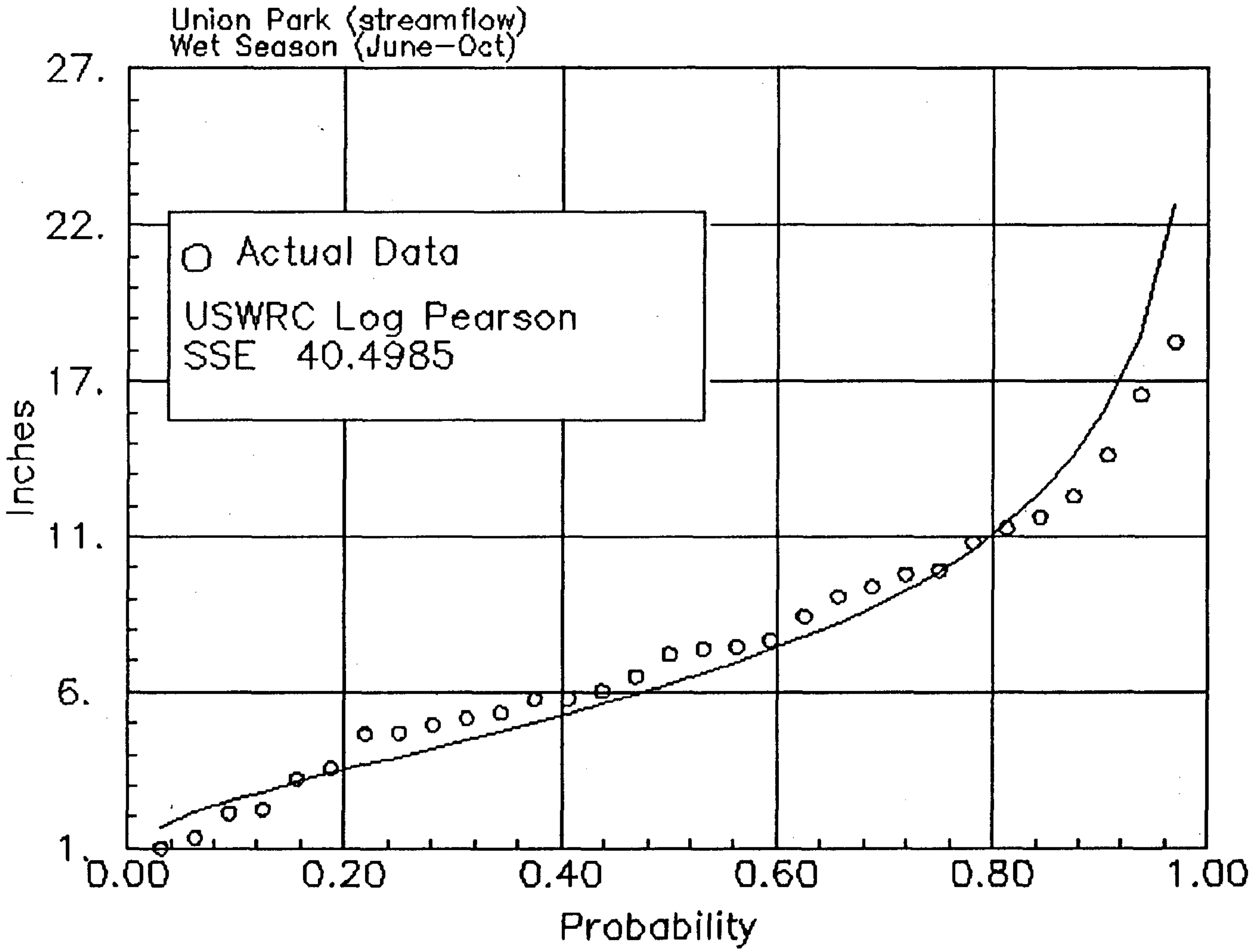


Figure G.3.6 Union Park, Wet Season streamflow distribution for the years of (1960–1990)

Table G.1 Statistical Comparisons For Wet Season Streamflow

Chuluota at Snowhill

Distribution	SSE	Rank	Standard Error	Rank	Kolmorgorv	Rank	Chi-Square	Rank	Graphical Rank
Normal Distribution	105.98	6	1.39	6	0.130	6	6.473	5	6
2 Parameter Log Normal	42.73	5	0.88	5	0.091	1	4.946	3	1
3 Parameter Log Normal	29.17	2	0.73	1	0.091	1	5.709	4	3
Gumbel	39.57	4	0.85	4	0.091	1	7.491	6	3
Pearson Type III	31.36	3	0.76	3	0.091	1	3.927	1	3
USWRC Log Pearson	29.04	1	0.73	1	0.091	1	3.927	1	2

Magnolia Ranch

Distribution	SSE	Rank	Standard Error	Rank	Kolmorgorv	Rank	Chi-Square	Rank	Graphical Rank
Normal Distribution	17.64	3	0.99	3	0.444	1	2.220	1	3
2 Parameter Log Normal	2558.11	5	11.92	5	0.500	4	24.000	5	4
3 Parameter Log Normal	10.27	1	0.76	1	0.444	1	2.220	1	1
Gumbel	11.56	2	0.80	2	0.444	1	3.778	3	1
Pearson Type III	*****METHOD DOES NOT CONVERGE******								
USWRC Log Pearson	2526.79	4	11.85	4	0.500	4	4.556	4	4

Union Park

Distribution	SSE	Rank	Standard Error	Rank	Kolmorgorv	Rank	Chi-Square	Rank	Graphical Rank
Normal Distribution	15.87	3	0.72	3	0.065	2	1.290	2	4
2 Parameter Log Normal	48.60	6	1.25	6	0.140	5	4.000	6	5
3 Parameter Log Normal	5.91	2	0.44	2	0.040	1	0.839	1	2
Gumbel	5.25	1	0.41	1	0.073	2	1.290	2	1
Pearson Type III	20.54	4	0.81	4	0.073	2	1.290	2	3
USWRC Log Pearson	40.50	5	1.14	5	0.720	6	1.290	2	5

APPENDIX H

DRY SEASON STREAM FLOW DISTRIBUTIONS

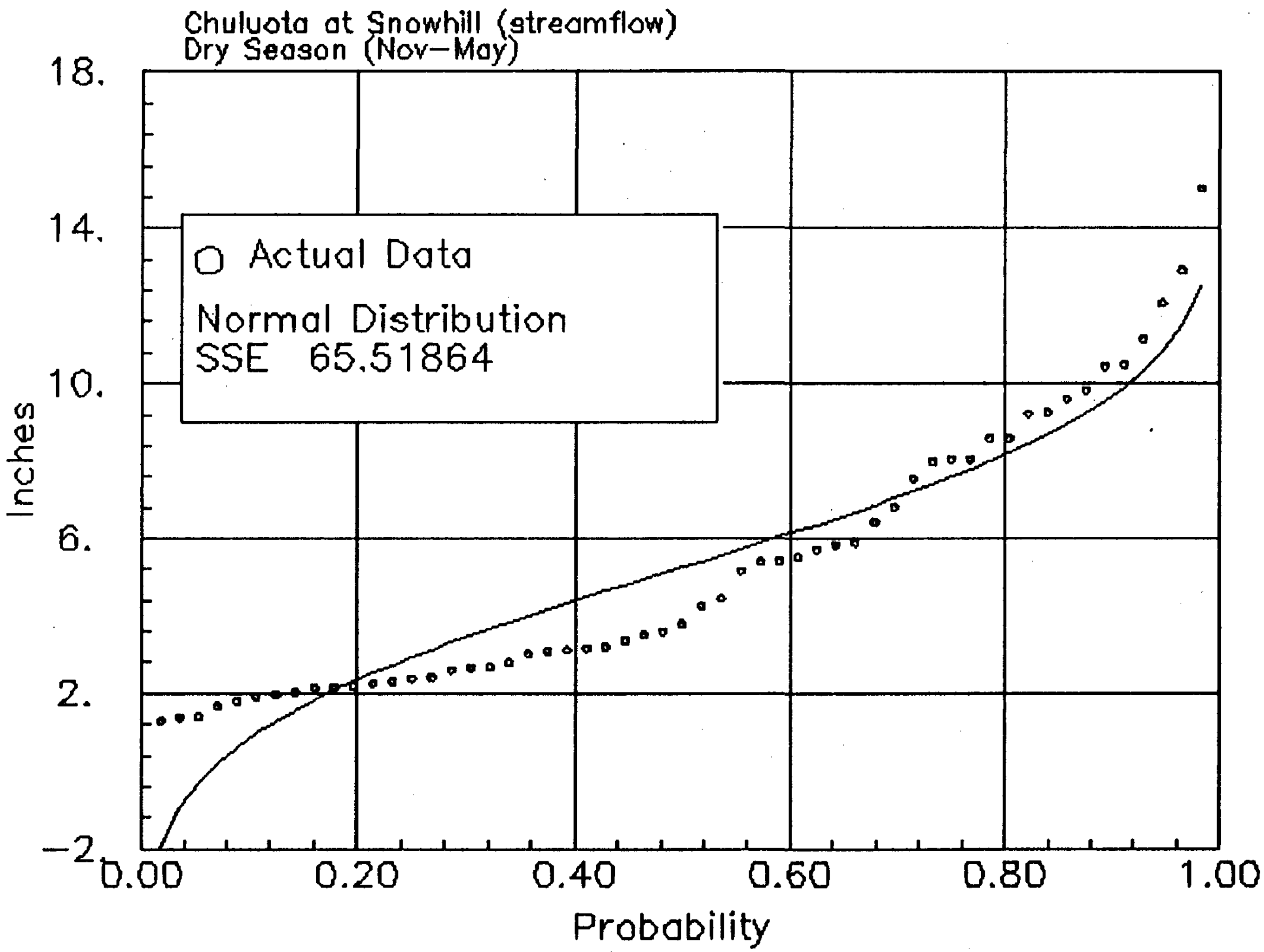


Figure H.1.1 Chuluota at Snowhill, Dry Season streamflow distribution for the years of (1936–1990)

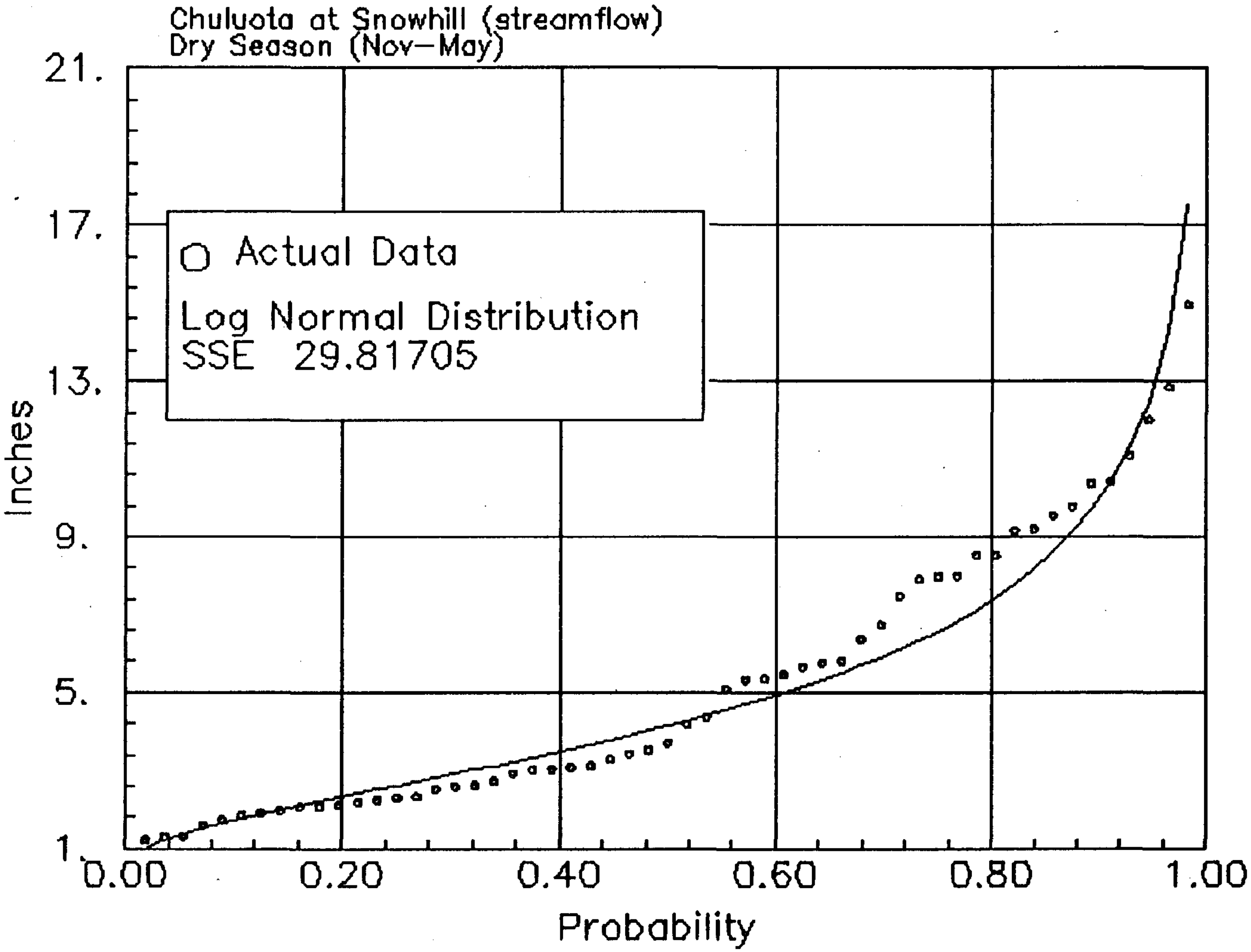


Figure H.1.2 Chuluota at Snowhill, Dry Season streamflow distribution for the years of (1936–1990)

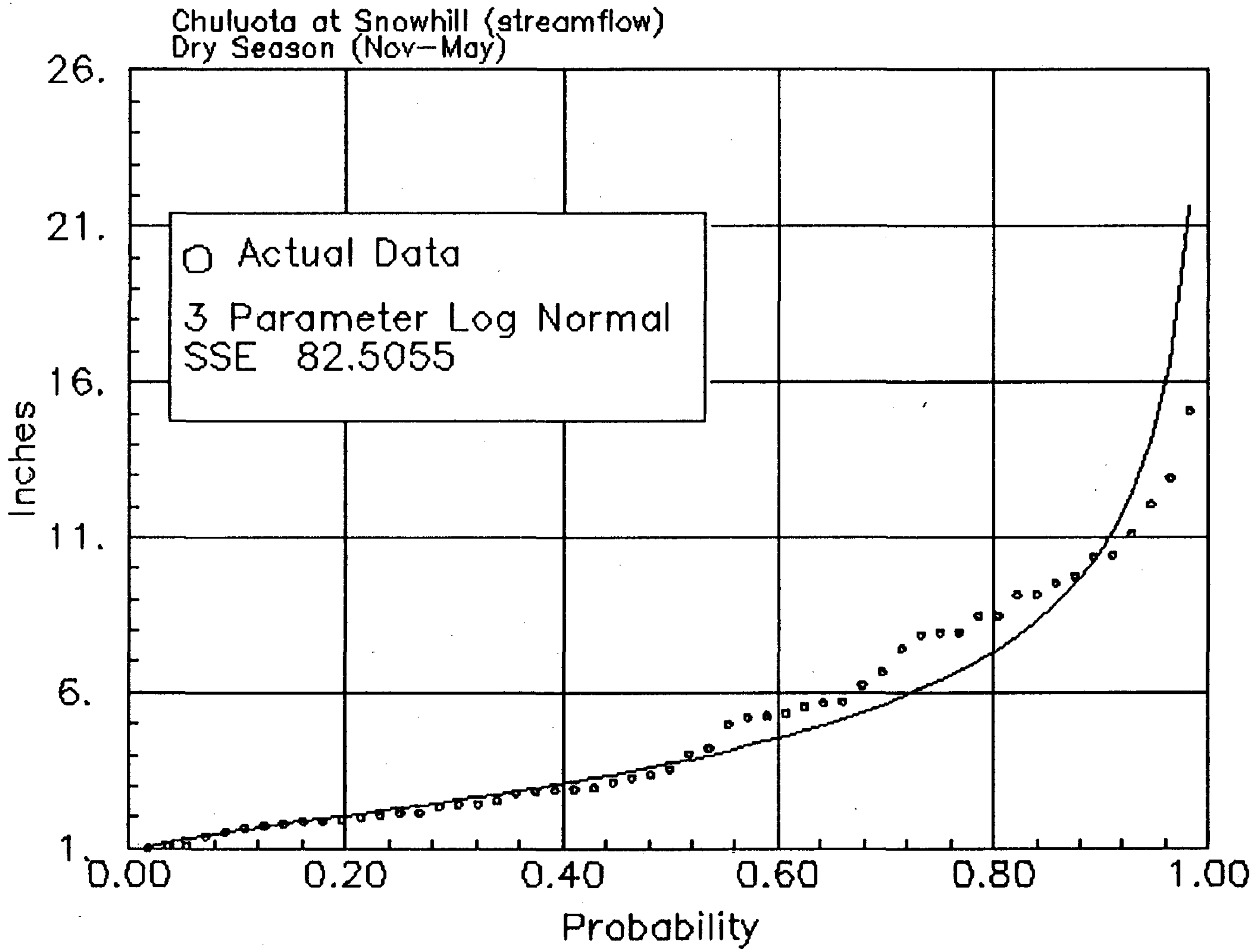


Figure H.1.3 Chuluota at Snowhill, Dry Season streamflow distribution for the years of (1936–1990)

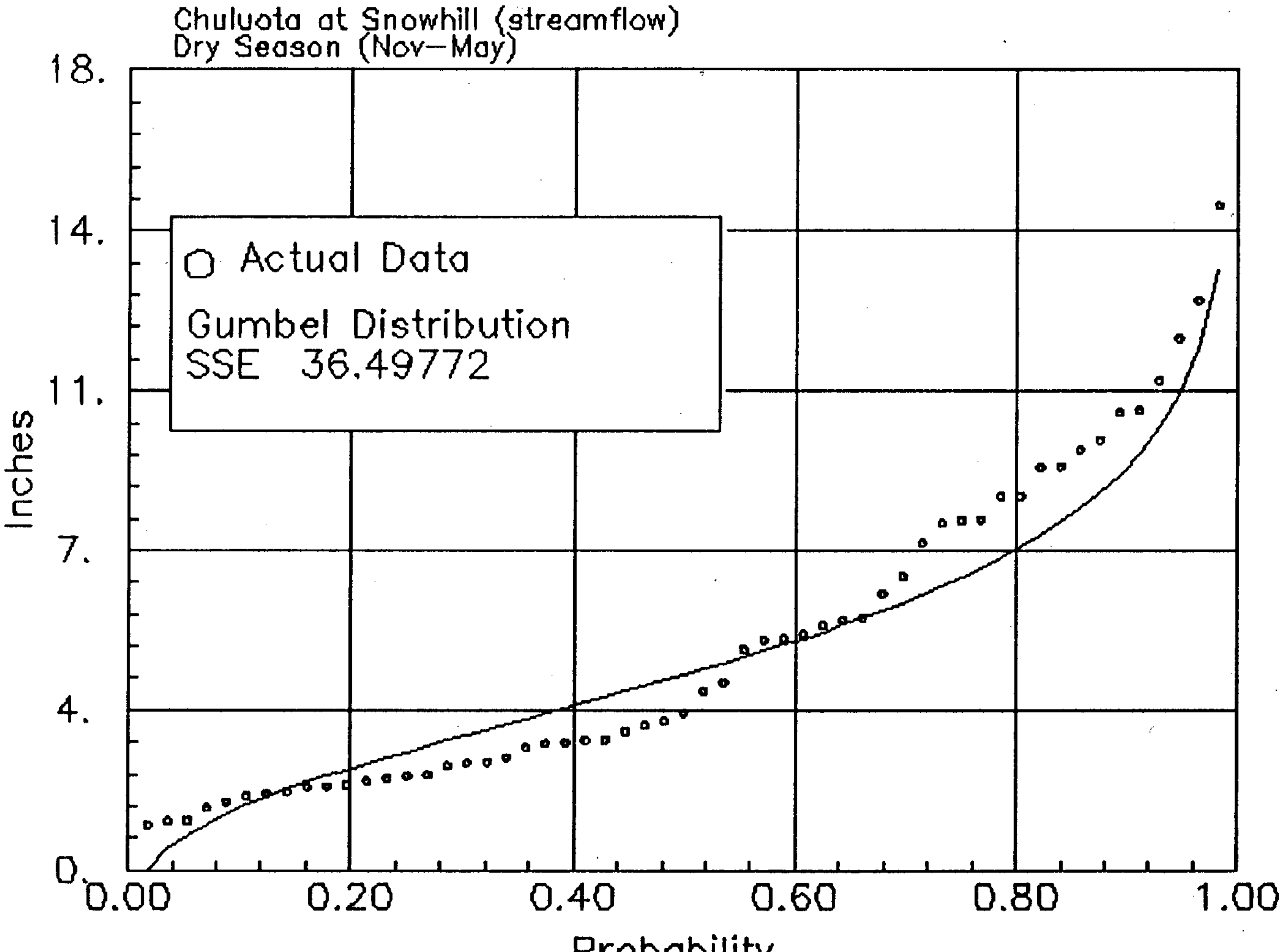


Figure H.1.4 Chuluota at Snowhill, Dry Season streamflow distribution for the years of (1936–1990)

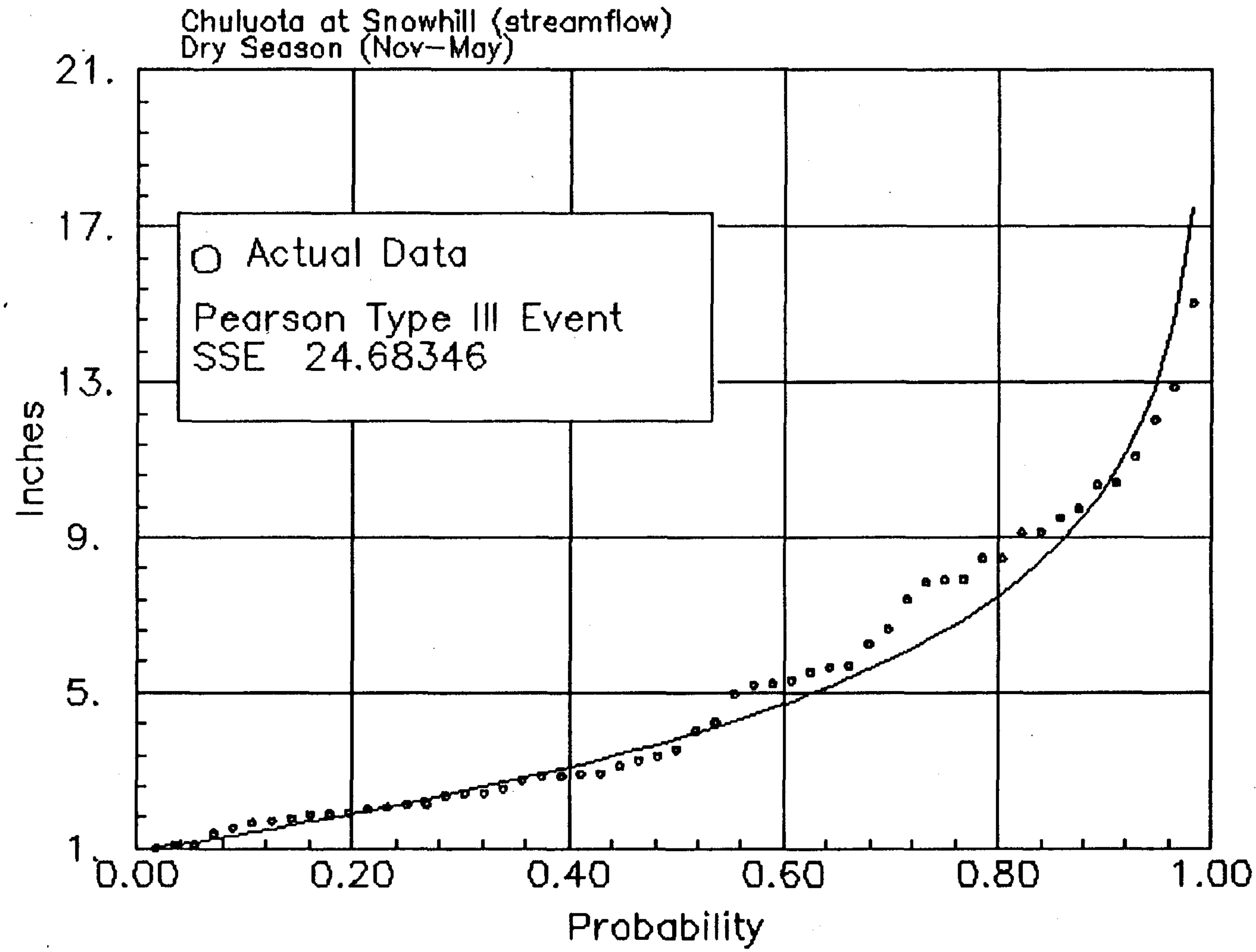


Figure H.1.5 Chuluota at Snowhill, Dry Season streamflow distribution for the years of (1936–1990)

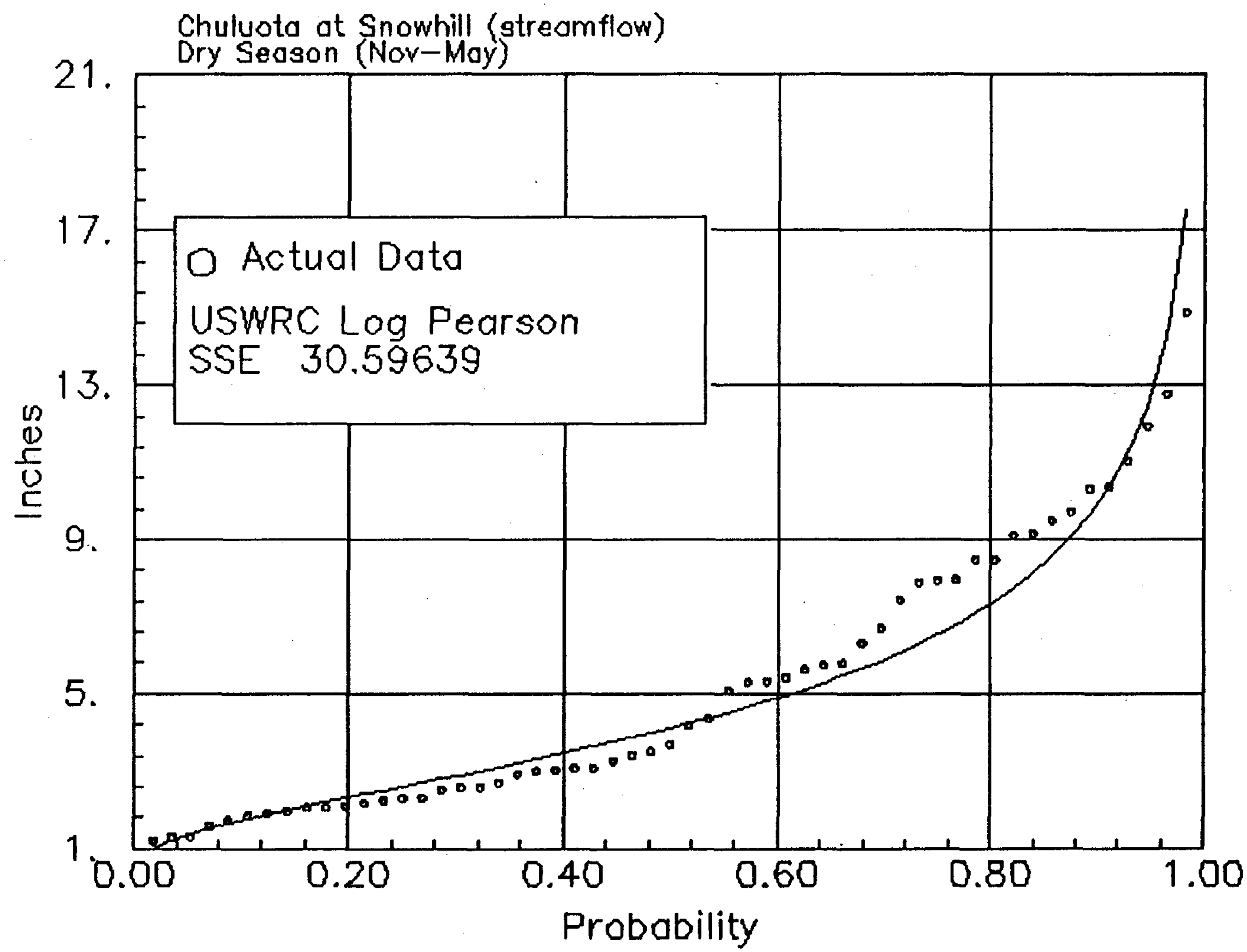


Figure H.1.6 Chuluota at Snowhill, Dry Season streamflow distribution for the years of (1936–1990)

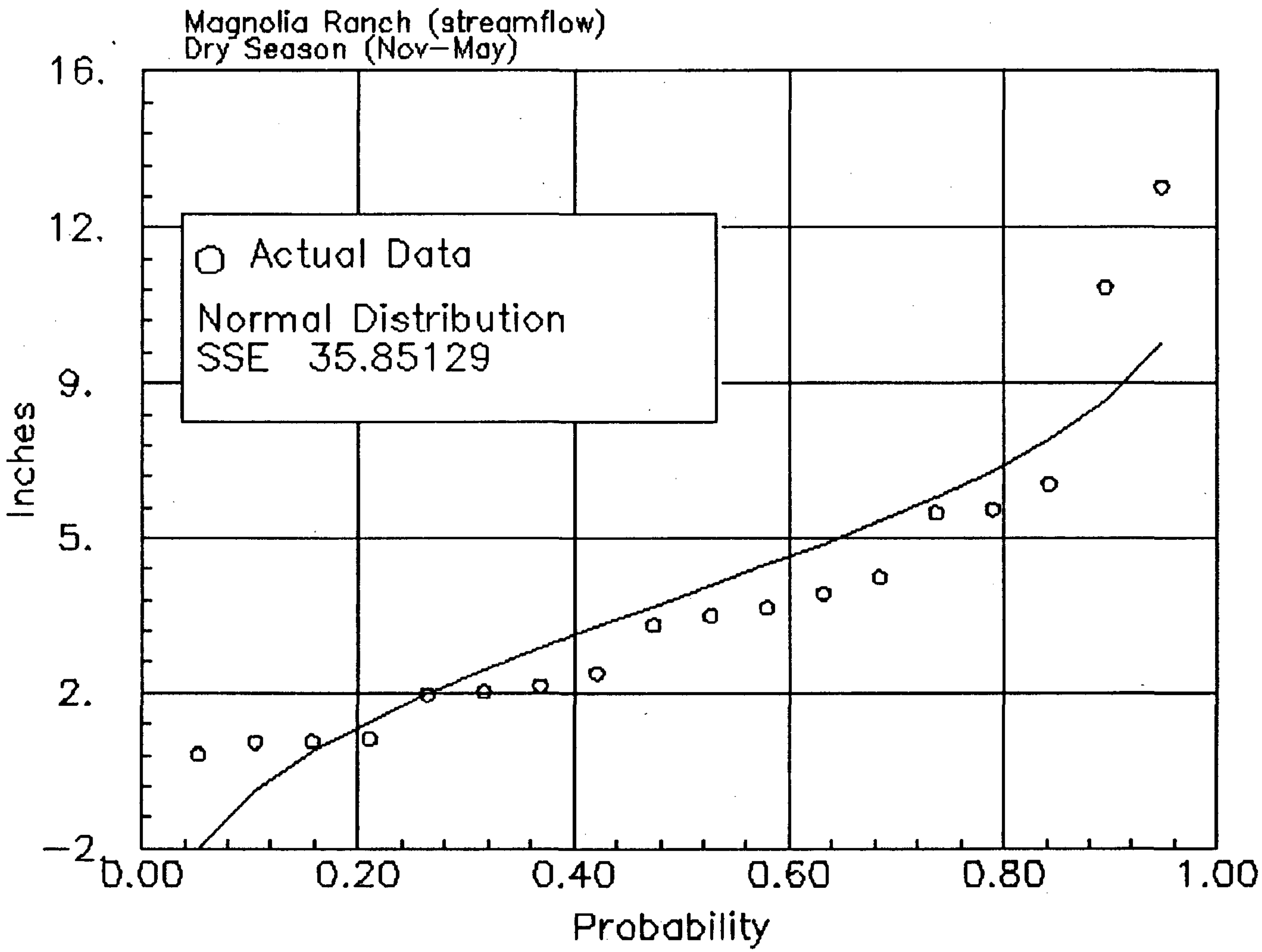


Figure H.2.1 Magnolia Ranch, Dry Season streamflow distribution for the years of (1973–1990)

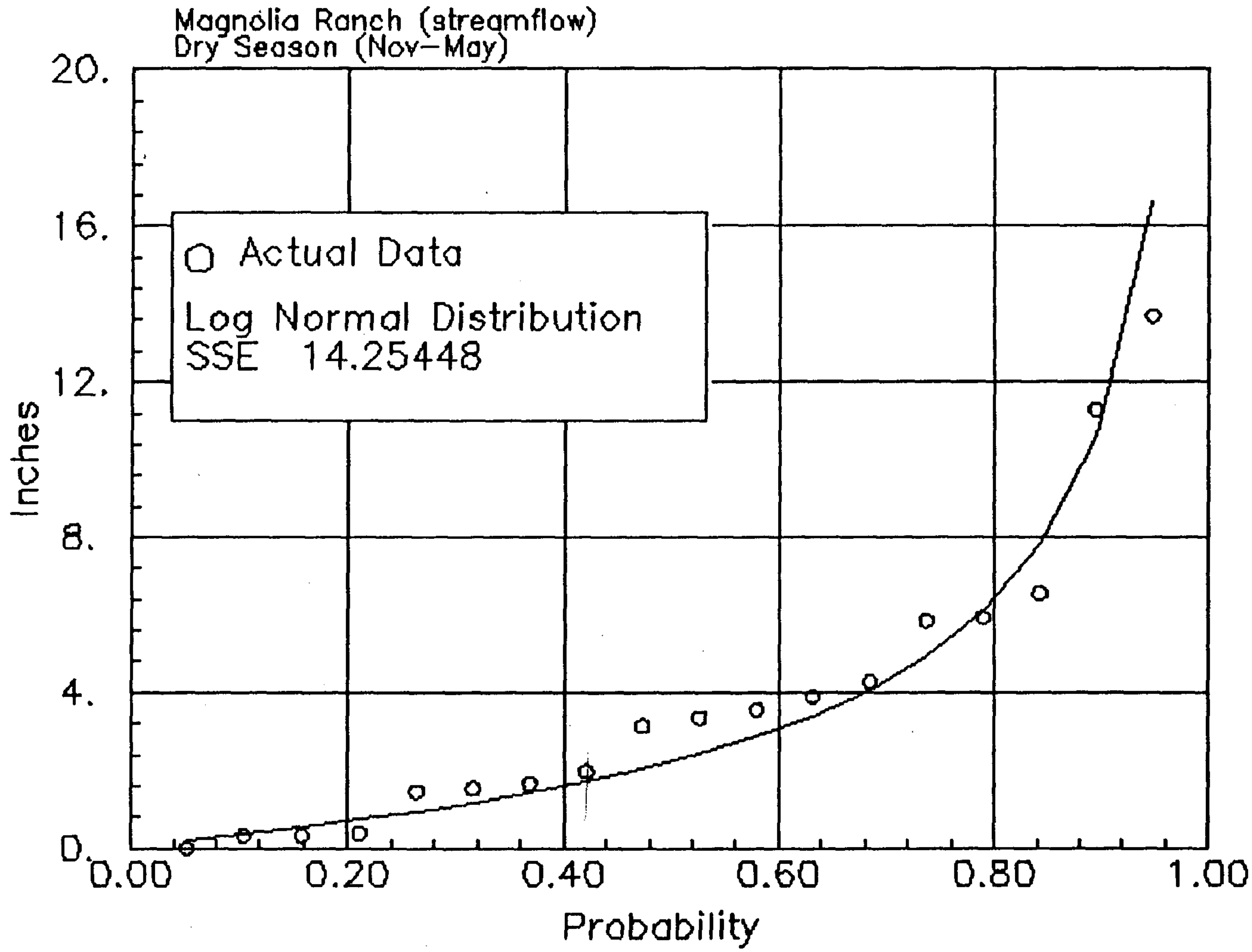


Figure H.2.2 Magnolia Ranch, Dry Season streamflow distribution for the years of (1973-1990)

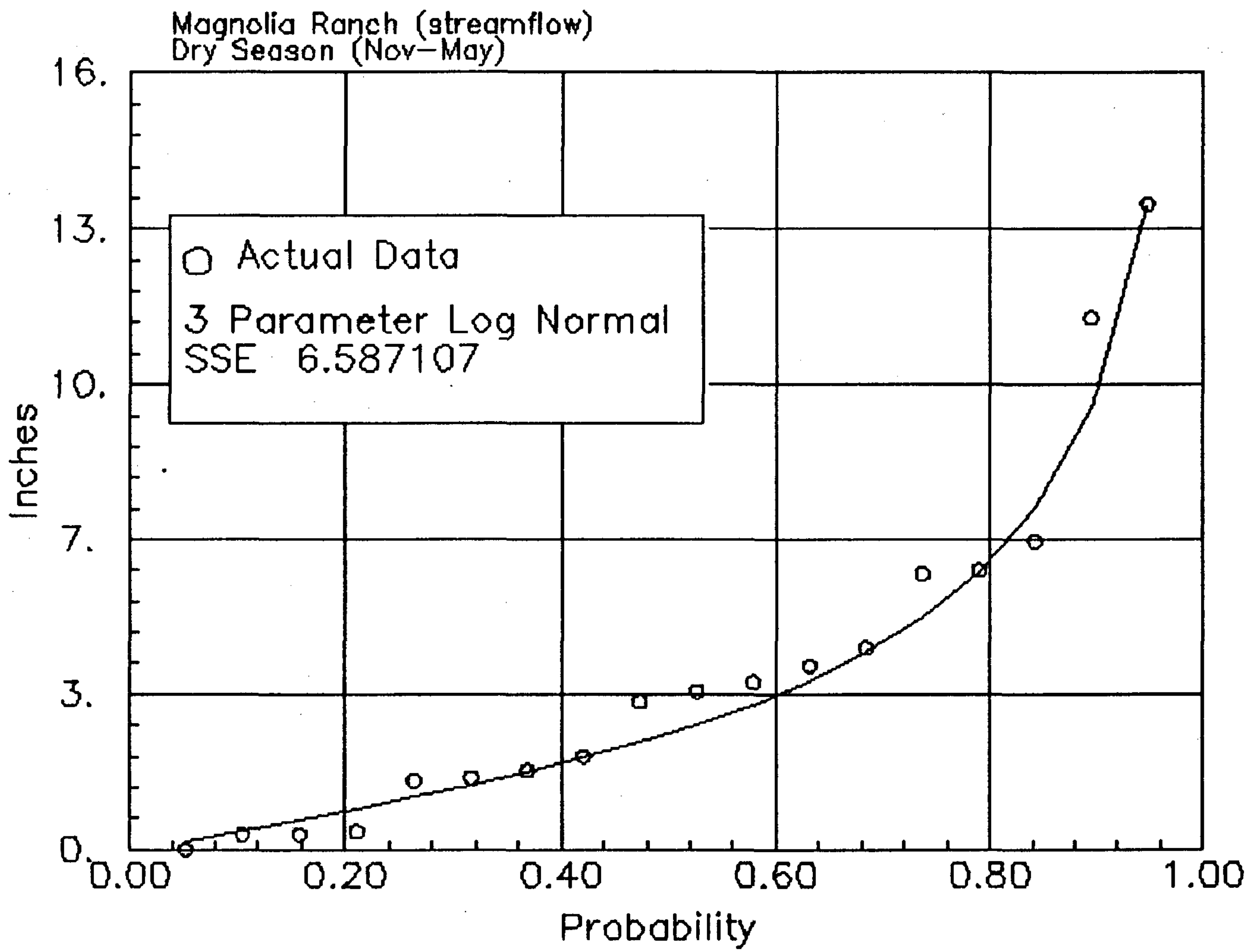


Figure H.2.3 Magnolia Ranch, Dry Season streamflow distribution for the years of (1973–1990)

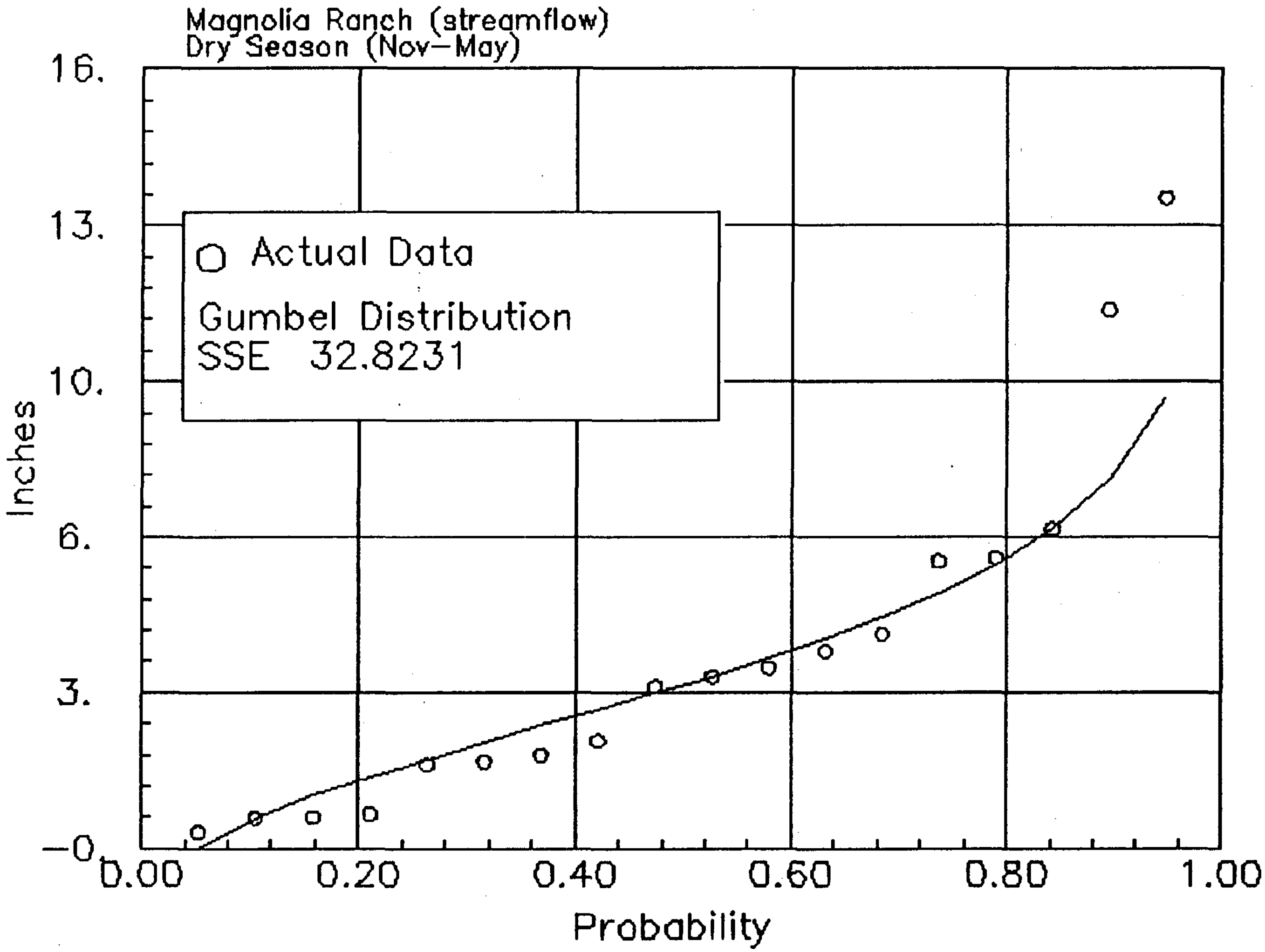


Figure H.2.4 Magnolia Ranch, Dry Season streamflow distribution for the years of (1973–1990)

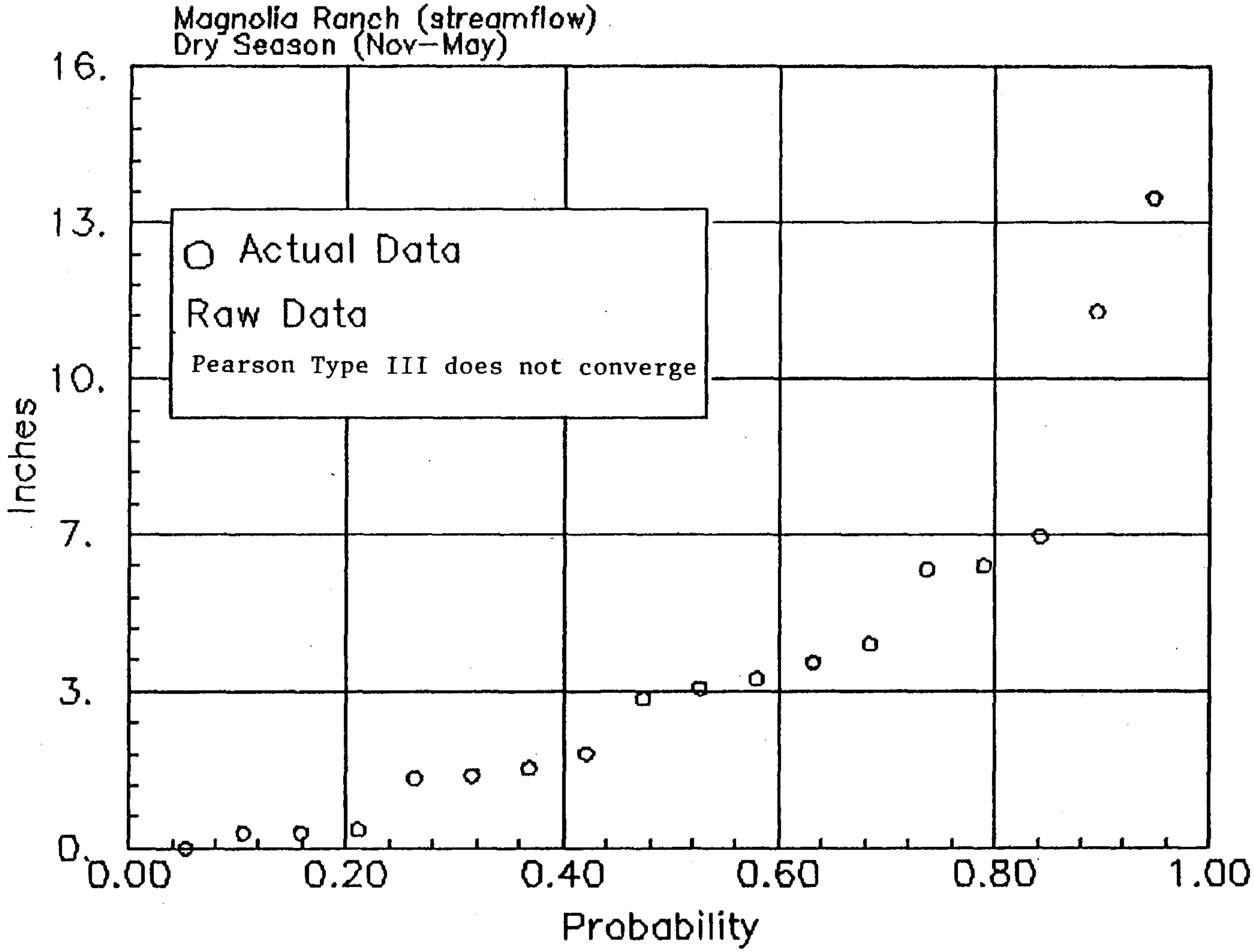


Figure H.2.5 Magnolia Ranch, Dry Season streamflow distribution for the years of (1973–1990)

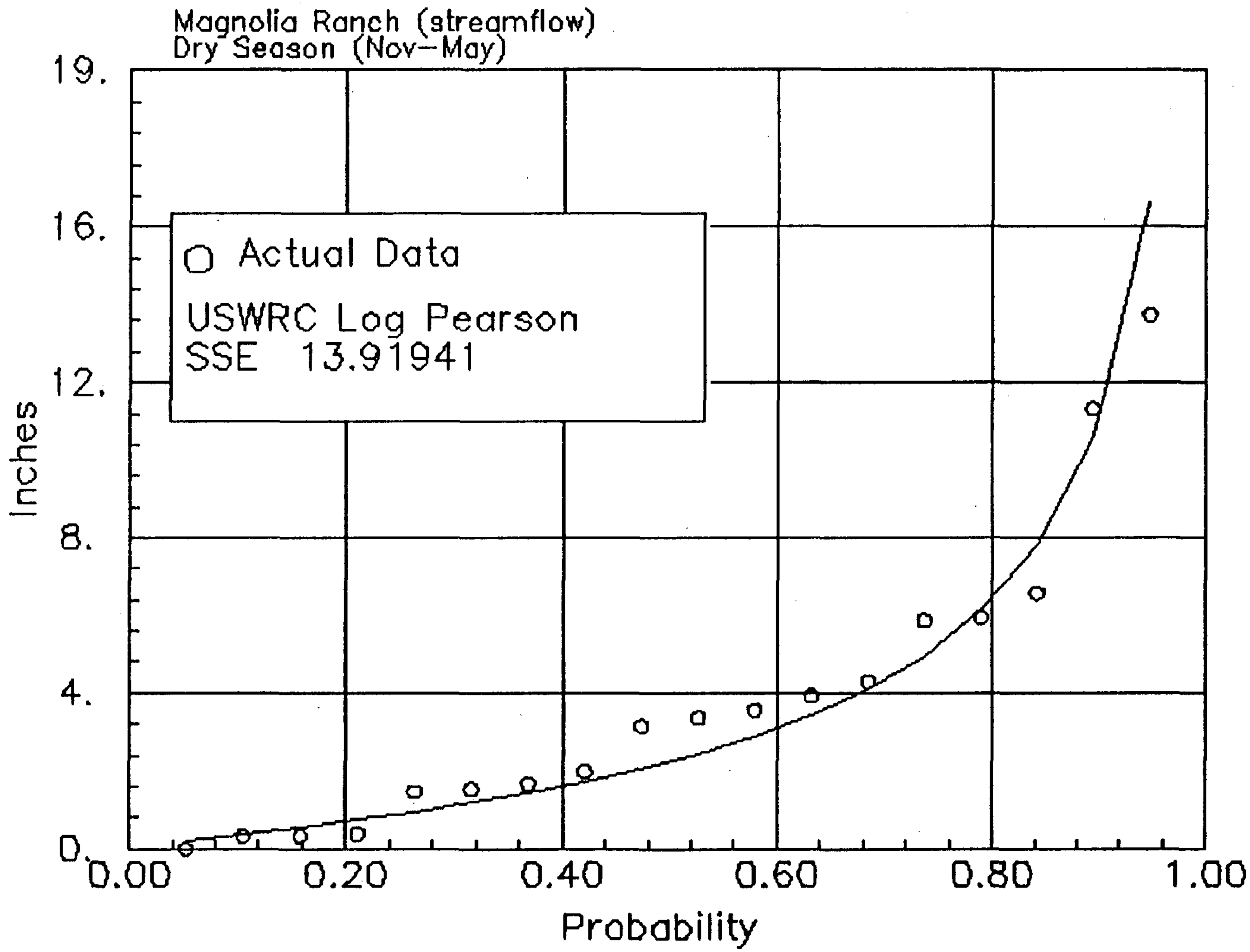


Figure H.2.6 Magnolia Ranch, Dry Season streamflow distribution for the years of (1973−1990)

