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THE MEMPHIS DEPOT
TENNESSEE

ADMINISTRATIVE RECORD
COVER SHEET

AR File Number 533

TECHNICAL MEMORANDUM

CH2MHILL

Groundwater Monitoring Program Sampling Strategy

PREPARED FOR: Dorothy Richards, COE/Huntsville

PREPARED BY: Dan Marion, CH2M HILL/ATL

COPIES Greg Underberg, CH2M HILL/ATL
Tara Proper, CH2M HILL/ATL
Shawn Phillips, DDMT/Memphis

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A long-term groundwater monitoring program has been implemented at the Defense Distribution Depot Memphis (DDMT) facility. The groundwater monitoring program was specifically designed to support ongoing Remedial Investigation/Feasibility Study (RI/FS) activities at DDMT. An important aspect of the monitoring program is to collect groundwater quality data that will be representative of the physical conditions that impact the temporal distribution of site-related chemicals With this in mind, recharge-discharge mechanisms have been studied to help provide a better understanding of the historical distribution of chemicals and , if necessary, to adjust the sampling frequency to optimize the program objectives.

Current chemical and hydraulic data indicate that surficial (water table) aquifer underlying the facility has been impacted by site-related chemicals and that this aquifer system is sensitive to rainfall recharge. When precipitation is high, groundwater elevations increase, and when precipitation is low, groundwater elevations decline, thus controlling the amount of groundwater available to mix and interact with site-related chemicals. Changes in the amount or volume of available groundwater can create temporal trends in the concentrations and distributions of chemicals found in the water table aquifer system. By collecting groundwater quality data when precipitation is at its highest and lowest points for the year, the physical significance of these conditions on the water table aquifer system can be best evaluated. As a result, historical precipitation data has been collected and evaluated to fine-tune the sampling frequency for the groundwater monitoring program, which will continue into 1998.

Specifically, the evaluation was performed to determine high and low trends in the annual precipitation over the past 30 years and since the first DDMT groundwater quality data was collected in 1989. Figure 1 summarizes the 30-year average monthly precipitation data for the Memphis, Tennessee area These data indicate that, historically, recorded precipitation levels have been highest during the period from March to April and lowest in October. An evaluation of more recent precipitation trends was performed by plotting data for the last 9 years (1989 through 1997) as shown on Figure 2. In addition, the average annual precipitation trend for this time period was plotted and shown on Figure 3. These more recent data indicate that the highest amount of precipitation fell between March and April and the least fell in August. Also the historical sampling events have been plotted Figure 3 at the corresponding monthly precipitation levels for the year the sampling event was

performed to show the deviations from the average trend. The temporal distribution of the events appear to capture most of the seasonal variability in precipitation observed during the period of 1989 through 1997.

Based on this evaluation, it has been concluded that the February and September 1997 sampling events were performed when precipitation was near its high and low, respectively, for the year. Furthermore, it is recommended that the 1998 sampling events be performed during March to potentially capture a high precipitation (Spring) event to compare to the Law 1989 sampling event; and during August to capture a historically low precipitation event

Memphis, TN
Monthly Precipitation (in)

	1989	1990	1991	1992	1993	1994	1995	1996	1997	89-97 AVG	30-Year AVG
Jan	7.91	3.97	2.90	1 78	3.59	5.53	7 07	5.53	4 00	4.70	3.73
Feb	10 51	8.99	6.46	2.18	2.46	4.67	2.12	2 77	6 91	5 23	4 35
Mar	5 50	5 65	3.68	7.07	3.14	6.65	3.35	5 31	10.89	5.69	5.41
Apr	2.13	6 93	17.13	1.39	6.20	4.04	4.38	3.37	7.46	5.89	5.46
May	2.36	4 55	5.10	3 68	4.56	3 00	5.90	6.28	4.37	4.42	4.98
Jun	7.20	2.68	1.42	7 50	4.20	5.03	6 66	10.17	7 02	5.76	3.57
Jul	7.55	2.21	1 92	5 38	0.86	4.03	8 42	9.89	4 36	4 96	3.79
Aug	1.43	1.18	2 06	2 44	3.69	2.00	3 63	2.07	4 29	2 53	3.43
Sep	6 08	5 21	1 47	3 62	3.73	1.44	0.39	5.99	6 46	3 82	3.53
Oct	2.37	4 37	4.39	4.01	1.91	2 72	1.57	7.12	4.65	3.68	3 01
Nov	3.65	3.44	5.54	4 82	4.07	4.34	7 62	11.51	2 08	5 23	5.10
Dec	2.20	10.61	7.04	3.28	5.59	6.04	5 79	6.18	6.18	5.88	5.74