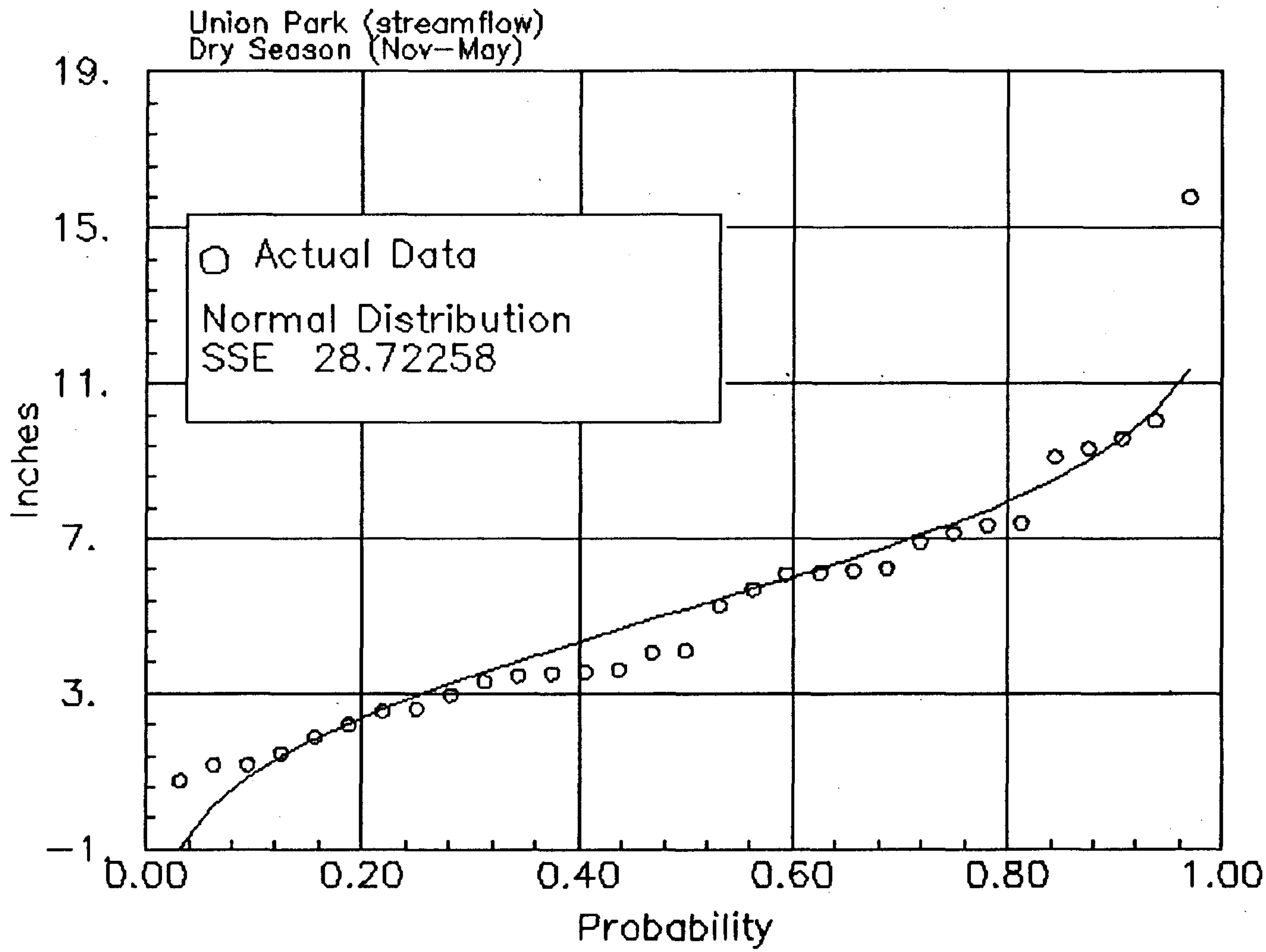


Figure H.3.1 Union Park, Dry Season streamflow distribution for the years of (1960–1990)

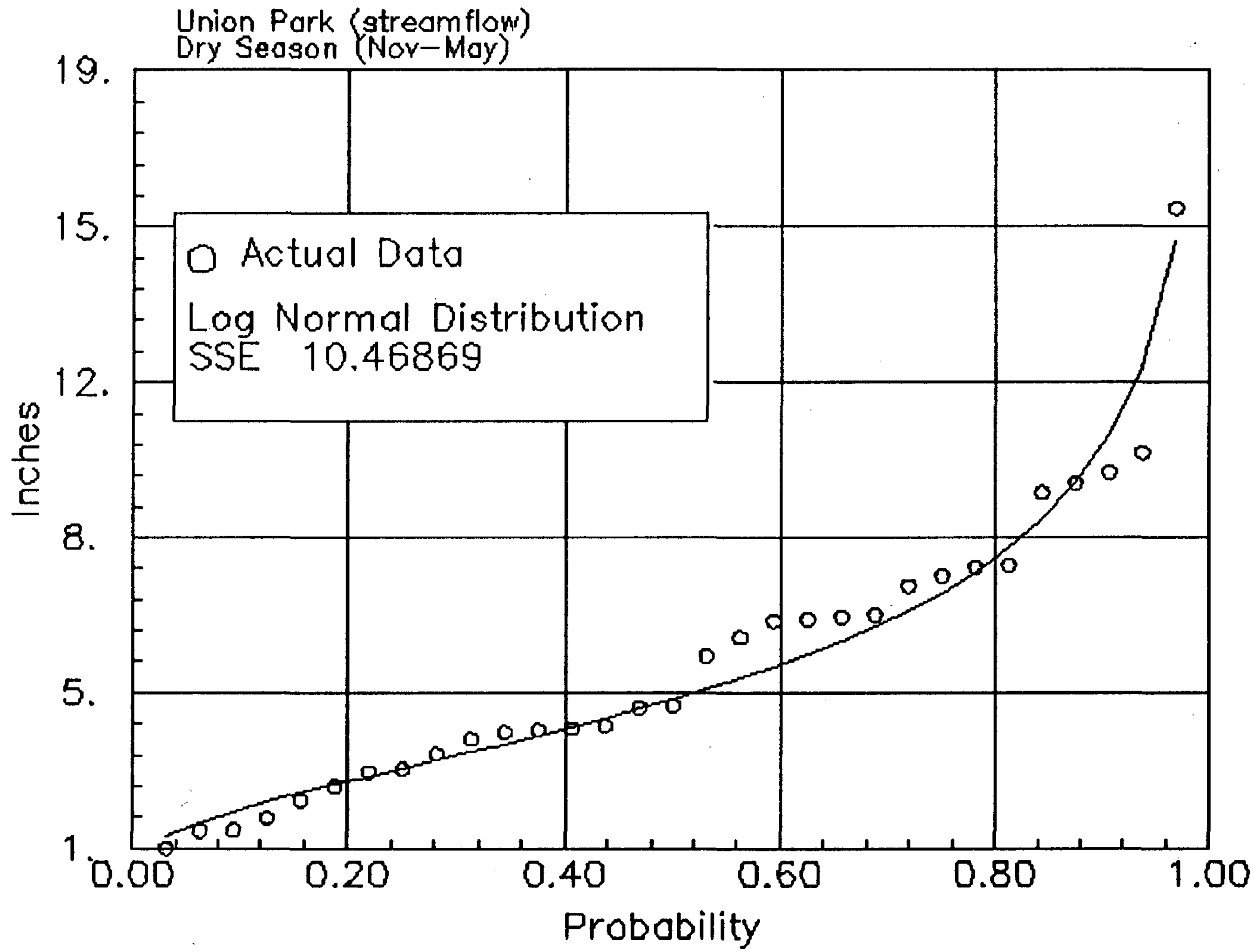


Figure H.3.2 Union Park, Dry Season streamflow distribution for the years of (1960–1990)

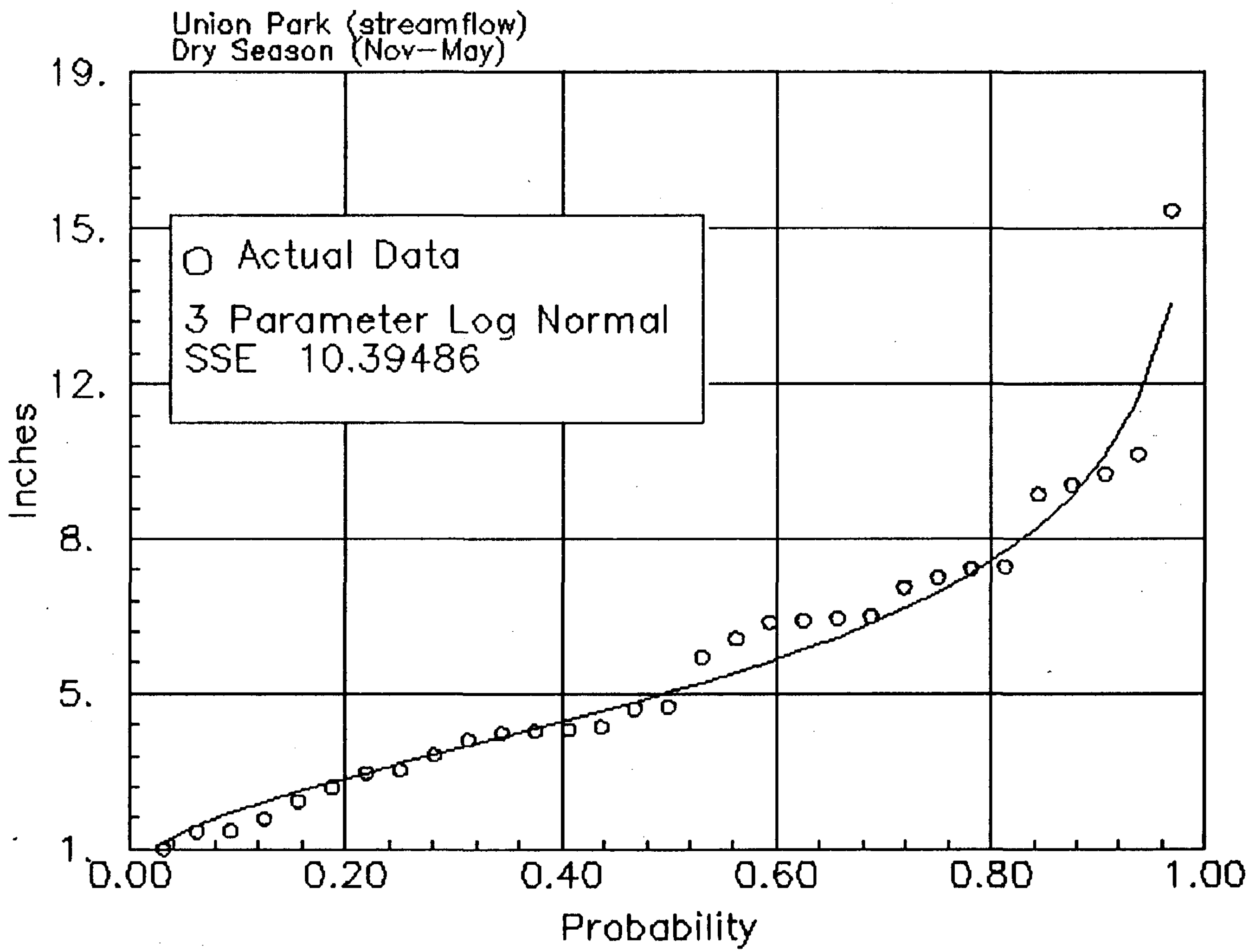


Figure H.3.3 Union Park, Dry Season streamflow distribution for the years of (1960–1990)

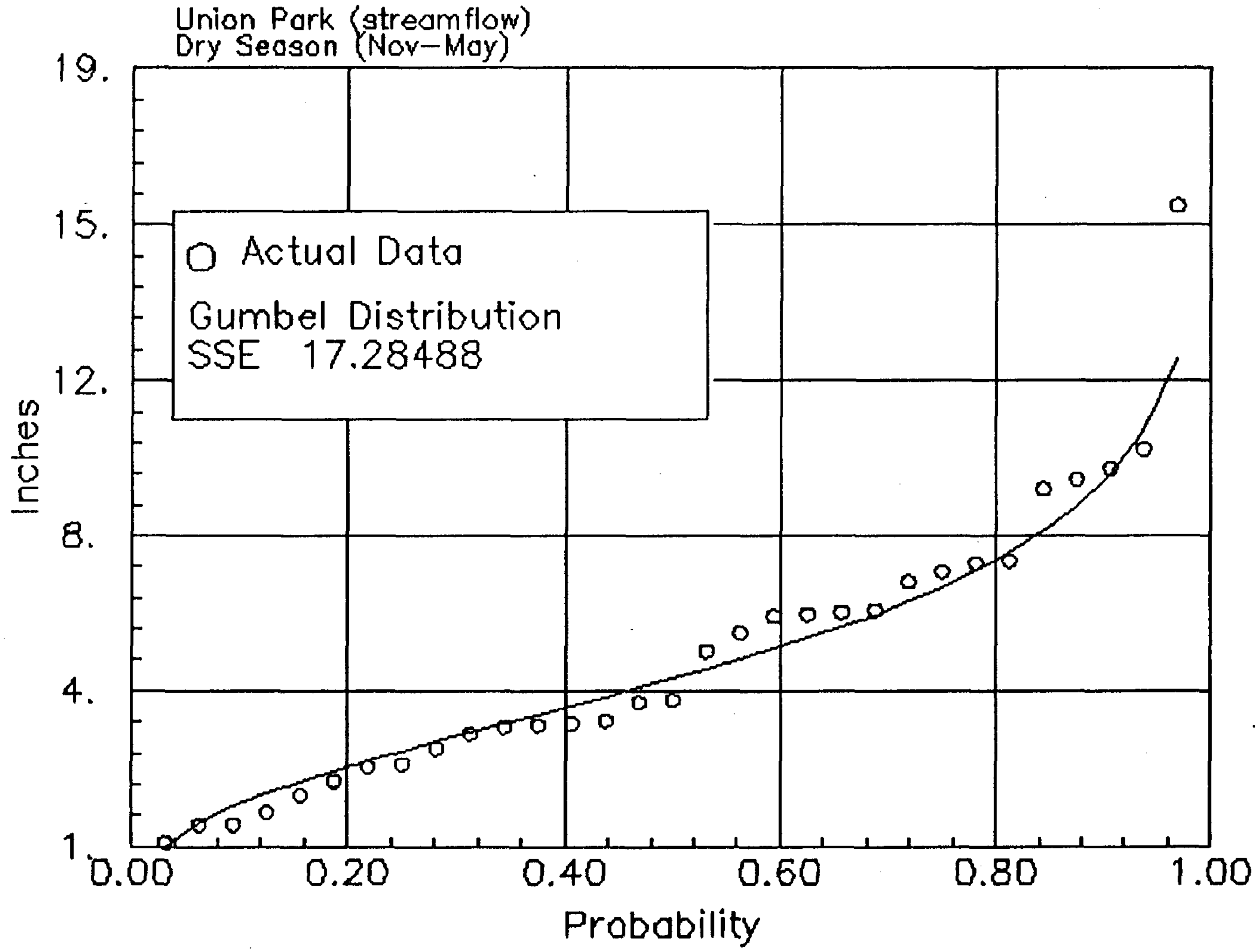


Figure H.3.4 Union Park, Dry Season streamflow distribution for the years of (1960–1990)

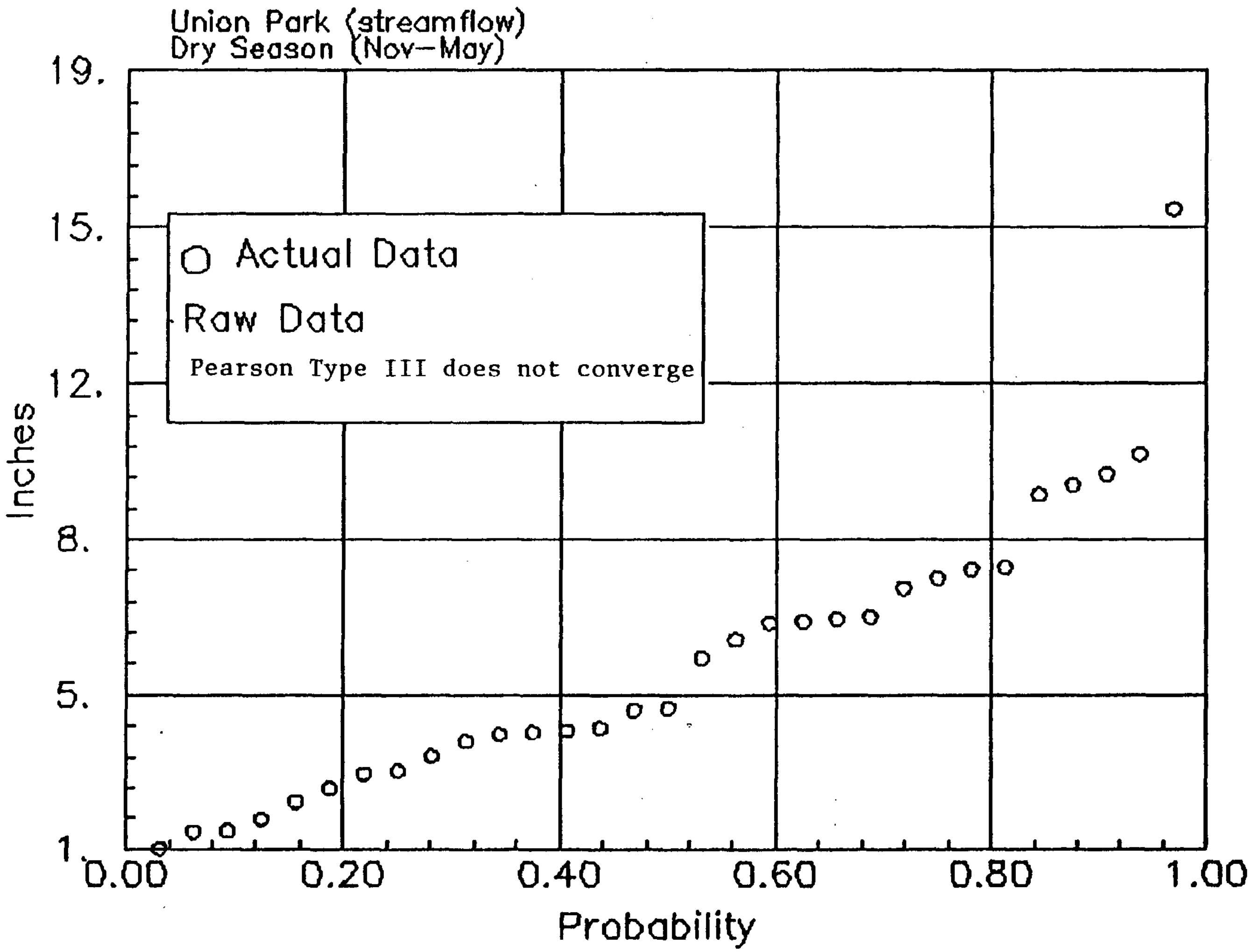


Figure H.3.5 Union Park, Dry Season streamflow distribution for the years of (1960–1990)

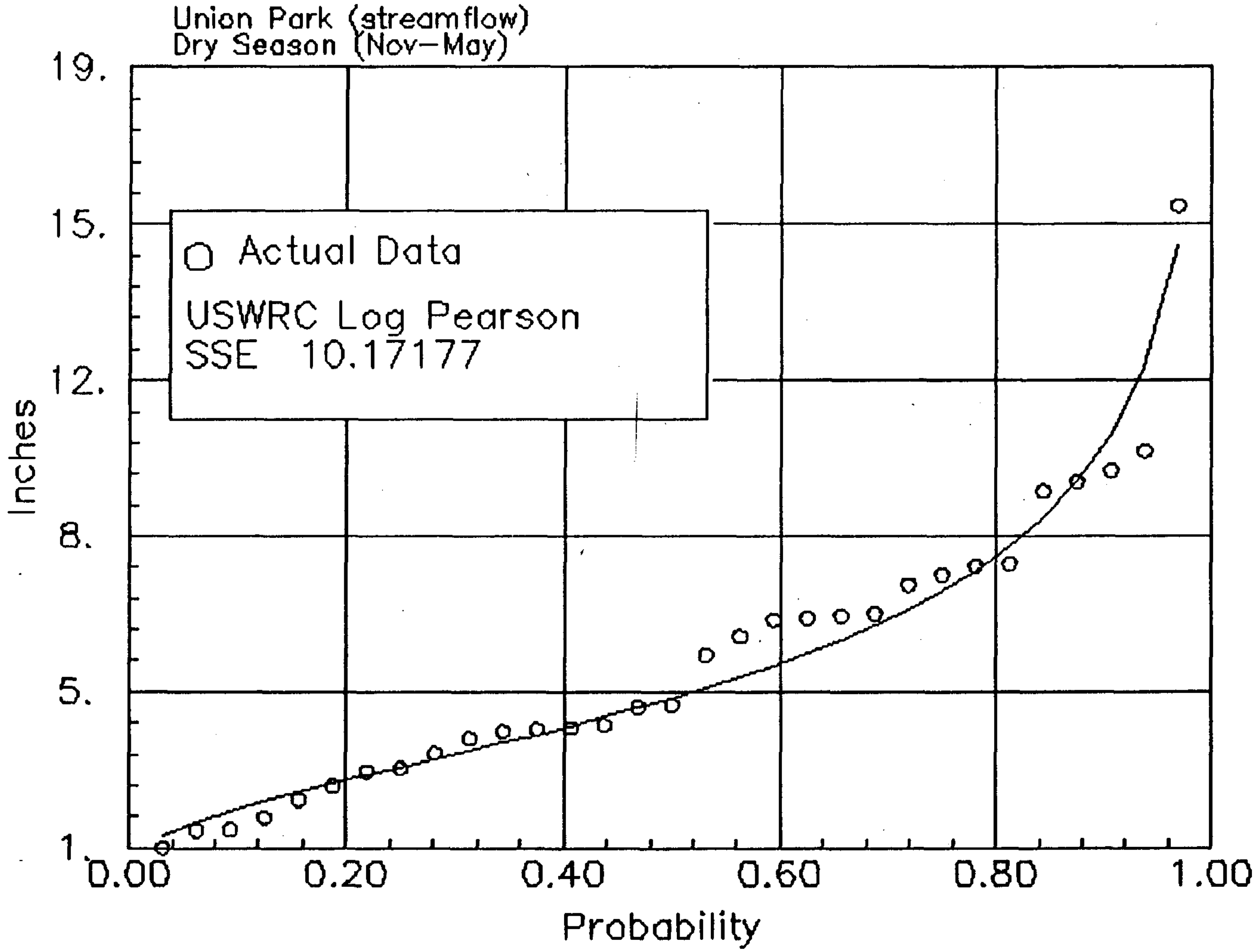


Figure H.3.6 Union Park, Dry Season streamflow distribution for the years of (1960–1990)

Table H.1 Statistical Comparisons For Dry Season Streamflow

Chuluota

Distribution	SSE	Rank	Standard Error	Rank	Kolmorgorv	Rank	Chi-Square	Rank	Graphical Rank
Normal Distribution	65.52	4	1.09	5	0.182	6	29.891	6	6
2 Parameter Log Normal	29.82	2	0.74	2	0.091	1	4.946	1	1
3 Parameter Log Normal	82.51	5	1.22	6	0.091	1	21.491	5	5
Gumbel	136.44	6	0.81	4	0.127	5	10.800	2	4
Pearson Type III	24.68	1	0.67	1	0.091	1	12.327	3	1
USWRC Log Pearson	30.60	3	0.75	3	0.091	1	12.327	3	1

Magnolia Ranch

Distribution	SSE	Rank	Standard Error	Rank	Kolmorgorv	Rank	Chi-Square	Rank	Graphical Rank
Normal Distribution	35.85	5	1.41	5	0.333	1	12.333	5	5
2 Parameter Log Normal	14.25	3	0.89	3	0.444	3	6.889	4	2
3 Parameter Log Normal	6.59	1	0.60	1	0.444	3	1.444	1	1
Gumbel	32.82	4	1.35	4	0.389	2	6.111	2	4
Pearson Type III	*****METHOD DOES NOT CONVERGE******								
USWRC Log Pearson	13.92	2	0.88	2	0.444	3	6.111	2	2

Union Park

Distribution	SSE	Rank	Standard Error	Rank	Kolmorgorv	Rank	Chi-Square	Rank	Graphical Rank
Normal Distribution	28.72	5	0.96	5	0.161	1	3.548	3	4
2 Parameter Log Normal	10.47	3	0.58	2	0.161	1	3.097	1	1
3 Parameter Log Normal	10.39	2	0.58	2	0.161	1	6.710	5	3
Gumbel	17.28	4	0.75	4	0.161	1	4.452	4	4
Pearson Type III	******METHOD DOES NOT CONVERGE******								
USWRC Log Pearson	10.17	1	0.57	1	0.161	1	3.097	1	1

APPENDIX I

HYDROLOGIC BUDGET DATA

TABLE I.1

HYDROLOGIC MASS BALANCE
ON THE
ECONLOCKHATCHEE RIVER AT CHULUOTA

Da = SURFICIAL DISCHARGE
S1 = INITIAL STORAGE VOLUME
S2 = FINAL STORAGE VOLUME
DWT = DEPTH TO WATER TABLE

P = RAINFALL
W.W. = WASTEWATER INPUTS
G.W.T. = GROUND WATER TABLE
ET(fit) = FROM REGRESSION EQUATION

DRAINAGE AREA = 241 Square Miles

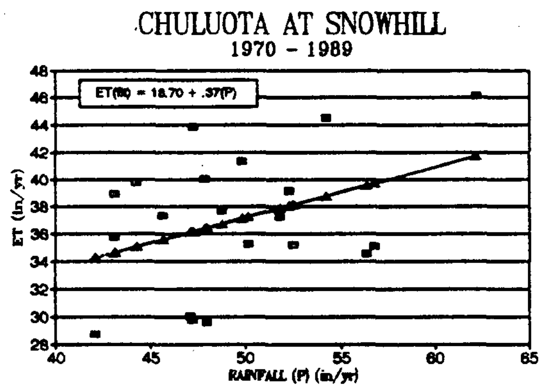
SURFACE ELEVATION 63.14

ETcal = -(S2-S1) + P - Da + WW

STORAGE CALCULATED FROM SPEIR'S EQUATION

CHULUOTA AT SNOWHILL

DATE	P (in/yr)	Da (cfs)	Da (in/yr)	W.W. (MGD)	W.W. (in/yr)	G.W.T. (ft)	DWT (ft)	STORAGE (in)	CHANGE STORAGE	ETcal (in/yr)	ET(fit) (in/yr)
1970	42.09	177.54	10.00			62.17	0.97	0.77	3.36	28.73	34.26
1971	47.24	126.05	7.10			59.86	3.28	4.13	-3.73	43.87	36.17
1972	54.21	162.45	9.15			62.54	0.60	0.40	0.56	44.50	38.75
1973	52.29	220.15	12.40			62.02	1.12	0.96	0.72	39.17	38.04
1974	47.96	314.07	17.69			61.49	1.65	1.68	0.72	29.55	36.43
1975	47.84	159.08	8.96			60.98	2.16	2.40	-1.17	40.05	36.39
1976	48.74	218.02	12.28			61.82	1.32	1.23	-1.21	37.67	36.72
1977	43.07	112.92	6.36			63.11	0.03	0.02	0.93	35.78	34.63
1978	50.14	243.05	13.69			62.03	1.11	0.95	1.22	35.23	37.24
1979	51.80	268.44	15.12			61.13	2.01	2.17	-0.56	37.24	37.85
1980	43.12	83.27	4.69			61.54	1.60	1.61	-0.53	38.96	34.64
1981	44.26	86.11	4.85			61.93	1.21	1.08	-0.40	39.81	35.07
1982	56.35	368.93	20.78			62.26	0.88	0.68	1.05	34.52	39.54
1983	62.21	338.21	19.05	19.02	1.66	61.45	1.69	1.73	-1.38	46.20	41.70
1984	47.07	310.87	17.51	21.89	1.91	62.59	0.55	0.35	1.42	30.05	36.11
1985	47.19	314.96	17.74	24.58	2.14	61.42	1.72	1.77	1.82	29.77	36.15
1986	49.83	248.38	13.99	24.06	2.10	60.21	2.93	3.59	-3.47	41.40	37.13
1987	56.79	387.04	21.80	20.84	1.82	62.93	0.21	0.13	1.67	35.13	39.70
1988	52.49	333.07	18.76	11.21	0.98	61.40	1.74	1.80	-0.50	35.21	38.11
1989	45.66	183.04	10.31	8.23	0.72	61.77	1.37	1.30	-1.30	37.37	35.58



Regression Output:

Constant		18.69906
Std Err of Y Est		4.752197
R Squared		0.145835
No. of Observations		20
Degrees of Freedom		18
X Coefficient(s)	0.369793	
Std Err of Coef.	0.210941	

TABLE I.2

HYDROLOGIC MASS BALANCE
ON THE
ECONLOCKHATCHEE RIVER FOR MAGNOLIA RANCH

Da = SURFICIAL DISCHARGE
S1 = INITIAL STORAGE VOLUME
S2 = FINAL STORAGE VOLUME
DWT = DEPTH TO WATERTABLE

P = RAINFALL
ET(fit) = FROM REGRESSION EQUATION
G.W.T. = GROUNDWATER TABLE

DRAINAGE AREA = 32.90 Square Miles

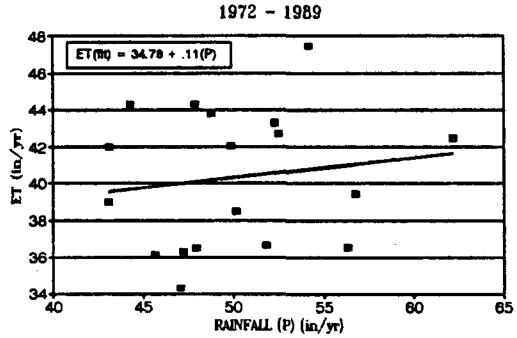
SURFACE ELEVATION 63.14

ETcal = -(S2-S1) + P - Da

MAGNOLIA RANCH

DATE	P (in/yr)	Da (cfs)	Da (in/yr)	G.W.T. (ft)	DWT (ft)	STORAGE (in)	CHANGE STORAGE	ETcal (in/yr)	ET(fit) (in/yr)
1972	54.21	15.00	6.19	62.54	0.60	0.40	0.56	47.46	40.78
1973	52.29	20.00	8.27	62.02	1.12	0.96	0.72	43.30	40.57
1974	47.96	26.00	10.73	61.49	1.65	1.68	0.72	36.51	40.09
1975	47.84	11.40	4.70	60.98	2.16	2.40	-1.17	44.30	40.08
1976	48.74	14.90	6.16	61.82	1.32	1.23	-1.21	43.79	40.18
1977	43.07	7.66	3.15	63.11	0.03	0.02	0.93	38.99	39.55
1978	50.14	25.30	10.43	62.03	1.11	0.95	1.22	38.49	40.33
1979	51.80	38.00	15.70	61.13	2.01	2.17	-0.56	36.66	40.52
1980	43.12	4.02	1.65	61.54	1.60	1.61	-0.53	42.00	39.56
1981	44.26	0.87	0.36	61.93	1.21	1.08	-0.40	44.30	39.68
1982	56.35	45.40	18.76	62.26	0.88	0.68	1.05	36.54	41.02
1983	62.21	51.10	21.11	61.45	1.69	1.73	-1.38	42.48	41.67
1984	47.07	27.30	11.31	62.59	0.55	0.35	1.42	34.34	39.99
1985	47.19	22.00	9.08	61.42	1.72	1.77	1.82	36.29	40.01
1986	49.83	27.20	11.22	60.21	2.93	3.59	-3.47	42.08	40.30
1987	56.79	38.00	15.66	62.93	0.21	0.13	1.67	39.46	41.07
1988	52.49	24.80	10.26	61.40	1.74	1.80	-0.50	42.73	40.59
1989	45.66	26.30	10.84	61.77	1.37	1.30	-1.30	36.12	39.84

MAGNOLIA RANCH
1972 - 1989



Regression Output:

Constant		34.7808081
Std Err of Y Est		3.81089598
R Squared		0.02279545
No. of Observations		18
Degrees of Freedom		16
X Coefficient(s)	0.11074723	
Std Err of Coef.	0.1812765	

TABLE I.3

HYDROLOGIC MASS BALANCE
ON THE
ECONLOCKHATCHEE RIVER AT UNION PARK

Da = SURFICIAL DISCHARGE
S1 = INITIAL STORAGE VOLUME
S2 = FINAL STORAGE VOLUME
DWT = DEPTH TO WATERTABLE

P = RAINFALL
GWT = GROUNDWATER TABLE
ET(fit) = FROM REGRESSION EQUATION

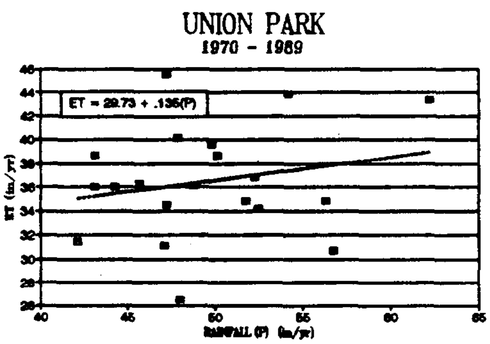
DRAINAGE AREA = 27.1 Square Miles

SURFACE ELEVATION 63.14

ETcal = -(S2-S1) + P - Da

UNION PARK

DATE	P (in/yr)	Da (cfs)	Da (in/yr)	G.W.T. (ft)	DWT (ft)	STORAGE (in)	CHANGE STORAGE	ET (in/yr)	ET(fit) (in/yr)
1970	42.09	14.51	7.27	62.17	0.97	0.77	3.36	31.46	35.05
1971	47.24	10.88	5.45	59.86	3.28	4.13	-3.73	45.52	36.04
1972	54.21	19.50	9.77	62.54	0.60	0.40	0.56	43.88	37.38
1973	52.29	29.45	14.75	62.02	1.12	0.96	0.72	36.82	37.01
1974	47.96	41.39	20.73	61.49	1.65	1.68	0.72	26.51	36.18
1975	47.84	17.59	8.81	60.98	2.16	2.40	-1.17	40.20	36.16
1976	48.74	27.59	13.82	61.82	1.32	1.23	-1.21	36.13	36.33
1977	43.07	12.24	6.13	63.11	0.03	0.02	0.93	36.01	35.24
1978	50.14	20.48	10.26	62.03	1.11	0.95	1.22	38.66	36.60
1979	51.80	34.96	17.51	61.13	2.01	2.17	-0.56	34.85	36.92
1980	43.12	10.00	5.01	61.54	1.60	1.61	-0.53	38.64	35.25
1981	44.26	17.21	8.62	61.93	1.21	1.08	-0.40	36.04	35.47
1982	56.35	40.87	20.47	62.26	0.88	0.68	1.05	34.83	37.79
1983	62.21	40.41	20.24	61.45	1.69	1.73	-1.38	43.35	38.92
1984	47.07	28.95	14.50	62.59	0.55	0.35	1.42	31.15	36.01
1985	47.19	21.66	10.85	61.42	1.72	1.77	1.82	34.52	36.03
1986	49.83	27.45	13.75	60.21	2.93	3.59	-3.47	39.55	36.54
1987	56.79	48.75	24.42	62.93	0.21	0.13	1.67	30.70	37.88
1988	52.49	37.53	18.80	61.40	1.74	1.80	-0.50	34.19	37.05
1989	45.66	21.26	10.65	61.77	1.37	1.30	-1.30	36.31	35.74



Regression Output:

Constant		26.96199
Std Err of Y Est		4.715116
R Squared		0.044765
No. of Observations		20
Degrees of Freedom		18
X Coefficient(s)	0.1922256	
Std Err of Coef.	0.2092952	

TABLE I.4

HYDROLOGIC MASS BALANCE
ON THE
ECONLOCKHATCHEE RIVER AT CHULUOTA

D = SURFICIAL DISCHARGE
Dc = CALCULATED DISCHARGE BY MASS BALANCE
Da = MEASURED STREAMFLOW
D FIT = DWT*(-1.485) + 15.04
DRAINAGE AREA = 241 Square Miles

GWT = GROUND WATER TABLE
DWT = DEPTH TO WATER TABLE
P = RAINFALL
ET = EVAPOTRANSPIRATION
W.W. = WASTEWATER INPUTS

SURFACE ELEVATION 63.14
S1 = INITIAL STORAGE VOLUME
S2 = FINAL STORAGE VOLUME

FRACTION NONHERBACEOUS (C) 0.59
FRACTION IMPERVIOUS 0

STORAGE = SPEIR'S
Dc = P - (S2-S1) - ETmax + W.W.

ETcal = P + W.W. - Da - (S2-S1)
ETmax = 2.14(1-C)P^.657 + 4.53C^1.76*P^.68

CHULUOTA AT SNOWHILL

DATE	P (in/yr)	Da (cfs)	Da (in/yr)	Dc (in/yr)	D FIT	Da-Dc	W.W. (MGD)	W.W. (in/yr)	G.W.T. (ft)	DWT (ft)	STORAGE (in)	CHANGE STORAGE	ETmax (in/yr)	ETcal (in/yr)
1970	42.09	177.54	10.00	12.45	13.60	-2.45			62.17	0.97	0.77	3.36	33.00	28.73
1971	47.24	126.05	7.10	7.84	10.17	-0.74			59.86	3.28	4.13	-3.73	35.67	43.87
1972	54.21	162.45	9.15	15.64	14.15	-6.49			62.54	0.60	0.40	0.56	39.13	44.50
1973	52.29	220.15	12.40	14.81	13.37	-2.41			62.02	1.12	0.96	0.72	38.19	39.17
1974	47.96	314.07	17.69	12.65	12.59	5.04			61.49	1.65	1.68	0.72	36.03	29.55
1975	47.84	159.08	8.96	10.70	11.83	-1.74			60.98	2.16	2.40	-1.17	35.97	40.05
1976	48.74	218.02	12.28	11.10	13.08	1.18			61.82	1.32	1.23	-1.21	36.43	37.67
1977	43.07	112.92	6.36	10.48	14.99	-4.12			63.11	0.03	0.02	0.93	33.52	35.78
1978	50.14	243.05	13.69	14.23	13.39	-0.54			62.03	1.11	0.95	1.22	37.13	35.23
1979	51.80	268.44	15.12	13.29	12.05	1.83			61.13	2.01	2.17	-0.56	37.95	37.24
1980	43.12	83.27	4.69	9.05	12.66	-4.36			61.54	1.60	1.61	-0.53	33.54	38.96
1981	44.26	86.11	4.85	9.72	13.24	-4.87			61.93	1.21	1.08	-0.40	34.14	39.81
1982	56.35	368.93	20.78	17.24	13.73	3.54			62.26	0.88	0.68	1.05	40.16	34.52
1983	62.21	338.21	19.05	19.56	12.53	-0.51	19.02	1.66	61.45	1.69	1.73	-1.38	42.93	46.20
1984	47.07	310.87	17.51	14.82	14.22	2.69	21.89	1.91	62.59	0.55	0.35	1.42	35.58	30.05
1985	51.10	314.96	17.74	17.46	12.48	0.28	24.58	2.14	61.42	1.72	1.77	1.82	37.60	33.68
1986	45.03	248.38	13.99	9.12	10.69	4.87	24.06	2.10	60.21	2.93	3.59	-3.47	34.54	36.60
1987	47.06	387.04	21.80	14.97	14.73	6.83	20.84	1.82	62.93	0.21	0.13	1.67	35.58	25.40
1988	52.71	333.07	18.76	14.79	12.45	3.97	11.21	0.98	61.40	1.74	1.80	-0.50	38.40	35.43
1989	43.16	183.04	10.31	9.01	13.00	1.30	8.23	0.72	61.77	1.37	1.30	-1.30	33.57	34.87
MEAN	48.87	232.78	13.11	12.95	12.95		18.55	1.62					36.45	36.37
STD DEV	4.98	92.33	5.20	3.18	1.18		5.90	0.51					2.48	5.21
SUM	977.45	4655.64	262.23	258.94	258.94	3.29	129.83	11.32					729.06	727.31

TABLE I.5

HYDROLOGIC MASS BALANCE
ON THE
ECONLOCKHATCHEE RIVER AT MAGNOLIA RANCH

D = SURFICIAL DISCHARGE
Dc = CALCULATED DISCHARGE BY MASS BALANCE
Da = MEASURED STREAMFLOW
D FIT = DWT*(-1.23) + 10.67
DRAINAGE AREA = 32.90 Square Miles

GWT = GROUND WATER TABLE
DWT = DEPTH OF WATER TABLE
P = RAIN FALL
ET = EVAPOTRANSPIRATION

SURFACE ELEVATION 63.14
S1 = INITIAL STORAGE VOLUME
S2 = FINAL STORAGE VOLUME

FRACTION NONHERBACEOUS (C) 0.65
FRACTION IMPERVIOUS 0

STORAGE = SPEIR'S
Dc = P - (S2-S1) - ETmax

ETcal = P - Da - (S2-S1)
ETmax = 2.14(1-C)P^.657 + 4.53C^1.76*P^.68

MAGNOLIA RANCH

DATE	P (in/yr)	Da (cfs)	Da (in/yr)	Dc (in/yr)	D FIT	Da-Dc	G.W.T. (ft)	DWT (ft)	STORAGE (in)	CHANGE STORAGE	E.T.max (in/yr)	E.T.cal (in/yr)
1972	54.21	15.00	6.19	12.39	9.94	-6.20	62.54	0.60	0.40	0.56	42.38	47.06
1973	52.29	20.00	8.27	11.64	9.30	-3.37	62.02	1.12	0.96	0.72	41.37	42.34
1974	47.96	26.00	10.73	9.66	8.65	1.07	61.49	1.65	1.68	0.72	39.02	34.83
1975	47.84	11.40	4.70	7.72	8.02	-3.02	60.98	2.16	2.40	-1.17	38.96	41.91
1976	48.74	14.90	6.16	8.08	9.05	-1.92	61.82	1.32	1.23	-1.21	39.45	42.56
1977	43.07	7.66	3.15	7.71	10.64	-4.56	63.11	0.03	0.02	0.93	36.29	38.97
1978	50.14	25.30	10.43	11.15	9.31	-0.72	62.03	1.11	0.95	1.22	40.21	37.54
1979	51.80	38.00	15.70	10.14	8.20	5.56	61.13	2.01	2.17	-0.56	41.10	34.49
1980	43.12	4.02	1.65	6.27	8.71	-4.62	61.54	1.60	1.61	-0.53	36.32	40.39
1981	44.26	0.87	0.36	6.89	9.19	-6.53	61.93	1.21	1.08	-0.40	36.97	43.22
1982	56.35	45.40	18.76	13.90	9.59	4.86	62.26	0.88	0.68	1.05	43.51	35.86
1983	62.21	51.10	21.11	14.32	8.60	6.79	61.45	1.69	1.73	-1.38	46.51	40.75
1984	47.07	27.30	11.31	9.96	10.00	1.35	62.59	0.55	0.35	1.42	38.53	33.99
1985	51.10	22.00	9.08	12.19	8.56	-3.11	61.42	1.72	1.77	1.82	40.73	38.43
1986	45.03	27.20	11.22	4.16	7.07	7.06	60.21	2.93	3.59	-3.47	37.40	33.68
1987	47.06	38.00	15.66	10.20	10.41	5.46	62.93	0.21	0.13	1.67	38.53	29.60
1988	52.71	24.80	10.26	10.62	8.54	-0.36	61.40	1.74	1.80	-0.50	41.59	41.15
1989	43.16	26.30	10.84	5.52	8.99	5.32	61.77	1.37	1.30	-1.30	36.35	32.32
MEAN	49.34	23.63	9.75	9.58	9.04						39.73	38.28
STD DEV	4.97	13.25	5.47	2.77	0.86						2.67	4.42
SUM	888.12	425.25	175.58	172.49	162.75	3.09					715.23	689.10

TABLE I.6

HYDROLOGIC MASS BALANCE
ON THE
ECONLOCKHATCHEE RIVER AT UNION PARK

D = SURFICIAL DISCHARGE
Dc = CALCULATED DISCHARGE BY MASS BALANCE
Da = MEASURED STREAMFLOW
D FIT = DWT*(-1.54) + 16.38
DRAINAGE AREA = 27.1 Square Miles

GWT = GROUND WATER TABLE
DWT = DEPTH TO WATER TABLE
P = RAINFALL
ET = EVAPOTRANSPIRATION

SURFACE ELEVATION 63.14
S1 = INITIAL STORAGE VOLUME
S2 = FINAL STORAGE VOLUME

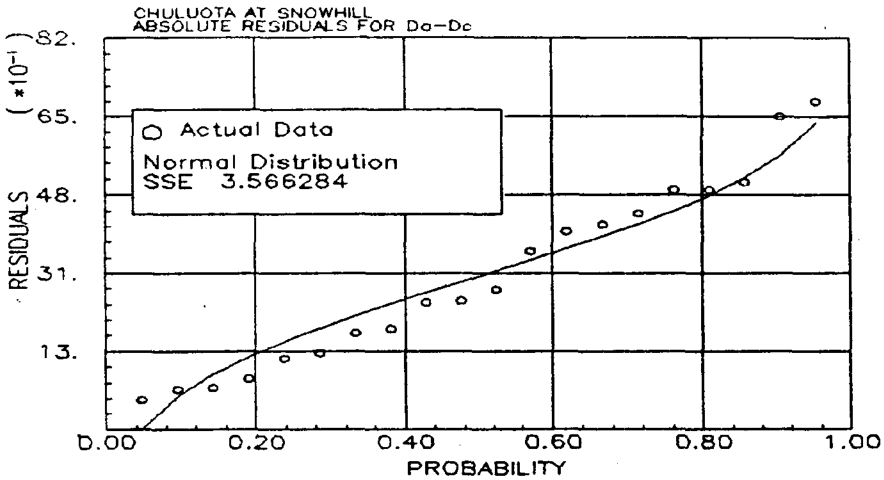
FRACTION NONHERBACEOUS (C) 0.58
FRACTION IMPERVIOUS 0

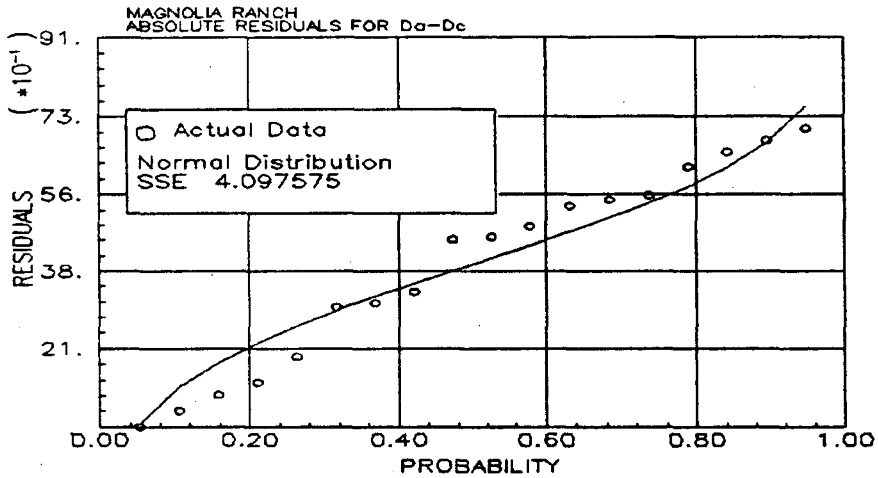
STORAGE = SPEIR'S
Dc = P - (S2-S1) - ETmax

ETcal = P - Da - (S2-S1)
ETmax = 2.14(1-C)P^.657 + 4.53C^1.76*P^.68

UNION PARK

DATE	P (in/yr)	Da (cfs)	Da (in/yr)	Dc (in/yr)	D FIT	Da-Dc	G.W.T. (ft)	DWT (ft)	STORAGE (in)	CHANGE STORAGE	ETmax (in/yr)	ETcal (in/yr)
1970	42.09	14.51	7.27	6.15	14.88	1.12	62.17	0.97	0.77	-3.36	32.58	31.46
1971	47.24	10.88	5.45	15.77	11.31	-10.32	59.86	3.28	4.13	3.73	35.21	45.52
1972	54.21	19.50	9.77	15.02	15.45	-5.25	62.54	0.60	0.40	-0.56	38.62	43.88
1973	52.29	29.45	14.75	13.88	14.65	0.87	62.02	1.12	0.96	-0.72	37.70	36.82
1974	47.96	41.39	20.73	11.67	13.83	9.06	61.49	1.65	1.68	-0.72	35.57	26.51
1975	47.84	17.59	8.81	13.50	13.04	-4.69	60.98	2.16	2.40	1.17	35.51	40.20
1976	48.74	27.59	13.82	14.00	14.34	-0.18	61.82	1.32	1.23	1.21	35.96	36.13
1977	43.07	12.24	6.13	9.05	16.33	-2.92	63.11	0.03	0.02	-0.93	33.09	36.01
1978	50.14	20.48	10.26	12.28	14.67	-2.02	62.03	1.11	0.95	-1.22	36.65	38.66
1979	51.80	34.96	17.51	14.90	13.28	2.61	61.13	2.01	2.17	0.56	37.46	34.85
1980	43.12	10.00	5.01	10.53	13.91	-5.52	61.54	1.60	1.61	0.53	33.11	38.64
1981	44.26	17.21	8.62	10.96	14.51	-2.34	61.93	1.21	1.08	0.40	33.70	36.04
1982	56.35	40.87	20.47	15.66	15.02	4.81	62.26	0.88	0.68	-1.05	39.64	34.83
1983	62.21	40.41	20.24	21.22	13.77	-0.98	61.45	1.69	1.73	1.38	42.37	43.35
1984	47.07	28.95	14.50	10.52	15.53	3.98	62.59	0.55	0.35	-1.42	35.12	31.15
1985	51.10	21.66	10.85	12.16	13.72	-1.31	61.42	1.72	1.77	-1.82	37.12	38.43
1986	45.03	27.45	13.75	14.40	11.85	-0.65	60.21	2.93	3.59	3.47	34.09	34.75
1987	47.06	48.75	24.42	10.27	16.06	14.15	62.93	0.21	0.13	-1.67	35.12	20.97
1988	52.71	37.53	18.80	15.31	13.69	3.49	61.40	1.74	1.80	0.50	37.90	34.41
1989	43.16	21.26	10.65	11.33	14.26	-0.68	61.77	1.37	1.30	1.30	33.13	33.81
MEAN	48.87	26.13	13.09	12.93	14.21						35.98	35.82
STD DEV	4.98	11.16	5.59	3.09	1.22						2.44	5.55
SUM	977.45	522.68	261.81	258.58	284.12	3.23					716.417	719.64





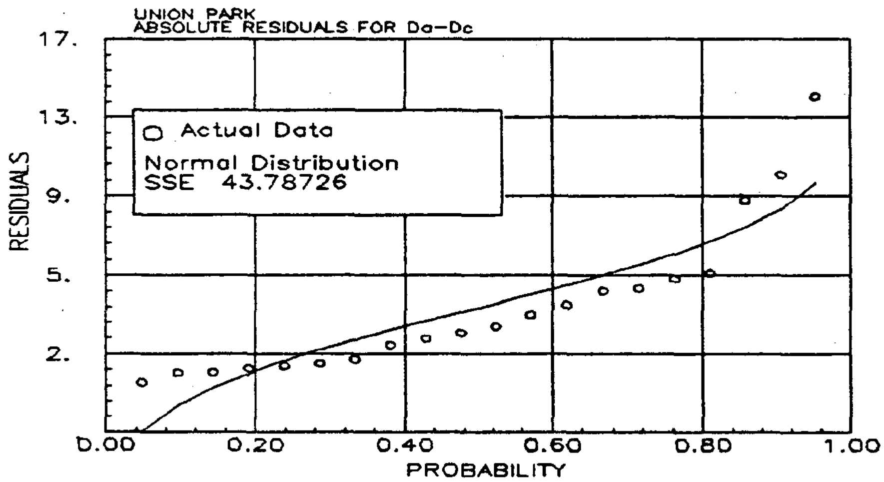
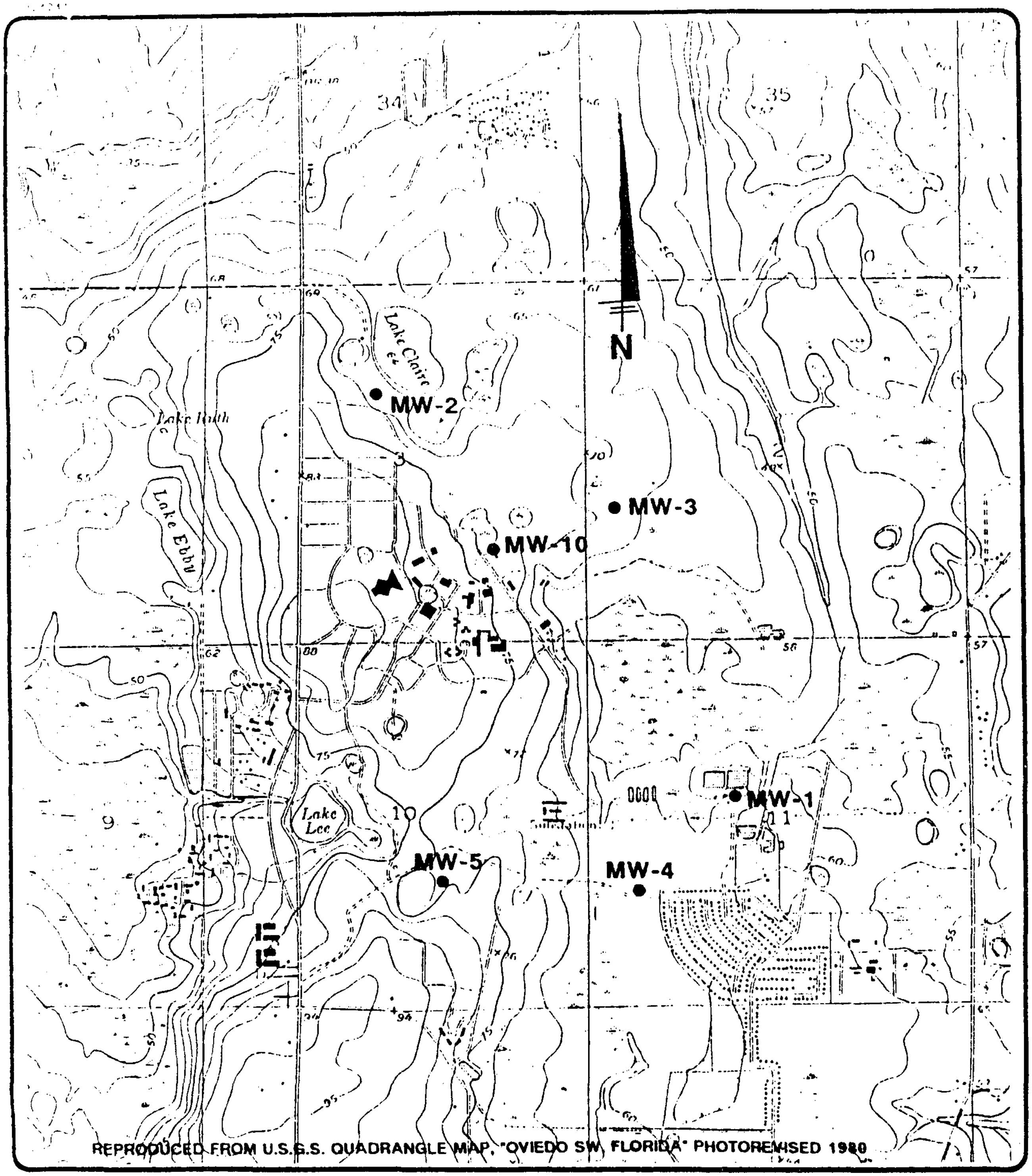