Note:
NOAA sampling point located at the Memphis National Airport, TN

Figure 1
Memphis, TN
30-Year Average Monthly Precipitation Trends

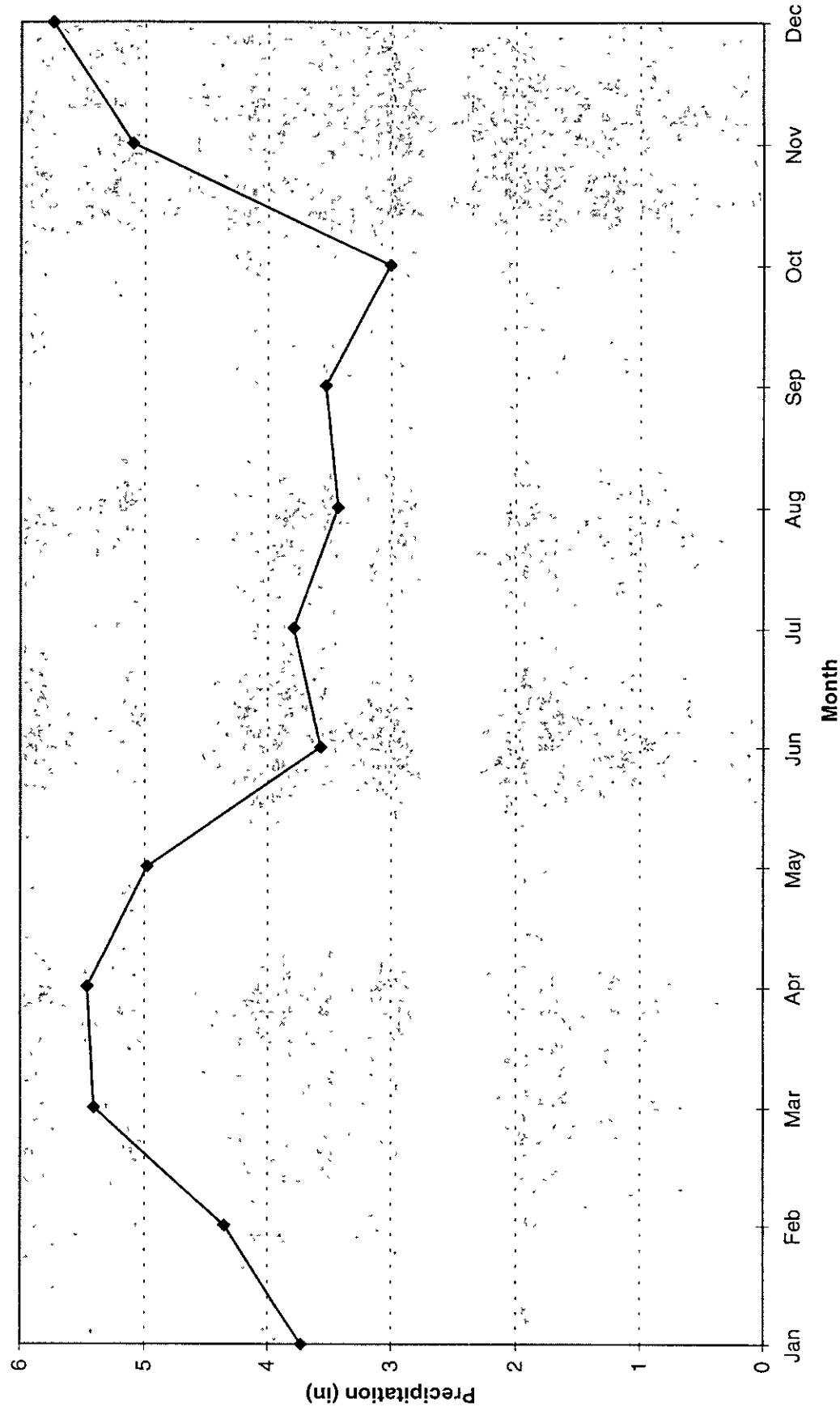

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Figure 3
Memphis, TN
1989 - 1997 Average Monthly Precipitation Trends
And Historical Sampling Events

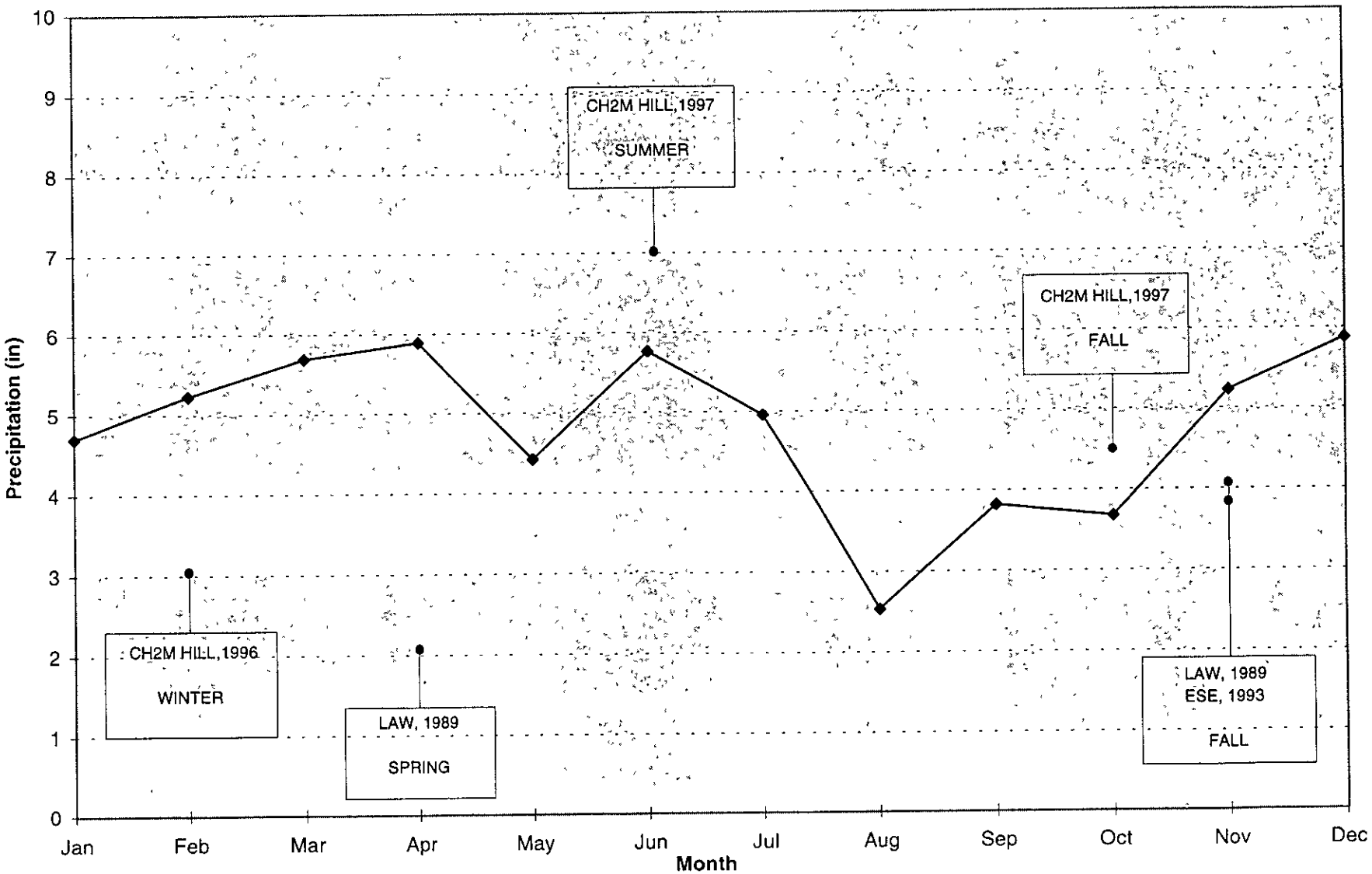

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