Figure I.1 Absolute Residual After Fitting A Normal Distribution

APPENDIX J

WELL INSTALLATION, SOILS, AND PERMEABILITY



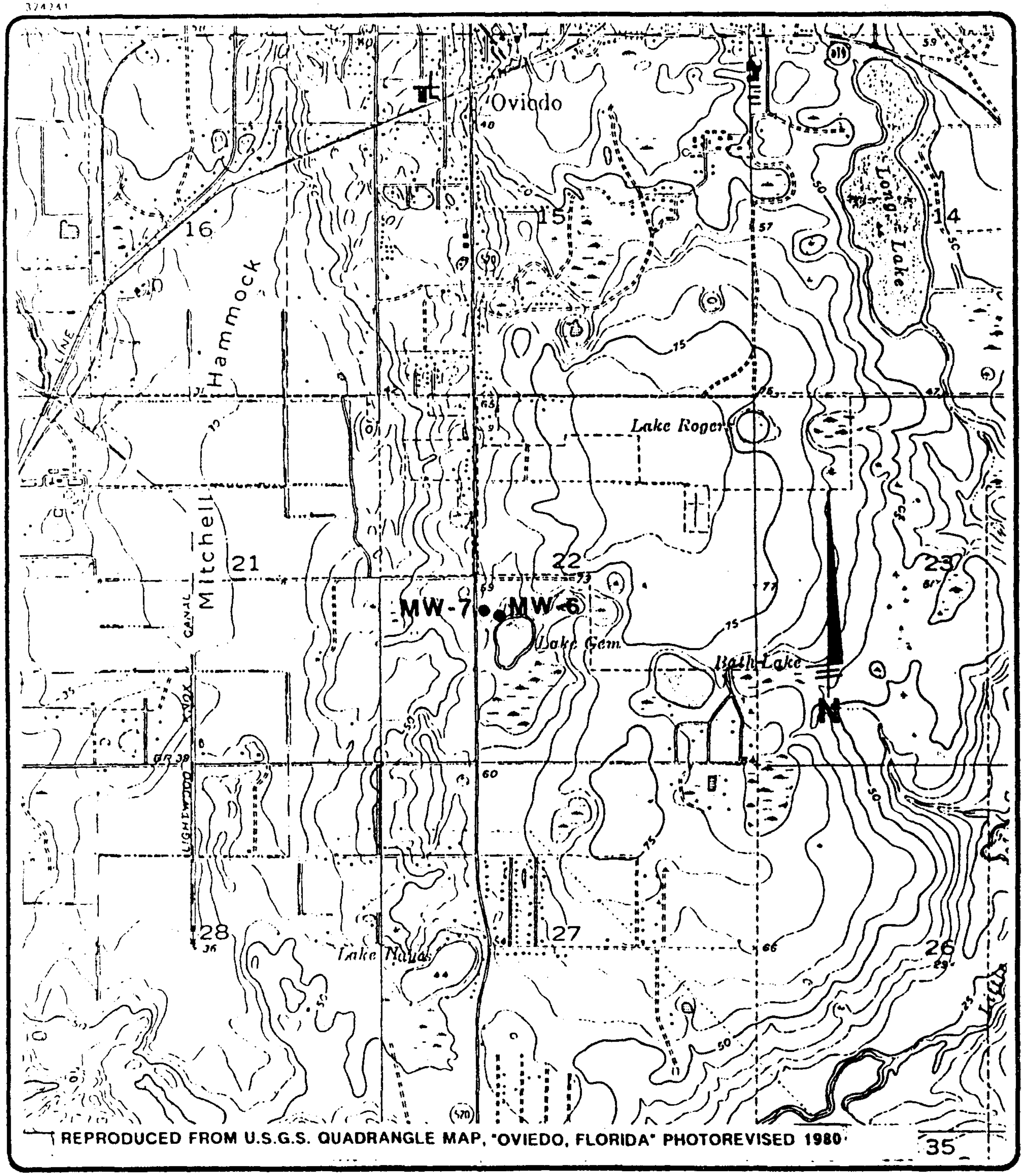
UNIVERSAL
ENGINEERING SCIENCES

MONITOR WELL INSTALLATIONS
ECONLOCKHATCHEE RIVER BASIN
ORANGE/SEMINOLE COUNTIES, FLORIDA

MONITOR WELL LOCATION MAP

DRAWN BY: R.K.S.	DATE: 6/21/91	CHECKED BY: J N	DATE: 6/24/91
SCALE: 1" = 2000'	ORDER NO: 15337-002-01	REPORT NO: 2257	PAGE NO: A-1

Figure J.1 Location of Wells 1-5 and 10



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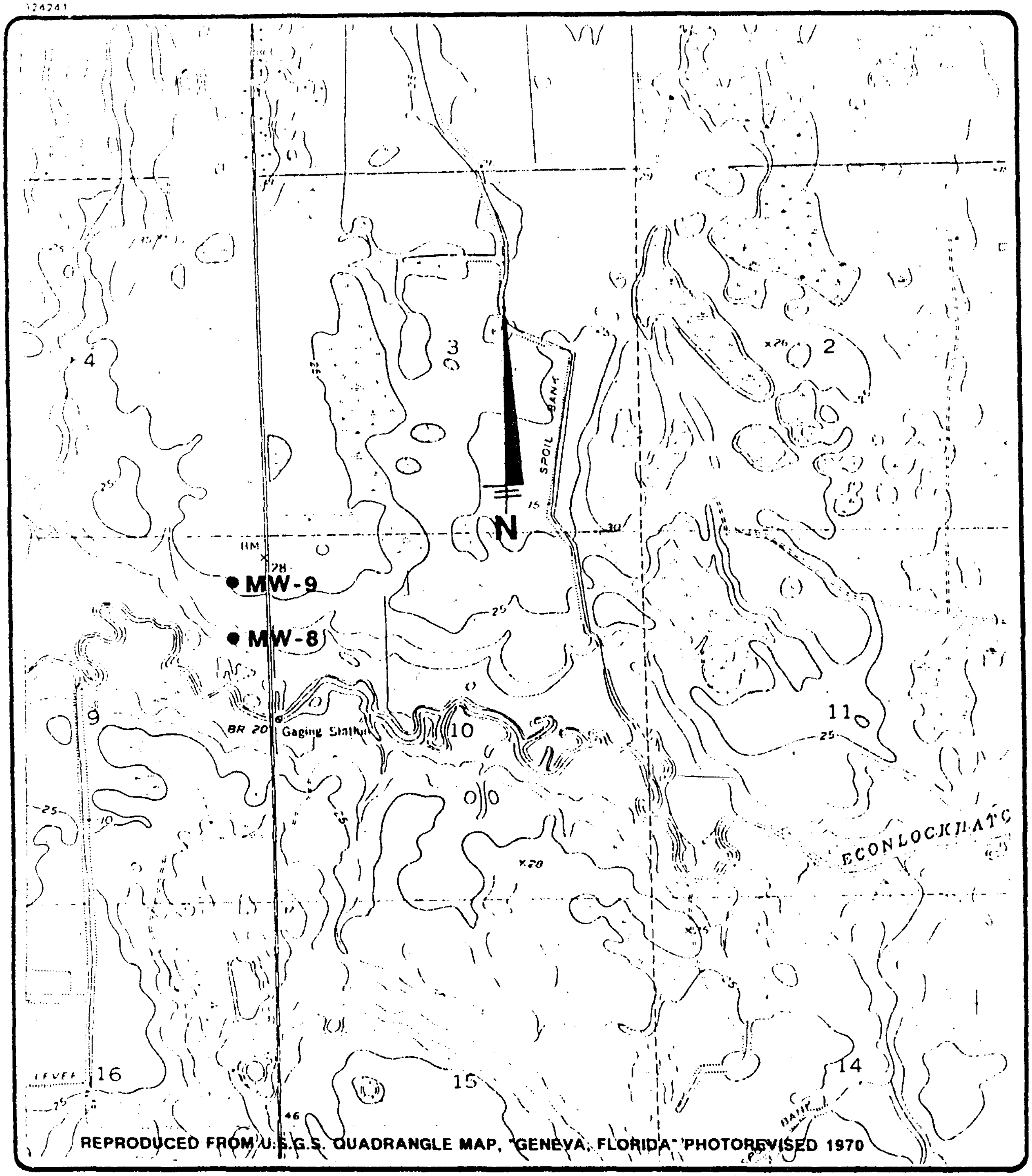
MONITOR WELL INSTALLATIONS
ECONLOCKHATCHEE RIVER BASIN
ORANGE/SEMINOLE COUNTIES, FLORIDA

MONITOR WELL LOCATION MAP

DRAWN BY: R.K.S.	DATE: 6/24/91	CHECKED BY: JN	DATE: 6/24/91
SCALE: 1" = 2000'	ORDER NO: 15337-002-01	REPORT NO: 2257	PAGE NO: A-2

Figure J.2 Location of Wells 6 and 7



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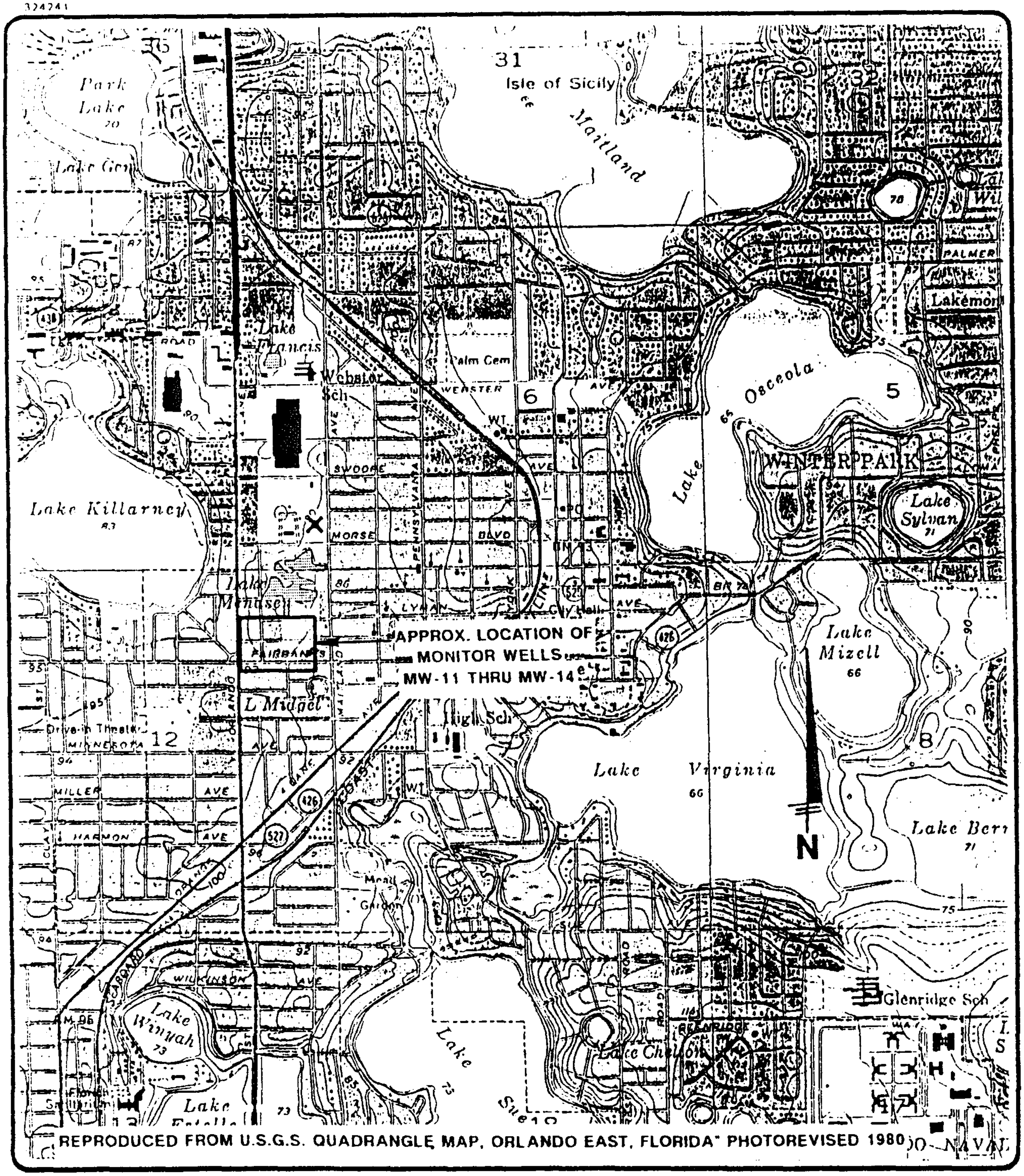
MONITOR WELL INSTALLATIONS
ECONLOCKHATCHEE RIVER BASIN
ORANGE/SEMINOLE COUNTIES, FLORIDA

MONITOR WELL LOCATION MAP

DRAWN BY:	R.K.S.	DATE:	6/21/91	CHECKED BY:	JN	DATE:	6/24/91
SCALE:	1" = 2000'	ORDER NO:	15337-002-01	REPORT NO:	2257	PAGE NO:	A-3

Figure J.3 Location of Wells 8 and 9



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MONITOR WELL INSTALLATIONS
ECONLOCKHATCHEE RIVER BASIN
ORANGE/SEMINOLE COUNTIES, FLORIDA

MONITOR WELL LOCATION MAP

DRAWN BY: R.K.S.	DATE: 6/24/91	CHECKED BY: JN	DATE: 6/24/91
SCALE: 1" = 2000'	ORDER NO: 15337-002-01	REPORT NO: 2257	PAGE NO: A-4

Figure J.4 Location of Wells 11 - 14

UNIVERSAL ENGINEERING SCIENCES WELL COMPLETION LOG	PROJECT NO.: 15337-002-01 REPORT NO.: 2257 PAGE NO: B-1

PROJECT: MONITOR WELL INSTALLATIONS, ECONLOCKHATCHEE RIVER BASIN

CLIENT: UNIVERSITY OF CENTRAL FLORIDA   DATE: 5/30-6/4/91

WELL NUMBER: MW-1, MW-2, MW-8, MW-9 & MW-10   LOCATION: SEE U.S.G.S. MONITOR WELL LOCATION MAP

INSTALLED BY: D. MEISTER

WELL DIAGRAM - NOT TO SCALE

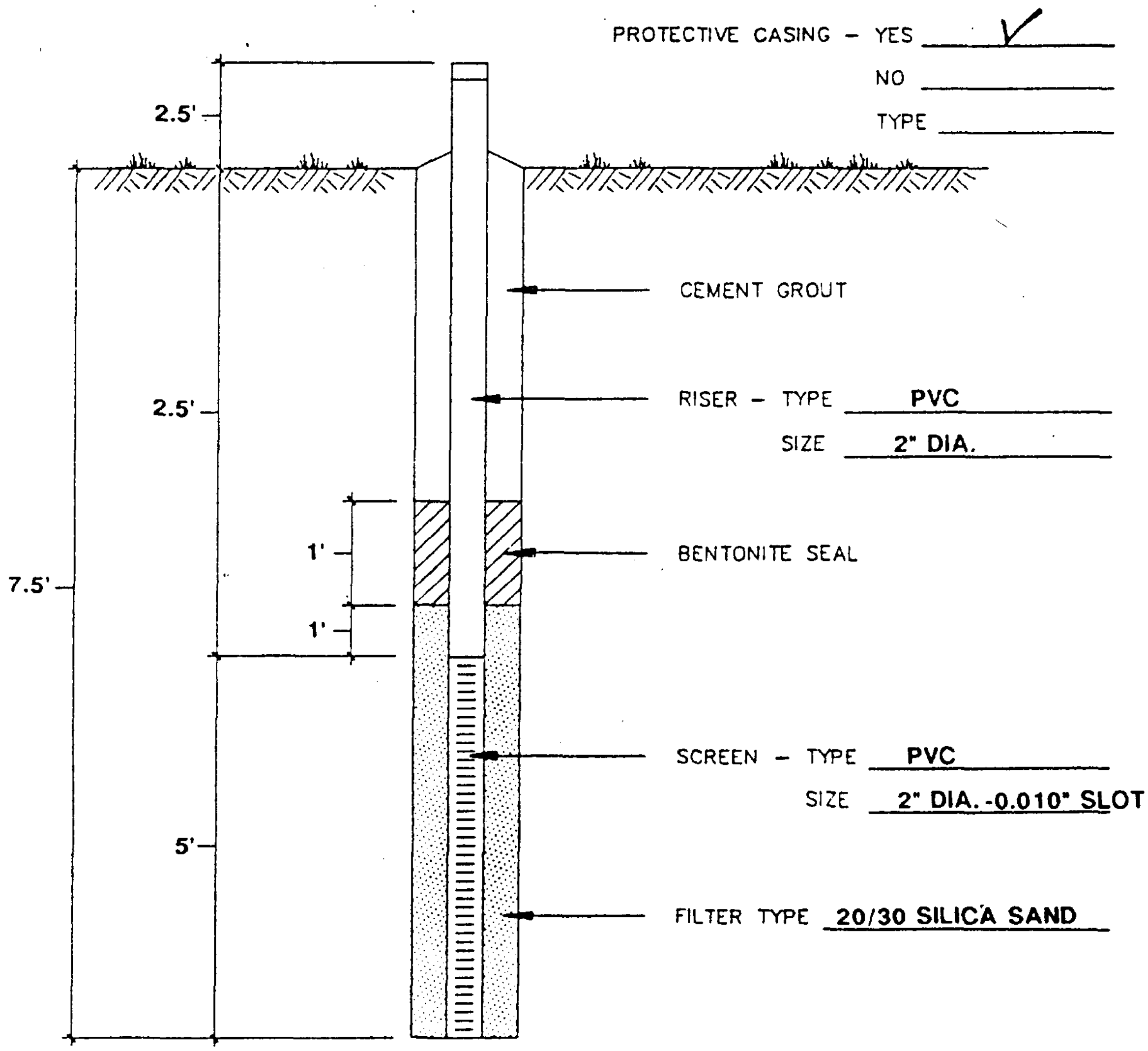


Figure J.5 Completion Log #1

UNIVERSAL ENGINEERING SCIENCES WELL COMPLETION LOG	PROJECT NO.: 15337-002-01
	REPORT NO.: 2257
	PAGE NO: B-2

PROJECT: MONITOR WELL INSTALLATIONS, ECONLOCKHATCHEE RIVER BASIN

CLIENT: UNIVERSITY OF CENTRAL FLORIDA DATE: 5/31-6/5/91

WELL NUMBER: MW-4, MW-6, MW-12, MW-13 & MW-14 LOCATION: SEE U.S.G.S. MONITOR WELL LOCATION MAP

INSTALLED BY: D. MEISTER

WELL DIAGRAM - NOT TO SCALE

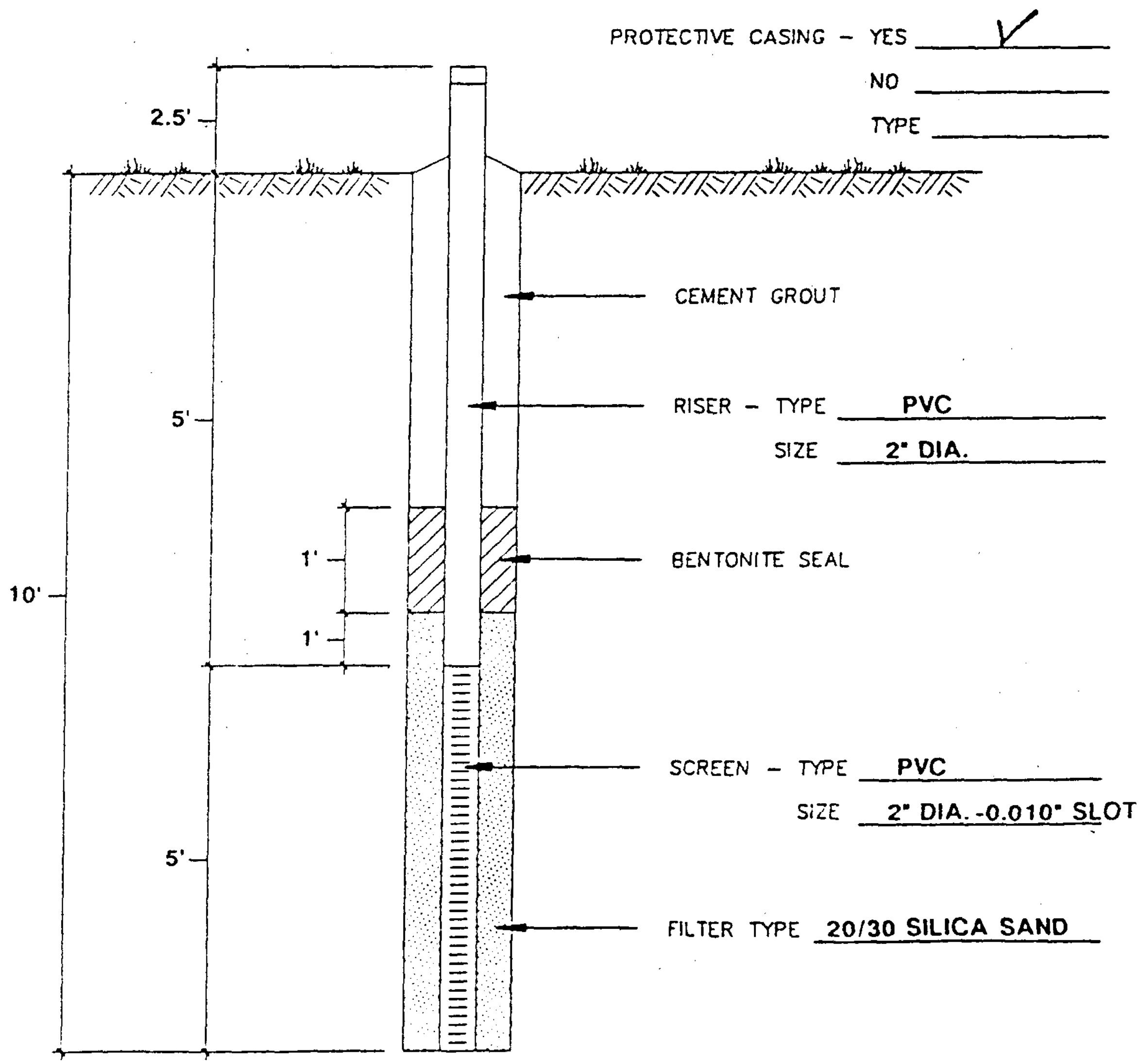


Figure J.6 Completion Log #2

UNIVERSAL ENGINEERING SCIENCES WELL COMPLETION LOG	PROJECT NO.: 15337-002-01 REPORT NO.: 2257 PAGE NO: B-3

PROJECT: MONITOR WELL INSTALLATIONS, ECONLOCKHATCHEE RIVER BASIN

CLIENT: UNIVERSITY OF CENTRAL FLORIDA DATE: 5/30/91

WELL NUMBER: MW-3 LOCATION: SEE U.S.G.S. MONITOR WELL LOCATION MAP

INSTALLED BY: D. MEISTER

WELL DIAGRAM - NOT TO SCALE

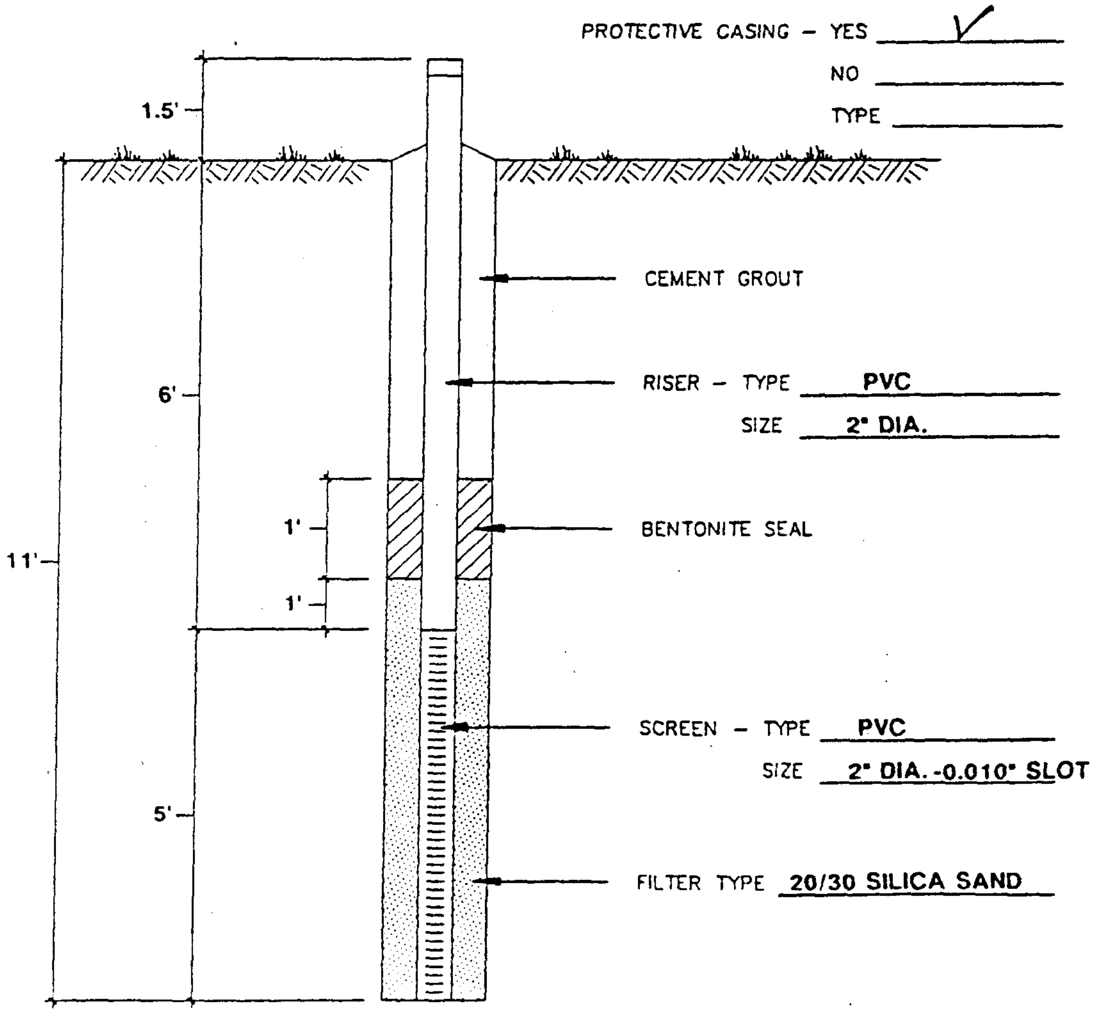


Figure J.7 Completion Log #3

UNIVERSAL ENGINEERING SCIENCES WELL COMPLETION LOG	PROJECT NO.: 15337-002-01 REPORT NO.: 2257 PAGE NO: B-4

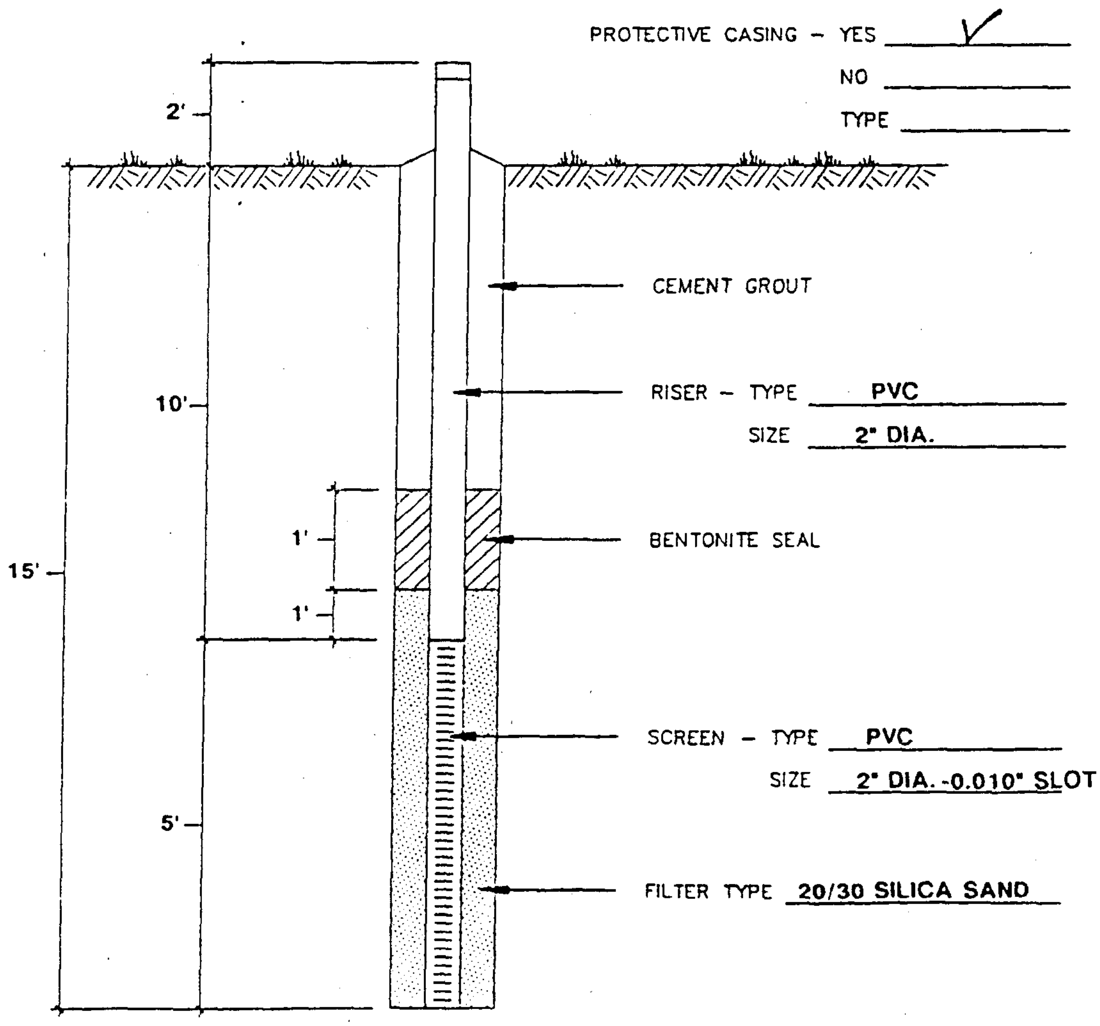
PROJECT: MONITOR WELL INSTALLATIONS, ECONLOCKHATCHEE RIVER BASIN

CLIENT: UNIVERSITY OF CENTRAL FLORIDA   DATE: 5/31/91

WELL NUMBER: MW-5   LOCATION: SEE U.S.G.S. MONITOR WELL LOCATION MAP

INSTALLED BY: D. MEISTER

WELL DIAGRAM - NOT TO SCALE



F-MW1

Figure J.8 Completion Log #4

UNIVERSAL ENGINEERING SCIENCES WELL COMPLETION LOG	PROJECT NO.: 15337-002-01 REPORT NO.: 2257 PAGE NO: B-5

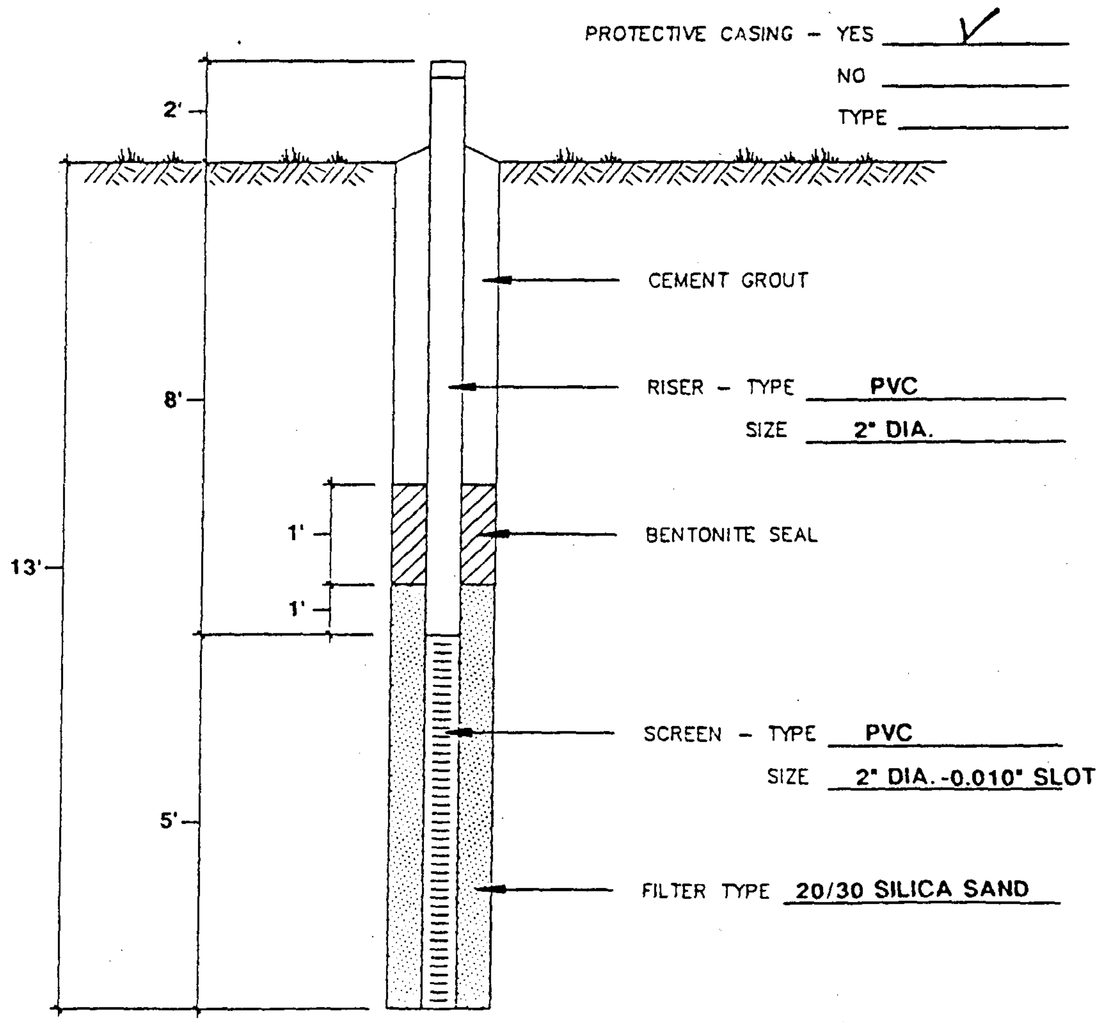
PROJECT: MONITOR WELL INSTALLATIONS, ECONLOCKHATCHEE RIVER BASIN

CLIENT: UNIVERSITY OF CENTRAL FLORIDA DATE:

WELL NUMBER: MW-7 LOCATION: SEE U.S.G.S. MONITOR WELL LOCATION MAP

INSTALLED BY: D. MEISTER

WELL DIAGRAM - NOT TO SCALE



F-MW1

Figure J.9 Completion Log #5

UNIVERSAL ENGINEERING SCIENCES WELL COMPLETION LOG	PROJECT NO.: 15337-002-01 REPORT NO.: 2257 PAGE NO: B-6

PROJECT: MONITOR WELL INSTALLATIONS, ECONLOCKHATCHEE RIVER BASIN

CLIENT: UNIVERSITY OF CENTRAL FLORIDA DATE: 6/4/91

WELL NUMBER: MW-11 LOCATION: SEE U.S.G.S. MONITOR WELL LOCATION MAP

INSTALLED BY: D. MEISTER

WELL DIAGRAM - NOT TO SCALE

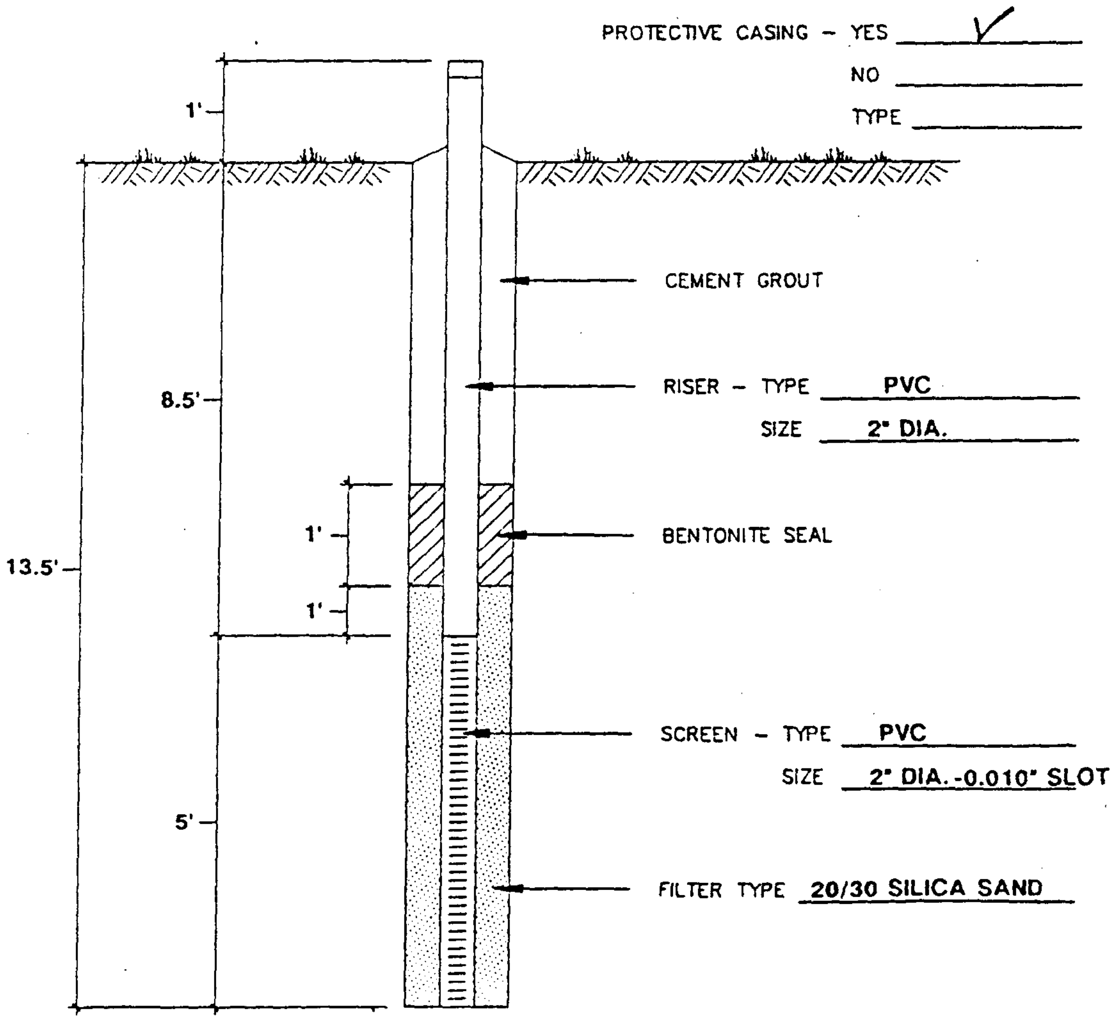


Figure J.10 Completion Log #6

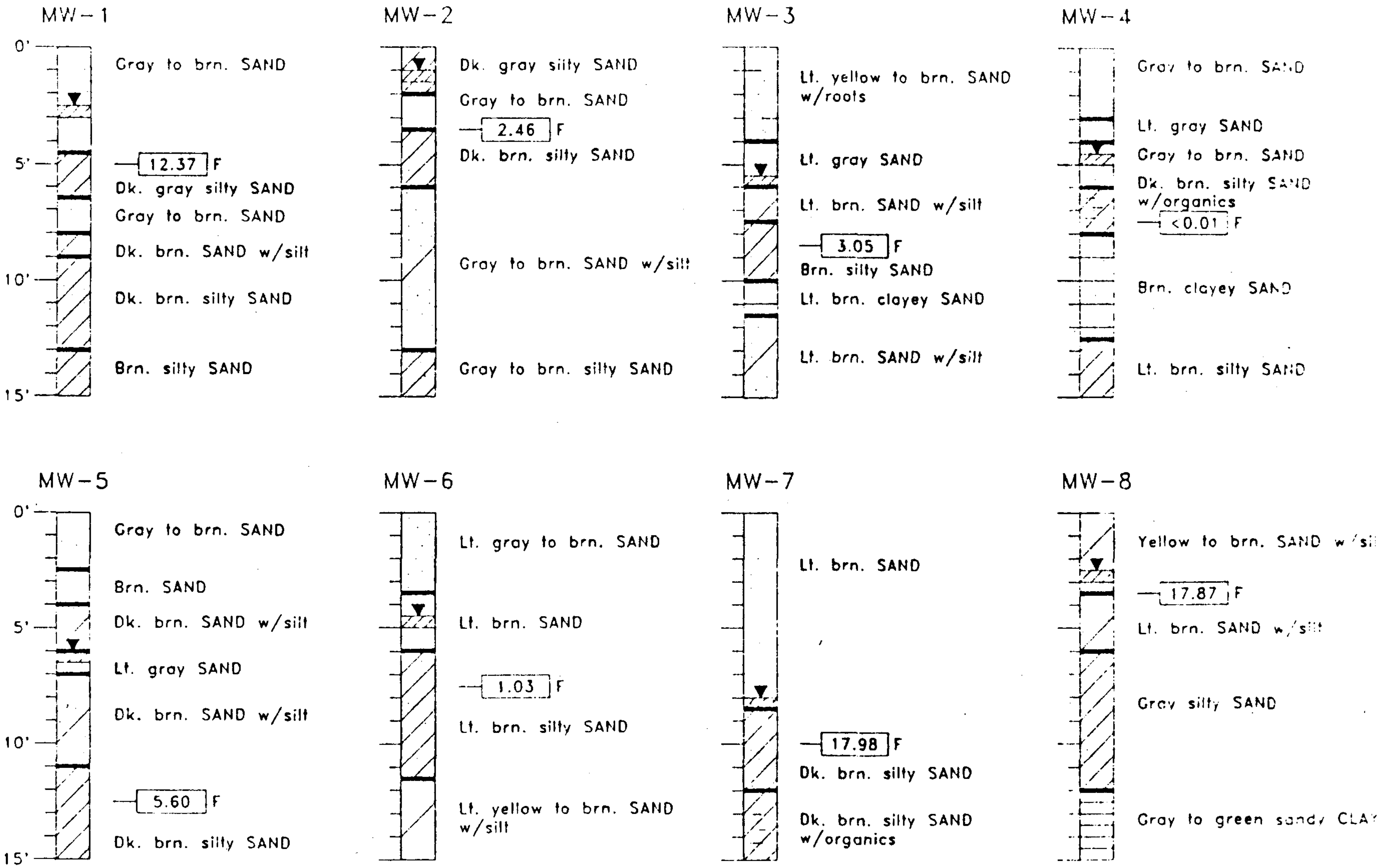


Figure J.11 Soil Profiles

BORINGS PERFORMED 6/4 & 6/5/91

F -- COEFFICIENT OF PERMEABILITY, FT./DAY (FIELD TEST)

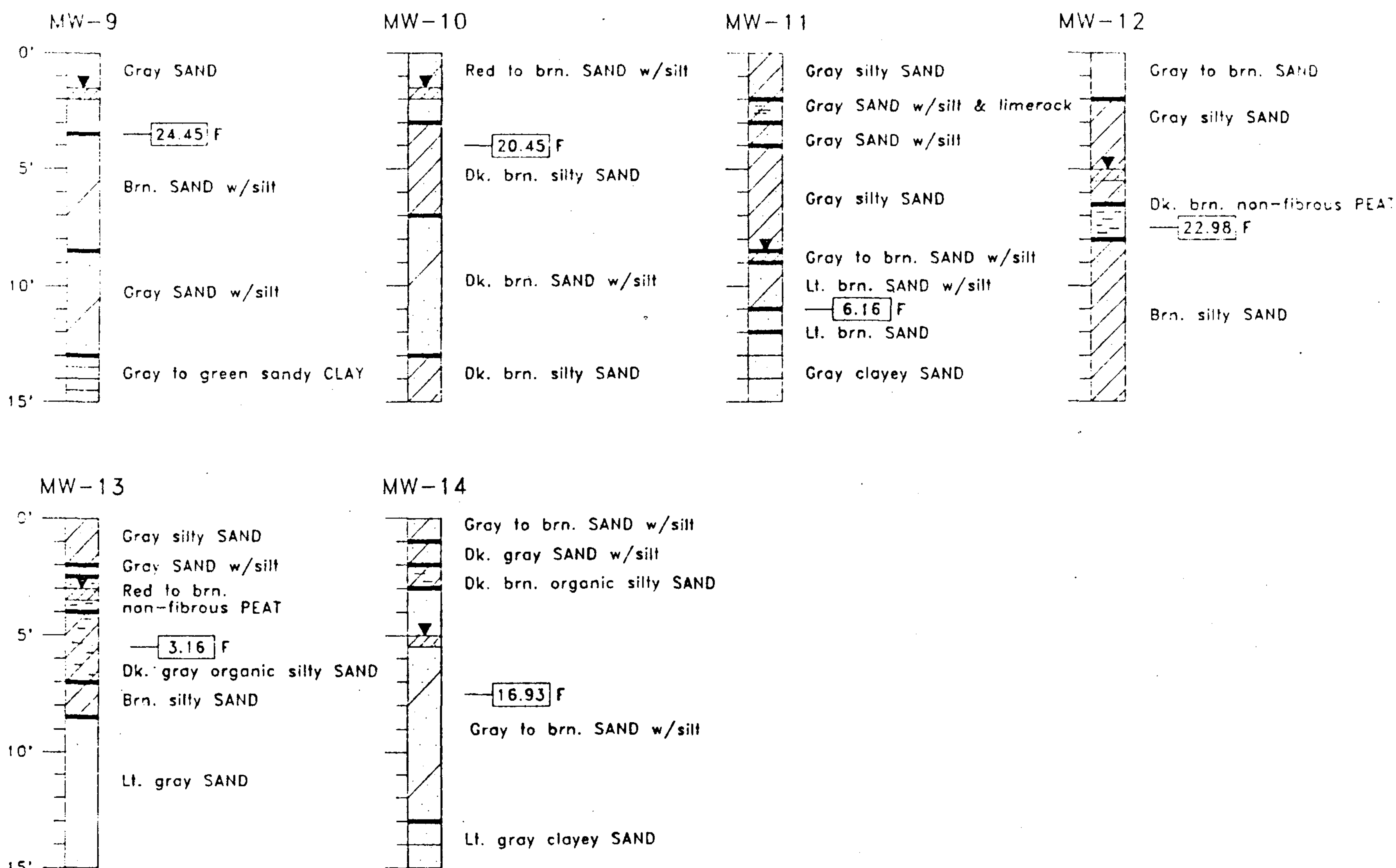


Figure J.11 (continued)

F – COEFFICIENT OF PERMEABILITY, FT./DAY (FIELD TEST)

BORINGS PERFORMED 5/30-6/3/91

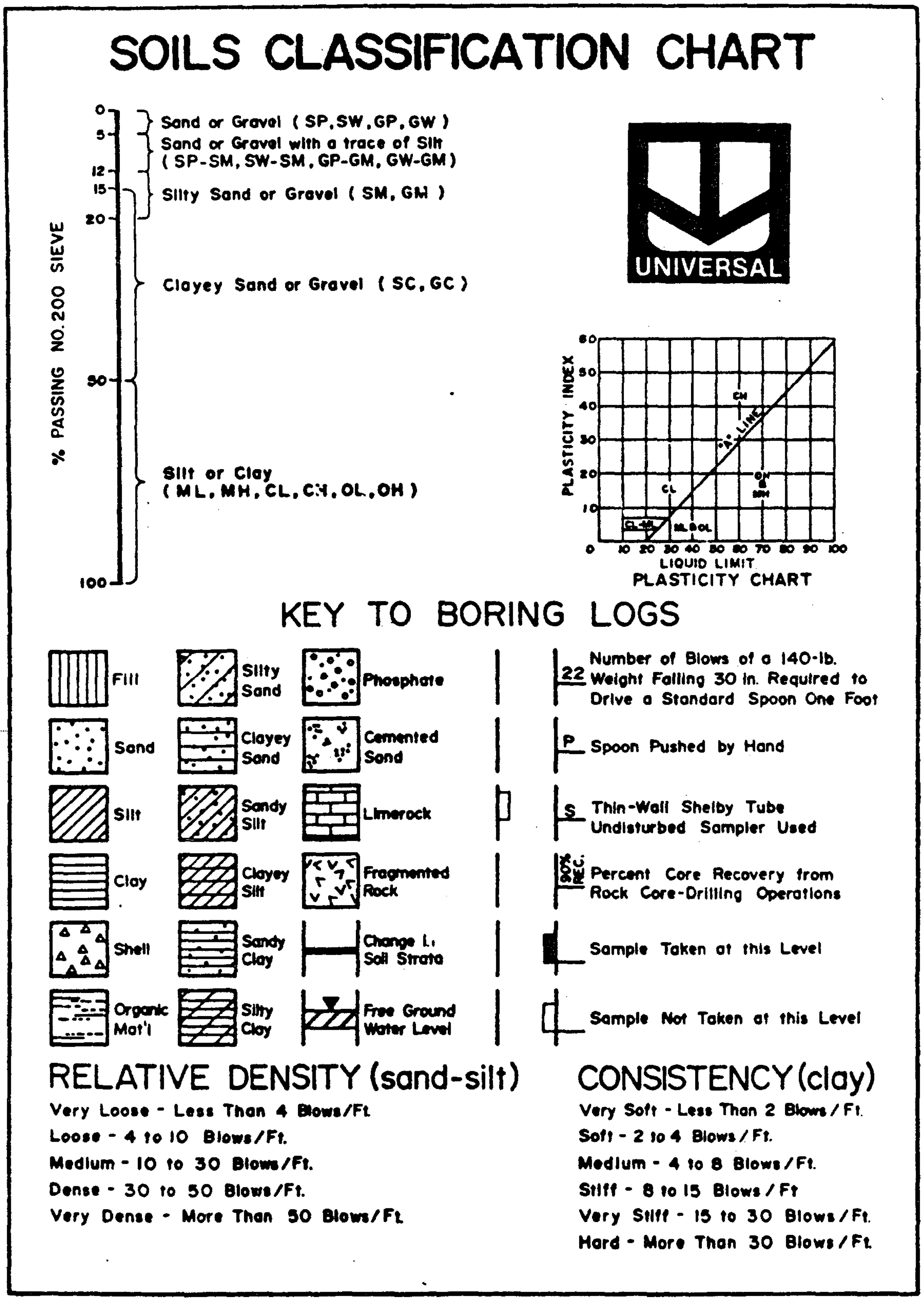
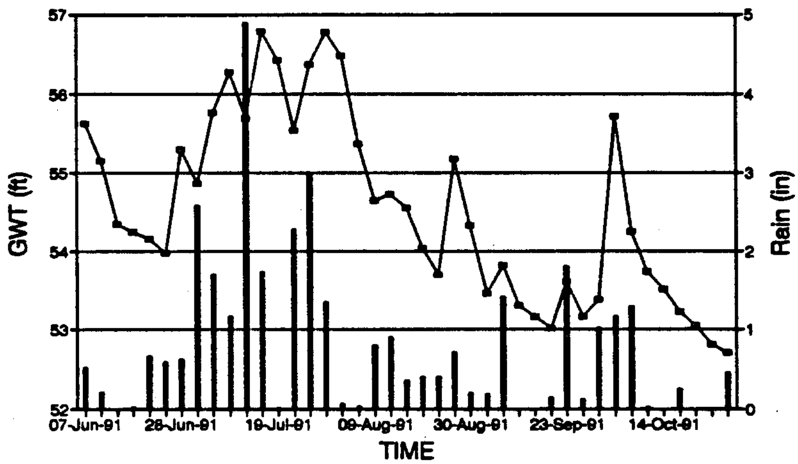


Figure J.12 Soil Classification Chart

APPENDIX K

MONITORING WELL LEVELS

Well # 1. UCF East-Wet Season
Ground Elevation 57.10



Top of well elevation (ft)	59.27
Height of pvc pipe above ground (ft)	2.17

DATE	TIME	DEPTH ft	DWT ft	GWT ft	RAIN in
07-Jun-91	10:33	3.65	1.48	55.62	0.52
10-Jun-91	12:17	4.12	1.95	55.15	0.20
14-Jun-91	10:00	4.92	2.75	54.35	0.00
17-Jun-91	09:48	5.02	2.85	54.25	0.02
21-Jun-91	09:30	5.10	2.93	54.17	0.66
24-Jun-91	11:16	5.29	3.12	53.98	0.59
28-Jun-91	09:28	3.98	1.81	55.29	0.62
01-Jul-91	09:22	4.40	2.23	54.87	2.58
05-Jul-91	09:10	3.50	1.33	55.77	1.70
08-Jul-91	09:02	3.00	0.83	56.27	1.17
12-Jul-91	09:09	3.58	1.41	55.69	4.88
15-Jul-91	09:15	2.48	0.31	56.79	1.74
19-Jul-91	08:55	2.85	0.68	56.42	0.01
22-Jul-91	09:00	3.73	1.56	55.54	2.28
26-Jul-91	11:34	2.90	0.73	56.37	3.00
29-Jul-91	08:55	2.50	0.33	56.77	1.35
02-Aug-91	09:40	2.79	0.62	56.48	0.06
05-Aug-91	12:05	3.90	1.73	55.37	0.03
09-Aug-91	09:35	4.62	2.45	54.65	0.80
12-Aug-91	13:08	4.54	2.37	54.73	0.90
16-Aug-91	10:20	4.71	2.54	54.56	0.35