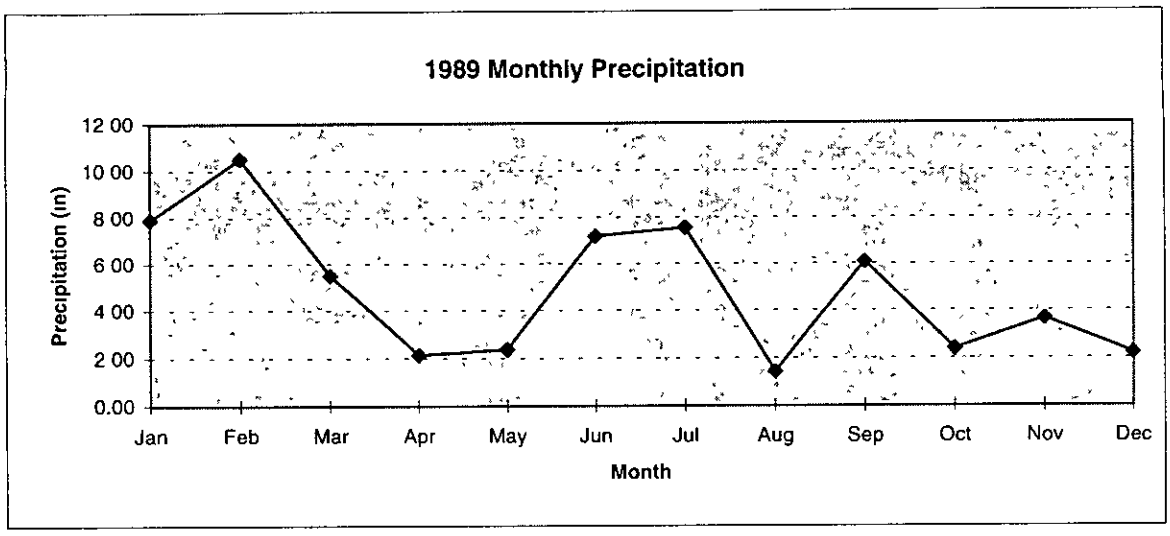
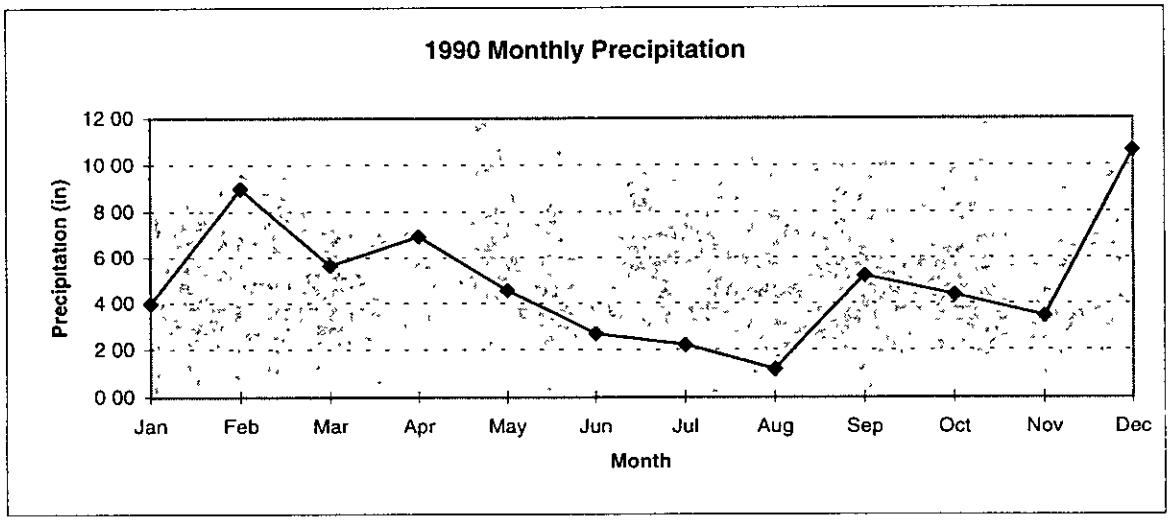
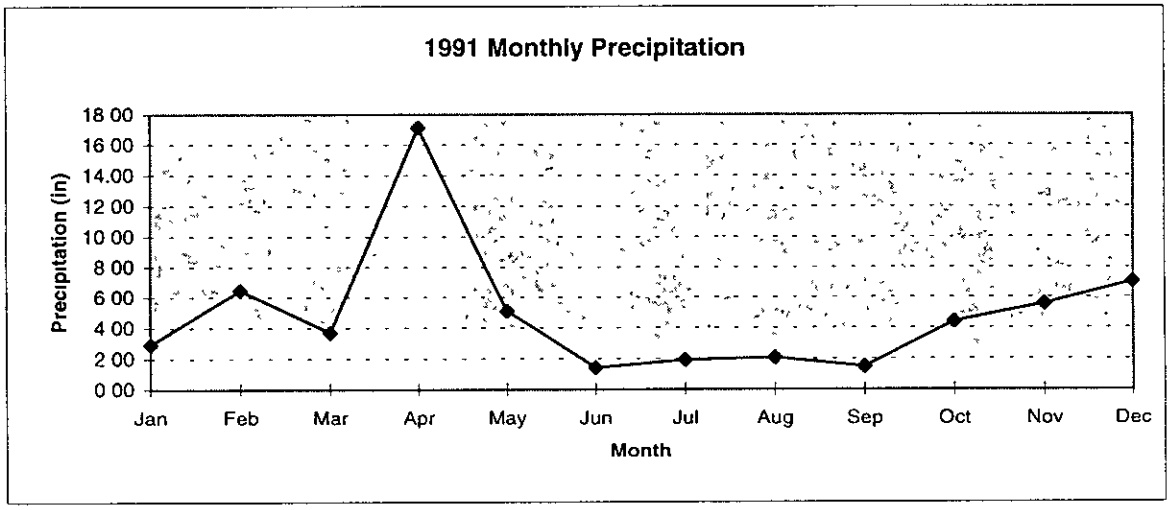
Figure 2
Memphis, TN
1989-1997 Annual Precipitaion Trends