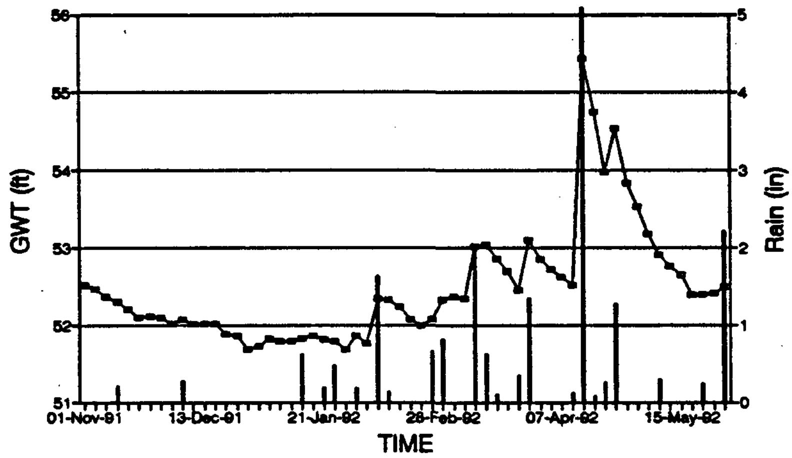
DATE	TIME	DEPTH ft	DWT ft	GWT ft	RAIN in
19-Aug-91	10:40	5.23	3.06	54.04	0.40
23-Aug-91	17:00	5.56	3.39	53.71	0.40
26-Aug-91	14:57	4.10	1.93	55.17	0.71
30-Aug-91	15:17	4.94	2.77	54.33	0.19
06-Sep-91	18:05	5.81	3.64	53.46	0.18
10-Sep-91	10:28	5.44	3.27	53.83	1.42
13-Sep-91	16:18	5.96	3.79	53.31	0.00
16-Sep-91	14:27	6.10	3.93	53.17	0.00
20-Sep-91	15:22	6.25	4.08	53.02	0.14
23-Sep-91	14:38	5.65	3.48	53.62	1.81
27-Sep-91	15:54	6.10	3.93	53.17	0.12
30-Sep-91	14:06	5.88	3.71	53.39	1.02
04-Oct-91	13:27	3.56	1.39	55.71	1.17
07-Oct-91	14:12	5.02	2.85	54.25	1.30
11-Oct-91	07:00	5.52	3.35	53.75	0.02
14-Oct-91	07:00	5.75	3.58	53.52	0.00
18-Oct-91	07:00	6.04	3.87	53.23	0.25
21-Oct-91	07:00	6.21	4.04	53.06	0.00
24-Oct-91	07:00	6.46	4.29	52.81	0.00
28-Oct-91	07:00	6.56	4.39	52.71	0.45

WET SEASON STATISTICS	GWT (Feet)	Rain (Inches)
# Data Points = 41	41.00	41.00
Standard Deviation	1.18	1.00
Variance	1.43	1.02
Average	54.55	0.81
Maximum	56.79	4.88
Minimum	52.71	0.00
Fluctuation	4.08	4.88
Cumulative Rainfall		33.04

Figure K.1.1 UCF East-Wet Season

Well # 1. UCF East-Dry Season

Ground Elevation 57.10



Top of well elevation (ft)	59.27
Height of pvc pipe above ground (ft)	2.17

DATE	TIME	DEPTH ft	DWT ft	GWT ft	RAIN in
01-Nov-91	07:00	6.75	4.58	52.52	0.00
04-Nov-91	07:00	6.79	4.62	52.48	0.00
08-Nov-91	07:00	6.90	4.73	52.37	0.00
12-Nov-91	07:00	6.96	4.79	52.31	0.20
15-Nov-91	07:00	7.06	4.89	52.21	0.00
18-Nov-91	07:00	7.17	5.00	52.10	0.00
22-Nov-91	07:00	7.15	4.98	52.12	0.00
25-Nov-91	07:00	7.17	5.00	52.10	0.00
02-Dec-91	14:51	7.25	5.08	52.02	0.00
06-Dec-91	07:00	7.19	5.02	52.08	0.27
09-Dec-91	07:00	7.25	5.08	52.02	0.00
13-Dec-91	07:00	7.25	5.08	52.02	0.00
16-Dec-91	07:00	7.25	5.08	52.02	0.00
20-Dec-91	07:00	7.38	5.21	51.89	0.00
23-Dec-91	07:00	7.40	5.23	51.87	0.00
27-Dec-91	08:55	7.58	5.41	51.69	0.00
30-Dec-91	07:00	7.54	5.37	51.73	0.00
03-Jan-92	07:00	7.44	5.27	51.83	0.00
07-Jan-92	07:00	7.48	5.31	51.79	0.00
10-Jan-92	07:00	7.48	5.31	51.79	0.00
14-Jan-92	07:00	7.44	5.27	51.83	0.62
17-Jan-92	07:00	7.40	5.23	51.87	0.00
21-Jan-92	07:00	7.46	5.29	51.81	0.19
24-Jan-92	07:00	7.48	5.31	51.79	0.48
28-Jan-92	07:00	7.58	5.41	51.69	0.00
31-Jan-92	07:00	7.40	5.23	51.87	0.18
04-Feb-92	07:00	7.50	5.33	51.77	0.00
07-Feb-92	07:00	6.92	4.75	52.35	1.64
11-Feb-92	07:00	6.94	4.77	52.33	0.14
14-Feb-92	07:00	7.02	4.85	52.25	0.00

DATE	TIME	DEPTH ft	DWT ft	GWT ft	RAIN in
18-Feb-92	07:00	7.19	5.02	52.08	0.00
21-Feb-92	07:00	7.27	5.10	52.00	0.00
25-Feb-92	07:00	7.19	5.02	52.08	0.65
28-Feb-92	07:00	6.94	4.77	52.33	0.82
03-Mar-92	07:00	6.90	4.73	52.37	0.00
06-Mar-92	07:00	6.92	4.75	52.35	0.00
10-Mar-92	07:00	6.25	4.08	53.02	2.04
13-Mar-92	07:00	6.23	4.06	53.04	0.62
17-Mar-92	07:00	6.40	4.23	52.87	0.10
20-Mar-92	07:00	6.56	4.39	52.71	0.00
24-Mar-92	07:00	6.81	4.64	52.46	0.34
27-Mar-92	07:00	6.17	4.00	53.10	1.35
31-Mar-92	07:00	6.42	4.25	52.85	0.00
03-Apr-92	07:00	6.54	4.37	52.73	0.00
07-Apr-92	07:00	6.65	4.48	52.62	0.00
10-Apr-92	07:00	6.75	4.58	52.52	0.11
14-Apr-92	07:00	3.83	1.66	55.44	5.28
17-Apr-92	07:00	4.52	2.35	54.75	0.08
21-Apr-92	07:00	5.29	3.12	53.98	0.26
24-Apr-92	07:00	4.73	2.56	54.54	1.28
28-Apr-92	07:00	5.44	3.27	53.83	0.00
01-May-92	07:00	5.73	3.56	53.54	0.00
04-May-92	07:00	6.08	3.91	53.19	0.00
08-May-92	07:00	6.35	4.18	52.92	0.29
11-May-92	07:00	6.50	4.33	52.77	0.00
15-May-92	07:00	6.63	4.46	52.65	0.00
18-May-92	07:00	6.88	4.71	52.40	0.00
22-May-92	07:00	6.88	4.71	52.40	0.24
26-May-92	07:00	6.85	4.68	52.42	0.01
29-May-92	07:00	6.77	4.60	52.50	2.22

DRY SEASON STATISTICS	GWT (Feet)	Rain (Inches)
# Data Points = 60		
Standard Deviation	0.76	0.81
Variance	0.58	0.67
Average	52.48	0.32
Maximum	55.44	5.28
Minimum	51.69	0.00
Fluctuation	3.75	5.28
Cumulative Rainfall		19.41

Figure K.1.2 UCF East-Dry Season

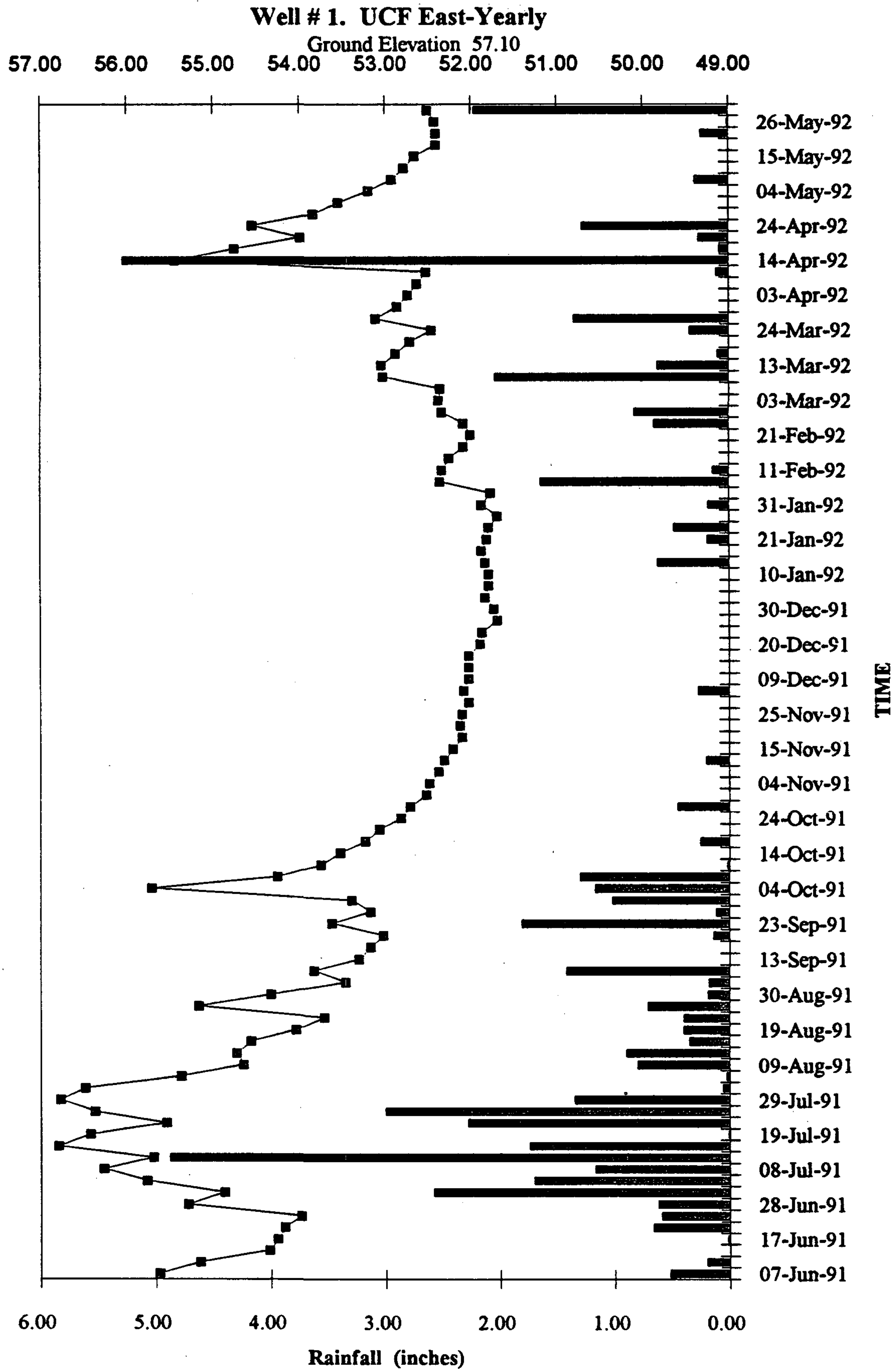
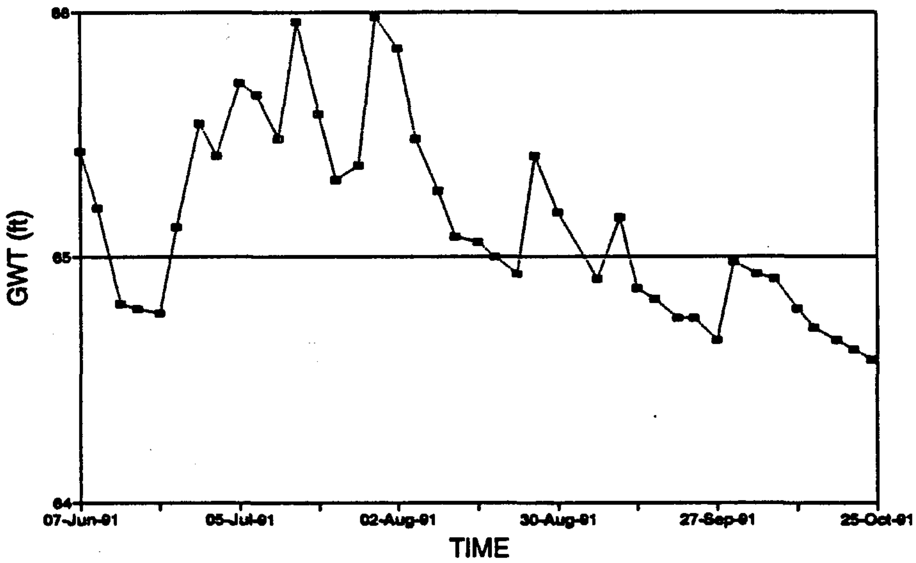


Figure K.1.3 UCF East-Yearly

Well # 2. UCF Pond-Wet Season
Ground Elevation 66.30



Top of well elevation (ft)	68.06
Height of pvc pipe above ground (ft)	1.76

DATE	TIME	DEPTH ft	DWT ft	GWT ft
07-Jun-91	11.25	2.63	0.87	65.43
10-Jun-91	12.36	2.86	1.10	65.20
14-Jun-91	09.25	3.25	1.49	64.81
17-Jun-91	10.10	3.27	1.51	64.79
21-Jun-91	09.58	3.29	1.53	64.77
24-Jun-91	12.35	2.94	1.18	65.12
28-Jun-91	09.57	2.52	0.76	65.54
01-Jul-91	09.47	2.65	0.89	65.41
05-Jul-91	09.38	2.35	0.59	65.71
08-Jul-91	09.24	2.40	0.64	65.66
12-Jul-91	09.29	2.58	0.82	65.48
15-Jul-91	09.50	2.10	0.34	65.96
19-Jul-91	09.40	2.48	0.72	65.58
22-Jul-91	09.24	2.75	0.99	65.31
26-Jul-91	11:08	2.69	0.93	65.37
29-Jul-91	09:35	2.08	0.32	65.98
02-Aug-91	09:55	2.21	0.45	65.85
05-Aug-91	12:25	2.58	0.82	65.48
09-Aug-91	10:20	2.79	1.03	65.27
12-Aug-91	13:37	2.98	1.22	65.08

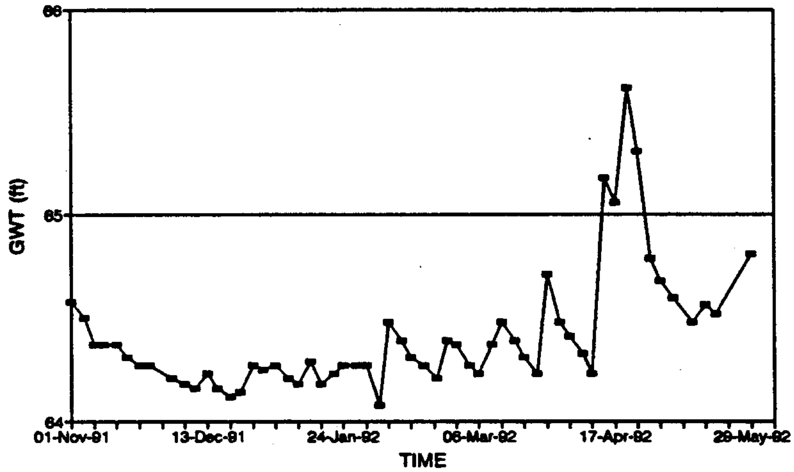
DATE	TIME	DEPTH ft	DWT ft	GWT ft
16-Aug-91	10:45	3.00	1.24	65.06
19-Aug-91	11:30	3.06	1.30	65.00
23-Aug-91	15:20	3.13	1.37	64.93
26-Aug-91	15:16	2.65	0.89	65.41
30-Aug-91	15:54	2.88	1.12	65.18
06-Sep-91	17:48	3.15	1.39	64.91
10-Sep-91	09:09	2.90	1.14	65.16
13-Sep-91	15:18	3.19	1.43	64.87
16-Sep-91	14:52	3.23	1.47	64.83
20-Sep-91	15:08	3.31	1.55	64.75
23-Sep-91	14:56	3.31	1.55	64.75
27-Sep-91	15:37	3.40	1.64	64.66
30-Sep-91	16:50	3.08	1.32	64.98
04-Oct-91	15:21	3.13	1.37	64.93
07-Oct-91	15:58	3.15	1.39	64.91
11-Oct-91	16:02	3.27	1.51	64.79
14-Oct-91	14:35	3.35	1.59	64.71
18-Oct-91	15:10	3.40	1.64	64.66
21-Oct-91	14:45	3.44	1.68	64.62
24-Oct-91	15:24	3.48	1.72	64.58

WET SEASON STATISTICS	GWT (feet)
# Data Points = 40	
Standard Deviation	0.38
Variance	0.15
Average	65.14
Maximum	65.98
Minimum	64.58
Fluctuation	1.40

Figure K.2.1 UCF Pond-Wet Season

Well # 2. UCF North-Dry Season

Ground Elevation 66.30



Top of well elevation (ft)	68.06
Height of pvc pipe above ground (ft)	1.76

DATE	TIME	DEPTH ft	DWT ft	GWT ft
01-Nov-91	14:49	3.48	1.72	64.58
05-Nov-91	09:26	3.56	1.80	64.50
08-Nov-91	15:55	3.69	1.93	64.37
11-Nov-91	15:30	3.69	1.93	64.37
15-Nov-91	14:15	3.69	1.93	64.37
18-Nov-91	14:10	3.75	1.99	64.31
22-Nov-91	14:41	3.79	2.03	64.27
25-Nov-91	14:43	3.79	2.03	64.27
02-Dec-91	15:16	3.85	2.09	64.21
06-Dec-91	12:27	3.88	2.12	64.18
09-Dec-91	17:54	3.90	2.14	64.16
13-Dec-91	16:10	3.83	2.07	64.23
16-Dec-91	16:38	3.90	2.14	64.16
20-Dec-91	16:02	3.94	2.18	64.12
23-Dec-91	09:30	3.92	2.16	64.14
27-Dec-91	09:25	3.79	2.03	64.27
30-Dec-91	14:00	3.81	2.05	64.25
03-Jan-92	14:56	3.79	2.03	64.27
07-Jan-92	12:03	3.85	2.09	64.21
10-Jan-92	13:30	3.88	2.12	64.18
14-Jan-92	12:48	3.77	2.01	64.29
17-Jan-92	16:14	3.88	2.12	64.18
21-Jan-92	13:50	3.83	2.07	64.23
24-Jan-92	15:47	3.79	2.03	64.27
28-Jan-92	12:25	3.79	2.03	64.27
31-Jan-92	16:07	3.79	2.03	64.27
04-Feb-92	13:45	3.98	2.22	64.08
07-Feb-92	15:58	3.58	1.82	64.48
11-Feb-92	13:08	3.67	1.91	64.39

DATE	TIME	DEPTH ft	DWT ft	GWT ft
14-Feb-92	14:33	3.75	1.99	64.31
18-Feb-92	13:34	3.79	2.03	64.27
22-Feb-92	14:23	3.85	2.09	64.21
25-Feb-92	13:00	3.67	1.91	64.39
28-Feb-92	12:57	3.69	1.93	64.37
03-Mar-92	11:58	3.79	2.03	64.27
06-Mar-92	12:25	3.83	2.07	64.23
10-Mar-92	15:45	3.69	1.93	64.37
13-Mar-92	09:10	3.58	1.82	64.48
17-Mar-92	15:25	3.67	1.91	64.39
20-Mar-92	13:45	3.75	1.99	64.31
24-Mar-92	13:35	3.83	2.07	64.23
27-Mar-92	13:16	3.35	1.59	64.71
31-Mar-92	14:32	3.58	1.82	64.48
03-Apr-92	14:12	3.65	1.89	64.41
07-Apr-92	09:54	3.73	1.97	64.33
10-Apr-92	16:20	3.83	2.07	64.23
14-Apr-92	14:58	2.88	1.12	65.18
17-Apr-92	15:24	3.00	1.24	65.06
21-Apr-92	15:45	2.44	0.68	65.62
24-Apr-92	16:08	2.75	0.99	65.31
28-Apr-92	17:23	3.27	1.51	64.79
01-May-92	13:53	3.38	1.62	64.68
05-May-92	12:20	3.46	1.70	64.60
11-May-92	13:45	3.58	1.82	64.48
15-May-92	16:05	3.50	1.74	64.56
18-May-92	12:35	3.54	1.78	64.52
29-May-92	16:16	3.25	1.49	64.81

DRY SEASON STATISTICS	GWT (feet)
# Data Points = 57	
Standard Deviation	0.30
Variance	0.09
Average	64.41
Maximum	65.62
Minimum	64.08
Fluctuation	1.54

Figure K.2.2 UCF North-Dry Season

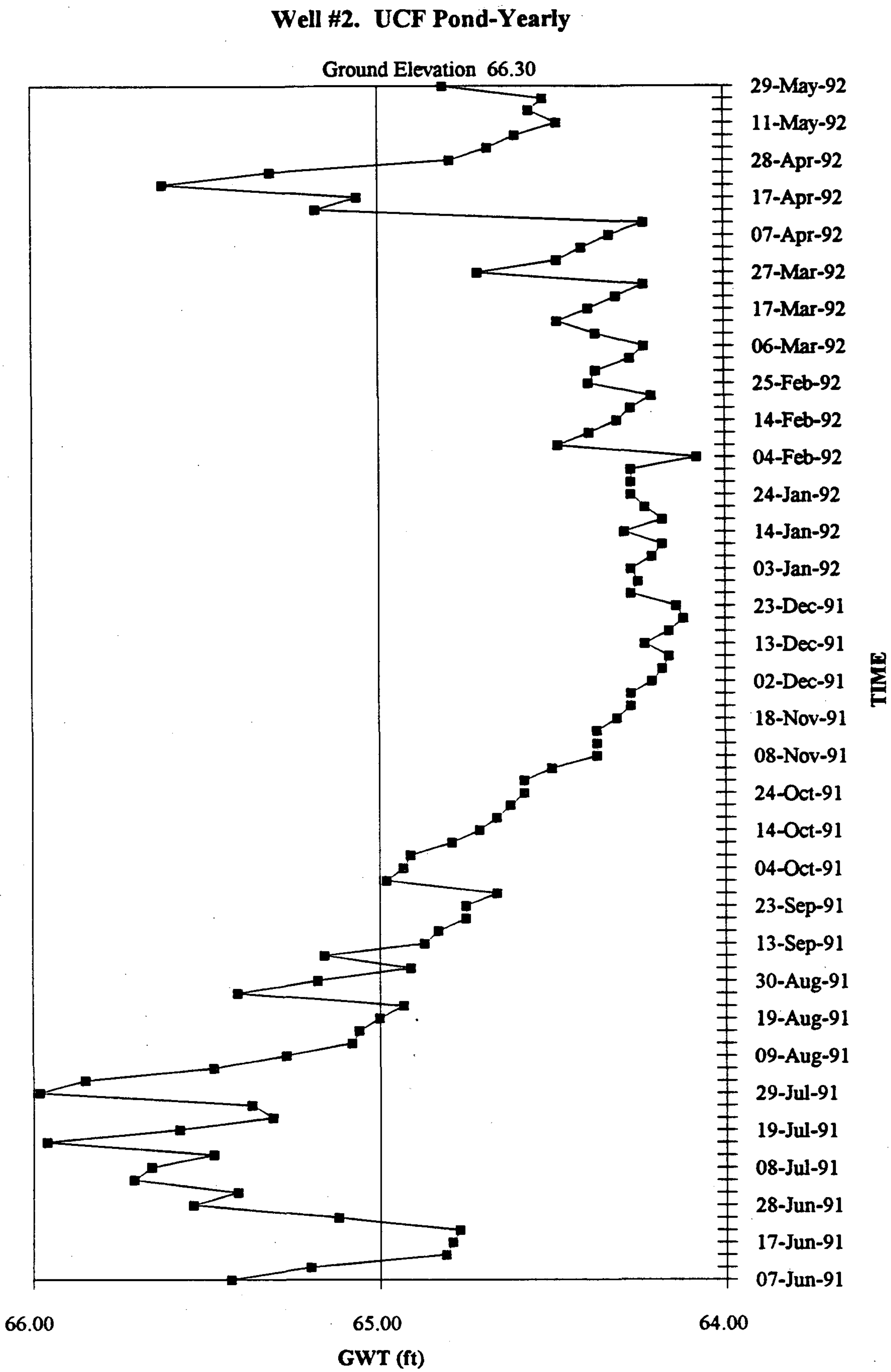
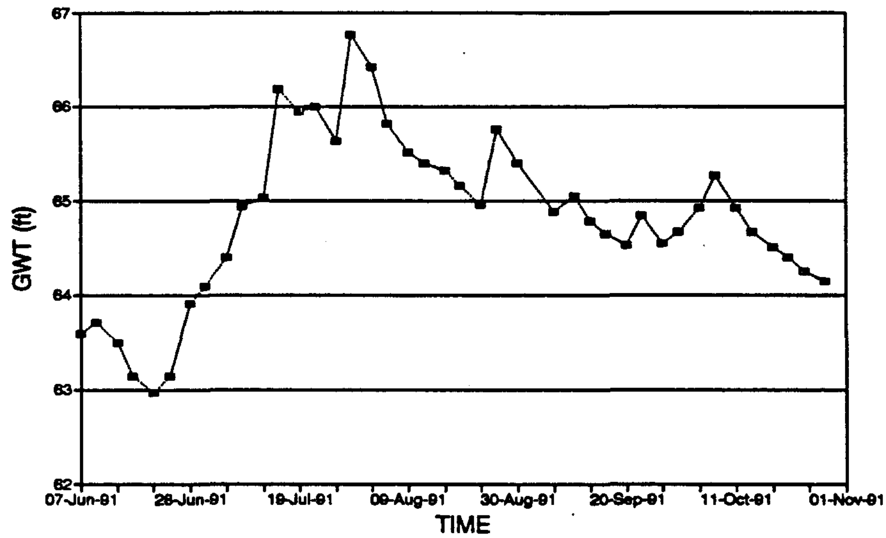


Figure K.2.3 UCF Pond-Yearly

Well # 3. UCF Oaks-Wet Season
Ground Elevation 68.60



Top of well elevation (ft)	70.34
Height of pvc pipe above ground (ft)	1.74

DATE	TIME	DEPTH ft	DWT ft	GWT ft
07-Jun-91	11:10	6.75	5.01	63.59
10-Jun-91	12:26	6.63	4.89	63.71
14-Jun-91	09:40	6.84	5.10	63.50
17-Jun-91	09:20	7.19	5.45	63.15
21-Jun-91	09:43	7.37	5.63	62.97
24-Jun-91	11:50	7.19	5.45	63.15
28-Jun-91	09:45	6.42	4.68	63.92
01-Jul-91	09:33	6.25	4.51	64.09
05-Jul-91	09:20	5.94	4.20	64.40
08-Jul-91	09:14	5.40	3.66	64.94
12-Jul-91	09:20	5.31	3.57	65.03
15-Jul-91	09:40	4.15	2.41	66.19
19-Jul-91	09:25	4.40	2.66	65.94
22-Jul-91	09:13	4.34	2.60	66.00
26-Jul-91	11:20	4.71	2.97	65.63
29-Jul-91	09:20	3.58	1.84	66.76
02-Aug-91	09:46	3.92	2.18	66.42
05-Aug-91	12:15	4.52	2.78	65.82
09-Aug-91	09:50	4.83	3.09	65.51
12-Aug-91	13:29	4.94	3.20	65.40
16-Aug-91	10:30	5.02	3.28	65.32

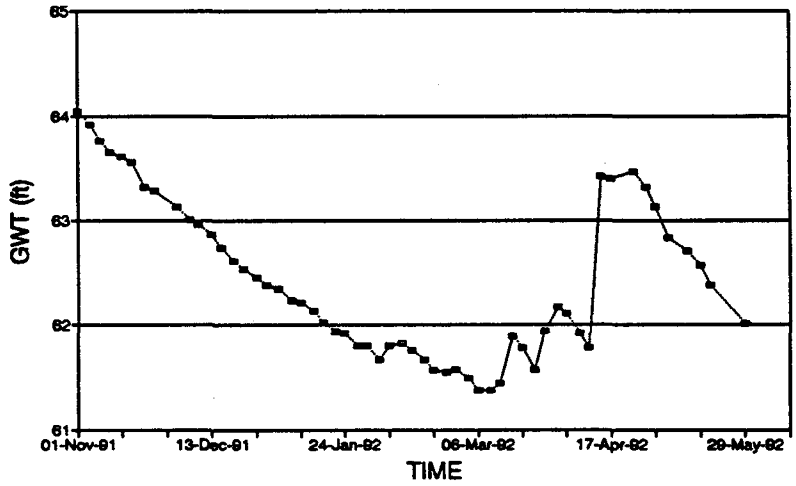
DATE	TIME	DEPTH ft	DWT ft	GWT ft
19-Aug-91	11:00	5.19	3.45	65.15
23-Aug-91	16:50	5.38	3.64	64.96
26-Aug-91	15:07	4.58	2.84	65.76
30-Aug-91	15:25	4.94	3.20	65.40
06-Sep-91	17:75	5.46	3.72	64.88
10-Sep-91	09:05	5.29	3.55	65.05
13-Sep-91	16:06	5.56	3.82	64.78
16-Sep-91	14:43	5.69	3.95	64.65
20-Sep-91	15:13	5.81	4.07	64.53
23-Sep-91	14:48	5.50	3.76	64.84
27-Sep-91	15:44	5.79	4.05	64.55
30-Sep-91	16:45	5.67	3.93	64.67
04-Oct-91	15:13	5.42	3.68	64.92
07-Oct-91	14:21	5.08	3.34	65.26
11-Oct-91	14:34	5.42	3.68	64.92
14-Oct-91	14:13	5.67	3.93	64.67
18-Oct-91	14:22	5.83	4.09	64.51
21-Oct-91	14:05	5.94	4.20	64.40
24-Oct-91	15:53	6.08	4.34	64.26
28-Oct-91	14:20	6.19	4.45	64.15

WET SEASON STATISTICS	GWT (feet)
# of Data Points = 41	
Standard Deviation	0.88
Variance	0.79
Average	64.82
Maximum	66.76
Minimum	62.97
Fluctuation	3.79

Figure K.3.1 UCF Oaks-Wet Season

Well # 3. UCF Oaks-Dry Season

Ground Elevation 68.60



Top of well elevation (ft)	70.34
Height of pvc pipe above ground (ft)	1.74

DATE	TIME	DEPTH ft	DWT ft	GWT ft
01-Nov-91	14:35	6.29	4.55	64.05
05-Nov-91	12:00	6.42	4.68	63.92
08-Nov-91	15:47	6.58	4.84	63.76
11-Nov-91	15:10	6.69	4.95	63.65
15-Nov-91	15:02	6.73	4.99	63.61
18-Nov-91	13:54	6.79	5.05	63.55
22-Nov-91	14:30	7.02	5.28	63.32
25-Nov-91	13:54	7.06	5.32	63.28
02-Dec-91	14:59	7.21	5.47	63.13
06-Dec-91	12:16	7.33	5.59	63.01
09-Dec-91	17:40	7.38	5.64	62.96
13-Dec-91	17:35	7.48	5.74	62.86
16-Dec-91	16:28	7.60	5.86	62.74
20-Dec-91	15:45	7.73	5.99	62.61
23-Dec-91	09:10	7.81	6.07	62.53
27-Dec-91	09:10	7.88	6.14	62.46
30-Dec-91	13:40	7.96	6.22	62.38
03-Jan-92	14:40	8.00	6.26	62.34
07-Jan-92	14:15	8.10	6.36	62.24
10-Jan-92	15:16	8.13	6.39	62.21
14-Jan-92	12:33	8.21	6.47	62.13
17-Jan-92	15:59	8.31	6.57	62.03
21-Jan-92	14:10	8.40	6.66	61.94
24-Jan-92	12:58	8.42	6.68	61.92
28-Jan-92	12:10	8.54	6.80	61.80
31-Jan-92	16:00	8.54	6.80	61.80
04-Feb-92	12:45	8.67	6.93	61.67
07-Feb-92	15:48	8.54	6.80	61.80
11-Feb-92	13:18	8.52	6.78	61.82
14-Feb-92	14:46	8.58	6.84	61.76
18-Feb-92	15:00	8.67	6.93	61.67
21-Feb-92	14:13	8.77	7.03	61.57
25-Feb-92	13:09	8.79	7.05	61.55
28-Feb-92	15:00	8.77	7.03	61.57
03-Mar-92	11:27	8.85	7.11	61.49
06-Mar-92	14:44	8.96	7.22	61.38
10-Mar-92	16:10	8.96	7.22	61.38
13-Mar-92	08:50	8.90	7.16	61.44
17-Mar-92	15:16	8.45	6.71	61.89
20-Mar-92	14:10	8.56	6.82	61.78
24-Mar-92	15:36	8.77	7.03	61.57
27-Mar-92	15:07	8.40	6.66	61.94
31-Mar-92	14:24	8.17	6.43	62.17
03-Apr-92	14:25	8.23	6.49	62.11
07-Apr-92	09:37	8.42	6.68	61.92
10-Apr-92	16:00	8.56	6.82	61.78
14-Apr-92	15:52	6.92	5.18	63.42
17-Apr-92	15:40	6.94	5.20	63.40
24-Apr-92	13:00	6.88	5.14	63.46
28-Apr-92	17:07	7.02	5.28	63.32
01-May-92	13:36	7.21	5.47	63.13
05-May-92	14:39	7.50	5.76	62.84
11-May-92	13:25	7.63	5.89	62.71
15-May-92	12:40	7.77	6.03	62.57
18-May-92	12:20	7.96	6.22	62.38
29-May-92	22:30	8.33	6.59	62.01

DRY SEASON STATISTICS	GWT (feet)
# Data Points = 56	
Standard Deviation	0.75
Variance	0.57
Average	62.42
Maximum	64.05
Minimum	61.38
Fluctuation	2.67

Figure K.3.2 UCF Oaks-Dry Season

Well # 3. UCF Oaks-Yearly

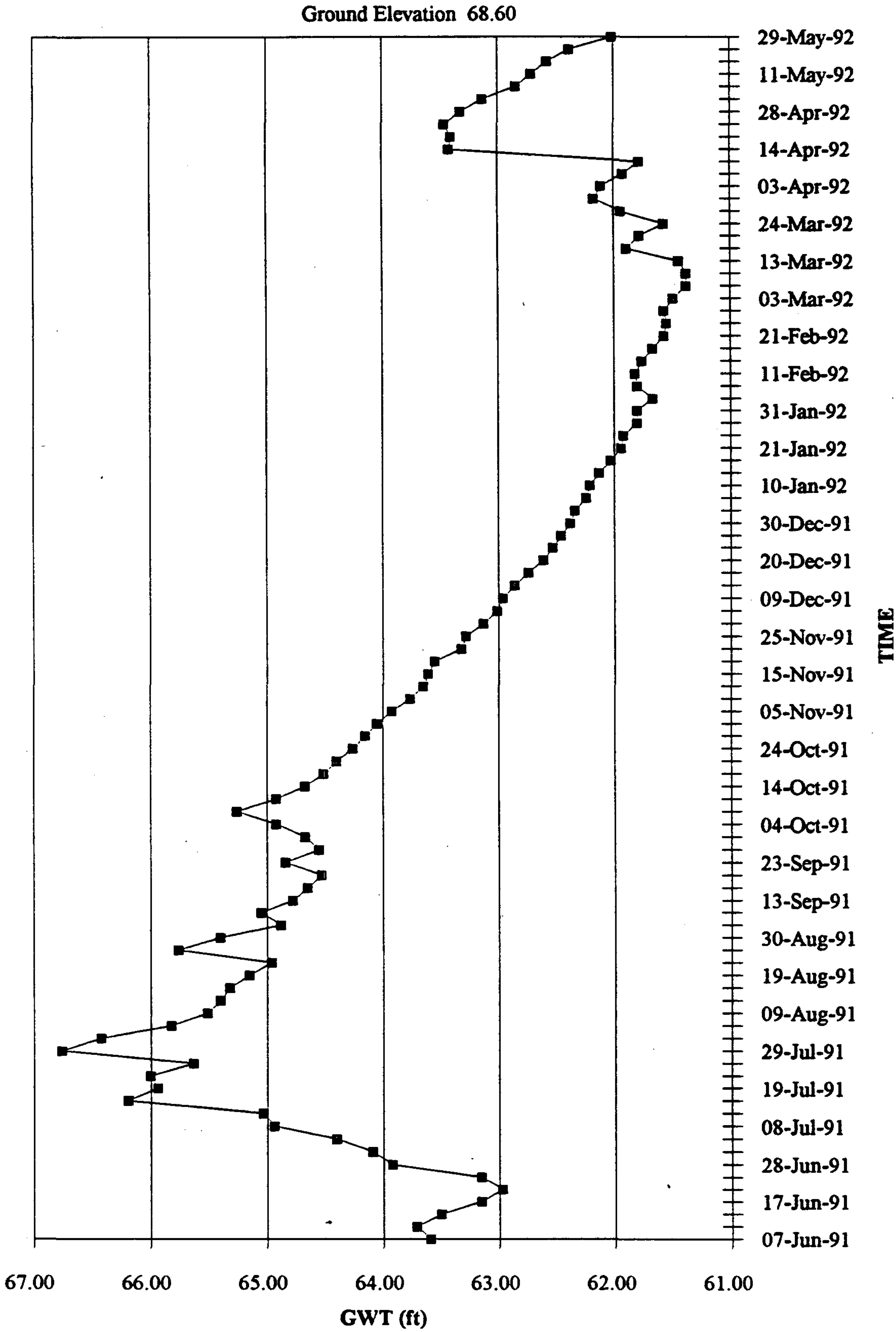
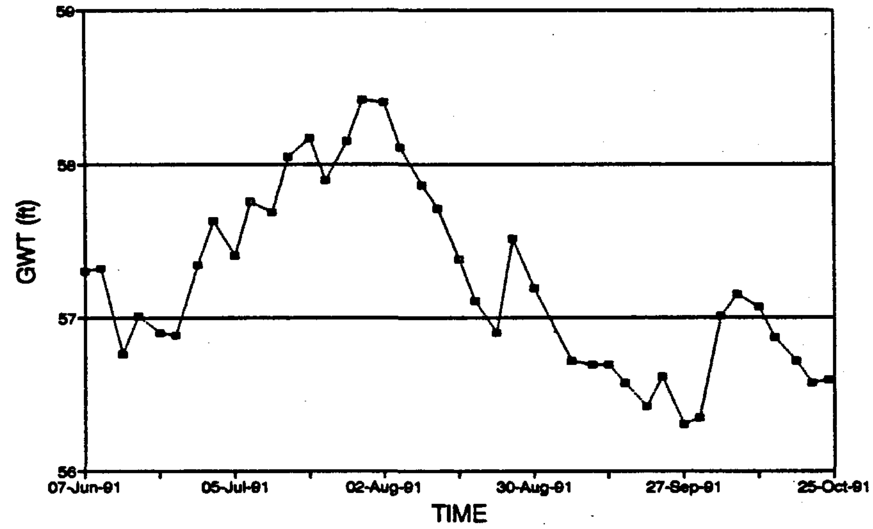


Figure K.3.3 UCF Oaks-Yearly

Well # 4. CFRP-East-Wet Season

Ground Elevation 61.40



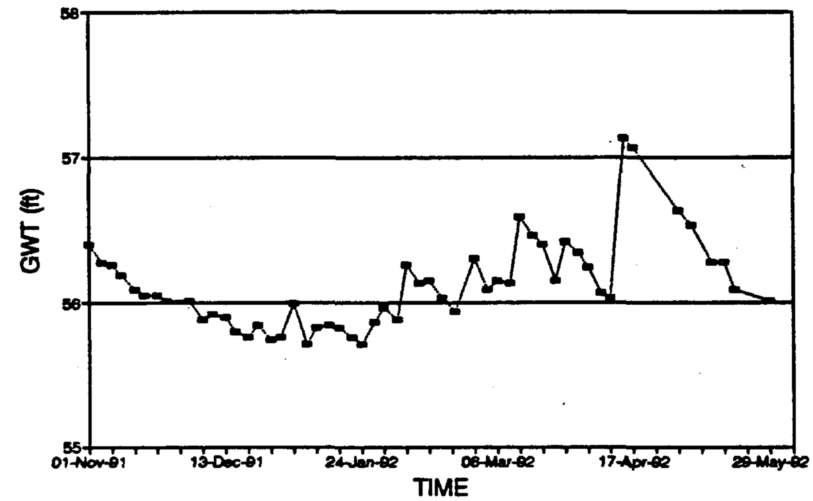
Top of well elevation (ft)	63.59
Height of pvc pipe above ground (ft)	2.19

DATE	TIME	DEPTH ft	DWT ft	GWT ft
07-Jun-91	09:45	6.29	4.10	57.30
10-Jun-91	12:00	6.27	4.08	57.32
14-Jun-91	10:08	6.83	4.64	56.76
17-Jun-91	09:35	6.58	4.39	57.01
21-Jun-91	09:20	6.69	4.50	56.90
24-Jun-91	10:28	6.71	4.52	56.88
28-Jun-91	09:22	6.25	4.06	57.34
01-Jul-91	09:12	5.96	3.77	57.63
05-Jul-91	09:02	6.19	4.00	57.40
08-Jul-91	08:55	5.83	3.64	57.76
12-Jul-91	09:04	5.90	3.71	57.69
15-Jul-91	09:32	5.54	3.35	58.05
19-Jul-91	09:13	5.42	3.23	58.17
22-Jul-91	10:02	5.69	3.50	57.90
26-Jul-91	11:54	5.44	3.25	58.15
29-Jul-91	08:50	5.17	2.98	58.42
02-Aug-91	09:32	5.19	3.00	58.40
05-Aug-91	12:00	5.48	3.29	58.11
09-Aug-91	09:30	5.73	3.54	57.86
12-Aug-91	13:13	5.88	3.69	57.71
16-Aug-91	10:15	6.21	4.02	57.38
19-Aug-91	10:35	6.48	4.29	57.11
23-Aug-91	17:04	6.69	4.50	56.90
26-Aug-91	14:48	6.08	3.89	57.51
30-Aug-91	15:08	6.40	4.21	57.19
06-Sep-91	18:10	6.88	4.69	56.71
10-Sep-91	14:45	6.90	4.71	56.69
13-Sep-91	16:24	6.90	4.71	56.69
16-Sep-91	14:21	7.02	4.83	56.57
20-Sep-91	15:28	7.17	4.98	56.42
23-Sep-91	14:31	6.98	4.79	56.61
27-Sep-91	15:58	7.29	5.10	56.30
30-Sep-91	14:00	7.25	5.06	56.34
04-Oct-91	13:36	6.58	4.39	57.01
07-Oct-91	14:06	6.44	4.25	57.15
11-Oct-91	14:05	6.52	4.33	57.07
14-Oct-91	16:24	6.73	4.54	56.86
18-Oct-91	16:20	6.88	4.69	56.71
21-Oct-91	13:45	7.02	4.83	56.57
24-Oct-91	16:01	7.00	4.81	56.59

WET SEASON STATISTICS	GWT (feet)
# of Data Points = 40	
Standard Deviation	0.59
Variance	0.35
Average	57.23
Maximum	58.42
Minimum	56.30
Fluctuation	2.12

Figure K.4.1 Central Florida Research Park-East-Wet Season

Well # 4. CFRP-East-Dry Season
Ground Elevation 61.40



Top of well elevation (ft)	63.59
Height of pvc pipe above ground (ft)	2.19

DATE	TIME	DEPTH ft	DWT ft	GWT ft
01-Nov-91	16:30	7.19	5.00	56.40
05-Nov-91	11:18	7.31	5.12	56.28
08-Nov-91	14:55	7.33	5.14	56.26
11-Nov-91	14:50	7.40	5.21	56.19
15-Nov-91	15:20	7.50	5.31	56.09
18-Nov-91	13:37	7.54	5.35	56.05
22-Nov-91	13:50	7.54	5.35	56.05
25-Nov-91	13:30	7.58	5.39	56.01
02-Dec-91	14:44	7.58	5.39	56.01
06-Dec-91	12:06	7.71	5.52	55.88
09-Dec-91	17:30	7.67	5.48	55.92
13-Dec-91	17:45	7.69	5.50	55.90
16-Dec-91	16:16	7.79	5.60	55.80
20-Dec-91	15:33	7.83	5.64	55.76
23-Dec-91	08:55	7.75	5.56	55.84
27-Dec-91	08:50	7.85	5.66	55.74
30-Dec-91	15:45	7.83	5.64	55.76
03-Jan-92	14:30	7.60	5.41	55.99
07-Jan-92	13:51	7.88	5.69	55.71
10-Jan-92	15:08	7.77	5.58	55.82
14-Jan-92	12:26	7.75	5.56	55.84
17-Jan-92	15:49	7.77	5.58	55.82
21-Jan-92	14:30	7.83	5.64	55.76
24-Jan-92	12:44	7.88	5.69	55.71
28-Jan-92	11:59	7.73	5.54	55.86
31-Jan-92	15:48	7.63	5.44	55.96
04-Feb-92	12:34	7.71	5.52	55.88

DATE	TIME	DEPTH ft	DWT ft	GWT ft
07-Feb-92	15:41	7.33	5.14	56.26
11-Feb-92	13:34	7.46	5.27	56.13
14-Feb-92	14:19	7.44	5.25	56.15
18-Feb-92	14:50	7.56	5.37	56.03
22-Feb-92	14:20	7.65	5.46	55.94
28-Feb-92	14:44	7.29	5.10	56.30
03-Mar-92	11:16	7.50	5.31	56.09
06-Mar-92	14:35	7.44	5.25	56.15
10-Mar-92	16:18	7.46	5.27	56.13
13-Mar-92	08:10	7.00	4.81	56.59
17-Mar-92	15:47	7.13	4.94	56.46
20-Mar-92	14:05	7.19	5.00	56.40
24-Mar-92	15:22	7.44	5.25	56.15
27-Mar-92	14:58	7.17	4.98	56.42
31-Mar-92	14:04	7.25	5.06	56.34
03-Apr-92	14:38	7.35	5.16	56.24
07-Apr-92	11:47	7.52	5.33	56.07
10-Apr-92	15:55	7.56	5.37	56.03
14-Apr-92	16:01	6.46	4.27	57.13
17-Apr-92	16:03	6.52	4.33	57.07
01-May-92	13:23	6.96	4.77	56.63
05-May-92	14:30	7.06	4.87	56.53
11-May-92	13:15	7.31	5.12	56.28
15-May-92	15:20	7.31	5.12	56.28
18-May-92	12:10	7.50	5.31	56.09
29-May-92	23:25	7.58	5.39	56.01

DRY SEASON STATISTICS	GWT (feet)
# Data Points = 53	
Standard Deviation	0.30
Variance	0.09
Average	56.12
Maximum	57.13
Minimum	55.71
Fluctuation	1.42

Figure K.4.2 Central Florida Research Park-East-Dry Season

Well # 4. Central Florida Research Park-East-Yearly

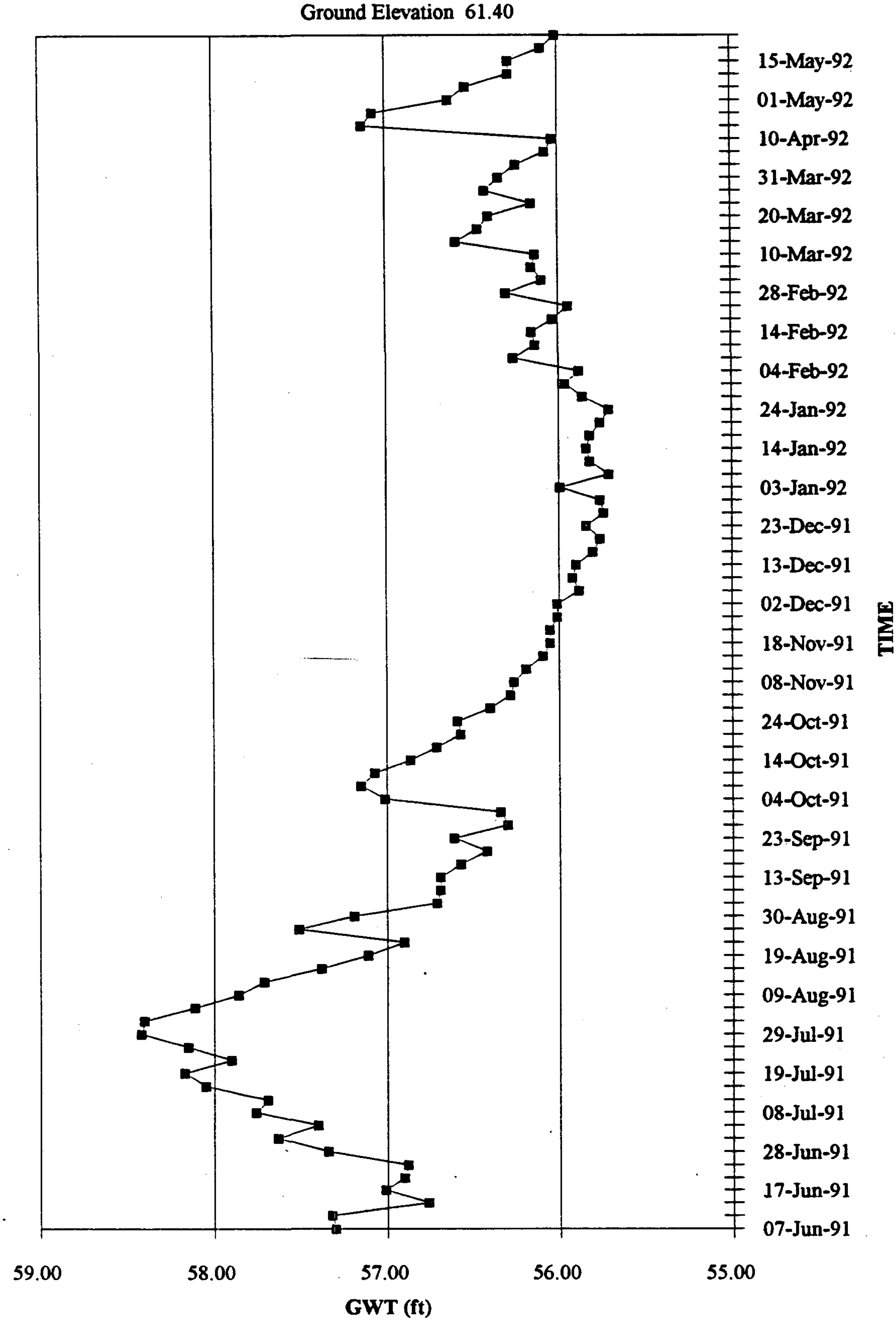
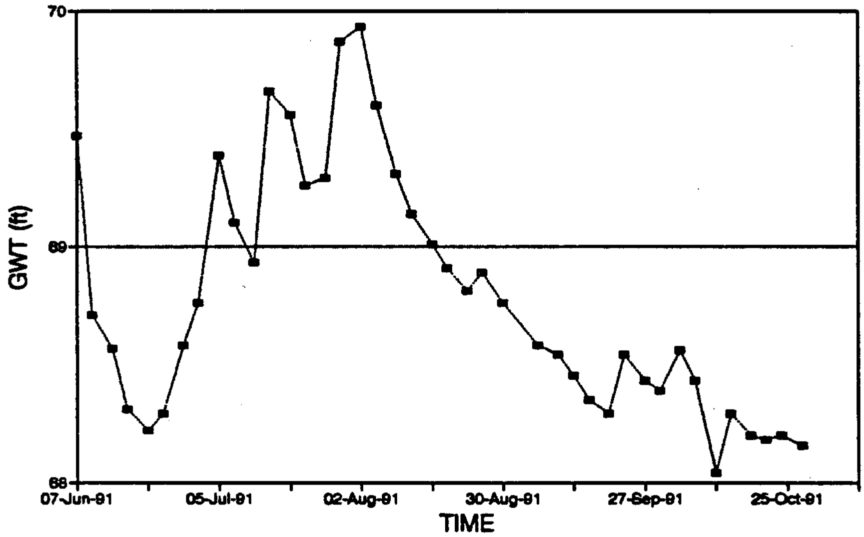


Figure K.4.3 Central Florida Research Park-East-Yearly

Well # 5. CFRP-West-Wet Season

Ground Elevation 75.00



Top of well elevation (ft)	77.64
Height of pvc pipe above ground (ft)	2.64

DATE	TIME	DEPTH ft	DWT ft	GWT ft
07-Jun-91	10:15	8.17	5.53	69.47
10-Jun-91	12:10	8.93	6.29	68.71
14-Jun-91	10:15	9.07	6.43	68.57
17-Jun-91	09:57	9.33	6.69	68.31
21-Jun-91	09:06	9.42	6.78	68.22
24-Jun-91	09:45	9.35	6.71	68.29
28-Jun-91	09:10	9.06	6.42	68.58
01-Jul-91	09:04	8.88	6.24	68.76
05-Jul-91	08:55	8.25	5.61	69.39
08-Jul-91	08:45	8.54	5.90	69.10
12-Jul-91	08:55	8.71	6.07	68.93
15-Jul-91	09:25	7.98	5.34	69.66
19-Jul-91	09:08	8.08	5.44	69.56
22-Jul-91	10:58	8.38	5.74	69.26
26-Jul-91	11:45	8.35	5.71	69.29
29-Jul-91	08:40	7.77	5.13	69.87
02-Aug-91	09:25	7.71	5.07	69.93
05-Aug-91	11:50	8.04	5.40	69.60
09-Aug-91	09:25	8.33	5.69	69.31
12-Aug-91	13:20	8.50	5.86	69.14
16-Aug-91	10:05	8.63	5.99	69.01

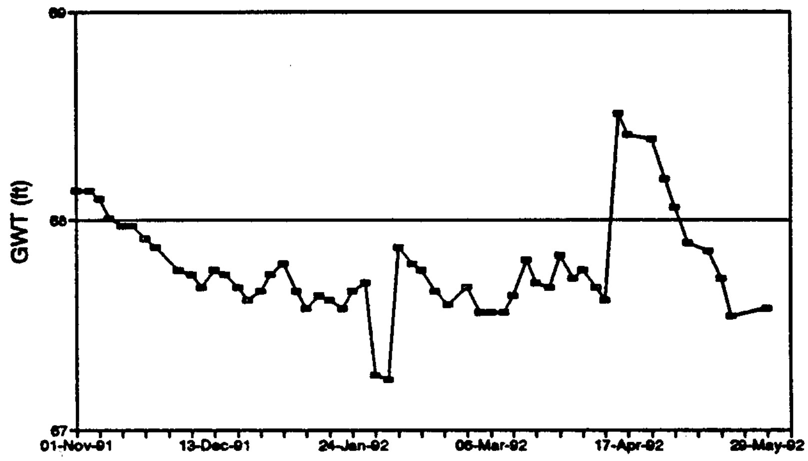
DATE	TIME	DEPTH ft	DWT ft	GWT ft
19-Aug-91	10:30	8.73	6.09	68.91
23-Aug-91	13:52	8.83	6.19	68.81
26-Aug-91	14:42	8.75	6.11	68.89
30-Aug-91	15:01	8.88	6.24	68.76
06-Sep-91	18:15	9.06	6.42	68.58
10-Sep-91	14:48	9.10	6.46	68.54
13-Sep-91	16:29	9.19	6.55	68.45
16-Sep-91	14:15	9.29	6.65	68.35
20-Sep-91	15:34	9.35	6.71	68.29
23-Sep-91	14:26	9.10	6.46	68.54
27-Sep-91	16:06	9.21	6.57	68.43
30-Sep-91	13:56	9.25	6.61	68.39
04-Oct-91	13:33	9.08	6.44	68.56
07-Oct-91	13:51	9.21	6.57	68.43
11-Oct-91	14:00	9.60	6.96	68.04
14-Oct-91	16:19	9.35	6.71	68.29
18-Oct-91	16:26	9.44	6.80	68.20
21-Oct-91	13:40	9.46	6.82	68.18
24-Oct-91	16:07	9.44	6.80	68.20
28-Oct-91	14:05	9.48	6.84	68.16

WET SEASON STATISTICS	GWT (feet)
# of Data Points = 41	
Standard Deviation	0.51
Variance	0.27
Average	68.78
Maximum	69.93
Minimum-	68.04
Fluctuation	1.89

Figure K.5.1 Central Florida Research Park-West-Wet Season

Well # 5. CFRP-West-Dry Season

Ground Elevation 75.00



Top of well elevation (ft)	77.64
Height of pvc pipe above ground (ft)	2.64

DATE	TIME	DEPTH ft	DWT ft	GWT ft
01-Nov-91	16:30	9.50	6.86	68.14
05-Nov-91	11:15	9.50	6.86	68.14
08-Nov-91	14:50	9.54	6.90	68.10
11-Nov-91	14:45	9.63	6.99	68.01
15-Nov-91	15:15	9.67	7.03	67.97
18-Nov-91	13:37	9.67	7.03	67.97
22-Nov-91	13:50	9.73	7.09	67.91
25-Nov-91	13:30	9.77	7.13	67.87
02-Dec-91	14:38	9.88	7.24	67.76
06-Dec-91	12:00	9.90	7.26	67.74
09-Dec-91	17:25	9.96	7.32	67.68
13-Dec-91	17:50	9.88	7.24	67.76
16-Dec-91	16:10	9.90	7.26	67.74
20-Dec-91	15:28	9.96	7.32	67.68
23-Dec-91	08:50	10.02	7.38	67.62
27-Dec-91	08:45	9.98	7.34	67.66
30-Dec-91	12:10	9.90	7.26	67.74
03-Jan-92	14:25	9.85	7.21	67.79
07-Jan-92	13:46	9.98	7.34	67.66
10-Jan-92	15:05	10.06	7.42	67.58
14-Jan-92	12:17	10.00	7.36	67.64
17-Jan-92	15:44	10.02	7.38	67.62
21-Jan-92	14:35	10.06	7.42	67.58
24-Jan-92	11:55	9.98	7.34	67.66
28-Jan-92	15:42	9.94	7.30	67.70
31-Jan-92	16:07	10.38	7.74	67.26
04-Feb-92	12:23	10.40	7.76	67.24
07-Feb-92	15:35	9.77	7.13	67.87

DATE	TIME	DEPTH ft	DWT ft	GWT ft
11-Feb-92	13:28	9.85	7.21	67.79
14-Feb-92	14:14	9.88	7.24	67.76
18-Feb-92	14:44	9.98	7.34	67.66
22-Feb-92	14:23	10.04	7.40	67.60
28-Feb-92	14:42	9.96	7.32	67.68
03-Mar-92	11:11	10.08	7.44	67.56
06-Mar-92	14:30	10.08	7.44	67.56
10-Mar-92	16:22	10.08	7.44	67.56
13-Mar-92	08:05	10.00	7.36	67.64
17-Mar-92	15:53	9.83	7.19	67.81
20-Mar-92	13:55	9.94	7.30	67.70
24-Mar-92	15:16	9.96	7.32	67.68
27-Mar-92	14:53	9.81	7.17	67.83
31-Mar-92	14:08	9.92	7.28	67.72
03-Apr-92	14:40	9.88	7.24	67.76
07-Apr-92	11:44	9.96	7.32	67.68
10-Apr-92	15:45	10.02	7.38	67.62
14-Apr-92	16:10	9.13	6.49	68.51
17-Apr-92	15:58	9.23	6.59	68.41
24-Apr-92	15:44	9.25	6.61	68.39
28-Apr-92	16:54	9.44	6.80	68.20
01-May-92	13:21	9.58	6.94	68.06
05-May-92	14:27	9.75	7.11	67.89
11-May-92	13:10	9.79	7.15	67.85
15-May-92	15:30	9.92	7.28	67.72
18-May-92	12:05	10.10	7.46	67.54
29-May-92	23:18	10.06	7.42	67.58

DRY SEASON STATISTICS	GWT (feet)
# Data Points = 55	
Standard Deviation	0.24
Variance	0.06
Average	67.78
Maximum	68.51
Minimum	67.24
Fluctuation	1.27

Figure K.5.2 Central Florida Research Park-West-Dry Season

Well # 5. Central Florida Research Park-West-Yearly

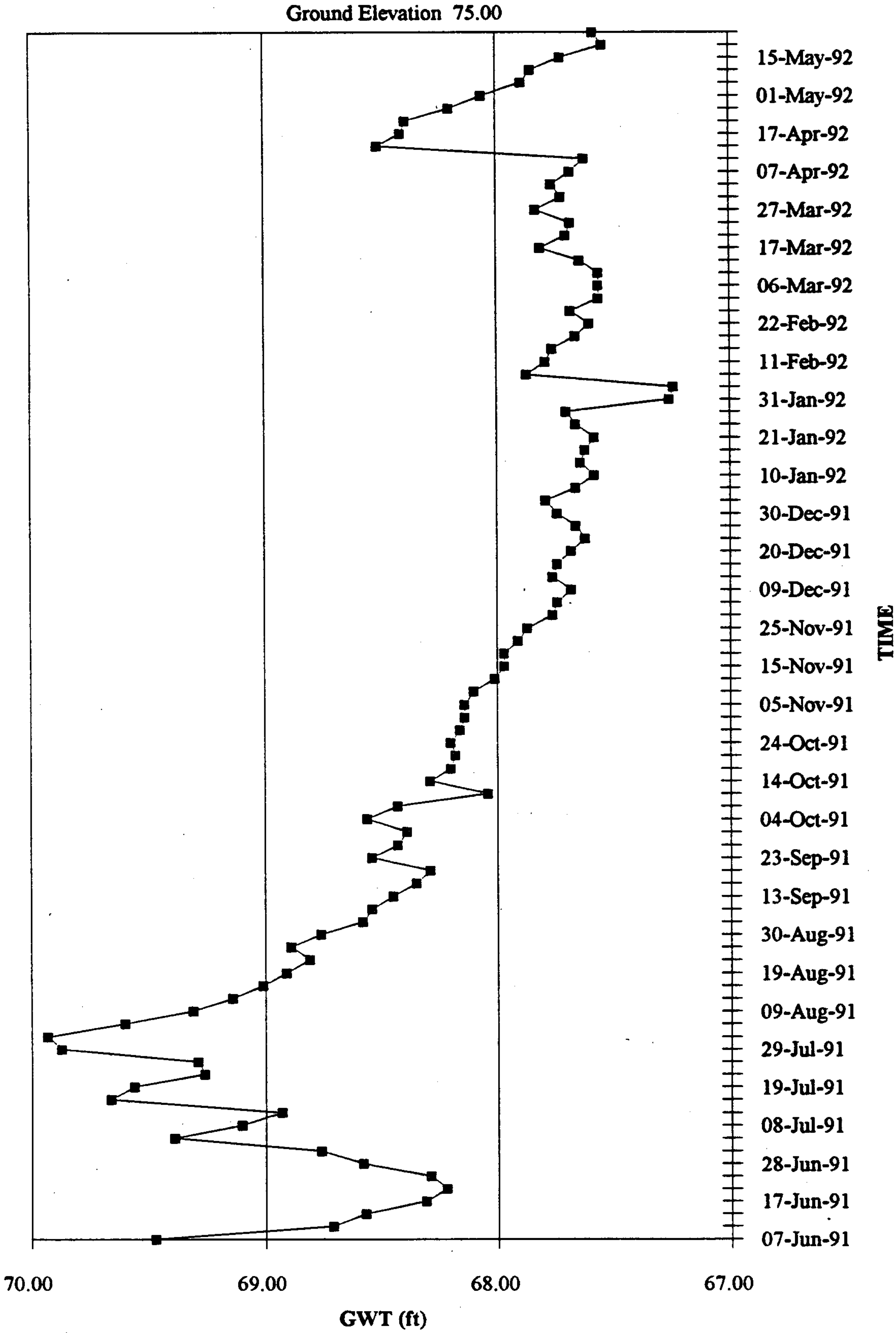
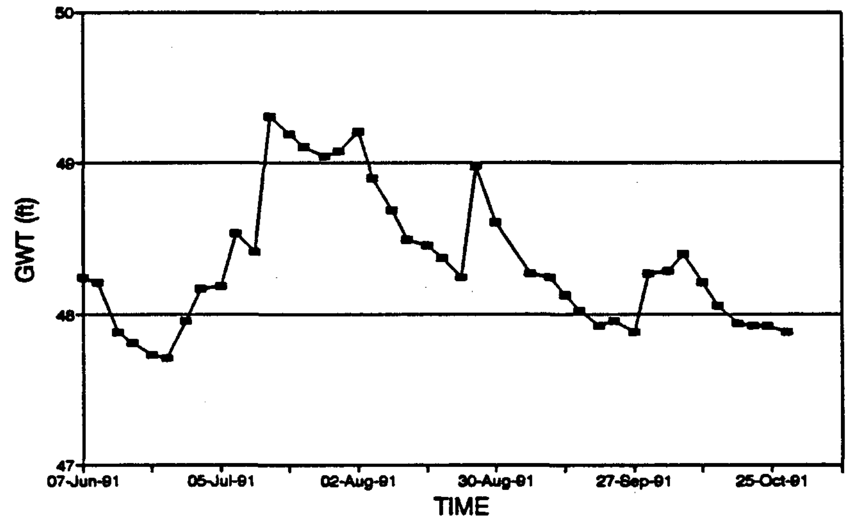


Figure K.5.3 Central Florida Research Park-West-Yearly

Well # 6. Canterbury at Lake-Wet Season

Ground Elevation 52.00



Top of well elevation (ft)	54.46
Height of pvc pipe above ground (ft)	2.46

DATE	TIME	DEPTH ft	DWT ft	GWT ft
07-Jun-91	11:50	6.21	3.75	48.25
10-Jun-91	12:40	6.25	3.79	48.21
14-Jun-91	10:45	6.58	4.12	47.88
17-Jun-91	10:25	6.65	4.19	47.81
21-Jun-91	10:10	6.73	4.27	47.73
24-Jun-91	13:55	6.75	4.29	47.71
28-Jun-91	10:18	6.50	4.04	47.96
01-Jul-91	09:57	6.29	3.83	48.17
05-Jul-91	09:45	6.27	3.81	48.19
08-Jul-91	09:34	5.92	3.46	48.54
12-Jul-91	09:38	6.04	3.58	48.42
15-Jul-91	10:04	5.15	2.69	49.31
19-Jul-91	09:52	5.27	2.81	49.19
22-Jul-91	09:37	5.35	2.89	49.11
26-Jul-91	10:45	5.42	2.96	49.04
29-Jul-91	09:50	5.38	2.92	49.08
02-Aug-91	10:06	5.25	2.79	49.21
05-Aug-91	12:35	5.56	3.10	48.90
09-Aug-91	10:30	5.77	3.31	48.69
12-Aug-91	13:47	5.96	3.50	48.50
16-Aug-91	10:55	6.00	3.54	48.46

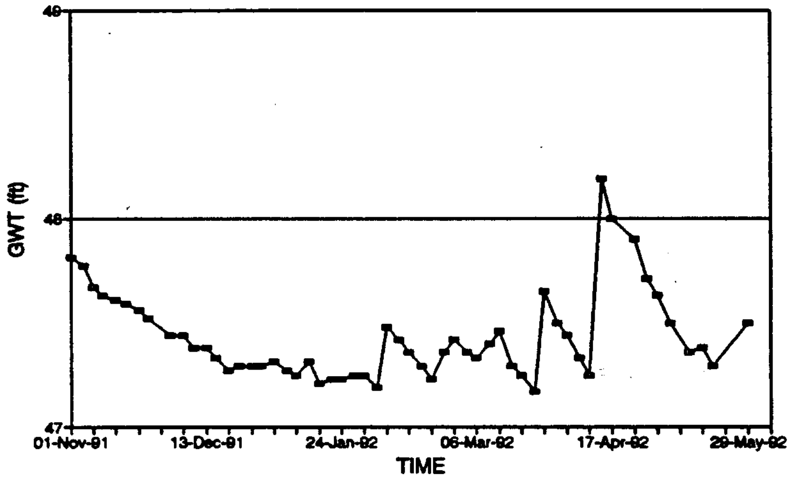
DATE	TIME	DEPTH ft	DWT ft	GWT ft
19-Aug-91	11:35	6.08	3.62	48.38
23-Aug-91	15:27	6.21	3.75	48.25
26-Aug-91	15:25	5.48	3.02	48.98
30-Aug-91	16:05	5.85	3.39	48.61
06-Sep-91	16:40	6.19	3.73	48.27
10-Sep-91	09:20	6.21	3.75	48.25
13-Sep-91	15:08	6.33	3.87	48.13
16-Sep-91	15:11	6.44	3.98	48.02
20-Sep-91	14:57	6.54	4.08	47.92
23-Sep-91	15:04	6.50	4.04	47.96
27-Sep-91	15:28	6.58	4.12	47.88
30-Sep-91	16:56	6.19	3.73	48.27
04-Oct-91	15:53	6.17	3.71	48.29
07-Oct-91	16:07	6.06	3.60	48.40
11-Oct-91	16:20	6.25	3.79	48.21
14-Oct-91	14:44	6.40	3.94	48.06
18-Oct-91	14:58	6.52	4.06	47.94
21-Oct-91	14:56	6.54	4.08	47.92
24-Oct-91	15:36	6.54	4.08	47.92
28-Oct-91	16:10	6.58	4.12	47.88

WET SEASON STATISTICS	GWT (feet)
# of Data Points = 41	
Standard Deviation	0.44
Variance	0.20
Average	48.34
Maximum	49.31
Minimum	47.71
Fluctuation	1.60

Figure K.6.1 Canterbury at Lake-Wet Season

Well # 6. Canterbury at Lake-Dry Season

Ground Elevation 52.00



Top of well elevation (ft)	54.46
Height of pvc pipe above ground (ft)	2.46

DATE	TIME	DEPTH ft	DWT ft	GWT ft
01-Nov-91	14:50	6.65	4.19	47.81
05-Nov-91	09:34	6.69	4.23	47.77
08-Nov-91	16:03	6.79	4.33	47.67
11-Nov-91	14:53	6.83	4.37	47.63
15-Nov-91	14:36	6.85	4.39	47.61
18-Nov-91	14:21	6.87	4.41	47.59
22-Nov-91	14:50	6.90	4.44	47.56
25-Nov-91	14:49	6.94	4.48	47.52
02-Dec-91	15:37	7.02	4.56	47.44
06-Dec-91	12:37	7.02	4.56	47.44
09-Dec-91	16:58	7.08	4.62	47.38
13-Dec-91	16:18	7.08	4.62	47.38
16-Dec-91	14:45	7.13	4.67	47.33
20-Dec-91	13:50	7.19	4.73	47.27
23-Dec-91	09:38	7.17	4.71	47.29
27-Dec-91	09:35	7.17	4.71	47.29
30-Dec-91	14:07	7.17	4.71	47.29
03-Jan-92	15:02	7.15	4.69	47.31
07-Jan-92	12:11	7.19	4.73	47.27
10-Jan-92	13:42	7.21	4.75	47.25
14-Jan-92	13:02	7.15	4.69	47.31
17-Jan-92	14:16	7.25	4.79	47.21
21-Jan-92	13:45	7.23	4.77	47.23
24-Jan-92	14:10	7.23	4.77	47.23
28-Jan-92	12:32	7.21	4.75	47.25
31-Jan-92	15:25	7.21	4.75	47.25
04-Feb-92	14:54	7.27	4.81	47.19
07-Feb-92	14:00	6.98	4.52	47.48

DATE	TIME	DEPTH ft	DWT ft	GWT ft
11-Feb-92	12:54	7.04	4.58	47.42
14-Feb-92	12:52	7.10	4.64	47.36
18-Feb-92	13:24	7.17	4.71	47.29
21-Feb-92	13:00	7.23	4.77	47.23
25-Feb-92	12:40	7.10	4.64	47.36
28-Feb-92	13:04	7.04	4.58	47.42
03-Mar-92	09:49	7.10	4.64	47.36
06-Mar-92	12:32	7.13	4.67	47.33
10-Mar-92	15:30	7.06	4.60	47.40
13-Mar-92	09:20	7.00	4.54	47.46
17-Mar-92	13:14	7.17	4.71	47.29
20-Mar-92	13:35	7.21	4.75	47.25
24-Mar-92	13:43	7.29	4.83	47.17
27-Mar-92	13:12	6.81	4.35	47.65
31-Mar-92	12:00	6.96	4.50	47.50
03-Apr-92	14:00	7.02	4.56	47.44
07-Apr-92	10:00	7.13	4.67	47.33
10-Apr-92	16:20	7.21	4.75	47.25
14-Apr-92	14:44	6.27	3.81	48.19
17-Apr-92	13:45	6.46	4.00	48.00
24-Apr-92	13:28	6.56	4.10	47.90
28-Apr-92	15:27	6.75	4.29	47.71
01-May-92	11:45	6.83	4.37	47.63
05-May-92	12:29	6.96	4.50	47.50
11-May-92	11:25	7.10	4.64	47.36
15-May-92	11:26	7.08	4.62	47.38
18-May-92	10:20	7.17	4.71	47.29
29-May-92	23:20	6.96	4.50	47.50

DRY SEASON STATISTICS	GWT (feet)
# Data Points = 52	
Standard Deviation	0.21
Variance	0.04
Average	47.43
Maximum	48.19
Minimum	47.17
Fluctuation	1.02

Figure K.6.2 Canterbury at the Lake-Dry Season

Well # 6. Canterbury at the Lake-Yearly

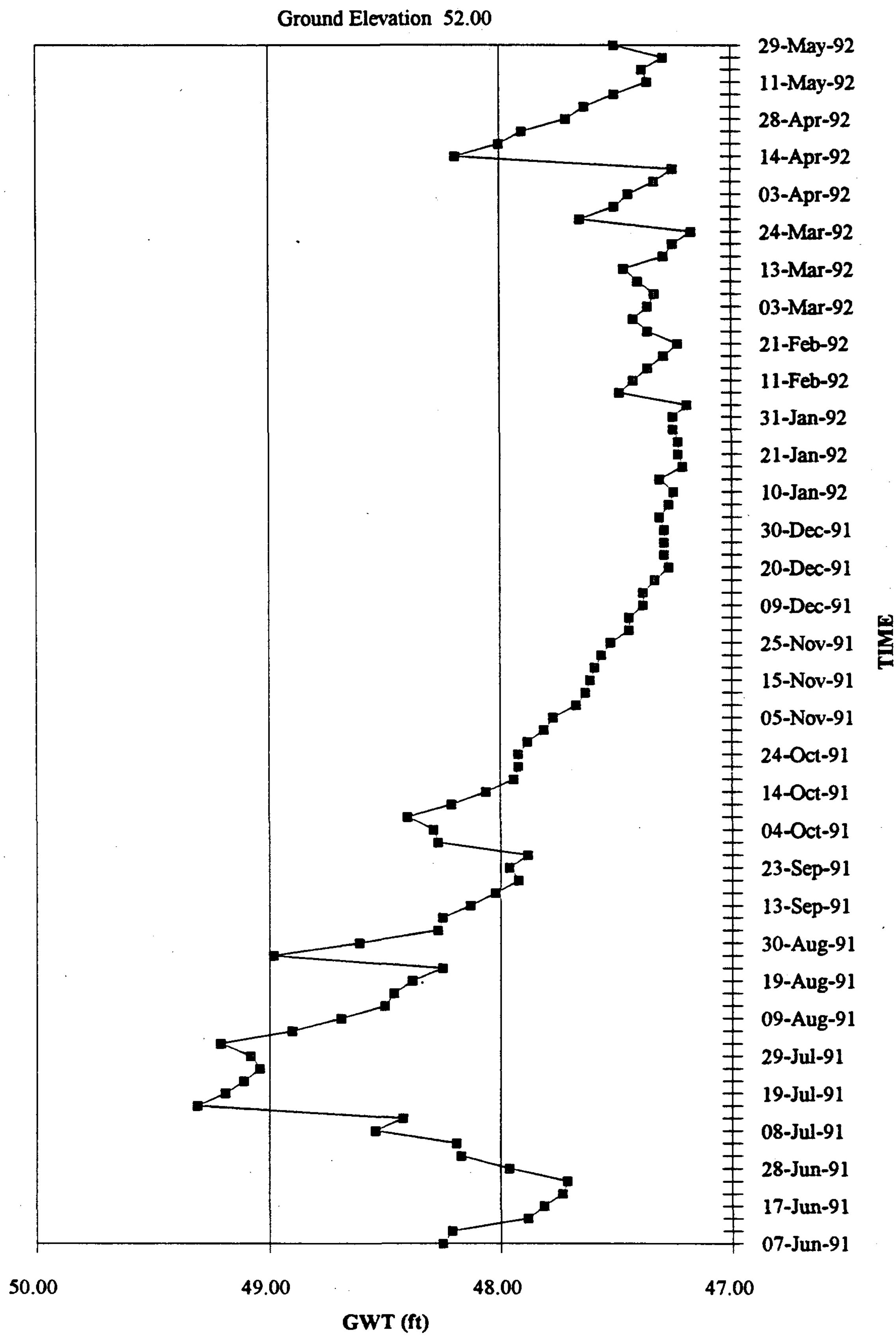
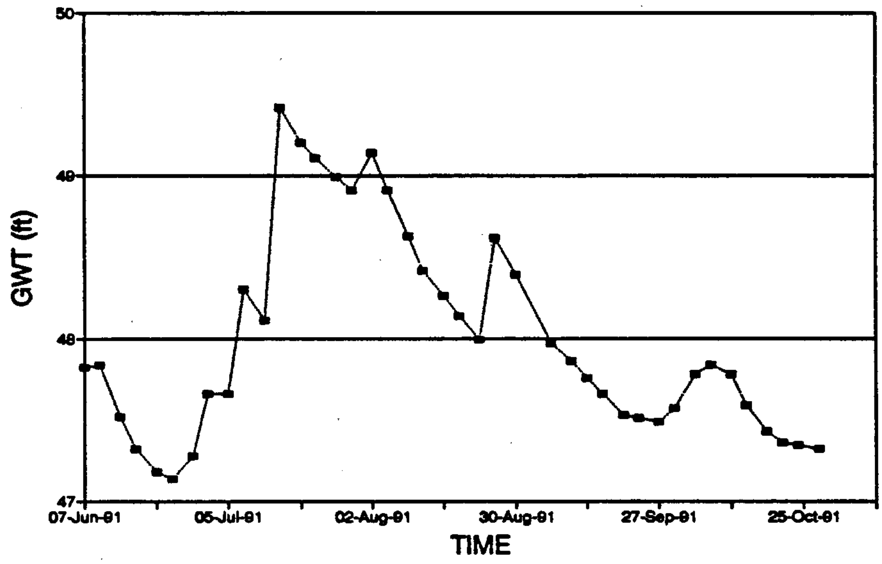


Figure K.6.3 Canterbury at the Lake-Yearly

Well # 7. Canterbury Field-Wet Season
Ground Elevation 55.20



Top of well elevation (ft) 57.24
Height of pvc pipe above ground (ft) 2.04

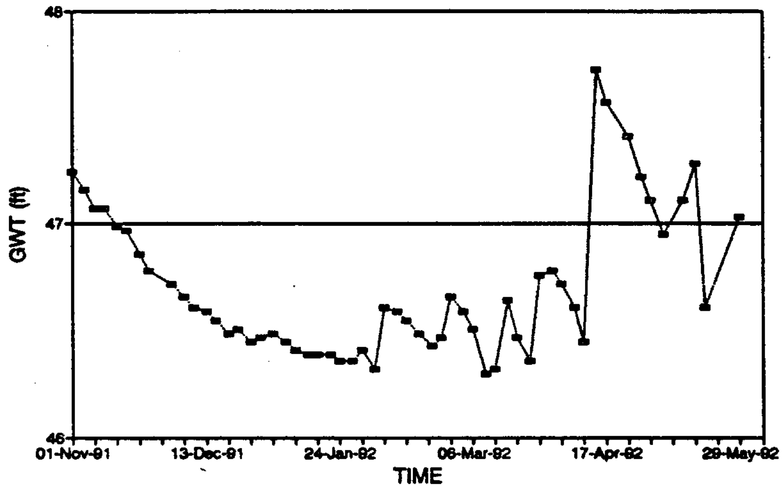
DATE	TIME	DEPTH ft	DWT ft	GWT ft
07-Jun-91	12:00	9.42	7.38	47.82
10-Jun-91	12:45	9.40	7.36	47.84
14-Jun-91	10:50	9.72	7.68	47.52
17-Jun-91	10:27	9.92	7.88	47.32
21-Jun-91	10:14	10.06	8.02	47.18
24-Jun-91	14:35	10.10	8.06	47.14
28-Jun-91	10:23	9.96	7.92	47.28
01-Jul-91	10:02	9.58	7.54	47.66
05-Jul-91	09:50	9.58	7.54	47.66
08-Jul-91	09:37	8.94	6.90	48.30
12-Jul-91	09:42	9.13	7.09	48.11
15-Jul-91	10:06	7.83	5.79	49.41
19-Jul-91	09:56	8.04	6.00	49.20
22-Jul-91	09:44	8.13	6.09	49.11
26-Jul-91	10:50	8.25	6.21	48.99
29-Jul-91	09:55	8.33	6.29	48.91
02-Aug-91	10:11	8.10	6.06	49.14
05-Aug-91	12:35	8.33	6.29	48.91
09-Aug-91	10:35	8.62	6.58	48.62
12-Aug-91	13:50	8.83	6.79	48.41
16-Aug-91	11:00	8.98	6.94	48.26
19-Aug-91	11:40	9.10	7.06	48.14
23-Aug-91	15:29	9.25	7.21	47.99
26-Aug-91	15:28	8.63	6.59	48.61
30-Aug-91	16:08	8.85	6.81	48.39
06-Sep-91	16:45	9.27	7.23	47.97
10-Sep-91	09:25	9.38	7.34	47.86
13-Sep-91	15:04	9.48	7.44	47.76
16-Sep-91	15:14	9.58	7.54	47.66
20-Sep-91	14:59	9.71	7.67	47.53
23-Sep-91	15:07	9.73	7.69	47.51
27-Sep-91	15:30	9.75	7.71	47.49
30-Sep-91	17:00	9.67	7.63	47.57
04-Oct-91	15:56	9.46	7.42	47.78
07-Oct-91	16:04	9.40	7.36	47.84
11-Oct-91	16:23	9.46	7.42	47.78
14-Oct-91	14:47	9.65	7.61	47.59
18-Oct-91	15:00	9.81	7.77	47.43
21-Oct-91	14:58	9.88	7.84	47.36
24-Oct-91	15:39	9.90	7.86	47.34
28-Oct-91	16:00	9.92	7.88	47.32

WET SEASON STATISTICS	GWT (feet)
# of Data Points = 41	
Standard Deviation	0.62
Variance	0.39
Average	47.99
Maximum	49.41
Minimum	47.14
Fluctuation	2.27

Figure K.7.1 Canterbury at Field-Wet Season

Well # 7. Canterbury in the Field

Ground Elevation 55.20



Top of well elevation (ft)	57.24
Height of pvc pipe above ground (ft)	2.04

DATE	TIME	DEPTH ft	DWT ft	GWT ft
01-Nov-91	14:50	10.00	7.96	47.24
05-Nov-91	09:37	10.08	8.04	47.16
08-Nov-91	16:06	10.17	8.13	47.07
11-Nov-91	14:55	10.17	8.13	47.07
15-Nov-91	14:39	10.25	8.21	46.99
18-Nov-91	14:11	10.27	8.23	46.97
22-Nov-91	14:50	10.38	8.34	46.86
25-Nov-91	14:48	10.46	8.42	46.78
02-Dec-91	15:40	10.52	8.48	46.72
06-Dec-91	12:40	10.58	8.54	46.66
09-Dec-91	17:00	10.63	8.59	46.61
13-Dec-91	16:21	10.65	8.61	46.59
16-Dec-91	14:48	10.69	8.65	46.55
20-Dec-91	13:52	10.75	8.71	46.49
23-Dec-91	09:40	10.73	8.69	46.51
27-Dec-91	09:37	10.79	8.75	46.45
30-Dec-91	14:10	10.77	8.73	46.47
03-Jan-92	15:05	10.75	8.71	46.49
07-Jan-92	12:14	10.79	8.75	46.45
10-Jan-92	13:44	10.83	8.79	46.41
14-Jan-92	13:06	10.85	8.81	46.39
17-Jan-92	14:18	10.85	8.81	46.39
21-Jan-92	13:50	10.85	8.81	46.39
24-Jan-92	14:14	10.88	8.84	46.36
28-Jan-92	12:35	10.88	8.84	46.36
31-Jan-92	15:27	10.83	8.79	46.41
04-Feb-92	14:57	10.92	8.88	46.32
07-Feb-92	14:02	10.63	8.59	46.61

DATE	TIME	DEPTH ft	DWT ft	GWT ft
11-Feb-92	12:56	10.65	8.61	46.59
14-Feb-92	12:54	10.69	8.65	46.55
18-Feb-92	13:26	10.75	8.71	46.49
22-Feb-92	14:23	10.81	8.77	46.43
25-Feb-92	12:42	10.77	8.73	46.47
28-Feb-92	13:06	10.58	8.54	46.66
03-Mar-92	09:52	10.65	8.61	46.59
06-Mar-92	12:34	10.73	8.69	46.51
10-Mar-92	15:34	10.94	8.90	46.30
13-Mar-92	09:25	10.92	8.88	46.32
17-Mar-92	13:21	10.60	8.56	46.64
20-Mar-92	13:40	10.77	8.73	46.47
24-Mar-92	13:45	10.88	8.84	46.36
27-Mar-92	13:15	10.48	8.44	46.76
31-Mar-92	12:03	10.46	8.42	46.78
03-Apr-92	14:05	10.52	8.48	46.72
07-Apr-92	10:03	10.63	8.59	46.61
10-Apr-92	16:22	10.79	8.75	46.45
14-Apr-92	14:49	9.52	7.48	47.72
17-Apr-92	13:47	9.67	7.63	47.57
24-Apr-92	13:31	9.83	7.79	47.41
28-Apr-92	15:29	10.02	7.98	47.22
01-May-92	11:48	10.13	8.09	47.11
05-May-92	11:25	10.29	8.25	46.95
11-May-92	11:28	10.13	8.09	47.11
15-May-92	11:30	9.96	7.92	47.28
18-May-92	10:28	10.63	8.59	46.61
29-May-92	10:30	10.21	8.17	47.03

DRY SEASON STATISTICS	GWT (feet)
# Data Points = 56	
Standard Deviation	0.34
Variance	0.12
Average	46.71
Maximum	47.72
Minimum	46.30
Fluctuation	1.42

Figure K.7.2 Canterbury in the Field-Dry Season

Well #7. Canterbury Field-Yearly

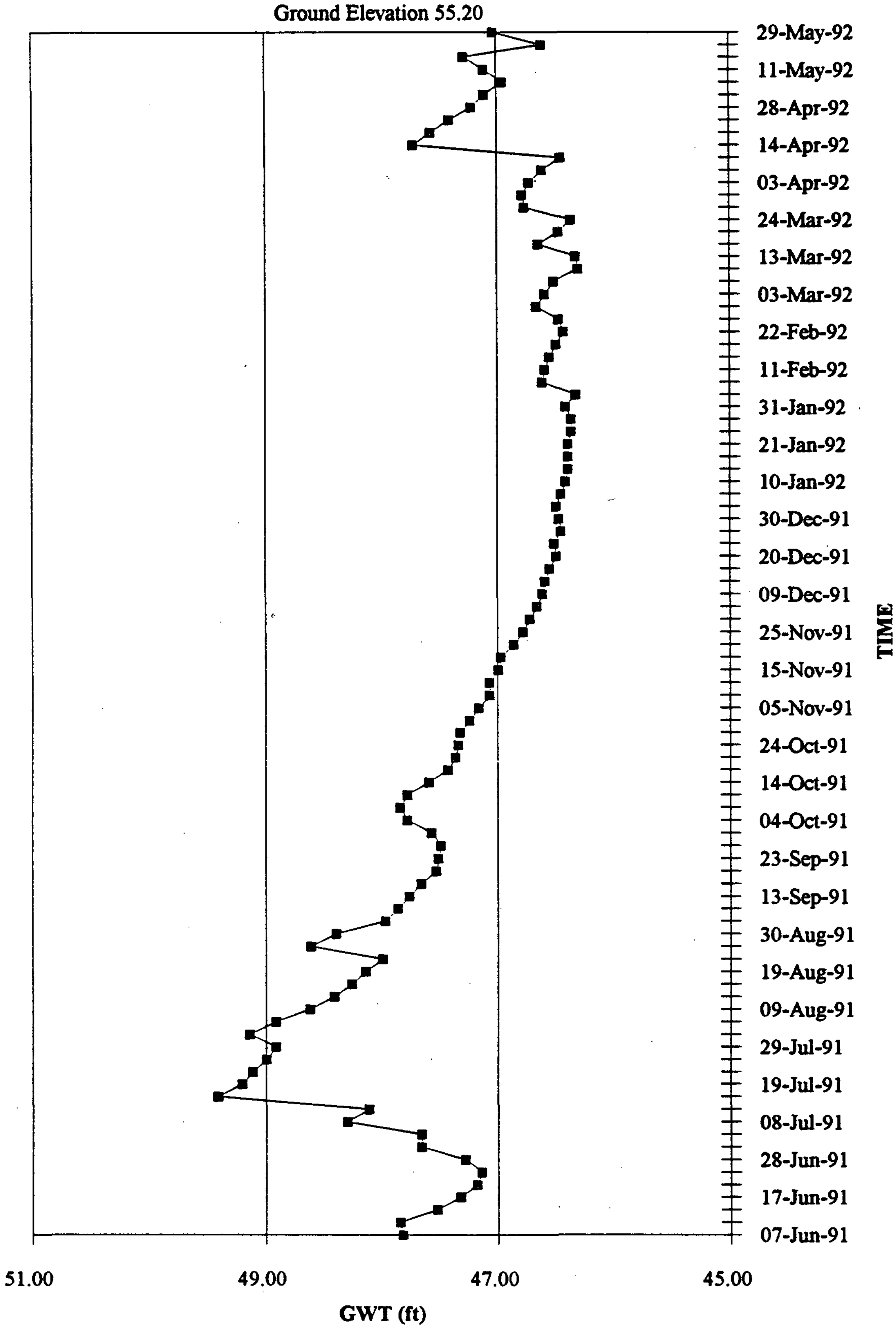
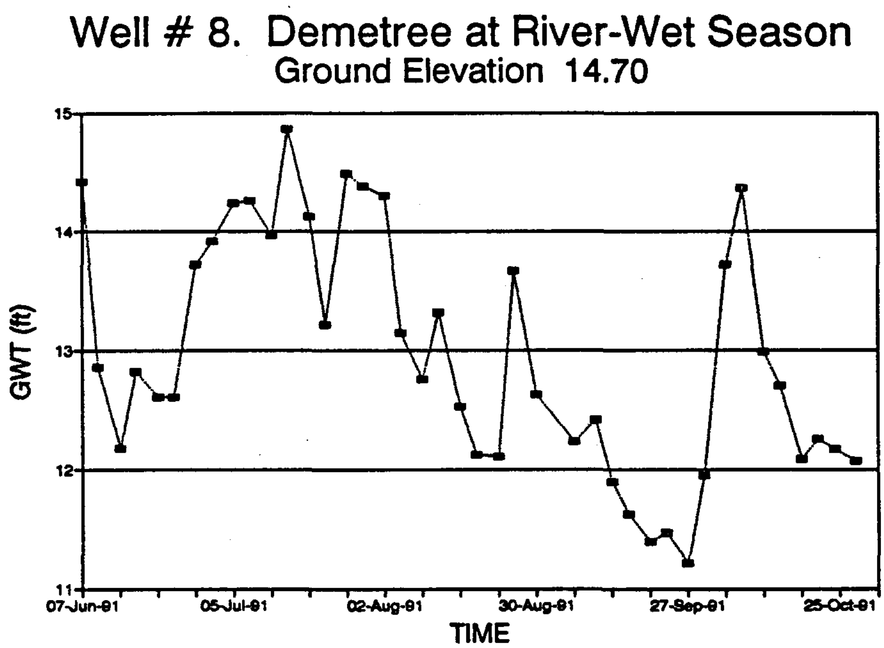


Figure K.7.3 Canterbury Field-Yearly



Top of well elevation (ft)	17.30
Height of pvc pipe above ground (ft)	2.60

DATE	TIME	DEPTH ft	DWT ft	GWT ft
07-Jun-91	13:10	2.88	0.28	14.42
10-Jun-91	13:20	4.44	1.84	12.86
14-Jun-91	11:20	5.12	2.52	12.18
17-Jun-91	11:00	4.48	1.88	12.82
21-Jun-91	10:45	4.69	2.09	12.61
24-Jun-91	15:20	4.69	2.09	12.61
28-Jun-91	10:51	3.58	0.98	13.72
01-Jul-91	10:29	3.38	0.78	13.92
05-Jul-91	10:23	3.06	0.46	14.24
08-Jul-91	10:04	3.04	0.44	14.26
12-Jul-91	10:07	3.33	0.73	13.97
15-Jul-91	10:34	2.44	-0.16	14.86
19-Jul-91	10:28	3.17	0.57	14.13
22-Jul-91	10:13	4.08	1.48	13.22
26-Jul-91	10:04	2.81	0.21	14.49
29-Jul-91	10:20	2.92	0.32	14.38
02-Aug-91	10:31	3.00	0.40	14.30
05-Aug-91	12:55	4.15	1.55	13.15
09-Aug-91	11:05	4.54	1.94	12.76
12-Aug-91	14:11	3.98	1.38	13.32
16-Aug-91	11:25	4.77	2.17	12.53

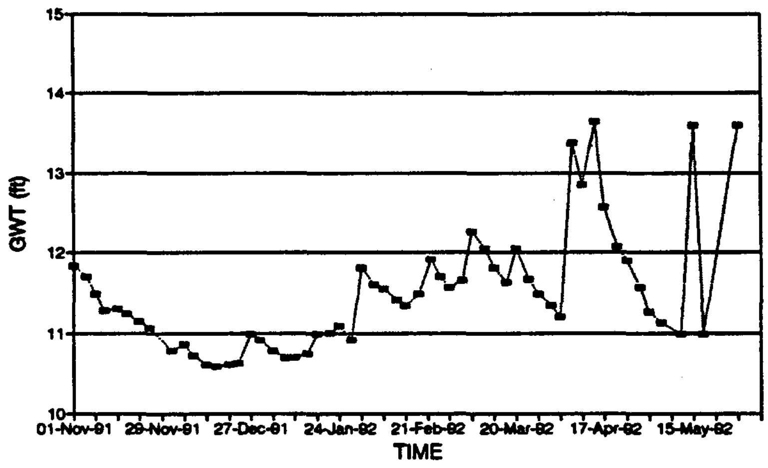
DATE	TIME	DEPTH ft	DWT ft	GWT ft
19-Aug-91	12:10	5.17	2.57	12.13
23-Aug-91	16:00	5.19	2.59	12.11
26-Aug-91	16:03	3.63	1.03	13.67
30-Aug-91	16:38	4.67	2.07	12.63
06-Sep-91	17:15	5.06	2.46	12.24
10-Sep-91	09:55	4.88	2.28	12.42
13-Sep-91	14:36	5.40	2.80	11.90
16-Sep-91	15:40	5.67	3.07	11.63
20-Sep-91	14:24	5.90	3.30	11.40
23-Sep-91	15:34	5.83	3.23	11.47
27-Sep-91	14:46	6.08	3.48	11.22
30-Sep-91	17:25	5.35	2.75	11.95
04-Oct-91	16:22	3.58	0.98	13.72
07-Oct-91	16:36	2.94	0.34	14.36
11-Oct-91	16:47	4.31	1.71	12.99
14-Oct-91	15:13	4.60	2.00	12.70
18-Oct-91	14:29	5.21	2.61	12.09
21-Oct-91	15:25	5.04	2.44	12.26
24-Oct-91	14:43	5.13	2.53	12.17
28-Oct-91	15:49	5.23	2.63	12.07

WET SEASON STATISTICS	*GWT* (Feet)
# Data Points	41
Standard Deviation	1.00
Variance	1.00
Average	12.97
Maximum	14.86
Minimum	11.22
Fluctuation	3.64

Figure K.8.1 Demetree at the River-Wet Season

Well # 8. Demetree at River-Dry Season

Ground Elevation 14.70



Top of well elevation (ft)	17.30
Height of pvc pipe above ground (ft)	2.60

DATE	TIME	DEPTH ft	DWT ft	GWT ft
01-Nov-91	15:20	5.46	2.86	11.84
05-Nov-91	10:13	5.60	3.00	11.70
08-Nov-91	16:33	5.81	3.21	11.49
11-Nov-91	15:35	6.02	3.42	11.28
15-Nov-91	14:10	6.00	3.40	11.30
18-Nov-91	16:06	6.06	3.46	11.24
22-Nov-91	15:30	6.15	3.55	11.15
25-Nov-91	15:15	6.23	3.63	11.07
02-Dec-91	16:03	6.52	3.92	10.78
06-Dec-91	13:05	6.44	3.84	10.86
09-Dec-91	16:22	6.58	3.98	10.72
13-Dec-91	16:45	6.69	4.09	10.61
16-Dec-91	15:14	6.71	4.11	10.59
20-Dec-91	16:22	6.69	4.09	10.61
23-Dec-91	10:10	6.67	4.07	10.63
27-Dec-91	10:05	6.31	3.71	10.99
30-Dec-91	14:52	6.38	3.78	10.92
03-Jan-92	15:34	6.52	3.92	10.78
07-Jan-92	12:39	6.60	4.00	10.70
10-Jan-92	14:11	6.60	4.00	10.70
14-Jan-92	13:32	6.56	3.96	10.74
17-Jan-92	13:37	6.31	3.71	10.99
21-Jan-92	13:47	6.29	3.69	11.01
24-Jan-92	15:53	6.21	3.61	11.09
28-Jan-92	13:08	6.38	3.78	10.92
31-Jan-92	13:45	5.48	2.88	11.82
04-Feb-92	15:18	5.69	3.09	11.61
07-Feb-92	14:31	5.75	3.15	11.55
11-Feb-92	12:30	5.88	3.28	11.42

DATE	TIME	DEPTH ft	DWT ft	GWT ft
14-Feb-92	13:18	5.96	3.36	11.34
18-Feb-92	12:55	5.81	3.21	11.49
22-Feb-92	15:47	5.38	2.78	11.92
25-Feb-92	12:12	5.60	3.00	11.70
28-Feb-92	13:32	5.73	3.13	11.57
03-Mar-92	10:15	5.65	3.05	11.65
06-Mar-92	13:30	5.04	2.44	12.26
10-Mar-92	14:55	5.25	2.65	12.05
13-Mar-92	09:50	5.48	2.88	11.82
17-Mar-92	12:45	5.67	3.07	11.63
20-Mar-92	13:10	5.25	2.65	12.05
24-Mar-92	14:13	5.63	3.03	11.67
27-Mar-92	13:42	5.81	3.21	11.49
31-Mar-92	12:35	5.96	3.36	11.34
03-Apr-92	13:35	6.10	3.50	11.20
07-Apr-92	10:36	3.92	1.32	13.38
10-Apr-92	14:00	4.44	1.84	12.86
14-Apr-92	11:43	3.65	1.05	13.65
17-Apr-92	14:13	4.73	2.13	12.57
21-Apr-92	16:15	5.23	2.63	12.07
24-Apr-92	14:41	5.40	2.80	11.90
28-Apr-92	16:00	5.73	3.13	11.57
01-May-92	12:15	6.04	3.44	11.26
05-May-92	13:19	6.17	3.57	11.13
11-May-92	12:08	6.31	3.71	10.99
15-May-92	11:58	3.70	1.10	13.60
18-May-92	10:50	6.31	3.71	10.99
29-May-92	23:10	3.70	1.10	13.60

DRY SEASON STATISTICS	GWT (feet)
# Data Points = 57	
Standard Deviation	0.75
Variance	0.58
Average	11.51
Maximum	13.65
Minimum	10.59
Fluctuation	3.06

Figure K.8.2 Demetree at the River-Dry Season

Well # 8. Demetree at River-Yearly

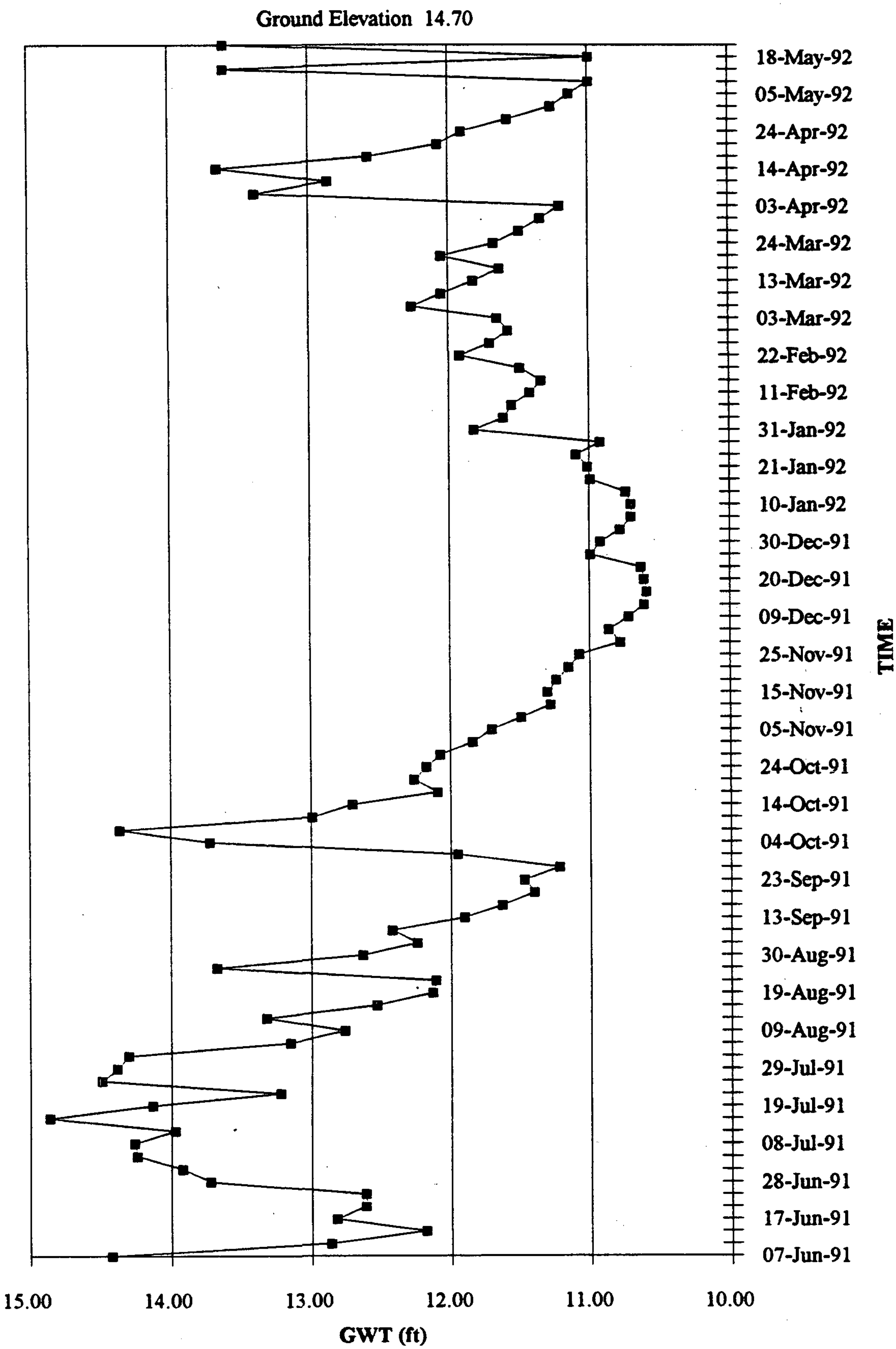
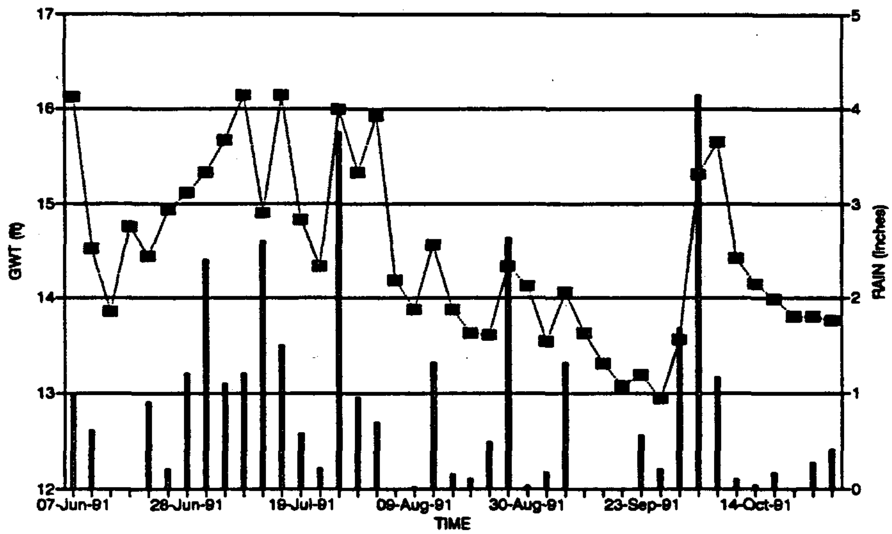