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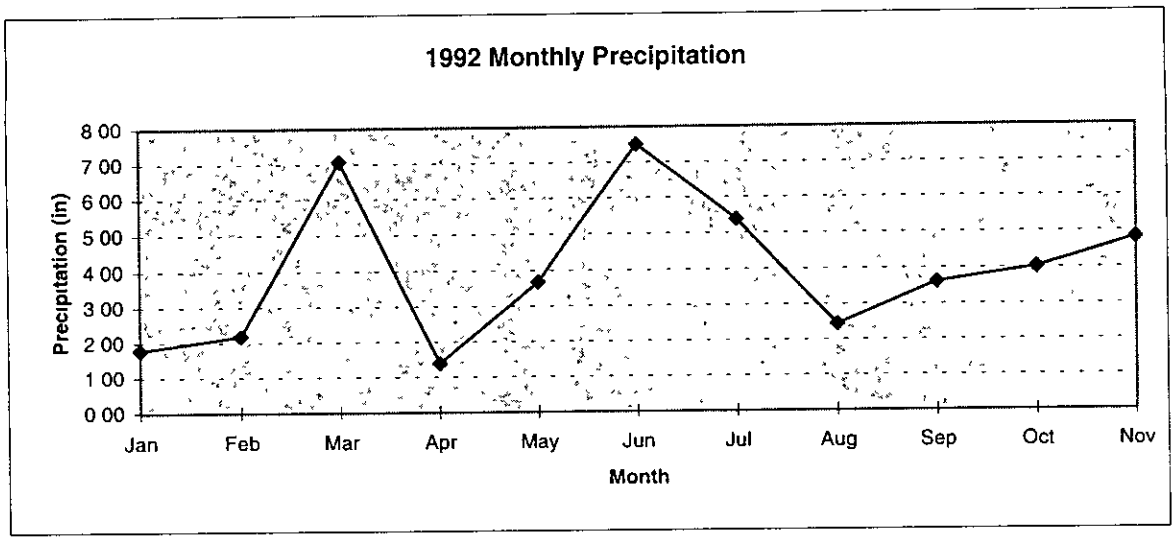