Figure K.8.3 Demetree at River-Yearly

Well # 9. Demetree in Field-Wet Season

Ground Elevation 16.40



Top of well elevation (ft)	18.96
Height of pvc pipe above ground (ft)	2.56

DATE	TIME	DEPTH ft	DWT ft	GWT ft	RAIN in
07-Jun-91	13:15	2.83	0.27	16.13	1.00*
10-Jun-91	13:24	4.44	1.88	14.52	0.60*
14-Jun-91	11.22	5.10	2.54	13.86	0.00*
17-Jun-91	11:04	4.21	1.65	14.75	0.00*
21-Jun-91	10:50	4.52	1.96	14.44	0.90*
24-Jun-91	15:24	4.02	1.46	14.94	0.20*
28-Jun-91	10:58	3.85	1.29	15.11	1.20*
01-Jul-91	10:33	3.63	1.07	15.33	2.40*
05-Jul-91	10:24	3.29	0.73	15.67	1.10*
08-Jul-91	10:07	2.81	0.25	16.15	1.20*
12-Jul-91	10:12	4.06	1.50	14.90	2.60*
15-Jul-91	10:46	2.81	0.25	16.15	1.50*
19-Jul-91	10:30	4.13	1.57	14.83	0.57
22-Jul-91	10:20	4.63	2.07	14.33	0.21
26-Jul-91	10:15	2.96	0.40	16.00	3.76
29-Jul-91	10:30	3.63	1.07	15.33	0.96
02-Aug-91	10:35	3.04	0.48	15.92	0.69
05-Aug-91	13:00	4.77	2.21	14.19	0.00
09-Aug-91	11:10	5.08	2.52	13.88	0.01
12-Aug-91	14:17	4.40	1.84	14.56	1.32
16-Aug-91	11:30	5.08	2.52	13.88	0.15

DATE	TIME	DEPTH ft	DWT ft	GWT ft	RAIN in
19-Aug-91	12:15	5.33	2.77	13.63	0.10
23-Aug-91	16:05	5.35	2.79	13.61	0.48
26-Aug-91	16:08	4.63	2.07	14.33	2.63
30-Aug-91	16:44	4.83	2.27	14.13	0.02
06-Sep-91	17:24	5.42	2.86	13.54	0.17
10-Sep-91	9:55	4.90	2.34	14.06	1.32
13-Sep-91	14:39	5.33	2.77	13.63	0.00
16-Sep-91	15:43	5.65	3.09	13.31	0.00
20-Sep-91	14:27	5.88	3.32	13.08	0.00
23-Sep-91	15:37	5.77	3.21	13.19	0.55
27-Sep-91	14:53	6.02	3.46	12.94	0.20
30-Sep-91	17:28	5.40	2.84	13.56	1.68
04-Oct-91	16:27	3.65	1.09	15.31	4.15
07-Oct-91	16:37	3.31	0.75	15.65	1.16
11-Oct-91	16:51	4.54	1.98	14.42	0.09
14-Oct-91	15:16	4.81	2.25	14.15	0.03
18-Oct-91	14:33	4.98	2.42	13.98	0.16
21-Oct-91	15:28	5.15	2.59	13.81	0.00
24-Oct-91	14:45	5.15	2.59	13.81	0.27
28-Oct-91	15:47	5.19	2.63	13.77	0.40

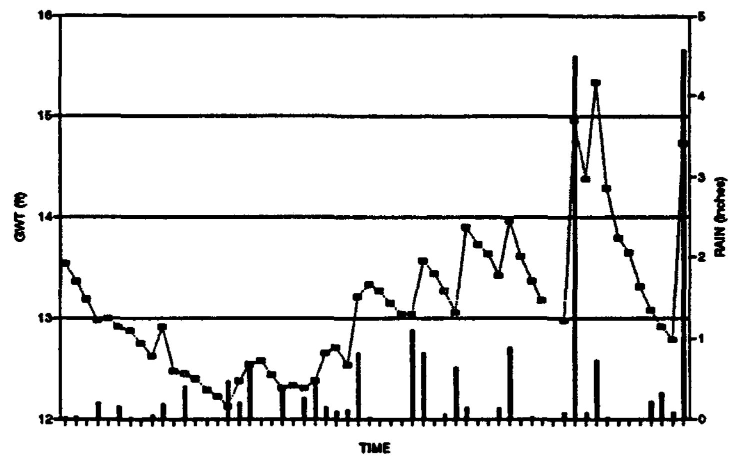
* Estimated Rainfall from Geneva Depth Gauge

WET SEASON STATISTICS	GWT (feet)	Rain (inches)
# of Data Points = 41		
Standard Deviation	0.90	1.01
Variance	0.83	1.05
Average	14.46	0.82
Maximum	16.15	4.15
Minimum	12.94	0.00
Fluctuation	3.21	4.15
Cumulative Rainfall		33.78

Figure K.9.1 Demetree in Field-Wet Season

Well # 9. Demetree in Field-Dry Season

Ground Elevation 16.40



Top of well elevation (ft)	18.96
Height of pvc pipe above ground (ft)	2.56

DATE	TIME	DEPT ft	DWT ft	GWT ft	RAIN in
01-Nov-91	15:20	5.42	2.86	13.54	0.01
05-Nov-91	10:13	5.60	3.04	13.36	0.02
08-Nov-91	16:35	5.77	3.21	13.19	0.00
11-Nov-91	15:30	5.98	3.42	12.98	0.20
15-Nov-91	14:10	5.96	3.40	13.00	0.00
18-Nov-91	16:10	6.04	3.48	12.92	0.15
22-Nov-91	15:30	6.08	3.52	12.88	0.01
25-Nov-91	15:20	6.21	3.65	12.75	0.00
02-Dec-91	16:06	6.33	3.77	12.63	0.04
06-Dec-91	13:06	6.04	3.48	12.92	0.18
09-Dec-91	16:25	6.48	3.92	12.48	0.00
13-Dec-91	16:47	6.50	3.94	12.46	0.40
16-Dec-91	15:16	6.56	4.00	12.40	0.00
20-Dec-91	14:25	6.67	4.11	12.29	0.00
23-Dec-91	10:10	6.73	4.17	12.23	0.00
27-Dec-91	10:10	6.83	4.27	12.13	0.46
30-Dec-91	14:50	6.58	4.02	12.38	0.20
03-Jan-92	15:35	6.42	3.86	12.54	0.66
07-Jan-92	12:41	6.38	3.82	12.58	0.00
10-Jan-92	14:10	6.52	3.96	12.44	0.00
14-Jan-92	13:36	6.65	4.09	12.31	0.40
17-Jan-92	14:49	6.63	4.07	12.33	0.00
21-Jan-92	13:47	6.65	4.09	12.31	0.26
24-Jan-92	13:33	6.58	4.02	12.38	0.49
28-Jan-92	13:12	6.31	3.75	12.65	0.14
31-Jan-92	13:47	6.25	3.69	12.71	0.09
04-Feb-92	14:02	6.42	3.86	12.54	0.11
07-Feb-92	14:34	5.75	3.19	13.21	0.81
11-Feb-92	12:33	5.63	3.07	13.33	0.01 *

DATE	TIME	DEPTH ft	DWT ft	GWT ft	RAIN in
14-Feb-92	13:20	5.69	3.13	13.27	0.00 *
18-Feb-92	12:57	5.81	3.25	13.15	0.00 *
22-Feb-92	12:00	5.92	3.36	13.04	0.00 *
25-Feb-92	12:15	5.92	3.36	13.04	1.10
28-Feb-92	13:35	5.40	2.84	13.56	0.81
03-Mar-92	10:19	5.52	2.96	13.44	0.00
06-Mar-92	13:34	5.69	3.13	13.27	0.05
10-Mar-92	14:52	5.90	3.34	13.06	0.64
13-Mar-92	09:55	5.06	2.50	13.90	0.14
17-Mar-92	12:47	5.23	2.67	13.73	0.00
20-Mar-92	13:15	5.33	2.77	13.63	0.00
24-Mar-92	14:15	5.54	2.98	13.42	0.13
27-Mar-92	13:46	5.00	2.44	13.96	0.88
31-Mar-92	12:40	5.35	2.79	13.61	0.00
03-Apr-92	13:39	5.60	3.04	13.36	0.01
07-Apr-92	10:39	5.79	3.23	13.17	0.00
10-Apr-92	14:02	5.98	3.42	12.98	0.07
14-Apr-92	11:40	4.00	1.44	14.96	4.49
17-Apr-92	14:15	4.58	2.02	14.38	0.07
21-Apr-92	16:18	3.63	1.07	15.33	0.73
24-Apr-92	14:44	4.67	2.11	14.29	0.01
28-Apr-92	16:01	5.17	2.61	13.79	0.00
01-May-92	12:19	5.31	2.75	13.65	0.00
05-May-92	13:22	5.65	3.09	13.31	0.00
11-May-92	12:10	5.88	3.32	13.08	0.21
15-May-92	12:02	6.04	3.48	12.92	0.33
18-May-92	10:55	6.17	3.61	12.79	0.08
29-May-92	23:15	4.23	1.67	14.73	4.57

* Estimated Rainfall from Geneva Depth Gauge

DRY SEASON STATISTICS	GWT (feet)	RAIN (inches)
# Data Points = 57		
Standard Deviation	0.69	0.84
Variance	0.48	0.73
Average	13.13	0.33
Maximum	15.33	4.57
Minimum	12.13	0.00
Fluctuation	3.20	4.57
Cumulative Rainfall		18.96

Figure K.9.2 Demetree in the Field-Dry Season

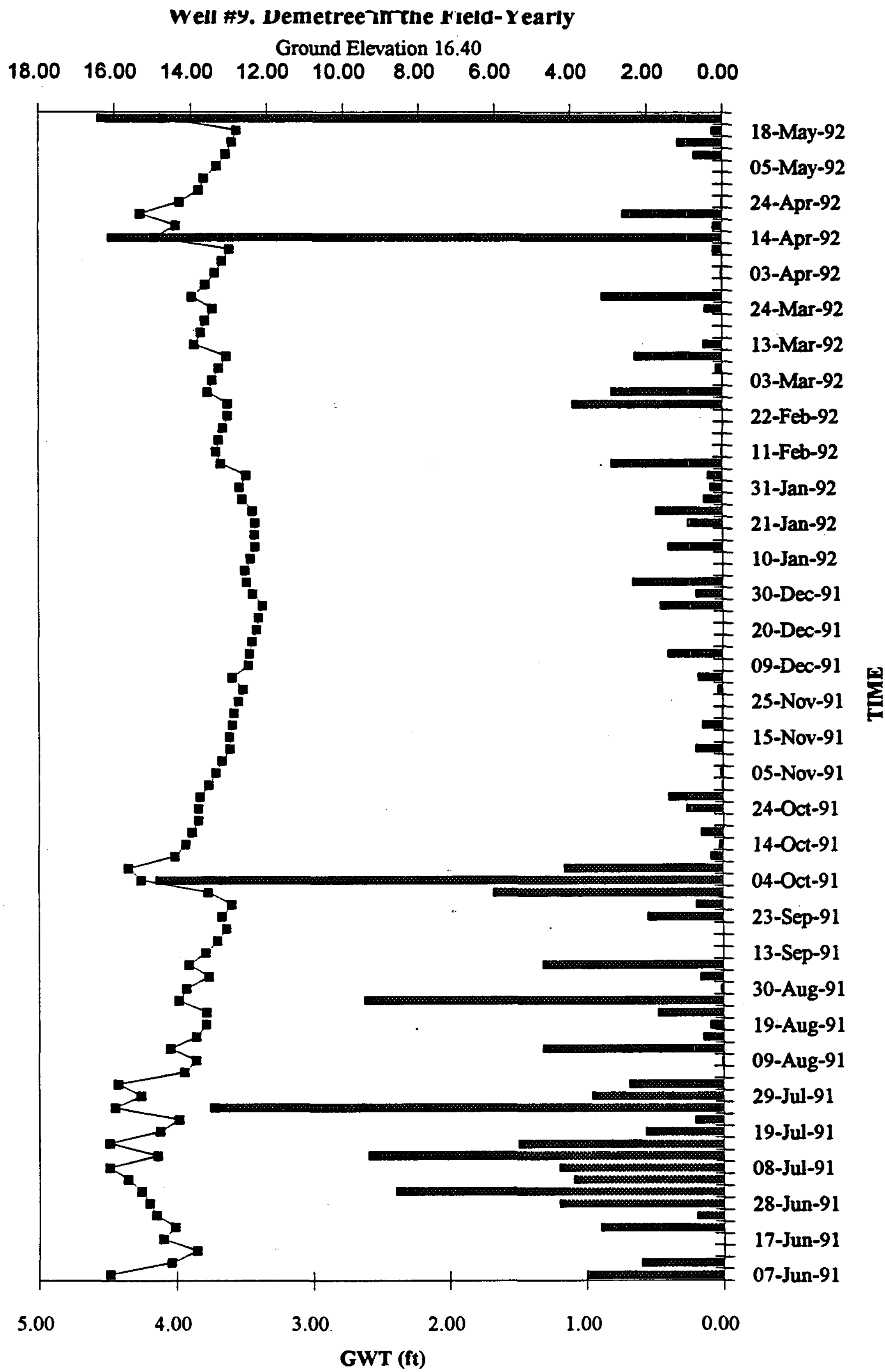
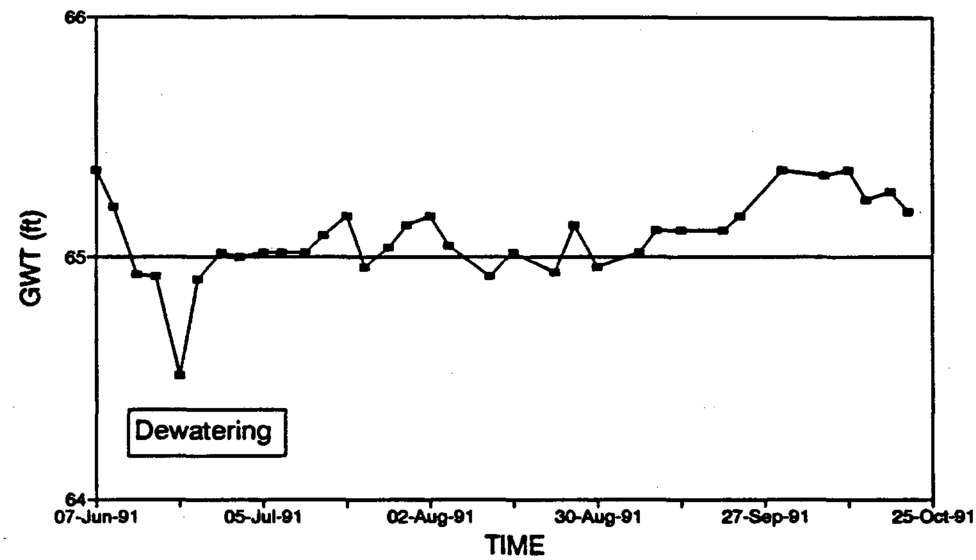


Figure K.9.3 Demetree in the Field-Yearly

Well # 10. UCF Center-Wet Season

Ground Elevation 66.31



Elevation at top of pvc pipe (ft)	67.91
Height of pvc pipe above ground (ft)	1.59

DATE	TIME	DEPTH ft	DWT ft	GWT ft
07-Jun-91	08:30	2.54	0.95	65.36
10-Jun-91	11:20	2.69	1.10	65.21
14-Jun-91	08:15	2.97	1.38	64.93
17-Jun-91	10:30	2.98	1.39	64.92
21-Jun-91	10:25	3.39	1.80	64.51
24-Jun-91	10:20	2.99	1.40	64.91
28-Jun-91	09:15	2.88	1.29	65.02
01-Jul-91	10:05	2.90	1.31	65.00
05-Jul-91	10:30	2.88	1.29	65.02
08-Jul-91	10:20	2.88	1.29	65.02
12-Jul-91	10:45	2.88	1.29	65.02
15-Jul-91	10:25	2.81	1.22	65.09
19-Jul-91	08:30	2.73	1.14	65.17
22-Jul-91	10:20	2.94	1.35	64.96
26-Jul-91	10:15	2.86	1.27	65.04
29-Jul-91	10:15	2.77	1.18	65.13
02-Aug-91	10:15	2.73	1.14	65.17

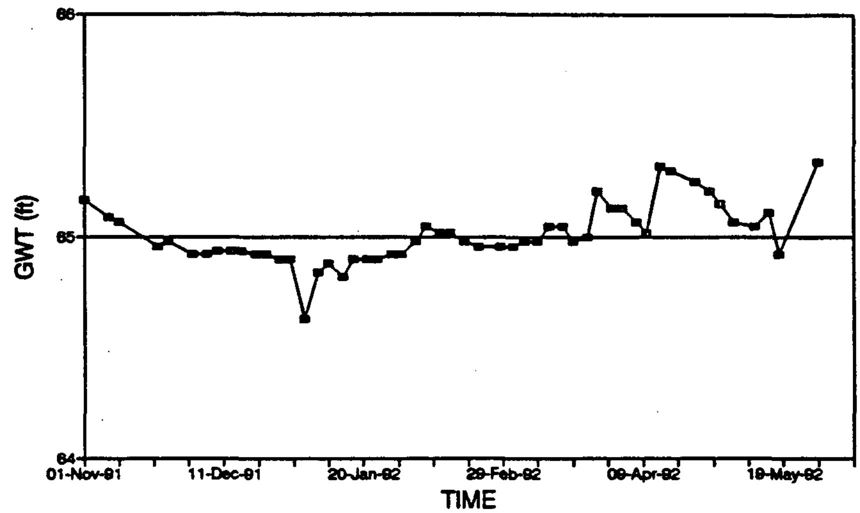
DATE	TIME	DEPTH ft	DWT ft	GWT ft
05-Aug-91	10:15	2.85	1.26	65.05
12-Aug-91	13:00	2.98	1.39	64.92
16-Aug-91	13:45	2.88	1.29	65.02
23-Aug-91	11:00	2.96	1.37	64.94
26-Aug-91	10:45	2.77	1.18	65.13
30-Aug-91	16:00	2.94	1.35	64.96
06-Sep-91	10:45	2.88	1.29	65.02
09-Sep-91	16:00	2.79	1.20	65.11
13-Sep-91	11:00	2.79	1.20	65.11
20-Sep-91	11:00	2.79	1.20	65.11
23-Sep-91	08:00	2.73	1.14	65.17
30-Sep-91	16:35	2.54	0.95	65.36
07-Oct-91	15:01	2.56	0.97	65.34
11-Oct-91	14:40	2.54	0.95	65.36
14-Oct-91	14:30	2.66	1.07	65.24
18-Oct-91	14:35	2.63	1.04	65.27
21-Oct-91	14:35	2.71	1.12	65.19

WET SEASON STATISTICS	GWT (feet)
# of Data Points = 34	
Standard Deviation	0.17
Variance	0.03
Average	65.08
Maximum	65.36
Minimum	64.51
Fluctuation	0.85

Figure K.10.1 UCF Center-Wet Season

Well #10. UCF Center-Dry Season

Ground Elevation 66.31



Elevation at top of pvc pipe (ft)	**67.90**
Height of pvc pipe above ground (ft)	**1.60**

DATE	TIME	DEPTH ft	DWT ft	GWT ft
01-Nov-91	12:20	2.73	1.13	65.17
08-Nov-91	14:40	2.81	1.21	65.09
11-Nov-91	14:50	2.83	1.23	65.07
22-Nov-91	14:05	2.94	1.34	64.96
25-Nov-91	14:38	2.92	1.32	64.98
02-Dec-91	15:10	2.98	1.38	64.92
06-Dec-91	12:20	2.98	1.38	64.92
09-Dec-91	17:50	2.96	1.36	64.94
13-Dec-91	17:52	2.96	1.36	64.94
16-Dec-91	16:50	2.96	1.36	64.94
20-Dec-91	15:52	2.98	1.38	64.92
23-Dec-91	09:20	2.98	1.38	64.92
27-Dec-91	09:15	3.00	1.40	64.90
30-Dec-91	13:52	3.00	1.40	64.90
03-Jan-92	14:49	3.27	1.67	64.63
07-Jan-92	14:00	3.06	1.46	64.84
10-Jan-92	15:25	3.02	1.42	64.88
14-Jan-92	12:45	3.08	1.48	64.82
17-Jan-92	16:09	3.00	1.40	64.90
21-Jan-92	16:09	3.00	1.40	64.90
24-Jan-92	14:00	3.00	1.40	64.90
28-Jan-92	14:03	2.98	1.38	64.92
31-Jan-92	14:15	2.98	1.38	64.92
04-Feb-92	13:18	2.92	1.32	64.98
07-Feb-92	15:56	2.85	1.25	65.05
11-Feb-92	13:13	2.88	1.28	65.02

DATE	TIME	DEPTH ft	DWT ft	GWT ft
14-Feb-92	14:46	2.88	1.28	65.02
18-Feb-92	13:44	2.92	1.32	64.98
22-Feb-92	13:16	2.94	1.34	64.96
28-Feb-92	15:15	2.94	1.34	64.96
03-Mar-92	11:54	2.94	1.34	64.96
06-Mar-92	14:54	2.92	1.32	64.98
10-Mar-92	15:55	2.92	1.32	64.98
13-Mar-92	09:00	2.85	1.25	65.05
17-Mar-92	15:36	2.85	1.25	65.05
20-Mar-92	14:40	2.92	1.32	64.98
24-Mar-92	15:45	2.90	1.30	65.00
27-Mar-92	15:26	2.69	1.09	65.21
31-Mar-92	14:36	2.77	1.17	65.13
03-Apr-92	14:22	2.77	1.17	65.13
07-Apr-92	09:45	2.83	1.23	65.07
10-Apr-92	16:15	2.88	1.28	65.02
14-Apr-92	15:44	2.58	0.98	65.32
17-Apr-92	15:34	2.60	1.00	65.30
24-Apr-92	16:04	2.65	1.05	65.25
28-Apr-92	17:15	2.69	1.09	65.21
01-May-92	13:47	2.75	1.15	65.15
05-May-92	14:50	2.83	1.23	65.07
11-May-92	13:35	2.85	1.25	65.05
15-May-92	15:55	2.79	1.19	65.11
18-May-92	12:35	2.98	1.38	64.92
29-May-92	16:02	2.56	0.96	65.34

DRY SEASON STATISTICS	GWT (feet)
# Data Points	52.00
Standard Deviation	0.13
Variance	0.02
Average	65.01
Maximum	65.34
Minimum	64.63
Fluctuation	0.71

Figure K.10.2 UCF Center-Dry Season

Well # 10. UCF Center-Yearly

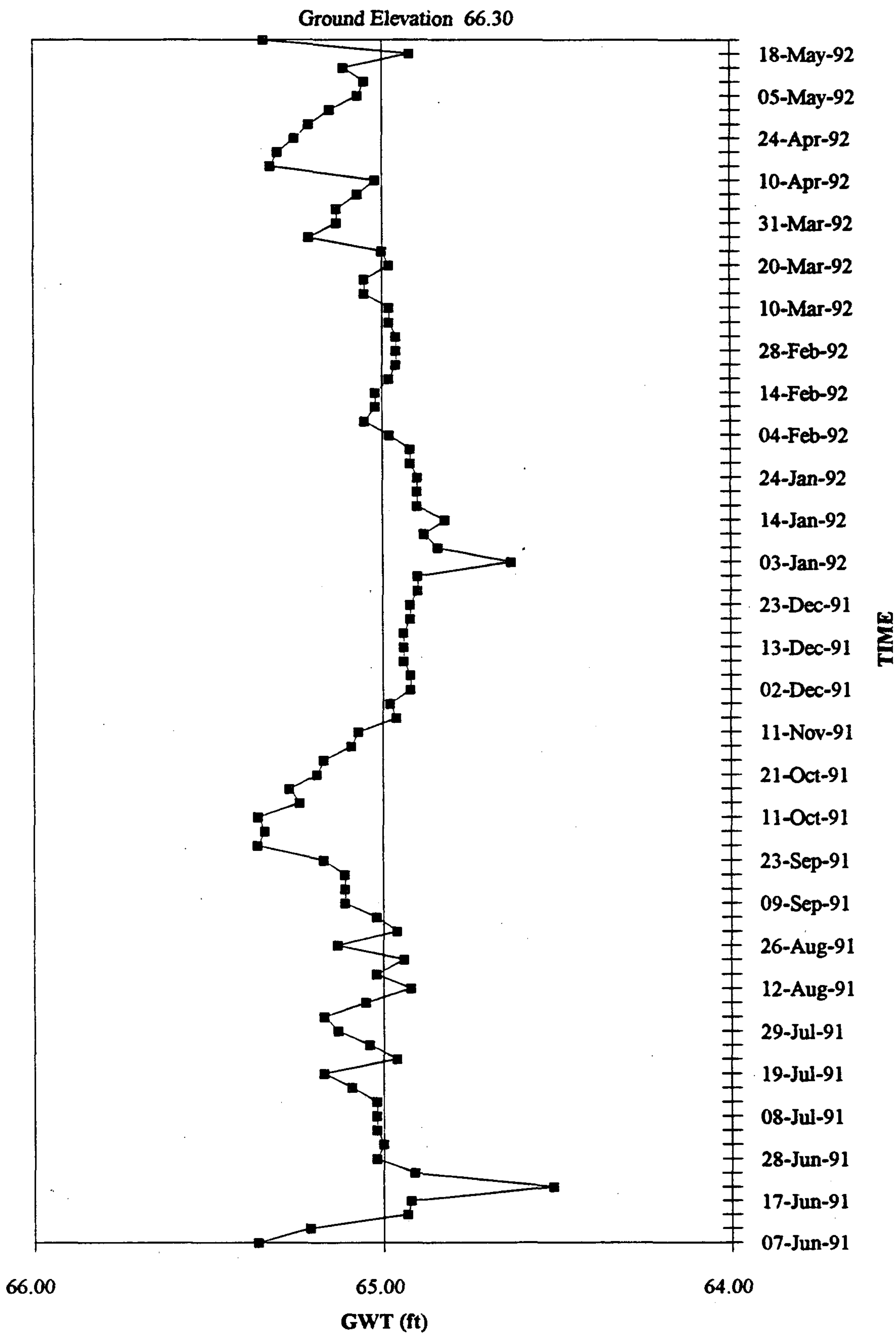
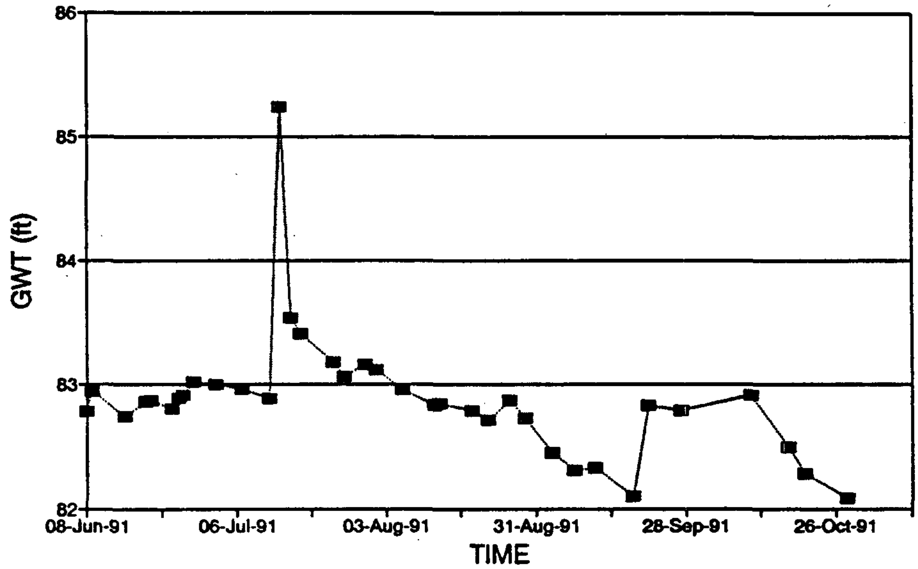


Figure K.10.3 UCF Center-Yearly

Well # 11. Reuse Pond West-Wet Season

Ground Elevation 86.58



Elevation of top of pvc pipe (ft)	89.33
Height of pvc pipe above ground (ft)	2.75

DATE	TIME	DEPTH ft	DWT ft	GWT ft
08-Jun-91	14:00	6.55	3.80	82.78
09-Jun-91	17:00	6.39	3.64	82.94
15-Jun-91	12:00	6.59	3.84	82.74
19-Jun-91	11:00	6.47	3.72	82.86
20-Jun-91	17:00	6.46	3.71	82.87
24-Jun-91	14:00	6.52	3.77	82.81
25-Jun-91	18:00	6.44	3.69	82.89
26-Jun-91	16:00	6.42	3.67	82.91
28-Jun-91	11:00	6.31	3.56	83.02
02-Jul-91	18:00	6.33	3.58	83.00
07-Jul-91	19:00	6.36	3.61	82.97
12-Jul-91	11:00	6.44	3.69	82.89
14-Jul-91	08:00	4.09	1.34	85.24
16-Jul-91	11:00	5.79	3.04	83.54
18-Jul-91	19:00	5.92	3.17	83.41
24-Jul-91	11:00	6.15	3.40	83.18
26-Jul-91	19:00	6.27	3.52	83.06
30-Jul-91	20:00	6.17	3.42	83.16

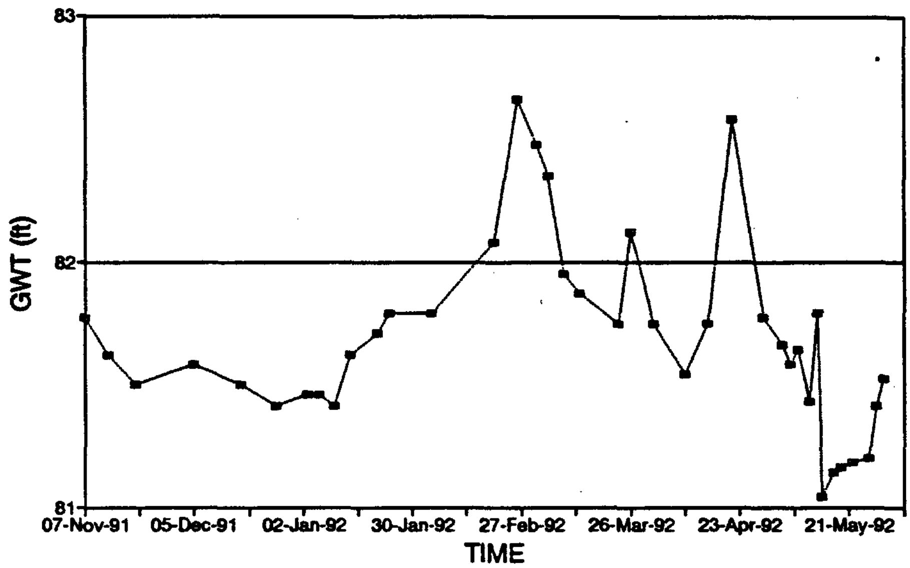
DATE	TIME	DEPTH ft	DWT ft	GWT ft
01-Aug-91	19:00	6.21	3.46	83.12
06-Aug-91	14:00	6.37	3.62	82.96
12-Aug-91	16:20	6.50	3.75	82.83
13-Aug-91	15:15	6.48	3.73	82.85
19-Aug-91	14:19	6.54	3.79	82.79
22-Aug-91	13:00	6.62	3.87	82.71
26-Aug-91	18:00	6.46	3.71	82.87
29-Aug-91	18:00	6.60	3.85	82.73
03-Sep-91	19:00	6.88	4.13	82.45
07-Sep-91	13:00	7.02	4.27	82.31
11-Sep-91	18:00	7.00	4.25	82.33
18-Sep-91	18:42	7.23	4.48	82.10
21-Sep-91	14:30	6.50	3.75	82.83
27-Sep-91	17:45	6.54	3.79	82.79
10-Oct-91	18:00	6.42	3.67	82.91
17-Oct-91	13:35	6.83	4.08	82.50
20-Oct-91	14:45	7.05	4.30	82.28
28-Oct-91	12:35	7.25	4.50	82.08

WET SEASON STATISTICS	GWT (feet)
# Data Points = 36	
Standard Deviation	0.51
Average	82.88
Maximum	85.24
Minimum	82.08

Figure K.11.1 Reuse Pond West-Wet Season

Well # 11. Reuse Pond West-Dry Season

Ground Elevation 86.58



Elevation of top of pvc pipe (ft)	89.33
Height of pvc pipe above ground (ft)	2.75

DATE	TIME	DEPTH ft	DWT ft	GWT ft
07-Nov-91	10:21	7.56	4.81	81.77
13-Nov-91	17:30	7.71	4.96	81.62
20-Nov-91	12:30	7.83	5.08	81.50
05-Dec-91	17:30	7.75	5.00	81.58
17-Dec-91	12:00	7.83	5.08	81.50
26-Dec-91	14:40	7.92	5.17	81.41
03-Jan-92	12:00	7.87	5.12	81.46
06-Jan-92	12:00	7.87	5.12	81.46
10-Jan-92	12:30	7.92	5.17	81.41
14-Jan-92	12:00	7.71	4.96	81.62
21-Jan-92	10:30	7.62	4.87	81.71
24-Jan-92	12:00	7.54	4.79	81.79
04-Feb-92	12:18	7.54	4.79	81.79
20-Feb-92	16:00	7.25	4.50	82.08
26-Feb-92	10:00	6.67	3.92	82.66
02-Mar-92	13:00	6.85	4.10	82.48
05-Mar-92	15:00	6.98	4.23	82.35
09-Mar-92	14:00	7.38	4.63	81.95
13-Mar-92	11:00	7.46	4.71	81.87

DATE	TIME	DEPTH ft	DWT ft	GWT ft
23-Mar-92	10:00	7.58	4.83	81.75
26-Mar-92	13:00	7.21	4.46	82.12
01-Apr-92	16:00	7.58	4.83	81.75
09-Apr-92	12:00	7.79	5.04	81.54
15-Apr-92	12:00	7.58	4.83	81.75
21-Apr-92	11:30	6.75	4.00	82.58
29-Apr-92	14:00	7.56	4.81	81.77
04-May-92	10:00	7.67	4.92	81.66
06-May-92	18:30	7.75	5.00	81.58
08-May-92	13:00	7.69	4.94	81.64
11-May-92	11:20	7.90	5.15	81.43
13-May-92	14:00	7.54	4.79	81.79
14-May-92	09:30	8.29	5.54	81.04
17-May-92	17:00	8.19	5.44	81.14
19-May-92	15:00	8.17	5.42	81.16
22-May-92	11:00	8.15	5.40	81.18
26-May-92	12:15	8.13	5.38	81.2
28-May-92	11:30	7.92	5.17	81.41
30-May-92	13:15	7.81	5.06	81.52

DRY SEASON STATISTICS	GWT (feet)
# Data Points = 38	
Standard Deviation	0.38
Variance	0.14
Average	81.68
Maximum	82.66
Minimum	81.04
Fluctuation	1.62

Figure K.11.2 Reuse Pond West-Dry Season

Well # 11. Reuse Pond West-Yearly

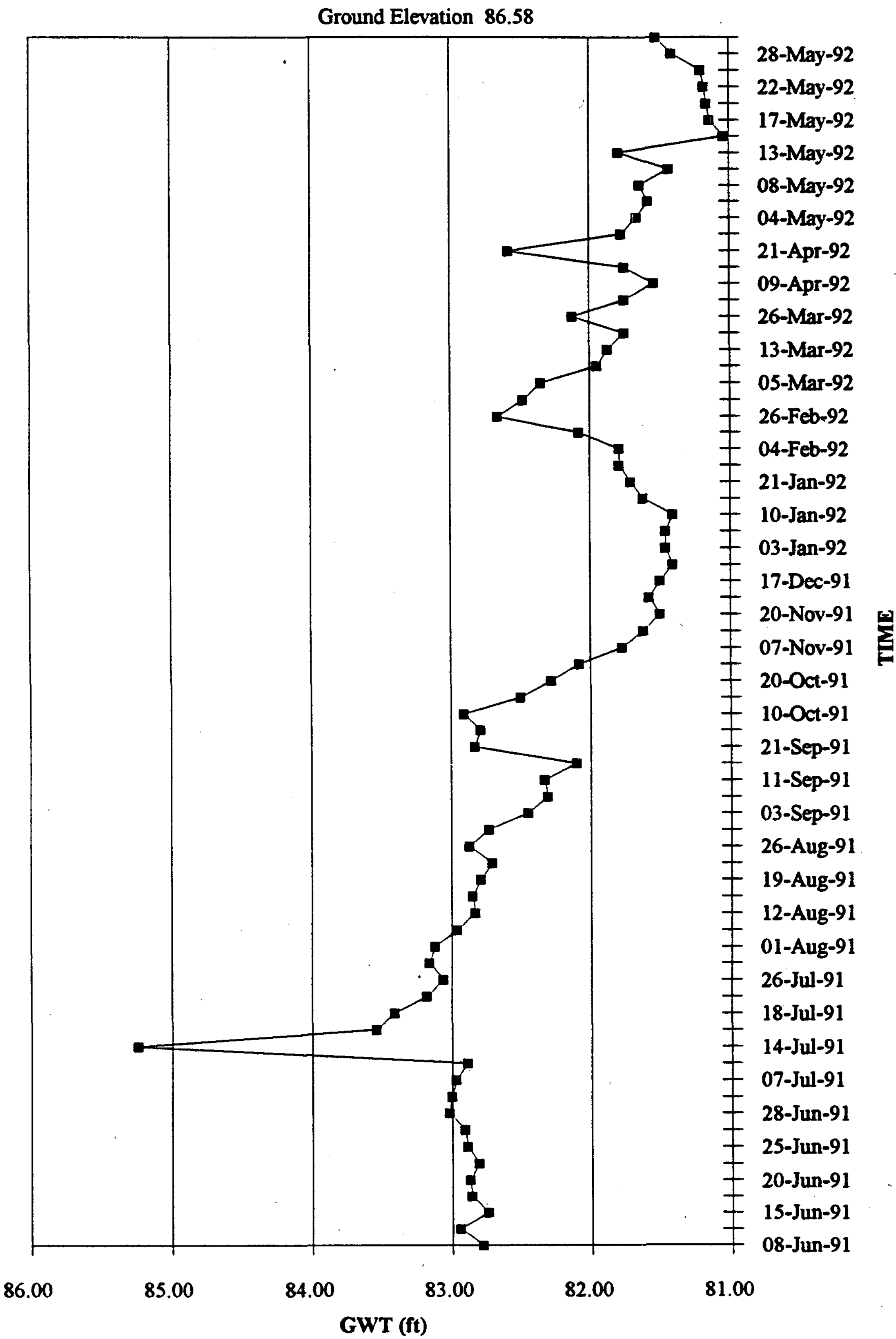
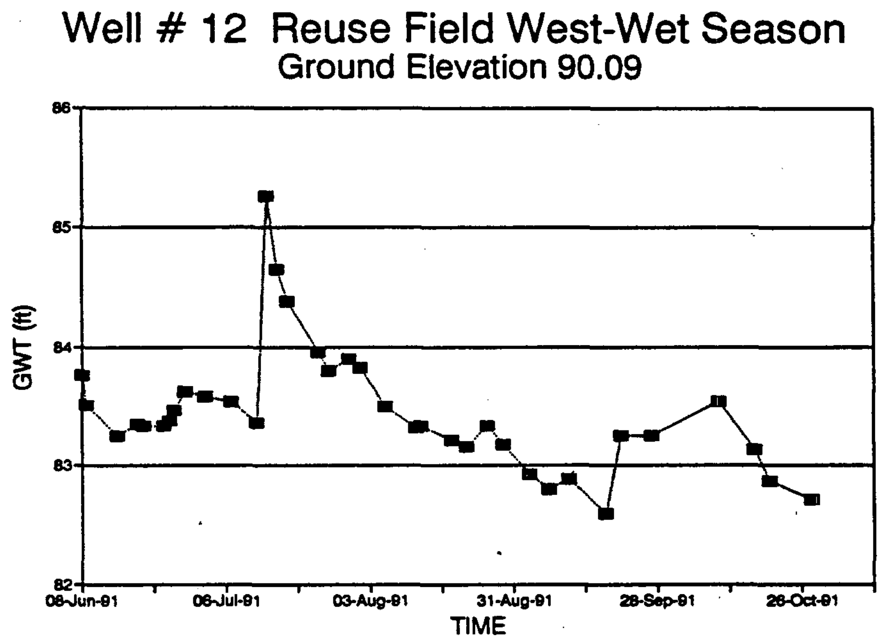


Figure K.11.3 Reuse Pond West-Yearly



Elevation of top of pvc pipe (ft)	91.67
Height of pvc pipe above ground (ft)	1.58

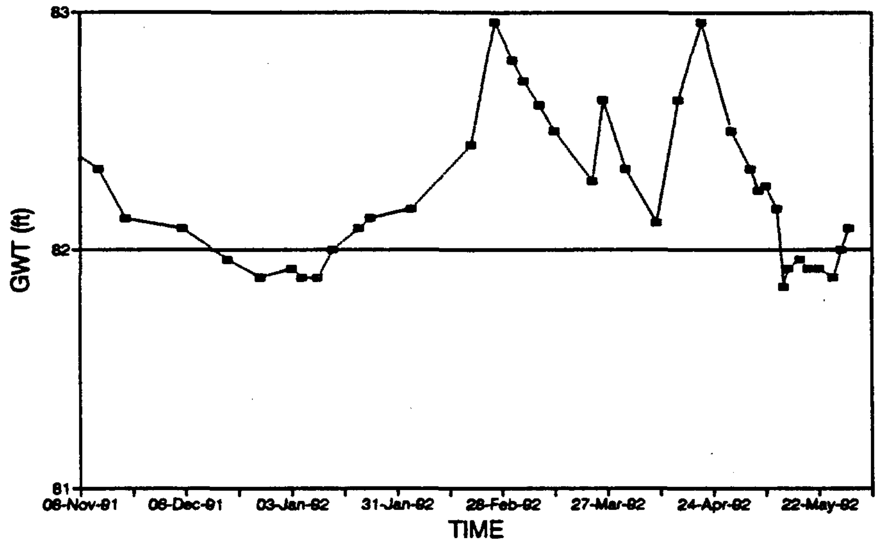
DATE	TIME	DEPT ft	DWT ft	GWT ft
08-Jun-91	14:00	7.90	6.32	83.77
09-Jun-91	17:00	8.15	6.57	83.52
15-Jun-91	12:00	8.42	6.84	83.25
19-Jun-91	11:00	8.32	6.74	83.35
20-Jun-91	17:00	8.33	6.75	83.34
24-Jun-91	14:00	8.33	6.75	83.34
25-Jun-91	18:00	8.29	6.71	83.38
26-Jun-91	16:00	8.20	6.62	83.47
28-Jun-91	11:00	8.04	6.46	83.63
02-Jul-91	18:00	8.08	6.50	83.59
07-Jul-91	19:00	8.13	6.55	83.54
12-Jul-91	11:00	8.31	6.73	83.36
14-Jul-91	08:00	6.41	4.83	85.26
16-Jul-91	11:00	7.02	5.44	84.65
18-Jul-91	19:00	7.29	5.71	84.38
24-Jul-91	11:00	7.71	6.13	83.96
26-Jul-91	19:00	7.87	6.29	83.80
30-Jul-91	20:00	7.77	6.19	83.90

DATE	TIME	DEPT ft	DWT ft	GWT ft
01-Aug-91	19:00	7.85	6.27	83.82
06-Aug-91	14:00	8.17	6.59	83.50
12-Aug-91	16:20	8.35	6.77	83.32
13-Aug-91	15:15	8.33	6.75	83.34
19-Aug-91	14:19	8.46	6.88	83.21
22-Aug-91	13:00	8.51	6.93	83.16
26-Aug-91	18:00	8.33	6.75	83.34
29-Aug-91	18:00	8.50	6.92	83.17
03-Sep-91	19:00	8.75	7.17	82.92
07-Sep-91	13:00	8.87	7.29	82.80
11-Sep-91	18:00	8.79	7.21	82.88
18-Sep-91	18:42	9.08	7.50	82.59
21-Sep-91	14:30	8.42	6.84	83.25
27-Sep-91	17:45	8.42	6.84	83.25
10-Oct-91	18:00	8.13	6.55	83.54
17-Oct-91	13:35	8.54	6.96	83.13
20-Oct-91	14:45	8.80	7.22	82.87
28-Oct-91	12:35	8.96	7.38	82.71

WET SEASON STATISTICS	GWT (feet)
# Data Points = 36	
Standard Deviation	0.52
Average	83.45
Maximum	85.26
Minimum	82.59

Figure K.12.1 Reuse Field West-Wet Season

Well # 12 Reuse Field West-Dry Season
Ground Elevation 90.09



Elevation of top of pvc pipe (ft)	**91.67**
Height of pvc pipe above ground (ft)	**1.58**

DATE	TIME	DEPT ft	DWT ft	GWT ft
07-Nov-91	10:21	9.27	7.69	82.40
13-Nov-91	17:30	9.33	7.75	82.34
20-Nov-91	12:30	9.54	7.96	82.13
05-Dec-91	17:30	9.58	8.00	82.09
17-Dec-91	12:00	9.71	8.13	81.96
26-Dec-91	14:40	9.79	8.21	81.88
03-Jan-92	12:00	9.75	8.17	81.92
06-Jan-92	12:00	9.79	8.21	81.88
10-Jan-92	12:30	9.79	8.21	81.88
14-Jan-92	12:00	9.67	8.09	82.00
21-Jan-92	10:30	9.58	8.00	82.09
24-Jan-92	12:00	9.54	7.96	82.13
04-Feb-92	12:18	9.50	7.92	82.17
20-Feb-92	16:00	9.23	7.65	82.44
26-Feb-92	10:00	8.71	7.13	82.96
02-Mar-92	13:00	8.87	7.29	82.80
05-Mar-92	15:00	8.96	7.38	82.71
09-Mar-92	14:00	9.06	7.48	82.61
13-Mar-92	11:00	9.17	7.59	82.50

DATE	TIME	DEPT ft	DWT ft	GWT ft
23-Mar-92	10:00	9.38	7.80	82.29
26-Mar-92	13:00	9.04	7.46	82.63
01-Apr-92	16:00	9.33	7.75	82.34
09-Apr-92	12:00	9.56	7.98	82.11
15-Apr-92	12:00	9.04	7.46	82.63
21-Apr-92	11:30	8.71	7.13	82.96
29-Apr-92	14:00	9.17	7.59	82.50
04-May-92	10:00	9.33	7.75	82.34
06-May-92	18:30	9.42	7.84	82.25
08-May-92	13:00	9.40	7.82	82.27
11-May-92	11:20	9.50	7.92	82.17
13-May-92	14:00	9.83	8.25	81.84
14-May-92	09:30	9.75	8.17	81.92
17-May-92	17:00	9.71	8.13	81.96
19-May-92	15:00	9.75	8.17	81.92
22-May-92	11:00	9.75	8.17	81.92
26-May-92	12:15	9.79	8.21	81.88
28-May-92	11:30	9.67	8.09	82.00
30-May-92	13:15	9.58	8.00	82.09

DRY SEASON STATISTICS	GWT (feet)
# Data Points = 38	
Standard Deviation	0.31
Variance	0.10
Average	82.23
Maximum	82.96
Minimum	81.84
Fluctuation	1.12

Figure K.12.2 Reuse Field West-Dry Season

Well # 12. Reuse Field West-Yearly

Ground Elevation 90.09

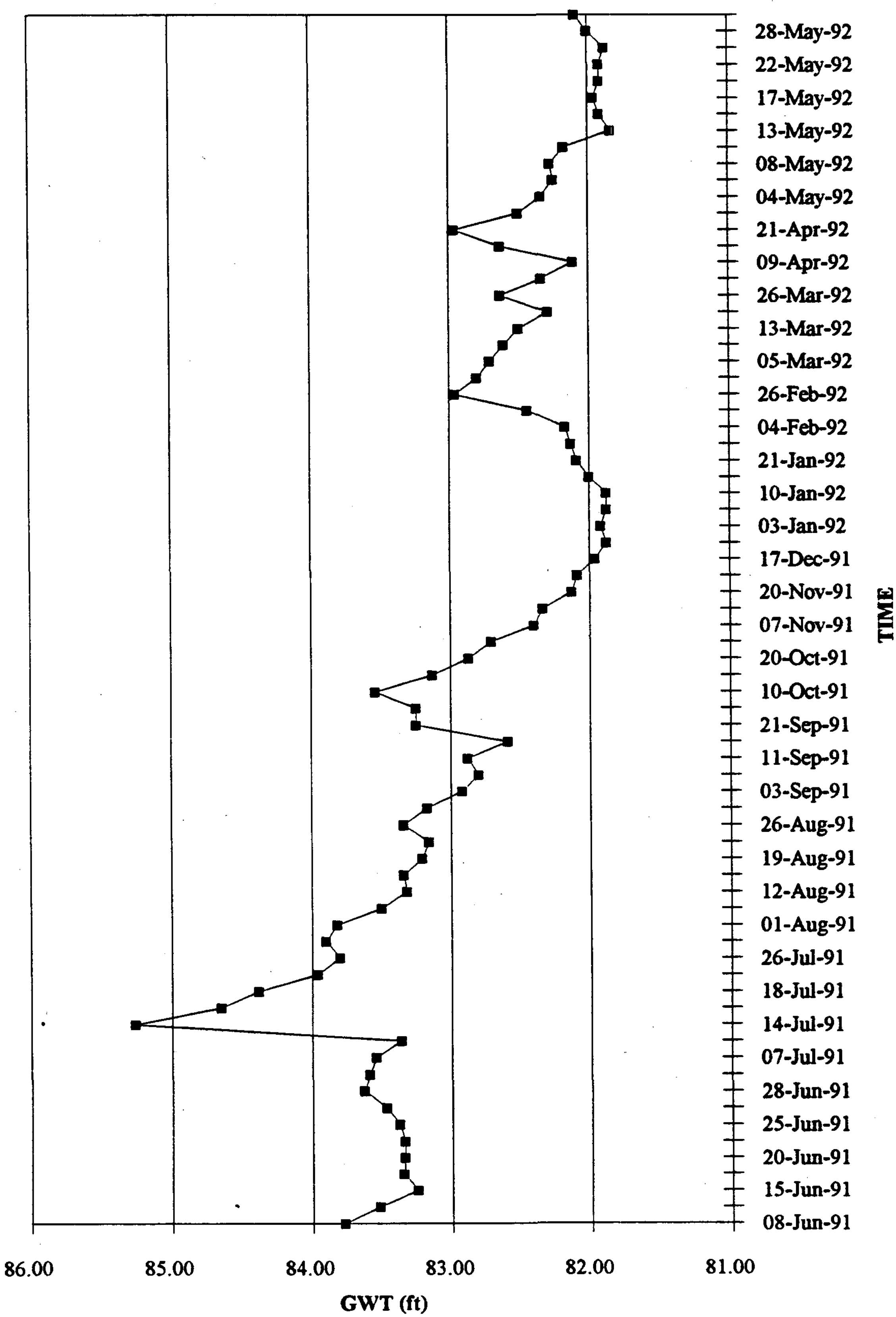
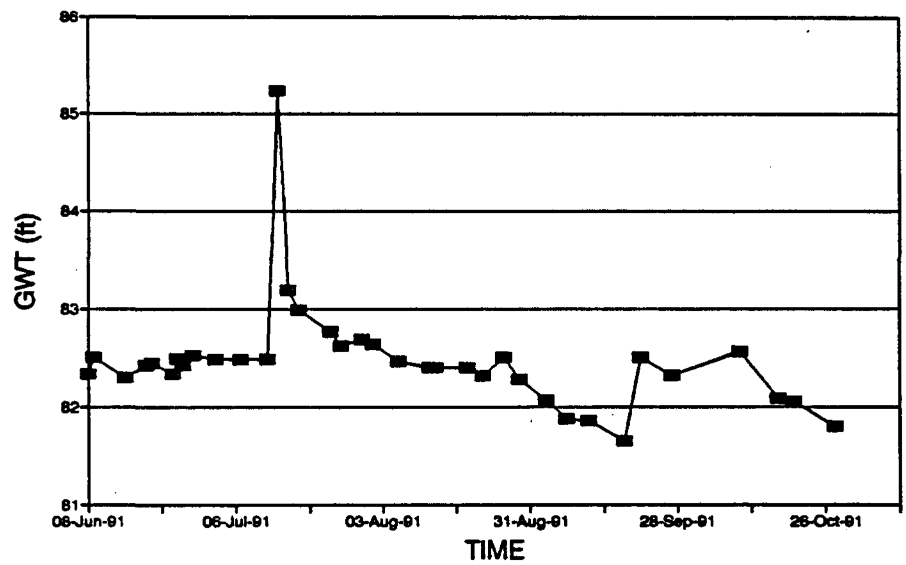


Figure K.12.3 Reuse Field West-Yearly

Well # 13. Reuse Pond South-Wet Season

Ground Elevation 84.28



Elevation of top of pvc pipe (ft)	86.78
Height of pvc pipe above ground (ft)	2.50

DATE	TIME	DEPTH ft	DWT ft	GWT ft
08-Jun-91	14:00	4.44	1.94	82.34
09-Jun-91	17:00	4.27	1.77	82.51
15-Jun-91	12:00	4.48	1.98	82.30
19-Jun-91	11:00	4.35	1.85	82.43
20-Jun-91	17:00	4.33	1.83	82.45
24-Jun-91	14:00	4.44	1.94	82.34
25-Jun-91	18:00	4.28	1.78	82.50
26-Jun-91	16:00	4.35	1.85	82.43
28-Jun-91	11:00	4.25	1.75	82.53
02-Jul-91	18:00	4.29	1.79	82.49
07-Jul-91	19:00	4.29	1.79	82.49
12-Jul-91	11:00	4.29	1.79	82.49
14-Jul-91	08:00	1.54	-0.96	85.24
16-Jul-91	11:00	3.58	1.08	83.20
18-Jul-91	19:00	3.79	1.29	82.99
24-Jul-91	11:00	4.00	1.50	82.78
26-Jul-91	19:00	4.15	1.65	82.63
30-Jul-91	20:00	4.08	1.58	82.70