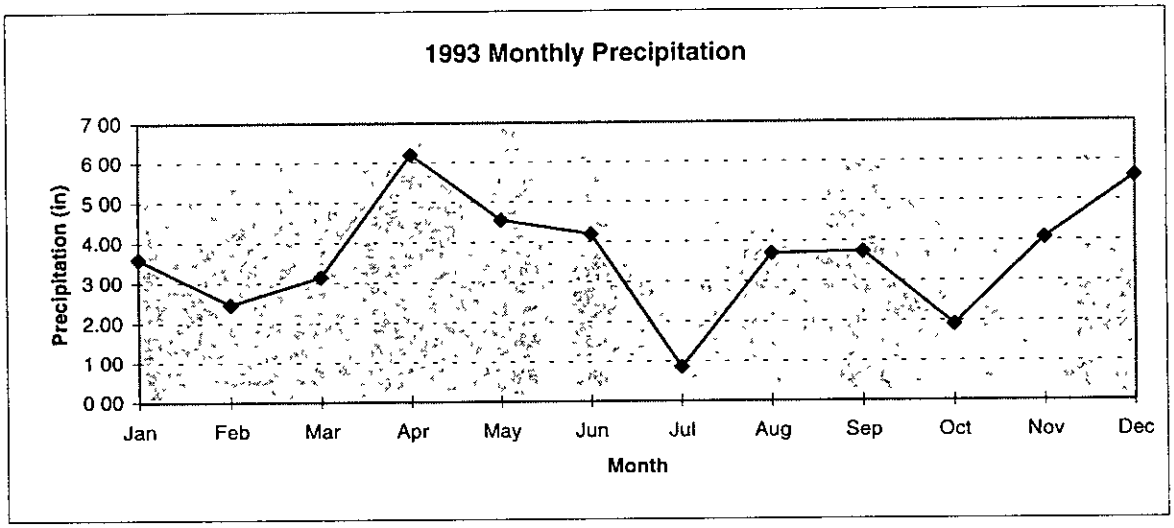

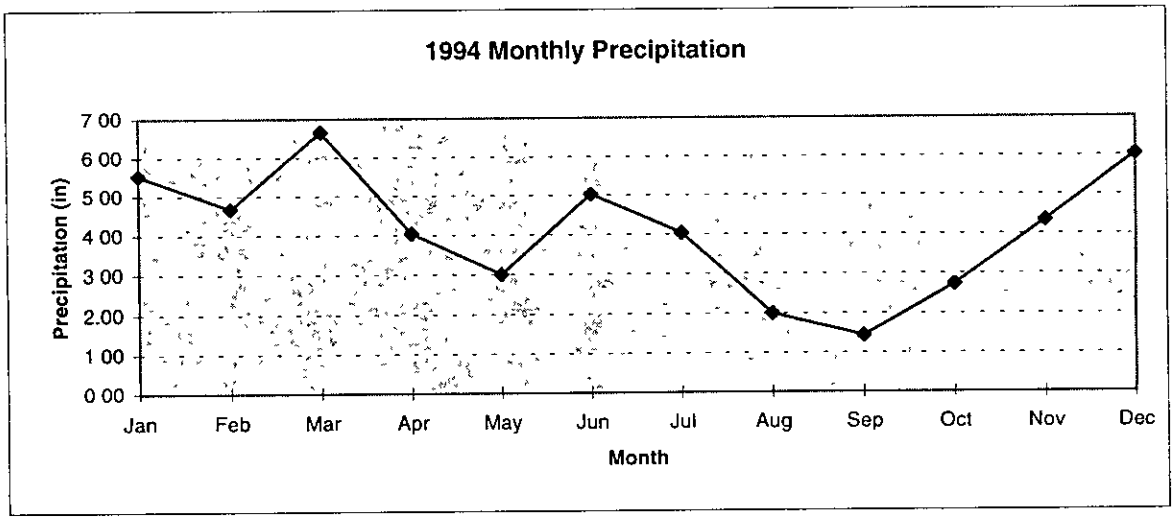

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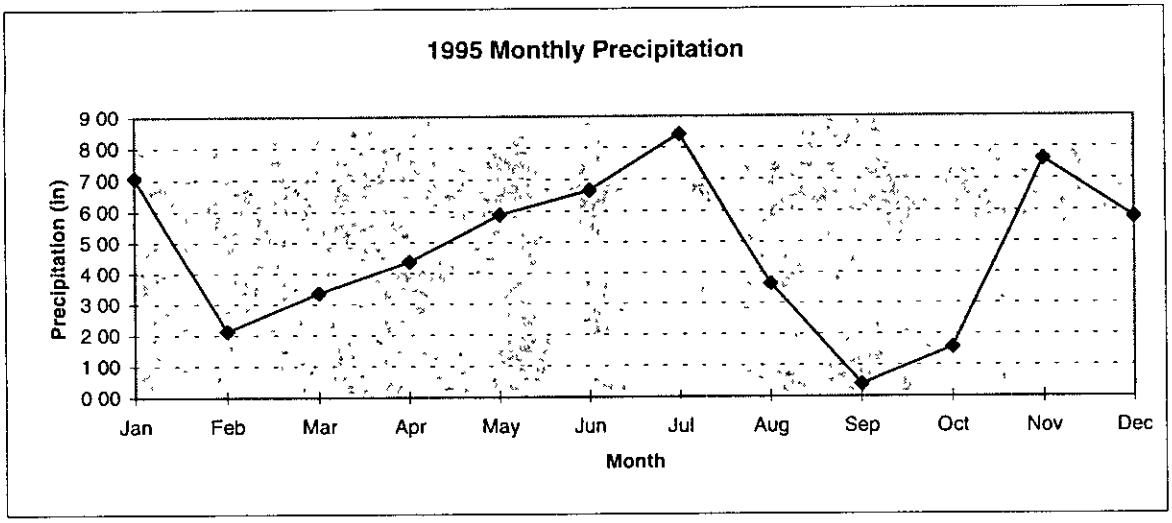
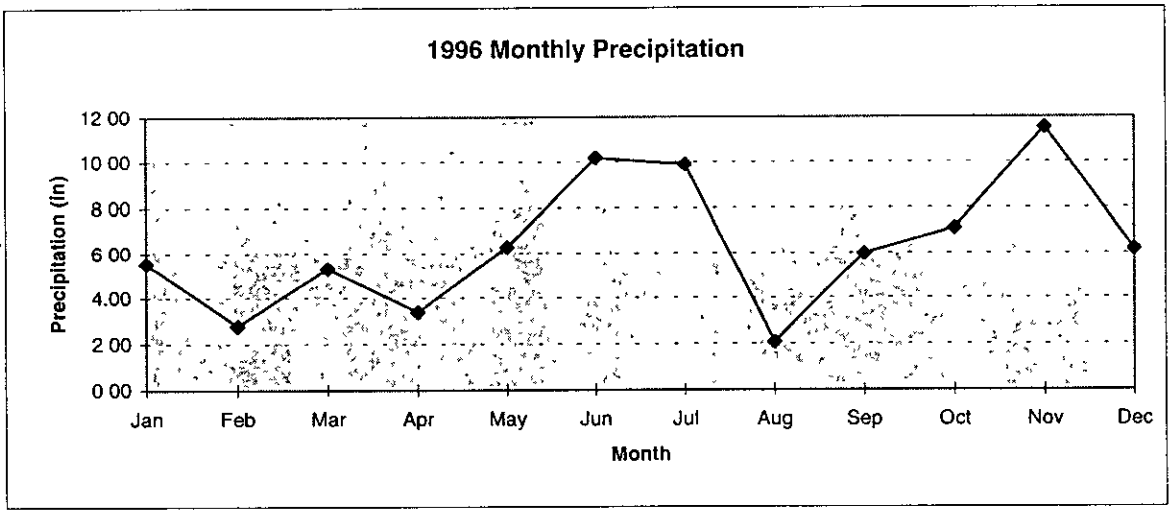
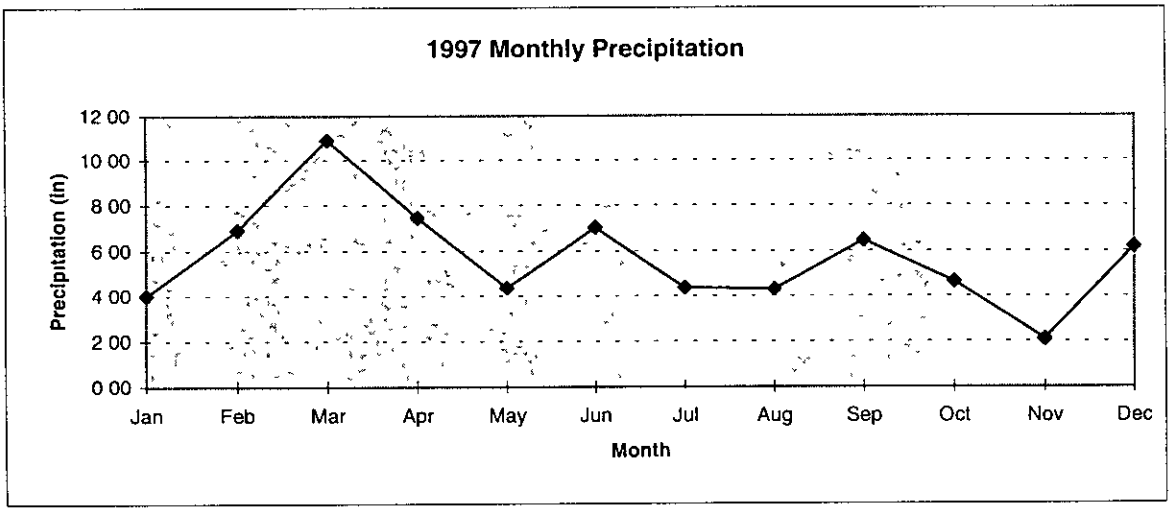
1989-1997 Annual Precipitation Trends







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