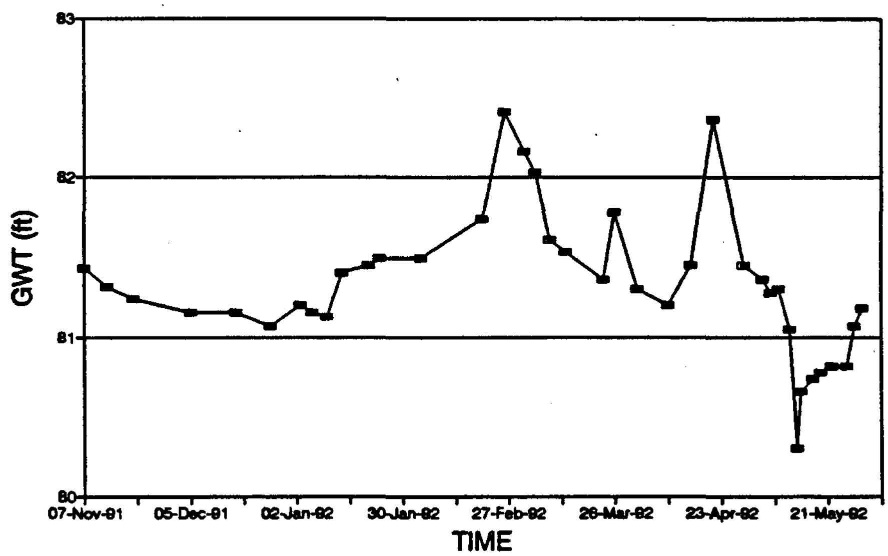
DATE	TIME	DEPTH ft	DWT ft	GWT ft
01-Aug-91	19:00	4.13	1.63	82.65
06-Aug-91	14:00	4.31	1.81	82.47
12-Aug-91	16:20	4.37	1.87	82.41
13-Aug-91	15:15	4.37	1.87	82.41
19-Aug-91	14:19	4.37	1.87	82.41
22-Aug-91	13:00	4.46	1.96	82.32
26-Aug-91	18:00	4.27	1.77	82.51
29-Aug-91	18:00	4.50	2.00	82.28
03-Sep-91	19:00	4.71	2.21	82.07
07-Sep-91	13:00	4.90	2.40	81.88
11-Sep-91	18:00	4.92	2.42	81.86
18-Sep-91	18:42	5.13	2.63	81.65
21-Sep-91	14:30	4.27	1.77	82.51
27-Sep-91	17:45	4.46	1.96	82.32
10-Oct-91	18:00	4.21	1.71	82.57
17-Oct-91	13:35	4.69	2.19	82.09
20-Oct-91	14:45	4.72	2.22	82.06
28-Oct-91	12:35	4.98	2.48	81.80

WET SEASON STATISTICS	GWT (feet)
# Data Points = 36	
Standard Deviation	0.56
Average	82.46
Maximum	85.24
Minimum	81.65

Figure K.13.1 Reuse Pond South-Wet Season

Well # 13. Reuse Pond South-Dry Season

Ground Elevation 84.28



Elevation of top of pvc pipe (ft)	86.78
Height of pvc pipe above ground (ft)	2.50

DATE	TIME	DEPTH ft	DWT ft	GWT ft
07-Nov-91	10:21	5.35	2.85	81.43
13-Nov-91	17:30	5.46	2.96	81.32
20-Nov-91	12:30	5.54	3.04	81.24
05-Dec-91	17:30	5.62	3.12	81.16
17-Dec-91	12:00	5.62	3.12	81.16
26-Dec-91	14:40	5.71	3.21	81.07
03-Jan-92	12:00	5.58	3.08	81.20
06-Jan-92	12:00	5.62	3.12	81.16
10-Jan-92	12:30	5.65	3.15	81.13
14-Jan-92	12:00	5.38	2.88	81.40
21-Jan-92	10:30	5.33	2.83	81.45
24-Jan-92	12:00	5.29	2.79	81.49
04-Feb-92	12:18	5.29	2.79	81.49
20-Feb-92	16:00	5.04	2.54	81.74
26-Feb-92	10:00	4.37	1.87	82.41
02-Mar-92	13:00	4.62	2.12	82.16
05-Mar-92	15:00	4.75	2.25	82.03
09-Mar-92	14:00	5.17	2.67	81.61
13-Mar-92	11:00	5.25	2.75	81.53

DATE	TIME	DEPTH ft	DWT ft	GWT ft
23-Mar-92	10:00	5.42	2.92	81.36
26-Mar-92	13:00	5.00	2.50	81.78
01-Apr-92	16:00	5.48	2.98	81.30
09-Apr-92	12:00	5.58	3.08	81.20
15-Apr-92	12:00	5.33	2.83	81.45
21-Apr-92	11:30	4.42	1.92	82.36
29-Apr-92	14:00	5.33	2.83	81.45
04-May-92	10:00	5.42	2.92	81.36
06-May-92	18:30	5.50	3.00	81.28
08-May-92	13:00	5.48	2.98	81.30
11-May-92	11:20	5.73	3.23	81.05
13-May-92	14:00	6.48	3.98	80.30
14-May-92	09:30	6.12	3.62	80.66
17-May-92	17:00	6.04	3.54	80.74
19-May-92	15:00	6.00	3.50	80.78
22-May-92	11:00	5.96	3.46	80.82
26-May-92	12:15	5.96	3.46	80.82
28-May-92	11:30	5.71	3.21	81.07
30-May-92	13:15	5.60	3.10	81.18

DRY SEASON STATISTICS	GWT (feet)
# Data Points = 38	
Standard Deviation	0.43
Variance	0.19
Average	81.33
Maximum	82.41
Minimum	80.30
Fluctuation	2.11

Figure K.13.2 Reuse Pond South-Dry Season

Well # 13 Reuse Pond South-Yearly

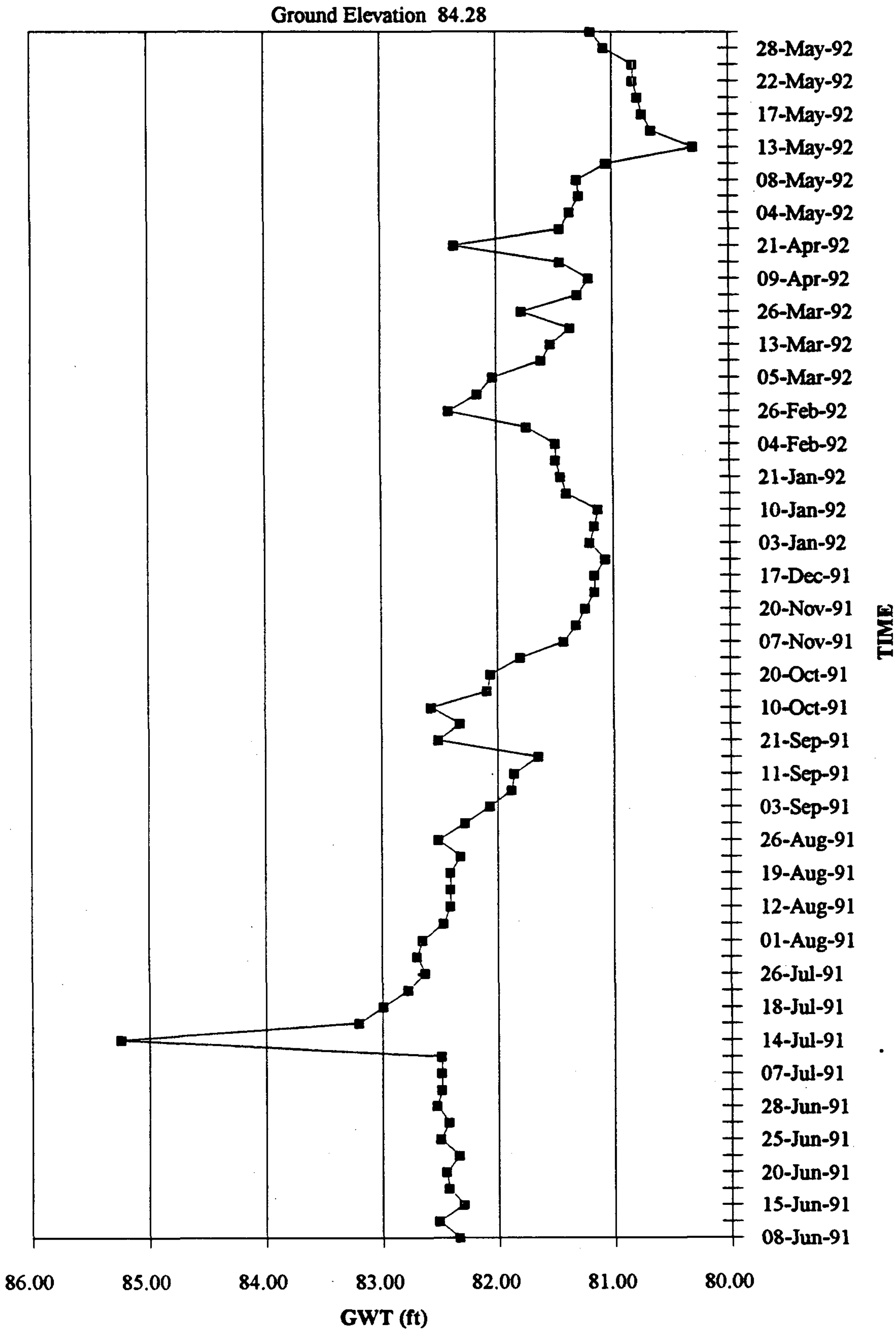
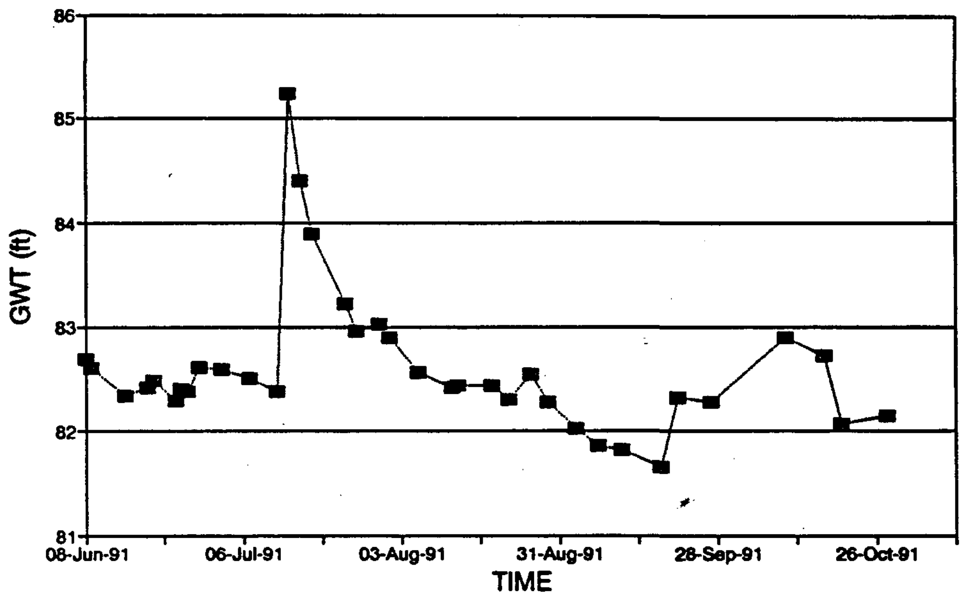


Figure K.13.3 Reuse Pond South-Yearly

Well #14 Reuse Field South-Wet Season
Ground Elevation 87.32



Elevation of top of pvc pipe (ft)	89.15
Height of pvc pipe above ground (ft)	1.83

DATE	TIME	DEPTH ft	DWT ft	GWT ft
08-Jun-91	14:00	6.45	4.62	82.70
09-Jun-91	17:00	6.54	4.71	82.61
15-Jun-91	12:00	6.81	4.98	82.34
19-Jun-91	11:00	6.73	4.90	82.42
20-Jun-91	17:00	6.66	4.83	82.49
24-Jun-91	14:00	6.86	5.03	82.29
25-Jun-91	18:00	6.74	4.91	82.41
26-Jun-91	16:00	6.77	4.94	82.38
28-Jun-91	11:00	6.53	4.70	82.62
02-Jul-91	18:00	6.55	4.72	82.60
07-Jul-91	19:00	6.64	4.81	82.51
12-Jul-91	11:00	6.77	4.94	82.38
14-Jul-91	08:00	3.91	2.08	85.24
16-Jul-91	11:00	4.75	2.92	84.40
18-Jul-91	19:00	5.25	3.42	83.90
24-Jul-91	11:00	5.92	4.09	83.23
26-Jul-91	19:00	6.19	4.36	82.96
30-Jul-91	20:00	6.12	4.29	83.03

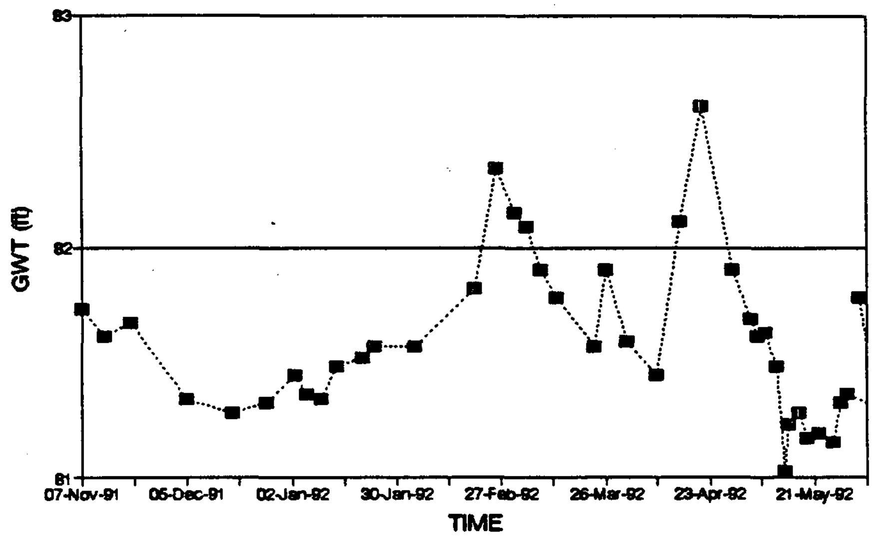
DATE	TIME	DEPTH ft	DWT ft	GWT ft
01-Aug-91	19:00	6.25	4.42	82.90
06-Aug-91	14:00	6.58	4.75	82.57
12-Aug-91	16:20	6.73	4.90	82.42
13-Aug-91	15:15	6.71	4.88	82.44
19-Aug-91	14:19	6.71	4.88	82.44
22-Aug-91	13:00	6.85	5.02	82.30
26-Aug-91	18:00	6.60	4.77	82.55
29-Aug-91	18:00	6.87	5.04	82.28
03-Sep-91	19:00	7.12	5.29	82.03
07-Sep-91	13:00	7.29	5.46	81.86
11-Sep-91	18:00	7.33	5.50	81.82
18-Sep-91	18:42	7.50	5.67	81.65
21-Sep-91	14:30	6.83	5.00	82.32
27-Sep-91	17:45	6.87	5.04	82.28
10-Oct-91	18:00	6.25	4.42	82.90
17-Oct-91	13:35	6.42	4.59	82.73
20-Oct-91	14:45	7.08	5.25	82.07
28-Oct-91	12:35	7.00	5.17	82.15

WET SEASON STATISTICS	GWT (feet)
# Data Points = 36	
Standard Deviation	0.68
Average	82.62
Maximum	85.24
Minimum	81.65

Figure K.14.1 Reuse Field South-Wet Season

Well #14 Reuse Field South-Dry Season

Ground Elevation 87.32



Elevation of top of pvc pipe (ft)	89.15
Height of pvc pipe above ground (ft)	1.83

DATE	TIME	DEPTH ft	DWT ft	GWT ft
07-Nov-91	10:21	7.42	5.59	81.73
13-Nov-91	17:30	7.54	5.71	81.61
20-Nov-91	12:30	7.48	5.65	81.67
05-Dec-91	17:30	7.81	5.98	81.34
17-Dec-91	12:00	7.87	6.04	81.28
26-Dec-91	14:40	7.83	6.00	81.32
03-Jan-92	12:00	7.71	5.88	81.44
06-Jan-92	12:00	7.79	5.96	81.36
10-Jan-92	12:30	7.81	5.98	81.34
14-Jan-92	12:00	7.67	5.84	81.48
21-Jan-92	10:30	7.63	5.80	81.52
24-Jan-92	12:00	7.58	5.75	81.57
04-Feb-92	12:18	7.58	5.75	81.57
20-Feb-92	16:00	7.33	5.50	81.82
26-Feb-92	10:00	6.81	4.98	82.34
02-Mar-92	13:00	7.00	5.17	82.15
05-Mar-92	15:00	7.06	5.23	82.09
09-Mar-92	14:00	7.25	5.42	81.90
13-Mar-92	11:00	7.37	5.54	81.78

DATE	TIME	DEPTH ft	DWT ft	GWT ft
23-Mar-92	10:00	7.58	5.75	81.57
26-Mar-92	13:00	7.25	5.42	81.90
01-Apr-92	16:00	7.56	5.73	81.59
09-Apr-92	12:00	7.71	5.88	81.44
15-Apr-92	12:00	7.04	5.21	82.11
21-Apr-92	11:30	6.54	4.71	82.61
29-Apr-92	14:00	7.25	5.42	81.90
04-May-92	10:00	7.46	5.63	81.69
06-May-92	18:30	7.54	5.71	81.61
08-May-92	13:00	7.52	5.69	81.63
11-May-92	11:20	7.67	5.84	81.48
13-May-92	14:00	8.12	6.29	81.03
14-May-92	09:30	7.92	6.09	81.23
17-May-92	17:00	7.87	6.04	81.28
19-May-92	15:00	7.98	6.15	81.17
22-May-92	11:00	7.96	6.13	81.19
26-May-92	12:15	8.00	6.17	81.15
28-May-92	11:30	7.83	6.00	81.32
30-May-92	13:15	7.79	5.96	81.36

DRY SEASON STATISTICS	GWT (feet)
# Data Points = 38	
Standard Deviation	0.34
Variance	0.12
Average	81.59
Maximum	82.61
Minimum	81.03
Fluctuation	1.58

Figure K.14.2 Reuse Field South-Dry Season

Well # 14 Reuse Field South-Yearly

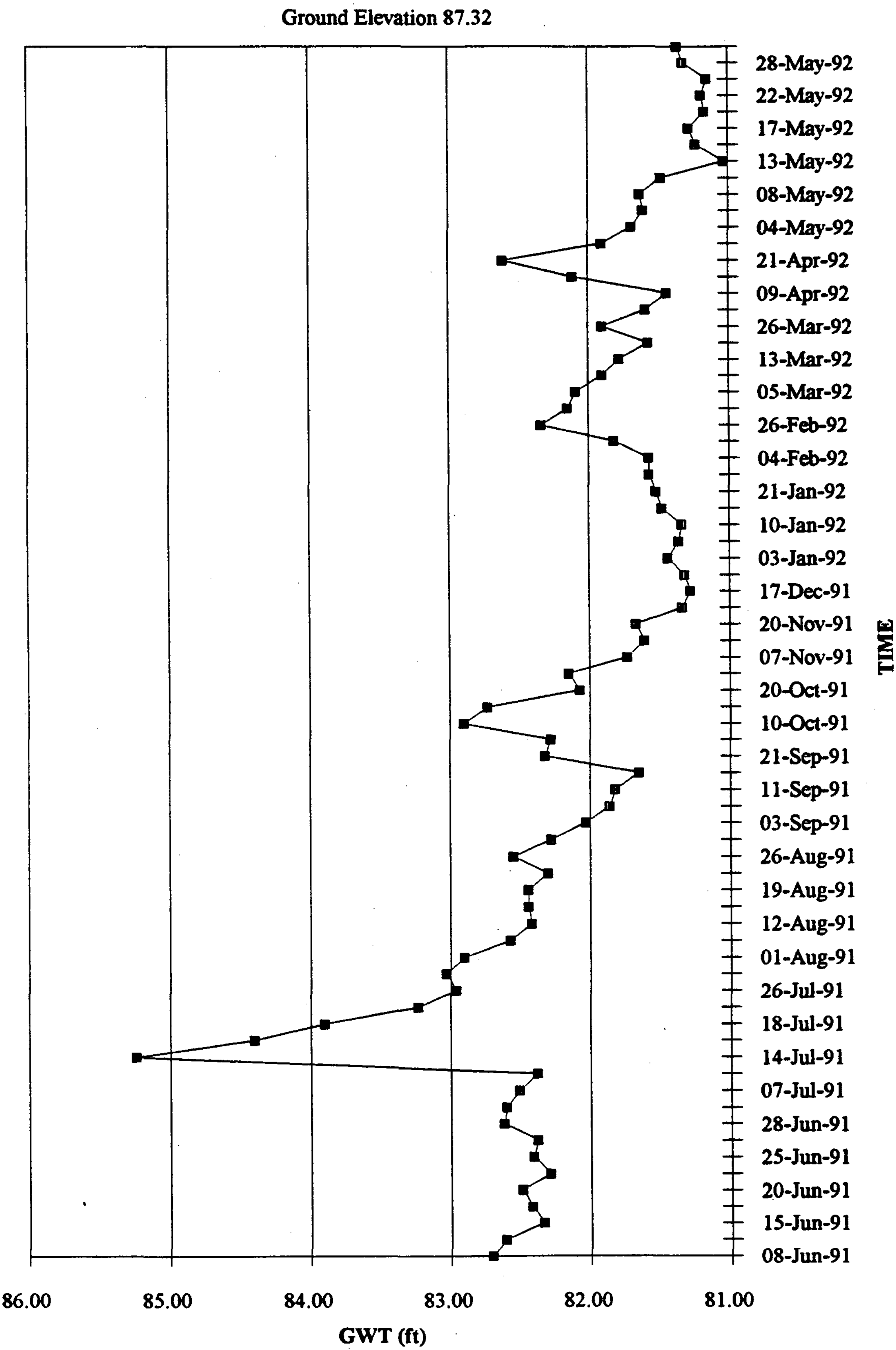
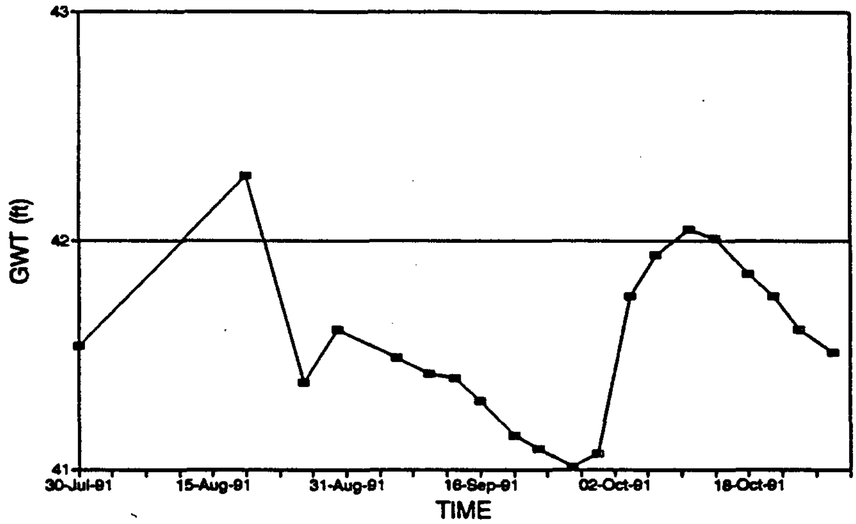


Figure K.14.3 Reuse Field South-Yearly

Well # 15. Geneva S-2-Wet Season

Ground Elevation 49.84



Top of well elevation (ft)	49.09
Height of pvc pipe above ground (ft)	0.75

DATE	TIME	DEPTH ft	DWT ft	GWT ft
30-Jul-91	14:34	9.05	8.30	41.54
19-Aug-91	12:05	8.31	7.56	42.28
26-Aug-91	14:25	9.21	8.46	41.38
30-Aug-91	16:25	8.98	8.23	41.61
06-Sep-91	17:01	9.10	8.35	41.49
10-Sep-91	09:43	9.17	8.42	41.42
13-Sep-91	14:50	9.19	8.44	41.40
16-Sep-91	15:30	9.29	8.54	41.30
20-Sep-91	14:37	9.44	8.69	41.15
23-Sep-91	15:24	9.50	8.75	41.09

DATE	TIME	DEPTH ft	DWT ft	GWT ft
27-Sep-91	15:03	9.58	8.83	41.01 *
30-Sep-91	17:15	9.52	8.77	41.07
04-Oct-91	16:13	8.83	8.08	41.76
07-Oct-91	12:24	8.65	7.90	41.94
11-Oct-91	16:38	8.54	7.79	42.05
14-Oct-91	15:01	8.58	7.83	42.01
18-Oct-91	14:42	8.73	7.98	41.86
21-Oct-91	15:13	8.83	8.08	41.76
24-Oct-91	15:00	8.98	8.23	41.61
28-Oct-91	15:23	9.08	8.33	41.51

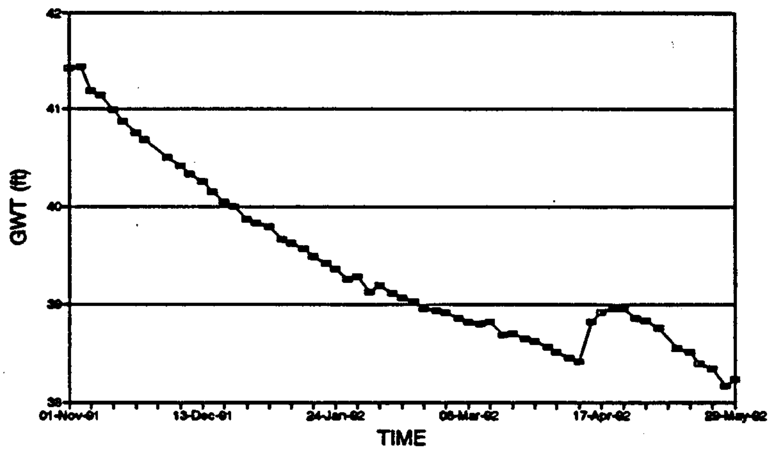
* Data obtained from United States Geological Survey at this site

WET SEASON STATISTICS	GWT (Feet)
# Data Points = 20	
Standard Deviation	0.34
Variance	0.12
Average	41.56
Maximum	42.28
Minimum	41.01
Fluctuation	1.27

Figure K.15.1 Geneva S-2-Wet Season

Well # 15. Geneva S-2-Dry Season

Ground Elevation 49.84



Top of well elevation (ft)	49.09
Height of pvc pipe above ground (ft)	0.75

DATE	TIME	DEPTH ft	DWT ft	GWT ft
01-Nov-91	15:10	9.17	8.42	41.42
05-Nov-91	09:54	9.15	8.40	41.44
08-Nov-91	16:20	9.40	8.65	41.19
11-Nov-91	16:00	9.44	8.69	41.15
15-Nov-91	14:23	9.60	8.85	40.99
18-Nov-91	15:57	9.71	8.96	40.88
22-Nov-91	15:11	9.83	9.08	40.76
25-Nov-91	15:04	9.90	9.15	40.69
02-Dec-91	15:55	10.08	9.33	40.51
06-Dec-91	15:23	10.17	9.42	40.42
09-Dec-91	16:40	10.25	9.50	40.34
13-Dec-91	16:36	10.33	9.58	40.26
16-Dec-91	15:05	10.44	9.69	40.15
20-Dec-91	14:15	10.54	9.79	40.05
23-Dec-91	09:55	10.58	9.83	40.01
27-Dec-91	09:55	10.71	9.96	39.88
30-Dec-91	14:40	10.75	10.00	39.84
03-Jan-92	15:30	10.79	10.04	39.80
07-Jan-92	12:29	10.92	10.17	39.67
10-Jan-92	14:00	10.96	10.21	39.63
14-Jan-92	13:23	11.02	10.27	39.57
17-Jan-92	14:33	11.10	10.35	39.49
21-Jan-92	14:23	11.17	10.42	39.42
24-Jan-92	15:44	11.23	10.48	39.36
28-Jan-92	12:50	11.33	10.58	39.26
31-Jan-92	13:22	11.31	10.56	39.28
04-Feb-92	15:13	11.46	10.71	39.13
07-Feb-92	14:18	11.40	10.65	39.19
11-Feb-92	12:41	11.48	10.73	39.11
14-Feb-92	13:09	11.52	10.77	39.07
18-Feb-92	13:08	11.56	10.81	39.03
21-Feb-92	13:00	11.63	10.88	38.96
25-Feb-92	12:25	11.65	10.90	38.94
28-Feb-92	13:21	11.67	10.92	38.92
03-Mar-92	10:08	11.73	10.98	38.86
06-Mar-92	13:10	11.77	11.02	38.82
10-Mar-92	15:15	11.79	11.04	38.80
13-Mar-92	09:40	11.77	11.02	38.82
17-Mar-92	12:57	11.90	11.15	38.69
20-Mar-92	13:20	11.88	11.13	38.71
24-Mar-92	14:00	11.94	11.19	38.65
27-Mar-92	13:33	11.96	11.21	38.63
31-Mar-92	12:25	12.02	11.27	38.57
03-Apr-92	13:47	12.08	11.33	38.51
07-Apr-92	10:26	12.13	11.38	38.46
10-Apr-92	14:20	12.17	11.42	38.42
14-Apr-92	11:55	11.77	11.02	38.82
17-Apr-92	14:04	11.67	10.92	38.92
21-Apr-92	16:07	11.63	10.88	38.96
24-Apr-92	13:48	11.63	10.88	38.96
28-Apr-92	15:52	11.73	10.98	38.86
01-May-92	12:06	11.75	11.00	38.84
05-May-92	13:10	11.83	11.08	38.76
11-May-92	11:55	12.04	11.29	38.55
15-May-92	11:45	12.08	11.33	38.51
18-May-92	10:40	12.19	11.44	38.40
22-May-92	10:10	12.25	11.50	38.34
26-May-92	12:45	12.42	11.67	38.17
29-May-92	10:48	12.35	11.60	38.24

DRY SEASON STATISTICS	GWT (Feet)
# Data Points = 59	
Standard Deviation	0.87
Variance	0.76
Average	39.39
Maximum	41.44
Minimum	38.17
Fluctuation	3.27

Figure K.15.2 Geneva S-2-Dry Season

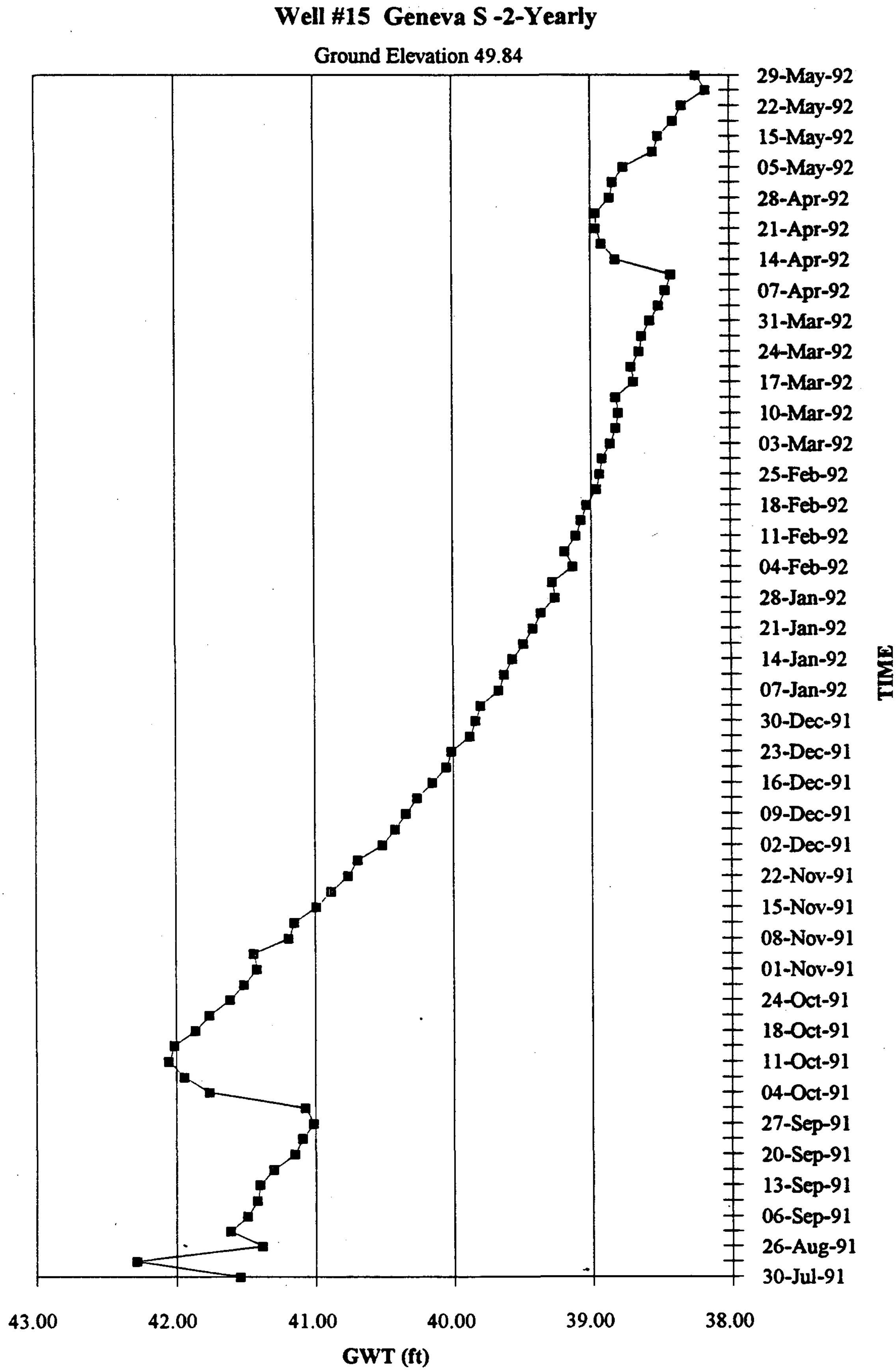
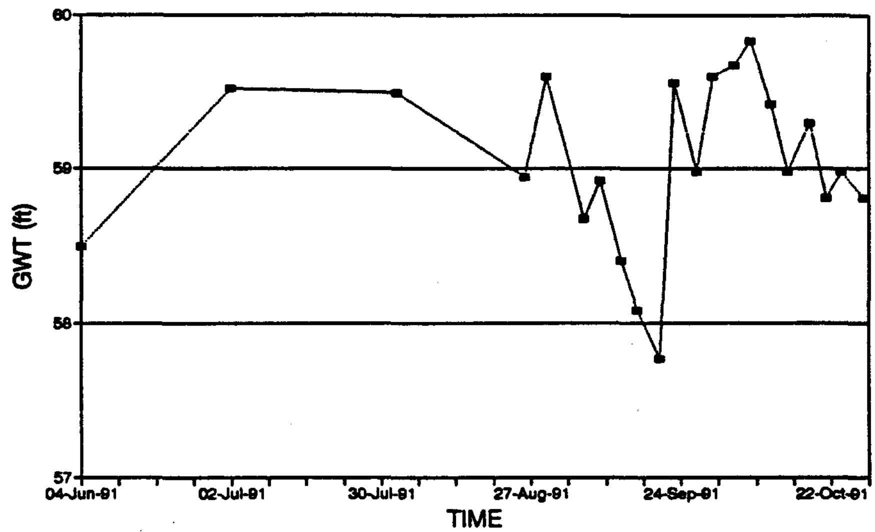


Figure K.15.3 Geneva S-2-Yearly

Well #16 Cocoa K (Surficial)-Wet Season

Ground Elevation 60.00



Top of well elevation (ft)
Height of iron well above ground (ft) 0.23

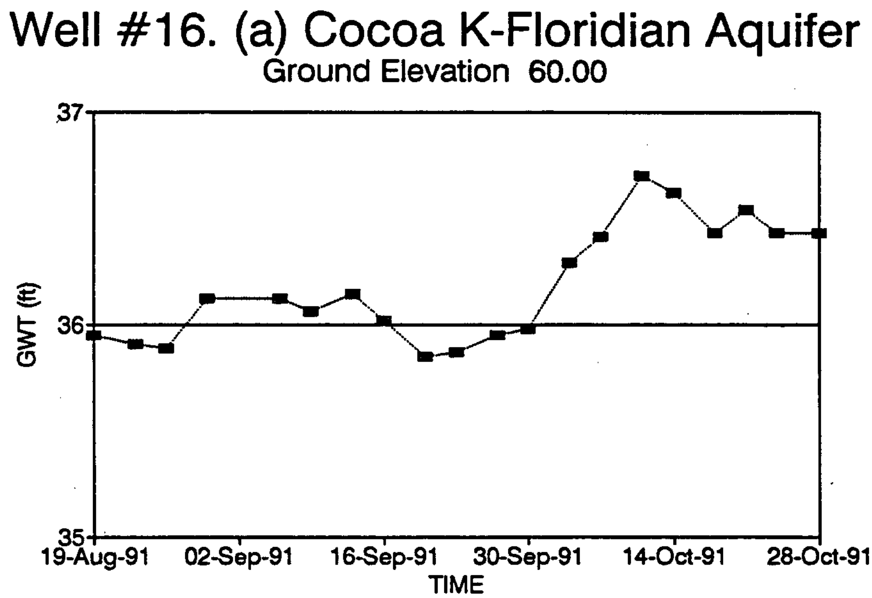
DATE	TIME	DEPTH ft	DWT ft	GWT ft	
04-Jun-91	11:36	1.73	1.50	58.50	*
02-Jul-91	09:50	0.71	0.48	59.52	*
02-Aug-91	08:00	0.74	0.51	59.49	*
26-Aug-91	14:09	1.29	1.06	58.94	
30-Aug-91	14:18	0.63	0.40	59.60	
06-Sep-91	16:00	1.56	1.33	58.67	
09-Sep-91	13:50	1.31	1.08	58.92	
13-Sep-91	14:00	1.83	1.60	58.40	
16-Sep-91	16:18	2.15	1.92	58.08	
20-Sep-91	13:44	2.46	2.23	57.77	
23-Sep-91	16:13	0.67	0.44	59.56	

DATE	TIME	DEPTH ft	DWT ft	GWT ft
27-Sep-91	14:14	1.25	1.02	58.98
30-Sep-91	17:58	0.63	0.40	59.60
04-Oct-91	16:58	0.56	0.33	59.67
07-Oct-91	17:15	0.40	0.17	59.83
11-Oct-91	17:19	0.81	0.58	59.42
14-Oct-91	16:52	1.25	1.02	58.98
18-Oct-91	13:54	0.94	0.71	59.29
21-Oct-91	16:18	1.42	1.19	58.81
24-Oct-91	14:03	1.25	1.02	58.98
28-Oct-91	14:43	1.42	1.19	58.81

* Data obtained from United States Geological Survey at this site

WET SEASON STATISTICS	GWT (Feet)
# Data Points = 21	
Standard Deviation	0.54
Variance	0.30
Average	59.04
Maximum	59.83
Minimum	57.77
Fluctuation	2.06

Figure K.16.1 Cocoa K (Surficial)-Wet Season



Top of well elevation (ft)	63.08
Height of iron well above ground (ft)	3.08

DATE	TIME	DEPTH ft	DWT ft	GWT ft
19-Aug-91	09:55	27.13	24.05	35.95
23-Aug-91	17:30	27.17	24.09	35.91
26-Aug-91	14:09	27.19	24.11	35.89
30-Aug-91	14:18	26.96	23.88	36.12
06-Sep-91	16:00	26.96	23.88	36.12
09-Sep-91	13:50	27.02	23.94	36.06
13-Sep-91	14:00	26.94	23.86	36.14
16-Sep-91	16:18	27.06	23.98	36.02
20-Sep-91	13:44	27.23	24.15	35.85
23-Sep-91	16:13	27.21	24.13	35.87

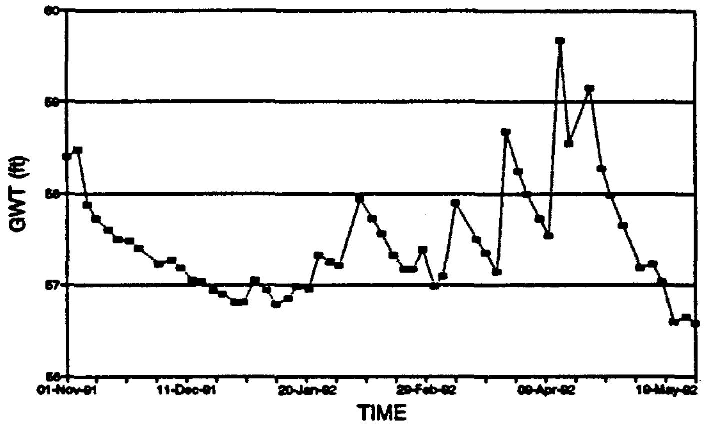
DATE	TIME	DEPTH ft	DWT ft	GWT ft
27-Sep-91	14:14	27.13	24.05	35.95
30-Sep-91	17:58	27.10	24.02	35.98
04-Oct-91	16:58	26.79	23.71	36.29
07-Oct-91	17:15	26.67	23.59	36.41
11-Oct-91	17:19	26.38	23.30	36.70
14-Oct-91	16:52	26.46	23.38	36.62
18-Oct-91	13:54	26.65	23.57	36.43
21-Oct-91	16:18	26.54	23.46	36.54
24-Oct-91	14:03	26.65	23.57	36.43
28-Oct-91	14:43	26.65	23.57	36.43

Wet Season Statistics	GWT (feet)
# Data Points = 20	
Standard Deviation	0.27
Variance	0.07
Average	36.19
Maximum	36.7
Minimum	35.85
Fluctuation	0.85

Figure K.16.1 (a) Cocoa K (Floridian Aquifer)-Wet Season

Well #16 Cocoa K (Surficial)-Dry Season

Ground Elevation 60.00



Top of well elevation (ft)	60.23
Height of iron well above ground (ft)	0.23

DATE	TIME	DEPTH ft	DWT ft	GWT ft
01-Nov-91	16:00	1.83	1.60	58.40
05-Nov-91	10:45	1.75	1.52	58.48
08-Nov-91	17:05	2.35	2.12	57.88
11-Nov-91	16:00	2.50	2.27	57.73
15-Nov-91	13:40	2.63	2.40	57.60
18-Nov-91	16:38	2.73	2.50	57.50
22-Nov-91	16:02	2.75	2.52	57.48
25-Nov-91	15:50	2.83	2.60	57.40
02-Dec-91	16:34	3.00	2.77	57.23
06-Dec-91	13:40	2.96	2.73	57.27
09-Dec-91	15:48	3.04	2.81	57.19
13-Dec-91	15:23	3.17	2.94	57.06
16-Dec-91	15:46	3.19	2.96	57.04
20-Dec-91	14:48	3.29	3.06	56.94
23-Dec-91	10:45	3.33	3.10	56.90
27-Dec-91	10:45	3.42	3.19	56.81
30-Dec-91	15:18	3.42	3.19	56.81
03-Jan-92	16:11	3.17	2.94	57.06
07-Jan-92	13:22	3.29	3.06	56.94
10-Jan-92	14:40	3.44	3.21	56.79
14-Jan-92	14:06	3.38	3.15	56.85
17-Jan-92	15:18	3.25	3.02	56.98
21-Jan-92	13:30	3.27	3.04	56.96
24-Jan-92	15:47	2.90	2.67	57.33
28-Jan-92	13:42	2.98	2.75	57.25
31-Jan-92	14:30	3.02	2.79	57.21
07-Feb-92	15:08	2.29	2.06	57.94
11-Feb-92	12:01	2.50	2.27	57.73

DATE	TIME	DEPTH ft	DWT ft	GWT ft
14-Feb-92	13:48	2.67	2.44	57.56
18-Feb-92	12:23	2.90	2.67	57.33
22-Feb-92	12:09	3.06	2.83	57.17
25-Feb-92	11:36	3.06	2.83	57.17
28-Feb-92	14:10	2.85	2.62	57.38
03-Mar-92	14:00	3.25	3.02	56.98
06-Mar-92	10:46	3.13	2.90	57.10
10-Mar-92	14:00	2.33	2.10	57.90
17-Mar-92	12:11	2.73	2.50	57.50
20-Mar-92	12:35	2.88	2.65	57.35
24-Mar-92	14:49	3.08	2.85	57.15
27-Mar-92	14:16	1.56	1.33	58.67
31-Mar-92	13:18	1.98	1.75	58.25
03-Apr-92	13:00	2.23	2.00	58.00
07-Apr-92	11:15	2.50	2.27	57.73
10-Apr-92	13:30	2.69	2.46	57.54
14-Apr-92	11:44	0.56	0.33	59.67
17-Apr-92	14:54	1.69	1.46	58.54
24-Apr-92	15:15	1.08	0.85	59.15
28-Apr-92	16:28	1.96	1.73	58.27
01-May-92	12:56	2.25	2.02	57.98
05-May-92	13:45	2.58	2.35	57.65
11-May-92	12:40	3.04	2.81	57.19
15-May-92	12:35	3.00	2.77	57.23
18-May-92	11:25	3.19	2.96	57.04
22-May-92	10:50	3.63	3.40	56.60
26-May-92	13:45	3.58	3.35	56.65
29-May-92	11:45	3.65	3.42	56.58

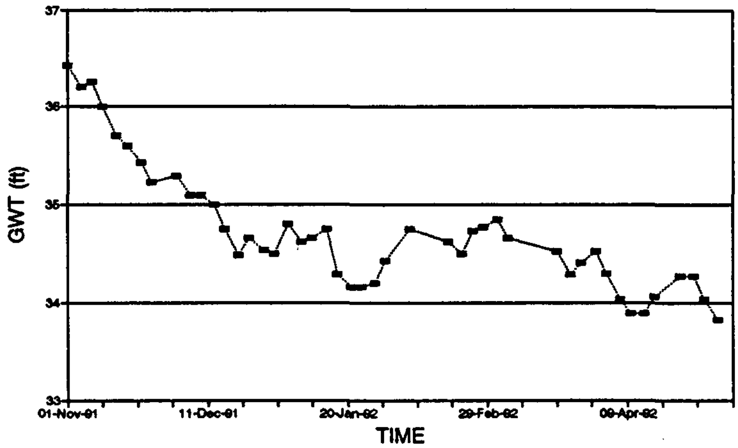
• Data obtained from United States Geological Survey at this site

DRY SEASON STATISTICS	GWT (Feet)
# Data Points = 56	
Standard Deviation	0.63
Variance	0.40
Average	57.47
Maximum	59.67
Minimum	56.58
Fluctuation	3.09

Figure K.16.2 Cocoa K (Surficial)-Dry Season

Well #16. (a) Cocoa K-Floridian Aquifer

Ground Elevation 60.00



Top of well elevation (ft)	60.23
Height of iron well above ground (ft)	3.08

DATE	TIME	DEPTH ft	DWT ft	GWT ft
01-Nov-91	16:00	26.66	23.58	63.42
05-Nov-91	10:45	26.88	23.80	36.20
08-Nov-91	17:05	26.83	23.75	36.25
11-Nov-91	16:00	27.08	24.00	36.00
15-Nov-91	13:40	27.38	24.30	35.70
18-Nov-91	16:38	27.48	24.40	35.60
22-Nov-91	16:02	27.65	24.57	35.43
25-Nov-91	15:50	27.85	24.77	35.23
02-Dec-91	16:34	27.79	24.71	35.29
06-Dec-91	13:40	27.98	24.90	35.10
09-Dec-91	15:48	27.98	24.90	35.10
13-Dec-91	15:23	28.08	25.00	35.00
16-Dec-91	15:46	28.33	25.25	34.75
20-Dec-91	14:48	28.60	25.52	34.48
23-Dec-91	10:45	28.42	25.34	34.66
27-Dec-91	10:45	28.54	25.46	34.54
30-Dec-91	15:18	28.58	25.50	34.50
03-Jan-92	16:11	28.27	25.19	34.81
07-Jan-92	13:22	28.46	25.38	34.62
10-Jan-92	14:40	28.42	25.34	34.66
14-Jan-92	14:06	28.33	25.25	34.75
17-Jan-92	15:18	28.79	25.71	34.29
21-Jan-92	13:30	28.92	25.84	34.16
24-Jan-92	15:47	28.92	25.84	34.16
28-Jan-92	13:42	28.88	25.80	34.20

DATE	TIME	DEPTH ft	DWT ft	GWT ft
31-Jan-92	14:30	28.65	25.57	34.43
07-Feb-92	15:08	28.33	25.25	34.75
11-Feb-92	12:01	28.56	25.48	34.52
14-Feb-92	13:48	28.35	25.27	34.73
18-Feb-92	12:23	28.46	25.38	34.62
22-Feb-92	12:09	28.58	25.50	34.50
25-Feb-92	11:36	28.35	25.27	34.73
28-Feb-92	14:10	28.31	25.23	34.77
03-Mar-92	14:00	28.23	25.15	34.85
06-Mar-92	10:46	28.42	25.34	34.66
10-Mar-92	14:00	28.15	25.07	34.93
17-Mar-92	12:11	28.60	25.52	34.48
20-Mar-92	12:35	28.56	25.48	34.52
24-Mar-92	14:49	28.79	25.71	34.29
27-Mar-92	14:16	28.67	25.59	34.41
31-Mar-92	13:18	28.56	25.48	34.52
03-Apr-92	13:00	28.78	25.70	34.30
07-Apr-92	11:15	29.04	25.96	34.04
10-Apr-92	13:30	29.19	26.11	33.89
14-Apr-92	11:44	29.19	26.11	33.89
17-Apr-92	14:54	29.02	25.94	34.06
24-Apr-92	15:15	28.81	25.73	34.27
28-Apr-92	16:28	28.81	25.73	34.27
01-May-92	12:56	29.04	25.96	34.04
05-May-92	13:45	29.25	26.17	33.83

- Data obtained from United States Geological Survey at this site

DRY SEASON STATISTICS	GWT (Feet)
# Data Points = 50	
Standard Deviation	0.61
Variance	0.37
Average	34.72
Maximum	36.42
Minimum	33.83
Fluctuation	2.59

Figure K.16.2 (a) Cocoa K (Floridan Aquifer)-Dry Season

Well #16. Cocoa K-Yearly

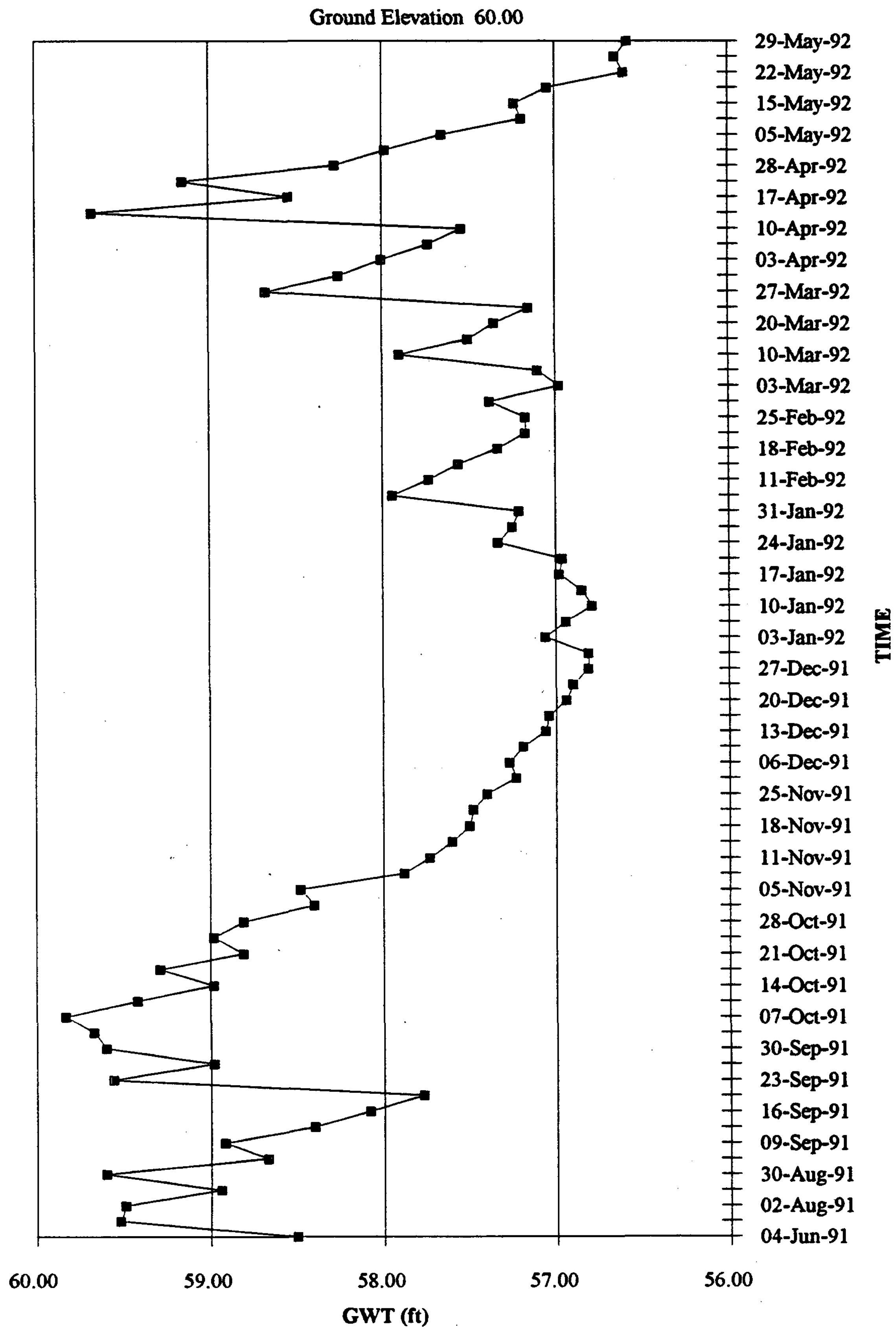


Figure K.16.3 Cocoa K-Yearly

Well #16. Cocoa K (Floridian aquifer) - Yearly

Ground Elevation 60.00

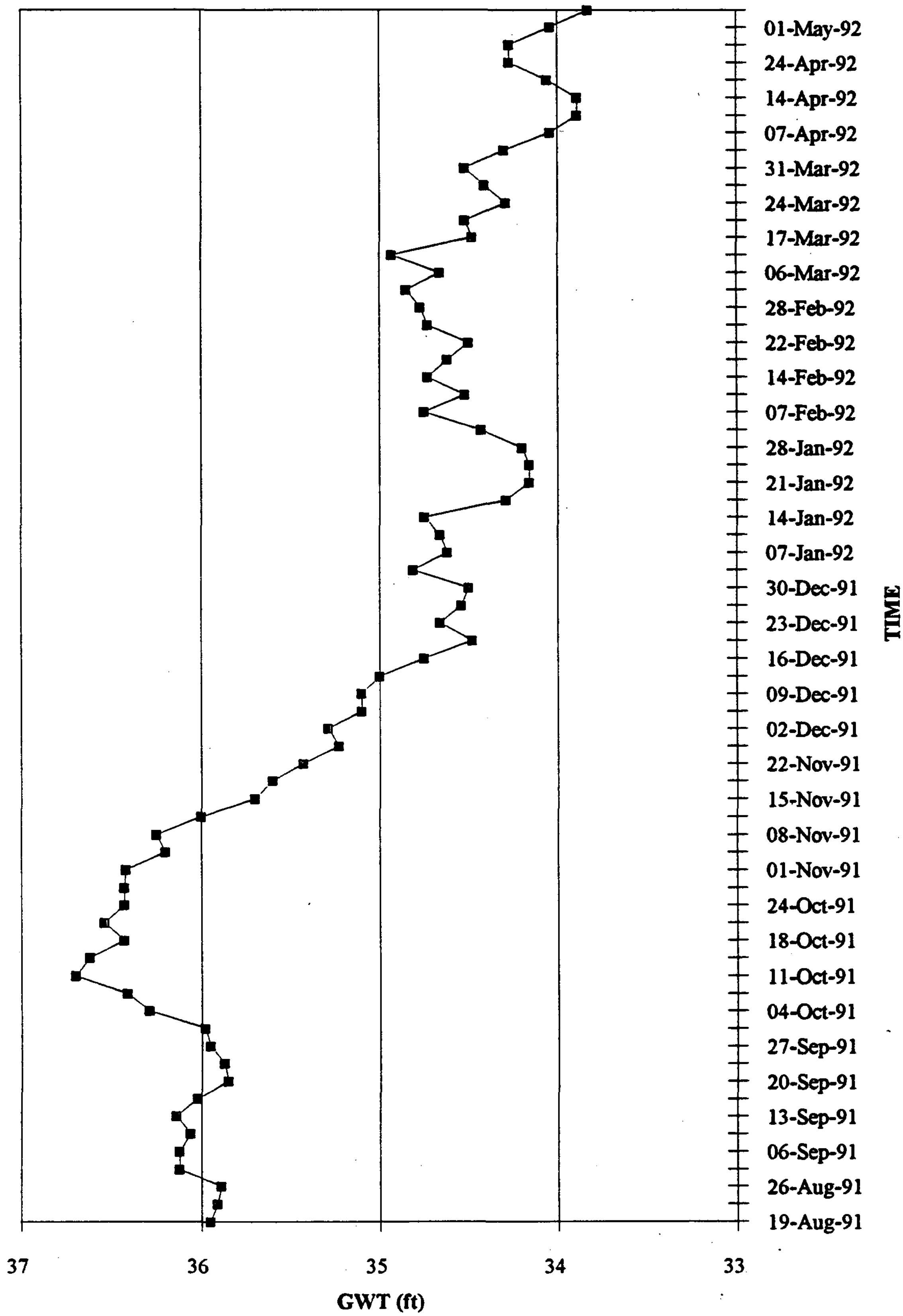


Figure K.16.3 (a) Cocoa K (Floridian aquifer) - Yearly

Well #16. Cocoa K (Floridian aquifer) with respect to Surficial well-Yearly

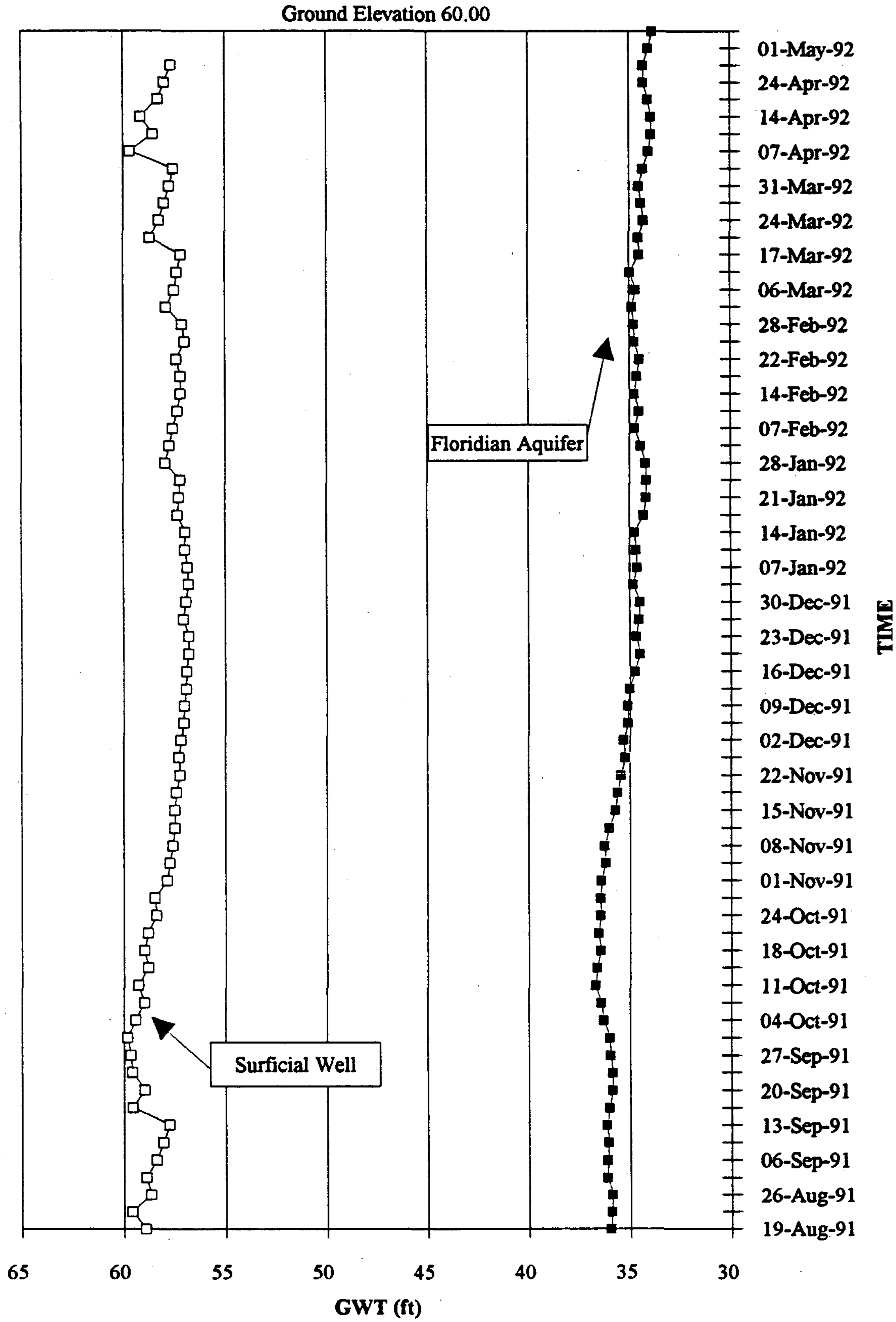
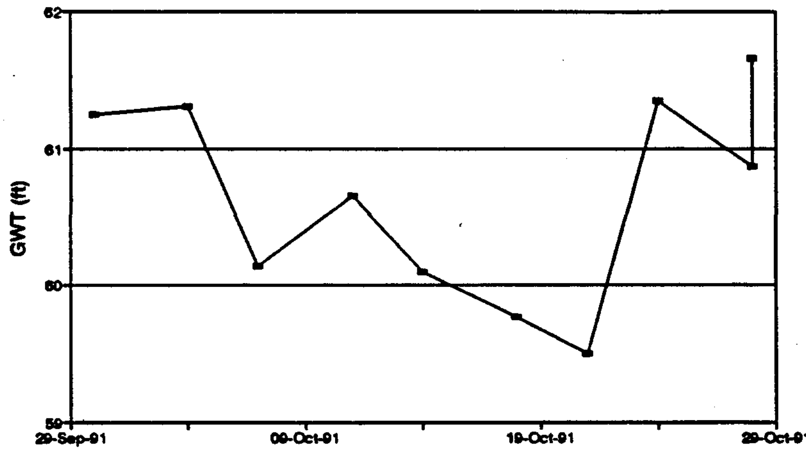


Figure K.16.3 (b) Cocoa K (Floridian aquifer) with respect to Surficial well-Yearly

Well # 17. Bithlo 3-Wet Season

Ground Elevation 63.14



Top of well elevation (ft)	65.35
Height of iron well above ground (ft)	2.21

DATE	TIME	DEPTH ft	DWT ft	GWT ft
26-Aug-91	14:22	4.10	1.89	61.25
30-Aug-91	14:36	4.04	1.83	61.31
06-Sep-91	16:15	5.21	3.00	60.14
09-Sep-91	14:04	4.69	2.48	60.66
13-Sep-91	14:13	5.25	3.04	60.10
16-Sep-91	16:27	5.58	3.37	59.77
20-Sep-91	13:58	5.85	3.64	59.50
23-Sep-91	16:25	4.00	1.79	61.35
27-Sep-91	14:23	4.48	2.27	60.87

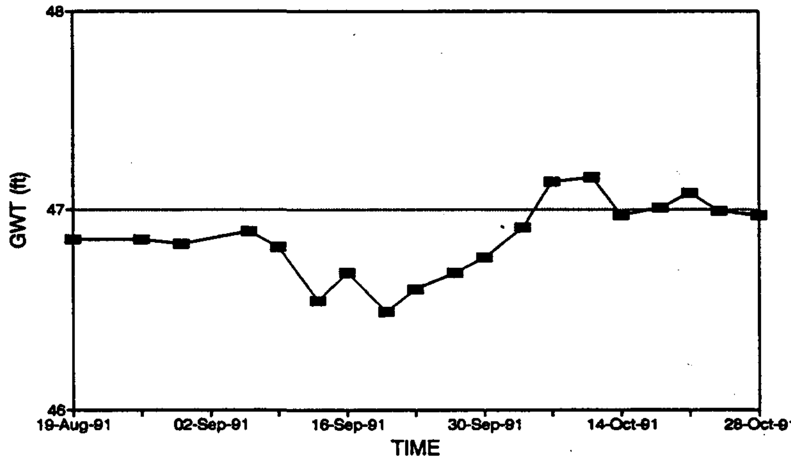
DATE	TIME	DEPTH ft	DWT ft	GWT ft
30-Sep-91	18:06	3.69	1.48	61.66
04-Oct-91	17:13	3.73	1.52	61.62
07-Oct-91	17:26	3.54	1.33	61.81
11-Oct-91	17:31	4.04	1.83	61.31
14-Oct-91	16:04	4.40	2.19	60.95
18-Oct-91	14:06	3.81	1.60	61.54
21-Oct-91	16:35	4.21	2.00	61.14
24-Oct-91	14:17	4.25	2.04	61.10
28-Oct-91	14:56	4.50	2.29	60.85

WET SEASON STATISTICS	GWT (Feet)
# Data Points = 18	
Standard Deviation	0.65
Variance	0.45
Average	60.94
Maximum	61.81
Minimum	59.50
Fluctuation	2.31

Figure K.17.1 Bithlo 3 (Surficial)-Wet Season

Well #17. (a) Bithlo 3 (Intermediate)

Ground Elevation 63.14



Top of well elevation (ft)	65.64
Height of iron well above ground (ft)	2.50

DATE	TIME	DEPTH ft	DWT ft	GWT ft
19-Aug-91	10:10	18.79	16.29	46.85
26-Aug-91	14:22	18.79	16.29	46.85
30-Aug-91	14:38	18.81	16.31	46.83
06-Sep-91	16:15	18.75	16.25	46.89
09-Sep-91	14:04	18.83	16.33	46.81
13-Sep-91	14:13	19.10	16.60	46.54
16-Sep-91	16:27	18.96	16.46	46.68
20-Sep-91	13:58	19.15	16.65	46.49
23-Sep-91	16:25	19.04	16.54	46.60
27-Sep-91	14:23	18.96	16.46	46.68

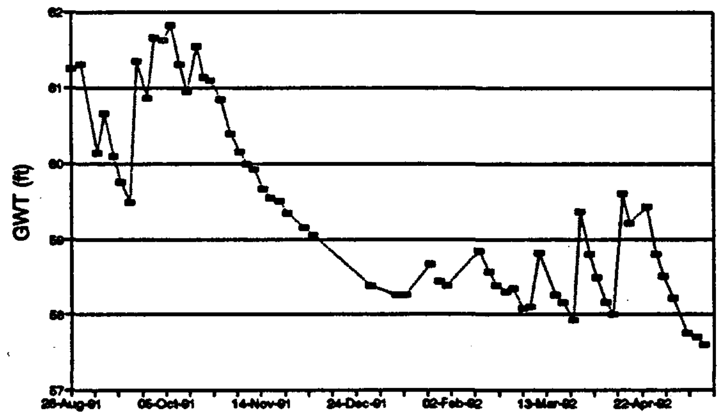
DATE	TIME	DEPTH ft	DWT ft	GWT ft
30-Sep-91	18:08	18.88	16.38	46.76
04-Oct-91	17:13	18.73	16.23	46.91
07-Oct-91	17:26	18.50	16.00	47.14
11-Oct-91	17:31	18.48	15.98	47.16
14-Oct-91	16:04	18.67	16.17	46.97
18-Oct-91	14:06	18.63	16.13	47.01
21-Oct-91	16:35	18.56	16.06	47.08
24-Oct-91	14:17	18.65	16.15	46.99
28-Oct-91	14:56	18.67	16.17	46.97

WET SEASON STATISTICS	GWT (feet)
# Data Points = 19	
Standard Deviation	0.19
Variance	0.04
Average	46.85
Maximum	47.16
Minimum	46.49
Fluctuation	0.67

Figure K.17.1 (a) Bithlo 3 (Intermediate)-Wet Season

Well # 17. Bithlo 3-Dry Season

Ground Elevation 63.14



Top of well elevation (ft)	65.35
Height of iron well above ground (ft)	2.21

DATE	TIME	DEPTH ft	DWT ft	GWT ft
01-Nov-91	16:15	4.96	2.75	60.39
05-Nov-91	10:59	5.19	2.98	60.16
08-Nov-91	17:15	5.35	3.14	60.00
11-Nov-91	17:00	5.42	3.21	59.93
15-Nov-91	13:50	5.67	3.46	59.68
18-Nov-91	16:55	5.79	3.58	59.56
22-Nov-91	16:17	5.83	3.62	59.52
25-Nov-91	15:58	6.00	3.79	59.35
02-Dec-91	16:45	6.19	3.98	59.16
06-Dec-91	13:50	6.29	4.08	59.06
09-Dec-91	16:00	6.40	4.19	58.95
13-Dec-91	15:46	6.56	4.35	58.79
16-Dec-91	16:55	6.63	4.42	58.72
20-Dec-91	15:05	6.77	4.56	58.58
23-Dec-91	10:55	6.81	4.60	58.54
27-Dec-91	10:55	6.90	4.69	58.45
30-Dec-91	15:22	6.96	4.75	58.39
03-Jan-92	16:25	6.79	4.58	58.56
07-Jan-92	13:32	7.00	4.79	58.35
10-Jan-92	14:50	7.08	4.87	58.27
14-Jan-92	14:18	7.08	4.87	58.27
17-Jan-92	15:23	7.21	5.00	58.14
21-Jan-92	15:00	7.27	5.06	58.08
24-Jan-92	15:27	6.67	4.46	58.68
28-Jan-92	13:52	6.90	4.69	58.45
31-Jan-92	14:40	6.96	4.75	58.39
07-Feb-92	15:24	5.94	3.73	59.41

DATE	TIME	DEPTH ft	DWT ft	GWT ft
11-Feb-92	12:10	6.33	4.12	59.02
14-Feb-92	13:59	6.50	4.29	58.85
18-Feb-92	12:32	6.77	4.56	58.58
21-Feb-92	15:00	6.96	4.75	58.39
25-Feb-92	11:47	7.04	4.83	58.31
28-Feb-92	14:21	7.00	4.79	58.35
03-Mar-92	10:56	7.27	5.06	58.08
06-Mar-92	14:11	7.25	5.04	58.10
10-Mar-92	14:20	6.52	4.31	58.83
17-Mar-92	12:21	7.08	4.87	58.27
20-Mar-92	12:50	7.19	4.98	58.16
24-Mar-92	15:00	7.42	5.21	57.93
27-Mar-92	14:24	5.98	3.77	59.37
31-Mar-92	12:25	6.54	4.33	58.81
03-Apr-92	13:47	6.85	4.64	58.50
07-Apr-92	10:26	7.19	4.98	58.16
10-Apr-92	14:20	7.35	5.14	58.00
14-Apr-92	11:55	5.73	3.52	59.62
17-Apr-92	14:04	6.13	3.92	59.22
24-Apr-92	15:30	5.92	3.71	59.43
28-Apr-92	16:40	6.54	4.33	58.81
01-May-92	13:03	6.83	4.62	58.52
05-May-92	14:00	7.13	4.92	58.22
11-May-92	13:50	7.60	5.39	57.75
15-May-92	12:45	7.65	5.44	57.70
18-May-92	11:38	7.75	5.54	57.60

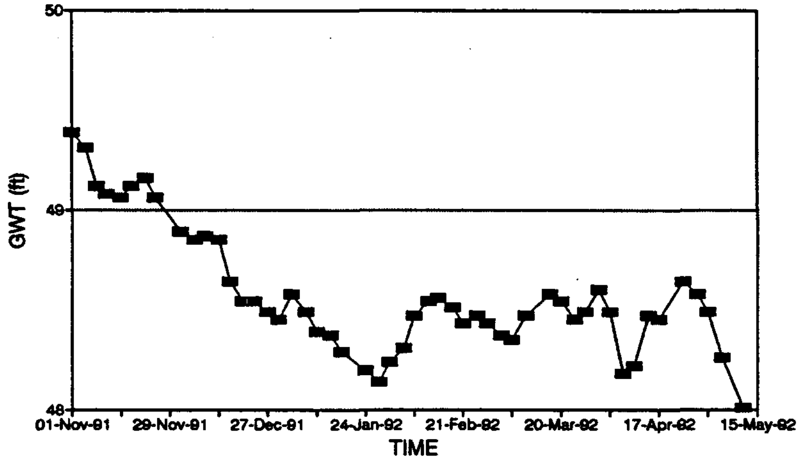
• Data obtained from United States Geological Survey at this site

DRY SEASON STATISTICS	GWT (Feet)
# Data Points = 53	
Standard Deviation	0.65
Variance	0.42
Average	58.72
Maximum	60.39
Minimum	57.60
Fluctuation	2.79

Figure K.17.2 Bithlo 3 (Surficial)-Dry Season

Well # 17. (a) Bithlo 3 (Intermediate)

Ground Elevation 63.14



Top of well elevation (ft)	65.64
Height of iron well above ground (ft)	2.50

DATE	TIME	DEPTH ft	DWT ft	GWT ft
01-Nov-91	16:15	18.75	16.25	49.39
05-Nov-91	10:59	18.83	16.33	49.31
08-Nov-91	17:15	19.02	16.52	49.12
11-Nov-91	17:00	19.06	16.56	49.08
15-Nov-91	13:50	19.08	16.58	49.06
18-Nov-91	16:55	19.02	16.52	49.12
22-Nov-91	16:17	18.98	16.48	49.16
25-Nov-91	15:58	19.08	16.58	49.06
02-Dec-91	16:45	19.25	16.75*	48.89
06-Dec-91	13:50	19.29	16.79	48.85
09-Dec-91	16:00	19.27	16.77	48.87
13-Dec-91	15:46	19.29	16.79	48.85
16-Dec-91	16:55	19.50	17.00	48.64
20-Dec-91	15:05	19.60	17.10	48.54
23-Dec-91	10:55	19.60	17.10	48.54
27-Dec-91	10:55	19.65	17.15	48.49
30-Dec-91	15:22	19.69	17.19	48.45
03-Jan-92	16:25	19.56	17.06	48.58
07-Jan-92	13:32	19.65	17.15	48.49
10-Jan-92	14:50	19.75	17.25	48.39
14-Jan-92	14:18	19.77	17.27	48.37
17-Jan-92	15:23	19.85	17.35	48.29
24-Jan-92	15:00	19.94	17.44	48.20
28-Jan-92	15:37	20.00	17.50	48.14
31-Jan-92	13:52	19.90	17.40	48.24
04-Feb-92	14:40	19.83	17.33	48.31

DATE	TIME	DEPTH ft	DWT ft	GWT ft
07-Feb-92	15:24	19.67	17.17	48.47
11-Feb-92	12:10	19.60	17.10	48.54
14-Feb-92	13:59	19.58	17.08	48.56
18-Feb-92	12:32	19.63	17.13	48.51
21-Feb-92	15:00	19.71	17.21	48.43
25-Feb-92	11:47	19.67	17.17	48.47
28-Feb-92	14:21	19.71	17.21	48.43
03-Mar-92	10:56	19.77	17.27	48.37
06-Mar-92	14:11	19.79	17.29	48.35
10-Mar-92	14:20	19.67	17.17	48.47
17-Mar-92	12:21	19.56	17.06	48.58
20-Mar-92	12:50	19.60	17.10	48.54
24-Mar-92	15:00	19.69	17.19	48.45
27-Mar-92	14:24	19.65	17.15	48.49
31-Mar-92	13:33	19.54	17.04	48.60
03-Apr-92	13:20	19.65	17.15	48.49
07-Apr-92	11:30	19.96	17.46	48.18
10-Apr-92	13:40	19.92	17.42	48.22
14-Apr-92	11:05	19.67	17.17	48.47
17-Apr-92	15:04	19.69	17.19	48.45
24-Apr-92	15:30	19.50	17.00	48.64
28-Apr-92	16:40	19.56	17.06	48.58
01-May-92	13:03	19.65	17.15	48.49
05-May-92	14:00	19.88	17.38	48.26
11-May-92	13:50	20.13	17.63	48.01

Dry Season Statistics	GWT (feet)
# Data Points = 51	
Standard Deviation	0.31
Variance	0.1
Average	46.08
Maximum	46.89
Minimum	45.51
Fluctuation	1.38

Figure K.17.2 (a) Bithlo 3 (Intermediate)-Dry Season

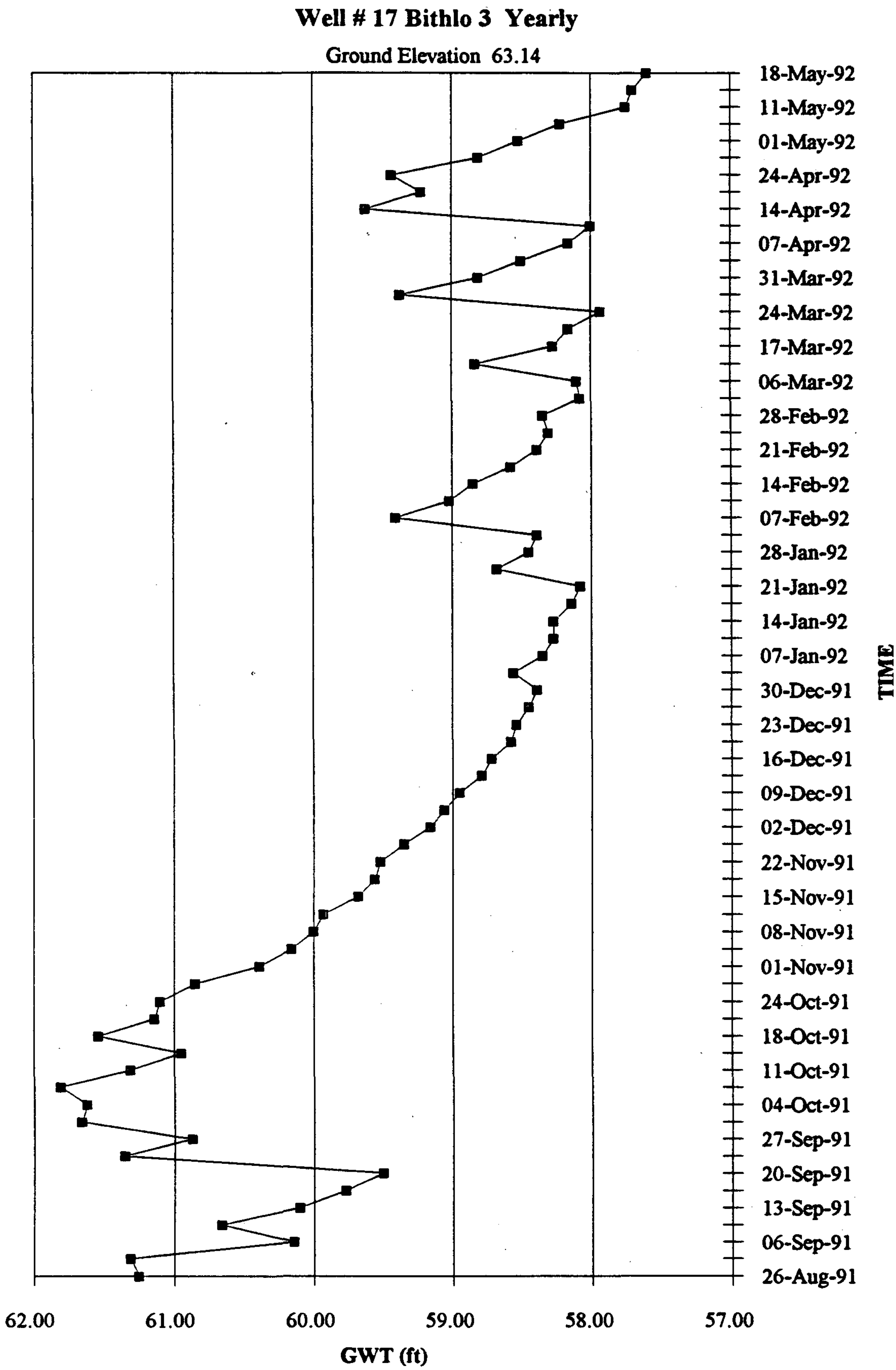


Figure # K.17.3 Bithlo 3 Yearly

Well # 17. Bithlo 3 (Intermediate) - Yearly

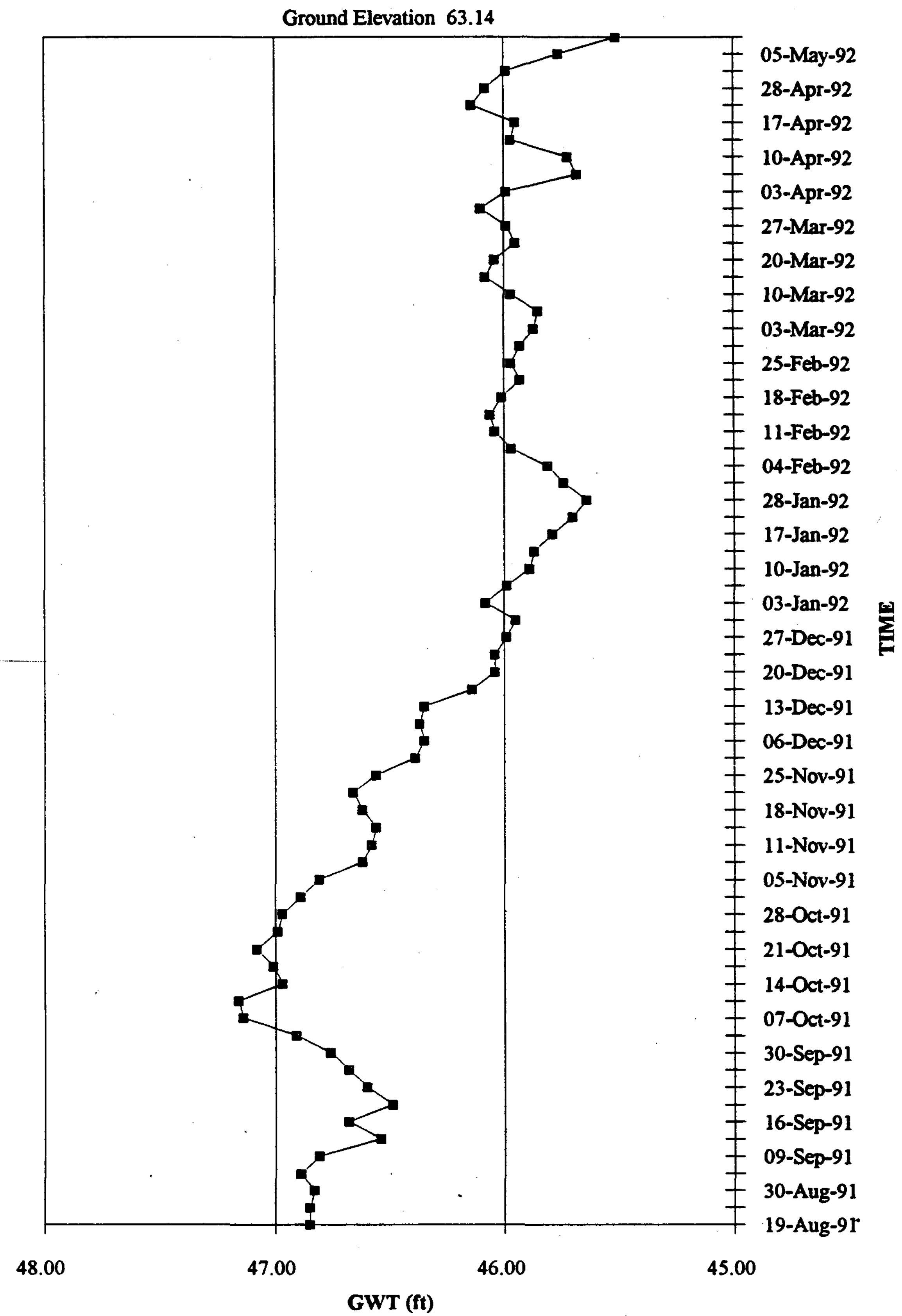


Figure K.17.3 (a) Bithlo 3 (Intermediate) - Yearly

Well #17. Bithlo 3 Intermediate well with respect to Surficial well-Yearly

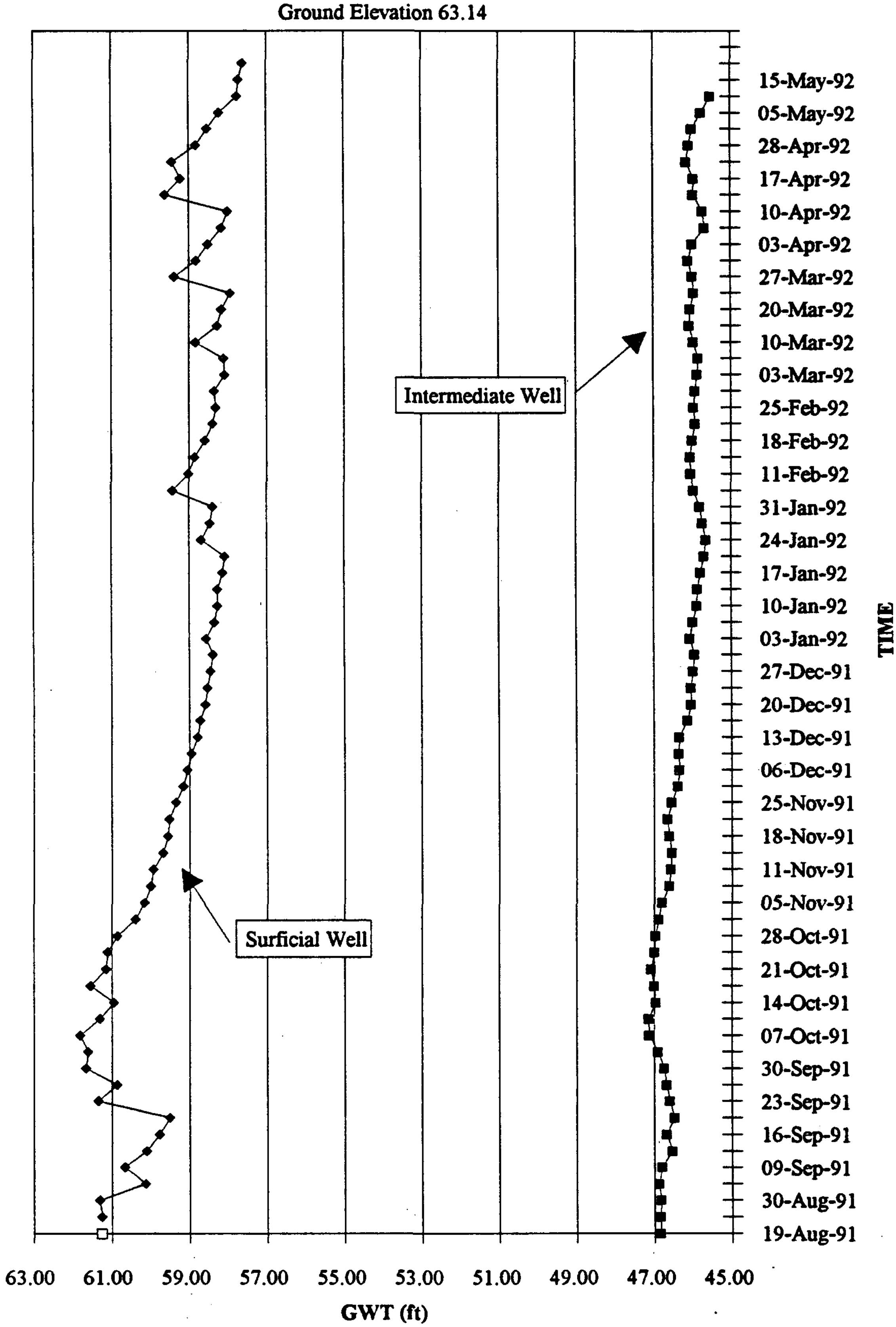


Figure K.17.3 (b) Bithlo 3 Intermediate with respect to Surficial well-Yearly

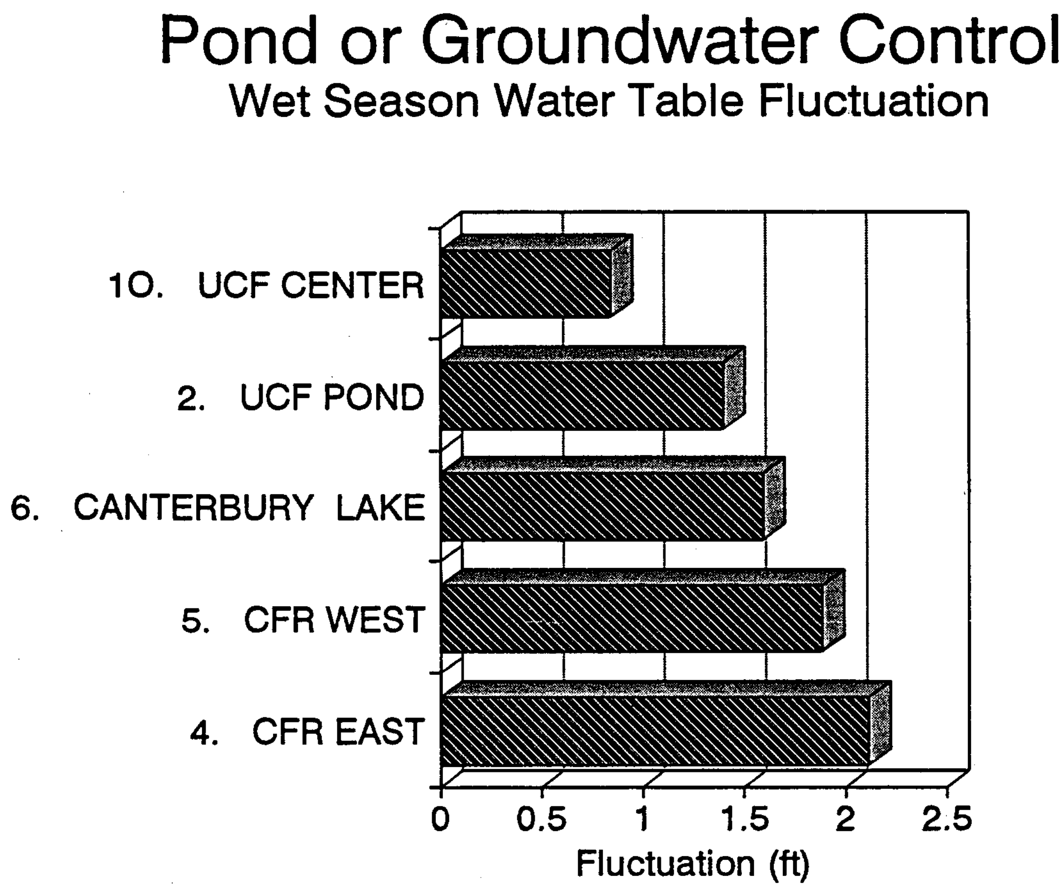


Figure K.18.1 Control-Wet Season

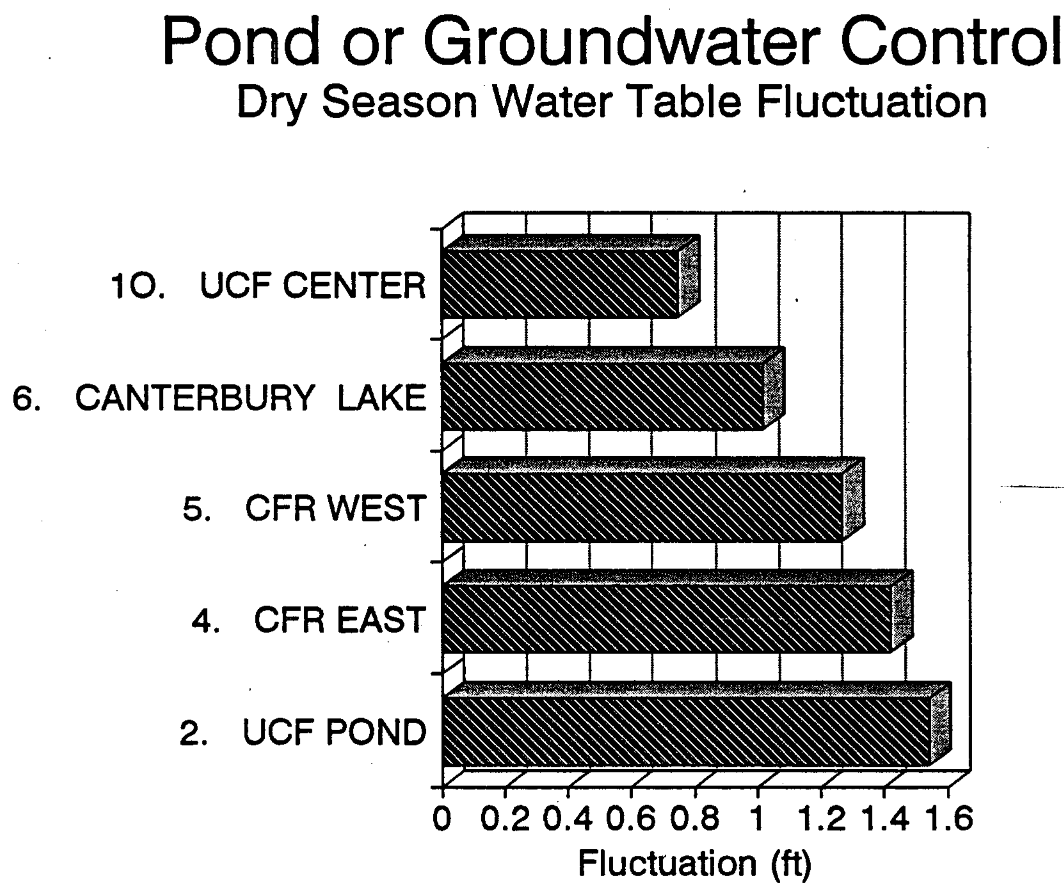


Figure K.18.2 Control-Dry Season

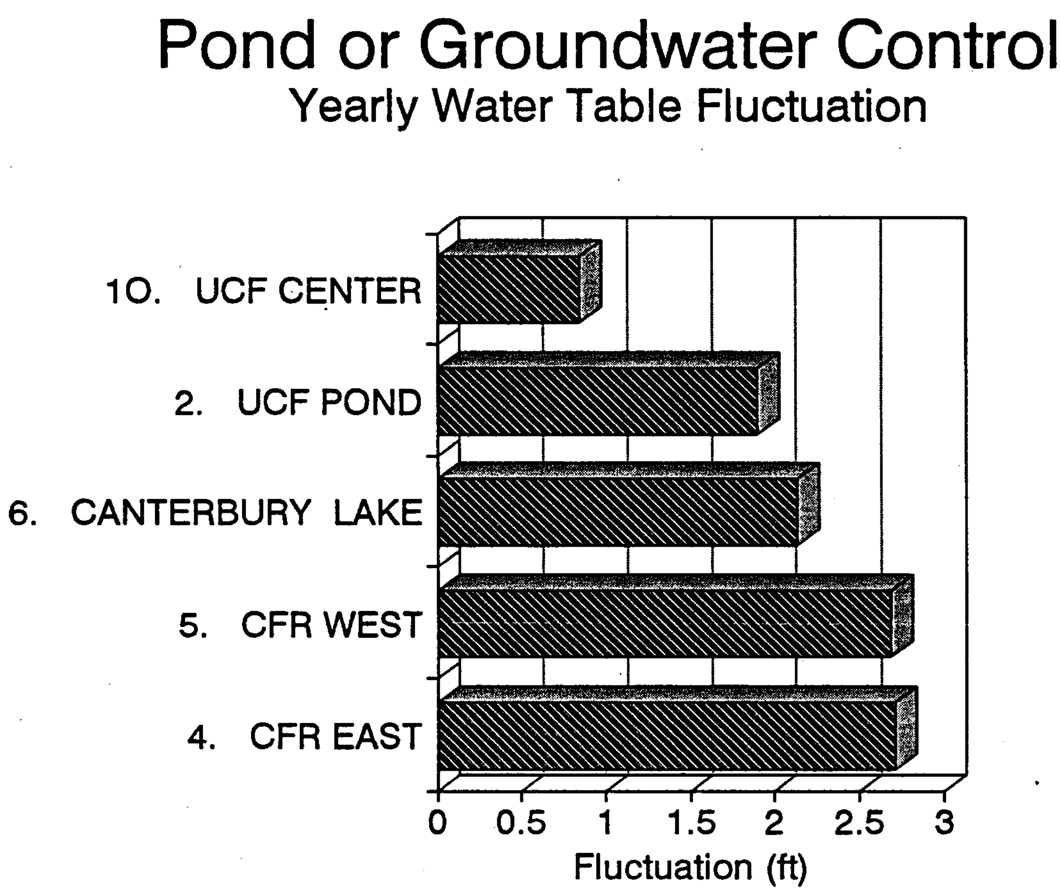


Figure K.18.3 Control-Yearly

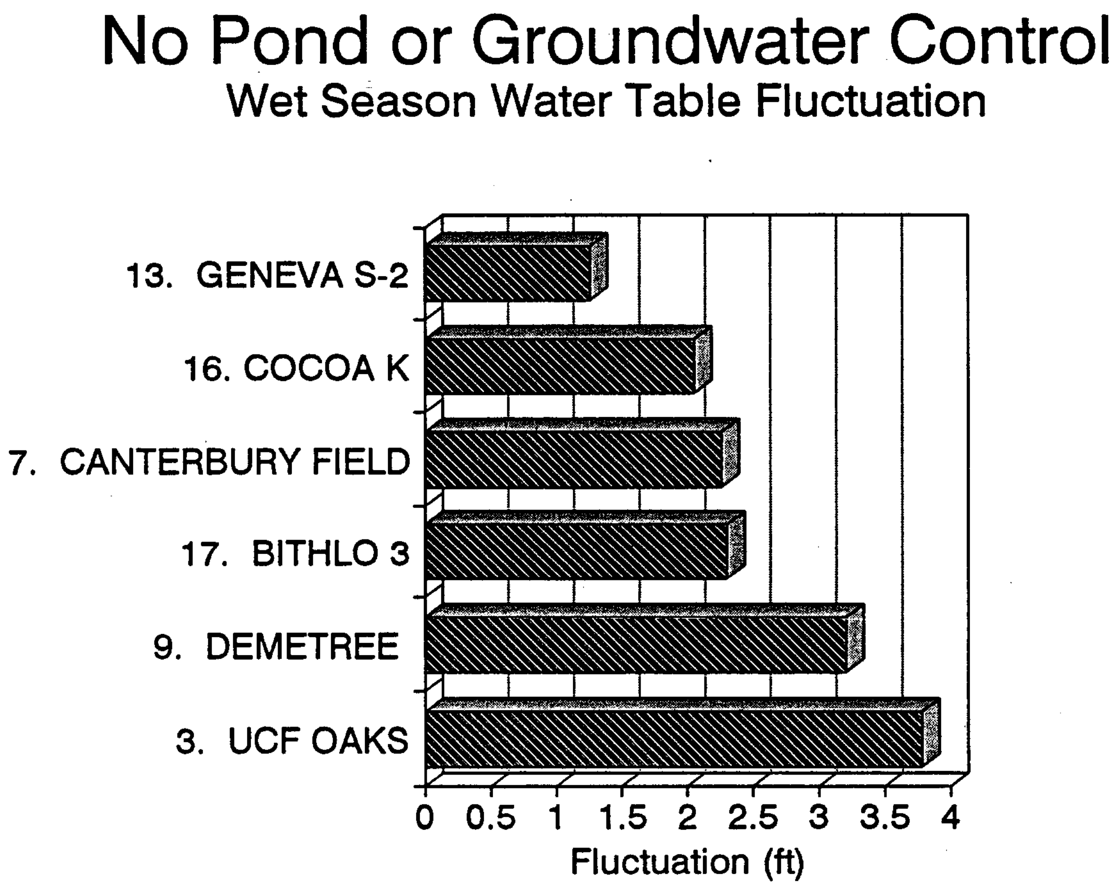


Figure K.18.4 No Control-Wet Season

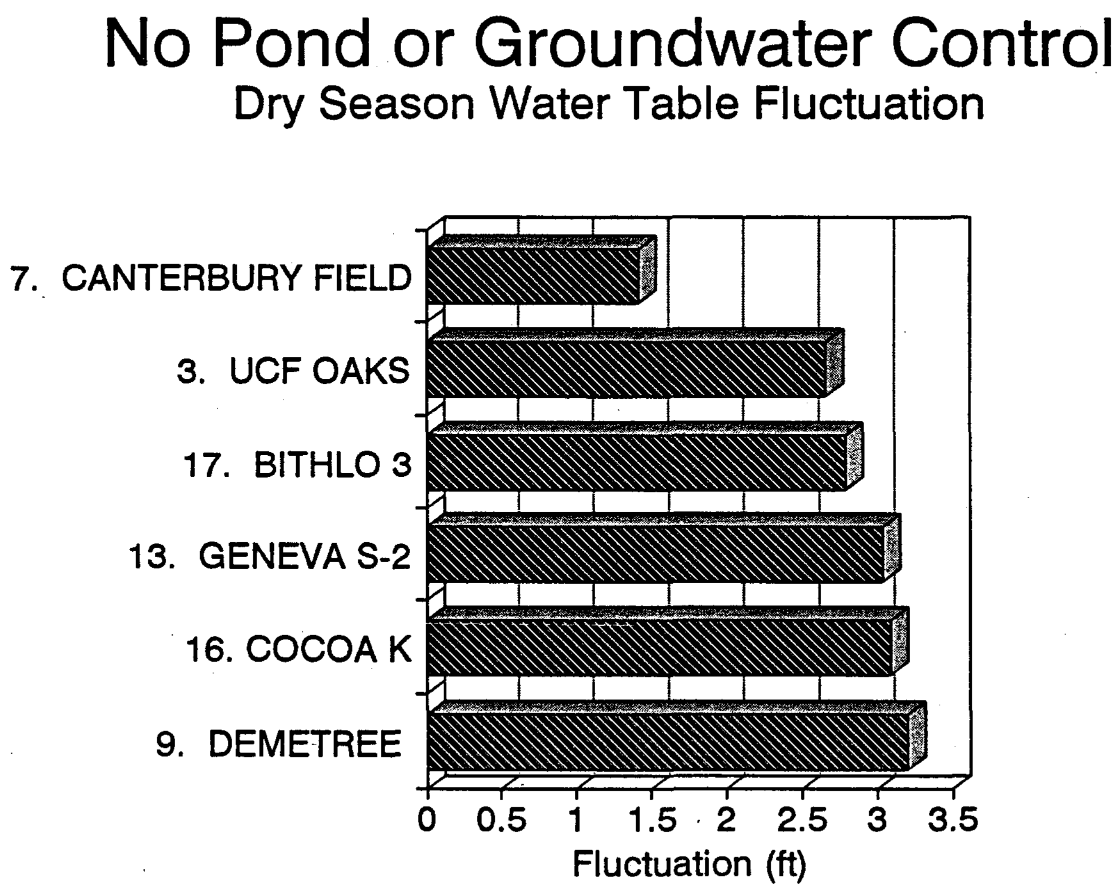


Figure K.18.5 No Control-Dry Season

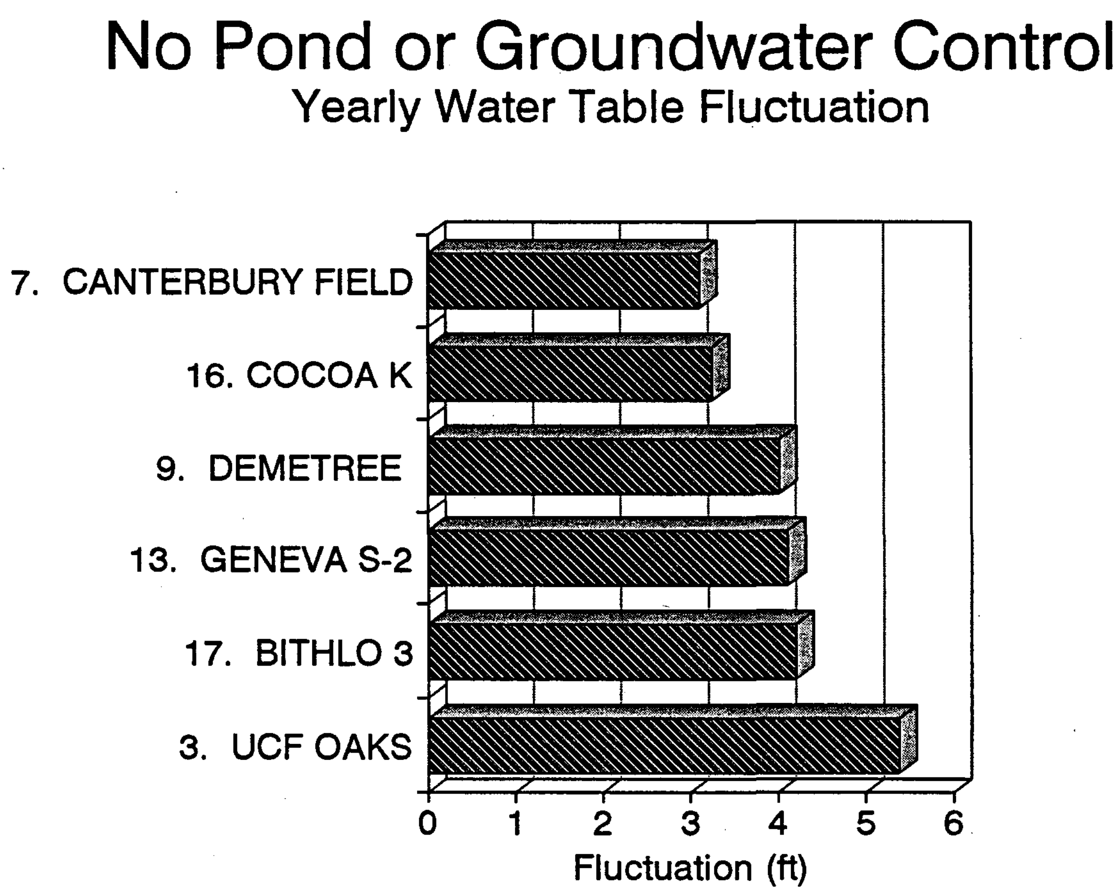


Figure K.18.6 No Control-Yearly